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VOLUME XIX

The Book of Knowledge

The Children's Encyclopedia

THAT LEADS TO LOVE OF LEARNING

Editor-in-Chief

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With an Introduction by

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The Children's Encyclopedia

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Los Angeles County Chamber of Commerce

The Roosevelt Highway follows a beautiful stretch of beach near Santa Monica in Los Angeles County, California.

THE WESTERN STATES—PART II

WEST of the Rocky Mountains there is a large plateau and basin country (Columbia Plateau, Great Basin and Colorado Plateau) which receives even less rainfall than the plains just to the east of the Rockies. This arid region lies between the Rockies on the east and the Cascade and Sierra Nevada ranges on the west. The region covers all or parts of the states of Nevada, Utah, Oregon, Washington, Montana, Idaho, Colorado, Wyoming, New Mexico, Arizona and California.

Most of the Great Basin is in Nevada and Utah. It is called a basin because the streams which rise within it or flow into it never reach the sea. For example, the great Humboldt River becomes smaller and smaller after it enters the basin, and is finally lost in the desert sands, except for a few low places in the ground which it fills with water. This is called Carson Sink. The lakes vary in size with the amount of water which the river brings down to them. A few disappear entirely for several weeks at a time. The mud then dries out and large cracks form, often an inch or more in width. Such a lake is called a "playa lake." Most of the permanent lakes or pools are salty, and some of them are so full of salt that it is impossible for a person to sink in the water. Great Salt Lake in Utah, 2,360 square miles in area, is in the basin country. The rivers carry salt into the lakes, and the hot sun and the desert winds evaporate the water. The salty material is left behind, and the water that remains gets saltier and saltier every year.

In this arid region the winds pick up the sand and blow it about, here forming hills and there covering the whole surface. Trails, roads and railroad tracks are often buried beneath the drifting sands. The most arid part of the basin is Death Valley in California. This desolate valley is 270 feet below the level of the sea, the lowest spot in the United States. Dry as the Great Basin country is, crops are raised in some parts of it, some by dry farming and some by irrigation. The Truckee-Carson project is an important irrigated region, and one of the oldest, in the Great Basin. More recent projects, such as Hoover, Shasta, Grand Coulee, Friant and



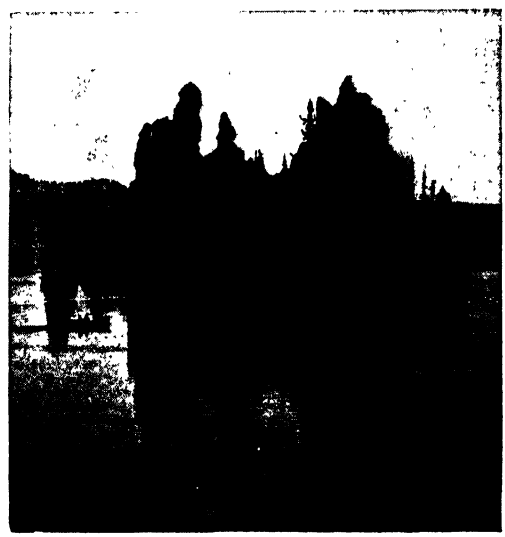
You can go sixty miles an hour down this toboggan slide in Yosemite National Park in California.

Arrowrock dams, have helped to provide still more irrigated land. Much of this arid territory will probably always remain uncultivated because of the difficulty of providing the necessary water.

Why do any people live in the Great Basin at all, you may wonder. Mining is the main answer. Tonopah and Goldfield are towns near places where gold has been found in large quantities. When the news of the discoveries in California reached the East, hundreds of men started across the country and became part of the gold rush of 1849. On the way to California people found gold in Nevada. In the higher places in the basin there is enough grass to permit a good deal of grazing. The grass is too short for large animals like cattle, but sheep with their small mouths can get close to the ground and eat the small blades of grass. Sheep, too, can go without water for a longer time than can cattle. Vast flocks of sheep range over the Utah section of the basin. Some of the wool that goes into our clothing grew on the backs of sheep raised in the semi-arid parts of western United States.

Nevada has fewer people for every square mile than any other large area in the United States. About a hundred of the cities of our country have population greater than that of the whole state of Nevada. The population of this state is, however, maintaining a steady growth. During World War II, Las Vegas, Nevada's largest city, increased greatly in population. This increase was brought about by the development of the magnesite, or magnesium, deposits in the near-by mountains. If the peacetime needs for this metal continue to be great it will be an excellent thing for the growth and development of the state. Nevada also produces lead, zinc, quicksilver (mercury), tungsten and other valuable metals.

The Colorado Plateau, which is south of the Great Basin, is also sparsely settled. The greater part of this plateau is in Arizona, but it extends also into southern Utah, Colorado, Nevada and California. Much of the plateau, like the basin, is arid. It is called a plateau because it is high above sea level and is cut up by deep canyons. The Colorado River rushes along with great speed at the bottom of the Grand Canyon, in Arizona, which is the deepest canyon in all the world. If you have never seen the Grand Canyon you can hardly imagine how big it is and what it looks like. In some places it is a mile deep, and a mile "up and down" seems a much greater distance than a mile on the level ground. At the widest place it is twenty-five miles wide, sloping down to the narrow bed of the river at the bottom, so far below. The river, which looks like a bit of ribbon at the bottom of the canyon, has done this giant work through uncounted years. Rushing along, it gradually wore away bits of the rock and carried them with it down to the sea. Year after year, for thousands and



The Phantom Ship, a rocky island in Crater Lake, Oregon. The lake fills the crater of a dead volcano.

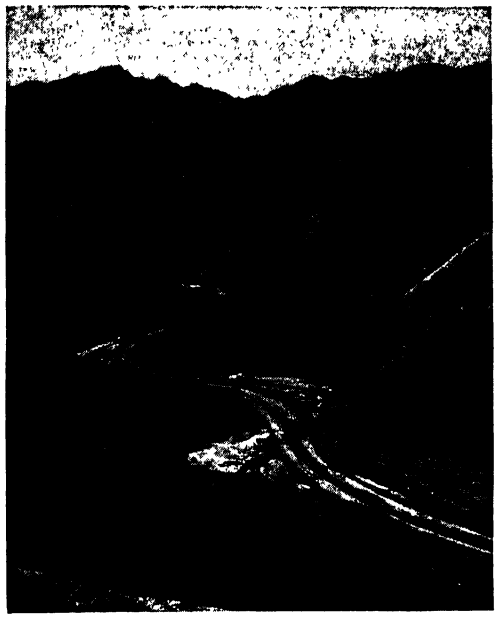


Photo by Frasher's, Pomona, Calif.
A winding road through Death Valley's "bad lands."

hundreds of thousands of years, through layer after layer of rock, it has cut itself down and down to the depth where we now see it. The layers of rock are of many different colors, making the canyon a beautiful picture, changing and changing again as the light shines here and there upon it, or the clouds throw shadows, or snow throws a blanket of white over the level places. For, you see, each side of the canyon looks like a staircase such as a giant might need if he wanted to climb from the river's bed to the top of the plateau. Each "step" is a layer of rock. No railroads cross the canyon, nor is it likely that any ever will.

Arizona, like New Mexico, is a golden land of sunshine and clear, bracing air, and many people go there every year for health and recreation. Besides the production of gold, silver, lead, asbestos and zinc, the state has a rich agriculture. Dates and tropical fruits are grown there, as well as wheat and other grains. It also grows the finest long-staple cotton in the United States. Its cities, such as Phoenix, Tucson and Flagstaff, have a charm that makes people want to return to them again and again.

Now let us imagine that we are suddenly taken from this great work of Nature to the country north of the Great Basin, in eastern Oregon, Washington and northwestern Idaho. We should now be on another plateau which



U. S. Department of the Interior
Sand dunes at Stovepipe Wells in Death Valley.

covers as large an area as the whole state of New York and the New England states together. This vast plateau is called the Columbia River Plateau because the Columbia River cuts across it in a deep canyon.

The rocks of this plateau are lava rocks. Long, long ago they were in a hot, soft condition deep down below the earth's surface and were poured out through cracks in the crust. Then they cooled and hardened. Thus they became solid rock, and after many more years the rock began to crumble on the surface, forming a fertile soil. The Columbia River, rising in Canada, is the second river in the United States in amount of water carried. The Grand Coulee and the Bonneville dams are parts of an immense irrigation and hydroelectric development.

Following the Columbia River, we should be heading west to the Pacific Ocean. The car window would frame an ever changing beautiful picture. Here are great terraces of flat benches high above the river along which the towns are built. There the great river rushes through a narrows and again it flows peacefully along with little motion. About 150 miles from the ocean the train goes through a great gap in the Cascade Mountain Range. Not far distant are Mounts Hood, and Rainier (also called Mount Tacoma), with their snow-covered peaks, but they can not be seen from this point. So gradually that the traveler hardly notices it the land has become more thickly clothed with vegetation, until the trees are now quite large. The reason is, of course, that there is greater rainfall here. If we were descending the river valley on a winter's day we would very likely have noticed the change in weather, for most of the rain in this region comes during the winter months. The winds, blowing from the ocean and laden with water



Northern Pacific Railway

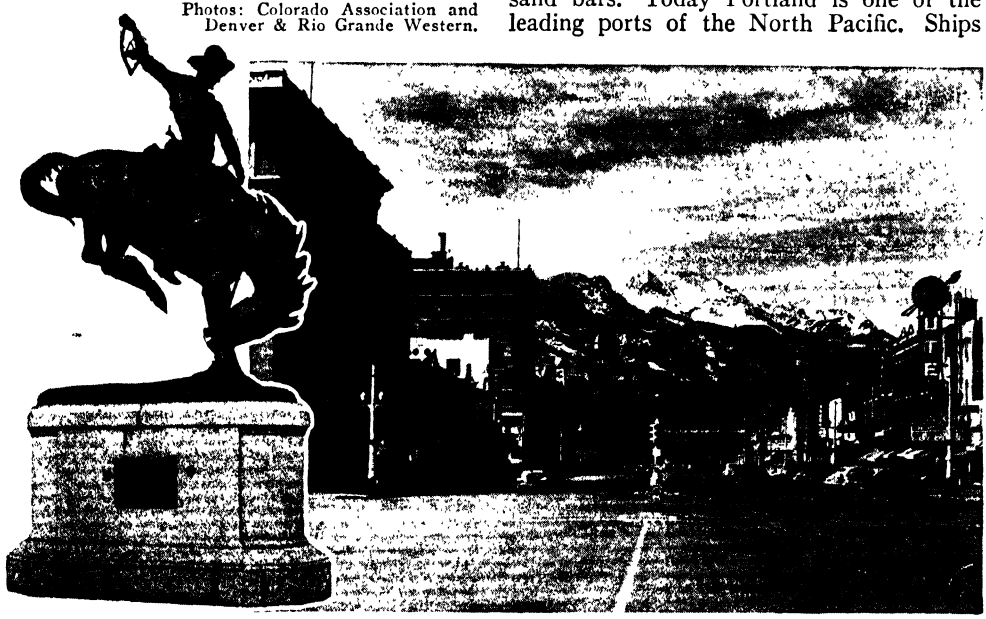
Seattle harbor is spacious and beautiful, but it is so deep in places that the longest anchor chains carried by ships can not reach the bottom. Seattle is a port of world importance.

vapor, when they pass up over the mountains are cooled by expansion, and the water vapor is changed into rain and snow. The winds are stronger in the winter time in Washington and Oregon and California.

Those curious machines built from the river bank out into the water are used for catching salmon as the fish in great numbers swim up the river from the ocean. Small fishing villages are located on the banks, and we see canning factories where the salmon are packed in cans to be shipped all over our country and perhaps to foreign countries.

Finally Portland, Oregon, is reached. This city, though over a hundred miles from the sea, is an ocean port. The Columbia River through the ages had carried down to the sea great loads of mud and sand which were dropped at the point where ocean water halted the river's current. It has cost millions of dollars to cut and maintain a channel deep enough for large ocean vessels through these sand bars. Today Portland is one of the leading ports of the North Pacific. Ships

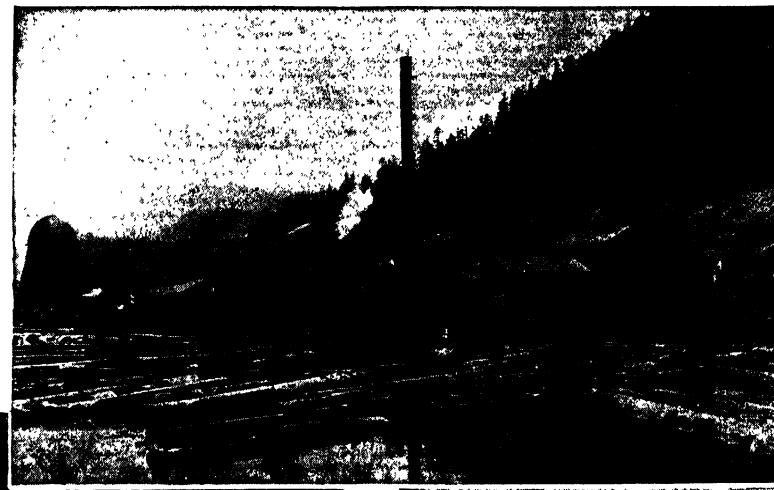
Photos: Colorado Association and Denver & Rio Grande Western.



Pike's Peak, in the background, looms over the city of Colorado Springs; the broad street is Pike's Peak Avenue. The monument at the left, the Broncho Buster, by J. K. Mullen, is in Denver.

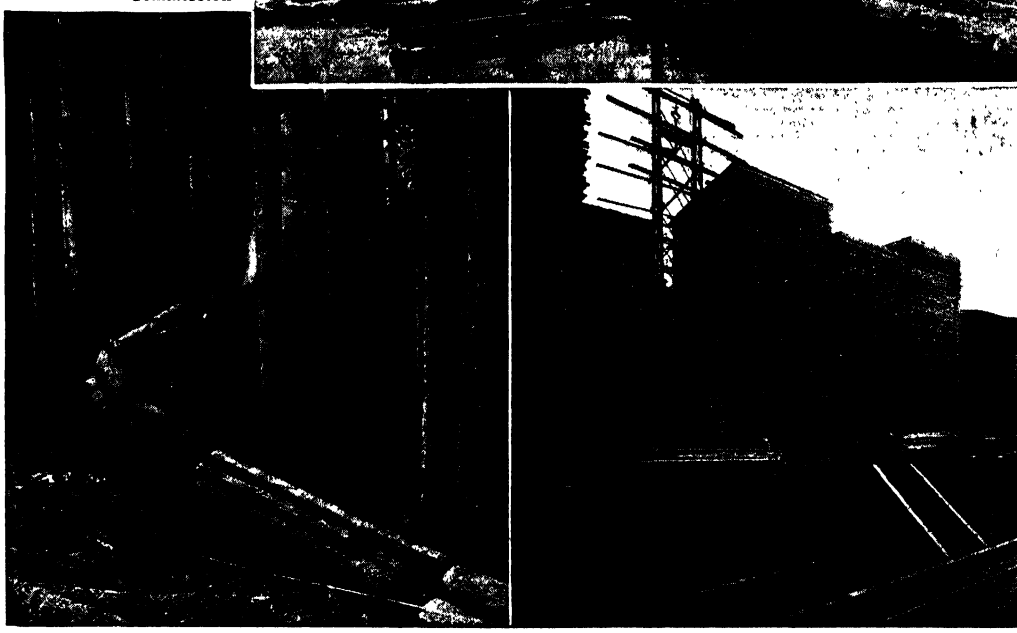
flying flags of many countries are to be seen in its harbor. To Portland are brought the products of what is often called the "Inland Empire," a 250,000-square-mile region in the eastern parts of Oregon and Washington and the northern part of Idaho, along the course of the Columbia River. Some of these products are shipped by rail to the Middle West and the East; others are shipped by water through the Panama Canal to Atlantic ports. There is, of course, a tremendous trade with countries across the Pacific. Before World War II Japan was one of America's biggest customers, and there is no doubt that in the years to come trade with Russia, Japan, China and other Pacific countries will keep on growing. This will make our Pacific coast cities increasingly important in world trade.

A trip 150 miles north along the Cowlitz River and beyond will take us to the Puget Sound country. On this trip we see the landscape of a rainy country. Instead of the bare ground to which we have become accustomed in most of the West, there are large trees (except where they have been cut down) and thick underbrush. Relatively flat land stretches away to the high mountains in the far distance. Here and there are open spaces where we see large fields of blackberries, loganberries, raspberries and many other small fruits. In the towns and villages along the way are the preserve factories where the fruits are canned and shipped away for people to enjoy in far-off towns and cities.

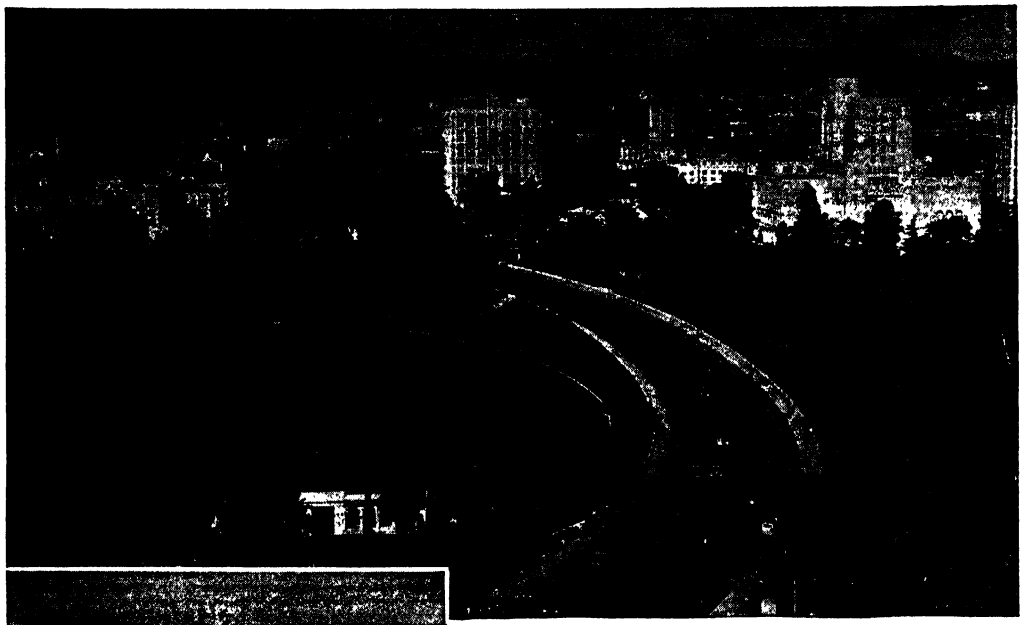


The lumber industry is one of the largest in the Pacific Northwest. Below is a logging railroad in the Oregon forests. To the right we see a sawmill where the logs are cut into boards like those stacked at the lower right.

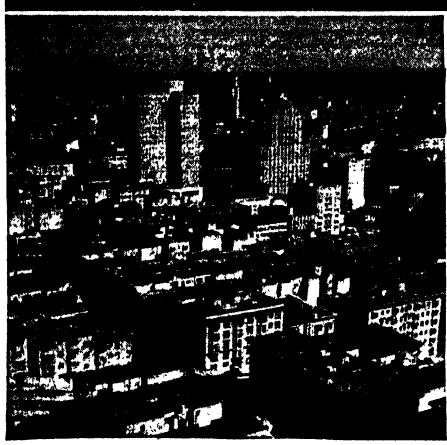
Photos from (top) U. S. Forest Service; (below) Portland Chamber of Commerce and Washington State Progress Commission



SCENES IN CALIFORNIA CITIES

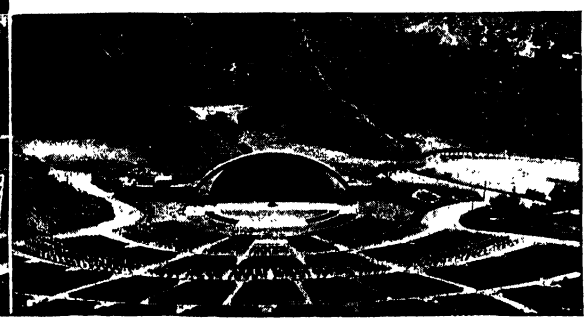


Wilshire Boulevard in Los Angeles, a world-famous street.



Screen Traveler, from Gendreau

The towers of San Francisco as seen from Nob hill.



The Hollywood Bowl, where outdoor concerts are often held.





Photos, Los Angeles Chamber of Commerce

To the left, the Huntington Library and Art Museum at San Marino. To the right, the Los Angeles Public Library.

The Puget Sound country is a great lowland region surrounded, except on the ocean side, by towering snow-capped mountains. There are many attractive towns and cities in the lowland. The most important are Seattle, Tacoma, Olympia, Port Townsend, Everett and Bellingham. Seattle, which is the metropolis of this region, is a fast-growing port city. Most people think that the deeper a harbor is, the better it must be, but the harbor of Seattle is actually so deep that the anchor chains of many vessels are not long enough to reach bottom! This great depth of the harbor has also made the building of wharves very expensive. Seattle is three days nearer to the ports of Japan than is San Francisco. If you look closely at a globe map of the world showing the routes that vessels take across the Pacific, you can see why this is true.

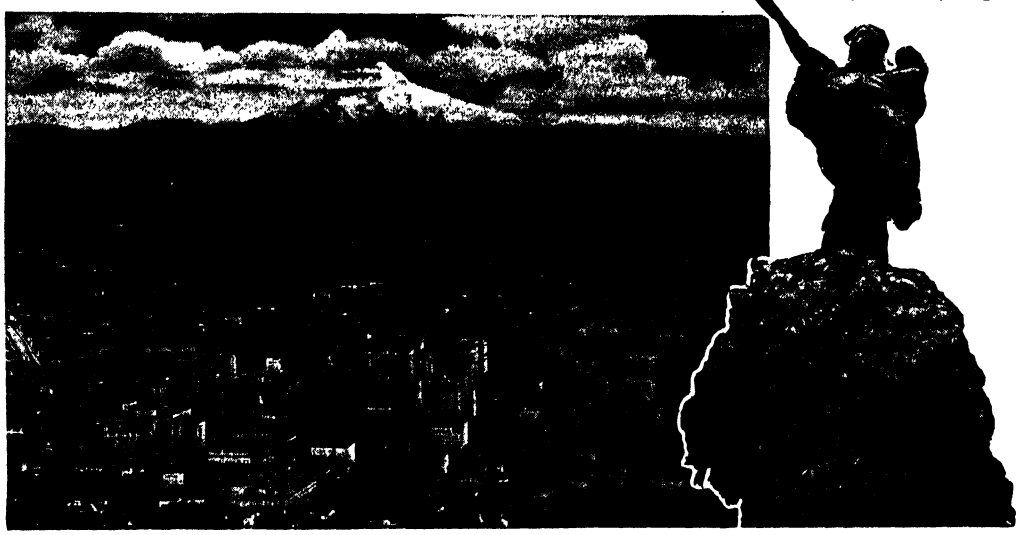
Perhaps we shall go back to Portland and take a trip south from that city. This will take us up the broad valley of the Willamette River. The country here is very similar to that of Portland. Gradually it becomes more mountainous, and then for three hundred miles the train winds through the valleys and passes of the Klamath Mountains. The mountains of the Pacific coast form a great letter H. Each of the lines in the H represents mountains, while the spaces in between represent the lowlands. The top space is the Puget Sound-Willamette Lowland. The line on the east is the Cascade Mountains, and the line to the west corresponds to the Coast Ranges and Olympic Mountains. Our train is now crossing the bar of the H—the Klamath Mountains. Finally the train begins to go downhill, coming out of the mountains and forests and following the valley of the Sacramento River into the bottom space of our letter H. This is the Great Vall y of California, so named because it is long and wide.

Here is another irrigated country. Seeing oranges and olives growing out in the open, you are surprised to learn that you are as far away from the Equator as central Illinois or Philadelphia. But the winters are much warmer here than in the other regions because of the warm winds that blow in from the Pacific Ocean. At the mouth of the Sacramento River a great deal of rice, a semi-tropical plant, is grown.

The Great Valley is one of the finest agricultural regions in the whole world, but the people who first came here were attracted by reports of gold. When rumors of this easily gotten wealth reached the East in 1849, thousands of people headed for California, either taking the route across the country or making the trip of thousands of miles around Cape Horn in ships. San Francisco grew from a small city of 1,000 inhabitants to over 15,000 in less than a year, and other places, too, grew rapidly. It was not long before California became an important state.

Gold is still mined in California, but agri-

Both pictures courtesy the Portland Chamber of Commerce, Portland, Oregon.



The city of Portland, with the dazzling peak of Mount Hood about fifty miles away. To the right, the statue of Sacajawea, the Indian woman who guided Lewis and Clark in their expedition to Oregon and the Pacific Northwest.



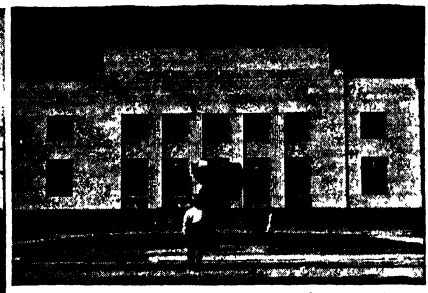
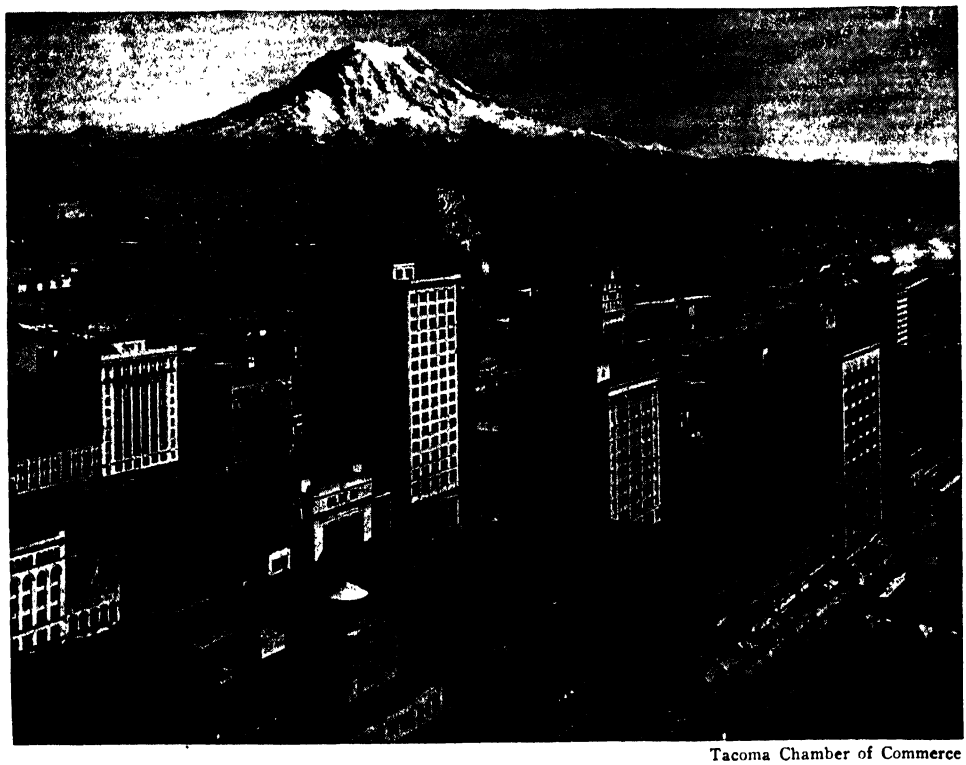


Photo at left, Ewing Galloway; above, Charles Phelps Cushing

At the left is a street in the old mining town of Virginia City, Nevada, which recalls the romantic days of the Old West. In striking contrast is the picture on the right: the Nevada State Supreme Court and Library building at Carson City, the capital of Nevada.

culture is now much more important than the mining industry. The irrigated fields of the Great Valley are occupied by two classes of crops—the fruits and the vegetables. The latter are called truck crops and include, besides many others, celery, lettuce, spinach and asparagus. A large proportion of the vegetables is canned because the fields are so far away from the large markets of the East. Almost every type of fruit is raised in the Great Valley. The train, as it goes down the Sacramento Valley and then up the San Joaquin River, passes through orchard after orchard of oranges, prunes, apricots, pears, and through many fields of smaller fruits, such as strawberries and raspberries. Vine-



Tacoma Chamber of Commerce

Tacoma, Washington, spread out below Mount Rainier, or, as the Indians called it, Mount Tacoma.

yards are common, especially near Fresno, where more than two-thirds of the raisins of the world are grown. The summer climate of this region is so dry and cloudless that it is safe to put the grapes and other fruits out into the sun with little fear of damage. If rain threatens at this time, there is great concern among the growers, because partially dried fruit quickly spoils if drenched with water.

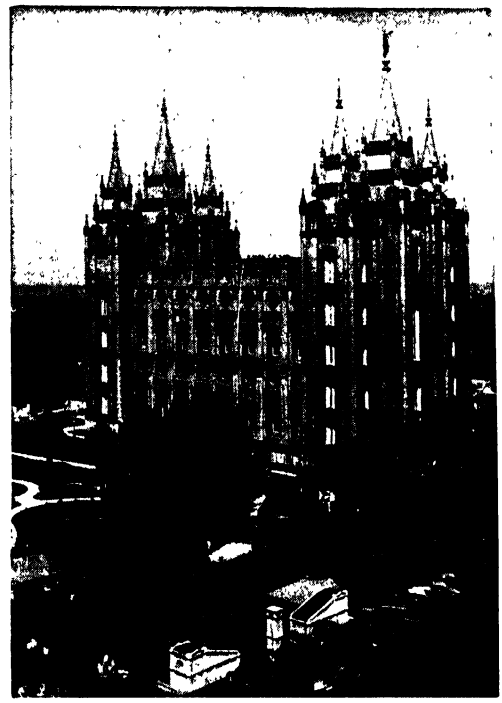
THE GARDEN SPOTS AMONG THE MOUNTAINS

In between the long ranges of the coastal mountains south of San Francisco there are many productive valleys which rank high among the garden spots of the world. The most famed of these valleys are Santa Clara, Salinas and Napa. These valleys are nearer the sea than the Great Valley, and receive the benefit of the ocean winds, which make the summers somewhat cooler than in the interior. The people who live in these valleys like to tell tourists how much better the climate of their region is than that of any other part of the country. There is certainly much truth in the glowing accounts of the climate of all parts of central and southern California. Thousands of people have left eastern cities to make permanent homes in California, and thousands more spend part of the year there. Besides these, many tourists go to California to enjoy its many attractions.

San Francisco, built on a point of land between San Francisco Bay and the ocean, has come to be a great tourist city. Just across from it there is another point, and the passageway thus formed, through which ships from all over the world sail from the ocean into the harbor, is called the Golden Gate. A scene which is not soon forgotten may be viewed by the fortunate traveler, late in the afternoon, looking out across the bay to the Golden Gate and beyond. A great suspension bridge now extends between the headlands. Many beautiful towns are near by. The chief ones are Berkeley, Oakland and Alameda. Still farther away are Stockton and Modesto. These cities get their drinking water from the faraway mountains.

THE WONDER CITY OF SOUTHERN CALIFORNIA

Los Angeles is the great city of southern California: it ranks fifth in population in the United States. The country around, especially the Imperial Valley, in southeastern California, is a region of great natural wealth. Los Angeles was at one time without a port, but as the city expanded it took in the port



Union Pacific Railroad photo

The famous Mormon Temple in Salt Lake City, Utah.

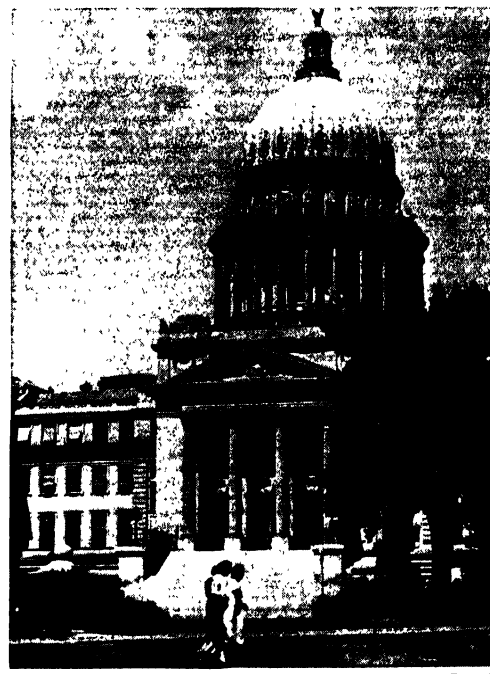


Photo from Frederick Lewis

The State Capitol at Boise, Idaho's capital city.

of San Pedro. This harbor was of little importance until Los Angeles took it over, but it has been improved until it is one of the busiest ports on the Pacific coast.

Hollywood is a name known all over the world for its association with the movie industry, but Hollywood is actually only a section of Los Angeles. Many years ago, when the movies began to be an important new form of entertainment, it was discovered that the neighborhood of Los Angeles made an ideal place to produce films. The year-around sunshine and the enormous variety of scenery within easy reach were just what the early producers needed. Today the movie industry, centered in Los Angeles, is one of the largest industries of any kind in the world, and there is no doubt that it has been one of the chief causes of the remarkable growth of the city. There are many other industries that contribute to the wealth of Los Angeles, among them the petroleum industry. But the climate is still the city's biggest asset. It has made of southern California a vast playground and health resort for the continent.



This relief map of California shows the Great Valley, which is one of the finest agricultural regions in the world. Other features of the geography of the state may also be seen if your eyes are sharp.

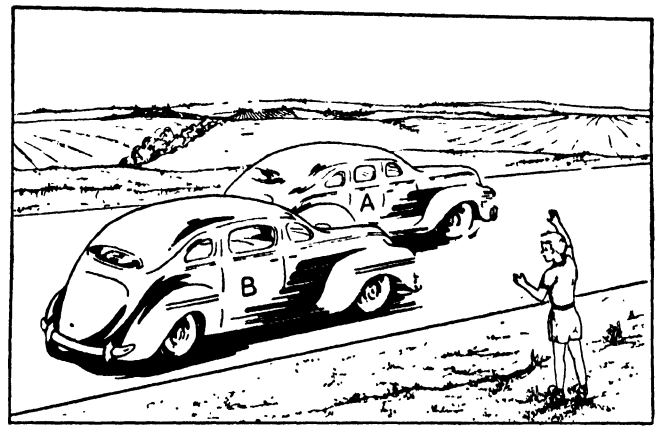
Not far from Los Angeles are the beautiful cities of Pasadena, Riverside and Redlands. Farther south, on the coast, is San Diego, whose beautiful surroundings and excellent harbor attract many tourists and much trade. San Diego is also an important naval base, and warships of all kinds are a common but always fascinating sight in its waters.

California offers many natural wonders to the tourist. Among them are the giant sequoias, the famous "big trees." Some of these were big trees hundreds of years before any white people came to America. Most of the larger trees have been saved from possible destruction at the hands of lumbermen by the creation of Sequoia National Park. The Yosemite National Park is another wonderful place. Most people are familiar with pictures of its beautiful waterfalls, or of El Capitan, that silent watchman of solid rock which overlooks the scene. Still farther north in the Sierras there is Lassen Peak—the only active volcano in the United States. Frequently smoke and cinders issue from its summit.

The Sierra Nevada Mountains have all the kinds of wild beauty that any mountains can have, and the Klamaths are as beautiful. California is a good place to end our tour of the western states because it has so many varieties of scenery. The whole West, as we have seen, is a varied country. Somewhere in the western states may be found every possible natural condition and almost every occupation which the ingenuity of man has yet invented. The region as a whole is still sparsely populated, but it is growing all the time.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 7105.

EINSTEIN'S UNIVERSE



Motion is relative—it depends upon where you are when you observe it. If you are riding in Car B, Car A seems to move by you more slowly than if you watched it from the roadside.

ALMOST everybody in the whole civilized world has heard of a certain quiet, retiring man named Albert Einstein. He is a scientist whose theories about our universe have changed the ideas held by most scientists since the days of Isaac Newton, who was born more than three centuries ago.

Newton it was who set down for us the laws of motion and of gravitation in the universe, and notions about space and time on which much of the study of physics and astronomy has been based. Newton was correct in his reasoning, according to the picture of the universe that he used as a starting-point. Einstein's reasoning proceeded from a different picture of the universe.

We must, according to Einstein and his followers, take into account time and space and motion, all three together, if we are to gain a true idea of what is happening in the universe. The famous Theory of Relativity by which Einstein is best known strives to explain this relationship (relativity) of time, space and motion.

Newton's physics says that all objects in space can be measured by three dimensions —length, breadth and thickness. Newton's physics considers time as a simple measurer of events or of periods between events. Newton's physics laid down certain rules about motion and gravitation that left some facts in mystery. Why, for instance, does the mass of objects increase at very high speeds? Why is a light-ray passing near the sun deflected slightly? These and many other questions were left unsolved by Newtonian physics, partly because instruments were not, until our own century, exact or powerful enough for us to measure very small or very large objects, or very small or very great speeds. Einstein tells us that we can not hope to understand the universe unless we can measure and consider these extremes. In fact, we must reach some final extreme of large or small for a measurer before we can even start to think exactly. What does this mean?

Well, how far is it from Toronto, Canada, to London, England? You can measure the distance in miles on your map, and get a rough idea in land miles or in land miles plus sea miles, or in a train-plus-ship-plus-train journey, or in an airplane journey. But your maps vary, and flat maps can not reproduce faithfully the dimensions of the rounded globe. Measuring by journey-time is inexact because no two journeys take precisely the same time. A plane going from London to Toronto is likely to go more slowly than in the other direction, unless it flies very high. A great many conditions—the type and the condition of plane, the skill of the pilots, the weather—all affect the journey-time. Five years from now planes will probably be so improved that even our rough measurement of "flight distance" may be very different. Einstein reminds us that our ideas of space and time and motion are *relative,* and that to be truly scientific we should have an absolutely exact and unvarying measurer.

There are really two Theories of Relativity which we must examine—the Special Theory and the General Theory. We can come to some understanding of the Special Theory by examples of relative motion. Imagine two automobiles traveling on a highway with constant speeds (that is, not changing). As you stand by the roadside,

the first, Car A, moves by at fifty miles per hour, and the second, Car B, at thirty miles per hour. An observer sitting in Car B, however, will see Car A passing him with a speed of fifty minus thirty, or twenty miles per hour. This speed is called the relative speed of Car A with respect to Car B. From your position at the side of the road, Car A appears to travel with a speed of fifty miles per hour. But is that really the speed of Car A? Does not this speed depend on where you are at the moment? Suppose you had a friend on the planet Mars. The speed of that automobile would scarcely be anything at all to him compared with the speed of our planet earth around its axis and around the sun.

If you travel from Montreal to Boston in a railroad car, with a monkey on your shoulder, think what happens: 1. The monkey does not move at all with respect to you; 2. You and the monkey move a certain distance relative to the earth; 3. Your friend on Mars sees you move (together with the earth) a longer distance still; 4. Our entire solar system (sun, earth and other planets) moves a still larger distance relative to the fixed stars.

PART I OF THE SPECIAL THEORY OF RELATIVITY

So we see that motion is relative, that it is always measured with respect to a "fixed" position. For convenience we usually consider the earth to be fixed when we discuss motions or measure distances. When we are interested in the planets, we take only the earth's motion into account. But we have no right, scientifically, to prefer any given body as the standard with respect to which all motions are observed. Our study of matter and energy is based on certain physical laws—such as the law which says that a body falling freely toward the earth falls at a uniform acceleration of thirty-two feet per second per second. (That is, if you drop a pencil out your window, it will fall at the rate of thirty-two feet the first second, sixty-four feet the next second, ninety-six feet the third second, and so on.) This law, and every other physical law must be the same whether observed by a man on the earth or by a creature on Mars, or at any other place in the universe which is itself in motion. This principle is Part I of Einstein's Special Theory of Relativity.

Part II of the Special Theory gives us the standard which we need. This says that the speed of light in a vacuum is always the same, whether its source is moving or standing still, and in whatever direction the light travels. The speed is a fraction over *186,000 miles per second.* Here we have an absolutely accurate space-time-motion unit of measurement.

Suppose you and a friend are sitting outdoors at dusk, ten miles apart. Exactly between you, but hidden by a hill, is an airplane beacon, unlighted. Along comes a plane. When the plane is over the beacon tower, it dips and flashes a signal light, and exactly at that instant the beacon lights up. You and your friend, a small fraction of a second later, see the two flashes together, though the beacon is stationary and the plane is moving toward one of you and away from the other.

Now suppose you are taking an ocean trip in a slow freighter. One night you look out your porthole and see the Queen Mary passing, some distance off. Your ship is going at ten knots, the Queen Mary is going in the opposite direction, at twenty-five knots. At the same instant lights are turned on, from the bridge of both ships. The light from the Queen Mary reaches you at the moment the light from your freighter reaches an observer on the Queen Mary. In this case, both sources were in motion, at differing speeds, and going in opposite directions. The speed of light was not affected by the speeds of the sources, or their directions.

Part II of the Special Theory also tell us that there is nothing in the universe which has a speed greater than the speed of light, 186,000 miles per second.

Suppose you fasten two pistols to a wheel, in front of a target. Set the wheel in motion and fire the pistols at the same instant. The bullet from one pistol would have the speed of the wheel added to its own speed. The bullet from the other pistol would have its speed decreased by the speed of the wheel. The pictures will explain this. So the bullet from the first pistol would reach the target sooner than the other bullet.

BUT THE LIGHT-FLASHES FROM BOTH PISTOLS REACH THE TARGET AT THE SAME INSTANT!

You may say "Yes, it may seem so, but light travels so fast—186,000 miles per second—that it might be impossible to note small differences in its speed."

To this objection we must answer that most wonderfully accurate measuring equipment has been devised—equipment capable of recording a time-difference of one part in 200,000,000. And always the speed of light

in a vacuum has been found to be 186,000 miles per second, no matter what the source of light—sunshine, candle, electric lamp or other source, and no matter whether the source is standing still or moving, relative to the observer. You can not add speeds to it and get any greater speeds, nor subtract speeds and get any smaller speed for light. This is our final extreme; our ideal measuring standard.

A further conclusion reached by scientists studying the speed of light is called the Lorentz-Fitzgerald Contraction, after the men who stated it. This law says that moving bodies undergo a sort of contraction in the direction of their motion, relative to an observer. This contraction is very, very small. For a speed of seventeen miles per second (the speed of the earth around its orbit), the contraction is only one part in 200,000,000, or two and a half inches of the earth's diameter.

George Gamow, a scientist working in an American university wrote an amusing fantasy, MR. TOMPKINS IN WONDERLAND, about a bank clerk who decided that he ought to learn more science. He read a paper on the Lorentz-Fitzgerald Contraction. Then he took a nap, and dreamed that the contraction effect was thousands of times stronger than it is. Mr. Tompkins' adventures in that strange dream-world were exciting and very funny.

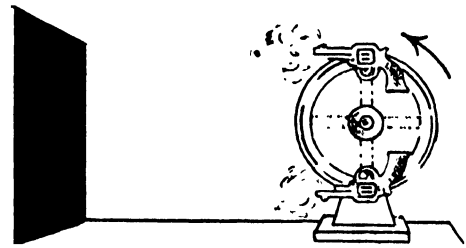
The article Mr. Tompkins had been reading said that time "contracts" also, where great speed is involved. In the dream, he met a man who spent his life traveling at great speed. This traveler kept the appearance of youth, because for him time had contracted, while his stay-at-home granddaughter aged in the usual way. The granddaughter looked like the man's grandmother! It seemed very puzzling to Mr. Tompkins in his dream.

Another effect studied by Professor Einstein is that bodies in motion at speeds approaching that of light actually gain in mass. For instance, the bits of smashed atoms that are bombarding us as cosmic rays are many times greater in mass than when at comparative rest within atoms. Cosmic rays travel at a speed almost that of light.

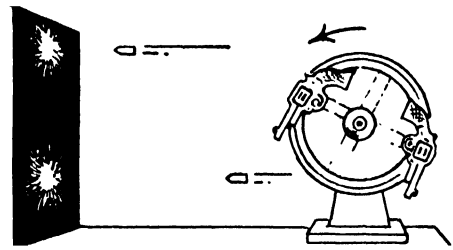
HOW WE MEASURE DISTANCE AND TIME

Let us examine more closely our way of measuring distance and time. For example, take a case where lightning strikes two places, A and B, at the same time. Now let us suppose that there is a person who has a certain wonderful ability; he can detect very, very small differences in time. He can note, for instance, a time difference of only a few hundred thousandths of a second. Let us suppose that this person is at the midway mark between A and B, when the lightning strikes at both places at the same instant. But note this—he is in a car moving toward B. He will say that the lightning at B occurred first. This is because during the short interval required for the light to travel to him, the man in the car moves a short distance toward B and away from A. We should be careful, then, when we say two events happen at the same time; they may only have been observed at the same time. If the man in the car had normal vision, both flashes of lightning would appear to be simultaneous.

The principle applies also to measuring distances: the measurement depends on your position relative to the article in question. We measure something by applying both ends of a ruler simultaneously to the ends of the object. That is quite easy if the measured object is at rest relative to us, as most things are. But just imagine trying to measure the length of a rapidly moving railroad car! That is more difficult. A



The two pistols which are attached to the rapidly rotating wheel are both fired at the same instant.



The light-flashes from the two pistols travel at the same speed and arrive at the target together. One bullet, however, will hit the target before the other.

person in the car will have no difficulty at all, as he is at rest relative to the car. But for a person standing on the station platform as the car whizzes by, the task is almost impossible. The measurement would require light signals sent out to each end of the car and then reflected back. Because of the definite time required for the light to travel to the two ends and return, the person on the platform will not get the same answer as the person inside the car.

The entire subject of simultaneous action would not make much difference if our earth did not act like a moving railroad car. But it does, and that makes all our measurements different from those of an observer who is not moving with the earth.

EINSTEIN'S GENERAL THEORY OF RELATIVITY

It is said that Newton discovered his Law of Gravitation when he saw an apple fall to the ground in his grandmother's garden. Einstein is believed to have formed his General Theory of Relativity when he saw a man fall down from a roof. (Fortunately the man fell on some hay and received no injuries.) When Einstein asked him later how he felt while falling he is said to have answered that he did not feel anything. This led Einstein to the conclusion that he might extend his ideas to include accelerated motion; and thus the General Theory of Relativity was born. What does it tell us?

We know that a freely falling object is accelerated downward with respect to the earth. The man fell thirty-two feet the first second, sixty-four feet the next second, and so on. This increase is relative; as far as the falling man is concerned, the effect is the same as if the earth were accelerated upward at thirty-two feet per second per second. A person who faints may feel himself falling, or it may seem to him that the floor is rising up to "smack" him.

So we see that even accelerated motion is only relative to what Einstein called our "frame of reference."

If you want to describe your location to a friend, you generally give him the information by referring to known places that you are near. In science this basic idea is called location by co-ordinates.

For example, if you live on the sixteenth floor of a house on the southwest corner of Seventy-first Street and Fifth Avenue in New York, your position is fixed. The intersection of Fifth Avenue and Seventy-first Street, and the particular corner, fix a particular house, while the sixteenth floor gives the height above street level. There are many more examples of such "co-ordinate" systems.

You can use three walls of your room as a co-ordinate system (this is called a Cartesian co-ordinate system in honor of its inventor, Descartes). You can fix any point in the room by giving its distance from the three edges. Our earth may be divided into horizontal circles (latitudes) and vertical circles (longitudes), which together fix the location of a place on the earth's surface.

However, to fix an event we need one more co-ordinate—time. Actually it is not sufficient to say that you live on the sixteenth floor of a house on the southwest corner of Fifth Avenue and Seventy-first Street. You should add that you are living there on January 1, 1946, at such and such an hour; you might not be there an hour or a day later. So you see that our world is really a four-dimensional one, three of space and one of time. Do not worry too much trying to imagine such a co-ordinate system; great mathematicians of all times have tried without much success.

EINSTEIN'S WORK ON GRAVITATION AND MOTION

Newton's Law of Gravitation says that the force of attraction between two bodies varies as the product of their masses, and inversely as the square of their distances. In other words, the smaller the masses of the two bodies, or the larger the distance between them, the smaller the attracting force. By that law Newton was able to explain the motion of the moon round the earth and of the planets round the sun. However, nothing was said of how that attraction takes place. Why should a body ten feet away attract another body?

If you take a bar magnet and hold it under a sheet of paper on which iron filings are spread, they will form themselves in a pattern. (See the illustration on page 4089.) They are said to set themselves along the lines of force of the magnetic field. By magnetic field we mean any region in which the influence of the magnet is felt.

In a similar way we may talk about a gravitational field. This is a region in which the influence of the gravitational forces is felt, and in which particles of matter will move along paths of least resistance and shortest distance.

Einstein noted that when a planet is closest to the sun in its orbit, and the gravi-

tational field is, therefore, greatest, the planet attains its greatest speed. At very great speeds the mass of a planet such as Mercury when closest to the sun (at perihelion, this is called) increases. This causes a constant shift in the orbit of Mercury; its longer diameter swings around the sun. Einstein was able to compute exactly how much shift would occur; and his calculations agreed exactly with observations that were later made.

Professor Einstein made many experiments and calculations, and proved the exact relationship (relativity) between gravitation and acceleration. One of his most important experiments involved light. If light consists of corpuscles (according to Newton) or of bundles of energy quanta (according to Einstein's belief), then light-rays would be bent in passing a large body, such as the sun. A certain amount of bending was admitted by astronomers, but Einstein figured an amount twice as large. How could this be determined? The sunlight is so bright it blots out the smaller lights of distant stars. But during the sun's eclipse, observations could be taken. The first observation was made during the eclipse of May 19, 1919, and others have been made during later eclipses. They seem to prove that gravitation does bend light-rays.

DOES THE UNIVERSE GO ON FOREVER?

Before Einstein's time people believed that the universe was infinite, or endless, that is, that you could go and go and still go, and never come back to the place from which you started.

Einstein suggested that the universe may be finite and yet you could go forever. In other words, he suggested that space itself might be curved. You can travel in a "straight" line on earth for example, as long as you wish, but after a certain time, that is, when you went once around the earth, you would be back at the starting point. This is because the surface is curved.

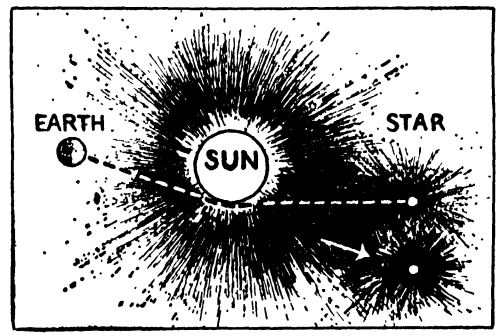
According to this theory, light will after a certain time return to its starting-point, even when the object which sent it out has moved away. Those images are called "ghosts." It is rather exciting to think that a certain star in the sky may be only a ghost of a star which was there 1,000,000,000 years ago.

Einstein made also an alternate suggestion about space—he thought that it may be curved, and yet still be infinite.

In THE BOOK OF KNOWLEDGE article on Space we tell you about Einstein's conjecture that the universe may be expanding.

We give pictures of a spotted balloon partly inflated, and further inflated. In the second picture the spots are farther apart than in the first. That is the sort of thing that seems to be happening out in space. The stars are moving farther apart, as if space is expanding. Some scientists think that after a certain time (millions or billions of years) such a finite, curved universe would stop expanding and even contract, and later expand again. They call it the pulsating universe.

Other scientists, those who hold to the infinite curved-space idea, do not believe



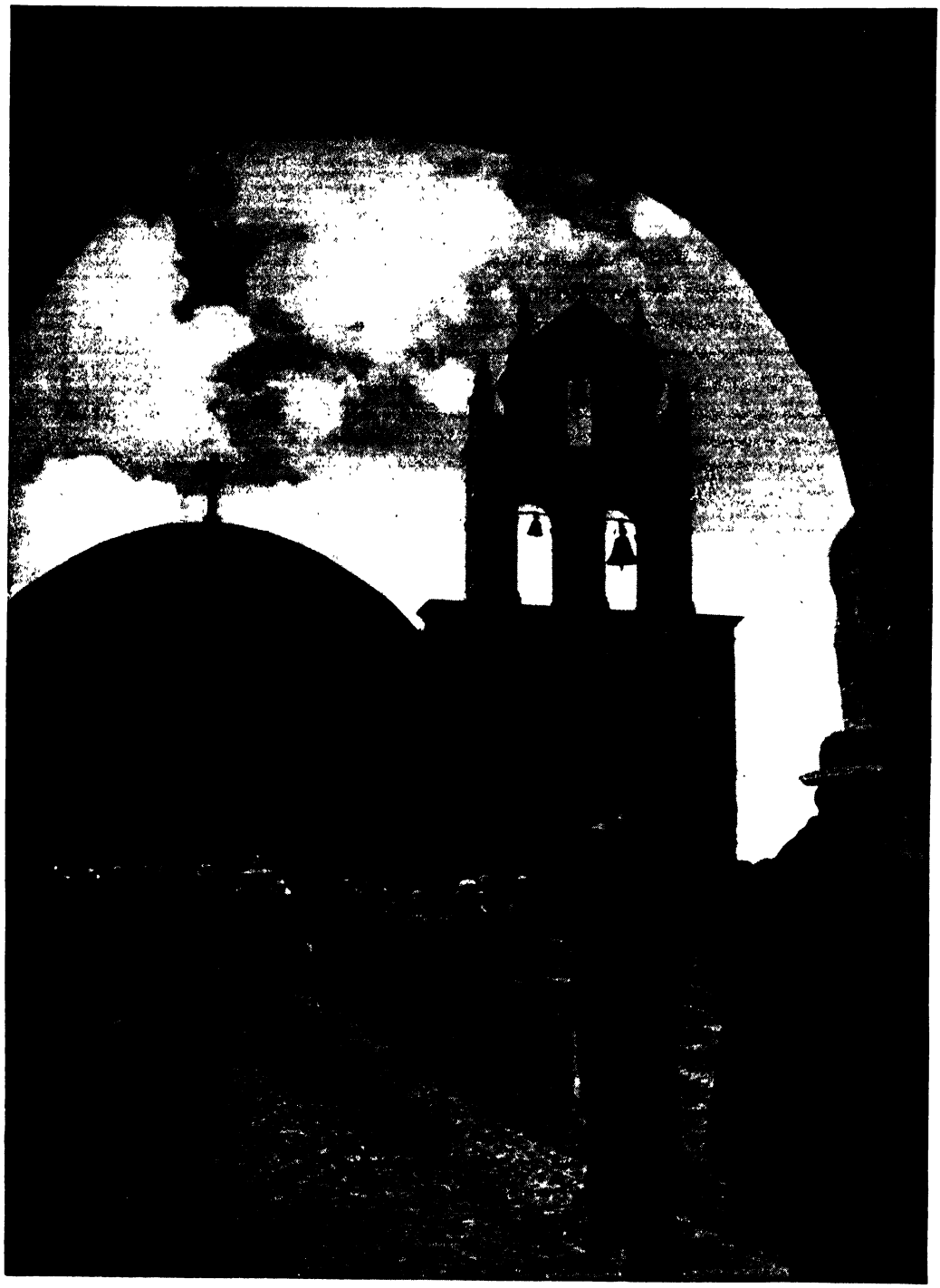
Einstein's theory says that light-rays will be bent, due to gravitation, in passing a large body like the sun. In the above diagram, the arrow points to the place from which it seems that the star's light is coming. Experiments seem to prove the theory correct.

that any contraction has ever taken place in our universe.

So, from Einstein's Theory of Relativity has grown a whole new science. It is a very advanced science, not easy to understand. We can not "see" Einstein's universe with our mind's eye, and most of us are limited in our imagination and reasoning to that which we can "see." When Einstein first proposed his theory, only a few people, five or six in all the world, had the mental training to follow his explanations. As the years passed, more and more people compared the ideas of Newton and Einstein, and slowly some acquaintance with the new physics grew. Today every important scientist understands Einstein's Theory. We have given you in this article not much more than a statement of principles touched upon by Professor Einstein. We have given no account of his experiments or of his mathematical proofs.

THE NEXT STORY OF SCIENCE IS ON PAGE 7001.

WHERE MANY GENERATIONS HAVE PRAYED



Courtesy, Grace Line

The Indians in many parts of South America have changed but little since the days of the old Spanish conquerors. These Bolivian Indians are coming out of the historic Spanish mission church at Laja, near La Paz, Bolivia.

EARLY HISTORY OF SOUTH AMERICA

WHEN the Spaniards and the Portuguese reached South America, they found the continent occupied by the native peoples called Indians. This name was the result of one of the most famous mistakes in all history. Columbus, when he landed in the New World, thought that he had reached a part of India and so he called the inhabitants Indians. That name has been applied ever since to the native peoples of both North and South America.

The history of the Indian peoples of South America is lost in the mists of time. It is thought that their ancestors came from Asia; that they entered the Alaskan peninsula by way of narrow Bering Strait; that they made their way down North America and into South America in the course of the centuries. At any rate, the Indians had been settled for a long time in South America when the Europeans first came there. They were divided into a number of stocks speaking different languages and they dwelt in different areas of the South American continent.

Of all the peoples living in the immense regions east of the Andes Mountains, the most peaceful were the Arawaks. They inhabited the northeastern coast and many islands of the West Indies group. The Arawaks cultivated corn and other crops. They knew how to make a wholesome flour from the root of the cassava or manioc plant by pressing out its poisonous juices. They made fine canoes; they were good fishermen. As they lived in a very warm climate they wore very little clothing; they built only the rudest of shelters.

The Arawaks were constantly persecuted



The old Incas, who dwelt in the highlands of what is now Peru, developed a truly remarkable civilization.

by their cruel neighbors, the Caribs, perhaps the fiercest of all South American Indians. In fleets numbering a hundred canoes and more, the Caribs used to make sudden raids on the coast, destroying and slaying without mercy. The Caribs were cannibals—that is, they ate human flesh.

As a matter of fact, our word cannibal comes from Carib. You see, the Spaniards first called the Caribs *Caribales*. Later, by way of pointing out that these natives were as savage as wild dogs, they changed the name *Caribales* to *Canibales* (*canis* means dog in Latin). After a time, the Spanish word *canibal* came to be applied not only to the Caribs but to all those who eat human flesh. Our word cannibal is taken directly from *canibal*.

The regions south of the Amazon, as far as the basin of the Plata River, were inhabited by the Tupis. They were good hunters and fishermen; they also practiced agriculture to a certain extent. They were quite skillful in making pottery, in weaving and in working stone. They lived in large houses of very light construction; each house held a number of families.

The Guaranis were a branch of the Tupian stock; they dwelt in what is now Paraguay and northern Argentina. They lived in houses of wood and thatch, in large palisaded villages. The Tehuelches, or Patagonians, were to be found farther south, in the tableland of Patagonia. They were a tall people, averaging nearly six feet in height. Since they lived in a comparatively cold climate, they clothed themselves in the skins of the animals which they killed for food.

The peoples that inhabited the mountainous regions of the west had reached a higher state of civilization than their eastern brethren. The most important of these stocks were the Araucanians, the Chibchas and the Incas.

The Araucanians dwelt in the southwestern part of South America, in what is now Chile. They knew something of agriculture, but supported themselves chiefly by hunting. They lived in numerous small villages, in houses made of poles and thatch. They wore



In an old Araucanian village. The man in the foreground is playing a primitive musical instrument—a reed pipe.



The Patagonians, who lived in the southern tableland of Patagonia, were ever so much taller than the Spaniards.

clothing made of wool or skins. Their religion consisted chiefly of the worship of their ancestors and of totemism.

They formed a sort of confederacy, made up of a number of different tribes. It is said that the chiefs of these tribes met once a year and made certain decisions, which were then submitted to the people of the various tribes for approval. There was no single leader over all the tribes in time of peace; when war broke out, however, the chieftains elected a supreme war lord called a *toque*. The Araucanians were a brave people; they resisted the white man more fiercely, perhaps, than any other native people of the New World.

Up in the north of the continent, where the Andes break up into three different ranges, the Spaniards found the Chibchas, who were as warlike as the Araucanians but more civilized. They cultivated corn and potatoes and used a good system of irrigation to water their fields. They mined emeralds and salt; they excelled in weaving, tanning skins and making pottery; they did wonderful work in gold, silver and precious stones.

The Chibchas lived in well-built towns and villages and carried on an extensive commerce with the neighboring peoples. Their government was organized under the rule of powerful chieftains called *caciques* (kah-seeks'). The Chibchas worshiped the sun and moon and other gods. The lakes, they thought, were the abodes of certain gods. Hence, offerings of gold and jewels were thrown into the lakes or buried along the shores.

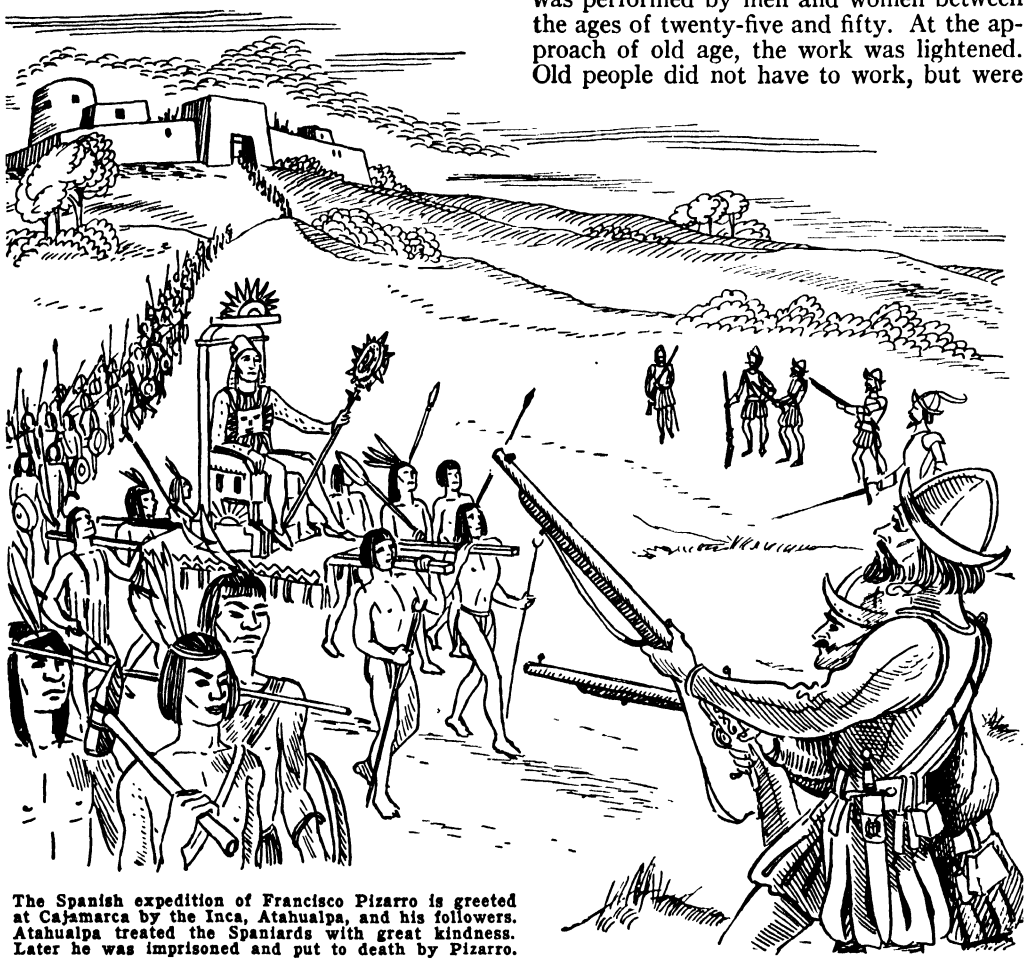
The most highly developed Indian civilization in South America was that of a people dwelling in the highlands of Peru. Their rulers were called Incas, and the people came to be called the Incas, from that title. When the Spaniards came to South America, the Incas had a great empire. It stretched from the land of the Chibchas in the north to what is now central Chile. On the west, the empire was bounded by the Pacific Ocean; it extended as far east, in some places, as the forests of the Amazon basin. The capital was at Cuzco.

Like most of the great empires of the world, that of the Incas included many conquered races. The various peoples of the empire, however, made up a more or less closely knit group. For one thing, conquerors and conquered alike came from the great Quechuan stock, that is, they spoke some form of the Quechuan language. They were bound together, too, by one of the most wonderfully organized governments that ever existed.

The empire was divided into four large districts, known as the United Provinces. Each province was divided into smaller districts; these, into units that were smaller still, and so on. Each unit of the government, large or small, had a leader who was responsible for what went on. Imperial offi-

cers and their staffs presided over the larger districts. Inspectors from the capital inquired into the affairs of every part of the empire; then they made their reports to the central government.

Each individual had his place in this remarkable state. At the head was the ruler, or Inca, who was held to be a descendant of the sun. Next came the aristocracy, the members of which were fitted by long and hard training to hold the most responsible positions in the government. There was a strong warrior class, and the priests belonged to a class by themselves. Finally, there were the great masses of the people, who gave unquestioning obedience to the Inca and his representatives.



The Spanish expedition of Francisco Pizarro is greeted at Cajamarca by the Inca, Atahualpa, and his followers. Atahualpa treated the Spaniards with great kindness. Later he was imprisoned and put to death by Pizarro.

A system of state socialism had been developed. The people had very little freedom of thought and action; in return they were guaranteed food and shelter and protection against their enemies as long as they lived. No one owned property; everything belonged to the state. Marriages were arranged by the officers of the state, who also supervised the housing, food, clothing, games, festivals and work of the people. Most of the labor was performed by men and women between the ages of twenty-five and fifty. At the approach of old age, the work was lightened. Old people did not have to work, but were supported by the state until they died.

The Incas were highly skilled in agriculture. Not a spot capable of being cultivated was neglected. Terraces for crops were built on the sides of the mountains, all the way from the base to the regions beyond which nothing could grow. Irrigation was practiced on a wide scale. Canals starting at the snow line of the mountains carried water down the mountain sides from one terrace to another. Another system of canals brought

water to the dry lands that lay along the coast.

Plentifully supplied with water and enriched with the fertilizer known as guano, the cultivated lands yielded fine crops of corn, potatoes and tomatoes, besides other plants that are not so familiar to us. Vast herds of domesticated llamas and alpacas supplied meat and wool for the whole nation; so did the wild guanacos and vicuñas.

The people showed great skill in working metals, weaving woolen cloth and making pottery and figures of clay. They built fine roads and bridges. They dug tunnels through mountains in order to change the course of streams. With practically no mechanical devices, such as hoists or cranes, they built huge stone structures—walls and fortresses and dwelling-places.

The Incas had a well-developed language and a fairly extensive literature. It is curious to note, however, that they had no system of writing; all their literary works were handed down by word of mouth. Their only records consisted of a system of knotted cords of many colors called *quipus*. It is generally believed that the *quipus* were used to keep accounts. It is also thought likely that they served, in some mysterious way that we do not know, to record the history and traditions of the Incas.

The Incas worshiped a number of gods, including the sun and the moon and many of the ancestors of the various Quechuan tribes. They also had a superstitious belief in fetishes—that is, lifeless objects that were supposed to be endowed with magical powers. Among these fetishes were small stones of peculiar shape and color.

In some respects the Inca Empire was a model state. In it the higher classes, intrusted with the chief responsibilities, had the longest training and worked the hardest. The masses of the people were well provided for. There was plenty of work for all able-bodied persons. Nobody, young or old, ever suffered want.

Yet the empire carried within it the seeds of its own destruction. For generations everything had been done for the people; they had been taught to look to their leaders to supply all their needs and to tell them what



Pizarro gives the signal for the arrest of Atahualpa, whose "crime" was that he had great stores of wealth.



Incas bringing treasure to their Spanish masters. The Spanish conquerors were notorious for their greed.

had to be done. Consequently, when these leaders were taken from them by the Spanish conquerors, they were like sheep without a shepherd. In this critical time the great majority of the people submitted meekly to their fate.

The Spaniards began their conquests in South America in the early part of the sixteenth century. The Spanish adventurers who had established themselves in Panama in the first years of the century began to hear rumors of a great southern empire, where vast stores of gold were to be found. Francisco Pizarro, a rough soldier from the province of Estremadura in Spain, believed these tales.

In the twenties of the sixteenth century, Pizarro made a series of explorations along the Pacific coast of South America, reaching as far south as the coast of Peru. From the natives he heard stirring accounts of the greatness and the riches of the Inca Empire. He tried to persuade the Spanish governor of Panama to send out a strong expedition to conquer this fabulous land; but the governor was not interested.

At last Pizarro decided to return to Spain and to get full powers of conquest from the government. He was successful in getting what he wanted. He himself was appointed governor of the great realms that he was to add to the Spanish crown; his friend Diego de Almagro was made the leader of the armed forces; Hernando de Luque was appointed bishop.

In 1530 Pizarro came back to the New World with his new commission in his pocket. In January of the following year he sailed with his two friends and a force of less than two hundred men to conquer an empire. He could not have chosen a better time for the enterprise. The old Inca, Huayna Coapac, had died several years before, and his two sons, Atahualpa and Huascar, had fought over the succession to the throne. The land was full of unrest. The people did not know whom to serve.

After reaching Tumbes, on the coast of Peru, Pizarro and his little band began an inland march in search of Atahualpa, who had overcome his brother and was now Inca. The Spaniards came upon Atahualpa at last

in the town of Cajamarca. He treated the white strangers kindly. Accompanied by a number of unarmed warriors, he paid a friendly visit to Pizarro. The Spaniards responded with an act of treachery. They suddenly seized the Inca and made him prisoner, and there followed a terrible slaughter of his followers.

Atahualpa, fearing for his life, offered the Spaniards a roomful of gold and two roomfuls of silver as ransom. The ransom was actually paid, but the Spaniards still continued to hold Atahualpa. Not long afterward (1533) they put him to death, claiming that he had conspired against them.

After this, Pizarro made himself master of a great part of the country and set up a native prince called Manco as a puppet ruler. When Manco revolted against his Spanish masters, he was captured and slain, and the Spaniards definitely took over the rule of the land. There now followed a quarrel between Pizarro and Almagro; soon a civil war broke out. In 1538 Almagro was captured and put to death.

Pizarro did not long survive. In 1541 he was assassinated by some of Almagro's followers. Pizarro was a cruel and treacherous man, but he was a great military leader and an able administrator. He had won for Spain a mighty realm, with fabulous resources of gold and silver.

Soon after the conquest of Peru by Pizarro, a Spanish adventurer called Gonzalo Ximénez de Quesada advanced up the Magdalena River in the extreme north of the continent and conquered the warlike Chibchas after several desperate battles. The other northern tribes did not offer much resistance. The Spaniards proceeded to occupy a large part of what is now Venezuela.

Elsewhere the Spanish made rapid strides in establishing settlements all over the continent. They pushed down from the old Inca Empire into the northern part of Chile. They crossed the Andes and made their way into western Argentina.

In 1535 their first attempt to establish a settlement on the Plata River proved unsuccessful. The colonists, wearying of fighting off continuous attacks by hostile Indians, abandoned their outpost on the Plata. They



The native Indian inhabitants of Brazil often fought stubbornly against the Portuguese who settled there.

made their way up the Paraná and Paraguay rivers and founded the city of Asunción, now the capital of Paraguay. In 1580 a band of colonists came down from Asunción and succeeded in planting the flag of Spain definitely on the banks of the Plata. They founded Buenos Aires, which was destined to become the largest city in all South America.

THE SPANIARDS MEET THEIR MATCH IN THE FIERCE ARAUCANIANS OF THE SOUTH

In southern Chile the Spaniards met with a setback when they tried to conquer the fierce Araucanians. Although their numbers were comparatively small, the Araucanians fought the Spaniards to a standstill. For over two hundred years the grim struggle went on, interrupted by occasional treaties and uneasy intervals of peace. At last, in 1773, the courageous natives, weakened by constant warfare against a greatly superior foe, were compelled to submit to Spain.

The Spanish colonies in South America were administered in the king's name by a famous Council of the Indies, sitting at Seville, in Spain. In the sixteenth and seventeenth centuries, the details of administration were left to a royal governor, called a viceroy, whose seat of office was at Lima, Peru. He ruled over most of the Spanish possessions in South America; his domain was called the Viceroyalty of Peru.

In the eighteenth century, a part of the Viceroyalty of Peru was made over into a new viceroyalty—that of New Granada, with its capital at Bogotá, in what is now Colombia. Then the Viceroyalty of La Plata was set up for the provinces from Bolivia eastward to the Atlantic.

The chief aim of the Spanish administration in the New World was to satisfy the never ending demands of the royal treasury. The mother-country jealously guarded the resources of her colonial possessions. The colonies were not permitted to trade with other nations or with one another.

Throughout the colonial period—from the sixteenth century to the nineteenth—the high posts in the administration of the Spanish colonies were held by officials who had been born in Spain. The royal officers and their families formed the leading class of colonial society. They considered themselves quite superior to the Creoles—the Spaniards who were born in the New World. The Creoles did not admit that they were inferior in any way. They were often persons of great wealth and pride.

As for the Indians, who made up the great majority of the population, they were considered chiefly as a convenient source of labor to work in the mines, to cultivate the fields and to build cities. Many of them were in a state of serfdom, or slavery. They labored long hours on the plantations of great landowners or in the mines; often they were brutally treated by overseers.

The Indians were often defended by the clergy against those who tried to enslave or mistreat them. In some parts of the country, members of various Catholic religious orders set up missions, taking under their wing all the natives of a given district. The most famous of all were those of Paraguay, where the Jesuits gathered large numbers of Guaranian Indians in village communities. The Jesuits converted and civilized the natives; they taught them agriculture and the mechanical arts. These Paraguay missions flourished until 1768, when the Jesuits were driven from the country.

In the course of time another class developed—that of the mestizos (mess-tee'zohs), who were of mixed white and Indian blood. Many of the skilled trades and small businesses were in their hands, and they often won considerable influence in their communities. They tended to cast their lot with the whites rather than with the Indians.

Between the Spanish settlements along the northeastern coast of South America and those in the basin of the Plata River, there was a great territory that had been reserved for the Portuguese even before they knew that it existed. This is how.

POPE ALEXANDER VI AND THE FAMOUS PAPAL LINE OF DEMARCATION

After Columbus discovered America, Pope Alexander VI wished to keep the two Christian powers of Spain and Portugal from going to war over the new lands. Therefore, in 1493 he drew a line running north and south on the map, about a hundred miles west of the Cape Verde Islands. The Spaniards, he said, were not to settle east of this line, nor were the Portuguese to settle west of it. In the following year the two countries agreed to move the line about 200 miles farther to the west. This Papal Line of Demarcation, as it was called, ran about fifty degrees west of Greenwich, England.

Some say that the Portuguese sailor, Pedro Alvares Cabral, first discovered the coast of Brazil in 1500; the Spaniards claim that honor for Vicente Yáñez Pinzón, a Spanish sea captain. However that may be, the Portuguese realized the importance of the dis-

SOUTH AMERICAN INDIAN TYPES



This dignified old gentleman is a Bolivian Indian chief.



Young couple of Pisac, Peru. They are standing upon the steps of a ruined fortress constructed long ago by the Incas.



An Indian mayor of a Peruvian village blowing a conch shell.



This Indian is a mighty hunter in the jungle area of Ecuador.



This serious-faced Indian lass is an inhabitant of Ecuador. She is carrying her water-jug in the approved fashion.



An Indian girl of La Paz, Bolivia, dressed in her very best.



An Araucanian woman, who dwells in the lake district of Chile.



These men with the queer hats and unsmiling faces are Aymara Indians of Bolivia.



An Indian boy of Ecuador taking two fine geese to market.

All photos, courtesy, Grace Line

covery. Since this new land lay on their side of the Papal Line of Demarcation, they sent out colonists who made a settlement south of Bahia in 1503. Gradually the Portuguese extended their holdings along the Brazilian coast; they advanced here and there into the interior of the country.

In 1578 the Spanish king acquired sovereignty over Portugal; that country remained a part of Spain until 1640. During this period Brazil, which of course was now a Spanish colony, was rather neglected. When Portugal became independent again in 1640, Brazil returned to Portuguese rule. It now entered upon a new period of development. The colony spread to the south, until it reached the basin of the Plata River.

COLONIAL DAYS IN BRAZIL, WHEN THE PORTUGUESE RULED THE LAND

Brazil was governed by a viceroy sent out from Portugal; the seat of government was first at Bahia and later at Rio de Janeiro. Colonial society in Brazil, like that in the Spanish colonies, was marked by sharp class distinctions. There was an exclusive governing class, made up of Portuguese born in the mother-country, and a much larger Creole class, the members of which had been born in the New World.

The Indians in the conquered areas of Brazil did not accept the white man's rule very meekly; of course the tribes dwelling in the unexplored interior were beyond the reach of the conquerors. The Brazilian colonists had difficulty in finding enough submissive workers for their plantations and their mines. Therefore they had great numbers of Negro slaves brought in from Africa. The Negroes flourished in the new land, and in time they formed a considerable part of the population.

The other nations of Europe did not adopt a hands-off policy in South America. The French and the Dutch tried to build up colonies along the Brazilian coast. The footholds that they managed to win here were only temporary. However, both the French and the Dutch and the English, too, succeeded in establishing themselves in the Guianas, on the northeastern coast of the continent. Here they still remain.

By the end of the eighteenth century, the greater part of South America had been divided up among the Spaniards and the Portuguese. In the Spanish colonies a good deal of unrest had developed. The colonists resented the restrictions on trade, the lack of self-government and the arrogance of the ruling class, which was very unpopular.

After the successful American Revolution and the stormy French Revolution, the unrest in South America became stronger. Little revolts against Spanish officials began to break out in various parts of the colonies; but they were put down mercilessly by the royal authorities. A new wave of rebellion swept the land when Napoleon made his own brother, Joseph, King of Spain, after deposing the reigning monarch, Ferdinand VII, in 1808.

The story of the wars of independence in South America is a long and confused one. Some of the rebels were loyal to Ferdinand VII, and revolted in order to protest against the manner in which he had been treated. Other members of the revolutionary group were convinced that the time had come to cast off the last ties that bound the Spanish colonies to the motherland.

Whatever unity there was in the struggle was provided by the stirring leadership of Simón Bolívar, a young liberty-loving Venezuelan, who helped to liberate Venezuela, Colombia, Ecuador, Peru and Bolivia. Other heroes of the wars of independence were José Antonio de Sucre, Bolívar's great lieutenant, Bernardo O'Higgins, who helped to win independence for Chile, and José de San Martín, who defeated powerful Spanish armies in Argentina and Peru.

We tell you more about the wars of independence in South America in the chapters beginning on pages 6975 and 7033. By the year 1824 Spanish rule in South America was practically at an end, though a Spanish garrison held out stubbornly at Callao, in Peru, until January, 1826.

HOW BRAZIL WON ITS INDEPENDENCE FROM THE PORTUGUESE MOTHERLAND

Brazil won its independence from Portugal almost without a struggle. In 1807 a French army had overrun Portugal; the Portuguese royal family had fled to Brazil and here the seat of government had been set up. The king, John VI, returned to Portugal in 1821, leaving behind his son Pedro, who was to serve as regent (acting ruler) in the king's name.

Very soon afterwards, the young regent put himself at the head of a party favoring complete independence from Portugal. In October, 1822, he had himself proclaimed Emperor of Brazil under the name of Pedro I. Brazil remained an empire until 1889, when a republic was set up.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 6975.



METRE AND RIME IN POETRY

Illustrated by Maurice Brévannes

METRE is a regular pattern of accented and unaccented syllables running through the lines of a poem, just as the time-beat runs through music. *Rhythm* is the longer, more irregular rise and fall of emphasis throughout the lines as they are read. Rhythm follows the pattern of the metre in a general way, but it has many variations. These are caused by the sound and meaning of the words, by pauses, by extra syllables tucked into some of the metres, or by changes in the metre itself. You may have noticed something like this when listening to music. For example, a waltz, like THE BEAUTIFUL BLUE DANUBE, has a regular ONE-two-three, ONE-two-three time-beat running through it, but the music flows in and out and rises and falls in a rhythm of its own, never really losing touch with the time-beat, but making many variations which give beauty and life to the sounds.

Not all poetry has metre; there is one kind that is called free verse because it is not governed by metre. We shall tell more about this in the chapter on Verse Forms and Patterns. All poetry does have some kind of rhythm. Let us see what kinds of metre there are, and what each is like.

In the English language there are four metres which are most used because they suit the natural stresses or accents of the language. These are called by names that have come down to us from ancient Greek poetry —the iambus, or iamb, the trochee, the dactyl and the anapest. Each is a little pattern, repeated as many times as the length of the line makes necessary. When we scan a line of poetry, that is, read it to find out where the accents fall, we use a mark like this — to show a stressed or accented syllable, and a mark like this ⏑ to show an unstressed syllable. Thus each of the four metres has its own little pattern of marks, and the syllables that make up each little pattern form a metre or metrical foot.

An iamb is a two-syllable foot, with the stress on the second syllable, as in the word "begin." An example of iambic metre is the line

The shades of night were falling fast.

You will find a great many poems in English made up of iambic metre, for it seems to fit the natural stresses of our written and spoken language better than any other metre. Shakespeare used it with wonderful skill in his plays. Many of our great epics, or story-poems, are in iambic metre. It can be varied so that it does not become tiresome. It also has life and sparkle in short poems.

The trochee is also used a great deal. It is an iamb turned round, for its stresses are — ⏑, as in the word "little." The nursery rime

Twinkle, twinkle, little star,

is an example of trochaic metre that every boy and girl knows. The word trochee comes from a Greek word meaning "running," and you will notice that the metre does seem to jog or run at a good, swift pace.

The dactyl is a three-syllable foot with the stress on the first syllable, as in the word "galloping." The name comes from *dactylos*, the Greek word for finger, because a finger has three joints, one long and two short. Dactylic metre suggests emotion, but the nature of the emotion it expresses can vary greatly. In the first lines of Tennyson's CHARGE OF THE LIGHT BRIGADE,

Cannon to right of them,
Cannon to left of them,

the words in their dactylic arrangement have the ring of danger and the excitement of battle. In the first line of Browning's LOST LEADER,

Just for a handful of ribbon he left us,

the dactylic metre brings out the sorrowful scorn that the poet felt for the leader who had deserted his cause.

The anapest is another three-syllable foot; in fact, it is a dactyl turned round, with the stress on the last syllable instead of on the first. Short lines made up of anapests, such as Cowper's

I am monarch of all I survey,

have a brisk, determined air about them.

Perhaps you have noticed that the different lines we have quoted do not all have the same number of metrical feet. In English poetry a line may have anywhere from one to eight feet. Lines of three, four and five feet are most used. Each kind of verse (a verse is a line of poetry) takes its name from the Greek word for the number of feet it has. Thus we have monometer (one measure, or one foot), dimeter (two measures), trimeter (three measures), tetrameter (four measures), pentameter (five measures), hexameter (six measures), heptameter (seven measures) and octameter (eight measures).

THE SELDOM USED MONOMETER VERSE MUST BE SHORT

A poem written entirely in monometer would naturally have to be rather short or it would soon become tiresome. Poems in monometer usually express a single thought in the fewest and most exact words. Monometer verse is very rare, but the seventeenth century poet, Robert Herrick, wrote a famous example which we give here:

Thus I
Pass by
And die,
As one
Unknown
And gone.

As you see, each of these lines is a single iambic metre.

The lines from Tennyson's CHARGE OF THE LIGHT BRIGADE, which we quoted to show what a dactyl is like, are also a good example of dimeter. If you will look at them again you will see that each line is made up of two dactyls, or two dactylic feet.

Trimeter has three feet to the line. The second and fourth lines of JACK SPRAT are iambic trimeter:

His wife could eat no lean,
They licked the platter clean.

Tetrameter, the four-foot line, often occurs in English poetry. Here are two very different examples of this line. The first, from Tennyson, is iambic tetrameter:

On either side the river lie
Long fields of barley and of rye.

The second, from Byron, is anapestic tetrameter:

The Assyrian came down like the wolf on the fold,
And his cohorts were gleaming in purple and gold.

THE ENGLISH LANGUAGE LENDS ITSELF MOST NATURALLY TO IAMBIC PENTAMETER

Pentameter is the five-foot line, and is one of those most frequently used in English poetry, especially iambic pentameter, as in the following line from Kingsley:

O Mary, go and call the cattle home.

The other three kinds of verse that we have mentioned, hexameter, heptameter and octameter, are not so often found in English. Longfellow wrote EVANGELINE in hexameter (six metres) made up chiefly of dactyls, and the first line of that poem will show you how long-drawn-out six feet of dactyls can be:

This is the forest primeval; the murmuring pines and the hemlocks.

Byron makes use of heptameter, seven iambic feet, to say

There's not a joy the world can give like that it takes away.

Poe creates the mournful magic of THE RAVEN partly with trochaic octameter, as in the opening line:

Once upon a midnight dreary, while I pondered weak and weary.

You may have noticed that in some of the lines we have quoted, the poet has shortened the last foot, or has made two short syllables take a single stress in a foot. These are among the many ways in which poets vary the rhythm of the lines. This rhythmic variation, as it is called, does two important things: it helps to bring out the meaning and beauty of the words, and it keeps the verse from sounding dull and monotonous. If you try to read a verse strictly according to the mechanical beat of the metre, you will find that it becomes as uninteresting as the ticking of a clock.

Sometimes the poet will add an extra beat to one of the feet. Sometimes a dactyl will be placed in a trochaic line, or an iambic line will begin with an anapest. A poet who

has a true sense of rhythm, and who is skilled in the selection and arrangement of words, very seldom sticks to a mechanically perfect metre throughout a poem.

THE CAESURA, OR CUT, IS USED IN A LONG LINE OF VERSE

There are two kinds of rhythmic variation that you will often meet when you are reading poetry. The first is the caesura, or cut, in the flow of a line. Read aloud the first line of EVANGELINE, with attention to the sense of the words:

— ⏑ ⏑ — ⏑ ⏑ — ⏑ / ⏑ — ⏑ ⏑ —
This is the forest primeval; / the murmuring pines
⏑ ⏑ — ⏑
and the hemlocks.

You can see that there is a natural pause marked by a semicolon, after the word "primeval," a pause that comes between the two weak stresses of a dactyl. That is a caesura. The mark for it is /, as shown in the quotation above. It breaks the long line in two and keeps it from dragging.

The other common rhythmic variation is a metrical foot called the spondee. It is a two-syllable foot in which both syllables have the same stress, and its pattern mark is two long accent lines, like this — —. It is brought into a line to give a slower, or more stately, emphasis to a particular point in the rhythm. Notice how the spondees vary the rhythm and emphasize the meaning of Pope's iambic pentameter line,

⏑ — — — ⏑ — ⏑ — — —
And ten slow words oft creep in one dull line.

When accented syllables, or whole words, have the same sound, such as go and flow, or dreaming and gleaming, we say that they rime. In poetry such rimes usually come at the ends of the lines, though you will notice that some poems have rimes inside the lines as well as at the end. This is called internal, or medial, riming.

RIME, WHICH GIVES A LILT TO POETRY, DEVELOPED LATE

Rime is almost the first thing that people notice about poetry—at least about English poetry. Some languages do not use rime, and others use it very little. Even very young children like and remember best those songs and sayings that have simple rimes. This is probably because the riming words give such a swing to the lines, and because repeating the sound of the end words helps us to remember them. And yet, strange to say, during the earliest centuries of the English language its poetry had no such rimes at all. Instead, it had alliteration, which some people call initial rime. Alliteration is still used in our poetry and we shall tell more about it farther on in this chapter.

There are several kinds of rime. First, there is the simple kind made with one-syllable words, such as *cat* and *rat* or *moon* and *soon*, or with the last syllables of longer words, such as *while*, be*guile*, com*pile* de*file*, or a*rose*, sup*pose*, un*close*. One-syllable rimes are called masculine rimes.

SOME SMOOTH, TWO-SYLLABLE RIMES ARE CALLED "FEMININE"

Two-syllable rimes in which the accent is on the next-to-last syllable are called feminine rimes. *Fountain* and *mountain*, *beauty* and *duty*, *spoken* and *token* are feminine rimes. You will notice that the masculine rime brings the rhythm of the line to a distinct pause, while the feminine rime has a smooth, swinging effect.

There are triple rimes, such as fra*gility*, versa*tility*, *he left us*, *bereft us*, and some poets have been able to manage even more complicated rimes. These polysyllabic (many-syllabled) rimes are generally used in clever, humorous verses. As a rule you will find that the more serious poetry has simpler rimes. This is partly because complicated rimes tend to draw attention away from the poem's mood and thought.

ARRANGEMENT OF RIME IS ONE OF THE DELIGHTS OF VERSE-MAKING

Rimes may be arranged in any number of ways, and this is one of the most fascinating parts of making up verses. They may be arranged in pairs, or couplets, as in

> The rainbow comes and goes,
> And lovely is the rose;

or the first line may rime with the third and the second with the fourth, as in this quatrain, or four-line arrangement:

> He is gone on the mountain,
> He is lost to the forest,
> Like a summer-dried fountain,
> When our need was the sorest.

An easy way to count the arrangement of rimes is to use a letter of the alphabet for each different sound that ends a line. In the quatrain we have just read, the rime-scheme is abab. In the following quatrain from Whittier the scheme is abcb, only the second and fourth lines agreeing in sound:

> The pines were dark on Ramoth hill,
> Their song was soft and low;
> The blossoms in the sweet May wind
> Were falling like the snow.

A line of poetry is called a verse. A number of verses, or lines, are generally grouped together according to a certain rime-scheme to make a stanza. The couplets and quatrains we have been quoting are stanzas. A stanza may be of any length. Four, six and eight-line stanzas are the most common. The stanzas within a poem usually have the same number of lines and follow the same rime-scheme, though this is not always true. In long poems, especially, the stanzas are likely to vary in number of lines and in rime-scheme. In this way the poet avoids monotony.

STANZAS ARE THE "PARAGRAPHS" OF POETRY

A stanza in poetry may be compared to a paragraph in prose. Each stanza expresses a single thought or picture, or a number of ideas which form a thought or picture. The number of lines in a stanza is closely connected with the rime-scheme. In Tennyson's poem THE EAGLE, which you will find on page 1006, in volume three, there are only six lines, rimed aaa bbb. With such an arrangement of the rimes the most natural way to group the lines is in two stanzas of three lines each. If the rime-scheme had been ababab, it would have been better to arrange the poem in one six-line stanza. William Blake's THREE THINGS TO REMEMBER has six lines rimed aabbcc, and falls naturally into two-line stanzas, or couplets.

A robin redbreast in a cage
Puts all Heaven in a rage.

A dove-house filled with doves and pigeons
Shudders Hell through all its regions.

A dog starved at his master's gate
Predicts the ruin of the state.

We have mentioned alliteration, or initial rime, which has been used in English poetry for more than a thousand years. Alliteration is the use of accented syllables which have the same initial sound, as in Swinburne's line,

Their *w*ays to *w*ander and their *w*ards to keep.

or as in Tennyson's line,

I *sl*ip, I *sl*ide, I *gl*oom, I *gl*ance.

In both of these lines the alliterative letters are consonants.

In vowel alliteration the accented letters do not have to be exactly the same, so long as they are vowels. A good example of vowel alliteration is Swinburne's line,

Nor *e*lfe nor *ou*phe nor *ou*ght of *ai*rier kind.

If we were to give an example of the Old English alliterative poetry it would be difficult to read, because our language has changed so greatly since those days. Here, however, are two lines from an ancient poem called THE WANDERER, which has been put into modern English words by Stopford Brooke:

*D*arkens then the *d*usk of night, *d*riving from the nor'rard
*H*eavy drift of *h*ail for the *h*arm of *h*eroes.

The accented d's in the first line and the h's in the second line give strength to the rhythm of the verses, and the very sounds of the letters seem to make more vivid the poet's foreboding of the dark northern winter.

Alliteration must be used with great skill and the poet must be sensitive both to the sound and meaning of words. If a line has too many words beginning with the same sound, or if the alliteration is used in a haphazard way, without regard for the sense and rhythm of the verses, the result can be very stupid, and not really poetry at all.

It is fun, however, and good exercise in thinking up words, to see how far one can go with alliteration. Among the poems in the following pages we have included a famous example of this sort of game, THE SIEGE OF BELGRADE. In it the poet used only words beginning with a in his first line, words beginning with b in his second line, and so on to the end of the alphabet. Even he was not able to think of a suitable line made up of words all beginning with j, so he left that letter out. This sort of thing is amusing, but it is more of a word game than a poem.

ASSONANCE, OR RIMING VOWEL SOUNDS

The third kind of riming about which we must tell you is assonance, or vowel rime. When two or more words have the same vowel sound, like stone and roam, wander and ward, we have assonance. The tones of such words seem to flow into one another and blend like the sound of bells that have been tuned alike. Hundreds of years ago, in the poetry of southern France and Spain, assonance played an important part in verse-making. It has never been quite so important in English poetry, yet most of our skilled poets have made use of it to lend a special glow and color to their verses. Here are two lines from Coleridge which have assonance:

Where *A*lph, the sacred river r*a*n,
Through c*a*verns measureless to m*a*n.

Rime, alliteration and assonance are called tone color. This is a fitting name for them, because they all have to do with the varying qualities of sound, which are like the shades of light and color. A poet must be able to select the words with which he creates a mood or picture, not only for meaning and rhythm, but for the kind and color of sound that they give. Poetry is still, as it was in the days before people began to write things down, a form of singing. That is why you can understand and enjoy it more when you read it aloud.

Just as some artists are greater in the use of line and others are greater in the use of color, so there are poets who excel in the creation of rhythm, and poets who are masters of tone color. A few have equal mastery of both, and one of the greatest of these makers of word-music was Edgar Allan Poe. If you read his wildly exciting poem THE BELLS, you will discover scores of wonderful examples of the different kinds of rime, of alliteration and of assonance, all giving glorious color contrasts to the complicated rhythm of the song.

In THE RAVEN, Poe uses these same poetic devices, but with what a different effect! When you read THE BELLS you feel a mounting excitement, that rises with the voices of the bells, until at its height there is a break, and the deep fateful tones of the iron bells chill your spirit with their message of doom. THE RAVEN does not make the reader's pulse beat faster. The rhythmic flow of its lines and the somber richness of its tone color seem to lay a sorrowful enchantment over the mind.

We have selected the poems on the following pages especially to show how skillfully the different kinds of rime and tone color can be used, as well as to show different metrical patterns. If, when you read them, you will look carefully for tone color and for metre, you will find your enjoyment of them greatly increased.



The Raven

By EDGAR ALLAN POE
(1809-1849)

ONCE upon a midnight dreary, while I pondered, weak and weary,
Over many a quaint and curious volume of forgotten lore,—
While I nodded, nearly napping, suddenly there came a tapping,
As of some one gently rapping, rapping at my chamber door.
" 'Tis some visitor," I muttered, "tapping at my chamber door:
Only this and nothing more."

Ah, distinctly I remember it was in the bleak December,
And each separate dying ember wrought its ghost upon the floor.
Eagerly I wished the morrow;—vainly I had sought to borrow
From my books surcease of sorrow—sorrow for the lost Lenore:
Nameless here for evermore.

And the silken sad uncertain rustling of each purple curtain
Thrilled me—filled me with fantastic terrors never felt before;
So that now, to still the beating of my heart, I stood repeating,
" 'Tis some visitor entreating entrance at my chamber door,
Some late visitor entreating entrance at my chamber door:
This it is and nothing more."

Presently my soul grew stronger; hesitating then no longer,
"Sir," said I, "or Madam, truly your forgiveness I implore;
But the fact is I was napping, and so gently you came rapping,
And so faintly you came tapping, tapping at my chamber door,
That I scarce was sure I heard you"—here I opened wide the door:—
Darkness there and nothing more.

Deep into that darkness peering, long I stood there wondering, fearing,
Doubting, dreaming dreams no mortal ever dared to dream before;
But the silence was unbroken, and the stillness gave no token,
And the only word there spoken was the whispered word, "Lenore!"
This I whispered, and an echo murmured back the word, "Lenore!"
Merely this and nothing more.

Back into the chamber turning, all my soul within me burning,

Soon again I heard a tapping somewhat louder than before.
"Surely," said I, "surely that is something at my window lattice;
Let me see, then, what thereat is, and this mystery explore;
Let my heart be still a moment and this mystery explore;
'Tis the wind and nothing more."

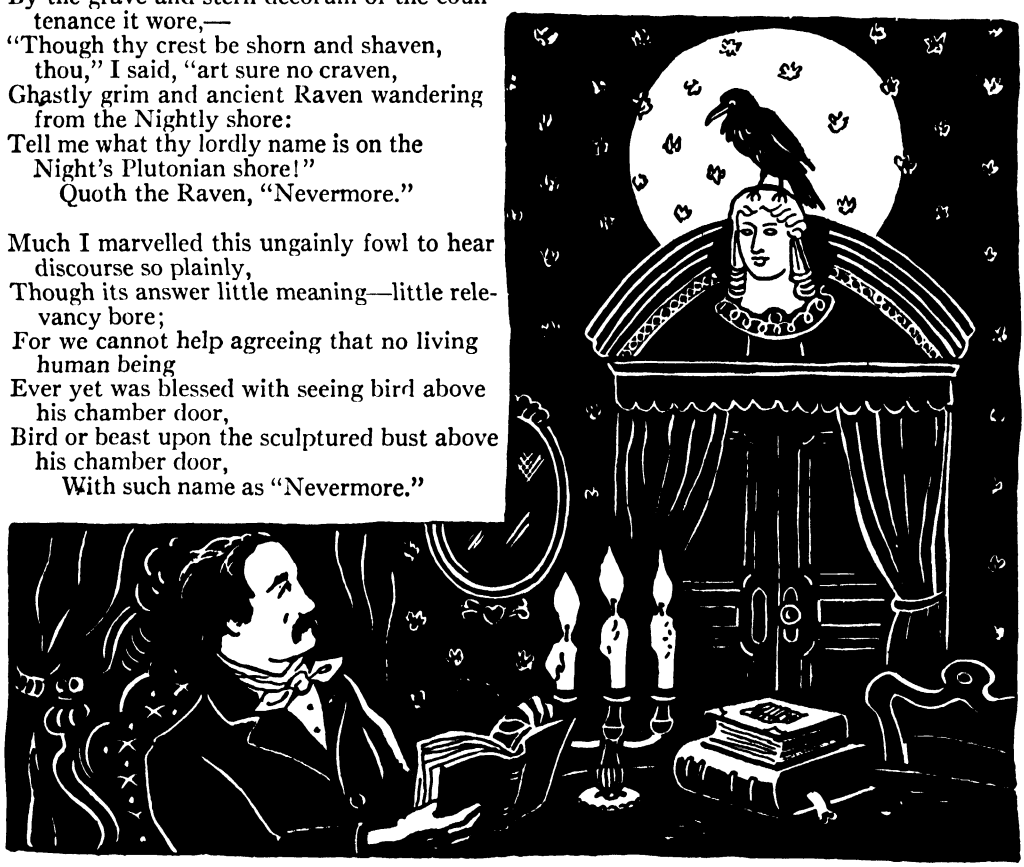
Open here I flung the shutter, when, with many a flirt and flutter,
In there stepped a stately Raven of the saintly days of yore.
Not the least obeisance made he; not a minute stopped or stayed he;
But, with mien of lord or lady, perched above my chamber door,
Perched upon a bust of Pallas just above my chamber door:
Perched, and sat, and nothing more.

Then this ebony bird beguiling my sad fancy into smiling
By the grave and stern decorum of the countenance it wore,—
"Though thy crest be shorn and shaven, thou," I said, "art sure no craven,
Ghastly grim and ancient Raven wandering from the Nightly shore:
Tell me what thy lordly name is on the Night's Plutonian shore!"
Quoth the Raven, "Nevermore."

Much I marvelled this ungainly fowl to hear discourse so plainly,
Though its answer little meaning—little relevancy bore;
For we cannot help agreeing that no living human being
Ever yet was blessed with seeing bird above his chamber door,
Bird or beast upon the sculptured bust above his chamber door,
With such name as "Nevermore."

But the Raven, sitting lonely on the placid bust, spoke only
That one word, as if his soul in that one word he did outpour.
Nothing further then he uttered, not a feather then he fluttered,
Till I scarcely more than muttered,—"Other friends have flown before;
On the morrow *he* will leave me, as my Hopes have flown before."
Then the bird said, "Nevermore."

Startled at the stillness broken by reply so aptly spoken,
"Doubtless," said I, "what it utters is its only stock and store,
Caught from some unhappy master whom unmerciful Disaster
Followed fast and followed faster till his songs one burden bore:
Till the dirges of his Hope that melancholy burden bore
Of 'Never—nevermore.' "



But the Raven still beguiling all my sad soul into smiling,
Straight I wheeled a cushioned seat in front of bird and bust and door;
Then, upon the velvet sinking, I betook myself to linking
Fancy unto fancy, thinking what this ominous bird of yore
What this grim, ungainly, ghastly, gaunt, and ominous bird of yore
Meant in croaking "Nevermore."

This I sat engaged in guessing, but no syllable expressing
To the fowl whose fiery eyes now burned into my bosom's core;
This and more I sat divining, with my head at ease reclining
On the cushion's velvet lining that the lamp-light gloated o'er,
But whose velvet violet lining with the lamp-light gloating o'er
She shall press, ah, nevermore!

Then, methought, the air grew denser, perfumed from an unseen censer
Swung by seraphim whose foot-falls tinkled on the tufted floor.
"Wretch," I cried, "thy God hath lent thee—by these angels he hath sent thee
Respite—respite and nepenthe from thy memories of Lenore!
Quaff, oh quaff this kind nepenthe, and forget this lost Lenore!"
Quoth the Raven, "Nevermore."

"Prophet!" said I, "thing of evil! prophet still, if bird or devil!
Whether Tempter sent, or whether tempest tossed thee here ashore,
Desolate, yet all undaunted, on this desert land enchanted—
On this home by Horror haunted—tell me truly, I implore:
Is there—*is* there balm in Gilead?—tell me—tell me, I implore!"
Quoth the Raven, "Nevermore."

"Prophet!" said I, "thing of evil! prophet still, if bird or devil!
By that Heaven that bends above us, by that God we both adore,
Tell this soul with sorrow laden if, within the distant Aidenn,
It shall clasp a sainted maiden whom the angels name Lenore:
Clasp a rare and radiant maiden whom the angels name Lenore!"
Quoth the Raven, "Nevermore."

"Be that word our sign of parting, bird or fiend!" I shrieked, upstarting.
"Get thee back into the tempest and the Night's Plutonian shore!
Leave no black plume as a token of that lie thy soul hath spoken!
Leave my loneliness unbroken! quit t' e bust above my door!
Take thy beak from out my heart, and take thy form from off my door!"
Quoth the Raven, "Nevermore."

And the Raven, never flitting, still is sitting, still is sitting
On the pallid bust of Pallas just above my chamber door:
And his eyes have all the seeming of a demon's that is dreaming,
And the lamp-light o'er him streaming throws his shadow on the floor;
And my soul from out that shadow that lies floating on the floor
Shall be lifted—Nevermore!

The Siege of Belgrade

By ALARIC ALEXANDER WATTS (1797-1864)

An Austrian Army, awfully arrayed,
Boldly by battery besieged Belgrade;
Cossack commanders cannonading come,
Dealing destruction's devastating doom.
Every endeavor engineers essay
For fame, for fortune,—fighting furious fray:
Generals 'gainst generals grapple—gracious God
How honors Heaven heroic hardihood!
Infuriate, indiscriminate in ill,
Kindred kill kinsmen—kinsmen kindred kill!
Labor low levels loftiest, longest lines;
Men march 'mid mounds, 'mid moles, 'mid murderous mines.
Now noisy, noxious numbers notice naught
Of outward obstacles opposing ought:
Poor patriots, partly purchased, partly pressed,
Quite quailing, quaking, quickly quarter quest.
Reason returns, religious right redounds,
Suwarrow stops such sanguinary sounds:
Truce to thee, Turkey—triumph to thy train!
Unjust, unwise, unmerciful Ukraine!
Vanish vain victory! vanish victory vain!
Why wish we warfare? Wherefore welcome were
Xerxes, Ximenes, Xanthus, Xaviere?
Yield, yield, ye youths! ye yeomen, yield your yell!
Zeno's, Zarpatus', Zoroaster's zeal,
All, all arouse! all against arms appeal!

The Destruction of Sennacherib

By LORD BYRON (1788-1824)

THE Assyrian came down like the wolf on the fold,
And his cohorts were gleaming in purple and gold;
And the sheen of their spears was like stars on the sea,
When the blue wave rolls nightly on deep Galilee.

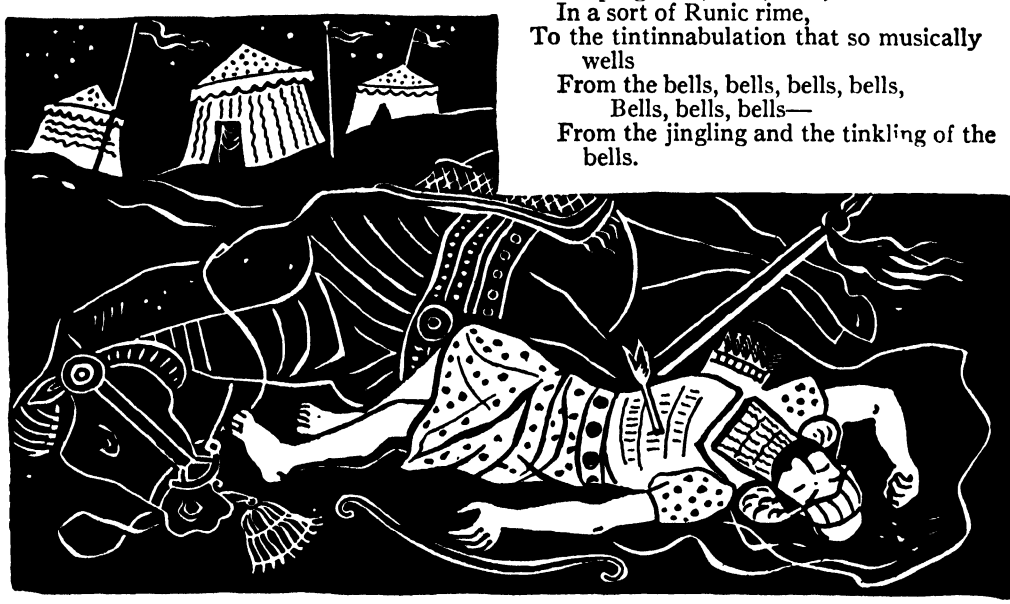
Like the leaves of the forest when Summer is green,
That host with their banners at sunset were seen:
Like the leaves of the forest when Autumn hath blown,
That host on the morrow lay withered and strown.

For the Angel of Death spread his wings on the blast,
And breathed in the face of the foe as he passed;
And the eyes of the sleepers waxed deadly and chill,
And their hearts but once heaved, and for ever grew still!

And there lay the steed with his nostril all wide,
But through it there rolled not the breath of his pride:
And the foam of his gasping lay white on the turf,
And cold as the spray of the rock-beating surf.

And there lay the rider distorted and pale,
With the dew on his brow, and the rust on his mail;
And the tents were all silent, the banners alone,
The lances unlifted, the trumpet unblown.

And the widows of Ashur are loud in their wail,
And the idols are broke in the temple of Baal;
And the might of the Gentile, unsmote by the sword,
Hath melted like snow in the glance of the Lord!



The Bells

By EDGAR ALLAN POE (1809-1849)

I

HEAR the sledges with the bells,
Silver bells!
What a world of merriment their melody foretells!
How they tinkle, tinkle, tinkle,
In the icy air of night!
While the stars that oversprinkle
All the heavens seem to twinkle
With a crystalline delight;
Keeping time, time, time,
In a sort of Runic rime,
To the tintinnabulation that so musically wells
From the bells, bells, bells, bells,
Bells, bells, bells—
From the jingling and the tinkling of the bells.



II

Hear the mellow wedding bells,
Golden bells!
What a world of happiness their harmony foretells!
Through the balmy air of night
How they ring out their delight!
From the molten-golden notes,
And all in tune,
What a liquid ditty floats
To the turtle-dove that listens, while she gloats
On the moon!
Oh, from out the sounding cells,
What a gush of euphony voluminously wells!
How it swells!
How it dwells
On the future; how it tells
Of the rapture that impels
To the swinging and the ringing
Of the bells, bells, bells,
Of the bells, bells, bells, bells,
Bells, bells, bells—
To the riming and the chiming of the bells!

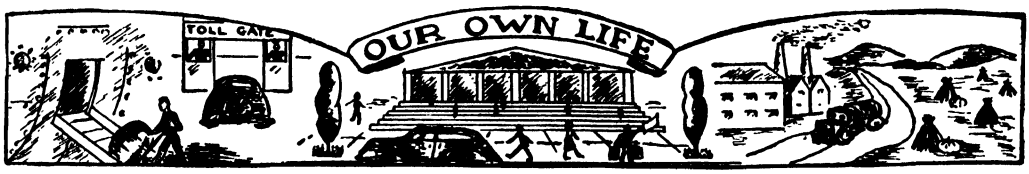
III

Hear the loud alarum bells—
Brazen bells!
What a tale of terror, now, their turbulency tells!
In the startled ear of night
How they scream out their affright!
Too much horrified to speak,
They can only shriek, shriek,
Out of tune,
In a clamorous appealing to the mercy of the fire,
In a mad expostulation with the deaf and frantic fire.
Leaping higher, higher, higher,
With a desperate desire,
And a resolute endeavor
Now, now to sit, or never,
By the side of the pale-faced moon.
Oh, the bells, bells, bells!
What a tale their terror tells
Of despair!
How they clang, and clash, and roar!
What a horror they outpour
On the bosom of the palpitating air!
Yet the ear it fully knows,
By the twanging,
And the clanging,
How the danger ebbs and flows;
Yet the ear distinctly tells,
In the jangling,
And the wrangling,
How the danger sinks and swells,
By the sinking or the swelling in the anger of the bells;
Of the bells—
Of the bells, bells, bells, bells,
Bells, bells, bells—
In the clamor and the clangor of the bells!

IV

Hear the tolling of the bells,
Iron bells!
What a world of solemn thought their melody compels!
In the silence of the night,
How we shiver with affright
At the melancholy menace of their tone!
For every sound that floats
From the rust within their throats,
Is a groan.
And the people—ah, the people,
They that dwell up in the steeple,
All alone.
And who tolling, tolling, tolling,
In that muffled monotone,
Feel a glory in so rolling
On the human heart a stone—
They are neither man nor woman,
They are neither brute nor human,
They are ghouls:
And their king it is who tolls;
And he rolls, rolls, rolls,
Rolls
A paean from the bells!
And his merry bosom swells
With the paean of the bells!
And he dances, and he yells;
Keeping time, time, time,
In a sort of Runic rime,
To the throbbing of the bells;
Of the bells, bells, bells—
To the sobbing of the bells;
Keeping time, time, time,
As he knells, knells, knells,
In a happy Runic rime,
To the rolling of the bells;
Of the bells, bells, bells—
To the tolling of the bells,
Of the bells, bells, bells, bells,
Bells, bells, bells—
To the moaning and the groaning of the bells.

THE NEXT POETRY CHAPTER IS ON PAGE 6985.



OURSELVES *and the* WORLD'S NATIONS

HOWEVER far back we go in the history of thought we find it recognized that man is, as Aristotle called him, a social animal. "None of us liveth to himself."

Unless we understand this fact and make it work in our lives, we can not be happy. Most of the great men of the world have realized its truth; and so have millions of others who, in simple ways, without thought of fame or reward, have lived in harmony with this great law.

We come into the world helpless, less able to take care of ourselves than any other living thing, animal or vegetable, and we remain helpless for a longer period than any other creature. From our first hour we are dependent on others, who influence us from the cradle to the grave, so that every one of us is, in some degree, actually a social product.

There have been cases of children a few years old who have been lost and have managed to live alone in a wood or forest for some years. But they grew up into beings which seemed hardly human. They missed the human companionship which every one of us needs; though, of course, they had it in their earliest years, or they would have died.

We must again go back to Aristotle, and even to Plato, his master, for the next great truth which we must learn—a truth which follows directly from what we have been saying. It is that a nation is not just a number of people, but is, in itself, like a great living creature. We call it the body politic, or the social organism, and sometimes picture it as a noble woman. This com-



parison of a nation with the body of a living individual is a very significant one.

Elsewhere in this book we read that, though an atom is a whole, it is made up of parts called protons and electrons and neutrons. Your body, though it is a whole, is made up of parts called cells, which are themselves alive. We have only begun to understand the living body since we learned something about the nature of the cells which make it.

So, also, we may imagine that the nation is a living body; but we shall never really understand the life of a nation until we understand the nature of the persons who combine to make it. That is the great key which governs all true thinking about a nation. It is one reason why we have been studying our own bodies and minds, so as to lead up to the study of the nation of which each of us is a part.

HOW A NATION OR "BODY POLITIC" MAY BE COMPARED TO THE HUMAN BODY

Now let us go a little more carefully into this comparison between the individual and a nation made up of many individuals, or units. In studying the history of life we find that the very smallest living things consist of only a single cell. Then there are living things consisting of a few cells all alike. In higher forms of life there are cells, few or many, which are different. In our own bodies, for example, there are billions of billions of cells. Some do one thing, and some, another. The same is true in a nation. In a nation the term usually employed is "division of labor."

This division of labor does not mean merely that when there is a lot of water to be carried from one place to another the labor is divided among ten men, each of whom takes a bucket and runs back and forth. It means, so to speak, that one man grows rubber and another manufactures rubber hose; that another gets iron out of the earth, while another makes iron into steel, and another makes steel into bridges; so that by such a division of labor the work is done far more easily than if all men did the same thing. When a great Frenchman was studying the life of the body, he saw that this division of labor occurs in the human body just as it does in the body politic; and so he called it the *physiological division of labor,* by which name it has been known ever since.

Now, with this key we can begin to understand many things. A nation has life, just as the body has life. It has to have men to guide it; and the men who guide a nation correspond to the nerve cells of the brain. It has to have men who make special things for the nation; and the manufacturers correspond to the gland cells of the body. It has to have people like soldiers, doctors and nurses to protect it from enemies inside and outside; and these protectors correspond to the white cells of the blood, which kill microbes, remove dirt from the air passages, and carry medicine and food to the parts of the body that have been injured.

The body could not exist without the division of labor; and the division of labor could not be carried on as it is unless the cells of the body were different. A nerve cell can not do the work of a red blood cell, nor a red blood cell that of a nerve cell; and neither of them can do the work of a muscle cell; and any of the three would make a very poor cell to cover the outside of our teeth. So we might go on endlessly. But the point is that this is precisely true of a nation. If all the cells of the body were born the same, it could never be a body at all; and if all men were born the same, they could never make a nation.

Fortunately all men are born more or less different; our faces are all different, and it is now beginning to be seen that this difference in our faces corresponds to deeper differences which are in all of us. One man has great strength and endurance; another is a great thinker; still another has musical skill, or inventive genius. Each can help the other. Ages ago the Emperor Marcus Aurelius declared that, instead of disliking or despising people who are different from ourselves, we ought to say, "The universe has need of them." One of the first needs for any nation is to realize these truths. We find that we are all dependent on one another.

DIVISION OF LABOR HAS BEEN PRACTICED SINCE EARLY TIMES

Ages ago, in rude and savage tribes, there was division of labor, though not nearly so much as there is now. The first division of labor was always that between men and women. There was also a certain amount of division of labor between young and old, between the skillful and the strong, between the enterprising and the stay-at-homes. As a society became more complicated, labor was divided up still more.

More and more people became specialists, just as the five or six different kinds of white blood cells are specialists; and all white blood cells taken together are specialists as compared with other blood cells, and all

blood cells together as compared with the rest of the body.

There is a famous old story of a revolt in the body, when the other parts of it said that the stomach did no part of the work, yet got all the food. Of course, we see that that would be a very foolish thing for the body. It would be just as bad for the body if the stomach revolted and said it would keep all the food it received. The stomach would get indigestion and the rest of the body would starve. The article on Co-operation explains this idea more fully.

It is no longer enough, however, for us to live in harmony with the people of our own nation. The time has come in the world's life when we must strive for a wider harmony—harmony between nations. Each kind of cell in the body has something to get from the body, and something to give. Each person in the nation should give and receive. Each nation on the globe must serve the others, and be served by them. The article on United Nations will tell you of a practical effort to bring the world's countries into harmony. The article on Trade Between Nations will tell you that one-sided commerce does a country very little good. "It takes two to make a bargain," and both must profit. In all our dealings with other nations, let us learn to use imagination. If we try to understand their interests, as well as our own, and if they will be equally considerate, little conflicts will not grow into big conflicts.

More than one hundred years ago the poet Tennyson wrote a passage of great beauty on the subject which we have been here discussing. Surely no finer quotation could be found to conclude this article, which is the final article in the department of Our Own Life:

For I dipt into the future, far as human eye could see,
Saw the Vision of the world, and all the wonder that would be;

Saw the heavens fill with commerce, argosies of magic sails,
Pilots of the purple twilight, dropping down with costly bales;

Heard the heavens fill with shouting, and there rain'd a ghastly dew
From the nations' airy navies grappling in the central blue;

Far along the world-wide whisper of the south-wind rushing warm,
With the standards of the peoples plunging thro' the thunder-storm;

Till the war-drum throbb'd no longer, and the battle-flags were furl'd
In the Parliament of man, the Federation of the world.

THE END OF THE STORY OF OUR OWN LIFE.





Buddie II, successor to the original Seeing Eye dog.

The SEEING EYE

PERHAPS you have walked into a dark room and suddenly realized how helpless you were without light. Perhaps you moved slowly and carefully, yet bumped into some object. What you felt at that time is what thousands of blind people feel all their lives. They must depend upon others to lead them everywhere. Although they are often able to work, most of the jobs open to them are tiresome and pay very little. Often they become dependent upon charity.

It was to give the blind happier and more useful lives that The Seeing Eye was established in Morristown, New Jersey. For many years dogs have been used for leading the blind, but there was little attempt to train them. A magazine article, written by a woman who had a "dog school" in Switzerland, aroused the interest of a blind young man. He went to Switzerland and there learned how to use a dog guide. He returned to America with his dog Buddy. Buddy's success in the heaviest city traffic was so remarkable that it was decided to create the organization now known as The Seeing Eye.

The Seeing Eye is supported by contributions. There are even junior clubs in the schools which raise money for this cause by putting on plays, holding pet shows and other activities. This money is used for buying dogs, caring for them and paying teachers, and even for training the blind to use their guide dogs successfully.

The dogs used are German shepherds, popularly known as "police dogs." Other breeds used are boxers or, Labrador retrievers. A Seeing Eye guide works very simply. It wears a leather harness with a long handle rising from the back. The handle is high so that the blind person does not have to stoop to hold it comfortably. The dog must obey three spoken orders, "Left," "Right" and "Forward." We must remember that it does not know where to go unless its master directs it. A blind person, however, forms a picture in his mind of his surroundings. All he needs is a leader. Even if he visits strange places he can easily ask directions as to the number of blocks and turns he must make to get to his destination. Then he can tell his dog when to go left, right or forward. The dog keeps him from bumping into other people, cars and obstructions. When they come to the curb of a street the dog stops until its master finds the step. Their pace is a little faster than that of the average walker.

The Seeing Eye guide's training begins at about fourteen months and lasts for three.



This dog is being trained to observe overhead obstacles.

It learns obedience. Then it is taught to lead a trainer in traffic. In the last stage it must learn to disobey! Let us suppose that some object blocks the path of dog and master. The master does not know it is there and the only command he can give is "Forward." Here the dog must think for itself. If it is to lead its master safely around the obstruction it must disobey his command. This it does, and even though it must make left and right turns, after the obstruction is passed it continues in the original direction. The dog is also trained to judge the height of overhanging objects, like awnings, lest its master bump his head.

When the dog has finished its education it can be depended upon completely. Before it is given to a blind person it passes a very hard test. It must prove itself by leading an instructor, who is blindfolded, through the most dangerous traffic. In all its training it has been treated with kindness. A Seeing Eye dog is not punished for mistakes, because any animal taught by fear is never well trained. The scornful word "pfui" is used as a reprimand. On the other hand, the dog is encouraged to do good work until it learns to love its duties and is anxious at all times to please.

The education of the dog is only part of the program. Next the blind person spends thirty days at The Seeing Eye school, adapting himself by trial and lesson to the dog. Lectures and classes are held at the school, but real practice is given on the streets of Morristown. At first, an instructor accompanies the student and his dog. Later, however, the blind person walks alone with his dog.

When he arrives at the institution, each pupil is assigned a dog. From that time on, dog and master are always together. The master takes full charge of his guide and in a very short while a bond of affection grows between them which only death can break. If the dog dies its master knows that it will not be long before he goes to The Seeing Eye for another "friend."

Through his dog the blind person gains independence and hope such as he has never had during his sightless days. Many of the men and women who come to The Seeing Eye have a great fear, arising from dependence upon others; they are dispirited and embittered. Before they return home, life generally takes on a new meaning. The dogs become their "eyes" and no longer do they have to rely on others to take them where they want to go. Most railway, bus and street car companies let the dogs travel with their blind masters. Many hotels and restaurants, which do not usually allow dogs, also make



End of the training period. Before being turned over to his blind master, the Seeing Eye dog must rehearse in traffic, leading the blindfolded man who trained him.

an exception in the case of Seeing Eye guides

The Seeing Eye has many records of the good work made possible by its dogs. Very often graduates are able to get work which they could not do without dogs to lead them. One man was taken out of a poorhouse and given the care of candy-selling machines. This required visits to machines located at various points in his city. A human guide was too costly and alone he could visit only a few machines, but with a Seeing Eye dog he managed many more. In this way he supported himself without charity.

Another interesting story is that of a chemist who lost his sight in an explosion. He lost faith in himself. A dog guide helped him to establish a profitable magazine-subscription business and to regain hope and peace of mind. Men and women, who, before receiving Seeing Eye dogs, could find no means of making a living, now follow many occupations.

One of the noblest deeds of The Seeing Eye is the opportunity it offers to blind young people who wish to go to college. Formerly these students had to ask fellow classmates to lead them about the campus. Now, with Seeing Eye dogs, they are free to move about by themselves. It means that they can enter into activities which were closed to them before.

The wonderful work done by The Seeing Eye is well expressed by a student who had been through years of blindness without a dog. He was speaking to a group of other Seeing Eye students who had only recently lost their sight. "You've always had your dog guide. *You don't know what it is to have been blind!*"

THE END OF THE STORY OF GOLDEN DEEDS





The blind man must know how to give his dog commands, as well as to regard the dog's silent warnings of danger. The U-shaped leather harness, held tightly in the master's hand, helps him to interpret the dog's signals. Notice the alertness of the dog in the picture on the right. (See additional pictures on following pages.)



How Does a Mussel Build Its Shell?

THE protecting shell of a mussel is built by a special part of its body called the mantle. The surface cells at the edge of the mantle have the power of separating the carbonate of lime from the blood of the mollusk, and when the lime is thrown out to the surface it hardens and takes the form of a shell.

As the mussel grows its mantle grows, too, and the ever widening edge deposits more and more lime as it expands. Any spine, scallop or other irregularity of the shell is there because there was a similar irregularity in the margin of the mantle. Usually the shell can be divided into three layers, each made of thin plates running in different directions. The inmost layer usually shines with rainbow colors, and is known as mother-of-pearl.

An interesting feature of the mussel's shell-building ability is that when the mantle is colored—it may be striped or spotted—the same color pattern is reproduced in the shell. This is because the pigment, or coloring matter, from the mantle is deposited along with the carbonate of lime. Shells are found in many varieties and combinations of hues.

The mussel is a mollusk, and all the mollusks have shells made in the same way out of limy material, though some are microscopic and some weigh hundreds of pounds. The two shells of the bivalve mollusk known as the giant clam sometimes weigh more than five hundred pounds.

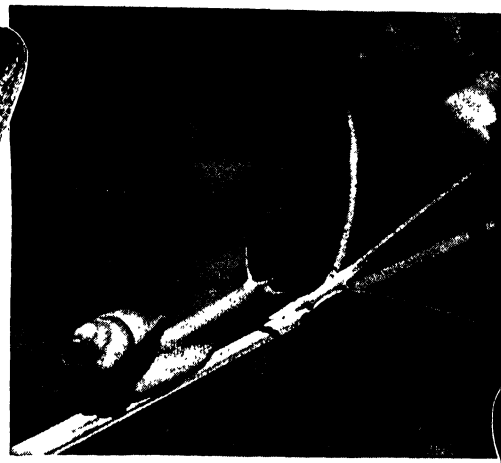
WHAT HAS HAPPENED TO THE SNAILS FROM ALL THE EMPTY SHELLS?

We may sometimes find along the seashore the white bones of a bird or some other animal, and we may ask why we do not find the dead bird, but only its bones. The answer is that the bones of the bird were harder than the rest of it, and lasted after all the soft flesh and muscle and everything else had decayed and disappeared. So in the case of the snail. When the snail dies, its soft body is easily broken up into many chemical substances, and all the moisture in it evaporates. Only the hard shell is left. Another example of this same process is coral. The tiny animals that build the coral die, leaving us the lovely yellowish red branches.

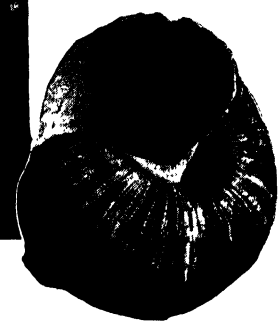
THE NEXT WONDER QUESTIONS ARE ON PAGE 6962.



American Museum of Natural History
The close-up view of an empty shell shows the perfect spiral.



L. W. Brownell
This snail out for a stroll feels where he is going by means of the "eyes" at the tips of his tentacles.



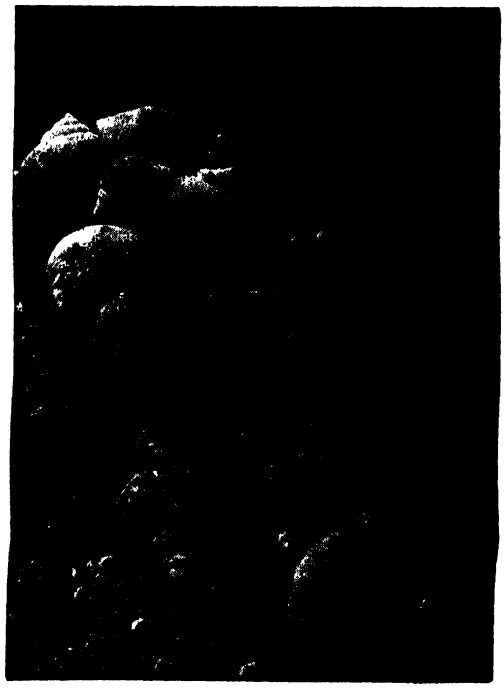
The MOLLUSKS

THE mollusks make up a large group of animals without backbones. They include snails, devilfishes, oysters, clams and other forms of life that are not so well known. All of these animals have soft bodies. Some have shells which serve as suits of armor. Some mollusks live on land, some in the sea; some dwell in fresh-water ponds, lakes and streams.

Most of us know something about snails and their relatives—pond snails, in particular. The first thing you notice about a pond snail is its limy shell, which is all in one piece and forms a spiral coil. In some snails the coil twists to the right, in others, to the left. Both right and left coils may be found among snails of the same species. Limpets, sea-dwelling animals closely related to the snails, do not have spiral shells, but develop tent-like coverings in the form of broad cones. Among the slugs, which are also members of the snail group, the shell is almost absent, or entirely so.

A snail is able to stretch its head out beyond the shell. On the head are two pairs of long processes called tentacles. Land snails have eyes at the ends of one pair of tentacles. In other kinds of snails these eyes are on the tentacles, but not at their ends. The other pair of tentacles may serve as centers for the sense of smell. The head also bears a mouth opening, which leads into a throat that may contain jaws to bite off food, and always includes a rasping structure that can be used to shred food materials.

A snail is also able to extend another portion of its body beyond the shell. This is the so-called foot, a muscular organ or flap that is used in crawling from place to place. Have you ever noticed that when a snail moves over a rock or some other flat surface it leaves a slick trail of mucus behind? This



L. W. Brownell
This species of sea snail is known as the periwinkle.

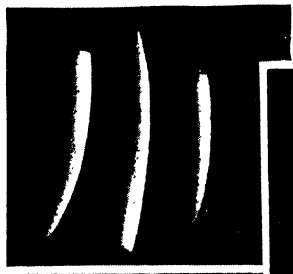
TEN REMARKABLE SEASHELLS



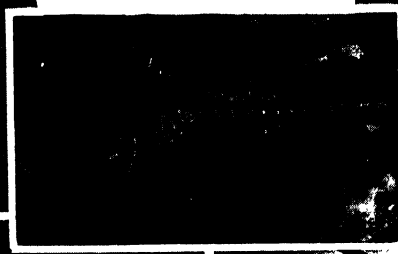
This shell shaped like an ice-cream cone is a Turritella Terebra.



The porphyry olive shell is covered with tiny tents.



As you might guess, these are tusk shells.



A comb shell that might be useful to a mermaid.



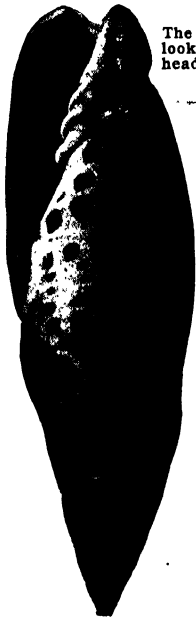
This fascinating mollusk shell is known as the cameo helmet.



The spider shell sometimes grows to a foot in length.



You can see how this turk cap got its name.



The Episcopal mitre looks like a bishop's headdress.



This one is called the slit shell, but it looks more like a spinning top.



Triton's trumpet is often over a foot long. It is from the tropics.

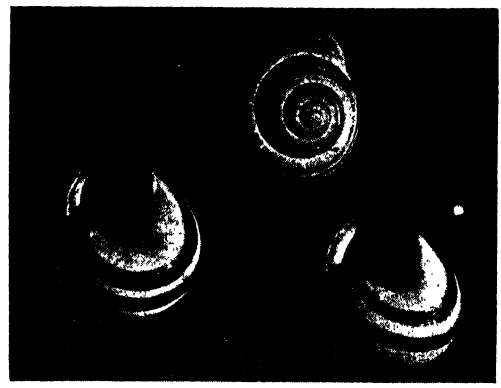
All photos, American Museum of Natural History

mucus is secreted by gland cells in the foot region, and it serves to moisten the path over which a snail creeps.

Some species of snails get their oxygen by means of gills, as fish do. Others have lung-like structures; and some merely take in oxygen through the body wall. Except for sea slugs, snails have a protective layer which covers the main portion of the body (except the head and foot) and is known as the mantle. It is the cells of this mantle that secrete, or manufacture, the shell.

You probably know that pond snails are often kept in aquariums because they will eat the tiny green plants that otherwise form films upon the glass surfaces. We have other uses for snails, also. Various kinds of land snails have been eaten by men throughout the ages. The present market supply goes largely to southern and western Europe, and to restaurants in our larger cities. These snails come mostly from snail farms, on which the animals are raised in small pens. Such farms are common in Spain, southern France and Italy. A snail will produce from fifty to sixty eggs a year. Two years must pass before a full-grown snail can develop.

Various sea snails and their relatives are also used as human food. Among them are the whelks and periwinkles, rather large species which are commonly eaten in Europe. The periwinkle has been brought to the New World, and is now found along parts of the Atlantic coast of North America. The abalones of our Pacific coast are collected in large numbers, and eaten fresh as "abalone steak," or dried and smoked and used in flavoring soups and making chowders. There is always a good demand for dried abalone among the peoples of the Orient.



American Museum of Natural History

The Helix Nemoralis wears a gay striped shell.

IT WAS ONE OF THE SEA MOLLUSKS THAT INSPIRED "THE CHAMBERED NAUTILUS"

Among the sea mollusks are the squids, octopods, or octopuses, and nautilids, or nautili. Nautili have become famous because of Oliver Wendell Holmes' poem, THE CHAMBERED NAUTILUS. These animals have well-developed head regions with large eyes. The mouth has a pair of sharp jaws meeting in a parrot-like beak, which is used in seizing and tearing the prey. Oxygen is taken through gills. Nautili have coiled shells, but other members of the group either have no skeletons, or merely a rod-like inner support.

Both squids and octopods have a structure known as an ink sac, filled with a dark-colored fluid. When a squid or octopus wishes to escape from a possible enemy, it may squirt this fluid into the water to form an "ink screen" under cover of which it retreats. These creatures have a kind of "jet-propulsion" aid to swimming. They develop mantle layers like those of the snails. The space between the mantle and the body proper is known as the mantle cavity. In swimming, water is taken into the mantle cavity and then forced out suddenly through a funnel. When the water squirts out of the funnel, the body of the squid or octopus is pushed in the opposite direction. Squids also have a pair of flap-like fins near one end of the body, which can produce slow swimming movements.

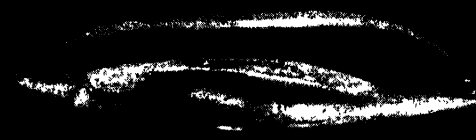
The common squids found along the eastern coast of North America have very long slender bodies, with the head, eight arms and two tentacles at one end. Both arms and tentacles bear suckers, and are used to seize and hold victims that are about to be eaten.

Squids are found in many of the warmer seas. Being relatively small, squids are eaten by various fishes, and for that reason they often are used as bait by fishermen. People also eat squids, especially in lands bordering on the Mediterranean Sea and in some of the larger North American cities.

The octopus, like the squid, has eight arms, but in the octopus the two longer tentacles found in squids are absent. The octopus uses its eight arms, with their suckers, to seize its prey and to climb or crawl about on the bottom of the sea. Octopods have no shell.

One species of octopus, or devilfish, is known to attain a weight of seventy-five pounds; and with its eight long arms, large staring eyes and vicious beak, is a creature to inspire fear in the stoutest heart. There are many stories of attacks by octopuses

MORE INTERESTING SEASHELLS



American Museum of Natural History
This queer shell is Simnia Californica.



This is a tiger cowry.



A highly polished Turbo Marmoratus.



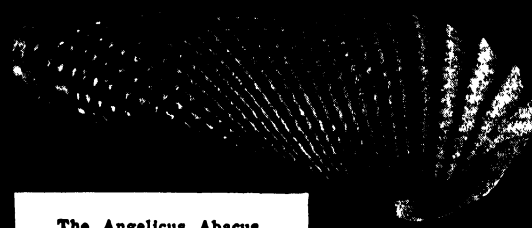
Rear view, tiger cowry.



Strombus Gallus, a species of conch.



The inside of a conch is often pink.



The Angelicus Abacus.

upon divers, and upon waders and swimmers. One of the most famous accounts of a fight between an octopus and a man is in Victor Hugo's TOILERS OF THE SEA. Probably most reports of this nature are more than half fiction. Nevertheless, large octopods have been known to attack and seriously hurt pearl-divers in the South Pacific.

The American octopus, or devilfish, is only about a yard long when fully grown, and is found in waters of the West Indies and along the Florida coast. It hides in rocky places on the bottom, especially around coral reefs, and feeds largely upon shellfish. Another much smaller species is common in the deeper water along the Atlantic coast of North America above the region of Cape Cod. Far larger than either of the preceding types is a type that occurs along the Pacific coast of North America, from Alaska to Mexico. In all, some fifty different kinds of octopods are known.

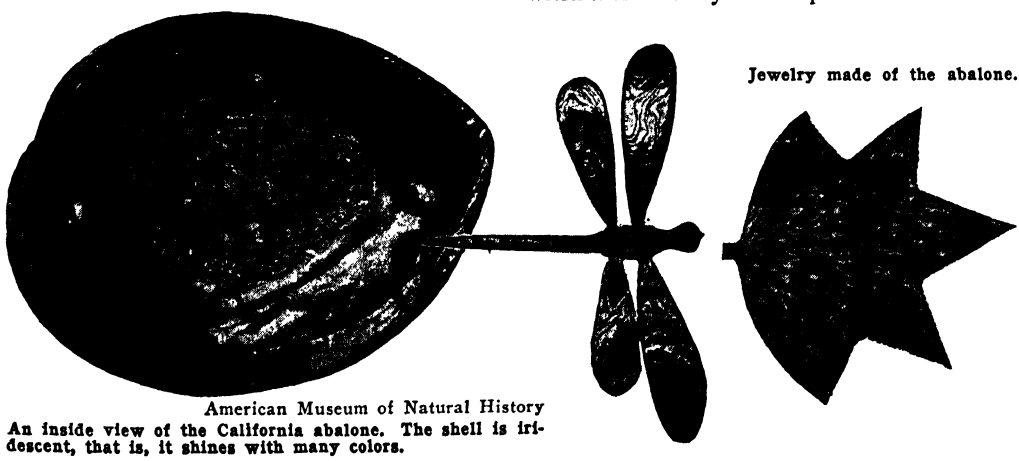
Strangely enough, octopus meat is eaten by people in various parts of the world, and especially in cities along the sea in Europe, the Orient and North America. South Sea Islanders sometimes wrap octopus arms in leaves of the taro plant, and cook them on hot stones.

There are only about four species of nautilids in the modern world. Once there were many more. Although fairly closely related to the squids and octopods, nautilids look very different, for they have outer coverings of coiled shells. They have about forty tentacles around the mouth opening, but the tentacles do not bear suckers. Nautilids are eaten by natives of the South Pacific, and are also sought as souvenirs and as specimens for natural history museums.

Another very important group of mollusks includes the clams, oysters and mussels. Some of the members of this group live in the sea, and others are found in freshwater streams, lakes and ponds. They are called bivalves because their shells are in two parts or valves. Bivalves do not have definite head regions like those of snails, squids and octopods.

The soft body of a bivalve lies inside the protecting shell, and is largely covered by a fleshy mantle layer. There is a muscular flap, or foot, which in some species can be extended beyond the shell. Between the mantle and the body proper is a space, or mantle cavity. Many species of bivalves have two pairs of gills in this mantle cavity, and there are usually two muscular tubes, or siphons, through which water enters and leaves the mantle cavity. The current of water coming in through one siphon brings oxygen and the tiny plants and animals upon which bivalves feed. The outgoing current of the other siphon carries off wastes.

The two valves of a bivalve shell are manufactured by the mantle layer. They are composed largely of a lime-like substance taken from the water. The inner surface of a valve is coated with fine, dense layers of nacre, or mother-of-pearl. Nacre may be dull white in color, or it may shine with all the colors of the rainbow. The valves of a shell usually interlock along one margin of the shell, and are free to open at the opposite margin. One or two strong muscles which extend between the two valves serve as hinges by which the valves are opened and closed. These are called adductor muscles. These are the muscles that must be cut when a clam or oyster is opened with a knife.



American Museum of Natural History

An inside view of the California abalone. The shell is iridescent, that is, it shines with many colors.

Jewelry made of the abalone.

The scars where the muscles were attached can be plainly seen on the inner surfaces of discarded shells.

Among the bivalves are the oysters which we eat. They have been an important item of human fare for centuries. Early settlers along the Atlantic coast of North America found the Indians feeding upon oysters, especially during the winter season. Great piles of oyster shells had been built up near many of the Indian towns and villages. Oysters were a boon to the colonists, too, because in those early days these bivalves were abundant in the shallow waters of the bays, and they provided good food that could be easily obtained.

For many years it was thought that there would always be plenty of oysters to meet any demand, but toward the close of the nineteenth century the natural supply be-



American Museum of Natural History

Devilfish sometimes attack human pearl-divers, but most species of this weird-looking sea creature are quite small and timid. In this photograph you can see the suckers along the undersides of the tentacles.

gan to fail to an alarming extent. The Indians had, of course, eaten oysters for hundreds of years. However, there were never many Indians to do the eating. The number of whites, on the other hand, kept increasing as the years passed. Moreover, methods of canning and preserving oysters were developed, and large quantities were shipped to the inland markets. So the time came when men began to think of raising oysters for trade. Today this is an important occupation in several places along the coasts.

The secret of oyster-raising is to know how these shellfish live and grow. Let us take as an example the case of the oyster found along the eastern and Gulf coasts of North America. A single female may produce as many as sixteen million eggs in a season. These eggs are merely discharged into the water. Meanwhile, male oysters discharge their sperm cells into the water also. If an egg cell encounters a sperm cell in the water, the sperm cell may enter the egg cell, and the fertilized egg develops into a tiny larva which bears little hair-like processes, called cilia. The cilia are used to provide swimming movements; and the larva now goes to the surface of the sea where it remains for about three weeks.

When fully grown, an oyster larva is about one seventy-fifth of an inch in diameter and is known to the oystermen as a "spat." The spat now drops to the bottom and becomes attached to some solid object by its left valve, which has begun to develop. From this time until the end of its life the oyster remains in the same location. Its fixed position is something of a hazard, because the oyster is at the mercy of the shifting sands and mud which may cover



American Museum of Natural History

Jellyfish (left) have no shells and are not mollusks. Squids (right) are mollusks, but instead of a shell have a rod-like inner support. Above is a paper nautilus or argonaut.

FAMILIAR AND STRANGE MOLLUSKS









Oysters are at home among submarine plants. They feed on tiny plants and animals. Insert above, the painted thorny oyster.

Upper photos L. W. Brownell; American Museum of Natural History

Upper left corner, common edible mussels to be found along the shores of Europe and America. Left, the ribbed or black mussels.



The familiar hard-shell clam.

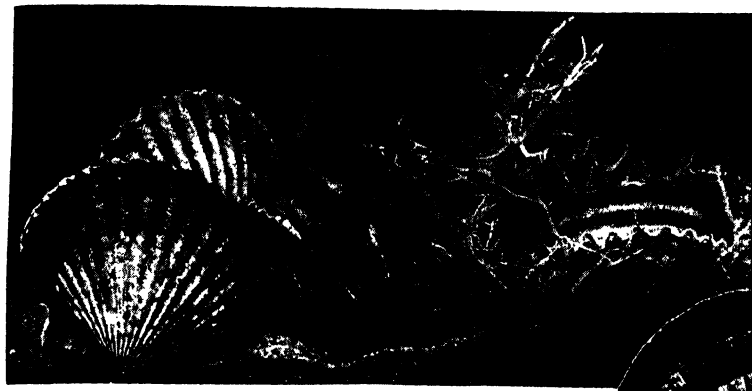
Right, this bivalve is known as the bear paw clam.



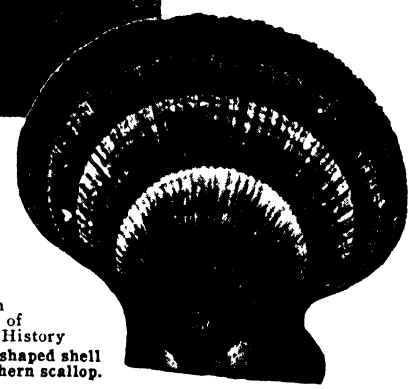


Lower photos L.W. Brownell; American Museum of Natural History

From its delicate shape, this species is known as the angel wing clam.



L. W. Brownell
At the left you see a group of scallops in their natural habitat on the sandy bottom of the ocean.



American Museum of Natural History
The fan-shaped shell of a northern scallop.

and smother the little bivalve at any time.

Oysters also have a number of natural enemies—the starfishes, which use their long arms to open oyster shells, and some of the larger bony fishes, such as the drumfish, which crush the shells of young oysters in their jaws. Various small types of snails drill through the shells of oysters to get at the soft bodies inside. During the period when oyster larvae are swimming or floating on the surface of the sea they are practically defenseless, and they are devoured in great numbers by fishes. No wonder oysters used to be rare and were regarded as a luxury.

Between the hazards of shifting sands and natural enemies, only a small percentage of oyster eggs ever produce adults. But oystermen have found ways and means to improve upon conditions found in nature. During the season when oyster eggs are produced, the oystermen may locate shallow bays where the surface of the water is filled with oyster larvae. They "pave" the bottom of such a bay with brush, pieces of old brick and tile, junk metal and other solid objects. In due course of time the spat drop to the bottom and become attached to this paving material, which can then be collected and "planted" in places that are suitable for oyster growth and development. Such places should be free from sewage and strong currents. They should provide a hard mud bottom, both because the hard mud is not likely to shift, and because on such a bottom there will be a growth of marine plants. Tiny plants, and animals that feed upon the marine plants, will provide food for the oysters. An effort is also made by oystermen to destroy natural enemies of the oysters. Starfish, for example, are sometimes dredged up from the bottom and killed. About half of the oysters we eat now come from privately owned beds.

Oysters are usually harvested after about four years of growth. They are either picked by hand in shallow water or raked or dredged up from the bottom.

The hard-shell clam is found along the southern portion of North America's Atlantic coast. It is so named because its shell, although small, is thick and hard. It has a good many local names, such as quahog, quohog, round clam, little-neck clam, and cherrystone clam. This clam is not attached to any object, but lives freely on the bottom of the ocean, usually in water more than fifty feet deep. It is a favorite variety for clam fries and chowders, and is also eaten raw on the half-shell. Since it lives in fairly deep water it can not be picked or raked up, but must be dredged.

The soft-shell clam, also known as the long-neck clam and the clam-chowder clam, is a North American species, occurring along the northern parts of both Atlantic and Pacific coast. Soft-shell clams may be steamed and buttered, or they may be fried or used in clam chowders.

The name "soft-shell clam" probably has its origin in the fact that this bivalve has a rather thin and fragile shell that can be crushed readily. A soft-shell clam lives buried in mud or sand to a depth of several inches along the shore. It possesses unusually long siphons and these are extended up through

the mud to the water above. In this way the animal gets oxygen and food and disposes of its wastes. The clam uses its muscular foot in digging or burrowing. Clam fishermen go along the shore and locate the telltale holes made by the clams. Then it is a fairly simple matter to dig them out with a short-pronged rake or hoe.

Third place among the bivalves we eat is held by scallops. Several species are found along the Atlantic and Gulf coast of North America. One of the better-known types is the bay scallop. Like hard-shell clams, scallops live freely on the bottom, and are not attached to any solid objects. Their shells are fan-shaped, have straight hinge lines, and are marked by heavy, regular ridges that radiate from the hinge line to the opposite margin. Scallops have only one adductor muscle, and this muscle is the only part of the animal that is used as human food.

The salt-water mussel lives in shallow water along the shores of Europe and eastern North America, in vast numbers at some places. It has a thin black shell. The salt-water mussel has long been used as food by the Europeans, and is occasionally served in restaurants in our larger cities. One reason it has not become more popular as food in North America is that this species spoils rather quickly when it has been removed from its natural element.

MANY MOLLUSKS ARE VALUABLE FOR OTHER USES THAN AS FOOD

In addition to their use as food, mollusks have also become very important in the modern world as sources of shell and shell products. Many tons of mollusk shells are crushed or ground up every year to be used as road-building and other construction materials. Ground-up shells also are a source of lime that can be used on soils, or fed to poultry. In the Mississippi Valley the shells of fresh-water mussels are utilized in the manufacture of pearl buttons. For a time, the mussels of this area were threatened with extinction because they were being used in such large numbers by the button factories. Laws which close certain streams to the clam fishermen now protect the mussels and give them a chance to become more numerous.

One of the most interesting and important bivalves from the standpoint of shell and pearl products is the pearl oyster, a fairly large type that is found on the west coast of Central America and Mexico, in various parts of the South Pacific, and in the Indian Ocean, the Persian Gulf and the Red Sea. Shells of this oyster (except those from the Red Sea, which are of poor quality) have a good market, and are used in making many pearl products, including inlays. The world center of the pearl-oyster fishery is the north coast of Ceylon. The majority of these bivalves are brought up from the depths by native divers, who get their steady reward from sale of the shells, with the added possibility that an occasional pearl may be found.

HOW NATURAL PEARLS ARE FORMED BY OYSTERS OR MUSSELS

Pearls are the most interesting products that come from mollusks, and the majority of good large pearls have been found in pearl oysters of the ocean. However, many gem pearls have been taken from fresh-water mussels of the streams of North America and Asia, and occasional specimens have been found in edible oysters. A sand grain may get between the valves of a clam or oyster shell. Its presence is irritating to the sensitive mantle layer, which responds by coating the sand grain with nacre. After several layers of the smooth nacre have been deposited, the sand grain becomes less irritating, but it probably will be irregular in shape and cemented to the shell. Such objects are not gem pearls, but are called "slugs" in the pearl trade, and have little value. The writer has taken a dozen or more slugs from a single fresh-water mussel.

True gem pearls may be formed in another manner. It is thought that little worm parasites occasionally get into the oysters and form cysts in the mantle layers. Such a cyst is then coated with layers of nacre, and eventually becomes a pearl. Since the cyst is rounded in form to begin with, the pearl has a fair chance of remaining almost spherical. Moreover, since the growing pearl is lodged in a fleshy layer, it probably will not become cemented to the shell and the entire surface will be perfectly smooth.

The value of pearls depends upon their size, form, color, texture and whether enough of them can be obtained and matched to yield an attractive necklace. Pearls range in color from dull white to yellow, rose, steel-blue and black. Good matched necklaces of large pearls have sold for as much as a million dollars. We tell you more about pearls, including culture pearls, in the article on page 4675. See also in the Index Buttons; and Oysters.

By F. L. FITZPATRICK.

THE NEXT STORY OF ANIMAL LIFE IS ON PAGE 7059.

BEAUTIFUL SHELLS OF THE WORLD

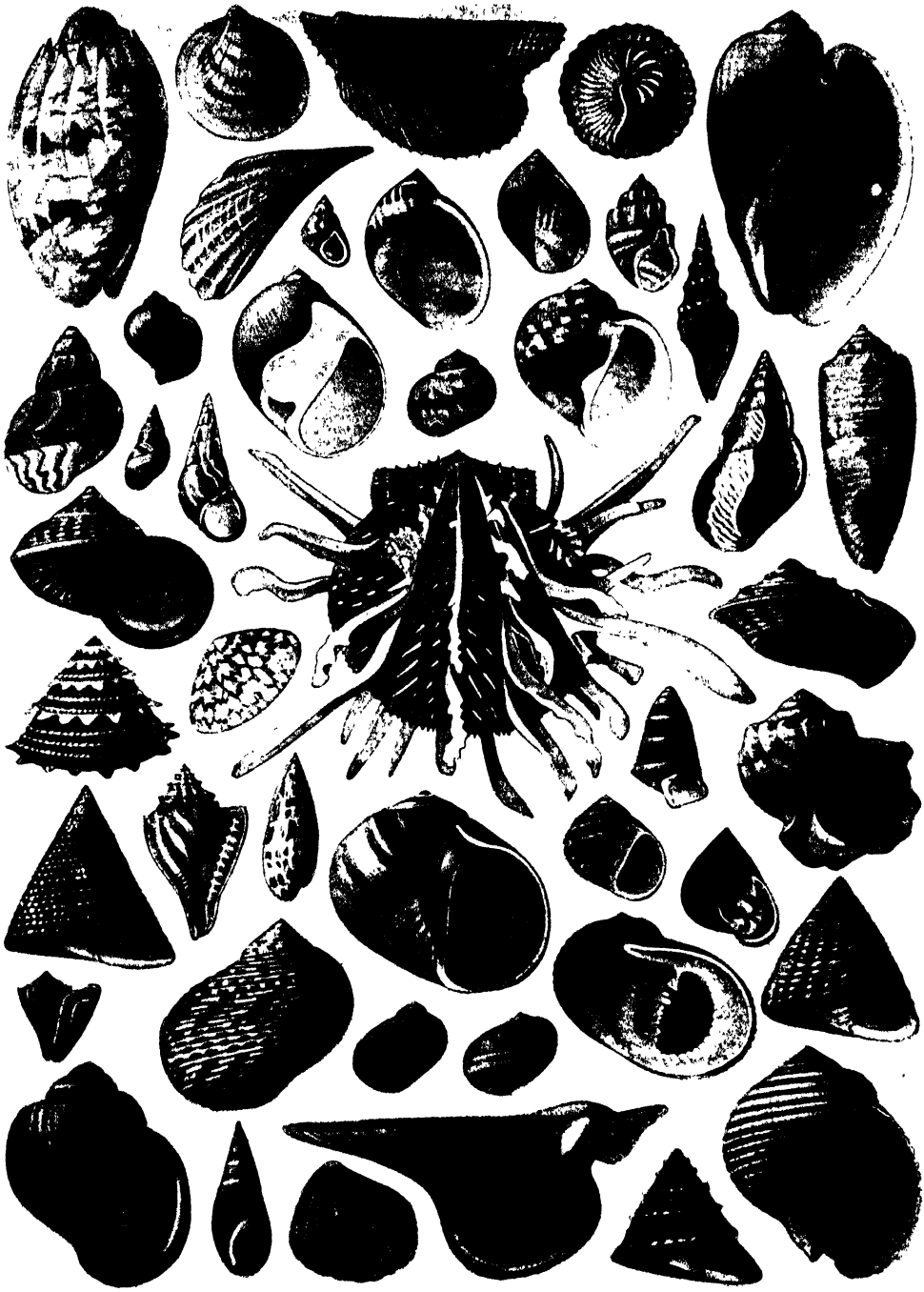
These pictures of shells of land, sea and river have been drawn from nature, and give some idea of the wonderful workmanship of their humble builders. A single shell is a work of art, but it is only when we see many together that we fully realize the beauty of their form and color. Most of the shells on this page are European, but some are common with us. Many have only difficult Latin names, but in the centre we see a Scallop, with the Striped Snail on its left, the Razor-shell underneath, and the Pond Mussel under that to the left. The first shell on the



page is the Lined Scallop and the last is the Sea Mussel. The big shell at the top is the Haliotis, and on the left of it is the Painter's Mussel. In the centre of the bottom is the Whelk. Under the striped snail is the Common Periwinkle, and under that again is the Horse Mussel. The pretty little pink shell on the left of the razor-shell is a Trochus Magus, and the curiously shaped shell on the right of the razor-shell is a Pelican's Foot. In the top right-hand corner is the Danicus Scallop, and under it the Tiger Scallop. Many of these will be clearly recognized.



You may recognize more of the shells on this and the two following pages, though but few of them have English names. The first is a Voluta, then come two little relatives of the Whelk and a Cone Shell, named from its shape. At the top on the right are three different kinds of Snails, and in the middle is a large Cowry, with a Scorpion Shell below it looking very spidery. In the bottom left-hand corner is a Wing Shell, and three snails are above it. In the bottom right-hand corner is a Turbinella, with two large Land Snails on its left. The beautiful heart-shaped shell in the bottom row is the Heart Cockle, and on its left is a little Scallop.



The first shell on this page is a Ducal Boat Shell. The queer-shaped ones like boats, top and bottom, are Aviculas. The spidery shell in the middle is a Spondylus and the group above it are Naticas, or Butterfly Shells. The green shell on the left like a pointed cap is a Trochus, and so is the one below it. The little spotted shell under the spondylus to the left is a Bishop's Mitre. The second shell down on the left and the two in line with it are Pheasant Shells. In the bottom left-hand corner is an Ampullaria, and in the right-hand corner a Black-mouthed Tun, with a trochus next to it on the left and another trochus above it. The four shells in a row above the avicula at the bottom are different kinds of Neritas.



The long spiky shell in the middle near the top is the Murex, often called Venus's Comb, and is the source of the ancient dye known as Tyrian purple. Another murex is immediately underneath this, but though it has projections, there are no sharp spikes as in its relative above. The big shell at the bottom, under the smaller murex, is a Bulla, or Bubble-shell. On the left of the spiky murex is the Nautilus, with a Haliotis below. The four long tapering shells in the middle are Terebras, or Boring Shells. Along the bottom on left and right are several kinds of Cowries. The shell halfway down on the right, like an ear, is the Ear-shell. These pictures do not, of course, show the shells in their natural sizes, but reduced.

FOREWORD FOR THE STORY OF MUSIC

EXPERIENCE has proven to me that music is a language which can be understood by all people, young, middle-aged or old, but they will understand and interpret it according to the emotions which they can feel and demonstrate at their respective periods of development. At my Young People's and Children's Concerts I find my audiences extraordinarily receptive to the most subtle expressions of feeling in the music which I explain and play for them. We all know that the joy of children is just as intense as our own, although it may be evoked by a different cause. The same is true of sorrow. The little girl whose doll is broken is just as tragically unhappy for the time being as a mother who has lost her child, although luckily the sorrow of the child is soon over and lost in the devotion to the next doll. I have therefore found it easy to make children realize that music is a language capable of demonstrating and beautifying the entire range of feeling which God has placed in the human heart. Children are equally quick to appreciate the evolution of music from the earlier times down to the present day.

Mr. Lawrence Jacob Abbott's article on the development of music is so able, and tells the story in such clear accents, that it can be appreciated not only by children, but those children of a larger growth who have not had opportunities for appreciating the greatest of all arts, which is now brought within the reach of all children who live in our larger cities. I congratulate the Grolier Society on having obtained so able an expression for its Book of Knowledge.

Walter Damrosch.

THE DEVELOPMENT OF MUSIC

I. THE BEGINNINGS AND GROWTH OF MUSIC



A PRACTICAL joke was once played on a great musician by a friend of his. One morning while this musical genius was still lying in bed his friend started to play a composition on the piano. He played it loudly enough to attract the musician's attention, and continued right on up to the very end. Then, just as he was about to sound the finishing chord he stopped. It was as if he had left the piece hanging in midair. The musician waited long for the last chord to come. Not a thing happened. Finally, in desperation, the disturbed man jumped out of bed, hurried downstairs to the piano, and finished it himself!

So responsive was he to the powers of music that cutting off the end of that piece was just as painful as cutting off his own little finger. Most people are not so sensitive as that. But, to some extent, music has the power to move all of us. Who, for instance, has not thrilled at the roll of the drums and the blaring-forth of brass instruments as the military band comes marching by? And music has so many different forms that it can affect us in a thousand different ways. The huge symphony orchestra of a hundred men that plays so impressively, the dance tune that makes our feet want to keep time to its rhythms, the big church organ with its solemn tones, the strange music of the opera, the cheerful little melodies of the hurdy-gurdy, the queer strains from far-off lands such as China and Egypt—these are but a few of the many kinds of music that affect us.

Some of it is good, some is bad. What is the difference between the two that makes us enjoy one and dislike the other? When we start to think about it we become very curious to know more about this strange and wonderful thing—music. Was it always in the form in which we know it? If not, where did it come from in the

beginning? How did it grow and change? To know a little of the interesting story of music in other lands and other times will give us more pleasure when we hear the music of to-day.

Back many centuries ago, among the primitive and savage races of mankind, the beginnings of music gradually took shape from the rude shoutings of men. How it did this will always be a matter of guesswork, but it is quite certain that singing of some sort came before any musical instruments were made. Probably hunting-calls or other vocal signals used in primitive life pleased the fancies of the people and began to be used for amusement. Perhaps the calls of the birds, the sound of the brook, or the whistling of the wind gave men the idea of imitating the sounds of nature. The picture shows primitive man making a sort of instrument of his arm by crooking it and chanting into the hollow. At any rate, the oldest music of which there is any record is a lament, or funeral chant, called by the Egyptians the "Maneros."



Primitive Chant, by H. A. MacNeil.

The tones which are used in all music of modern times seem so natural to us that it is hard to believe there was ever music based on a different system of tones. Yet, just as man has tried out all sorts of clothes, from the bearskin to the dress-suit, many kinds of scales, or arrangements of tones, were used before man finally discovered the form of music which pleased him best.

On the modern piano we are at liberty to strike eighty-eight different notes. Yet scientists have found 11,000 tones which can be told apart. What a small number, after all, musicians have chosen, to the exclusion of all the rest! If these cast-off tones are used by mistake, the music is said to be "out of tune." Thousands of years ago, however, these strange tones delighted the ears of savage peoples.

THE WONDERFUL PATTERN OF NOTES IN MODERN MUSIC

Let us examine our own musical tones and see what they are like. This is easiest to do with the piano. Musical tones are named after the first seven letters of the alphabet—A, B, C, D, E, F, G. Forgetting the black keys which divide the "whole notes" into "half notes," we start at the left of the piano with the lowest note, playing the white keys and naming the first A, the second B, and so on. When we have played seven we have used up the names, and must start in on the eighth with A again and repeat the same letters. Then notice a remarkable thing. No matter on what note we start, the eighth note after it, which is called by the same letter, always sounds strangely like the first. This eighth note is called the *octave,* after the Latin word for "eighth." Each A sounds like a thinner, higher version of the A below it; each C likewise sounds similar to every other C.

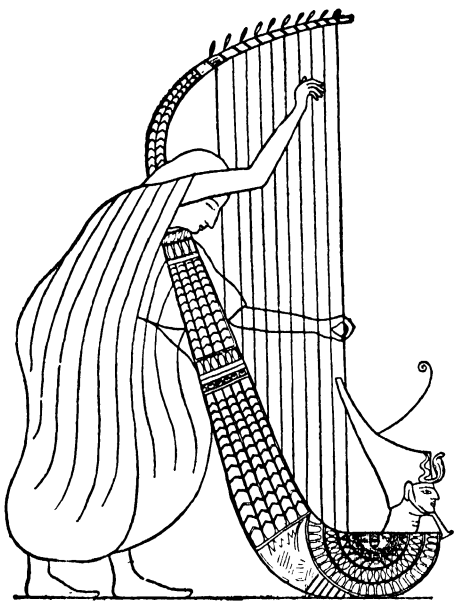
From the octave comes our modern scale. The complete scale, using both white and black keys, is made of twelve notes, each just as far apart in tone as the other. As we play from one C to another the white notes alone form our *major scale,* which is bright and cheery. And by changing a few notes we can form the *minor scale,* which is, by contrast, sad and mournful.

This arrangement of tones is based on fact, for Pythagoras, an ancient Greek philosopher, discovered from the Egyptians its mathematical relations, and used it to form the Greek scale. But long before that time primitive nations divided their octaves into minute parts and used third-tones and quarter-tones. On the other hand, the Chinese used only five notes in their scale, corresponding to the black keys on the piano. This is just like the Scotch folk music, which we hear in such tunes as Auld Lang Syne.

You may read more about the relations of notes to one another and the ways in which they are produced in the article beginning on page 6695.

PRIMITIVE MAN'S WARS AND HUNTS, THEN INSTRUMENTS

But even while vocal music was in a very crude state man began to fashion instruments for himself. By cutting a reed and blowing across it he discovered he could make a musical tone. A long reed produced a low tone, a short reed a high one. Thus were invented the pipes—oldest of all instruments. And as the huntsmen fingered their bows and delightedly



A harp as pictured on a temple wall of ancient Egypt.

found what a pleasing twang they could draw from the strings, the first rude harp came into existence.

The Chinese very early learned the art of music, and invented pipes and stringed instruments which were like primitive guitars. They also had many forms of chimes, gongs and drums. African chiefs, from the most ancient times, had horns and trumpets made from ivory, wood or even large seashells. All savage races had gongs for war-dances, and drums, such as the skin-covered bowls of the Hottentots.

If we start to study these instruments—indeed, if we look over the thousands of types of instruments man has made from the earliest times to the present—we find they are easier to remember than we might think at first. For musical sounds are produced in only a very few ways. And if we think of the ways in which different instruments make such sounds, it is as simple to sort them out as it is to separate a pile of red and black checkers.

SOUND COMES FROM THROBBING AIR IN DIFFERENT WAYS

First, there are *stringed* instruments. Some of them are plucked, like the harp and the banjo. Some are rubbed with a bow, like the violin. Some are struck with hammers, like the piano. The earliest stringed instruments were plucked; this is the easiest way to make them sound. Later on men began to use bows, and invented the grandfathers and great-grandfathers of our modern violin. But the idea of striking a string with a hammer is quite recent; the piano is not much more than two hundred years old.

Then there are the *wind* instruments. These have been divided into two groups, according to the different ways in which musical sounds are made by them. The instruments in one group are called wood-wind instruments, most of them being made of wood; those in the other, brass instruments.

Then we can divide up the wood-wind instruments still further. Some of them have single pieces of reed which vibrate to produce the musical tones, like the clarinet and the saxophone. Some of them have double reeds, like the oboe and bassoon. And some have no reeds at all, like the flute and all kinds of pipes and whistles. The brass instruments are peculiar: they have no reeds at all, and yet they are very much like the reed instruments. This is because the lips of the players take the place of reeds and vibrate in order to make the musical tones. That is why the brass-instrument player has to be careful that his "lip" is fully under his control. The brass include the trumpets, cornets, trombones, horns and tubas.



Pipes were the earliest of all instruments invented. Here is a youth playing on double pipes.



From a MS. of the thirteenth century.
You see here Reinmar, the Minnesinger, with his instrument, an early form of violin.

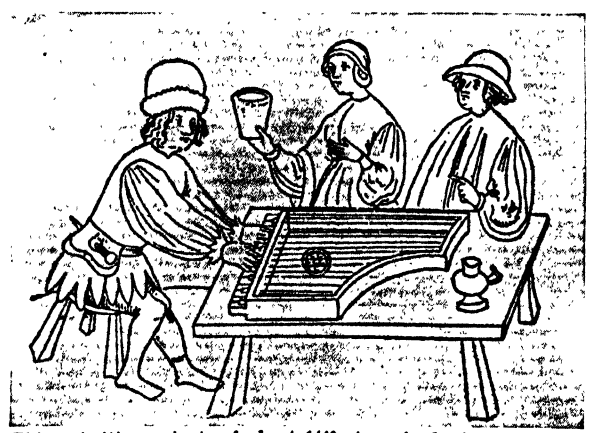
The third main group consists of the *percussion* instruments—those which are struck. This includes drums, cymbals, bells, gongs and many others. So, although the instruments used by ancient man to give him music seem very crude and very different from the ones we are familiar with, they were based on exactly these same principles of making musical sounds.

Among the ancient Greeks music was never considered a great art, to compare with poetry or sculpture. In fact, it was first thought of as merely a part of the art of poetry. Wandering minstrels sang to the accompaniment of the lyre. This was a small instrument something like a harp, with a frame shaped like the letter U, and having from four to eighteen strings. In the Greek dramas there was singing and also playing on wind instruments. Of the various wind instruments, the most popular was a flute of cane or bored wood, called the "aulos." The Greeks also had instruments something like our modern oboes, clarinets and bassoons.

But it is with the early Christians that a real beginning was made to the many steps which have led to music of modern times.

Music, of course, started in its simplest form. It started with melody. There can be nothing simpler than a tune all by itself, with no accompaniment, especially if the tune is unadorned and without important rhythm. It was just this sort of music that was used in the Christian church in its earliest days. The choir sang alone and in unison. Then gradually the organ was adopted. But still the music consisted of only the tune; such things as chords and harmonies, which seem to us the most natural things on earth, were unknown to the music-makers of that period.

The developing of music from its simple, formless state was done chiefly by the religious leaders. That, of course, was about the only way for it to develop, for the only music of importance was that of the church. Toward the end of the fourth century Bishop Ambrose adopted from the Greek music four scales, called the *authentic modes*. Later Pope Gregory added four more scales based on the scales of Bishop Ambrose. These have been called the *plagal modes*. Later still, two more authentic and two more plagal modes were added. All church music was restricted to these modes. Although to our ears they sound old-fashioned and queer, yet they were just as much the forerunners of our major and minor scales as the uncomfortable *chug-chugging* "horseless carriages" of twenty-five years ago were the forerunners of the modern automobile. But the old modes had many merits. Often composers to-day make use of modal melodies in their music as a means of helping to create interesting and unusual effects.



This primitive spinet, of about 1440, is a far-back ancestor of our piano. From the Weimar "Wunderbuch."

A CHANGE LEADING AWAY FROM THE SONGS OF BIRDS

About the tenth century a big change occurred: part-singing made its way into music. By "part-singing" is meant singing by several groups of persons at the same time, each group singing a different "part," or tune. There may be only two parts or there may be six or eight. Hymns are usually sung by a choir in four parts. Though the change was very simple at first, it was important, because it was the first step in the separation of the music of man from the songs of the birds. From now on music had a certain quality which man put into it himself that was not just an imitation of nature's. The singing of different notes at the same time—that is man's own development of the music he found in nature.



A lady playing on the clavichord, from a painting by Jan Miense Molenaer, in Amsterdam.

Why did this change come? Probably because people began to have an unconscious longing for something new and richer in music. Singing two different tones at once produced a pleasing effect. Several centuries before, people would have called two tones sung at once harsh and disagreeable. But by the tenth century their musical tastes had developed until they wanted something more than melodies.

We shall see this change going on all the way down to present times. People's ears have steadily become used to more and more complicated music. Sounds that were thought ugly by one generation grew to be considered beautiful by the next. At first two notes at once—which sound very thin to us—were the limit. Then three. Then four and five. Later on, harsh combinations of sounds were thought agreeable, but only if followed by other combinations of sounds which were soothing. People wanted harshness sprinkled through their music very carefully, like a sprinkling of pepper in one's food. But nowadays almost anything in the way of discord is considered "within the rules" of good music. Some of it is all pepper.

Part-singing had developed not only in the church, but in the daily life of the people as well. To satisfy the thirst for music of the nobles and common people alike, traveling singers wandered from place to place. In France there were the troubadours, in Germany the minnesingers and meistersingers. In England, too, there was part-singing. An interesting example of it is a song for six men's voices, dating back to about 1200, called "Sumer is icumen in." It is what is known as a "round," like the familiar tune Three Blind Mice. One voice starts the melody and a second voice follows a few notes behind with the same melody, and then each voice that enters imitates the one before. Another name for this form of music is *canon*. The word "canon" means "rule," and it is a very strict rule that a canon must follow!

While such pieces were becoming popular, composers began to do even more with music. They started writing two or more tunes to be sung at the same time. Have you ever heard Way Down upon the Suwanee River and the Humor-

esque by Dvorák played together? They sound well even though they are entirely different melodies. That is just the kind of music people started to write away back in the fifteenth century. It is called *counterpoint.*

Let us stand off for a moment and look at music to find out what counterpoint really is. There are two ways to look at music. One is to think of it as standing still and made up of different kinds of chords. The other is to think of it as moving, with tunes running along one above the other. The first is thinking of *harmony,* the second of *counterpoint.*

Imagine that music is like a fence made of wooden posts with three or four wires running along it. We expect a fence to be dull and uninteresting, but not music. For music is a fence with different-sized posts, some long and slender, others short, thick and crooked; while the wires run in graceful curves, sometimes far apart, sometimes near together. If we think of the shape of the posts and the places to which we nail the wires, that is like thinking of chords and harmony. But if we think of the curves of the wires and their relations to each other, then we are thinking of counterpoint.

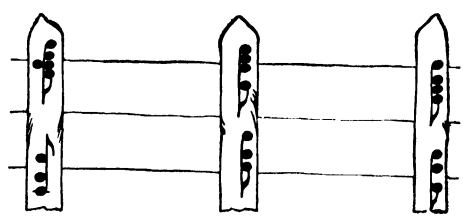
The three illustrations below will help to make this idea easy to understand. The first row gives a fanciful arrangement showing two kinds of musical fence. Below these a few measures from a prelude in Bach's Well-Tempered Clavichord are an example of counterpoint. At the foot of the page a section of one of Schumann's compositions, Symphonic Studies, illustrates harmony.

One very interesting thing is that almost never do we find harmony without some counterpoint mixed in—or counterpoint without some harmony mixed in. For instance, although the Bach prelude below is chiefly counterpoint, the notes of the two melodies form the notes of repeated chords, which make harmony. And although the Schumann piece looks like harmony without any counterpoint, the chords in the left hand imitate those in the right hand. This makes a *canon,* which is really a kind of counterpoint, as you can see.

MUSIC, A FENCE OF POSTS AND WIRES



Here is one kind of musical fence, where the wires are notes running along—two tunes at the same time. This is counterpoint.



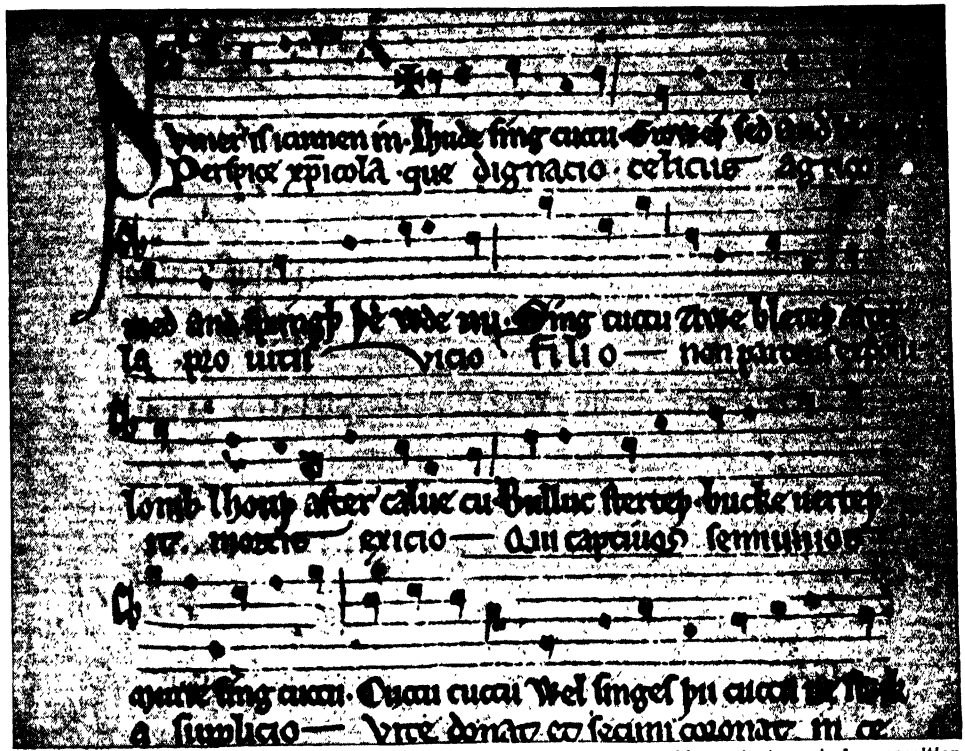
This is the second kind of fence, where the posts themselves are big chords in which all the notes sound together. This is harmony.



These few measures from a prelude in Bach's Well-Tempered Clavichord show the two melodies running across the page to be played at the same time—a bit of counterpoint.



In these measures taken from one of Schumann's Symphonic Studies you find the notes standing one above another so as to form chords—a good example of harmony.



Here you see a facsimile of part of the manuscript of "the most remarkable ancient musical composition in existence"—the old canon, or round, Sumer is icumen in. The manuscript, made by an English monk in 1240, is in the British Museum. Some of the words, in modern English, are given on page 3497.

PALESTRINA THE FIRST GREAT NAME IN MUSICAL HISTORY

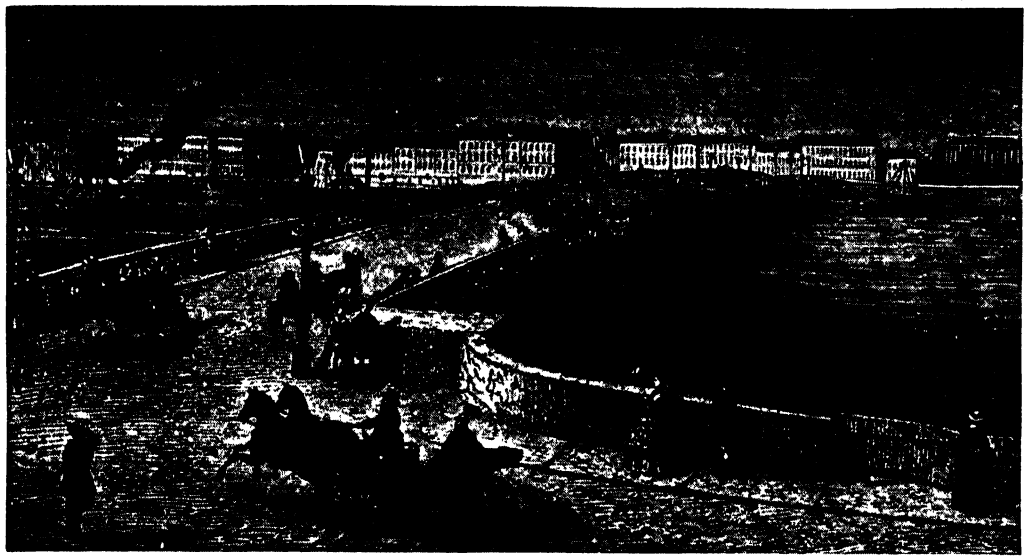
Greatest of the masters of counterpoint in the old church style was Palestrina. He is the first towering figure in the history of music. His name was really Giovanni Pierluigi, but he was called Palestrina after the town where he was born. Although the works of Palestrina sound uninteresting and queer to our ears until we know them well, they are really great and wonderful compositions. His most important music he wrote for church services; this was simple but very noble. It was written in "modal" harmony, not in the major and minor keys familiar to us. And whenever we hear it, we notice that it lacks any strong rhythm, such as we find in music to-day.

After Palestrina's death, composers began to change the kind of music they wrote. More and more they abandoned the contrapuntal style in their compositions—the weaving and winding about of different melodies. In place of that, they turned to simpler music, based on harmony.

One important new branch of music was started at this time—opera. In 1600, a group of musicians in Florence, Italy, decided to write musical plays in the style of the ancient Greek dramas. Their first attempt, Peri's "Euridice," was simple and crude, but it was the beginning that has led to the marvelous operas of to-day. Soon this new form of entertainment became popular. One of the famous opera writers in that century was Monteverde. Usually opera orchestras were small and badly chosen, but Monteverde paid great attention to the orchestras that played his operas. He employed harpsichords, viols, guitars and wind instruments. He also originated new methods of playing; under him the viols first used the device of plucking their strings, instead of scraping them with their bows.

But not until the next century did there come any extraordinarily great musical genius. Then Bach, father of our modern music, wrote compositions unlike anything heard before.

THE NEXT STORY OF THE FINE ARTS IS ON PAGE 7071.



Sovfoto

A scene in old Russia under the tsars, probably around the time of the novels of Turgenev and Tolstoy.

The LITERATURE *of* RUSSIA

RUSSIAN literature, which now occupies a distinctive and considerable position in the world's treasury of books, is of quite modern origin. Russian books that will be permanently read outside of Russia date back, at the farthest, for two hundred years. It was not till the Napoleonic Wars were over that a Russian history was written which helped Russia to realize her own place in the world. Not until that time did she produce a national poet who expressed her character and aspirations in her own tongue, discarding imitations of the poets of other nations.

But almost as striking as the lateness of her beginning with a literature of her own is the rapidity with which it arrested the attention of the world. Nicholas Karamzin published in 1816 the first eight volumes of his HISTORY OF THE RUSSIAN STATE. Alexander Pushkin, the first truly national Russian poet, who found inspiration in Karamzin's HISTORY, died in 1837; and forty years later there had been written all the novels by Gogol, Turgenev, Tolstoy, and Dostoevski that have carried Russian fiction over the civilized world. Seed late sown brought an abundant harvest.

Of course, Russia had a far earlier primitive literature made and sung, or told, by the people before it was written down, somewhat like the Norse sagas. It consisted of legendary poems or tales, collectively called *byliny,* or "tales of old time," as the word may be translated. The subjects were the legendary heroes of the Russian stock. These stories formed groups, or cycles, that referred to each of the regions which had been prominent in the country's earlier history. Vladimir, Prince of Kiev, was a central figure, and Novgorod, Moscow and the Cossack country each had its share of legendary lore casually transmitted through popular memory. A group of such tales, chiefly of peasant origin, had had time to form around even the character and doings of Peter the Great, who died in 1725.

Besides the *byliny,* or legendary poems, the Russians have large collections of *skazki,* or folk tales, which are full of valuable material.

Two twelfth-century chronicles have been preserved—THE CHRONICLE OF KIEV, the city round which the earliest Russia formed itself, and THE STORY OF THE RAID OF PRINCE IGOR, a later twelfth-century prince of Novgorod. These chronicles, written in a kind of singing prose, have features which are expanded in modern Russian literature, such as using nature as a background for a

story. THE RAID OF PRINCE IGOR is especially interesting for the light it throws on early Russian history and language. For the most part these compilations were written by monks and remind us of the ANGLO-SAXON CHRONICLE—dry details alternating with here and there a picturesque incident.

We have in early Russian literature also many lives of the Saints and the Fathers. Some of these have been edited by Count Bezborodko in his MEMORIALS OF ANCIENT RUSSIAN LITERATURE. It must be remembered that at this time Russia was cut off from the west and south of Europe by her position far inland, and knew little of such culture as the other nations had. Her isolation was increased by her religion: she belonged to the Greek Catholic Church, with Constantinople as its center. Indeed, it was not till the second half of the seventeenth century, in the reign of the father of Peter the Great, that the literatures of the West began to percolate into Russia and give her writers new models for their writings.

Moscow had now become the center of Russian life, but Kiev was more closely in touch with Western learning. To Moscow from Kiev came Simeon Polotsky, who acted as tutor to Peter the Great's half-brother, Tsar Feodor. Simeon Polotsky introduced the writing of verse in Russian. He it was who wrote the first Russian play, THE PRODIGAL SON. Polotsky marks the dividing line between primitive Russia and the Russia which began to know and imitate western Europe. He lived at the same time as John Milton, the blind poet of England.

THE FISHERMAN'S SON WHO FOUNDED ONE UNIVERSITY AND BECAME HEAD OF ANOTHER

Russian literature of the eighteenth century expressed the influence of German, French and English literature before Russian authors began to build up a literature of their own. The strongest influence in introducing German thought was Michael Lomonosov, a son of an Archangel fisherman. As a lad Lomonosov became absorbed in a love of learning. At seventeen he made his way to Moscow, became conspicuous as a student, passed on to St. Petersburg, and then studied in Germany. Returning to Russia, he founded the University of Moscow, and finally became rector of the University of St. Petersburg.

Lomonosov's chief love was science, but he had wide interests. Through his writings, which included verse, he helped to develop the Russian tongue, which he said combined the vivacity of French with the strength of German, the softness of Italian and the conciseness of Greek and Latin. He was a tireless writer of verse and prose, and has left odes, tragedies, essays and fragments of epics.

CATHERINE II FAVORED FRENCH, BUT CAME TO DISAPPROVE OF FRENCH IDEAS

The influence of French literature became very important in Russia during the reign of Empress Catherine II, sometimes called "the Great." That strongminded German usurper made French the favored language of her court until Russian enthusiasm for France was chilled by the excesses of the French Revolution. The best-known Russian writer of the period was the poet Gabriel Derzhavin, who was born in 1743 and died in 1816. Though he had a fine mastery of his native language, he can not be ranked as a truly national poet, for his resounding style was influenced from abroad. He was an admirer of the Gaelic forgery OSSIAN. There is something lofty and organ-like in his high-sounding verse. His style is perfect, and he had the courage to write satirically of many persons of high rank. Perhaps the best-known of his poems is his ODE TO GOD. Other celebrated works are: FELITZA, ODES ON THE DEATH OF PRINCE MESTCHERSKI, THE NOBLEMAN and THE TAKING OF WARSAW.

Though Catherine admired French writers, such as Diderot and Voltaire, who helped to bring on the French Revolution, she sternly repressed freedom of the press in her own country. An instance is seen in the case of an unfortunate official, Alexander Radistchev, who was indiscreet enough to write a book on A JOURNEY TO ST. PETERSBURG AND MOSCOW, describing the pitiable condition of the Russian peasantry, or serfs. The descriptions were perfectly true, but Radistchev was sentenced to death for writing what would now be regarded as a humane and public-spirited appeal. He was banished to Siberia, kept there till his health was undermined, and eventually brought back. He committed suicide when threatened with a renewal of exile. An equally sad fate befell the spirited writer Nicholas Novikov, who, after having worked as a journalist and done much for education in Russia, fell under the suspicion of the Government and was imprisoned by Catherine. On her death he was released.

Not till Alexander I succeeded to the Russian tsardom in 1801 did Russia begin to live an independent literary life. The man whose writings mark the beginning of the change is Nicholas Karamzin. His father

was an officer of Tartar stock. The boy was educated at Moscow and St. Petersburg. After he had done some literary work he traveled in Germany, France, Switzerland and England. Returning to edit a Moscow journal, he published LETTERS OF A RUSSIAN TRAVELER, and also a number of translations into Russian from languages ancient and modern. Finally he settled down to write the book that Russia needed most of all, a HISTORY OF THE RUSSIAN EMPIRE. He read his volumes to the Tsar as he wrote them. Eight volumes were published in 1816, and three more, bringing the history up to 1613, were finished when the writer died, in 1826.

As a historian Karamzin was a defender of whatever he found done by authority in Russia's past, whether it was tyrannical or not. His aim was to arouse in Russians the sense of nationality. His success was great from the point of view of a conservative patriotism. Russia became conscious of herself. She began to speak to the world through a literature that was her natural expression, and not an echo of French, German or English writing. Karamzin's success was due partly to the glow and pride of his patriotic writing, but it was due equally to the fact that his prose style was simple, like ordinary speech. Lomonosov and Karamzin are the founders of a Russian prose style.

Among the Russian writers of the nine-



Gogol, the first great Russian novelist (1809-1852), who wrote of the sad life of the serfs.



Pushkin, the greatest of Russian poets (1799-1836), whose works have been translated into many languages.

teenth century who must be named, besides the half dozen that are more commonly known, is Ivan Krylov (1768-1844), who gained fame as a poet first by translating La Fontaine's fables, and then by writing fables of his own invention—simple, humorous, dramatic—appealing to all classes and all ages.

Literature was now growing directly out of Russian life. One instance is that of perhaps the most famous comedy, or satire, that holds the Russian stage. When Alexander I died, in 1825, an unsuccessful rising took place, as a result of which five conspirators were hanged.

The state of society in Moscow at this time was satirized pungently by a young foreign-office official in a play called THE MISFORTUNE OF BEING TOO CLEVER. The author, Alexander Griboyedov (1759-1829), writer of a play which has now been popular for more than a hundred years, had a strange end. He was sent as Russian ambassador to the Persian capital Teheran. In the embassy there some Russian subjects, Georgians and Armenians, took refuge, but the Persian populace was incensed against them, and, storming the building, killed the ambassador, who was shielding them.

A poet who broadened the Russian idea of poetry was Basil Zhukovski (1783-1852), who was first reader to the Empress and afterward tutor to the children of the Rus-

sian royal family. He showed that England and Germany had poetry as great as that of France. In 1802 he published a translation of Gray's ELEGY, and followed it with translations from Byron, Moore and Southey, as well as Goethe, Schiller and other German poets. Late in life he translated the ODYSSEY. Zhukovski was remarkably successful in preserving in his translations the poetic quality of the original verse.

The new start of genuine Russian literature was most clearly made by Alexander Pushkin, though it is perfectly easy to trace the sources of his inspiration to foreign writers. Still, his subjects were essentially Russian, and his fine use of his own language and his poetical genius enabled him to Russianize thoroughly any foreign suggestion. Pushkin is generally accepted as the greatest of Russian poets, and he is also a master of prose.

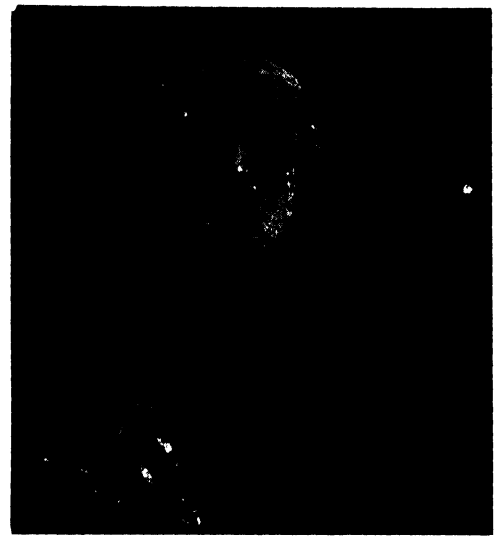
He was born at Moscow in 1799, and was educated near St. Petersburg, where he attracted attention by his poetry when he was a schoolboy. At first he wrote in French, but soon discarded it for his own language. Having become mixed up in dangerous politics after he had become a foreign-office official, he was sent to the south of Russia on duty, and his poetical impulse was stimulated by the scenery and romance of the Caucasus. There he wrote lyrics and tales clearly prompted by Lord Byron, the English poet whose fame was then at its height. When Pushkin returned to the capital, a poem on gipsy life won him wide popularity.

PUSHKIN'S EUGENE ONEGIN, A NOVEL IN THE FORM OF A POEM

Pushkin was now enthralled by Shakespeare, and in imitation of him wrote his chronicle play BORIS GODUNOV. Later, his greatest work, EUGENE ONEGIN, took the form of a poem that is a novel. Now it is probably the most quoted literary work in the Russian language, though its rise to fame was not swift.

Pushkin's mind was extraordinarily prolific, though it usually worked on a suggestion from other poets, and his output was abundant and varied. Historically he relied on Karamzin's history, and felt strongly the thrill of his ardor. Pushkin was killed, at the age of thirty-seven, in a foolish duel with a Dutchman who had married his wife's sister. He had brought into Russian poetry a note of freshness which has tended to brighten it ever since.

Two other Russian lyrical poets have a sure resting place in the hearts of the people. Michael Lermontov (1814-41) is believed to have been of Scottish descent, and his name a Russianizing of Learmont. His was a turbulent nature. He became an officer, but because of his quarrels he was sent to the Caucasus, which at that time was frequently in a state of revolt. Here the splendid scenery and romantic surroundings acted as inspirations, and he wrote poems which are known to almost every Russian child. Returning to Moscow, he became a social figure, but his life was wayward, and twice more he was exiled from the society he loved. Finally he met his death, at the age of twenty-six, in a duel in the Caucasus, the land which had called forth his genius. Lermontov wrote a novel, A HERO OF OUR TIME, with himself as its hero, and that work is believed to have been the cause of the quarrel which led to his death. He was one of the poets who felt strongly the influence of Byron, though his own writing was distinctly national in its spirit and expression. He has left us many lovely lyrics.



Turgenev, the first Russian novelist popular abroad.

Alexis Koltsov (1809-42), contemporary with Lermontov, was a true peasant poet. His subject was the life of the rural people, and he sang of it in lyrics as natural as those of Robert Burns, and as exquisite. They are to be found in all collections of Russian poetry. As a cattle dealer he moved about freely and was a part of the life he sang. Even among the illiterate his songs were known.



Leo Tolstoy in the simple workroom where he wrote feelingly of the tragic condition of the serfs.

Other poets of distinction are: Nicholas Nekrasov (1821-77), a grim portrayer of peasant life; and Count Alexis Tolstoy (1817-75), who wrote satires and historical plays, but is best known for melodious love lyrics, nature poems and ballads.

It is not, however, through its poetry that Russian literature has become widely known, but through its prose, and particularly its fiction.

Other forms of prose-writing have been successful, but in a far less degree. Vissarion Belinsky (1811-47) founded a school of criticism which was more vigorous than wise, and Russian criticism has always been lacking in moderation and toleration. It is inclined to tear, rather than to dissect, its subject. Much of it, as, for instance, that of Alexander Herzen (1812-70), was written outside of Russia. Herzen preached communism for many years in London through a newspaper of his own. Michael Saltykov (1826-89) was a savage satirist who found much in Russia to expose bitterly. Well known in other lands, through translations of his books, is Dmitri Merezhkovski (1865-1941). His LEONARDO DA VINCI, a splendid biography of the Italian artist, has been translated into many languages, and his interpretation of Russian fiction is well known.

The first great Russian novelist was Nicholas Gogol, who was born in the Cossack country in 1809 and lived till 1852. From his twentieth to his twenty-seventh year he lived in St. Petersburg, first as a government clerk and then as a professor of history. He was far from home.

But all the time Gogol's heart was away in Little Russia, and he put his remembrances into some sketches, EVENINGS ON A FARM NEAR DIKANKA, which determined his future. Other sketches of Cossack life followed, with a strange mingling of the real and the fantastic, fun and melancholy. He was only twenty-seven when he wrote a comedy which competes for the position of the most popular on the Russian stage, and has been seen with cordial appreciation on the English stage. This is THE INSPECTOR-GENERAL, a satire on the truckling, flattery, jealousy and corruption of the Russian official world. The play was saved from official censorship by the Tsar, who ordered it to be played.

After the successful appearance of his comedy, Gogol left Russia and spent the rest of his life abroad, chiefly in Rome. Here he wrote his masterpiece, the novel DEAD SOULS, an exposure of the serf system then enslaving the Russian peasantry. By his simple sincerity in picturing real life Gogol led Russian fiction away from wordy pomposity. Gogol did not complete DEAD SOULS. It was planned in three parts, and only the first part and an incomplete section of the second

part are published. Possibly the book was not becoming quite what its author meant it to be; as he lived he grew more and more religious and humble, and more and more inclined to advocate patient suffering. In his TARAS BULBA he gives us a powerful picture of the savage warfare carried on between the Cossacks and the Poles.

Ivan Turgenev (1819-83), the first Russian novelist to win a large reading public outside of Russia, was born of a good family. Like so many Russian writers, he found his early writings officially frowned on as tending to be dangerous; and he was kept on his family estate for two years. When he was free he left Russia for Germany, and later went to Paris, where he wrote most of his novels of Russian life.

Turgenev introduced Russian character to Europe, but he did not keep quite in touch with the Russia of his own day. He was a poet in essence, and his style had a gift of elegance and finish of form which were almost French in character. That form he carried into Russian prose with advantage to it, but he had not so close a grip of Russian life as some brother-novelists of equal fame had. The foreign reader feels a strangeness in Russian character as depicted by Gogol, Tolstoy, Dostoevski and Gorky, which borders on the unnatural, and yet is not unnatural in Russia. This strangeness is not felt in the same degree in Turgenev's novels, and they are therefore accepted without hesitation. Perhaps the difference comes from writing from memory away from the actual Russian atmosphere.



Count Tolstoy at work in the fields—From the painting by Ilya Yefimovich Repin.

Turgenev's first prose writing, PAPERS OF A SPORTSMAN, described the miserable condition of the peasants with startling realism. His NEST OF NOBLES, a singularly pathetic story, won him wide popularity. In 1862 his FATHERS AND CHILDREN was published. This story was attacked by extremists on both sides in politics. Disheartened by the reception given his book, Turgenev left Russia. The story describes the nihilistic doctrines then beginning to spread in Russia, and ac-

cording to some writers Turgenev invented the word "nihilism." The tale is his masterpiece. VIRGIN SOIL, his later ambitious story, was written when Turgenev had withdrawn from a Russian environment. Besides his longer stories, many shorter ones were produced, some of great beauty and others showing great power of character analysis. These were afterward collected into three volumes. Unquestionably he is one of the great novelists of Europe. He knew the nobles of Russia by birth and contact, and the peasantry by sympathy and observation; but peasant life had never been his own. His mother never forgave him for doing such an undignified thing as writing so that anybody could criticize! His writings have been made familiar to people by translations.

Count Leo Tolstoy (1828-1910) is far more widely known than any other Russian writer, because his writings cover an enormous range of human interest. He appeals to different types of people as a novelist, a religious zealot seeking rest and an economic and social pioneer. In all these aspects, he expresses himself in striking literature, powerful in its simplicity. Unquestionably Tolstoy is a landmark in the world of literature. There has been no one like him. It is doubtful if there could be anyone like him outside of Russia.



Dostoevski who wrote of the tragedies he witnessed as an exile in Siberia.

Tolstoy was educated by foreign tutors, according to the fashion of the day. As a child, though thoughtful and observant, he showed no marked talent. He was very sensitive and this led him, as he grew older, to hide himself away from his playmates and spend hours in lonely brooding. At the age of fifteen he entered the University of Kazan. But he wasted his time and did not study, and finally left without accomplishing much. He returned to his estates, determined to improve the condition of the peasantry. But lacking the necessary patience to deal with deep-rooted misery, he again threw all serious life to the winds. Finally his brother's persuasions led him to enter the army, and he saw service in the Crimean War.

Distinguished for his military writings, he returned to St. Petersburg to become the center of the literary society of the day.

Already he was writing poetry, tales, sketches, an autobiography of his youth. Then, after a period of social gaiety, he spent some time in foreign travel, still writing tales. Then came his marriage to Sophia Behrs, and more restful writing, merging into the ambitious composition of his greatest books —WAR AND PEACE and ANNA KARENINA. The accession of Alexander II in 1855 saw a movement for the freeing of the serfs in Russia. "The People" and "Progress" became the watchwords of the press of Germany and Russia. A new impulse was felt in literature, and all the Russian authors of the day were deeply stirred. Tolstoy was affected most deeply and lastingly of all. Now at last he realized the bent of his mind, and "The People" henceforth form the keynote of his life and writings. His POLIKOUSHKA is a painful story of the ills of serfdom.

He was now famous throughout the world as a writer, but the problems of religion and life absorbed his thoughts, and he tried to plan a life of perfect goodness and of strict social justice. These aims produced much more literature. Later still he wrote other novels, including THE KREUTZER SONATA and RESURRECTION. Finally, having failed to rid himself of all his earthly possessions and to break with the social conditions by which he was surrounded, he died at the age of eighty-two, at a railway station, while on the way to a monastery.

Tolstoy was a Russian through and through. He pursued whatever object he had in view with a narrow intensity, and whatever object he was pursuing he wrote (as the ordinary Russian talks) a great deal about it, and with great fervor. He had the power of giving his writing, whatever its subject might be, the clearness, simplicity and power of great literature. What he had to say he said choicely if it needed choiceness, powerfully if it needed impressiveness. His literary strength was greatest when he wrote WAR AND PEACE, and, judged by that epic tale, he will remain one of the world's supreme novelists. His personality, as shown in all his writings, is a fascinating study.

Feodor Dostoevski (1821-81) is regarded by many who best understand the Russian character as the greatest Russian novelist of all, but special experience of the Russian

temperament is needed to reach that opinion.

Dostoevski was educated for the army, but adopted literature and showed the direction of his sympathy by writing a story called POOR PEOPLE. It was recognized by critics as charged deeply with emotion, and it gave its author a favorable start. But Dostoevski, having joined a political-discussion society, was suddenly arrested as a revolutionary. He was imprisoned, sentenced to death, and then, instead of being hanged, was sent to exile in Siberia for four years with hard labor, to be followed by service for life as a private soldier. He served his four years and three more as a soldier before he was recalled to Russia.

Such was life in the old Russia.

This experience in Siberia colored all Dostoevski's remaining years. It had broken his health, but it filled his heart with infinite compassion and with a great longing for a time when a spirit of mutual kindness should govern the actions of man toward man. He had seen life at its best and worst, and his experiences were told in a book, BURIED ALIVE IN SIBERIA, while his impressions took form in a novel, CRIME AND PUNISHMENT. The book moved the heart of Russia.

The novelist had gained by his enforced close contact with his fellow-prisoners, some of them hardened criminals, a great insight into the workings of men's minds. We call this psychology, and seldom has there been a more vivid expression of it than in this novel, CRIME AND PUNISHMENT. The hero is a poor student who is led on to commit a murder; he repents, gives himself up and is exiled to Siberia. The book expresses some of the theories of Dostoevski: the idea of purification by suffering, the hope of a Russian state of the future bound together only by the ties of brotherly love; the belief that in every life, no matter how degraded, there is some moment of high self-devotion. Dostoevski hates the use of physical force: he believes everything can be done by moral suasion.



Sovfoto

Chekhov with his young friend, Maxim Gorky.

SOME RUSSIAN DRAMATISTS WHOSE PLAYS HAVE BEEN TRANSLATED INTO ENGLISH

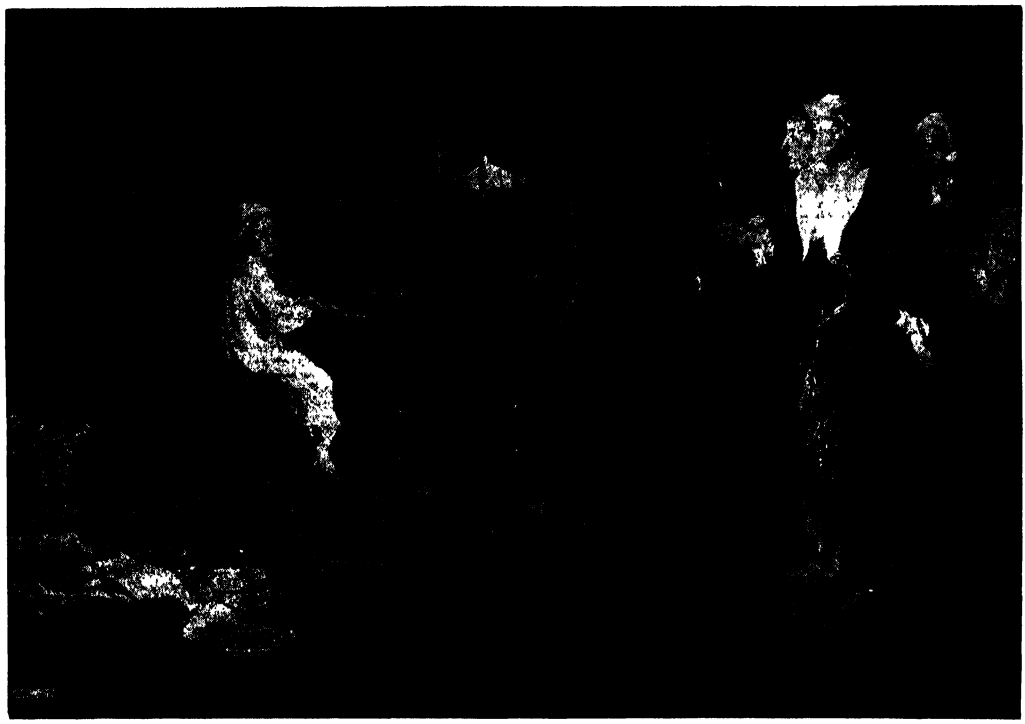
Ivan Turgenev, Count Tolstoy and other novelists made important contributions to Russian drama. But Alexander Ostrovski (1832-86) wrote almost entirely for the theater; his best-known play is THE STORM. After him, Anton Chekhov (1860-1904), with THE SEAGULL and THE CHERRY ORCHARD, Leonid Andreyev (1871-1919), with HE WHO GETS SLAPPED, and MAXIM GORKY (1868-1936), with THE LOWER DEPTHS, have been the most prominent writers for the Russian stage.

Chekhov was even more famous for his short stories, of which he wrote more than 150. Gorky, too, wrote stories and novels, and was specially honored by the Soviet Government for his literary work. The novelist, Ivan Bunin, (1870-), wrote the familiar short story THE GENTLEMAN FROM SAN FRANCISCO. Among recent Russian poets, Boris L. Pasternak (1890-) has achieved an outstanding position.

The tradition of Russia's novelists has followed the political and social trends brought about the soviet system. Among the best known of these writers are Konstantin Fedin (1892-), with his CITIES AND YEARS, Mikhail Sholokhov (1905-), who gained prominence with AND QUIET FLOWS THE DON, and Ilya Ehrenburg (1891-), whose novel, THE FALL OF PARIS, was awarded the Stalin Prize for fiction in 1943.

M. Ilin (pen name of Ilya Marshak) wrote a delightful story for children, THE RING AND THE RIDDLE, in collaboration with his wife, Helen Segal. It is a fairy tale based on modern inventions such as the airplane, submarine and radio. In the fine novel, DAYS AND NIGHTS, Constantin Simonov (1915-) describes vividly the siege of Stalingrad in World War II.

THE NEXT STORY OF LITERATURE IS ON PAGE 7009.



Little George Handel, practicing his music secretly in his attic room at night, is discovered by his family.

COMPOSERS *of* GREAT MUSIC

"MUSIC is the universal language of mankind," said the American poet Longfellow. Here we shall speak of the life and work of some of the great composers of music. We shall see, as Longfellow suggested, that they are like the authors of a kind of world literature. Fine music can be understood and enjoyed by people of all countries. Beethoven was a German; Verdi was an Italian; and Tschaikowsky, a Russian. But they and their music belong to every land and every century. Nevertheless, each land has its own forms of music. With the growth of civilization, the art of making music has been continually improved.

Music expresses not only man's daily joys and sorrows, but his highest sentiments, too. For this reason we shall find that music has always been closely associated with religion. This was true in the earliest civilizations that we know, those of Egypt, Assyria and Babylon. That it played a great part in the divine worship of the Hebrew people is clear from very many pages of the Bible. Even in the ancient lands of the East, in China and India, music has always had a place of honor: but in those countries it has never had the growth and development which are a part of our Western civilization.

To the Greeks, music was a part of education and everyday life. Unfortunately the musical accomplishments of that wonderful people have not come down to us. The system of preserving music in the form of written notation is only about a thousand years old. During the Middle Ages a wealth of music grew up, in the form of church hymns and of popular folk songs. But there were no composers of importance then, and this store of melody was used only by the later writers, who drew ideas and inspiration from it.

The first name among the composers of great music is that of Giovanni Pierluigi da Palestrina (1526-94). He was the son of peasants who lived near Rome, and he received his musical training in the churches

of that city. The Catholic Church at that time wished to restore the dignity of her sacred music. Palestrina was commissioned by the Council of Trent to compose a mass which would bring about this improvement. He did so with great success. This, and his other compositions, became the model for Catholic church music during the next few centuries.

At the same time two men in England were doing much to develop music in that country. They were Thomas Tallis (1505?-85), "the father of English cathedral music," and his even more famous pupil, William Byrd (1543-1623). Both were organists at cathedral or abbey churches, and then they served together as the organists of the Chapel Royal under Queen Elizabeth. The Queen did much to help them. William Byrd composed all sorts of music—for the organ, for orchestra and for the voice. His work was long forgotten. In recent times, however, it has been sought out and published, and William Byrd is recognized as the greatest of the early English composers.

Italy, during this period, had the chief figure in the writing of opera music, Claudio Monteverdi (1567-1643). Royal magnificence in France, at the court of King Louis XIV, called the Sun-King, produced the ornamental compositions of Jean Baptiste Lully (1632-87). The fine English composer, Henry Purcell (1659?-95), wrote music in this French style, but also composed in the warm and simple manner of William Byrd.



The first great name in modern music was that of Palestrina, an Italian composer who brought about a great change in the music of the Church.

AN AGE OF GREAT MUSIC BEGINS IN THE EIGHTEENTH CENTURY

The great period of music opened with the composer George Frederick Handel (1685-1759). Handel was a German, born in the little town of Halle. His father wished him to be brought up to become a lawyer. But young George had a natural love for music, and nothing could check his ambition to be a composer. With the help of a friend he smuggled a clavichord into the attic where he slept. The clavichord—a forerunner of the piano—could not be heard through the closed door, so at night, when all the others were in bed, he played and played until he mastered the instrument. His father soon realized that it was impossible to keep George from the music which he loved. He allowed the boy to study with a fine music teacher named Zachow, who taught Handel the music of all countries and all composers. George later studied in Berlin and in Hamburg, and continued his studies for some years in Italy.

In 1710 Handel was appointed music director in the household of the Elector of Hanover, the ruler in that part of Germany. In the following year Handel went on a visit to England, and liked it so much that he settled down there. You can imagine how embarrassed he was some years later when the same Elector of Hanover, whom he had deserted, became King George I of England! Soon, however, a pardon was granted. King and composer became good friends. A delightful souvenir of that friendship is the WATER MUSIC which Handel is thought to have written for a royal water picnic on the Thames River.

Handel wrote numerous operas, from which we have many lovely melodies. But his greatest work was in the form of the oratorio. This is a long sacred composition for voices, the words nearly always taken from the Bible. Someone has said that Handel set the Bible to music, and he very nearly did. His best known oratorio is THE MESSIAH, which is often sung at Christmas time. The choral section of that oratorio, the Hallelujah Chorus, brought King George I to his feet with reverent enthusiasm, and

many audiences since then have followed the King's example. In his last years Handel gradually became blind, but he continued to direct the performances of his works. He became an English citizen and was showered with honors by his adopted country. After his death he was buried among the other immortals in Westminster Abbey.

BACH, ONE OF THE GREATEST NAMES IN MUSIC

Greater than Handel—one of the true giants of music—was Johann Sebastian Bach (1685-1750). The two never met, even though Bach once traveled to Halle for this purpose. He was too late; Handel had gone to England. Bach came from a great family of musicians. His father and mother died when he was ten, and he went to live with an older brother, Christoph, who was also musical. But Johann, or John as we would call him in English, showed such talent that his brother became jealous and hid some precious pages of music from him. Johann managed to find them, and secretly copied the pages by moonlight. When he grew up, Johann served as an organist in various churches, and finally settled in the city of Leipzig. He lived a quiet life, but poured forth a great wealth of musical composition for the organ and for the voice. The reason for Bach's greatness lies in the grandeur and perfection of his music, much of which is of a religious nature. He developed the art of counterpoint (combining two or more melodies) for instruments to a magnificent peak. For the voice he wrote such grand compositions as the ST. MATTHEW and the ST. JOHN PASSION. Poor Bach, like Handel, lost his sight in his last years. But he had a vigorous and cheerful spirit. At one time he wrote a COFFEE cantata, as a protest against drinking too much coffee!

GLUCK'S WORK IN THE DEVELOPMENT OF THE OPERA

Meanwhile another composer was applying his talents to the field of opera. Christoph Wilibald Gluck (1714-87) changed that form of music, with its heretofore stiff unnatural style, into a true music-drama, in which the melodies helped to interpret the words and meaning of the play. He said "I wanted to ban all those misuses against which healthy common sense and true taste have fought so long." Gluck lived in Vienna, but his operas were produced chiefly in Paris. Here, as elsewhere, there was opposition to his new ideas, and Gluck needed the help of his former pupil, who had become Queen Marie Antoinette of France. ORPHEUS AND EURYDICE, IPHIGENIA IN AULIS and IPHIGENIA IN TAURIS are the names of his three most successful operas, all based on stories from the ancient Greek legends. Gluck's music is often played in concerts today, and it has a particular clarity and grace of its own.

An even greater ease, grace and charm of melody bubbles forth in the music of Haydn and Mozart. These two gifted and delightful composers were close friends. Mozart was the greater of the two, and Haydn once wrote "It would be difficult for anyone—no matter whom—to equal the great Mozart. That is why I wish that all music lovers, especially the influential, could know the inimitable works of Mozart with a profundity of musical knowledge, and a keen appreciation equal to my own." Joseph Haydn (1732-1809) was the son of humble Austrian peasants, his father being a wheelwright and his mother, a cook. But both parents were fond of music, and Joseph soon developed a strong love for it. Even when he became a famous composer, honored by many countries, he took pride in having been born a poor boy and of having made his own way in the world.

THE CHARM AND GRACE OF THE MUSIC OF HAYDN

Haydn received musical training near home and then as a choir boy at the cathedral in Vienna. In both cases he learned under harsh masters, and he was dismissed from the choir for the prank of cutting off another singer's pigtail. He had difficulty in making a living during the following years. Success came gradually, however, and he was appointed musical director for the household of the great Esterhazy family. Here he stayed for some thirty years, writing many of his 125 symphonies, overtures and other compositions. His FAREWELL Symphony was written to earn a vacation for himself and his musicians. During the performance, one member of the orchestra after another played his portion of the work, blew out his candle and left the stage, finally leaving only Haydn there. This symphony is still played that way today, so that at the end only the conductor remains on the stage; but there are no candles to blow out! Prince Esterhazy took the hint and the vacation was granted. Other fanciful compositions of Haydn were his TOY and his CLOCK symphonies for children, and his SURPRISE Symphony, which had a sudden crash of drums to wake up people who might be dozing at the concert.

In 1791 Haydn visited London, where his music was received with great enthusiasm. He returned by way of Bonn in Germany, where he met Beethoven, who became his pupil. Haydn composed the Austrian national anthem: no other country could boast a national song written by a really great composer. Most important of all Haydn's works is his magnificent oratorio, THE CREATION, which makes one of a great trio, together with Handel's MESSIAH, and Mendelssohn's ELIJAH, of which we shall speak presently.

MOZART WAS A CONCERT ARTIST WHILE STILL A SMALL CHILD

Wolfgang Amadeus Mozart (1756-91), in some ways the most charming of all composers, was born in the lovely Austrian city of Salzburg. His father was a talented musician and his sister, Maria Anna, was also gifted in music. On a musical tour with his father and his sister, he played before the Empress Maria Theresa, and took part in games with the little princess who afterwards became Queen Marie Antoinette of France. In England, too, he was the favorite and pet of royalty.

But this period of fortune did not last. Mozart, like many another composer, had to struggle bitterly against the hardships of poverty. In spite of these difficulties, he composed operas, symphonies, church music and other types of composition with a style and grace perhaps never equaled by any other composer. Many years later someone asked the Italian composer Rossini whom he considered the greatest of all composers. Rossini answered "Beethoven." Then his questioner asked, "What about Mozart?" "Ah," said Rossini, "He is the only one!" Mozart's operas, especially THE MAGIC FLUTE, THE MARRIAGE OF FIGARO and DON GIOVANNI, are among the best loved and most admired of all compositions for the operatic stage. His symphonies, such as the JUPITER Symphony and the one in G minor have a wonderful combination of lightness and strength. His masses, including the Requiem (a sort of funeral song), have a fine, dignified beauty.

THE GREATEST NAME IN MODERN MUSIC, BEETHOVEN

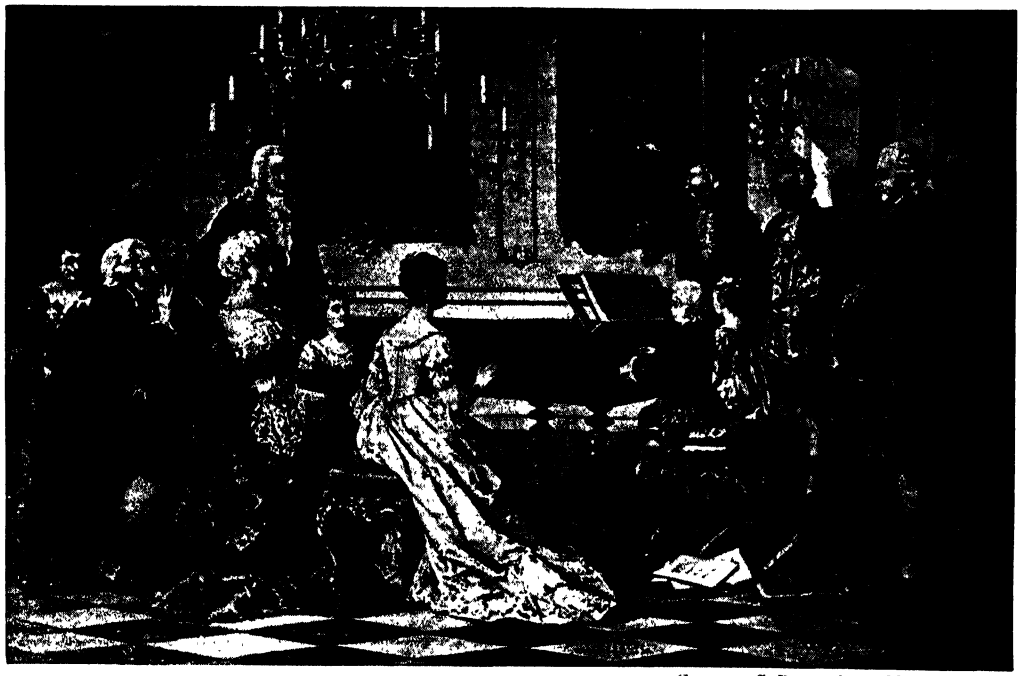
We come now to perhaps the greatest name in all music, Beethoven. Not limited to the quiet religious exaltation of Bach, nor to the youthful grace and charm of Mozart, this mighty spirit ranged through all the aspects of music and filled them with his powerful and stormy character. Ludwig van Beethoven (1770-1827) was born in the town of Bonn on the Rhine River, but he spent the greater part of his life in Vienna, "the city of music." His childhood had been made miserable by a harsh, drunken father, who had hoped to profit by young Ludwig's musical talents. This helped to produce a rebellious trait in Beethoven's character, which sometimes showed in his rough manner toward other people, though he tried to subdue it. Deafness in his later years and other troubles tried his soul. Yet he realized his musical powers, and took a proud attitude toward nobility and royalty, feeling that he, too, was a king in his own realm of music.



Johann Sebastian Bach, one of the giants of music, perfected such forms of music as the fugue, in which two or more melodies, or "voices," are blended.

Of Beethoven's nine symphonies, certain ones are particular favorites. The Third (EROICA) was originally written to honor Napoleon. But the selfish ambition of that ruler disgusted Beethoven, and he changed the dedication. The Fifth Symphony opens with the four-note sequence which was adopted as the "victory" theme in World War II. The Sixth, or PASTORAL, Symphony is a lovely picture of the countryside near

Vienna. The great Ninth is for orchestra and voices, with its choral movement based on the poet Schiller's ODE TO JOY, a mighty hymn of human brotherhood. Beethoven wrote one opera—FIDELIO, many sonatas, string quartets, overtures and other compositions. His "Moonlight" Sonata, Minuet, and the grand EMPEROR Concerto for piano and orchestra are among the best known and loved of his compositions.



Gramstorff Bros., Inc., Malden, Mass.

The six-year-old Mozart and his eleven-year-old sister played before many royal and noble personages. This picture shows the talented children playing for Maria Theresa, Empress of Austria, at her palace in Vienna.

During this time another composer was laying the foundations of German national opera. He was Carl Maria von Weber (1786-1826), a second cousin of Mozart by marriage. Like Beethoven, he was harshly treated by his shiftless father, who hoped to make money from the boy's musical talents. But in spite of obstacles, Weber rose to success. He studied with Michael Haydn, brother of Joseph. Weber became a leader of the Romantic movement, which stressed feeling and sentiment in music, rather than its form. Among his many compositions the most famous and popular are his three operas: DER FREISCHÜTZ (The Free-Shooter), EURYANTHE and OBERON.

One of the immortal songbirds of music, whose melodies will never be forgotten, lived in Vienna in the days of Mozart and Beethoven. This was Franz Schubert (1797-1828), whose sad and romantic life has been told so often in story and drama. Schubert lived and died in poverty and hardship, even though the dying Beethoven said of him "Truly, Schubert has the divine fire in him." Schubert's songs and other compositions were sold, but they brought wealth to the publishers and not to him. How wonderful they were the world has since realized. The AVE MARIA, the SERENADE, the LINDEN TREE, HARK, HARK THE LARK, THE ERL KING, are but a few of these beautiful melodies.

Schubert came to know Beethoven during that great man's last days. Of another immortal fellow-composer Schubert wrote, "Oh Mozart! immortal Mozart! how many, and what countless images of a brighter, better world hast thou stamped on our souls!" Though Schubert was often happy and carefree in spirit, ill health and hardship brought his death at the age of thirty-one. He was buried, at his own request, near the grave of Beethoven, and on his own tombstone friends inscribed the words "Music has buried here a rich treasure, But still fairer hopes." Franz Schubert's life was like his most famous

composition, the UNFINISHED Symphony.

A distinguished composer, chiefly for the piano, who was devoted to Schubert's music, was Robert Schumann (1810-56). He was born in Saxony, the son of a bookseller. Literary taste came easily to him, and the German authors whom he read inspired many of his musical compositions, while he himself became editor of a music journal which did much to spread a love for good music. Schumann never suffered from poverty, and his married life was one of great happiness. His wife, Clara, daughter of his former music teacher and a fine pianist herself, was devoted and wonderfully helpful in his work. Though many of his compositions are rather serious in spirit, Robert Schumann has also given us the charming CHILDREN'S ALBUM. This fine composer became subject in later years to fits of insanity, and died in a sanatorium near Bonn on the Rhine. But his life had been a splendid contribution to music and to the appreciation of other great composers.

THE POLISH MAGICIAN OF THE PIANO

Quite different from Schumann was a composer who reminds us of the poet Shelley, and whom we may well call "the poet of the piano." This was the Polish genius, Frédéric Chopin (1810-49). Though never strong in health, he was a brilliant pianist, and poured forth a wealth of the most poetical, dreamy, emotional compositions that we are ever likely to hear from the piano. A later musician has said that Chopin is the very soul of that instrument. Frédéric Chopin left his native Poland and, after visiting Vienna and other cities, settled in Paris for the remainder of his short but meteoric career. There he was the center of a dazzling circle of writers, artists and composers. Balzac, Liszt, Meyerbeer, Heine, Berlioz, Mendelssohn, and especially the woman novelist who called herself George Sand, were among his intimate associates. Still, and perhaps for all time, the most magical music written for the piano is that of Frédéric Chopin, the musical poet of Poland.

MENDELSSOHN, WHO WAS BOTH GIFTED AND HAPPY

A bright and pleasant figure in the story of music is the composer Felix Mendelssohn (1809-47). The name "Felix" means "happy," and it was well suited to this man's life and personality. Both wealth and a strong bond of family affection and understanding, especially between Felix and his musically gifted sister Fanny, provided a sunny climate for the growth of musical talent. Mendelssohn's home was in Hamburg, Germany, but his career took him to Berlin and Paris and frequently to England, where he was enormously popular. He composed charming overtures such as A MIDSUMMER NIGHT'S DREAM, THE HEBRIDES and FINGAL'S CAVE. His SCOTCH and ITALIAN symphonies are also great favorites. Among his many compositions, the noble ST. PAUL and the ELIJAH oratorios are Mendelssohn's finest works.

We come to a strange genius, the French composer Hector Berlioz (1803-69), who did much for orchestral music as it is known today. He was the son of a physician and was intended to follow in his father's footsteps. But he left the medical school in Paris and made his own way in the field of music. The German poet Heine once called him "the lark with eagle's wings," and it was this ambition for far greater things than he could achieve which made Berlioz a bitter and restless character. Among his famous works are THE DAMNATION OF FAUST (based on Goethe's poem), the FANTASTIC Symphony and the ROMEO AND JULIET Symphony. His ROMAN CARNIVAL overture and the music from his opera BENVENUTO CELLINI are other favorite concert pieces.

LISZT, THE HUNGARIAN GENIUS OF THE PIANO

Much like Chopin in many ways was the fiery Hungarian pianist Franz Liszt (1811-86). Liszt, however, was a more vigorous character. His musical genius shone forth at an early age, and his family moved from Hungary to the Austrian capital, Vienna, where the young prodigy was acclaimed by Beethoven. Liszt went on to Paris and there became a fashionable idol. His success as concert pianist and composer was enormous throughout Europe. Yet he was not spoiled by this acclaim. He earned by concerts enough money to complete the Beethoven monument at Bonn, and he gave generous aid to the composers Wagner, Schumann and Berlioz. For some years he lived in Rome, where he was honored by Pope Pius IX, and became a cleric with the title of Abbé Liszt, though he continued his musical work and had many pupils. Liszt wrote orchestral compositions, such as his DANTE, Tasso and FAUST symphonies; but we remember best, perhaps, those brilliant piano memories of the land of his birth—the Hungarian rhapsodies.

No one among all the composers of great



Beethoven's life was a stormy one and so was his disposition. He often took long, solitary walks in the country, striding along with bowed head and frowning brow, unaware of the scenery through which he was passing. His thoughts were concentrated on the themes and patterns of the noble music which was his true life.

music has been the subject of so much controversy as Richard Wagner (1813-83). He may truly be described as the giant of the opera. Though much of Wagner's work was done in his native city of Leipzig, and in Dresden and Munich, his name is ever associated with Bayreuth, the shrine of the Wagnerian operas. The central idea of this composer was to combine all the arts into one, and he chose the operatic stage for this purpose. Wagner was much influenced by Beethoven and Von Weber, though, unlike them, he never mastered the piano as an instrument. His new ideas in the composition of his music and his concept of drama caused a storm of opposition almost every time one of his operas was produced.

Wagner's first well-known opera was RIENZI, whose fine overture is often played at concerts. Then came the vigorous FLYING DUTCHMAN, the dignified TANNHAÜSER and LOHENGRIN—both based on old Christian legends. The next group, known as the RING series, consists of four operas which deal with stories from German mythology, in which the magic ring of the Nibelungs plays an important part.. Gods, men and people from below the earth are involved in these tales. The four operas are THE RHINEGOLD, THE VALKYRIE, SIEGFRIED and THE TWILIGHT OF THE GODS. These operas are very long and ponderous, with much heavy but often magnificent music. The French composer Gounod, who did not like Wagner's music, said "It has its divine moments, but, oh, the weary hours!" Of Wagner's last three operas, TRISTAN AND ISOLDE is a love tragedy, based on an ancient Irish legend; the music reaches its climax in the passionate *Liebestod,* or Love-Death. THE MEISTERSINGERS is a merry opera about the German master singers of the Middle Ages and Hans Sachs, the shoemaker. Finally, PARSIFAL tells a story of the Knights of the Holy Grail, one of the early Christian legends.

Another composer of opera, but not on so great a scale, was Giacomo Meyerbeer (1791-1864). He was born in Berlin, and became a fellow-pupil and close friend of Von Weber. Meyerbeer gave assistance to Wagner, though it is doubtful if the two were ever good friends. He studied the opera of Germany, Italy and France, seeking to combine the best features of all these. His operas ROBERT THE DEVIL, THE HUGUENOTS, THE PROPHET and L'AFRICAINE achieved a success which they still enjoy.

Bach and Beethoven are two of the "three

great B's" of music. The third is Johannes Brahms (1833-97). We should mention that this remark about the "three great B's" was made by another composer, Von Bülow. It infuriated the enthusiastic followers of Wagner. It also embarrassed Brahms, as did the high praise from Robert Schumann, since this acclaim placed the newcomer on a pedestal when his career had scarcely begun. Schumann had hailed Brahms as the new messiah, or savior, of music. But the young man from Hamburg did not write romantic music, as Schumann, Liszt and others had expected. Brahms wrote in the classical style, with strict attention to form and technique. Of his four symphonies, the First is much like Beethoven's style; in fact, it has been called Beethoven's Tenth Symphony. The other three are more formal and restrained. A GERMAN REQUIEM, written in memory of those who fell in the German-Austrian war of 1866, is a magnificent work, and established Brahms' right to fame. Brahms was one of the great composers of songs and of piano music. We all know one of his songs, the charming LULLABY, and we enjoy his Hungarian dances, which remind us of the rhapsodies of Liszt.

Brahms established his home in Vienna. Among the composers there at that time were Hugo Wolf (1860-1903), one of the great writers of songs, Anton Bruckner (1824-96), and Gustav Mahler (1860-1911), who wrote excellent but heavy symphonies and other works, and the "Waltz King," Johann Strauss (1825-99), who set the whole world humming and dancing. Although he was not one of the great composers, Strauss wrote truly fine music, and was loved and admired by such men as Brahms. A lady once asked Brahms to write something on her fan. He jotted down the opening notes of Strauss's famous waltz ON THE BEAUTIFUL BLUE DANUBE, and wrote underneath "Unfortunately not composed by me." THE THOUSAND AND ONE NIGHTS, TALES FROM THE VIENNA WOODS and ROSES FROM THE SOUTH are other favorites among the enchanting and lilting melodies of Johann Strauss.



The gentle Haydn, whose boyhood was one of poverty and hardship, lived to be happy and successful in the work he loved, the making of beautiful music.

SOME GREAT MODERN FRENCH COMPOSERS

Turning to France, we meet a fine person, César Franck (1822-90), who wrote beautiful and noble music. His one symphony and many of his other compositions are greatly admired by music lovers. Franck was originally a Belgian, but later made his home in Paris, where he was organist in one of the churches. His pupil Vincent d'Indy (1851-1931) gained some fame with various forms of compositions, as did also Camille Saint-Saëns (1835-1921), who is perhaps best known for his opera based on the Bible story of Samson and Delilah.

The most important of "modern" French composers is Claude Debussy (1862-1918), whose music is like delicate shades of various colors. It resembled the pictures by Impressionist painters at that time, who did not draw clear, sharp outlines in their pictures, but showed everything in contrasts of color and light. One of Debussy's short and much loved piano compositions, CLAIRE DE LUNE (Moonlight), shows this power of suggesting a scene and its atmosphere. A few of the chief works of Debussy are his opera PELLEAS AND MELISANDE; his orchestral pieces THE AFTERNOON OF A FAUN and THE SEA; the three nocturnes CLOUDS, FESTIVALS and SIRENS; and the amusing piece for children, the GOLLIWOG'S CAKEWALK.

Maurice Ravel (1875-1937) followed Debussy's style. His BOLERO is very well known. Some listeners say it sounds almost like the approach of a railroad train.

Now we turn to the French composers of opera. The most famous, perhaps, is Charles

Gounod (1818-93), with his opera FAUST, based on Goethe's poem. Gounod wrote many other things, but this one music-drama is the most popular, and children often learn to sing its fine Soldiers' Chorus. A rival to FAUST in popularity is the stirring opera CARMEN by Georges Bizet (1838-75), with its Spanish setting and ringing Toreador Song. Bizet went to Spain and carefully studied the music and the customs of the people there. Unfortunately he did not live long enough to enjoy the tremendous success of this splendid opera.

Jules Massenet (1842-1912) wrote several successful operas. The Meditation from his THAÏS is a well-known selection. Ambroise Thomas (1811-96) composed the charming MIGNON. Jacques Offenbach (1819-80) delighted Paris with his gay comic operas. From his TALES OF HOFFMAN we have that magic Barcarolle or Boat Song, which glides, as does a gondola upon the sparkling waters of Venice. Let us mention here a composer of opera who was not French but Irish, for many of his works were produced in Paris. This was Michael Balfe (1808-70), who was born in Dublin. His opera THE BOHEMIAN GIRL has given us such lovely songs as I DREAMED I DWELT IN MARBLE HALLS, THE HEART BOWED DOWN and THEN YOU'LL REMEMBER ME.

ROSSINI, WHOSE OPERAS HAVE BRILLANCE AND CHARM

Now we must go back in order to meet the first of the Italian composers of modern opera. This was Gioacchino Rossini (1792-1868), one of the jolliest personalities in the history of music. His father was a poor trumpet player and inspector of slaughter-houses, but a gay and good-humored soul, so that people called him Vivazza, which means vivacity. Gioacchino's beautiful mother was also fond of music. Thus the boy inherited his wit, jollity, good looks and musical talents, which made him the favorite of all Europe. It is said that Napoleon considered him as a king. Though poor, young Rossini soon gained a good education in music-loving Italy. *His operas quickly won great fame and popularity, especially* THE BARBER OF SEVILLE. We often hear today the overtures from other Rossini operas; WILLIAM TELL, THE THIEVING BLACKBIRD, ITALIAN IN ALGIERS and SEMIRAMIDE are some of them. Rossini married a beautiful opera singer, and on a trip to Vienna they paid a special visit to Beethoven. Paris and London were other scenes of Rossini's triumphs.



Chopin, the famous Polish composer, has been called the poet of the piano. The music he created and his own playing changed the whole art of piano-playing.

Fame and wealth increased, but suddenly, at the age of thirty-seven, Rossini stopped writing operas and never composed any more. Richard Wagner told him that it was a crime for such a genius to throw away his pen. Rossini said that if he had had children he would doubtless have continued to work, and added, "But to tell you the truth, after having labored for fifteen years, composing during that period forty operas, I felt a need for repose and went back to live tranquilly in Bologna." Instead of operas, Rossini, we are told, now took up cooking as a hobby. It is said that a lady once asked him what was the finest thing he ever wrote, and he answered that it was a recipe for a salad dressing! Although his career as an opera composer had ended, Rossini wrote a beautiful religious *composition, the* STABAT MATER, *and some other fine church music in his later years. He finally settled in Paris, but is buried in the* Church of Santa Croce in Florence, Italy.

Other Italian opera composers of the time were Vincenzo Bellini (1801-35), whose NORMA is his best-known work, and Gaetano Donizetti (1797-1848). Donizetti wrote a number of popular operas, including THE ELIXIR OF LOVE, LUCREZIA BORGIA, THE

DAUGHTER OF THE REGIMENT and THE FAVORITE. His greatest success was LUCIA DI LAMMERMOOR, based on a novel by Sir Walter Scott. It is interesting to know that when Donizetti's father opposed his becoming a musician, young Gaetano entered the army and started to compose and produce operas while he was still a soldier.

The grand figure of Italian opera is Giuseppe Verdi (1813-1901), He was the son of a grocer and inn-keeper, and worked as a grocer's boy. His employer loved music and, seeing the talent of young Giuseppe, helped to send him to study in Milan. Giuseppe was serious and rather slow, but his musical genius soon began to show itself. At the age of twenty-six he saw his first opera, OBERTO, produced at the great La Scala Opera House in Milan. A great career had started. But it almost ended as soon as it had begun. Tragedy overwhelmed the young composer in the death of his wife and two little children within a short time. Verdi was so grief-stricken that he vowed never to compose anything more.

VERDI'S OPERAS ARE STILL AMONG THE MOST POPULAR

However, the wise and kindly manager of the Milan opera house, Merelli, managed to interest him in a new composition. Verdi's enthusiasm was reawakened, and, putting aside his rash decision, he composed the music for the opera NABUCCO, which had great success. There followed some of his less-known works, ERNANI, MACBETH and LUISA MILLER. Then came the period of his famous and now world-loved operas, RIGOLETTO, IL TROVATORE and LA TRAVIATA. Less known, but also beautiful are THE SICILIAN VESPERS, SIMON BOCCANEGRA and THE MASKED BALL —also written at this time. Verdi married again, his second wife being a charming singer, Giuseppina Strepponi, who had sung in his operas, and who became a devoted helpmate in his work. For the opera house in Russia's capital, St. Petersburg, Verdi now composed THE FORCE OF DESTINY, and for the Paris Opera he wrote DON CARLOS. But his most spectacular work in this period was AÏDA, written to celebrate the opening of the Suez Canal. This grand and dramatic opera was produced with great splendor in Egypt, and was soon a favorite everywhere.

At the age of seventy, Giuseppe Verdi was somewhat weary after his strenuous career. He had written other music besides operas, and had taken part in the stormy political events which brought the unification of his country. His interests were centered on his farm near the town of Busseto, where he had been born. There he busied himself with his garden, his horses and dogs. But once again he was stirred to creative activity. This time it was through the influence of his devoted wife, Giuseppina, and of the composer and producer, Boito. Verdi now wrote his two last operas, both based on plays by Shakespeare. They were the magnificent tragic opera, OTELLO, and the fine comic opera, FALSTAFF. Verdi's greatest composition outside the field of opera is his beautiful Requiem Mass. He wrote this in honor of Italy's great author, Alessandro Manzoni, whose novel, THE BETROTHED, is perhaps one of the finest in modern Italian literature.

ALL THE WORLD OF MUSIC MOURNED FOR VERDI

With the death of his wife, Verdi soon came to the end of his own life. His love of democracy had caused him to refuse a title from the King of Italy. He asked that his funeral should be simple and quiet, but 100,000 admirers came to do him homage. He left most of his fortune to a home for aged musicians in Milan.

Italian opera had other but lesser figures among its composers. Two men became famous, each for a single opera. We often hear those two short operas played on the same program. They are CAVALLERIA RUSTICANA (Rustic Chivalry) by Pietro Mascagni (1863-1945), and I PAGLIACCI (The Players) by Ruggiero Leoncavallo (1858-1919). A more productive composer was Giacomo Puccini (1858-1924). Most famous and popular of his operas are LA BOHÈME, MADAMA BUTTERFLY and TOSCA. Less known, but successful works, are his MANON LESCAUT and THE GIRL OF THE GOLDEN WEST. A single opera, THE LOVE OF THREE KINGS, by Italo Montemezzi (1875-) has won acclaim in Italy and America. Outside of the field of opera, perhaps the best-known Italian composer of the recent era has been Ottorino Respighi (1879-1936), with his picturesque symphonic poems, such as THE FOUNTAINS OF ROME, THE PINES OF ROME and ROMAN FESTIVALS.

THE NINETEENTH CENTURY RUSSIAN COMPOSERS

Now let us look at the great Russian group. We shall speak later of Russian composers in very recent times. The pioneer of Russia's national music was Michael Glinka (1804-57). In his operas A LIFE FOR THE TSAR, and RUSSLAN AND LUDMILLA, Glinka turned



César Franck, though born in Belgium, is usually spoken of as a French composer. He was an organist, but he composed many orchestral works.

from the music of western Europe to create an expression of his own people and country. Another composer, Alexander Dargomyzhsky (1813-69), with such works as THE STONE GUEST, aided Glinka in this first period of Russian music.

Then came "the Great Five"—Mily Balakirev (1837-1910), César Cui (1835-1918), Alexander Borodin (1833-87), Modest Moussorgsky (1839-81), and Nicolas Rimsky-Korsakov (1844-1908). All of these men were composers, and they formed a sort of grand council to further the progress of their country's music. Moussorgsky wrote with power and dramatic force. These qualities are best seen in his highly dramatic opera, BORIS GODUNOFF, which reminds us of one of Shakespeare's tragedies.

Perhaps the best musician in the group was Rimsky-Korsakov. Almost everyone has heard the haunting SONG OF INDIA, from his opera SADKO. His orchestral compositions, the SPANISH CAPRICCIO, and SCHEHERAZADE (named after the heroine of the ARABIAN NIGHTS), are also very well known. Rimsky-Korsakov was for some years an officer in the Russian Navy, and visited the United States during a cruise of some Russian warships. In addition to his own compositions, he did much work in adapting the music of Moussorgsky and of some of the other composers.

Alexander Glazunov (1865-1936) and Anatol Liadov (1855-1914) wrote fine symphonic music, while Anton Rubinstein (1829-94) was a famous pianist and composer.

TSCHAIKOWSKY'S POPULARITY HAS NEVER WANED

The most celebrated and popular of Russian composers is Peter Ilyich Tschaikowsky (1840-93). In modern times his music is played everywhere, and great numbers of popular songs have been based on his melodies. Tschaikowsky started as a law student and civil-service employee, but soon turned his attention entirely to music. Although he said of himself that he was "no Beethoven," his symphonies, especially the Fourth, Fifth and Sixth (the PATHETIQUE), are among the best-loved of orchestral compositions. The fourth part, or "movement," of his Fourth Symphony is based on a simple Russian folk song, "In a field there stood a birch tree," and we can almost hear these words when listening to the thrilling music. It is one example of how the great composers took their themes from the everyday songs of the people. Tschaikowsky's orchestral composition, the NUTCRACKER suite, is a great favorite with old and young because of its many delightful and fanciful tunes. The MARCH, DANCE OF THE SUGAR-PLUM FAIRY, DANCE OF THE FLUTES and WALTZ OF THE FLOWERS, are some of these tunes. EUGENE ONEGIN and PIQUE DAME (The Queen of Spades) are two of Tschaikowsky's best-known operas. The ANDANTE CANTABILE, a movement from a quartet, the ROMEO AND JULIET overture, and the CAPRICCIO ITALIEN are popular selections from his great wealth of compositions. Tschaikowsky was a sensitive and shy man, who often wrote sad, romantic music. He met a strange death, when, during a plague, he drank a glass of unfiltered water, and died of cholera.

NINETEENTH CENTURY ENGLISH COMPOSERS

Let us see some of the composers who had been writing in other countries during this period. England had Sir Edward Elgar (1857-1934), who composed THE DREAM OF GERONTIUS, the march POMP AND CIRCUMSTANCE and other works. Also in England, Sir Arthur Sullivan (1842-1900) wrote the music for delightful comic operas (the Gilbert and Sullivan operas), and Ralph Vaughn Williams (1872-) has composed excellent orches-

tral works based on old English themes.

The richness of Jewish traditional music was adapted by Ernest Bloch (1880-), a Swiss who became an American citizen.

Edvard Grieg (1843-1907) of Norway wrote fascinating compositions, such as his PEER GYNT suite, based on Northern themes.

TWO FAMOUS BOHEMIAN COMPOSERS

Bohemia, which is now a part of Czechoslovakia, produced two noted composers. One was Bedřich Smetana (1824-84), who wrote the popular opera, THE BARTERED BRIDE, and the orchestral piece, THE MOLDAU, in which we follow the river of that name through the beautiful countryside until it reaches the sea. The other was Anton Dvořák (1841-1904). Dvořák is especially famous in the United States for his FROM THE NEW WORLD Symphony, which is based on themes that he heard in America. Well known are his short compositions, which include HUMORESQUE and SONGS MY MOTHER TAUGHT ME.

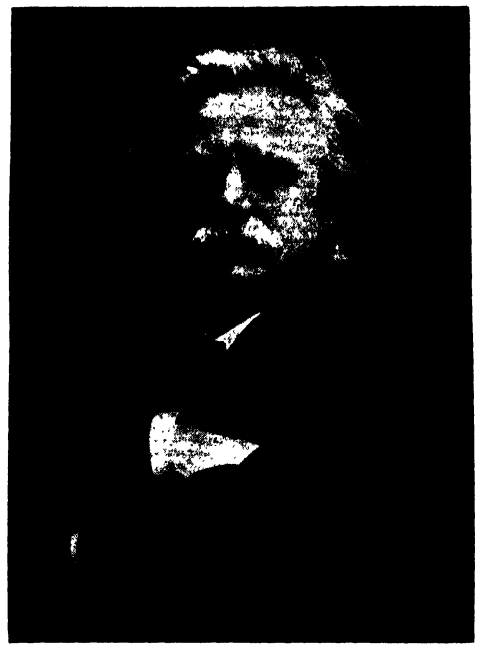
Hungarian music has had interpreters in Béla Bartók (1881-1945), and Zoltán Kodály (1882-). Spain produced Enrique Granados (1867-1916), and the fine music of Manuel De Falla (1876-), who wrote the opera, LA VIDA BREVE (Life Is Short), the ballet, EL AMOR BRUJO (Love, the Magician), and the orchestral suite, NIGHTS IN THE GARDENS OF SPAIN. Colorful gipsy melodies have come to us in the Rumanian rhapsodies, the symphonies and other compositions of Georges Enesco (1881-). Some of the strange discords in modern music were introuduced by the Austrian composers Arnold Schönberg (1874-), and his pupil Alban Berg (1885-1935), who wrote the opera WOZZECK.

STRAUSS AND SIBELIUS ARE LEADING MODERN COMPOSERS

Perhaps the two outstanding figures among modern composers have been Richard Strauss and Jean Sibelius. Richard Strauss (1864-) (not related to the "Waltz King") was born in Munich, but has spent much of his life in Vienna. He has written many compositions for the orchestra and for the operatic stage, but none more popular than the lovely opera, DER ROSENKAVALIER (The Cavalier of the Rose).

Jean Sibelius (1865-) is the musical genius of Finland. His orchestral suites, like THE SWAN OF TUONELA, are based on the legends of his country, and his symphonies reflect the rugged grandeur of that land. Very popular is his fine tone poem, FINLANDIA. The hymn-like tune with which it ends has been adopted as the Finnish national anthem.

In the United States, Stephen Foster (1826-64) adapted Negro melodies and wrote songs that have never lost their popularity. Edward MacDowell (1861-1908) is perhaps the best known of American composers, especially for his short compositions, such as TO A WILD ROSE and TO A WATER LILY. But he wrote many other works, which may perhaps



Grieg, a Norwegian composer, based many of his fascinating compositions on themes of the Northland.

gain in popular favor, and he did much to aid the development of American music. Other composers in the United States have been John Knowles Paine (1839-1906), Horatio Parker (1863-1919) and George Chadwick (1854-1931).

A pioneer in the use of everyday American themes for serious music has been Charles Ives (1874-). From the popular jazz music of the nineteen twenties and thirties, George Gershwin (1898-1937) developed works of true musical value in his RHAPSODY IN BLUE, his Piano Concerto in F, and his unique American folk opera, PORGY AND BESS. Gershwin's death was a great loss to the music of the people. Excellent symphonic

music has been written by Frederick Shepherd Converse (1871-1940), Howard Hanson (1896-), Roy Harris (1898-), William Schuman (1910-), Aaron Copland (1900-), and Walter Piston (1894-). Virgil Thomson (1896-) is noted both as a music critic and as a composer. He is especially famous for an opera, FOUR SAINTS IN THREE ACTS, and for the background music for two real-life motion pictures, THE PLOUGH THAT BROKE THE PLAINS and THE RIVER. Among other works, Marc Blitzstein (1905-) has composed a successful light opera, THE CRADLE WILL ROCK; and a symphony, THE AIRBORNE, which is a history in music of human flight. We tell you about the American writers of songs in the article beginning on page 3600.

Latin America, with its stirring melodies and rhythms, has produced numerous modern composers. They have woven native and national themes into their compositions. In Mexico, Silvestre Revueltas (1899-1940) and Carlos Chavez (1899-) have gained prominence, and their music has been widely played. Heitor Villa-Lobos (1881-) is one of Brazil's leading composers, and Juan José Castro (1895-) of Argentina is known for his Argentine and Biblical symphonies. There is a spirit and strength in Latin American music that promises well.

The rich flow of Russian music has continued in recent times. We have seen that its beginning, as a form of national expression, came later than in some other countries. An important Russian composer of the early twentieth century was Alexander Scriabin (1872-1915). As a pianist he toured in Europe and in the United States, and was affected by the styles of Western music. But he later returned to the forms developed by Russia's "Great Five." With a special quality of religious inspiration, he wrote such works as THE DIVINE POEM, THE POEM OF ECSTASY and PROMETHEUS (THE POEM OF FIRE).

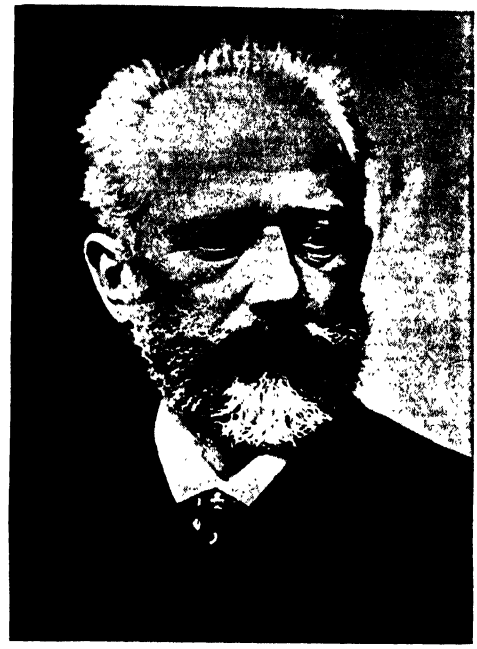


All of the men in this picture are composers of the eighteenth and nineteenth centuries. From right to left they are; Chopin, Handel, Gluck, Schumann, Weber, Bach, Haydn, Mozart, Schubert, Beethoven, Mendelssohn, Wagner, Meyerbeer, Gounod, Verdi, Liszt, Bruckner, Brahms and Grieg.

One of Scriabin's classmates in school, and a devoted admirer of his music, was the distinguished Russian pianist and composer, Sergei Rachmaninoff (1873-1943). As a young student, he had the opportunity to study under Rimsky-Korsakov in St. Petersburg. But his idol was Tschaikowsky, who lived in Moscow. Therefore Rachmaninoff stayed there until Tschaikowsky's death in 1893. The young musician then began his career as a composer and concert pianist, making world tours. A composition of his, the Prelude in C Sharp Minor, had become famous everywhere, and even children were

learning to play its thunderous chords, which were said to represent the great bells of Moscow. But Rachmaninoff composed far more important and larger works—symphonies and piano concertos. He was several times invited to become the conductor of the Boston Symphony Orchestra, but preferred to continue as a pianist. He left Russia at the time of the revolution in 1917, and never returned. Rachmaninoff later became a citizen of the United States, where his songs and orchestral compositions, and his concert tours made him a leading figure in the field of music.

A somewhat startling composer has been Igor Stravinsky (1882-). Although he studied for a short time under Rimsky-Korsakov, his music has been very different from that of his instructor. The discords and clashing sounds in many of his compositions were something entirely new, and caused much opposition as well as admiration. Some of his famous works are THE RITE OF SPRING, and the ballets THE FIRE BIRD and PETROUCHKA. In 1930, Stravinsky wrote the SYMPHONY OF PSALMS for the fiftieth anniversary of the Boston Symphony Orchestra. Stravinsky, disapproving of the revolution in Russia, became a French citizen, and, after the fall of France in World War II, became a citizen of the United States. In gratitude to his new homeland he published, on July 4, 1941, a new orchestral arrangement of THE STAR-SPANGLED BANNER; this composition, however, has some of the strange qualities of some of his other music. He has made a serious study of jazz music and other popular forms.

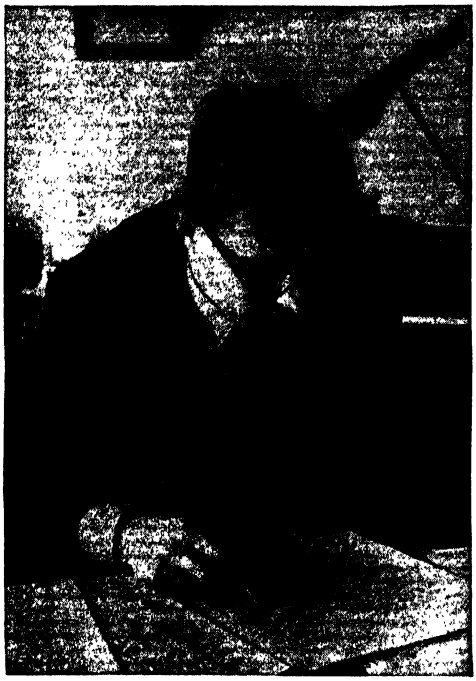


Tschaikowsky was perhaps the greatest of the Russian romantic composers of the nineteenth century. Many of his works are based on Russian themes.

COMPOSERS OF SOVIET RUSSIA

Other Russian composers have remained in their own country and lent their talents to the new era. Michael Ippolitov-Ivanov (1859-1935) is perhaps best known for his orchestral suite, CAUCASIAN SKETCHES, which is often played at concerts. After the Russian revolution, he became conductor at the Moscow Opera, and wrote several songs and marches, such as the SONG OF STALIN, and THE VOROSHILOV MARCH, which became popular with the Red Army. Ivanov, or Ivanoff had also been a student under Rimsky-Korsakov. He added the first part of his name to avoid confusion with a music critic named Ivanoff. Reinhold Glière (1875-) composed the ballet, RED POPPY, which has been very popular in the Soviet Union, and its SAILORS' DANCE has become a world-wide favorite. It is often heard on the air.

Most noted of the new Russian composers have been Dimitri Shostakovitch (1906-) and Serge Prokofieff (1891-). Shostakovitch was only eleven years old when the revolution took place in Russia, and grew up in the Soviet state. Some of his symphonies have won him a world-wide reputation. Much attention was centered on his Seventh Symphony, part of which was written in Leningrad (the old St. Petersburg) in December, 1941, while that city was being besieged by German armies. It won great success in Russia, and the score was photographed on microfilm and flown to the United States, where it was first performed on a radio broadcast by the NBC Symphony Orchestra under the great conductor Arturo Toscanini in July, 1942. The Polka from a ballet, THE GOLDEN AGE, by Shostakovitch, is frequently heard on concert programs. Shostakovitch has said "I am a Soviet composer . . . ," and "Music can not help having a political basis . . . ," and he has benefited from the rewards which his government has given to its favored artists. In 1936, however, his opera, LADY MACBETH OF MZENSK, and his ballet, THE LIMPID STREAM, were condemned in the offi-



Courtesy, National Broadcasting Co.

Dimitri Shostakovich is one of the most celebrated of living Russian composers. Part of his Seventh Symphony was written during the siege of Leningrad.

cial newspaper, PRAVDA, and the composer was obliged to adapt his music more closely to Soviet ideas.

More popular, perhaps, outside Russia have been the compositions of Serge Prokofieff. This composer has brought the forms of Western music into many of his works. At the age of six, little Serge wrote a waltz and a march. When he was nine he composed an opera, THE GIANT, which he and some of his family produced at home. As he grew up, he studied with distinguished Russian composers, Glière, Glazunov, Liadov, Rimsky-Korsakov and others. With his various compositions, especially for the piano and for orchestra, Prokofieff gained a wide reputation. He visited the United States and England, and then lived in France from 1920 to 1927, when he returned to Russia. Prokofieff's music varies from his popular CLASSICAL Symphony, which reflects the style of Mozart, to the sharp discords and clashes of the SCYTHIAN suite. Selections from his opera, LOVE FOR THREE ORANGES, are frequently played as orchestral numbers. This opera deals with the strange story of a prince who meets three princesses, each of whom makes her appearance out of an orange.

A more recent opera is his WAR AND PEACE based on the famous novel by Count Tolstoy. To celebrate the new industrial growth of Russia, Prokofieff composed a ballet called THE STEEL LEAP. Children everywhere have come to know his delightful piece PETER AND THE WOLF. In this composition each character is represented by an instrument. Peter is represented by strings, his grandfather by the bassoon, the bird by the flute, the duck by the oboe, the cat by the clarinet, and the wolf by three horns. There are some bright and simple melodies in this piece which children easily remember. Another entertaining composition by Prokofieff is his music for the motion picture, LIEUTENANT KIJE. This is the story of an imaginary lieutenant, invented by some Russian officers to hide a mistake made by the tsar (the emperor), and it makes fun of the old Russian empire.

We learn to know the great composers through hearing their music. After we have listened to a good deal of music, we can begin to recognize the composer by his style. A piece by Mozart or Haydn will be clearly different from a composition by Wagner or Verdi or George Gershwin. It may not be possible in all cases to guess correctly who has written the selection. But we shall enjoy our growing acquaintance with the composers and with their manner of writing music.

GREAT MUSIC IS NOW WITHIN THE REACH OF ALL

Opportunity to hear the world's musical masterpieces has greatly increased in our day. Many cities in the United States and in other countries now have fine symphony orchestras, which present programs of old and new orchestral works. A spirit of international brotherhood is encouraged when music lovers seek out the best music in all countries. Opera, too, is gaining in the New World some of the great popularity it enjoyed in the many large and small opera houses of Europe. Magnificent presentations, such as those of the Metropolitan Opera in New York, are broadcast to nation-wide audiences, and to other countries as well. The radio and the phonograph, together with the various musical instruments, make it possible for every household to take its place in the world of music. Dance bands and popular orchestras have increased our familiarity with the means of making music. From Palestrina to Prokofieff, the great composers are near at hand, to delight and inspire us.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 7051.



A spray of Wild Rose.

FLOWERS OF NORTH AMERICA

FLOWERS OF THE PACIFIC COAST



WE have told you several times that the same trees and flowers are not found in all parts of North America. While some species are very widely distributed, each section has some which are not found elsewhere. Differences in soil and temperature, the presence or absence of high mountains, and the amount of moisture in the air are some of the reasons for these differences. To tell them all would require a book.

Taken as a whole, the flora of the Pacific coast is quite different from that of the other sections of the continent. While many of the species found in this region are the same as those found elsewhere, or are closely related to them, yet many others are quite distinct. For example, the Big Trees and the Redwoods (Sequoias) are found nowhere else.

Within the region itself are great differences of soil and climate, and, as might be expected, the same plants do not grow in all parts of it. In the north the climate is cool and moist, while in the south there is almost no rain. Parts of the region are between the two in these respects. Then, too, the same plants do not grow upon the high mountains and on the lower lands. We shall describe some of the more common flowers of the region, and the descriptions and pictures will enable you to know them when you find them.

The Trillium is one of the most abundant and attractive woodland flowers of early spring. The pure white of its flowers contrasts sharply with the darker background of humous soil and decaying vegetation so characteristic of the dense coniferous forests. Only the inner three of the showy parts of the flower are white, the outer three being green. As the flowers grow old the white parts of many of them change to a reddish color. The name trillium comes from a word meaning "three," the parts of the flower being conspicuously in threes. The plant belongs to the Lily Family. The species that is common in the woods of the northern Pacific coast region is a foot or more in height, has three large leaves a short distance below the flower, and grows from a short stout rootstock situated rather deep in the soil. This species is found from Alaska to California and Idaho.

THE DOG-TOOTH VIOLET IS NOT REALLY A VIOLET

The Dog-tooth Violet is another beautiful flower of the Lily Family. It is readily distinguished from the trillium by both its flowers and its leaves. All six of its outer flower parts are alike, and its two leaves are borne at the surface of the soil. The color of

the flower varies, being white, yellowish, purplish or pink in different species. The color of the leaves also varies, being green in some and mottled in others. The plant grows from a very short thick roundish stem situated deep in the soil. The name alludes to the fancied resemblance of the outer flower parts to the teeth of the dog. The name violet is somewhat deceptive, since the plant is not closely related to the true violets. A large species which is abundant on prairies and the borders of open woods from Vancouver Island to Oregon has yellowish flowers and brown-mottled leaves.

BEAR GRASS, FROM WHICH BASKETS ARE MADE

Bear Grass, another member of the Lily Family, is a tall plant with large masses of white flowers at the top of the tall stem. It forms a striking feature of the flora of meadows and open woods on mountains, but is not found at lower levels. At the base of the plant there are numerous long slender tough leaves. Farther up the stem the leaves are shorter and less abundant. The leaves have been used by Indians for making baskets, and the plant is often called Indian Basket Grass. It is a perennial plant growing from a thick woody underground stem. It is found from British Columbia to California and Montana.

SKUNK CABBAGE, WHICH HAS AN UNPLEASANT ODOR

Skunk Cabbage appears in swamps from Alaska to California in early spring. The individual flowers are very small and are crowded together on a fleshy stalk. This stalk, the flowers and the leaf-like organ that at first envelops them are golden yellow, and the young plant is thus conspicuous and attractive in appearance, though its skunk-like odor discourages close acquaintance. The leaves are smooth and bright green, and grow from the underground stem. They are broad and extremely large, often reaching a height of more than three feet, thus forming the most conspicuous feature of the plant in summer. This plant belongs to the Arum Family, which comprises also the eastern skunk cabbage and the Jack-in-the-pulpit.

TWO ORCHIDS—CALYPSO AND RATTLESNAKE PLANTAIN

The Calypso, or Cytherea, is a small delicate orchid found in early spring in mossy woods from Alaska to Labrador and south to California, Michigan and Maine. The stem is erect, and grows from a whitish solid bulb, which also produces a single green leaf separate from the stem. Each stem bears a single flower at its summit, and has usually three bracts, the upper one being a slender purple structure, erect near the flower, and thus rather showy. The flower is purple or lavender in color and is showy. Its lower portion has the sac-like form that is characteristic of orchids. This and the five slender upward-pointing portions at its top readily distinguish it.

The Rattlesnake Plantain also belongs to the Orchid Family, but is better known by its leaves than by its flowers. Its leaves are evergreen and grow close to the ground in a rosette. They have numerous whitish lines extending both lengthwise and crosswise of the leaf, contrasting sharply with the green of the rest of the leaf and giving it a mottled appearance. The leaves are not very numerous and are about four inches long. In summer the plant has small whitish flowers along the upper portion of an erect and somewhat hairy or glandular stem often a foot tall. It is common in mossy woods and is found from British Columbia to Quebec and south to California and New York.

MINERS' LETTUCE, WHICH IS SOMETIMES EATEN

Miners' Lettuce is a low herb with very succulent leaves and stems, and numerous white or pinkish flowers with red veins in the petals. It gets its name from the fact that its stems and leaves are sometimes used for greens where other plants are not available. Some of the leaves grow from the base of the plant and have long leaf-stalks, but a single pair of leaves without stalks grows on the stem a short distance below the flower. It is abundant in open woods and is found from Alaska to California and Idaho. It belongs to the Purslane Family and is closely related to the spring beauty of central and eastern United States.

THE YELLOW POND LILY AND ITS RELATIVES

The Yellow Pond Lily is common in shallow lakes. Its leaves are large and roundish with a heart-shaped base, and either lie flat on the surface of the water or stand a little above it on round green leaf-stalks. Its stems are from two to six inches thick and grow horizontally in the mud. They are not at all woody, and

FLOWERS OF MOUNTAIN AND SWAMP



Several buttercups are found in the West. This is Suksdorf's Buttercup, one of the most attractive of all. It is abundant only in open places on high mountains, where it grows close up to the snow-line. It is about a foot high. The petals are bright yellow and soon fall.



The Skunk Cabbage of the Pacific coast is a member of the Arum Family, and does not differ greatly from the eastern type. Though attractive in appearance, its unpleasant odor will preserve it from the destruction which has come to so many of our wild flowers.

Upper photo, Linkletter Studio; lower, Asahel Curtis, Seattle

have large air spaces in them. The flowers are raised above the surface of the water and are yellow, sometimes tinged with red. Insects are numerous in some of them. The seeds have been used as food by Indians. This species is found from Alaska to California and Colorado. It is closely related to the water-lilies that were dedicated by the Greeks to the water-nymphs.

THE WATER-SHIELD IS NOT CONFINED TO THE PACIFIC COAST

The leaves of the Water-shield form an almost complete covering on the surface of considerable areas in the shallow margins of lakes all along the Pacific coast. The creeping stem is in the mud at the bottom of the lake, and the long slender leaf-stalks extend up to the surface, where they are attached to the centre of the floating leaf-blades. The floating portion of the leaf is elliptical in shape, and is from two to four inches long. The whole plant, except the upper surface of the leaves, is covered with a tough transparent jelly. This is a common plant also in eastern and southern United States, as well as in Asia, Africa and Australia. Its flowers are dull purple and are borne just above the surface of the water.

BUTTERCUPS OF THE LOWLANDS AND THE MOUNTAINS

Buttercups are common in the Pacific coast region in both the lowlands and the mountains. They are usually readily distinguished from other herbs by their flowers. The flowers are usually yellow, and always have all four of the circles of organs—sepals, petals, stamens and pistils—separate and all borne on the receptacle. The sepals usually fall off early, and the petals are the most conspicuous part of the flower. The stamens and the pistils are numerous. A few flowers belonging to the Rose Family look somewhat like the buttercups, but are readily distinguished from them by the fact that their stamens are borne on the calyx. The Blotched Buttercup is one of the common species in the lowlands. It is a tall plant common in shady places. Its flowers are small, pale yellow and not showy; but its leaves are rather large, and each one has at its centre a dark blotch which contrasts sharply with the green of the rest of the leaf.

Suksdorf's Buttercup is one of the attractive flowers of Nature's wonderful gardens in the open places on high mountains. It blooms in July and August, and is found close to the snow in both the Cascades and the Olympics. The plant is one foot or less in height and is smooth. The petals are bright yellow and turned back, and fall off early.

THE WESTERN ANEMONE, A FLOWER OF THE MOUNTAINS

The Western Anemone is a plant of the Crowfoot Family and closely resembles the pasque flower of midwestern United States. It is, however, much larger than the pasque flower, and it grows in high mountains near the snow, while the pasque flower grows on prairies and dry hills. The western anemone has large lavender flowers, which come earlier than the leaves. Many fruits develop from each flower; each fruit has a long feathery appendage, giving the whole head a plume-like appearance. The leaves have many narrow divisions, and are borne on the erect stem some distance below the head of fruits. The plant has a striking appearance, especially when in fruit.

TWO SAXIFRAGES—YOUTH-ON-AGE AND FRINGED CUP

Youth-on-age is common in rich woods, and is easily recognized by the fact that many of the leaves have clusters of young leaves on the older ones at the point where the leaf-stalk joins the blade. As these leaves come in contact with the soil, roots are formed, and new plants thus originate from the old ones. The stems are from one to two feet tall, and the flowers are loosely distributed along its upper part. Some of the leaves are borne around the base of the stem at the surface of the soil and some farther up the stem. The outer part of the flower is purple. The plant is perennial, and the leaves remain green all winter in some places.

This plant was first collected by Archibald Menzies, who was the surgeon and naturalist with Vancouver during his exploration from 1790 to 1795. It belongs to the Saxifrage Family.

The Fringed Cup receives its name from the fact that the colored parts of its flowers are fringed on the edges. Its stems are hairy and are from one to three feet tall. The flowers, which are at first yellowish or greenish and later change to red or purple, are loosely borne along the upper part of the stems. It is an attractive flower, common in moist woods. Its underground parts live through the winter, and its stems, leaves and flowers grow

COMMON WESTERN FLOWERING PLANTS



The Salmon Berry has red flowers succeeded by edible berries, from the color of which the plant gets its name.



The Hard-hack is a common shrub in swamps and near water. The flowers are rose-colored, but soon give way to the brownish, unattractive fruit.



The Cat's-ear would be admired more if it were not such a pest on lawns and in pastures. It bears some resemblance to that other pest, the dandelion.



The Pearly Everlasting is a perennial herb which seems to flower in winter. These are not true flowers, but bracts surrounding the flower-heads.

Photos, upper left, Asahel Curtis; others, R. E. Chapman.

rapidly in spring. The flowers and flower-stalks have glands. The leaves are somewhat heart-shaped and are toothed at the margin. Like youth-on-age, it belongs to the Saxifrage Family and was first collected by Menzies. It is found from Alaska to California.

OREGON GRAPE, SOMETIMES CALLED WESTERN HOLLY

Two kinds of Oregon Grape are familiar in western Washington, Oregon and British Columbia. Both are shrubs with yellow wood and long evergreen leaves consisting of several pairs of spiny leathery leaflets with an odd leaflet at the end. Both bear long clusters of yellow flowers in spring, and in late summer produce black or bluish berries with a whitish coating on them.

The two are readily distinguished by the height of their stems and the character of their leaflets. The one called the Dull Oregon Grape has very short stems, so that its leaves seem to come almost from the surface of the soil. Its leaflets are dull green in color, somewhat spiny, and their nerves come from the midrib in a somewhat feather-like arrangement. The Tall Oregon Grape has taller stems, usually three feet or more high, and very shiny, very spiny leaflets with three nerves from the base. This one is sometimes called Western Holly. The dull one is very common in open coniferous woods, while the tall one is less abundant and is usually found in gravelly or rocky places. The underground stems of both are an official drug, but the market for the drug is not large. The fruit of the dull one is often used for jelly. Both belong to the Barberry Family.

SWEET-AFTER-DEATH, ANOTHER MEMBER OF THE BARBERRY FAMILY

This is a delicate herb appearing in early spring in open woods in the coast region from British Columbia to northern California. It has an underground stem from which grow a single leaf about a foot high with three fan-shaped leaflets at its top, and an erect stem of about the same height with numerous small white flowers crowded close together at its top. The plant is fragrant when it dries, its odor being somewhat vanilla-like. *It belongs to the same family (Barberry) as the Oregon grapes, though its general appearance is very different.* The similarity to the Oregon grapes lies in certain botanical characters of its flowers.

THE BLEEDING HEART AND ITS CULTIVATED RELATIVE

This is a low smooth delicate herb with pink or rose-colored flowers, common in moist woods from British Columbia to California in the coast region. Its stems and leaves grow from perennial underground parts. The flowers are borne loosely along the upper portion of the stem. The leaves are divided into many narrow lobes. This plant belongs to the Poppy Family and is closely related to the cultivated bleeding heart and also to the Dutchman's breeches, common in northern United States and portions of southern Canada.

THE PITCHER PLANT, WHICH EATS INSECTS

The Pitcher Plant is an herb which is very common in the marshes and sphagnum bogs of southwestern Oregon and northern California. The plant has a slender brittle stem from one to three feet tall, with a few small leaves scattered along it and a single large brownish flower at its top. The "pitcher" leaves come from the part of the plant that is imbedded in the moss or other vegetation. The leaf is a foot or more in height, and consists of a tube enlarging gradually from the base to the top, which is covered with a translucent mottled hood having a slender projection at each side. There are reddish lines extending down the body of the leaf from the hood. The remains of insects are commonly found in the base of the tube inside of the leaf, and it seems that the leaf uses the insects for food. The whole leaf presents a somewhat bizarre appearance and, looking like a sort of fairy puzzle, must excite the curiosity of an insect if it has any. This plant belongs to the Pitcher Plant Family, but differs somewhat in the form of its leaves from the pitcher plants found in the bogs of eastern United States.

SUNDEW, ANOTHER PLANT THAT EATS INSECTS

The Sundew is another plant that uses insect food, but it is quite different in appearance from the pitcher plants. It is a small reddish herb, very common in the sphagnum moss of bogs from Alaska to Labrador and southward to California and Florida. *It is common also in Europe and Asia. Its leaves form a rosette on the surface of the bog,* and its slender stem is erect and bears from five to twenty small white flowers. The leaf of

ATTRACTIVE FLOWERS OFTEN SEEN



The Western Anemone is an interesting plant of the Crowfoot Family. The large lavender flowers appear earlier than the leaves. It grows in the mountains.



The fruits of the Western Anemone look almost like flowers themselves on account of their feathery appearance.



The Trillium, common on the Pacific coast, has showy white flowers which change to reddish as they wither. It grows a foot or more high.



The Shooting Star is a showy plant with rather odd-looking flowers resembling the cyclamen. Some species grow in arid regions, others in wet places.

Upper photos, Linkletter Studio; lower, Asahel Curtis.

the commonest species consists of a rounded blade borne on a slender leaf-stalk. On the blade are numerous glandular hairs each having a drop of red sticky liquid at its summit. These shine in the sun and give the plant its name. Insects are caught and held fast in this sticky liquid. They are pressed down to the surface of the leaf by the bending of the hairs and are there digested. The remains of insects are readily found in many of the leaves. The plant is an official drug, its fluid extract being used as a remedy for certain disorders.

THE RED-FLOWERED CURRANT, A SHOWY WESTERN SHRUB

The Red-flowered Currant is a very showy shrub from three to nine feet tall, bearing numerous red flowers in early spring. It is common in open woods from British Columbia to California in the coast region. It is easy to transplant and is commonly seen in yards and parks. The fruit is a black, slightly hairy berry covered with a whitish powder, and is not attractive as food. The plant is very ornamental for a short time in the spring when in flower, but is very ordinary-looking in summer when in fruit. It belongs to the Gooseberry Family.

THE HARD-HACK, WHICH LIKES DAMP GROUND

This is a shrub four or five feet tall forming dense thickets in swamps and on lake margins. In midsummer it is conspicuous and attractive because of the dense masses of rose-colored flowers along the summit of the stem above the leaves. In late summer, however, the bright color of the flowers gives way to the dull brown of the small pod-like fruit and the plant becomes less conspicuous. This shrub is common in the coast region from British Columbia to Oregon. The first specimens of it were collected by David Douglas, a Scotch botanist who collected in this region at various times from 1824 to 1832.

OCEAN SPRAY, COMMON IN THE OPEN WOODS

Ocean Spray is a tall shrub with large masses of white or yellowish flowers. It reaches a height of from six to fifteen feet, and is very common in open woods, especially on banks and rocky places. It is an unusually attractive plant for a short time in summer, but when its flowering season has passed it is much less beautiful. This plant has very hard wood, and is said to have been used by the Indians for arrows. The leaves are simple and are not evergreen. The plant was first collected in 1806 by Lewis, of the famous Lewis and Clark Expedition.

NUTKA ROSE, FIRST FOUND ON VANCOUVER ISLAND

The Nutka Rose is a tall plant with large showy flowers and large red fruit. The plant sometimes reaches a height of seven feet. Many of its flowers are more than two inches broad, and its fruit is often three-fourths of an inch thick. Its prickles are stout but few, as compared with some other wild roses. This plant was first collected at Nootka Sound on the west coast of Vancouver Island, and is found from Sitka, Alaska, to California and Utah. Several other wild roses are common on the coast, and a sweet-briar has been introduced and now runs wild.

PURPLE MARSH-LOCKS, ANOTHER MEMBER OF THE ROSE FAMILY

Purple Marsh-locks is a perennial herb with dark green leaves and large purple flowers, common in marshes and bogs, especially at the margins of ponds and lakes. Its stems are prostrate and numerous, and they grow rapidly forward into the water, thus helping in the filling of ponds and lakes. In summer, when their flowers are at their best, these plants form a particularly conspicuous feature of many shallow lake margins. When the flowers have faded, the plants may be recognized by their dark green compound leaves and the spongy disks on which the flower parts were borne. It belongs to the Rose Family. It is most characteristic of northern regions, but is found in California.

THE SALMON BERRY, VALUED BOTH FOR FLOWERS AND FRUIT

The Salmon Berry is a tall, somewhat prickly shrub with red flowers and salmon-colored or garnet edible fruit. The petals are the most conspicuous part of the flower. The pistils and stamens are numerous and are borne on the corolla. The fruit resembles the raspberry in the fact that the receptacle comes off with the berry when it is picked. When a blackberry is picked the receptacle remains on the plant. The salmon-colored berries have the better flavor, though the garnet ones are also edible. The two kinds of berries are borne on separate plants, the one bearing the garnet fruit being distinguished, even in flower, by its purplish twigs. The young fleshy shoots are sweet and are said to have been eaten

FOUR BEAUTIFUL FLOWERING SHRUBS



Salal is one of the commonest evergreen shrubs of the West. It bears white or rose-colored flowers, which appear late in the spring.



The Red-flowered Currant is a showy shrub which is often transplanted to lawns. The blackish berry is not edible. It belongs to the Gooseberry Family.



The Dogwood in the West is even more beautiful than in the East, and sometimes grows into quite a large tree. It is often transplanted to lawns.



The Sticky Balm is a showy shrub bearing masses of small white flowers, with a pleasant odor. The plant is an evergreen.

Photos on this page and on 6927 by Asahel Curtis.

by the Indians. Though the prickles of this plant are rather weak, they are strong enough and numerous enough to make traveling through a salmon-berry thicket a rather unpleasant experience. The bark of the older stems peels off in shreds. The leaves are compound, being composed of three leaflets. This plant is found in wet bottom lands and along streams from Alaska to California and northern Idaho. It occurs in lowlands and also up to 2,000 feet elevation on mountains. It was first collected in 1806 by Lewis, of the famous Lewis and Clark Expedition.

BROOM HAS BEEN INTRODUCED FROM EUROPE

The Broom is a shrub with stiff green angular twigs, yellow flowers and flat pods. It has been introduced from Europe and is spreading rapidly along the coast. It is common in the Puget Sound region, and forms dense thickets on Vancouver Island and elsewhere in southern British Columbia. It is also found in eastern United States. A variety with white flowers is occasionally seen in Washington and British Columbia and also one whose flowers are yellow and have some red portions. The twigs of this plant are an official drug, but the market for it is not extensive. The plant belongs to the Pulse Family along with peas, beans and vetches.

STICKY BALM OFTEN FOLLOWS FOREST FIRES

The Sticky Balm is a large much-branched shrub with showy masses of small white flowers. It has a pleasant cinnamon-like odor. Its leaves are thick and evergreen, shiny on the upper surface, and rather sticky. They are somewhat heart-shaped and have three nerves from the base. This shrub forms dense thickets, *especially on gravelly soil where the forest has been burned, and is found from British Columbia to California, Colorado and* the Dakotas. It is another of the plants collected by David Douglas during his adventurous botanizing trips in the Pacific Northwest.

VIOLETS ARE EVEN MORE COMMON THAN IN THE EAST

Violets are common in the Pacific coast region in both the lowlands and the mountains. Some kinds have yellow flowers, others have blue or violet flowers, and one has white flowers. Some are found in open woods, others in swamps and bogs, and some are especially abundant on the prairies. The Evergreen Violet is common in open woods in the lowlands and is also found on mountains. Its leaves remain green all winter, and it produces a profusion of yellow flowers in early spring. In some parts of western Washington there are gravelly prairies, and portions of these are carpeted in early spring with blue violets of remarkable beauty.

THE DEVIL'S CLUB DESERVES ITS UNPLEASANT NAME

The Devil's Club richly deserves its name. Anyone who has had the experience of slipping while walking a fallen log in the swampy forest and grasping the spiny stem of this plant for support, or who has had the misfortune to step on the prostrate portion of one of its stems and has as a result been struck in the face by the erect portion, may have felt that even this name was not strong enough to express his opinion of the plant.

It is a shrub whose stems are flexible, sometimes twelve or fifteen feet long, including both the prostrate and erect portions, producing very few branches and thickly covered with very stiff sharp prickles—a suitable club for his Satanic Majesty. In spring the plant produces at its top several large spiny sharply lobed leaves often as much as a foot in diameter. In summer it produces above the leaves a showy cluster of cream-colored flowers which later produce conspicuous scarlet berries.

In the Pacific coast region this plant ranges from Kodiak Island, in Alaska, to California. In Washington it is found in the mountains, both in the Cascades and in the Olympics. It is found also in the Rocky Mountains and occurs as far east as Isle Royale in Lake Superior. With all its striking qualities this plant is likely *to be known to anyone who has had much experience in the forests of the Pacific* Northwest.

THE DOGWOOD TREES OF THE WESTERN REGION

Among the most beautiful flowers of the Pacific coast region are the large white flowers produced so profusely in spring by the Dogwood tree. The showy part is not the flowers themselves, but consists of the large white bracts surrounding the head of small flowers. In autumn the trees produce showy red berry-like fruits which soon fall. The dogwood is a small tree whose stems in the forest frequently grow in clusters. Its branches occur in

pairs on opposite sides of the stems, but these pairs are frequently so close together that the branches seem to come in groups. The leaves are opposite, and fall in autumn. The dogwood is readily transplanted, and is a very attractive tree for street planting and for parks. Its wood is hard and tough and is used for sledge-handles, wedges for splitting logs and for other purposes.

Two other dogwoods are common in the Pacific coast region. One is a perennial herb with small flower-heads and short bracts, common in mountain regions and also found occasionally in wild cranberry marshes and open woods in the lowlands. The other is a shrub with red twigs and cream-colored flowers without bracts, common in wet places.

THE WINTERGREEN IS COMMON IN THE WESTERN WOODS

Several species of wintergreen are common in the coniferous woods of the Pacific coast. They are low smooth perennial herbs with red, white or pink flowers on an erect stem. Most of them have evergreen leaves spreading in a rosette from the base of the plant, but some have no leaves at all. One of the commonest and most attractive kinds in the Puget Sound region has thick leathery leaves with blades three inches or more long and leaf-stalks of about the same length. It has rather numerous dull red, irregular flowers borne along a stem a foot or more in height.

THE PINESAP, A NEAR RELATIVE OF THE INDIAN PIPE

Several odd-looking plants occurring in coniferous forests are entirely devoid of the green color that most plants have. This means that they do not have chlorophyl, the green substance that enables plants to manufacture food from the carbon dioxid of the air and the water of the soil. Since these plants cannot manufacture their own food, they either live as parasites on the roots of green plants or obtain their food from decaying organic matter, mainly the remains of vegetation. In the latter case they are called saprophytes.

One of the commonest of these saprophytes in the coniferous woods of the Pacific coast is the Pinesap. It is a reddish or yellowish plant from four to sixteen inches tall, with scale-like leaves, whose underground portion consists of a mass of fleshy roots. It bears several flowers which at first are nodding, but later become erect. This plant is found from British Columbia to New Brunswick and southward to Arizona and Florida, and also in Europe and Asia. It is closely related to the Indian Pipe, a waxy white or sometimes pink plant which is also widely distributed and occurs in rich woods.

THE RHODODENDRON, THE STATE FLOWER OF WASHINGTON

The Rhododendron is one of the most showy flowers of the Pacific coast region. The plant is an evergreen shrub usually from six to nine feet tall, but sometimes reaching a height of eighteen feet. In late spring it produces large clusters of beautiful rose-colored or pink flowers. The petals are united, forming a bell-shaped corolla from one and a half to two inches long. The flower has ten stamens curving at the tip. The anthers discharge their pollen by the opening of a pore at the top, instead of splitting open as the anthers of many flowers do. The fruit is a capsule splitting into five parts. The leaves are attractive in appearance, being green and shiny. They are from four to six inches long, and are somewhat inrolled at the edges. This rhododendron is found from British Columbia to California in the coast region, and is the state flower of Washington. It is local in its distribution, though usually abun-



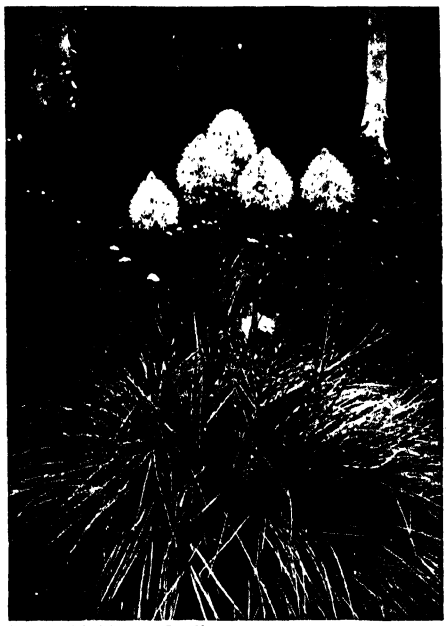
Photo, Linkletter Studio.

The Rhododendron is a shrub which sometimes reaches the height of eighteen feet. Both leaves and flowers are attractive. It is the state flower of Washington.

dant where it is found at all. It flourishes well in some of the logged-off and even the burned areas in western Washington, especially on gravelly hills. It is a near relative of the rhododendrons and azaleas of eastern United States. Another species of rhododendron is found in the mountains of Washington and other portions of the Northwest. It has white flowers and deciduous leaves.

LABRADOR TEA, WHICH ALSO GROWS IN THE EAST

Labrador Tea is a low slender evergreen shrub common in cranberry marshes



Photo, Linkletter Studio.

Bear Grass is a member of the Lily Family which grows only in the high country, generally on mountains. Indians used to make baskets from the leaves.

(sphagnum bogs) and growing taller and often forming dense thickets in wet areas bordering these marshes. Its leaves are mainly at the top of the stem, are inrolled at the edges and covered on the lower surface with a dense growth of rusty brown hairs. It produces at the top of the stem an abundance of white flowers in late spring. Its fruit is a small capsule splitting into five parts. It is found from Alaska to Greenland and southward to New Jersey, Wisconsin and Oregon. It belongs to the Heath Family along with the heathers, the rhododendrons, swamp laurel and salal. A taller kind, with hairless leaves, is common in bogs and open woods in parts of Oregon and is also found in southwestern Washington.

SWAMP LAUREL, FOUND ONLY IN MARSHY PLACES

The Swamp Laurel is a low evergreen shrub whose flowers are perhaps the most beautiful wild flowers found on the Pacific coast excepting those of the rhododendron. It is not so well known as it deserves to be. The explanation of its rare charms being so unfamiliar to flower-lovers is that it is found only in cranberry marshes. Where the forests are not cleared these marshes are rather isolated places, difficult to visit because of the very wet, swampy character of their borders. Where the forest has been removed many of these marshes are drained and burned in an attempt to bring the drier parts of them into cultivation, and the swamp laurel is thus killed. To the marshes in their natural condition its wonderful profusion of showy red or rose-purple flowers imparts in late spring a beauty that is rarely matched. The corolla of the flower is saucer-shaped and is about three-fourths of an inch broad. Each anther is at first held in a little fold in the corolla, but as the flower grows older the anthers snap loose when the flower is touched, discharging a little cloud of pollen. Its leaves are shiny on top, inrolled at the margins, and covered on the lower surface with a whitish powder. Its geographical range is similar to that of Labrador tea. It is closely related to the mountain laurel of eastern United States.

TWO EVERGREENS—THE HEATHERS AND SALAL

The heathers are low evergreen plants forming dense mats in mountain meadows and often found among trees at high elevations. They are in blossom in midsummer when visitors most commonly go into the mountains, and contribute much to the beauty of the region at that time. The White Heather has white bell-shaped flowers scattered along the stem, each one nodding on its erect flower-stalk. The stems have erect branches and are covered with small leaves pressed close against the stem, giving the plant a somewhat moss-like appearance. It is found from Alaska to California.

The Red Heather is larger and stouter than the white one and is often found

with it. It has showy red or rose-colored flowers borne in groups, each on its own flower-stalk at the top of the plant. It is found from British Columbia to Wyoming and California.

Salal is perhaps the commonest evergreen shrub of the coniferous forests in the Puget Sound region, and is found from British Columbia to central California, west of the Cascades and the Sierras. Though its stems are not stout, and are usually crooked and tend to assume a reclining position with only their newer portions growing erect, it usually attains a height of from two to four feet, and sometimes grows much taller. Its leaves are smooth and leathery, and are attractive in appearance. They are from two to four inches long, rather broad, heart-shaped at the base, and minutely toothed. Its flowers are white or rose-colored and appear in late spring. In summer it has black berries which are edible but are not prized as food where other berries are obtainable. A smaller species found in the Cascade Mountains and the Olympics has a spicy delicious red fruit.

THE SHOOTING STAR, WITH ITS ODD-LOOKING FLOWERS

Several species of Shooting Star are found in the Pacific coast region. They are showy herbs with basal leaves and an erect stem bearing several odd-looking flowers resembling those of the cyclamen. One species, with nodding purple flowers, is abundant on the dry prairies of the Puget Sound region, and a somewhat similar one is common in wet places in the mountains. The fruit of these plants is a many-seeded capsule.

TWO GENTIANS, FOUND ONLY IN THE WEST

The Gentians are herbs with opposite leaves and showy flowers. A low species with tufted stems and deep blue flowers is one of the most attractive and abundant flowers of late summer in the meadows on Mount Rainier. It was first collected by Dr. Tolmie, a medical officer of the Hudson's Bay Company, who was the first botanist to visit this mountain. He obtained his specimens in 1837 near the Puyallup Glacier. A taller species, with pale green leaves and blue flowers, usually dark-spotted inside, is found in the wild-cranberry marshes of western Oregon and southwestern Washington. Several species of gentians are found in eastern United States, but these two species are found only in the west.

THE DODDER, WHICH IS A GREEDY PARASITE

The Dodder most commonly found on the coast is a slender yellow or orange-colored vine parasitic on saltwort and other plants in salt marshes. It is conspicuous because it often forms dense yellow patches several feet in diameter which are easily seen at a distance in these marshes. Having no chlorophyl, it cannot make its own food, and gets its food by sending short roots into the fleshy portions of the plants on which it grows. It produces rather numerous small white flowers. Several other species of dodder are found on the coast. They are parasitic on various herbs and shrubs. Some are parasitic on clover and other plants of economic importance, and thus are bad weeds. Dodders are found in practically all parts of the United States and also in Europe and tropical America, and often do great damage to cultivated plants.

THE TWIN FLOWER MAKES THE WOODS ATTRACTIVE IN SUMMER

The Twin Flower is an evergreen vine with slender stems from one to three feet long forming dense growths in open woods. It either creeps on the ground or trails over logs and other objects. The leaves have short stalks, and their blades are usually less than an inch long, somewhat roundish or oval, and slightly wedge-shaped at the base. The flowers are borne in pairs on an erect stalk a few inches tall. The corolla is purple or whitish, is funnel-shaped and slightly hairy inside. The great profusion of these flowers and the beauty of their form and color combine to make this one of the most showy and attractive flowers of the woods in summer. This plant was a great favorite with Linnæus, the great Swedish botanist, and in many of his pictures he has a piece of the blossoming plant in his hand. It was given the botanical name *Linnæa* in his honor.

THE SNOWBERRY, COMMON OVER A WIDE RANGE

The Snowberry is a low branching shrub with white or pink flowers and conspicuous white berries. This plant loses its leaves in winter and is scarcely noticed then. In spring it is noticeable because of its rather numerous pink blossoms, and in summer it is conspicuous because of

its showy white berries. In the Pacific Northwest this shrub is common in open woods. It is found as far south as California, as far north as Alaska and as far east as Massachusetts.

THE CAT'S-EAR, WHICH RESEMBLES THE DANDELION

The Cat's-ear is a troublesome weed resembling the common dandelion. Like the dandelion, it is beautiful when in flower, unattractive when in fruit, and spreads rapidly, to the detriment of the grass in lawns and pastures. It is common in Washington and British Columbia, and is spreading rapidly. It is readily distinguished from the common dandelion by its leaves and its flower-stalks. The leaves of the cat's-ear are hairy and have rounded lobes, while those of the dandelion are smooth and have angular lobes. The flower-stalks of the cat's-ear are not hollow and are branched, with a head of flowers at the end of each branch, while those of the dandelion are hollow and unbranched. Its principal blossoming time is a little later than that of the dandelion.



There are two kinds of Oregon Grape in the West, one very short and the other three feet or more tall. Both are evergreen shrubs of the Barberry Family. This is the Tall Oregon Grape. Photo, R. E. Chapman, Seattle.

PEARLY EVERLASTING KEEPS ITS BEAUTY INTO THE WINTER

The Pearly Everlasting is most attractive in late autumn and even early winter, when many other plants have lost their beauty of leaf or flower or fruit. It is a rather woolly perennial herb with straight erect leafy stems and numerous small heads of flowers. The bracts which surround the flower-heads are pearly white, and it is these that retain their beauty and give attractiveness to the plant in its autumn or winter condition. They are slightly sweet-scented and often are used for funeral wreaths.

> They are love's best gift,
> Bring flowers—pale flowers.

Pearly everlasting is abundant in the lowlands in open places, especially burned areas, and is also found at low elevations in the mountains.

THE PINEAPPLE WEED RESEMBLES THE DOG-FENNEL OF THE EAST

The Pineapple Weed is a small herb somewhat resembling the eastern dog-fennel. The most striking points of similarity are that both are weeds, both have heads of yellow flowers, and both have leaves with many slender divisions. The striking points of difference are that the dog-fennel has white ray flowers around its flower-heads, while the pineapple weed has no ray flowers at all; and that the dog-fennel has an unpleasant odor, while the pineapple weed has, when bruised, a pleasant odor resembling that of pineapple. The cat's-ear, the dandelion, the pearly everlasting, the pineapple weed and the dog-fennel all belong to the Composite Family, along with the asters, the goldenrods, the sunflowers and many other plants. The plants of this family have their flowers in dense heads on a common receptacle, surrounded by one or more circles of leaf-like bracts.

Space forbids us to do more than mention the reeds, grasses, sedges and rushes which "make music" on the Pacific coast and mountains. We find the Broad-leaved Cat-tail, familiar as the "false sceptre" painted in the hands of the Savior in the pictures of old Italian masters; the Simple-stemmed Bur-reed, with bur-like brownish flower-head and reed-like stem; the Marsh Arrow Grass, with narrow leaves tapering to a point and greenish yellow flowers; Alpine Timothy; Hare's-tail, a soft fluffy-beaded sedge; Tussock Sedge, with its many relatives; and the Alpine Bog Rush.

THE NEXT STORY OF PLANT LIFE IS ON PAGE 7085.

King Arthur and His Knights

THE COMING OF THE KING

ON a bright, crisp spring morning in Eastertide some years after the Romans had withdrawn from Britain, there rode toward Westminster, on the banks of the Thames, a pleasing trinity of horsemen—an old, cheerful-faced knight named Sir Hector; his handsome young son, Sir Kay, only just dubbed knight; and a beautiful fair-haired youth of a most noble and kingly bearing, who, nevertheless, seemed more to desire the good fortune and happiness of the other two than to consider only his own comfort and pleasure.

As they rode merrily forward a sudden vexation overspread the face of Sir Kay, and he reined in his horse, exclaiming, with all the annoyance of youth, "I have left my sword behind me!" Sir Hector laughed with a loud delight, for here was a young man riding to a tournament who had thought most carefully of his little mustaches, his fine apparel, his spurs and the accoutrements of his horse, but had forgotten his sword! Sir Kay, though he laughed, flushed under his father's banter and he was glad when the noble youth at his side turned the current of laughter by announcing his intention of riding back to get the sword for Sir Kay.

Back rode this handsome youth, whose name was Arthur, glad to do a service for his friend; but on coming to the house he found it locked and silent, for every one of the attendants had pressed forward to the famous tournament at Westminster. Arthur's brows clouded as he looked at the silent walls and the closed windows. What would his friend do at the tournament without a sword? What misery for him! What vexation! Never would Sir Kay hear an end of Sir Hector's banter.

As he mused in this manner it came to his mind that there was, in a field by Westminster, an extraordinary sword stuck so fast in an anvil that no man could move it. Stories had reached his ears about this sword ever since Christmastide—strange stories. Some even said that he who could draw the sword would be chosen rightful king of Britain. Arthur thought that, whether these stories were true or not, he would at least try to get the sword for his friend and half-brother, the bold handsome Sir Kay.

As soon as this thought occurred to him he rode forward and came to the anvil, which was set in a stone, and climbing thereon, he lifted the sword easily from its cleft. He must have thought the story was an idle jest. For there stood the large anvil in the field, the Thames flowing by in the distance, and nowhere that his eyes looked could he see any man guarding the sword. It was evidently set there for a jest, and the ease with which it came from the anvil convinced him that the story, at least in its meaning, had been exaggerated. Cheerfully he rode forward and overtook Sir Hector and his son. But Sir Kay, taking the sword with a bright word of thanks, turned it over, and his face became deadly white, and he questioned Arthur how he came by it. Arthur told him.

"Then am I," cried Sir Kay, with a loud voice, turning quickly to his old father, "king of Britain?"

Sir Hector grew very solemn, and demanded of his son how he came by that sword. Sir Kay told him. Then the old knight, raising his eyes to the boy Arthur, dismounted from his horse, and bending his knee at Arthur's stirrup-leather, said: "Sir, I perceive that thou art my King, and here I tender thee my homage."

Sir Kay did likewise.

Then they rode to tell the Archbishop all that had happened. Strange must it have seemed to Arthur, who had taken the sword to do another a kindness, that this simple little act of friendship and love had made him king of Britain.

But Arthur did not know the story of his birth. All he knew was this—that he had grown up side by side with Sir Kay under the roof of the brave Sir Hector, that they had been like brothers together, and that always Sir Hector had treated him with love, and yet withal a certain restraint, as though to do him reverence.

How the boy Arthur came to live in the

house of Sir Hector may be briefly told. The father of Arthur was one Uther Pendragon, king of Britain, and this king loved a lady who cared not for him and would not be his wife. There came to him Merlin the Wizard, who said to the King, "Grieve not, Pendragon, for I will give this lady to you; but first swear to me by your honor that the son which shall first be born to you you will give to me." The King promised. Then Merlin gave to the King a change of aspect which pleased the disdainful lady, and she became his Queen. And when the son was born, named Arthur, the King gave him to Merlin, and the Wizard took the child and carried him to Sir Hector, and bade the good knight to bring up the child with the little Kay.

Now, why did the wise Merlin do this? Because he knew the trouble that was coming. Uther Pendragon died, and immediately there was rebellion and riot in the land, the nobles fighting against each other, and in their pride trampling down the crops of the peasants and slaying so many good men that the whole kingdom was brought to waste and ruin. The little Arthur would certainly have been killed had he been found on the Queen's knee. But Merlin waited, and when Arthur was grown to man's estate, and was kingly enough to take and keep his kingdom, then Merlin went to the Archbishop and bade him call to Westminster at Christmastide all the barons and knights of that realm, that they might pray Heaven for peace and deliverance from ruin, and there should be seen a great marvel, which would mean much to the land.

And it came to pass when the great nobles came forth from the Abbey on Christmas Day that they beheld an anvil set on a stone, and in the anvil, as though a giant's stroke had cleft it there, a sword strong and mighty; and they approached and saw written on the stone: "Whoso can draw forth this sword is rightful king of Britain born."

All the barons rushed greedily to wrench out the sword, but each man failed, and was astonished and angered. Then said the Archbishop that there should be held a great tournament at Eastertide, and then, once again, the barons and knights should tug at the sword for the crown of Britain.

Imagine the surprise and indignation of the great, fierce barons when they learned at Eastertide from the Archbishop how that Arthur had drawn the sword easily, no man seeing him, and that he was rightful king of Britain. They roared their dissatisfaction. "Let us see it done with our own eyes," they said. "If he pulled it out, let him press it back and do it again."

So they all rode back to the anvil set on a stone, and he who had ridden so humbly to the tournament, almost as the squire of Sir Kay, now found himself the center of a dense mass of men, all their eyes gazing upon him.

The spring sunshine fell upon his fair hair, and the people, seeing him on the stone — young, beautiful and strong, with the sword in his hand and his eyes bent upon them— felt a strange stir in their blood. And they were glad—so glad that their cries of "Arthur is king!" rent the air when he forced back the sword and drew it forth again as if it were a withy from the stream.

Yet were the barons not satisfied. "What this boy can do a man can do," they argued. And the sword was put back, and one by one the barons wrenched at it, but in vain.

Then at last they acknowledged Arthur as their king, and the Archbishop set the crown upon the fair head of the young man, and the people filled those happy Easter skies with their shouting, for the face of Arthur was like a blessing, and from his eyes there seemed to fall a healing peace upon the sorely wounded land of Britain.

THE FOUNDING of the KINGDOM

THE COMING OF THE QUEEN AND THE MAKING OF THE ROUND TABLE

SCARCELY had Arthur promised peace to his land when a number of kings who swore they would never acknowledge this magic-chosen monarch as a rightful king linked their forces and came up against Arthur in battle. So Arthur, who longed to give his people peace, was obliged to fight, and two good kings of Gaul, Ban and Bors, came to his aid, and he fought with his enemies and overthrew them in a mighty battle. But now, once again, he was unable to devote his days to peace, for Ban and Bors begged him to bring his army to their rescue in Gaul, where they themselves were threatened by enemies. So

Arthur went with his allies and fought with them. Glad was he, indeed, when the war was over, and he returned to his own land.

But what a kingdom it was! War had trampled it into the likeness of a wilderness: the forest had spread itself out and conquered the tilled fields; weeds, rank and gross, grew in the gardens; the huts of the peasants were in ruins; and, worst of all, misery had so worked in the hearts of the people that they had turned against God and were living fierce, evil and barbarous lives. In those days the woods were full of robbers. Ladies dared not walk beyond the end of the street. Murder lurked behind every bush, and terror in every shadow. Every man's hand was against his brother, and every man considered, not the welfare of others, but his own.

Arthur looked with sorrow on this degraded land, but not with despair. He knew that there is, in all men, good to which a good man may always safely appeal. So he proclaimed a reign of justice and love; he cut broad roads through the dense forests, and called upon the strong to protect the weak, and bade every man who called him king to honor women and little children. The peasants rejoiced in these commands of their king, and the land once more began to smile under the hand of husbandry; but still there were many who loved violence for its own sake, and others who robbed and murdered because they hated to work.

At this time Arthur fell in love with the most beautiful princess in the world, Guinevere, only daughter of King Leodegran, who reigned in Cameliard. He told Merlin the Wizard of his great yearning for this exquisite lady, and Merlin was sad. Arthur questioned him about his sadness, but Merlin said sorrowfully that it was in vain to try to turn the tide of a man's passion: Arthur must have his way; yet evil would come out of this marriage.

Arthur was too hot in love, and too flushed with the joy of his young kingship, to listen to these twilight warnings of the old man. Very joyfully he rode out to meet the lovely Guinevere, and at Canterbury, where the marriage was to take place, he held a great feast, and there he set up what is called the Round Table, and called to it all valiant and gentle men who would stand round their King and protect the weak and punish the tyrant. And chief among those at the King's side was the peerless knight, Sir Lancelot of the Lake, who had brought Guinevere to the King. Next after King Arthur himself, Sir Lancelot was the greatest knight in Britain.

And this is the history of the Round Table. Merlin made it for Uther Pendragon, and at the death of Uther Pendragon it passed to King Leodegran, who held it in high esteem. But when Guinevere, his daughter, rode forth with Sir Lancelot of the Lake to marry Arthur at Canterbury, Leodegran sent to the young King this huge table which had once been his father's, as the next best gift he could give after Guinevere, his lovely daughter. And so Uther Pendragon's table became Arthur's table.

Now, at the marriage feast, when Arthur called brave men to his table, it was no mere act of amusement. With high pomp and gorgeous ceremony he called his knights. He made them as knights servants of Christ the King.

He bade them consider themselves as the soldiers of the Perfect Christ; and he explained to them his high and noble purpose, which was to rule Britain by his order of chivalry, by the Knights of his Round Table. They were to go forth, armed and vigilant; they were to ride up and down in the land punishing tyrants and evil men, helping the poor and needy, succoring the weak and defenseless, and turning the hearts of all men to Christ and the King.

Thus, in the good providence of God, Britain should have peace, and the blessings of Heaven light upon the lovely isle forever.

We wonder what the gracious and lovely Queen thought of King Arthur as he spoke to his knights, and as they one by one came and knelt before him. She must have admired his beauty; she must have felt the magic in his words; she must have seen the power in his soul; but did she feel love for him? Alas, this lovely Queen, smiling at Canterbury upon the first act of the King's chivalry, was to be its ruin and disgrace. She spoke her marriage vow: "I love thee to the death!" but the dream of the great King was to be shattered by her falseness. And through her woe fell upon the land.

Perhaps at that grand ceremony Merlin did not look either at the King or at his kneeling knights, but only at the Queen. Did their eyes meet, we wonder — the young Queen's and the old prophet's? And if so, did Guinevere flush and look aside, avoiding the eyes both of Merlin and of Sir Lancelot?

THE CHALLENGE of the KING

AND THE FIGHT WITH SIR PELLIMORE IN THE FOREST

So gay and cheerful was King Arthur that he would often ride out alone and without kingly state into the forest, seeking an adventure after the manner of his knights, who went about redressing wrong.

And it chanced one day, as he rode in the forest Perilous, that he encountered a wicked knight who for the mere joy of fighting mounted guard over the path, permitting no man to go past. This wicked Sir Pellimore challenged the knight approaching him, and Arthur gave him battle, veiling his kinghood. The two horses crashed together, and both horsemen came to the ground. Sir Pellimore was mighty above every man at that time, and he splintered the King's shield and broke his sword. But Arthur rushed at him, and seizing him about the middle, hurled him to the ground. Yet did Sir Pellimore cling to him, and would have done him some harm if Merlin had not come and thrown him into a deep sleep. When he aroused and knew that he had fought with the King, Sir Pellimore was sore afraid. But Arthur forgave him, and accepted him as a Knight of the Round Table, so that Sir Pellimore forsook his evil ways and fought only for the honor of Christ and the King.

The King went on with Merlin, and they came to a deep lake in the midst of the forest. And Merlin stayed the King, and they went to the edge of the water and looked across it. And as they looked a wondrous arm came from the center of the lake, and in the hand was clasped a sword. Then Arthur saw a little boat by the lake, and Merlin bade him enter it and go out upon the water and take the sword. So Arthur did as the Wizard told him, and returned with the sword.

It was rich with jewels on the hilt, "bewildering heart and eye," and its blade so bright that men were blinded by it.

Then Merlin pronounced its name "Excalibur," and told Arthur that it was the mightiest sword on earth, and that upon the hilt was engraved on one side, "Keep me," and on the other, "Throw me away." Arthur's face was sad at taking it, but old Merlin thus counseled him. "Take thou and strike! the time to cast away is yet far off."

And this sword, in the hand of the King, became mightiest in Christendom, and its fame has lasted unto this day. Even now do poets sing about it.

No man could stand before Excalibur, and the glory of the King increased. Yet never once used he Excalibur in an evil cause, nor encouraged the brotherhood of his knights to love fighting save for noble ends.

And his knights were like, as it were, his apostles; they gathered unto themselves something of the glory of his soul, and carried chivalry into all the length and breadth of Britain, so that there was no land so honored and so happy as Britain, and no knights in all Christendom so famous for pure lives, great valor and exceeding courtesy as King Arthurs' Knights of the Round Table. Gloriously in those days did the sun shine upon the green fields and the waters of Britain.

THE VISION of SIR GALAHAD

AND HOW THE YOUNGEST OF THE KNIGHTS FOUND THE HOLY GRAIL

Now, the knights of King Arthur had each one his own seat at the Round Table, and on every seat the name of the knight was carved.

But there was one seat called the Perilous, which had no occupant, none daring to sit in it, and over the name which no man knew, there was always a covering.

One day, as the King and his knights sat together, there entered the great hall an aged knight, followed by a most beautiful young man. The old knight advanced to the seat called Perilous, and pointed to the young man that he should sit there. When his command was obeyed, the old man bent over the youth, kissed him, and departed.

Much amazed was the King, and asked the young man his name.

"I am called Galahad," said he.

Then the King raised the cloth on the seat, and lo! the name written there was "Galahad."

Now, Galahad was the youngest of the knights, and not so strong a man as the others; but there was such majesty in his eye, such purity in his brow and such sweetness

KING ARTHUR AND HIS KNIGHTS



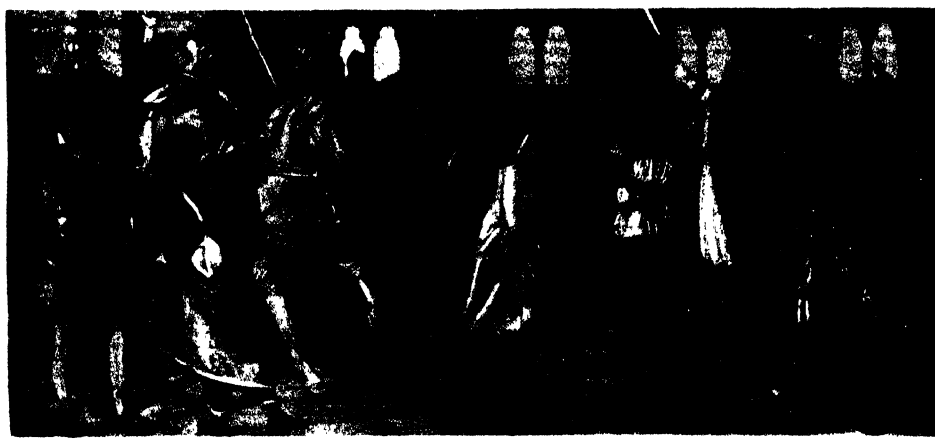
ENID AND GERAINT. FROM THE PAINTING BY ROWLAND WHEELWRIGHT



THE KNIGHTS OF KING ARTHUR. FROM A TAPESTRY DESIGNED BY SIR EDWARD BURNE-JONES AND MADE BY MORRIS & COMPANY



LANCELOT AND ELAINE OF ASTOLAT. FROM THE PAINTING BY SIDNEY PAGET



SIR TRISTRAM IS ADMITTED AS A KNIGHT OF THE ROUND TABLE. FROM A FRESCO IN THE KING'S ROBING-ROOM IN THE PALACE OF WESTMINSTER



SIR GALAHAD,
BY ALLAN STEWART



THE BEGUILING OF MERLIN,
BY SIR E. BURNE-JONES



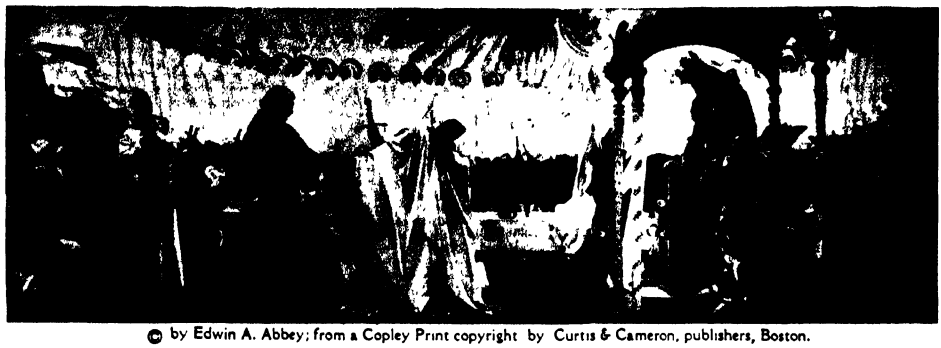
SIR GALAHAD,
BY G. F. WATTS



THE PASSING OF ARTHUR. FROM THE PAINTING BY JAMES ARCHER

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SACRED MYSTERIES AND SORROWS



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THE VISION OF THE HOLY GRAIL. FROM THE PAINTING, THE ROUND TABLE OF KING ARTHUR, BY EDWIN A ABBEY



KING ARTHUR IN AVALON WHEN MORTALLY WOUNDED. FROM THE PAINTING BY SIR EDWARD BURNE-JONES



KING ARTHUR'S QUEEN, GUINEVERE, IN THE NUNNERY GARDEN. FROM THE PAINTING BY MARY F. RAPHAEL

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on his lips that the others felt for him a great reverence, and he was treated even by the King with high honor.

One evening as the knights sat together, the King being absent, a good and happy young knight named Sir Percivale entered the hall with a wonderful story.

He had been to see his sister, who was a nun, and this sister had told him how one night as she lay sleeping in her cell she was suddenly awakened by most sweet music, and opening her eyes, saw a broad shaft of moonlight streaming through her window, in the midst of which floated and throbbed like a beating heart the sacred chalice out of which our Savior drank the wine at the Last Supper —the sacred cup, called by all men the Holy Grail.

The knights started up at the tale. This Holy Grail, so ran the legend, had been brought to England by that good Joseph of Arimathea who laid our Savior in the sepulchre from which He rose triumphant on the Christians' first Easter Day.

The Holy Grail had once been venerated in England, but suddenly it had vanished—some said because of the evil in the land—and after searching for it up and down the kingdom for a long time men at last had ceased to think about it. But now the vision had appeared again.

Among the knights to whom Sir Percivale's story came with great power was Sir Galahad. His face made clear how deeply he was moved. Sir Percivale, looking upon him, saw that the expression in Sir Galahad's eyes was like that which he had seen in the eyes of his sister, and it came to him that Sir Galahad should go and see the nun, and speak to her about the Holy Grail. If any man was to find the Cup, it might well be this pure and noble youth.

So Sir Percivale took Galahad to the place where his sister lived, and as soon as the nun saw Galahad she knew that he was to be Knight of the Holy Grail. Then the beautiful nun cut from her head all the lovely hair that adorned it, and made a girdle of these gleaming tresses, and bound it about Sir Galahad's waist, and fastened his sword to it, and charged him with the holy mission. He was to pray often; he was to go forth doing good, and after the vision of the Holy Grail was vouchsafed to him, he was to journey to a far-off city where the people would crown him king.

Sir Galahad obeyed the nun. He was not the only knight who went forth in quest of the Holy Grail, for the story of the nun had fired the imagination of all the knights of King Arthur's court, and Britain now witnessed the dispersal of these brave men in quest of the sacred Grail. But Galahad vas the only knight whose heart was pure, and it was to Galahad that the vision came.

On his long journey he fell in with his old friend Sir Percivale, and Sir Percivale confessed that not yet, in spite of fastings and prayer, had he seen the blessed vision. Then Galahad told Percivale how the vision was always before him, and how it had led him from victory to victory, and how no man could stand against his spear.

"But you, too, shall see the vision," he concluded, "for I am about to go to a far city, and at the moment of my departure you shall see the Holy Grail."

The two knights traveled forward on their horses. Sir Galahad carried on his left arm a white shield with a scarlet cross, and his great war-horse, with its crisping mane and long, flowing tail, was as white as milk. They rode silently, as men engaged upon some absorbing quest. Sir Galahad's eyes gazed straight before him, with a strange light in them. Sir Percivale glanced often at Sir Galahad. He was like a man who had looked upon the face of Christ.

Toward nightfall they reached the wide-stretching marshes, and heard in the far distance the roll of the surf. As they urged their horses into the gloom overhanging the marshes they saw rising up before them, and stretching forward on pier after pier to the well-nigh invisible ocean, a vast and towering bridge. Sir Galahad's eyes lighted at sight of this bridge, a smile illumined his pale face, and with one bound he was upon the bridge and clattering upward and forward.

Sir Percivale reined in his horse. He dared not follow. For as Sir Galahad reached the first pier it sent up into the night-sky a tongue of scarlet flame, and the second pier did the same, and the third, till the whole bridge over which Sir Galahad had passed was a great, sweeping mass of fire. Thrice above him the heavens opened and blazed with thunder such as seemed the shouting of all the angels. But Sir Percivale, waiting in the darkness on his startled horse, had his reward. Just as Galahad reached the sea the whole sky was filled with the anthem of heaven; a

mighty city of pearl-white towers and pinnacles disclosed itself above the ocean. And over this city into which Sir Galahad was entering, swimming in a mist of everlasting beauty, appeared the Holy Grail, mystic, wonderful.

Sir Percivale bowed his head upon his breast, and in that moment, so sacred, so wonderful that no language can describe it, vowed his life to the service of God and the love of Christ.

The poet Tennyson told the story of Sir Galahad in his IDYLLS OF THE KING, but he also wrote another famous poem about this knight who found the Holy Grail. We give it here:

My Good blade carves the casques of men,
  My tough lance thrusteth sure,
My strength is as the strength of ten,
  Because my heart is pure.
The shattering trumpet shrilleth high,
  The hard brands shiver on the steel,
The splintered spear-shafts crack and fly,
  The horse and rider reel:
They reel, they roll in clanging lists,
  And when the tide of combat stands,
Perfume and flowers fall in showers,
  That lightly rain from ladies' hands.

How sweet are looks that ladies bend
  On whom their favors fall!
For them I battle till the end,
  To save from shame and thrall:
But all my heart is drawn above,
  My knees are bow'd in crypt and shrine:
I never felt the kiss of love,
  Nor maiden's hand in mine.
More bounteous aspects on me beam,
  Me mightier transports move and thrill;
So keep I fair thro' faith and prayer
  A virgin heart in work and will.

When down the stormy crescent goes,
  A light before me swims,
Between dark stems the forest glows,
  I hear a noise of hymns:
Then by some secret shrine I ride;
  I hear a voice, but none are there;
The stalls are void, the doors are wide,
  The tapers burning fair.
Fair gleams the snowy altar-cloth,
  The silver vessels sparkle clean,
The shrill bell rings, the censer swings,
  And solemn chants resound between.

Sometimes on lonely mountain-meres
  I find a magic bark;
I leap on board: no helmsman steers:
  I float till all is dark.
A gentle sound, an awful light!
  Three angels bear the holy Grail:
With folded feet, in stoles of white,
  On sleeping wings they sail.
Ah, blessed vision! blood of God!
  My spirit beats her mortal bars,
As down dark tides the glory slides,
  And star-like mingles with the stars.

When on my goodly charger borne
  Thro' dreaming towns I go,
The cock crows ere the Christmas morn,
  The streets are dumb with snow.
The tempest crackles on the leads,
  And, ringing, springs from brand and mail;
But o'er the dark a glory spreads,
  And gilds the driving hail.
I leave the plain, I climb the height;
  No branchy thicket shelter yields;
But blessed forms in whistling storms
  Fly o'er waste fens and windy fields.

A maiden knight—to me is given
  Such hope, I know not fear;
I yearn to breathe the airs of heaven
  That often meet me here.
I muse on joy that will not cease,
  Pure spaces cloth'd in living beams,
Pure lilies of eternal peace,
  Whose odors haunt my dreams;
And, stricken by an angel's hands,
  This mortal armor that I wear
This weight and size, this heart and eyes,
  Are touch'd, are turn'd to finest air.

The clouds are broken in the sky,
  And thro' the mountain-walls
A rolling organ-harmony
  Swells up, and shakes and falls.
Then move the trees, the copses nod,
  Wings flutter, voices hover clear:
"O just and faithful knight of God!
  Ride on! the prize is near."
So pass I hostel, hall, and grange;
  By bridge and ford, by park and pale,
All-arm'd I ride, whate'er betide
  Until I find the holy Grail.

ENID AND GERAINT

A TALE OF KING ARTHUR'S COURT

OF ALL the fair ladies at the Court of Arthur, Enid was, after Queen Guinevere, the most fair. She was a favorite of the Queen who took much pleasure in her company. Now Enid was wife to Geraint; a good and holy knight; and it began to seem to Geraint that the idle life of this court was not the best thing in the world for a sweet lady. There was vanity and there were malicious tongues and temptations as well, perhaps. Therefore, Geraint sought a pretext to leave the court and to return home.

Now, at this time, there were throughout the kingdom bands of outlaws whose pleasure it was to waylay travelers and rob them. At the outskirts of Geraint's princedom there were several such groups. Using them as an excuse he obtained Arthur's permission to leave the court and to take Enid with him.

Geraint was so deeply in love with Enid that once home he forgot his promise to rid his lands of lawless men. He thought only of his wife. It grieved Enid to see him neglect his duties, but because he loved her so well she could not bring herself to reproach him.

His subjects scoffed and behind his back called him wife-ridden. Enid, aware of their taunts, was saddened; and Geraint thought she did not love him any longer, but cared only for the gay life of the court. One morning he came upon her as she pondered her unwillingness to tell him what was being said of him, and heard her say "I fear I am no true wife." Here, he thought, was confirmation of his fears.

Calling his squire he bade horses be made ready. Harshly he commanded Enid to put on her meanest dress and to come with him. Sadly she surveyed her magnificent wardrobe. Then she thought of her faded silk, the dress she had on when first he saw her; of how Geraint had loved her in it; and of his wooing; and of her happy wedding day.

Enid remembered these things as, dressed in her shabby gown, she rode out of the courtyard to follow Geraint wherever it was his pleasure to take her; and indeed she knew not where they were going, nor why this black mood had come upon him. He commanded her to ride ahead of him, and thus they took their way through the wood.

In their journey they encountered three bandit knights, who tried to kill Geraint and rob him. He slew them, and later in the day put another such group to rout.

That night at an inn they met Limours, a former suitor of Enid. When he saw that Enid and Geraint were scarcely speaking to one another, and that Enid was very sad, he would overcome Geraint and make her his wife. At daybreak Enid told her husband of this plan. They left the inn at once and started for the castle of the Earl of Doorm, the most powerful of the bandit lords. Soon they were overtaken by Limours and his followers. Geraint dispersed them, but not before he had been wounded. He ignored the wound and rode on until he fell from his horse. Enid did what she could for him and sought the assistance of passers-by, but all ignored her. Wounded men were a familiar sight on the roadways of the Earl of Doorm.

What happened next we shall tell in the words of the poet Tennyson, who wrote of Enid and Geraint in his IDYLLS OF THE KING.

But at the point of noon the huge Earl Doorm,
Broad-faced with under-fringe of russet beard,
Bound on a foray, rolling eyes of prey,
Came riding with a hundred lances up;
But ere he came, like one that hails a ship,
Cried out with a big voice, "What, is he dead?"
"No, no, not dead!" she answer'd in all haste.
"Would some of your kind people take him up,
And bear him hence out of this cruel sun:
Most sure am I, quite sure, he is not dead."

Then said Earl Doorm; "Well, if he be not dead,
Why wail you for him thus? you seem a child.
And be he dead, I count you for a fool;
Your wailing will not quicken him: dead or not,
You mar a comely face with idiot tears.
Yet, since the face *is* comely—some of you,
Here, take him up, and bear him to our hall:
An if he live, we will have him of our band;
And if he die, why earth has earth enough
To hide him. See ye take the charger too,
A noble one."

He spake, and past away,
But left two brawny spearmen, who advanced,
Each growling like a dog, when his good bone
Seems to be pluck'd at by the village boys
Who love to vex him eating, and he fears
To lose his bone, and lays his foot upon it,
Gnawing and growling: so the ruffians growled,
Fearing to lose, and all for a dead man,
Their chance of booty from the morning's raid;
Yet raised and laid him on a litter-bier,
Such as they brought upon their forays out
For those that might be wounded: laid him on it
All in the hollow of his shield, and took
And bore him to the naked hall of Doorm,
(His gentle charger following him unled)
And cast him and the bier in which he lay
Down on an oaken settle in the hall.

. . . . . .

And at the last he waken'd from his swoon,
And found his own dear bride propping his head,
And chafing his faint hands, and calling to him;
And felt the warm tears falling on his face;
And said to his own heart, "She weeps for me:"
And yet lay still, and feign'd himself as dead,
That he might prove her to the uttermost,
And say to his own heart "She weeps for me."

. . . . . .

But when Earl Doorm had eaten all he would,
He roll'd his eyes about the hall, and found
A damsel drooping in a corner of it.
And then he remember'd her, and how she wept;
And out of her there came a power upon him;
And rising on the sudden he said, "Eat!
I never yet beheld a thing so pale.
God's curse, it makes me mad to see you weep.

Eat! Look yourself. Good luck had your good man,
For were I dead who is it would weep for me?
Sweet lady, never since I first drew breath,
Have I beheld a lily like yourself.
And so there lived some color in your cheek,
There is not one among my gentlewomen
Were fit to wear your slipper for a glove.
But listen to me, and by me be ruled,
And I will do the thing I have not done,
For you shall share my earldom with me, girl,
And we will live like two birds in one nest,
And I will fetch you forage from all fields,
For I compel all creatures to my will."

Enid cared nothing for the offers of the Earl, and thought only of Geraint. When the bandit lord commanded her to eat she answered that she would do so only when Geraint, her dear lord and husband, could be at her side.

Doorm then mocked her for crying over one who had scorned her by dressing her in rags. He ordered a shimmering gown to be given her, as green as the sea. Enid spurned this offer. The infuriated Earl struck her across the face. Enid screamed and Geraint heard her cry. He leaped from his couch, grasped his sword and beheaded Doorm. The other bandits fled in terror from the hall, and never returned to it again.

Then Geraint begged his dear wife's pardon for his harshness. Together they fled from the castle. On the journey home they met one of Arthur's knights, who said that the King was not far away. Then Enid and Geraint went together to pay their respects to their liege lord, King Arthur.

Geraint never again mistrusted the fair and loyal Enid. They ruled the princedom wisely for many years, loved and respected by their subjects; till at length Geraint fell in battle, fighting for the just cause of the brave Arthur.

THE PASSING of KING ARTHUR

AND THE BREAK-UP OF THE ROUND TABLE

THERE are many other stories of King Arthur's knights, and these you may read in books; but here we have room only to tell of the end of the Round Table. For this gracious order of chivalry, which was like a parliament ruling Britain in a goodly manner, so that no man dare play the tyrant and none oppress the poor and the weak, came to an end, and the unwitting cause of it was Queen Guinevere, the loveliest lady in Christendom.

This beautiful lady could not keep her thoughts from dwelling much on Sir Lancelot of the Lake, who was the handsomest, the strongest, and the most courteous of all King Arthur's knights, and Arthur loved him as a brother. So great was Arthur's love that when evil men, who hated Lancelot, tried to make him think that Guinevere loved the knight more than himself, Arthur was very wroth. But these evil men bided their hour, and one day when Lancelot was alone with the Queen they came in a great number and made an uproar at the door of the Queen's chamber, crying: "Treason! Treason!" So Lancelot, after slaying many of them, had to flee, and Guinevere—against the King's will—was tried for treason, and was ordered to be burned as a traitor to the King.

As she stood bound to the stake, and the flames began to rise around her, Lancelot rode up, slew those about her and before her, and carried her off. He had saved her, but she could not be his, for Lancelot loved honor. So he took her to an abbey, where she gave up all her life to prayer and holiness, and there the greatest knight of Christendom parted from the lovely Queen. After that Lancelot retired to Gaul. Then the brother of one whom Lancelot had slain forced the heart-broken Arthur against his will to make war on Lancelot. They fought in Gaul, and Lancelot gave orders that none should hurt the King, and as often as he saw Arthur dismounted, he himself went to his rescue. Many times in the midst of this fierce battle the two great men looked into each other's eyes and exchanged words of love and courtesy.

Afterward Arthur returned to Britain, for his kingdom was in an evil state, and there was a great war in the West. The story of Lancelot and the Queen had been a poison in the land, and men forgot honor and courtesy, and became like beasts. It seemed as if all the King's noble work was undone. The ideals of kindness and chivalry which had given peace, glory and virtue to the land were now mocked at as make-believe and foolish notions. The strong trampled on the weak. Few cared for honor. There was none

to help the weak and oppressed. Sad and heart-broken was King Arthur, who had lost his queen, his favorite knight, and now his kingdom. But he fought in the West boldly for Christ and righteousness, as one who would never surrender; and there was he wounded to the death.

Now, when he was wounded, he called upon Sir Bedivere to carry him to a little church by the seashore; and Sir Bedivere wept, but Arthur comforted him. Then said the King:

"Take now my sword Excalibur, and hasten thee to the side of the water, and fling it into the deep." And Sir Bedivere went away. But the beauty and fame of the sword tempted him, so that he hid it, and returned to the King with a lie. But the King knew that he lied and sent him a second time. Yet a second time did Sir Bedivere lie, and the King sent him a third time. Then Sir Bedivere returned for the last time, and this time when the King asked:

"What sawest thou?"

"I saw," answered Sir Bedivere, "a hand rise from the water, and as the sword hurtled toward the waters the hand caught it by the hilt, and brandished it thrice in the air, and afterward drew it down under the water."

"It is well," said the King.

Then he commanded Bedivere to carry him to the water's edge. As they reached the shore a great barge came to them, wherein were three queens, all in black with crowns upon their heads. And the queens received the King into the barge, and the barge drew slowly away across the darkening sea.

And the last words of King Arthur came faintly across the waters to Sir Bedivere, left kneeling on the shore: "Pray for me."

In his IDYLLS OF THE KING, Tennyson describes his passing thus:

Then saw they how there hove a dusky barge,
Dark as a funeral scarf from stem to stern,
Beneath them; and descendng they were 'ware
That all the decks were dense with stately forms
Black-stoled, black-hooded, like a dream—by these
Three Queens with crowns of gold. . . .

. . . . . .

Then murmur'd Arthur, "Place me in the barge."
And to the barge they came. There those three Queens
Put forth their hands, and took the King, and wept.
But she, that rose the tallest of them all
And fairest, laid his head upon her lap,
And loosed the shatter'd casque, and chafed his hands,
And call'd him by his name, complaining loud,
And dropping bitter tears against his brow
Striped with dark blood: for all his face was white
And colourless, and like the wither'd moon
Smote by the fresh beam of the springing east;
And all his greaves and cuisses dash'd with drops
Of onset; and the light and lustrous curls—
That made his forehead like a rising sun
High from the dais-throne—were parch'd with dust;
Or, clotted into points and hanging loose,
Mix'd with the knightly growth that fringed his lips.
So like a shatter'd column lay the King;
Not like that Arthur who, with lance in rest,
From spur to plume a star of tournament,
Shot thro' the lists at Camelot, and charged
Before the eyes of ladies and of kings.

Then loudly cried the bold Sir Bedivere,
"Ah! my Lord Arthur, whither shall I go?
Where shall I hide my forehead and my eyes?
For now I see the true old times are dead,
When every morning brought a noble chance,
And every chance brought out a noble knight.
Such times have been not since the light that led
The holy Elders with the gift of myrrh.
But now the whole ROUND TABLE is dissolved
Which was an image of the mighty world;
And I, the last, go forth companionless,
And the days darken round me, and the years,
Among new men, strange faces, other minds."

And slowly answer'd Arthur from the barge:
"The old order changeth, yielding place to new,
And God fulfils himself in many ways,
Lest one good custom should corrupt the world.
Comfort thyself: what comfort is in me?
I have lived my life, and that which I have done
May He within himself make pure! but thou,
If thou shouldst never see my face again,
Pray for my soul. More things are wrought by prayer
Than this world dreams of. Wherefore, let thy voice
Rise like a fountain for me night and day.
For what are men better than sheep or goats
That nourish a blind life within the brain,
If, knowing God, they lift not hands of prayer
Both for themselves and those who call them friend?
For so the whole round earth is every way
Bound by gold chains about the feet of God.
But now farewell. I am going a long way
With these thou seëst—if indeed I go
(For all my mind is clouded with a doubt)—
To the island-valley of Avilion;
Where falls not hail, or rain, or any snow,
Nor ever wind blows loudly; but it lies
Deep-meadow'd, happy, fair with orchard lawns
And bowery hollows crown'd with summer sea,
Where I will heal me of my grievous wound."

So said he, and the barge with oar and sail
Moved from the brink, like some full-breasted swan
That, fluting a wild carol ere her death
Ruffles her pure cold plume, and takes the flood
With swarthy webs. Long stood Sir Bedivere
Revolving many memories, till the hull
Look'd one black dot against the verge of dawn,
And on the mere the wailing died away.

But when that moan had past for evermore,
The stillness of the dead world's winter dawn
Amazed him, and he groan'd, "The King is gone."
And therewithal came on him the weird rhyme,
"From the great deep to the great deep he goes."

THE NEXT STORIES ARE ON PAGE 7215.

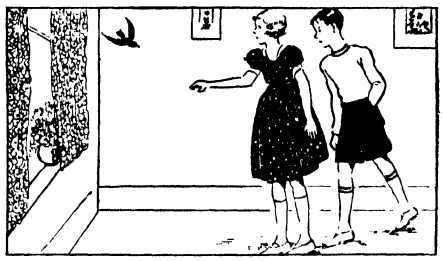
FRENCH—*The Little Visitor*

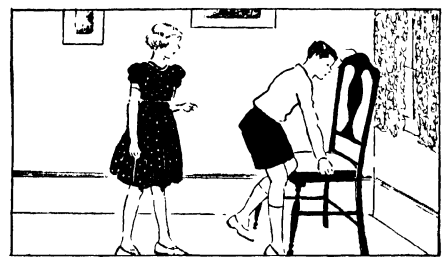
First line, French; second line, English word; third line, as we say it in English.

Un jour quelque chose s'abattit sur la fenêtre de la salle d'étude.
One day some thing itself fell upon the window of the room of study.
One day something flew in at the schoolroom window.

Les enfants sautèrent. "Regardez!" s'écria Ethel. "C'est une petite grive."
The children jumped. "Look!" herself cried Ethel. "This is a little thrush."
The children jumped up. "Look!" cried Ethel. "It is a little thrush."

"Essayons de l'attraper," dit Guillaume. L'oiseau était sur les rideaux.
"Let us try of her to catch," said William. The bird was upon the curtains.
"Let us try to catch it," said William. The bird was on the curtains.



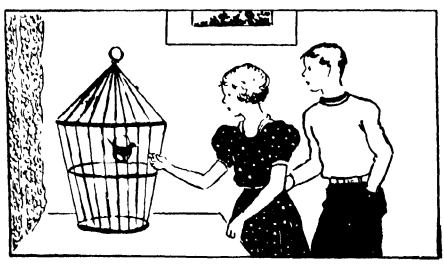


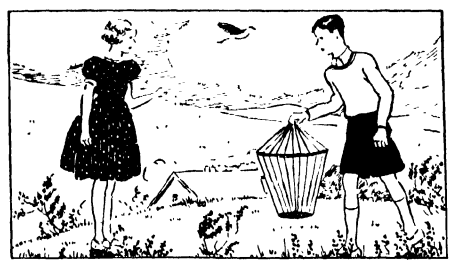
Il essaya de l'atteindre, mais il était trop petit. Il réfléchit un moment.
He tried of it to reach, but he was too little. He considered a moment.
He tried to reach it, but he was too short. He thought a moment.

Guillaume mit une chaise sur la table, monta dessus, et étendit la main.
William put a chair on the table, mounted upon, and extended the hand.
William put a chair on the table, climbed up, and put out his hand.

L'oiseau ne bougea pas. "Pauvre petite grive!" dit-il. "L'aile est blessée."
The bird (not) stirred not. "Poor little thrush!" said he. "The wing is hurt."
The bird did not move. "Poor little thrush!" said he. "Its wing is hurt."

"Laisse-moi le voir," dit Ethel, courant à la table et étendant la main.
"Let me him to see," said Ethel, running to the table and extending the hand.
"Let me see it," said Ethel, running up to the table and holding out her hand.





"Nous le mettrons dans une cage et le soignerons." "Quelle bonne idée!"
"We it will put into a cage and him will care for." "What good idea!"
"We will put it in a cage and take care of it." "What a good idea!"

Aussitôt que le petit oiseau fut tout à fait bien il désirait de nouveau la liberté.
As soon as the little bird was all to made well it desired again the liberty.
As soon as the little bird was quite well it wanted to be free again.

Les enfants ouvrirent la porte de la cage et l'heureuse grive s'envola.
The children opened the door of the cage and the happy thrush herself flew away.
The children opened the cage door and the happy thrush flew away.

SWIMMING AND DIVING



Courtesy, Y. W. C. A.

1. Swimming instruction at Quannacut Camps, New York State.

SWIMMING is one of the most healthful of sports. It develops the wind; it makes the muscles flexible. Swimming is great fun too. How enjoyable it is to feel the cool waves splashing against our bodies on a hot day or to rest upon the water as though floating on air! There is no telling, too, when a knowledge of even the simplest strokes will enable you to save your own life or that of a friend. Any boy or girl in good health can learn to swim; this is an accomplishment which is never forgotten.

Before we actually start learning the various swimming strokes, we should first go through a series of preliminary exercises. These exercises should be performed in water that is about up to our waists.

First we should learn to breathe properly while in the water. In swimming much of the breathing is done through the mouth. Inhaling (drawing in of the breath) is generally done through the mouth; exhaling (letting out the breath) is done largely through the mouth and only to a certain extent through the nose. Furthermore in some strokes (including the popular crawl stroke) exhalation takes place under water, as the face is kept under the surface of the water for a certain part of the stroke.

To practice correct breathing, kneel in the water and bend your body until your face is under water, holding the breath as the nostrils touch the surface. Turning your head so that the mouth is out of water, take a quick gulp of air. Next turn your head until mouth and nose are under water and exhale beneath the surface of the water. Now roll your head around until the mouth is out of water as before; then continue inhaling above water and exhaling under the surface. It is important to remember that the breath should not be held between the inhalation and the exhalation. The exhalation under the surface should begin as soon as the inhalation ceases.

Another thing that we should practice is keeping our eyes open under water. The tendency is to close one's eyes tightly as soon as they come in contact with the water. Remember that it does not hurt to keep one's eyes open under water and that it is quite safe. You will find that things look a bit blurred as seen through water but that you will be able to make out general outlines and colors without difficulty. The ability to keep one's eyes open while under the water is particularly useful when one is swimming under the surface.

Next we learn to push ourselves through the water. If we are at a swimming beach, we wade out until the water comes up to our waists; then we face the shore. Stooping, we extend our arms straight ahead and place the head between the arms. Taking a deep breath we shove off with our feet. We slide ahead upon the surface of the water while lying face downward upon it. As our momentum slackens, we let our feet touch bottom and push down our hands; then we rise to our feet. If we are in a pool we shove ourselves from one end of the shallow part of the pool to the other end.

You should practice as faithfully as possible the exercises that have just been described above. Among other things they will give you the confidence in the water that you must have if you are to become a really good swimmer.

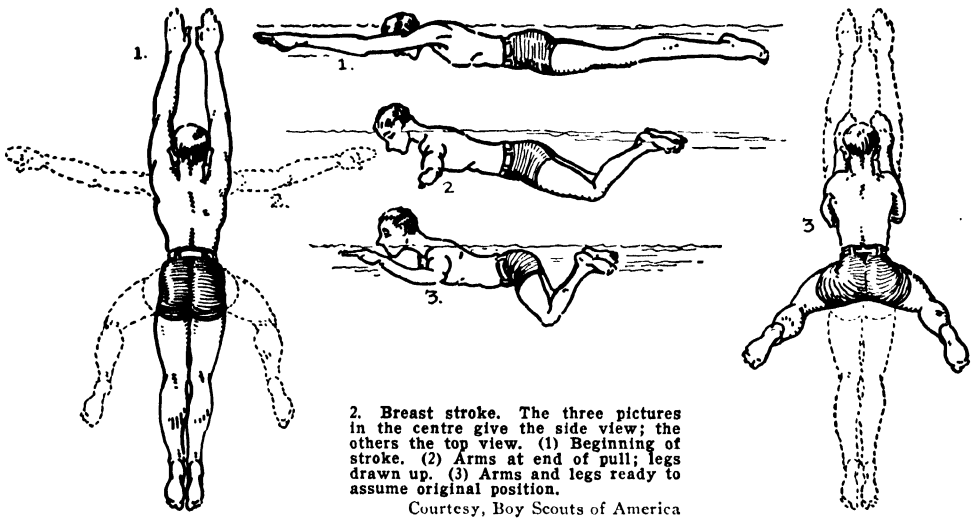
We may now consider what is perhaps the most important accomplishment of the swimmer—the ability to keep himself afloat with little or no effort on his part. Even the strongest swimmer tires while in the water and it is absolutely necessary that he should be able to rest upon the water so that he may recover his strength.

As you may know, the average human body is somewhat lighter than fresh water and quite a good deal lighter than salt water. Therefore, if we properly balance the body, most of us should have no difficulty in keeping afloat. We must point out, however, that not all people are equally buoyant. Some can float with ease, others can just barely float and a few people cannot remain afloat at all unless they keep moving their hands or feet.

There is a simple way of finding out whether you are buoyant enough to float without any motions on your part. Wade out until the water is waist-deep; then bend your back, lower your head beneath the surface, draw your knees up toward your chin and clasp your ankles with your hands. This position is known as the Jelly fish float. If, while doing this float, any part of the head or back appears above the surface of the water, it shows that you are buoyant and that you can learn to float.

There are several kinds of motionless floating. In the horizontal float the body is kept parallel to the surface, the greater part of the body being submerged. The head is kept well back, with the ears under water; the arms are extended sideways with the palms turned up. Some people float so easily that they find it possible to keep their hands at their sides or even to fold them upon their breasts while doing the horizontal float just described.

In the semi-vertical float the head is laid back gently upon the surface of the water until all but the face is under water. The back is arched so that a part of the chest is out of the water, the arms are extended sideways under the water with the palms of the hands turned upward. The rest of the body tends to adopt a more or less vertical position. In the vertical floating position the body is kept more or less vertical in the water with the head thrown back and only the face above the surface.



2. Breast stroke. The three pictures in the centre give the side view; the others the top view. (1) Beginning of stroke. (2) Arms at end of pull; legs drawn up. (3) Arms and legs ready to assume original position.

Courtesy, Boy Scouts of America

While you are learning to float have a friend stand by and support you in the water by placing one hand under the back of the head and the other under the body, until you can float without any support.

A very few people cannot float while motionless. These should adopt the horizontal position described above and they should keep paddling gently with the hands or feet or with both hands and feet.

When we have mastered the float, we are ready to learn the various swimming strokes. The breast stroke is a good one for beginners to learn, as the face can be kept out of the water at all times and the various movements of the arms and legs are quite natural. The breast stroke, too, is generally used in underwater swimming.

At the start of the stroke the body is in a fully extended position, face downward, arms straight ahead, fingers and thumbs kept close together with the thumbs touching each other, legs kept straight with toes extended. You now pull with your arms backward and slightly downward until the arms are at right angles to the body. The elbows are now drawn to the sides; the palms touch under the body. Then the arms are pushed out straight ahead until they reach the first position.

As the arms pull backward, the knees are bent, the heels being kept together. As the arms are pushed forward vigorously, the legs are kicked out, then brought quickly again to the original position with a snap. The breath should be taken while the arms are wide apart.

THE BACK STROKE

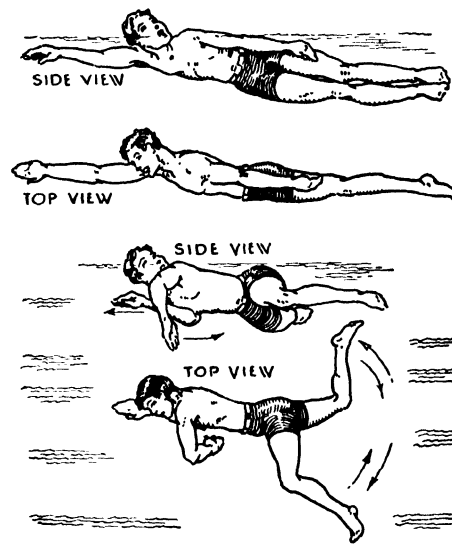
The elementary back stroke somewhat resembles the breast stroke; only in this case the swimmer lies on his back. His arms are held straight down his sides; the palms are pressed against the thighs; the legs are held straight together.

The hands come up under the water over the front of the body, and then reach diagonally upward and outward until the arms are fully extended. The arms are then pulled down to the thighs to the first position. The elbows must be kept under water throughout the stroke. As the arms are extended outward, the knees are brought up slowly (the heels being kept together) and spread apart. Then the feet are extended wide to the sides. As the arms are pulled down, the feet are brought straight together again. After each stroke the body glides forward from five to ten feet. The back stroke is very slow but it is perhaps the least fatiguing of all strokes; it is often used as a resting stroke.

THE SIDE STROKE

The side stroke is popular and fairly easy to acquire. We start this lying on the right side with the right arm extended in the direction toward which we are to swim; the left arm is kept in front of the left thigh. Both arms are kept under the surface of the water. The left shoulder is kept out of the water and the face is turned toward the left shoulder. The right arm pulls down toward the bottom and slightly in front of the body; the elbow bends, the hand comes up past the right shoulder and is extended forward to the first position. The left arm starts to move at the same time as the right. The left arm is brought up close to the body just under the surface of the water until the hand comes up to the right shoulder. The arm is extended straight downward and then is brought back to its original position in front of the left thigh.

The legs do what is known as a scissors kick on this stroke; that is, they are spread apart from the hip, the left leg going forward and the right leg backward. The knees are bent as the legs are spread apart; then



Courtesy, Boy Scouts of America

3. Side stroke; side and top views.

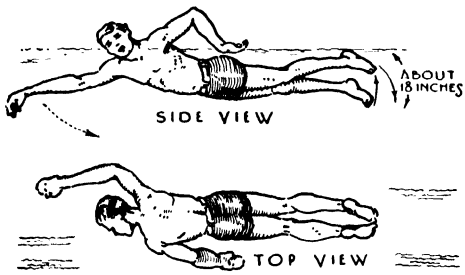
they are straightened out again with a snap as the legs are brought together straight.

The movement of the arms is started first. When the hands are opposite each other at the shoulder, the legs start to open. As the arm stroke is completed, the legs come smartly together. There is then a long glide with the right arm extended straight ahead, the left arm at the side and the feet together, before the next series of arm and leg motions begins.

A very popular stroke is the crawl stroke. The body is held as nearly flat on the surface as possible, with both arms extended straight forward. Each arm in turn is brought downward and backward through the water. The pull ends at the hip; then the arm is brought out of the water and is carried forward above water to the pulling position. As one arm comes out of the water the other arm starts its pull. There is no

break between one complete revolution of the arms and the next one.

As the arms revolve, the legs do what is called a flutter kick—they execute a series of up-and-down kicks. The legs and toes are fully extended; the toes are bent slightly inward. The action is from the hips; the knees are not kept absolutely stiff but are allowed some play. The distance between the top foot and the lower foot should never be more than 18 inches. Generally the legs kick 6 times for each complete revolution of both arms; this is called a 6-beat crawl. There are other types of crawls, deriving their names from the number of kicks for each complete revolution of both arms. Thus we



Courtesy, Boy Scouts of America

4. Crawl stroke; side and top views.

have the 2-beat crawl, the 4-beat crawl and the 8-beat crawl as well as the 6-beat crawl that we have just described.

The breath is taken by turning the head sideways as either the left or right arm strikes the water at the beginning of the stroke. A quick gulp of air is taken through the mouth. The head is then turned downward and the breath is exhaled through the mouth and nose under water. As we pointed out, the breath should not be held after the intake of breath; exhalation should begin immediately after the gulp of air.

The back crawl stroke is much like the crawl stroke, except that the swimmer is on his back. His arms are extended at his sides, his legs are straight, the head is raised slightly. The arms pull at the water alternately as in the crawl. At the beginning of each stroke the elbow is bent, the arm is lifted above the surface and the hand is carried back over the head. The hand catches the water for the downward pull back of the shoulder; it is pulled down and sideways to the hip. The pull is completed at the hip just as the other arm catches the water. As in the crawl, the revolution of the arms is continuous. The flutter kick is almost the same as for the 6-beat crawl; however, the up-movement of each leg receives more force than the down-movement. The toes are turned in more than in the crawl. As the head is always above water, the breath may be taken at any time.

THE TRUDGEN CRAWL

Another variation of the crawl is the trudgen crawl. In this the body is rolled slightly to the breathing side and a narrow scissors kick is substituted for the first two flutter kicks. The scissors kick is followed by four ordinary flutter kicks.

A stroke that has won considerable favor with those who find the crawl stroke tiring is the trudgen stroke. This is really a combination of the crawl and the side stroke. The arm movements and the breathing are about the same as in the crawl; the leg movements are the same as in the side stroke; that is, the scissors kick is used instead of the flutter.

THE ART OF DIVING

When we can do at least several of the above strokes effectively, we are ready to practice our first dives. Every good swimmer should know how to dive. This is the easiest method of entering the water, and is the quickest way to actually start swimming. A dive is particularly useful when speed is urgent, as when one wishes to reach a drowning person.

We should begin with the very simplest dives, which should be practiced, if possible, in a swimming pool. The easiest dive of all is the frog dive. We sit on the edge of the swimming pool with both feet resting on the rail. The knees are kept apart and the body is bent between them. The arms are extended forward with the thumbs locked together; the head is tucked down between the arms. We take a deep breath and then we push off.

Next, we do the knee dive. We take a kneeling position close to the edge of the pool, keeping the head and arms in the same position as before. We inhale and then jump off. To do the standing dive we stand at the edge of the pool with our toes just over it. The knees are partially bent, the body leans forward, the head and arms are kept as before. We rise on our toes, take a deep breath and jump.

When we can do these dives effectively, we are ready to use the springboard. First we try a plain standing dive from the edge of the springboard. Next, we step back two

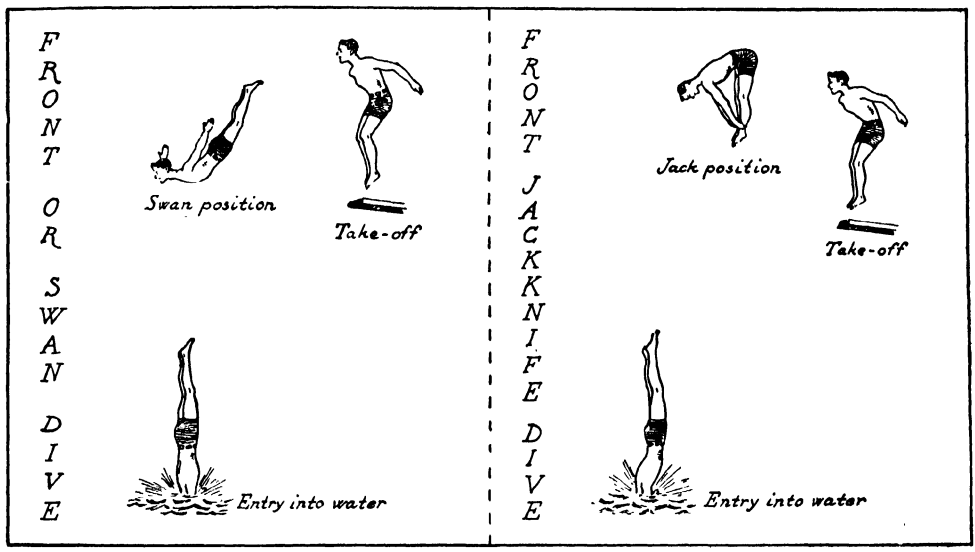
paces from the free end. We take one step forward and then we dive, head down, arms out in front and thumbs interlocked. When we have become proficient in this sort of dive, we go back about four feet from the free end of the springboard. We take two quick steps; then we jump to the end of the board. We land with both feet together; then we take off.

We are now ready to do fancy diving. In all dives there are certain things to bear in mind. We should always have full confidence in ourselves as we do each dive; otherwise our form is apt to suffer. We should take off from the board with a spring as high in the air as possible. As the body enters the water, it should be kept fully extended; the head should be kept between the arms and the back should be slightly arched. Some fine divers clench the fists at the moment of striking the water. When the body is about half way in the water, the hands should be bent upward at the wrists. This will cause the head to come quickly to the surface.

There are many different fancy dives, which require much faithful practice to master. The two simplest fancy dives, perhaps, are the front or swan dive and the front jackknife. In the front dive the takeoff is made from both feet. The spring is upward rather than outward. As the body rises, the arms are placed in position at right angles to the body and held out-stretched for a moment or two. Upon entering the water the arms must be extended straight ahead; the body is arched the legs are held straight with toes pointed. In the front jackknife, the takeoff is much the same as for the front dive. The jack position (body bent at hips, hands touching the legs ' elow the knees) should be held momentarily. The position for the entry is the same as in the front dive.

So far we have explained to you the various things that you should do in order to become a good swimmer. There are also some don'ts to bear in mind. Never practice swimming unless a good swimmer is near at hand to assist you if something goes wrong. Be sure there are no treacherous holes or broken bottles in your beach. Never go swimming within an hour after a meal. Do not enter water beyond your depth unless you can swim fifty strokes.

Never dive unless you are certain that the water into which you are to plunge does not contain rocks or submerged stumps. Before you dive from a springboard be sure that the person who has preceded you on the board has swum away from the place where he entered the water. As soon as you have finished your own dive, swim away from the vicinity of the springboard as rapidly as possible. A collision between a diver and a swimmer may result in serious injury to one or both.



5. Two popular dives—the front or swan dive and the front jackknife dive.

A FILTER ANYONE CAN MAKE

IN most cities and towns, drinking water is carefully tested by public health authorities and is perfectly safe. In a number of places in the country, unfortunately, there is no such careful supervision. The water drawn from rivers, ponds or wells may become polluted (to pollute means to make impure) and may cause serious illness. There are various ways, however, in which any water may be made safe for drinking. One effective device is the filter, which we describe on pages 5059-60 of The Book of Knowledge.

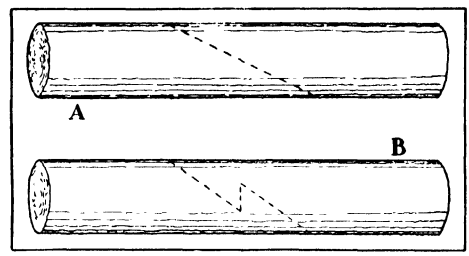
Here is a simple form of filter that any boy or girl can make without any trouble. We take an ordinary garden flower-pot, at least six inches in diameter at the top, and, after thoroughly washing it, we stop the hole with a piece of sponge. Then we put in equal layers of charcoal, clean sand and coarse gravel, with the charcoal at the bottom and the gravel on top. We set the filter in position over a vessel of some kind; then we let the water which is to be filtered run through the various layers in the flower-pot. By the time it reaches the vessel, the water will be perfectly pure. It will be necessary to replace the charcoal, sand and gravel from time to time, as they will collect many impurities.

TWO WAYS OF SPLICING A STICK

EVERY boy should know how to splice a stick or a pole. By proper splicing, broken sticks or poles can be mended and other sticks or poles may be extended to any desired length.

A simple method is to make a straight splice as shown in A, in the picture. The two ends to be joined are cut at a sharp angle and made to fit exactly upon one another. If we are handling a pole or beam, the two portions are bolted together; if sticks or thin poles are being spliced, we glue or screw them to one another.

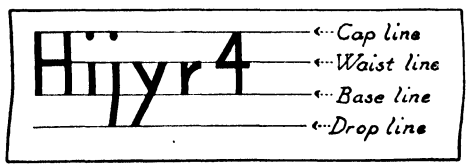
A strong method of splicing is that known as the bracing-splice. Instead of making a straight slanting cut at the end of each piece, a kind of step is cut in each. The



two portions fit each other exactly (see B in the picture). They may be fastened together by having wire bound around them, if the pole is thick, or by using glue if we are splicing a stick.

HOW TO DO NEAT LETTERING

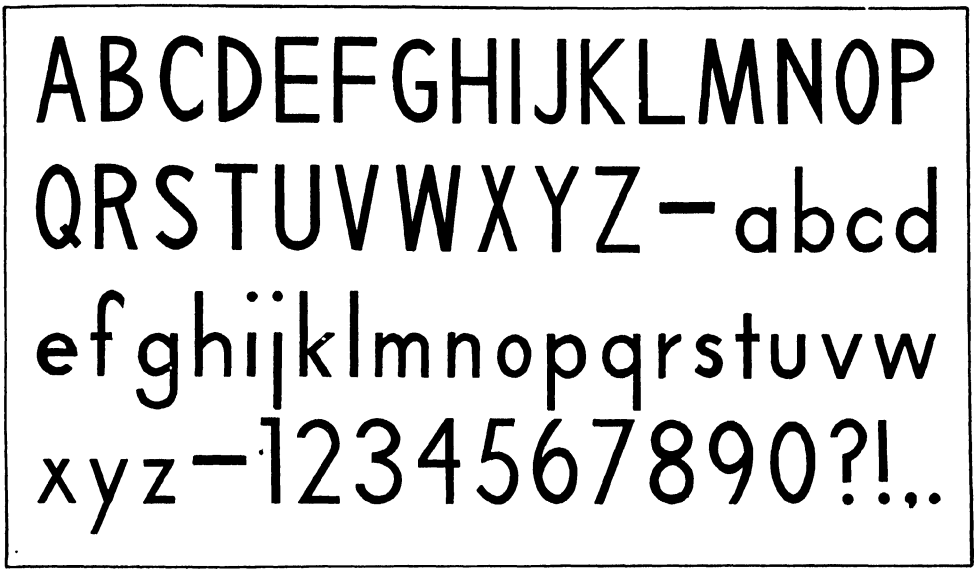
LETTERING is the art of producing more or less ornamental letters, as distinguished from those of one's ordinary handwriting. People sometimes refer to lettering as printing, because the letters that are produced are often (but by no means always) like those found in printed books. Lettering is really a profession in itself. Lettering experts use a great deal of equipment of many different kinds—brushes, special pens or quills, compasses, T-squares, triangles and so on—and they produce the fine lettering that you see in show-cards, store displays, seals, letterheads, diplomas, book jackets, greeting cards and the like.



1. Guide lines for lettering.

To acquire a complete knowledge of lettering one must combine years of training with years of experience. Any boy or girl, however, can master without difficulty one or several printed alphabets and with an ordinary brush or pen can produce neat and effective printing.

There are many cases in which printed



2. An effective alphabet that can be learned easily.

letters are preferable to the letters of one's ordinary handwriting. Let us think of a few things that seem to call for printed letters. To begin with, addresses on parcels or labels are much clearer if done in neat printed letters; there is much less likelihood of the parcel going astray because the letterman or expressman is unable to read the writing. Printed letters are also effective when used for albums containing collections of such things as stamps, photographs and plants. In making maps for school, names should be printed rather than written in ordinary handwriting. Printed letters are also appropriate for greeting cards.

A specialist in lettering has a great number of alphabets from which to choose when he begins work on a lettering assignment. It would be well for the beginner, however, to choose a single alphabet and to practice it faithfully until each letter in the alphabet can be produced accurately and without hesitation. For the purpose of this article we have chosen an alphabet that is very popular at the present time and that is quite easy.

If you wish to do a particularly careful job, it would be well to mark guide lines across the page with pencil and then to have the letters fit within these lines. Figure 1 shows the various guide lines used in lettering, with the names that are given to each. The cap line marks the upper limit of capital letters and of such small letters as b, d, f, h and so on. The waist line marks the upper limit of such small letters as a, c, e, g and so on. The base line indicates the lower limit of most capital letters and of most small letters; the drop line, the lower limit of small letters that drop below the base line (such as g, j, p and so on).

The guide lines should be drawn very lightly in pencil. After the letters have been inked in, the guide lines should be erased with art gum, which you can buy in any art supply store.

For ordinary lettering jobs, such as writing addresses on parcels, it will not be necessary to make more than the base line. As you acquire added skill in lettering, you may find it possible to dispense with even this one guide line.

To letter the alphabet that is illustrated in figure 2, you may use either brush or pen. A number 8 brush is best for ordinary purposes; with the brush you may use either an opaque water color or India ink. Good results may be obtained by using an ordinary medium point pen, using India ink or, if this is not available, any good writing ink. First trace the outlines of the letters in pencil and then use the brush or pen over the pencil marks.

Remember that guide lines should always be used whenever a particularly accurate lettering job is called for.

WHY DOES A MATCH STRIKE?

A MATCH strikes because we make it warm by rubbing it on something. You know that you have to rub it on a rather rough surface, so that there will be a good deal of friction. The movement of the match is hindered by the rough thing you press it against, and that is what we mean by friction. Friction causes heat. Rub the tip of your finger on your coat, and you will soon mak· your finger hot.

The head of the match is made of a mixture of substances to which nothing happens as long as they are kept ordinarily cool, but as soon as they are made hot enough they catch fire—that is to say, they combine with the oxygen of the air, and so burn.

The problem of the match-maker, then, is to get a kind of mixture that will stay on the end of a piece of wood, or some such substance, and will catch fire from friction. Well over a hundred years ago the first friction match was made. It required a lot of friction, for it had to be drawn up between two pieces of sandpaper before it would catch fire. Then the curious substance called phosphorus (its name means light-bearer) began to be used, and matches were made very much like those we use now. Phosphorus readily catches fire just as we want it to do. A number of other materials are put into the match head, especially a substance that contains oxygen and can supply it for purposes of burning even more readily than the oxygen of the air. That is why you get a little explosion when you strike some kinds of matches.

Of course there is a certain amount of danger in having anything that will catch fire readily. Thus, if you have ordinary matches (what we call kitchen matches) loose in a pocket, they may get rubbed together accidentally and they may catch fire. Therefore, the question arose whether there could not be made some kind of match that would strike only when we want it to strike.

This kind of match was invented in 1852. Such matches are called safety matches. There is no phosphorus in their heads; the phosphorus is put on the outside of the box instead; and so this kind of match is almost certain not to catch on fire except when it it purposely struck where the phosphorus is.

There are at least two different kinds of phosphorus. The commonest and cheapest of these, white or yellow phosphorus, is a very deadly poison. It is, in fact, used in making a poison to kill rats and other animal and insect pests. Once this was used on the heads of ordinary matches, and the people who made the matches were liable to phosphorus poisoning. The Belgian Government offered a reward for a match that would contain no poisonous phosphorus. Two Frenchmen succeeded in making one, and now these matches are commonly used. Laws are in force in many countries forbidding the use of the dangerous white or yellow phosphorus in the match industry.

WHY DOES A MATCH GO OUT WHEN WE BLOW IT?

When we strike a match we cause friction against certain chemical compounds. The friction creates heat, not very much heat, but enough to make those chemicals burst into flame. The hot flame then burns the match stick; that is, causes the substance of the match stick to combine with the oxygen of the air.

In other words, to have a fire we must have three things—oxygen, a substance that will combine with oxygen, and heat. Take away the oxygen (cover the fire so no air can reach it) and the fire goes out. Take away the heat and the fire goes out.

When you blow on a match gently, you make it burn more brightly than before, because you are sending a brisker supply of air toward the match. Blow hard and you cool the match and it will no longer burn.

WHY DOES A MATCH FLARE UP WHEN TURNED UPSIDE DOWN?

The hot gases that make the flame of the match are lighter than the air; therefore they rise. The part of the match near the flame burns (combines with oxygen) and thus we have a steady supply of the gases that keep the flame alive. Turn the match upside down. The flame will still rise, in fact, it will rise and form a ring of flame around the lower part of the match. The added heat at that part will cause the match to burn faster, and feed gases to the flame more quickly, so the flame will be brighter.

THE NEXT WONDER QUESTIONS ARE ON PAGE 7245.

THE EARLIEST WAYS OF MAKING A FIRE

There was once a time, many thousands of years ago, when man knew nothing of fire except, perhaps, the fires that were the result of natural accidents. Without fire, food was eaten raw, cave homes were often damp and cold, and nights were dark indeed.



1. Then one day the cave-man found out that if he rubbed two sticks of dry wood together briskly, enough heat would be produced to set light to dry grass or moss, making a fire. This was one of the first big steps on the long road to civilization.

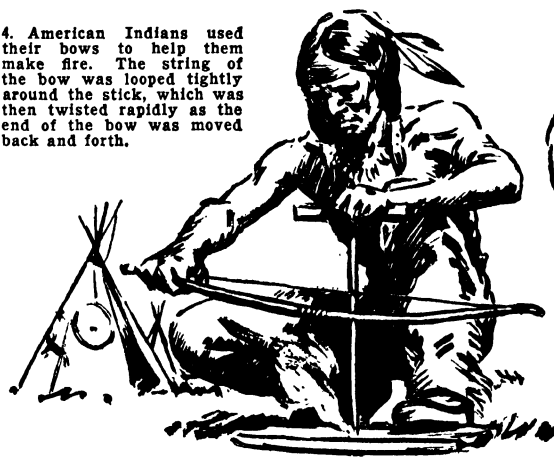




2. Another way to start a fire was to cut a slot in a plank, and then to saw this slot with a wooden stick. The friction would set the sawdust afire.

3. A variation on the rubbing of wood together was to twirl a dry stick, twisting it rapidly, in a hole, or socket, cut in a dry plank or tree trunk. As soon as he saw the smoke, of course, our early man would know that the fire had started.

4. American Indians used their bows to help them make fire. The string of the bow was looped tightly around the stick, which was then twisted rapidly as the end of the bow was moved back and forth.



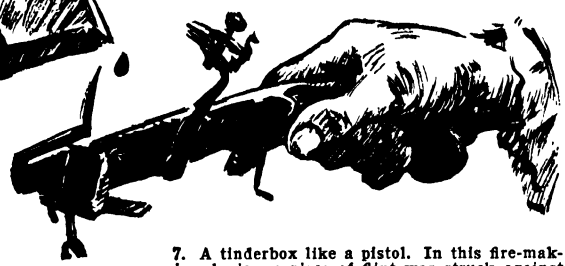


5. Man made a great stride forward when he discovered that by striking a piece of metallic stone against a flint, sparks would fall. Before the sparks had a chance to die, they would be caught on a little heap of dry moss.

HOW MAN LEARNED TO STRIKE A LIGHT



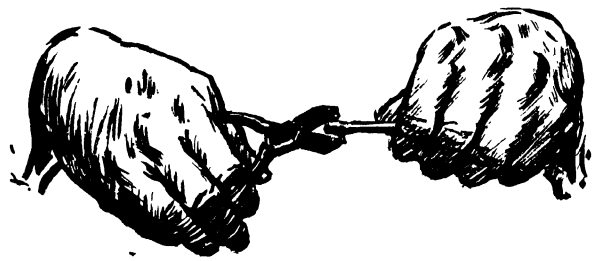
6. When iron and steel became known to man, he improved his fire-making outfit. A piece of flint, steel, and the half-burnt cloth, tinder, on which the sparks were caught, were kept in a rough box. The steel was struck on the flint, driving a spark into the box, and it set the tinder on fire.



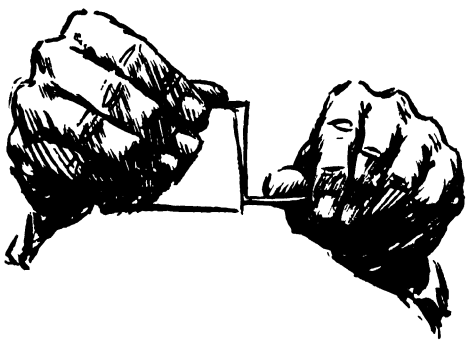
7. A tinderbox like a pistol. In this fire-making device, a piece of flint was struck against the upright steel; and a spark fell into the box below so rapidly that wind or rain could not put it out before a little fire was started.



8. The first modern match was invented by a Frenchman, Chancel, in 1805. Chemicals on the head burst into flame when dipped in a bottle of acid. However, this meant that one always had to have the bottle of acid handy.



9. A little later matches made of rolled-up paper came into use. At the tip was a tiny glass bulb of acid, and the whole tip was coated with a chemical preparation. When the tip was crushed between pincers, the acid escaped, mingled with the chemicals, and set fire to them.



10. The first practical lucifer match was invented by John Walker, an Englishman. It was very like those we use today, and was struck by drawing it through a piece of folded sandpaper. These matches were sold at the price of twelve a penny (two cents).



11. The safety match strikes easily and is safe. Its head can not catch fire unless it is deliberately rubbed against the side of the box. It is one of the simplest and tiniest of things, yet it took man hundreds of years to invent it.



© Keystone View Co.

The first step in the manufacture of matches.

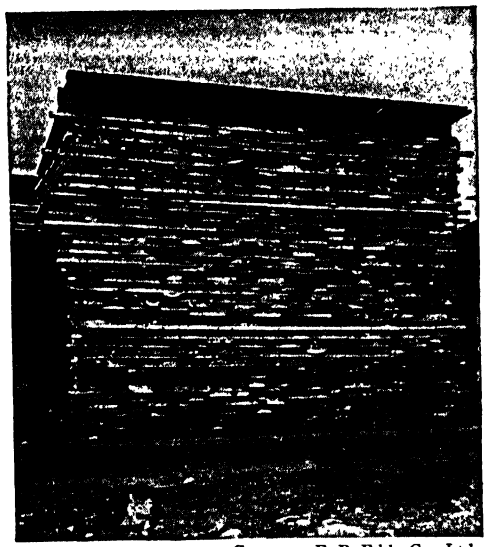
HOW MATCHES ARE MADE

A WORLD without fire would be a world of savages. How men first got fire we do not know. Perhaps it was from a volcano, or from a fire set by lightning. At first, after men had learned the value of fire, they did not dare let it go out, and when they moved from one place to another they carried burning coals with them. Next they learned to get fire by rubbing pieces of wood together, and then by sparks from flint and metal. Next came crude matches, which were expensive and dangerous, but which have been improved, until we can now carry them in the pocket with perfect safety and can get fire in a moment without trouble. The story and the pictures show you how matches are made by the million from logs and a few chemicals. If you will follow the story you can see why it is now possible to buy a thousand matches for a few cents. Made by hand, they would be very expensive because of labor costs.

If you were ever on a picnic, or in camp, and suddenly found that the matches had been left behind, or had got wet and refused to strike, you quickly realized how much we depend upon these little pieces of wood or cardboard with their crackling heads. They are so common and so cheap that we often forget what a convenience they are. Yet the world got along without matches for thousands of years; for the first real matches, something like those we have to-day, were made little more than a hundred years ago.

When our ancestors first began to use fire to cook their food or to keep them warm, a central fire was kept burning all the time, so we are told. Certain persons were appointed to tend it and to see that it did not go out for want of fuel or because of the rain. From this central fire the different families would take a burning branch to kindle separate fires to cook their food. When the tribe moved, the fire was carried along too. It is not strange that many savages worshiped the dancing tongues of flame, which were so mysterious and terrible and yet so useful.

We know that some savages used to get fire, and still get it, by rubbing two pieces of dry wood together in different ways. This method is difficult, and not everyone can learn the knack of doing it. Men found an easier way after they learned the use of iron and steel. If a flint is struck sharply on a



Courtesy, E. B. Eddy Co., Ltd.

White pine planks, each two inches thick, piled in the lumber yard for seasoning. The planks must be seasoned for more than a year to make good matches.

piece of steel, sparks fly off and will set some very dry substance on fire. The muskets used in the Revolutionary War were called flintlocks, because they used this idea. A little hole was bored through the barrel, and a few grains of powder were shaken out on the edge. A flint attached to the hammer, or lock of the gun, struck a piece of steel when the trigger was pulled, and the sparks set the powder outside on fire, and the flame exploded the powder inside the barrel.

During pioneer days, and long afterward, many houses had tinderboxes, which contained some flints, a piece of steel and some rags which had been baked until they were very dry. When a fire was wanted, sparks were struck into a bit of the tinder, as the half-burned rags were called. This would smolder, and, by blowing, tiny splinters could be lighted and soon there would be a roaring fire of logs in the great fireplace. Sometimes very dry rotten wood was used instead of tinder. You may have seen a piece of punk, which holds fire a long time. Usually, however, the coals were covered with ashes at night so that they would keep alive. Sometimes this was forgotten, or perhaps the family went away from home for a few days, and the fire went out. If the house did not own a tinderbox, or if there was no tinder prepared, someone took an iron pot or shovel and went to a neighbor's house to get some live coals.

Now we get rid of all this trouble by using a match, and do not care very much if we must use two or three. This has not been true very long. The first matches made were very expensive and were considered a luxury. It is not so very long ago that the price of matches was many times what it is to-day. In those days people took care to make every single match do its service.

A man named Godfrey Haukwitz made a match as long ago as 1680. His match was both costly and dangerous, however, and was not successful when offered for sale. Later a number of other crude chemical matches were made, but not widely used. Later the brimstone match, as it was called, became popular. This was a small strip of pine wood dipped in sulphur. To light it, you struck a spark upon it from a flint and steel. This was less dangerous than the earlier chemical matches, but it was clumsy.

Early in the nineteenth century, people were using Instantaneous Light Boxes, invented by an Englishman named Jones. These consisted of bits of wood tipped with a mixture of chlorate of potash and sulphur. When one of these was dipped into a bottle of sulphuric acid, the combination caught on fire. Sulphuric acid, however, will eat through clothing or burn the skin, so the Instantaneous Light Boxes were not found to be the ideal matches.

THE FIRST REAL FRICTION MATCHES ARE MADE

The first real matches were made by John Walker, an Englishman. They were tipped with gum, antimony and potash, over a layer of sulphur. With every box a sheet of folded sandpaper was furnished. The match was placed in the fold, which was tightly pressed together with one hand, and the match was jerked with the other. This match was called a lucifer. Lucifer matches were made in the United States, in Massachusetts, Connecticut and possibly in other states, as early as 1835. The lucifers went off in a sort of small explosion and a shower of sparks that was dangerous. Sometimes they did not go off at all. A better match was still needed.

You know that rubbing, or friction, produces heat. This is the secret of the match; and the problem was to find some substance or substances which would flame from the heat produced by rubbing against a rough substance and yet would not be too dangerous to use. This is called a friction match.

Phosphorus had been discovered long before, but it catches on fire with very little

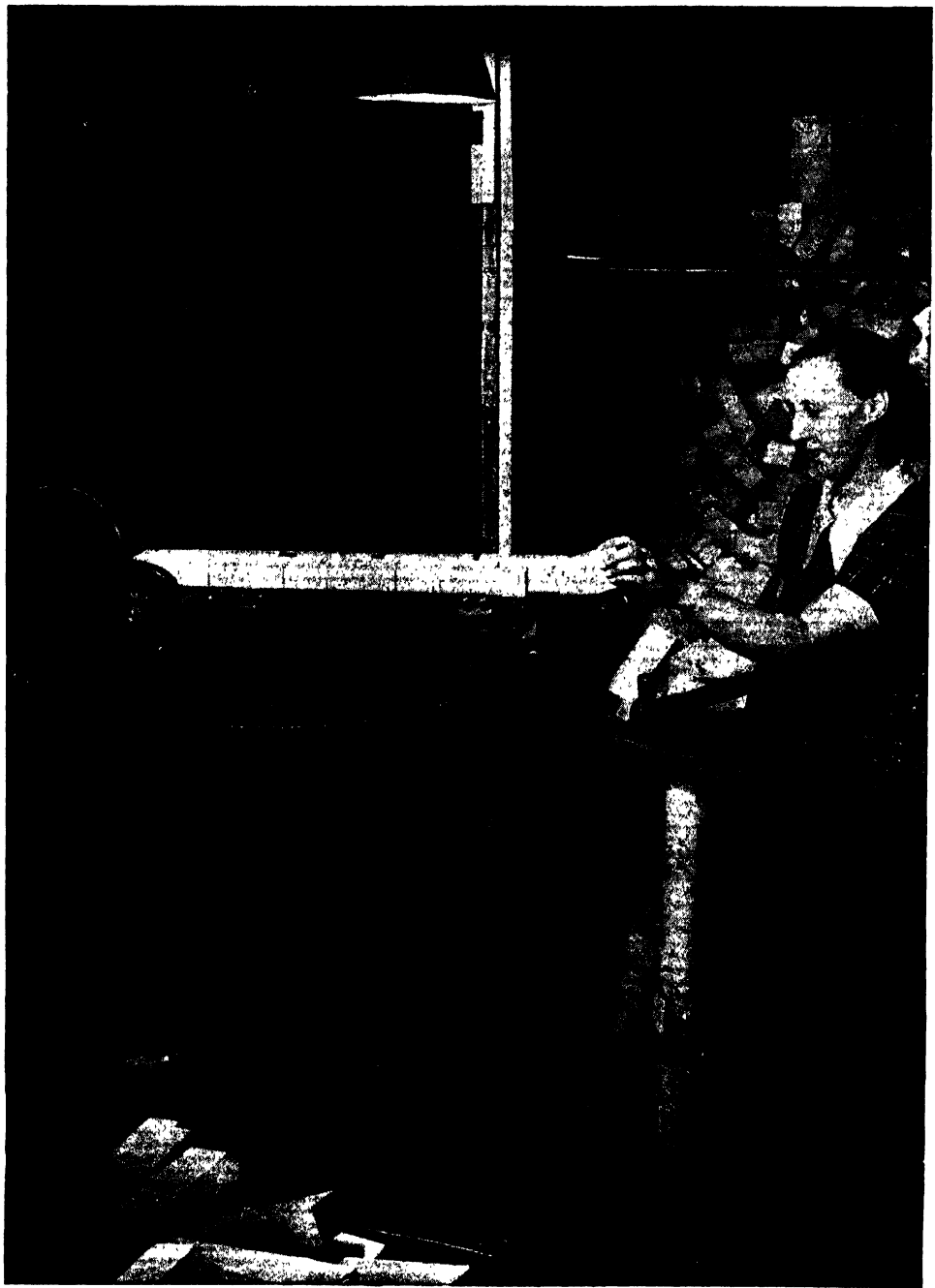
THE BEGINNING OF A MATCH



Courtesy, E. B. Eddy Co., Ltd.

After the planks have been properly seasoned, they are planed smooth on one side and then sawed into blocks the length of a match. Here we see a plank being sliced into blocks by the sawing machinery.

THE BLOCKS BEGIN THEIR JOURNEY



Pictures on pages 6968, 6970, 6971 and 6972 © Dmitri Kessel, courtesy, Fortune Magazine

The blocks of wood are shown being fed into the machinery which will cut them into splints, as the match sticks are called. Although the wood has been carefully selected, some of the blocks may have poor or unsuitable portions in them. When one of these blocks appears the operator who is feeding the machine removes the block and chops the defective portion out with the hatchet which is kept on the stand beside her.

heat, and was thought to be too dangerous to use for this purpose. It is poisonous besides. It was found, however, that by mixing the phosphorus with other substances a match could be made that would strike easily and yet was not likely to flame unless rubbed purposely. Several men found this out about the same time, for we find this same John Walker and men in Germany and Austria making phosphorus matches in 1833.

LOCOFOCO MATCHES COULD BE STRUCK ANYWHERE

In the United States a patent for a friction match was taken out in 1836, by Alonzo Dwight Phillips of East Hartford, Connecticut. His match was a stick tipped first with sulphur and then with a mixture of phosphorus, chalk and glue. It ignited when rubbed on any rough surface, and it did not explode so much as the lucifer. Soon other people were making "strike anywhere" phosphorus matches. They were called locofocos, from the Latin words for place and fire. Later paraffin began to be used on the match-head instead of sulphur "in order not to smell up the parlor." These were called parlor matches. Paraffin is now generally used. To-day's matches are modern versions of the first locofocos, though changed and improved and varied enormously in many respects.

The substances in the head of a match are not always the same. Different manufacturers use different mixtures. The double-dip, or "bird's eye," match has a tiny striking tip, but most of the head is made of some substance which burns easily and gives a good flame. Matches made for use at the seaside, or where the wind blows strongly, have very large heads and burn quite slowly.

THERE ARE MANY DIFFERENT KINDS OF MATCHES

Matches are made in many sizes, kinds and brands, from the high-grade, safe and reliable match of everyday life to the very special ones made for use in very cold regions, where life itself may depend upon the making of a fire. Once lighted, these Arctic matches, as they are called, cannot be extinguished even though submerged in water. The use of such matches in settled communities is forbidden by law. If they were in common use the danger from fires would be very much increased.

The locofocos caused many fires by rubbing together, or by being stepped upon, or by being nibbled by rats or mice. Sometimes a whole box in a man's pocket would catch on fire if he pressed against a wall or the arm of a chair. About 1852 safety matches were made by J. E. Lundstrom in Sweden. There was no phosphorus in the heads of these matches, but a certain kind of phosphorus was painted on the box. They 'ighted only when struck on the box or on a glassy surface, and therefore were much safer than ordinary matches. Now safety matches are made in many parts of the world, and no other sort of matches should be carried in the pocket, unless one uses a metal match-box to carry them.

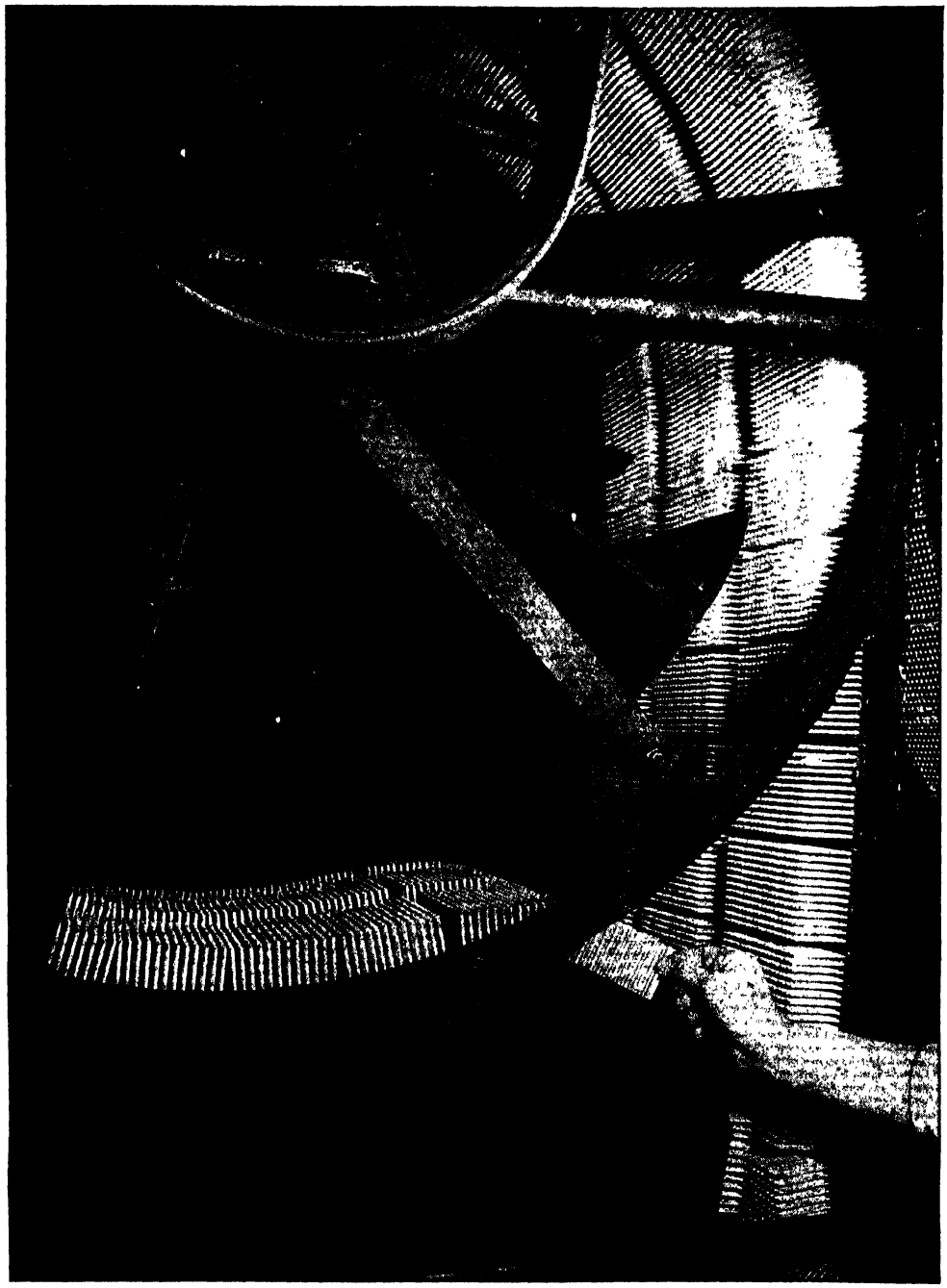
Years ago workers in match factories were often attacked by a peculiar disease. The white phosphorus used attacked the teeth and the bones of the jaw, and caused great suffering. Now the use of white phosphorus is not allowed, but a harmless substitute is used instead.

GREAT FOREST TREES ARE USED TO MAKE TINY MATCHES

There are many steps in the making of matches. First the pine trees in the forest are felled. Those suitable for match manufacture are chosen and sawed into lumber. The lumber is inspected, and the suitable material is separated and piled for six months before it is inspected again. This is repeated at the end of each six months for a period of two years. The accepted planks are then sent to the factory and planed before being cut into blocks the length of a match. Another inspection takes place, and the blocks that are passed are sent to storage bins to cure. When cured still another inspection is made before the blocks go to the match floor of the factory to be fed to the match machines.

When the blocks come out of the match machine they are cut into splints or sticks, the regular match size. The splints are forced into small holes in steel plates. It is the forcing of the end into the plate that makes the small end which you can notice is opposite the head end. The plates with the splints sticking in them pass through a chemical solution the object of which is to prevent an afterglow when the match has been used and blown out. The carrying plates next travel through a drying chamber to drive off extra moisture and to fix the chemicals in the splint. The splints are then ready for a trip through hot paraffin wax, followed by another drying process by means of blasts of hot air. After this they pass to the composition mechanism of the machine and receive the proper amount of composi-

THE SPLINTS ARE PUT IN THE MACHINE



The match splints are attached to metal carrying plates by forcing one end of the splint through a hole in the plate. This is what makes the small end of the match opposite the head end. There are more than two hundred splints on each of the metal plates shown in this picture. This is a close-up view of just one part of the wonderfully whorled and looped machine by which the match splints are carried through the remaining processes which make them into the familiar and useful articles that we see in the kitchen or near the fireplace.

MIXING THE MATCH COMPOSITION

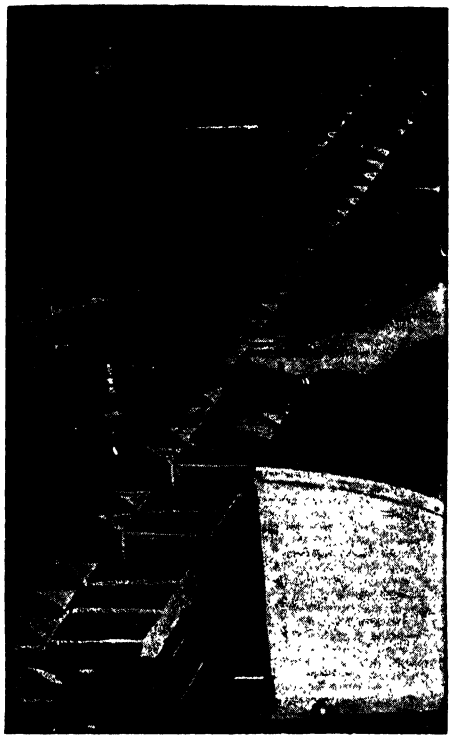


The man in this picture is mixing the composition which is used to tip the striking end of the match. Each match company has its own special mixture, and not all of the ingredients are the same. It is an intricate process and requires skilled workers. Some of the substances that go into the mixture are ground by large grinding machines similar to those used in making paint and chocolate. All of the hundred ingredients used have to be blended with the greatest care, and this makes it necessary to use many special appliances.

ROUND AND ROUND THE MATCHES GO



Here we see the slowly turning wheels and belts that carry the match splints through the various processes until they are ready to be boxed and shipped to the market. First the plates with the match splints stuck in them pass through a chemical bath which keeps the match from glowing after the flame has been blown out. Then the machine takes them through a drying chamber to fix the chemicals. After that the matches are put through a bath of hot paraffin wax and then through another drying process. The next step is to dip the heads in just the right amount of composition to put the striking part on. After this the matches wind in and out while currents of hot air blow on them to set the heads. Some matches are dipped in two different mixtures to make the two-color heads that we often see. The machine automatically expels the dried matches.



This machine packs the matches into the boxes. Before the boxes are pressed into the cases they pass before watchers who pull out imperfect ones.

tion which puts the heads on them, thus changing them from pieces of wood into matches. After the heads have been put on, the plates follow a winding course while blasts of hot air are blown on the matches to dry and set the head material. The matches are finally automatically expelled from the plates on to circular tables where they are packed into boxes. The empty plates pass on to receive a new head of splints.

The making of the composition with which the matches are tipped is an extremely intricate operation. Large mechanical grinders, similar to those used in the grinding of paint or chocolate, and many special appliances are used to mix thoroughly the hundred ingredients used. This requires very skilled workers.

In addition to the other precautions taken in all steps of their manufacture the matches are packed with extreme care. First, girls fill the individual boxes. In filling the home-size boxes half of the match-heads are placed on one side of the box and half at the other side. The reason for this division is precaution against fire. The cases, cartons and individual boxes are practically air-tight, so there is little oxygen available. If by accident the box catches on fire, the burning of the heads of one half of the matches in one box exhausts the supply of oxygen.

After the individual boxes are wrapped in paper cartons containing from five to twelve boxes, according to the size, the cartons are carefully packed in cases.

You know what book matches are—a comb of cardboard safety matches set in a cover. Combs of wooden locofocos, called card matches, were made as early as the eighteen-thirties. These were used until 1913, but some paper book matches had been used for some years before that. The improved cardboard book matches of to-day became very popular with men in service during World War I. During that war, also, the small wooden strike-on-box matches came to the fore in America. These had previously been made in Europe.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 7015.



© Underwood and Underwood

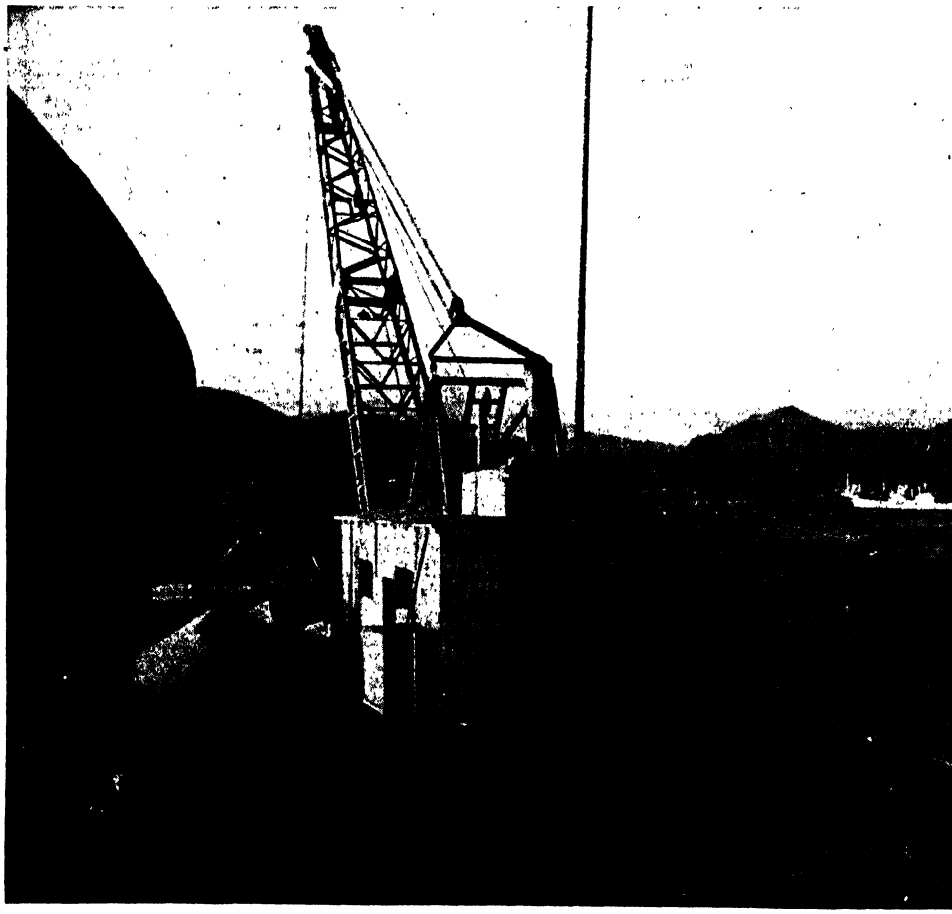
The boxes are then pushed home into the outer cases, and they pass down out of the machine, when they are ready for packing into dozens for the shops.

SCENES IN TWO OF THE GUIANAS



Netherlands Information Bureau, New York

The capital of Surinam (Netherlands Guiana) is Paramaribo, near the mouth of the Surinam River. The population is 50,000. The pleasant government buildings, in Dutch architecture, face a sunny park.



© British Combine Photos, Ltd.

Loading bauxite at Georgetown, capital and chief port of British Guiana. Bauxite is the chief ore from which aluminum is secured. Much bauxite is mined in both British and Dutch Guiana.



Courtesy, Moore-McCormack Lines Inc.

Carreta Monument in Montevideo, Uruguay, with ox-team and carreta (cart) of pioneers.

THE REPUBLICS OF SOUTH AMERICA

PART I

THREE small colonies in the north of South America were untouched by the wars of independence of which we read on page 6864. These colonies are French Guiana, Dutch Guiana and British Guiana. They belong, as their names indicate, to France, Holland and to the British Empire.

The three colonies changed hands several times. Dutch Guiana, or Surinam, was first settled by the English, but in the reign of Charles II was ceded to the Dutch, while by the same treaty New York was ceded to the English. On the other hand, British Guiana was first settled by the Dutch in the seventeenth and eighteenth centuries. The colonies were captured by the British more than once and were finally ceded to them at the close of the Napoleonic Wars. Since that time there have been boundary disputes with Venezuela, which lies to the west, and with Brazil; but the boundaries were settled by arbitration. A large proportion of the population is composed of East Indians and Negroes. Of the white inhabitants much the larger number are Portuguese. There have been no striking events in the history of Dutch Guiana since it became a possession of Holland. The population is small (173,000), and more than half are native Indians. East Indians are employed on the rice and sugar plantations. Paramaribo, the capital, has a population of 54,291. Settlements were made in French Guiana, or Cayenne, in the year 1626, and, with the exception of a few years during the Napoleonic Wars, this colony has ever since remained in possession of the French.

To free themselves from Spanish rule, Venezuela and New Granada united to form the Republic of Colombia, which included Ecuador. Simon Bolivar, "the Liberator," was chosen as first president, and the city named for him (Ciudad Bolivar) was made the capital. In 1829 the union was broken at the desire of Venezuela, and that country set out on her career alone. The first president, José Antonio Páez, was a strong man, who had made a name as a leader during the revolution.

Whether he was in or out of office, Páez held the power for about twenty years. Two other strong men in Venezuela's history have been Guzman Blanco, who was the real ruler from 1880 to 1892, and Juan Vicente Gomez, from 1910 to 1935. Venezuela is a federal union of states, resembling that of the United

States. The official name is *Los Estados Unidos de Venezuela* (The United States of Venezuela). The name Venezuela means Little Venice, for the lake dwellings which the Spanish navigators found on the Lake of Maracaibo.

As we have seen, the Spanish conquerors went to the country, not to settle, but in search of gold. The first colonists did not take their families with them, and those who settled in the country freely intermarried with the natives. Intermarriages continued even after settlers commenced to bring their families to the country. The population is now about 3,500,000, chiefly of mixed blood. Caracas, the capital, has over 20,000 people.

Petroleum was first produced about 1921, and is now the chief product. Venezuela stands third (after the United States and Russia) in oil output. Most of the crude petroleum is shipped to the near-by refineries in the Netherlands West Indies; the products are taken thence to many countries. Other minerals found in Venezuela are gold, salt, asphalt, coal, copper and magnesite, iron, some tin, asbestos and mica.

More than 3,000,000 head of cattle graze in the pastures. Horses, sheep and other stock are raised. As you might expect, hides are tanned and leather products manufactured.

The chief exports, after oil, are coffee and cacao. Wheat, sugar-cane, cotton, beans, tobacco, rice and corn are raised. In the wide forests are many species of useful trees. The government is teaching modern methods of agriculture, and Venezuela, with her wonderful natural resources, is advancing rapidly.

There are about six hundred miles of railway in the country. Recently the highroads have been much improved, and are reaching out along the coast and south toward the Orinoco. In remoter parts, away from the rivers, traffic is also carried on by means of pack-animals or small mule carts. About half the country is covered by forest. Another large section consists of the llanos, or great plains in the central part of the country, which are watered chiefly by the Orinoco and its tributaries. The climate, of course, is very hot except in the high mountain valleys, where nearly all the crops of the temperate regions can be grown.

Immense tracts of Venezuela have never been fully explored. In some places tribes of independent Indians live under their own



Courtesy, Grace Line

Sugar cane is raised in Venezuela, chiefly for home use. The two greatest exports are petroleum and coffee.



Courtesy, Colombian Information Bureau

Donkey-loads of young coffee shrubs in Colombia, to be transplanted. The coffee trees begin to yield fruit when three years old, and bear for about twenty years. Colombia has more than 500,000,000 coffee trees in bearing.

chiefs. Large numbers of these Indians know nothing of Christianity, and live almost as they did when they were first discovered by Europeans. Many of them, however, are very intelligent, and can be taught the ways of civilization without losing what is best of their own.

COLOMBIA'S VARIED CLIMATES AND MANY PRODUCTS

A good deal of what we have said about Venezuela might just as well be the story of Colombia. When Spanish rule was first overthrown, Ecuador and Panama, as well as Venezuela, were joined to Colombia. Ecuador declared its independence about the same time as Venezuela, but Panama continued to be part of Colombia until 1903, when it broke away. That, however, belongs to the story of Central America, which you will find elsewhere in this volume.

Colombia is wonderfully rich in minerals, including much gold and platinum, also silver, copper, iron, tin, cinnabar, lead, nickel, asbestos, coal, petroleum and salt. This country produces more emeralds than any other in the world.

Cattle-raising is important. Tropical fruits are grown in the lowlands. Bananas are exported in great numbers. Coffee is raised on the hills, and on the uplands grains flourish, and other crops common to the temperate zones. Rice, corn, sugar-cane, potatoes, beans and tobacco are grown.

The llanos stretch from Venezuela into Colombia, almost to the foot of the Andes. Colombia is much more mountainous than Venezuela, and up in the mountain plateaus and valleys there are large tracts of rich land. The population of Colombia is about 10,500,000. Bogotá, the capital (population, 482,480), is in the ancient Chibcha country. Though it is only a few degrees north of the Equator, the climate on the mountains is not hot.

ECUADOR, THE COUNTRY ON THE EQUATOR

Ecuador, as you may see, lies along the Equator, whence its name. A large part of the country is mountainous, and the most thickly populated regions are the plateaus of which the Incas had obtained possession. Quito, the capital, where, you remember, Atahualpa held his court, is only a few miles away from the Equator, but it is built so high up in the mountains that it has a temperate climate, though in lower valleys the country is very hot.

Navigable rivers run through the coastal plain and sometimes take the place of roads. There are, however, about 3,000 miles of roads in the country, and more than 2,000 miles of trails, or bridle paths. There are about 1,000 miles of railways, including some under construction; and airplane services are good.

A great deal of Ecuador has never been explored. Uncivilized Indians inhabit the forests of the coast and the east. The population of 3,089,078 includes 27 per cent Indians, 54 per cent *mestizos* (people of mixed Spanish and Indian descent), 8 per cent Negroes and mulattos, 8 per cent whites

and 3 per cent others. The whites are chiefly of Spanish descent.

Quito, the capital, has a population of 150,000. Guayaquil, the chief port, has 180,000 inhabitants. The city of Cuenca has 48,300. There are many other towns, mostly along the coast, but no other large cities.

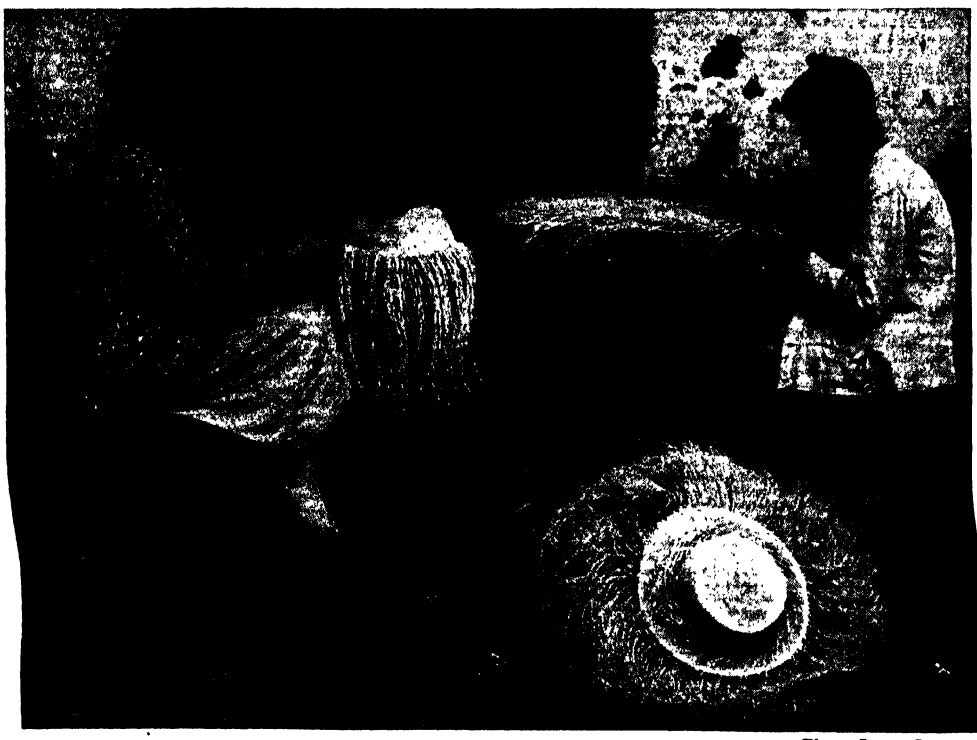
The borders of Ecuador have not been defined, and there is a wide area claimed by both that country and Peru.

The chief agricultural products of Ecuador are cocoa, ivory nuts, rubber, coffee, tobacco, mangrove bark, hat straw and other vegetable crops. The forests are large and minerals in the mountains include gold, quicksilver, lead, iron, copper, emeralds and rubies, salt and petroleum. From Toquilla straw the natives make hats which they call jipi-japa hats, but which we, curiously enough, call Panama hats. They are not made in Panama.

BOLIVIA, AN INLAND STATE IN THE MOUNTAINS

At the conclusion of the War of Independence, Upper Peru, which had been part of the Spanish province of La Plata, elected to separate from Argentina, and took the name of Bolivia, in honor of the Liberator, Simon Bolivar, who drew up the first constitution for the new country. This provided for a President, to be chosen for life. The lot fell to General Sucre, who had helped to secure Bolivia's independence. He, however, accepted the office for only two years, and since then there have been over seventy presidents or dictators. A new constitution, adopted in 1880, gives power to a President elected for four years, and to a Senate and House of Representatives.

The early years of Bolivia, Chile and Peru were not easy. The limits of the Spanish provinces had never been defined properly. The boundaries, therefore, which the republics inherited were very vague, and the want of a definite statement of the territory of each country led to disputes. Bolivia and Chile had such a dispute about forty years after they won independence. The question was settled then by a treaty by which the



Photo, James Sawders

The girls in a small town in Ecuador are weaving hats we know as "Panama" hats. Few are made in Panama, but Panama City has long been an important sales centre for them. The fibre is not straw, but is shredded from the leaves of a shrub, the jipi-japa, or toquilla. A fine hat requires months to complete.



L. Green from Gendreau, N. Y.

An Aymara Indian woman of Bolivia, on her way to market. She is well wrapped against the cold in homespun shawls, but her feet are bare. More than half the people of Bolivia are of pure Indian stock.

boundary line was defined and Chileans were given the right to mine nitrates in the desert of Atacama. Later on a dispute arose over a question of duty to be paid on the nitrates, and the three republics found themselves at war. At the end of it (1884) Bolivia lost all of her coastline, and is now an inland state.

Some years later she had a boundary dispute with Brazil which was settled by Brazil's paying a large sum. In 1932 a serious war with Paraguay began over a territory, mostly swampland, known as the Gran Chaco. The land is not a prize in itself; but through it flows the Paraguay River, part of the great Paraguay-Paraná system which empties into the Atlantic. Possession of the Gran Chaco would thus afford Bolivia a much-needed outlet to the sea. In 1938 settlement was made, giving each country some territory and granting Bolivia the river-rights she so urgently needed. She also uses a northern route to the Atlantic by railway, then down the Madeira and Amazon Rivers in Brazil.

Bolivia's natural wealth lies principally in minerals, and most of the people depend, directly or indirectly, on the mining industries. Tin is most important, accounting for more than 70 per cent of the country's exports. Silver, wolfram, antimony, lead, copper and zinc are also important. Less gold is produced than formerly. A very small quantity of petroleum and small amounts of other minerals are produced, such as mercury, cobalt, mica and sulphur.

Among the crops raised are potatoes, cacao, coffee, barley and rice. The country is second highest in South America in the value of rubber exports. (Brazil comes first.) Sheep, llamas and alpacas, cattle and goats are the chief livestock.

There are 1,400 miles of railway in Bolivia, and over 6,000 miles of highroads and secondary roads. An arm of the Pan-American Highway goes through Bolivia. Airplane service is good. Horses and mules are used to carry travelers through the mountains, and natives, mules and llamas carry freight from place to place. Traffic on Lake Titicaca and on the Bolivian rivers is carried on by steamers.

More than half the population (the total is 3,200,000) is composed of native Indians, and more than a quarter of *mestizos*, the mixed race. The other portion is made up principally of white people.

TWO CITIES OF PERU



© Underwood and Underwood

The fine old cathedral at Lima, begun in 1535 and rebuilt in 1758. Lima was called by Pizarro, its founder, City of the Kings, because the site was chosen on January 6, the Feast of the Magi, or Three Kings from the East.



Courtesy, Grace Line

A street in Cuzco, a city high in the Andes. It was the capital of the ancient Inca Empire.

The mountain Indians are descended from the tribes which were ruled by the Incas. Many of them still live in village communities such as existed in Inca times.

The capital is Sucre, but the actual work of government is carried on at La Paz. The town of Potosi, centre of the silver and tin mines, is the highest town in the world, 14,350 feet above sea level.

PERU, A LAND OF MYSTERIOUS RUINS

Peru is a land of great ruins. When the Spaniards conquered Cuzco and the plateau of Titicaca they found there curious and impressive ruins of forts, cities and temples built of enormous stones. The Incas had a faint tradition that long, long ago their ancestors, the children of the sun, had built these temples and cities. That is all we know about them. The stones used in their construction are immense. The engineering skill and the mason work of the builders were wonderful. No mortar was used to hold the stones together, and yet the walls have stood for untold centuries, and it is impossible to-day to insert the thinnest knife-blade between their joints.

The greatest mystery of all is that at the time these buildings were erected the plateau of Titicaca must have been thickly populated, yet in its present state it will support only a very sparse population. Oca, which is a root something like a potato, grows there, and so does a small grain; but corn will not ripen, nor will any of the cereals introduced by Europeans. How then did a large population live? No one knows; but some students suppose that the mountains may have risen to their present height after the Megalitic, or Great Stone, people had finished their work. Lake Titicaca is 13,861 feet above the sea and is the highest lake in the world. The boundary line between Peru and Bolivia runs through this lake.

Peru was the last of the Spanish provinces to obtain independence. Whether the majority of the people wished it or not, they had no opportunity to throw off the yoke, for the country was the centre of Spanish power, and freedom had to be brought to them from without. It was plain, of course, that as long as the Spaniards had a foothold in the country they would make efforts to regain the territory they had lost. Therefore San Martin, the Argentine leader, and the navy of Chile under Lord Cochrane, an English officer, invaded Peru. The army of Colombia, under Simon Bolivar, also gave help. Then the Spanish forces were defeated, and Peru became independent (1824).

The early years of the new republic were troubled by war with Chile, and by disorders within the country. Among the men who were for a time rulers was a descendant of the Incas named Santa Cruz, who sought to make the country prosperous, and endeavored to unite Bolivia and Peru into something like the old Inca empire.

On the whole, however, the government of Peru had been quite peaceful. From 1845 to 1879 was practically a period of peace. In the early part of this period the country prospered, but later too much money was spent on public works, and the government became almost bankrupt, in spite of large sums of money made from the deposits of nitrate and guano in the coastal desert and on the islands. These valuable deposits led to a disastrous war with Chile. This broke out in 1879. The fleet which Peru had been building up was destroyed, the Peruvian armies were defeated, and Lima, the capital, with Callao, its port, were occupied by the Chileans. When peace was made in 1883,



Courtesy, Grace Line

A boat of woven reeds on Lake Titicaca which is in both Peru and Bolivia.



Courtesy, Grace Line

High in the Andes, near the old Inca capital of Cuzco, was an old fortified city, Machu Picchu, whose age no one knows. Its ruins are massive, and made of enormous stones fitted perfectly together, as you can see.

Chile was able to keep possession of the nitrate coast of Peru, as well as the coast provinces which she had taken from Bolivia.

The coast of Peru lies in the dry belt. Much of it is desert, but there are many fertile valleys, and irrigation has opened up to farming more than 62,000 acres of the dry lands. Cotton, sugar and coffee are the chief crops. Hides and skins are important products (from cattle, llamas, alpacas and sheep). There are rubber plantations and silk culture is being developed.

As you might expect, Peru is rich in minerals. Copper, petroleum, silver, gold and lead are secured. Guano deposits (for fertilizer) are found on near-by islands. On the eastern sides of the mountains Peru owns rich forest land.

Most of the people of the country live in the high, cool valleys between the mountain ranges, where the ancient inhabitants built aqueducts and made terraced fields and gardens on the steep mountainsides.

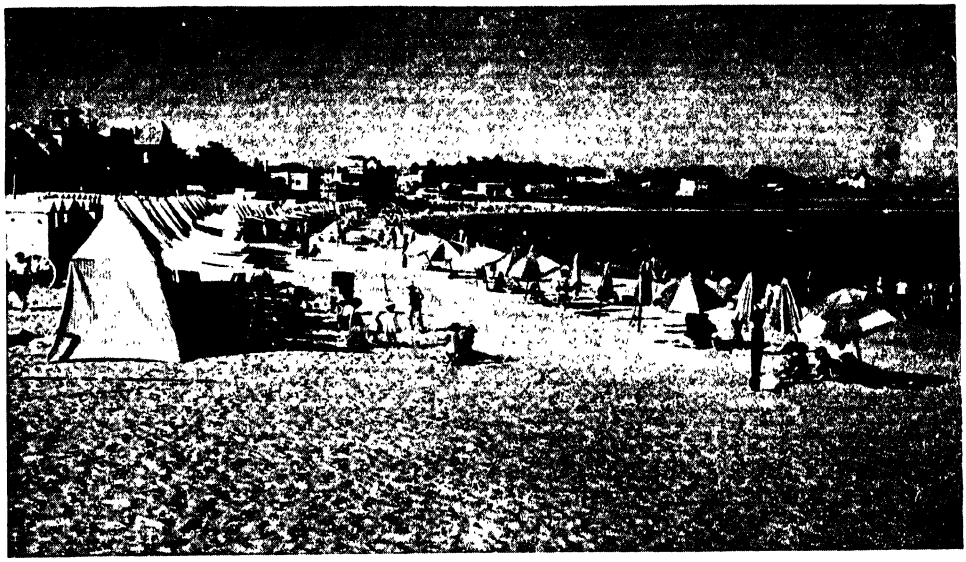
More than half the people of Peru are Indians, and nearly a fourth of mixed race, so you see that less than a fourth are of pure European descent. There are a few Negroes, but not many. Many of the Indians tend their flocks of llamas high up on the mountainsides.

The population is 6,500,000. Lima, the capital, has 370,000 inhabitants; the port city of Callao has 75,000; Arequipa, 46,000; Cuzco, 40,000; Iquitos, 40,000; Chiclayo, 35,000 and Trujillo, 30,000.

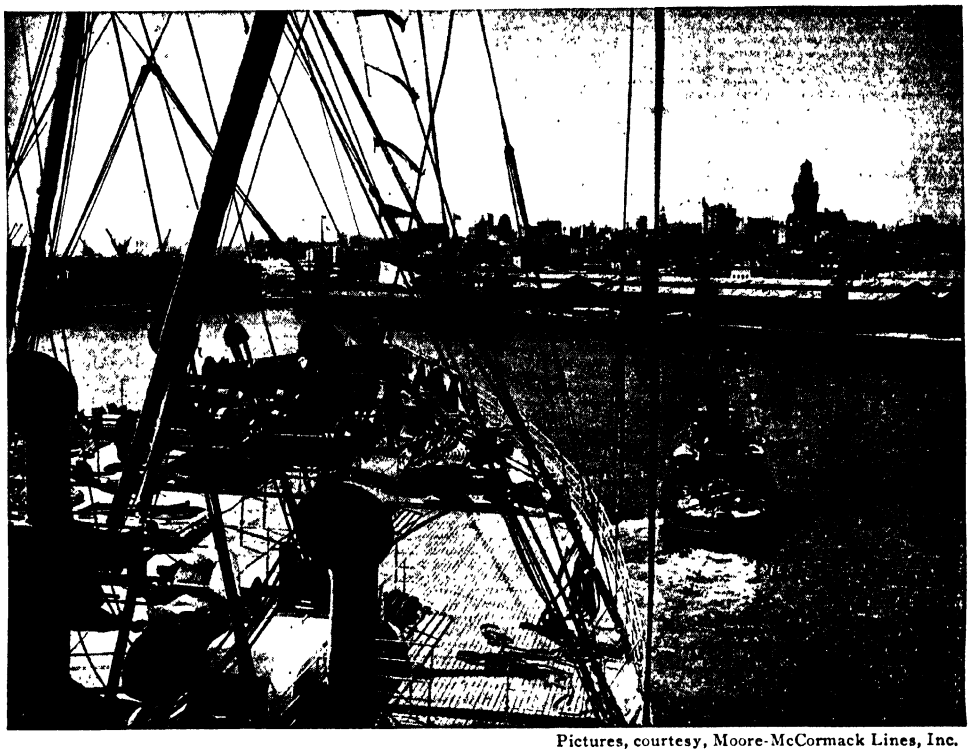
There are around 3,000 miles of railways in the country. You can go by train from the coast to Lake Titicaca, and sail down the lake in a steamboat, while from its decks you watch the Indians sail along the shores in their reed boats called *balsas*. Another branch of the same railway will bring you to the great copper-mines or to Cuzco, the ancient Inca capital. There are other railways, and more than 13,000 miles of highways, and excellent air service for mail and passengers.

Some of the eastern commerce reaches the Atlantic Ocean by a slow route down the great Amazon waterway. All the rubber from the lowland forests comes to us in this way. Steamships can sail up from the ocean

IN MONTEVIDEO BY THE SEA



The sands at Pocitos Beach, pleasure-resort of Montevideo, capital of Uruguay. The city almost tripled its population in the last fifty years. It now has more than 682,000 inhabitants.



Pictures, courtesy, Moore-McCormack Lines, Inc.

Montevideo is on the northern coast of the mouth of the Rio de la Plata (the River Plata). Across the river, and a little farther north, is Buenos Aires, capital of Argentina. Above is a harbor scene at Montevideo.



Courtesy, Paraguayan Consul General, New York

Paraguay's capital is Asunción, with a population of 107,000. It is beautifully and healthfully situated on a bluff high above the Paraguay River. The picture shows El Oratorio, memorial to Paraguayan heroes.

up the Amazon as far as Iquitos, and smaller boats go a long way up the rivers into the mountain valleys.

URUGUAY HAS BECOME A PROSPEROUS COUNTRY

The story of Uruguay is bound closely to the story of Brazil and Argentina, as each of these great republics sought to make the little state part of its territory.

At one time Brazil succeeded in conquering Uruguay; but in a few years the Uruguayans regained their independence. The country is now a prosperous modern state, though the area is only 72,153 square miles and the population only 2,093,331.

Most of the land is given up to grazing. There are more than 8,000,000 cattle and about 18,000,000 sheep. Cereal crops and fruit are raised. There are minerals in the country, which will doubtless be developed.

Education is not only compulsory but well enforced and effective. The schools of Montevideo are especially fine.

The *gauchos* (cowboys) are numerous; they are *mestizos*—a name that applies to those who are of mixed Spanish and Indian descent. The Indian tribes were practically exterminated in a war in which they sought to drive out the Spanish invaders. There has been a good deal of immigration into the state, chiefly from Italy, Brazil and Argentina.

PARAGUAY, THE INDIAN REPUBLIC

The story of Paraguay is a tragic one. The population was formerly composed of Indians of the Guarani tribes, who, when the Spanish entered the country, had already learned the simple forms of cultivation. They were a peaceable people and easily conquered. The Jesuit missionaries, from 1610 to 1769, taught the people many things, including better farming. After the country became independent, these simple Indians were easily dominated by the white inhabitants, and for about fifty years the land was ruled by dictators. The first of these, José Francia, who ruled for nearly thirty years (1810-1840), literally turned the country into a "hermit land." None of the inhabitants were permitted to leave. No foreigners were allowed to enter.

He was succeeded by Carlos Antonio Lopez, who changed Francia's plans, tried to establish commerce, and began to build railways. Under his rule the country began to gain in prosperity. He was succeeded in power by his son, whose mind was filled with wild ambitions. In an endeavor to carry them out he began a war with Brazil, Argentina and Uruguay, which ended only with his death in 1870. There have been several revolutions since. In 1932 a desperate war with Bolivia began, over possession of the Chaco.

Like Bolivia, Paraguay is an inland state. The Paraná River is its highway to the sea. The principal products are livestock, tannin (from the bark of the quebracho tree), *petitgrain* (an essence from bitter orange leaves, used in perfumes) and *yerba maté* or Paraguay tea, tobacco, coffee, sugar, fruits and rice. There are abundant minerals, including iron, manganese and copper, but these have not yet been developed. The chief imports are textiles, foodstuffs, hardware, readymade clothing and hats.

There are around 1,000,000 inhabitants, including about 50,000 Guarani and Chaco Indians.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 7033.



PATTERNS IN VERSE

Illustrated by Elinore Blaisdell

IF you turn the pages of any collection of poems, you will notice how many different patterns the lines and stanzas form. There are some patterns of verse which have proved to be so well suited to the expression of certain kinds of ideas that they have come to be standard verse forms, and almost all poets use them at one time or another.

The simplest, and one of the oldest, of these verse patterns is the ballad stanza. Here is an example from one of the most famous of traditional ballads:

There lived a wife at Usher's Well,
And a wealthy wife was she;
She had three stout and stalwart sons,
And sent them o'er the sea.

As you may see, this is a quatrain, or four-line stanza. The first and third lines are tetrameter, while the second and fourth lines are trimeter, and only the trimeter lines rime. The ballad form is used to tell a simple story, sometimes gay or humorous, but more often sad. Poets often vary this pattern a little, as Keats did in his beautiful LA BELLE DAME SANS MERCI, but it is always easy to recognize the ballad stanza.

Rime royal is an old French stanza pattern, first used in English poetry by Chaucer. It has since been used by many great poets, including Shakespeare. It consists of seven iambic pentameter lines, riming ababbcc. Here is an example from Chaucer's COMPLAINT TO HIS EMPTY PURSE:

To you, my purs, and to non other wight
Compleyne I, for ye be my lady dere!
I am so sory, now that ye be light;
For certes, but ye make me hevy chere,
Me were as leef be leyd upon my bere;
For whiche unto you mercy thus I crye:
Beth hevy ageyn, or elles mot I dye!

Terza rima and ottava rima were introduced into English poetry from the Italian, hundreds of years ago. Terza rima, or triplet rime, has a fascinating rime-scheme. The lines, which are usually about ten syllables long, are grouped in threes, called tercets or triplets. The middle line of the first triplet rimes with the first and third lines of the second triplet, and so on to the end of the poem. These stanzas from Shelley's ODE TO THE WEST WIND show the curious interlinked riming:

O wild West Wind, thou breath of Autumn's being,
Thou, from whose unseen presence the leaves dead
Are driven, like ghosts from an enchanter fleeing,

Yellow, and black, and pale, and hectic red,
Pestilence-stricken multitudes: O thou,
Who chariotest to their dark wintry bed

The winged seeds, where they lie cold and low,
Each like a corpse within its grave, until
Thine azure sister of the Spring shall blow

Her clarion o'er the dreaming earth, and fill
(Driving sweet buds like flocks to feed in air)
With living hues and odors plain and hill:

Ottava rima is an eight-line stanza in iambic pentameter, riming abababcc. Byron used this verse pattern in his DON JUAN, as you will see in the following stanza:

Perhaps you think, in stumbling on this feast,
He flew into a passion, and in fact
There was no mighty reason to be pleased;
Perhaps you prophesy some sudden act,
The whip, the rack, or dungeon at the least,
To teach his people to be more exact,
And that, proceeding at a very high rate,
He showed the royal penchants of a pirate.

You're wrong.—he was the mildest mannered man
That ever scuttled ship or cut a throat

. . . . . .

The Spenserian stanza was named for Edmund Spenser, who used it in THE FAERIE QUEENE and in other poems. It is made up of nine iambic lines, eight of them in pentameter, and the ninth in hexameter. This hexameter line is called an Alexandrine, because it was used in some early French poetry about Alexander the Great. In the Spenserian stanza

the lines rime ababbcbcc. In the following stanza from THE FAERIE QUEENE you will notice the musical flow of the lines, and the curious lift that the longer end-line gives to the verses.

Unto this place whenas the Elfin knight
Approached, him seemèd that the merry sound
Of a shrill pipe he playing heard on height,
And many feet fast thumping th' hollow ground,
That through the woods their echo did rebound.
He nigher drew, to wit what mote it be;
There he a troop of ladies dancing found
Full merrily, and making gladful glee,
And in the midst a shepherd piping he did see.

Byron used the Spenserian stanza in CHILDE HAROLD'S PILGRIMAGE; Keats's EVE OF ST. AGNES and Shelley's ADONAIS were written in it.

The sonnet is another verse form which was adopted into English poetry from the Italian. It is a very strict pattern, and poets find it fascinating to play with, for that reason. It requires both skill and poetic imagination to express thought with beauty and clarity within the rigid limits of the pattern.

THE TWO KINDS OF SONNET IN ENGLISH POETRY

In the English language there are two varieties of sonnet, the Italian, or Petrarchan, and the Shakespearean. Both kinds consist of fourteen iambic pentameter lines. The Italian type, which is more often used, is divided into two stanzas, the octave, with eight lines, and the sestet, with six lines. The lines rime abbaabba cdecde. Richard Watson Gilder wrote a sonnet about the sonnet, and we will give it here because it shows the pattern and explains the nature of this kind of poem.

What is a sonnet? 'Tis the pearly shell
That murmurs of the far-off murmuring sea;
A precious jewel carved most curiously;
It is a little picture painted well.
What is a sonnet? 'Tis the tear that fell
From a great poet's hidden ecstasy;
A two-edged sword, a star, a song—ah me!
Sometimes a heavy-tolling funeral bell.

This was the flame that shook with Dante's breath,
The solemn organ whereon Milton played.
And the clear glass where Shakespeare's shadow falls;
A sea this is,—beware who ventureth!
For like a fiord the narrow floor is laid
Mid-ocean deep sheer to the mountain walls.

The Shakespearean form of the sonnet is divided into four parts, three quatrains and a couplet. The rime-scheme is usually abab cdcd efef gg. This form of the sonnet was invented by the Tudor poet Surrey, but Shakespeare brought it to perfection and so it has been named for him. You will find both kinds of sonnet among the poems in this chapter.

THE ODE CAME TO US FROM GREEK DRAMA

The ode was originally a part of ancient Greek drama, a poem chanted by a chorus and accompanied by dancing. The form has gone through many changes during the centuries, and the most famous odes in English poetry are quite unlike those of ancient Greece. We have three kinds of odes: the Pindaric, which is named after Pindar, one of the greatest of Grecian lyric poets; the free English ode; and the regular stanzaic ode.

The Pindaric ode is very rare in English poetry. Its stanzas follow an exact pattern based on the original Greek form, and it has been used chiefly by poets who were familiar with the language and poetry of ancient Greece. Thomas Gray wrote two famous Pindaric odes, THE PROGRESS OF POESY, and THE BARD. The free English ode has a great variety of line and stanza and rime, and its richness and beauty are limited only by the power of the poet. Wordsworth's ODE ON THE INTIMATIONS OF IMMORTALITY belongs to this type. Keats' ODE TO A NIGHTINGALE is an example of the regular stanzaic ode, in which all the stanzas have the same form.

THE HEROIC COUPLET WAS FAVORED BY EIGHTEENTH-CENTURY POETS

The heroic couplet has been an important verse pattern in English poetry since the time of Chaucer, but it reached its greatest popularity in the eighteenth century, the time of Pope and Goldsmith. Heroic couplets are in iambic pentameter, which is called heroic verse because it is suitable for important, dignified poems about heroes. There are two kinds of heroic couplet. One is called the closed couplet, because each couplet rounds out a sentence, or at least a complete thought, as in the following lines from Pope's ESSAY ON CRITICISM:

True wit is nature to advantage dressed;
What oft was thought, but ne'er so well expressed.

The other type of couplet is called the run-on couplet, because the sense of the lines may run on without regard for the rime endings. These lines from ENDYMION, by Keats, show how one thought may be completed in the

first line of the couplet and a new thought may begin in the second.

A thing of beauty is a joy forever:
Its loveliness increases; it will never
Pass into nothingness; but still will keep
A bower quiet for us, and a sleep
Full of sweet dreams, and health, and quiet
breathing.

Long poems made of heroic couplets may become very tiresome to read unless the poet is exceptionally skilled in his craft.

THE VILLANELLE, THE TRIOLET AND THE RONDEAU

There are several charming verse patterns which are sometimes used for short lyrics. Most of them have been borrowed from the French, and among the most interesting are the villanelle, the triolet and the rondeau. A villanelle has nineteen lines, grouped in tercets, or three-line stanzas, except for the last stanza, which is a quatrain. Only two rimes are used throughout the verses. The first and third lines of the first stanza are used in turn as the last line of each of the other stanzas, both being used at the end of the last, or four-line, stanza. Edwin Arlington Robinson's THE HOUSE ON THE HILL is a fine example of a villanelle. You will find it among the poems in this chapter. You will also find a triolet, URCEUS EXIT, and a rondeau, IN AFTER DAYS, both by Austin Dobson.

A triolet is a single stanza of eight lines using only two rimes. The first line is repeated as the fourth and seventh, and the second line is repeated as the eighth. A rondeau is usually made up of thirteen lines with only two rimes. There are three stanzas, the first and last having five lines and the middle one three lines. The opening words of the first line of the poem are repeated after the other two stanzas in a sort of refrain.

HEROIC BLANK VERSE WAS USED BY SHAKESPEARE IN HIS PLAYS

You have probably noticed that not all poetry has rime or metre. A most important type of verse, which has metre but no rime, is heroic blank verse. This is the verse in which most of the great dramatic and epic poetry of the English language is written. Shakespeare's plays, Milton's PARADISE LOST, Tennyson's ULYSSES and the IDYLLS OF THE KING are all written in blank verse, and so are some of the noblest works of Shelley, Wordsworth and Browning.

Heroic blank verse is iambic pentameter; but there are three distinct types of line ending which you will find in poems written in this verse form. The first type is sometimes called end-stopped blank verse because the sense of each line comes to a pause at the end of the metre, as in these lines from Marlowe's TAMBURLAINE THE GREAT:

"And ride in triumph through Persepolis!"
Is it not brave to be a king, Techelles?
Is it not passing brave to be a king
And ride in triumph through Persepolis?

Just as with end-stopped couplets, this regularity of pause is sometimes a little tiresome to read. Run-on blank verse allows more freedom and variety, as you may see in Cardinal Wolsey's thrilling lament in Shakespeare's HENRY VIII:

Farewell, a long farewell, to all my greatness!
This is the state of man: today he puts forth
The tender leaves of hope; tomorrow blossoms,
And bears his blushing honors thick upon him;
The third day comes a frost, a killing frost,
And—when he thinks, good easy man, full surely
His greatness is a-ripening—nips his root,
And then he falls, as I do.

The third kind of blank verse is almost like prose, the metre and rhythm are so broken up, and the endings slurred or chopped off. Shakespeare uses this kind of blank verse quite often in his later plays, such as THE TEMPEST, usually where a conversation is going on between two or more people. It does have metre, however, so it is genuine blank verse.

MUCH MODERN POETRY IS WRITTEN IN FREE VERSE

Free verse is verse without metre, and in most instances without rime. Most of the poetic forms in our language are old. Poets have used them for hundreds of years. Free verse, in English, received very little notice until the nineteenth century, when a few writers experimented with it. For years it was not well received, but since about 1910 it has been an accepted verse form. Some free verse is difficult to tell from prose except for the way the lines are arranged on the printed page, but the arrangement of the lines is a guide to the way they should be read. You may see this quite clearly in Carl Sandburg's delightful poem THE FOG:

The fog comes
on little cat feet.

It sits looking
over harbor and city
on silent haunches
and then moves on.

There is a certain rhythm in most free verse, but it is not so clear as the rhythm of metrical verse.

Besides modern free verse there are other examples of irregular rhythm which are more musical in their effect upon the ear. Such are the translations of ancient Oriental poetry, especially the poetry in the Bible; that is, the PSALMS, THE SONG OF SONGS, ECCLESIASTES, PROVERBS and JOB. We know that the PSALMS were originally intended to be sung or chanted to music, and one can not read them without hearing the rise and fall of their musical rhythm. A beautiful example is PSALM 137:

By the rivers of Babylon,
There we sat down, yea, we wept,
When we remembered Zion.
We hanged our harps upon the willows
In the midst thereof.
For they that carried us away captive
Required of us mirth,
Saying, "Sing us one of the songs of Zion."
How shall we sing the Lord's song
In a strange land?
If I forget thee, O Jerusalem,
Let my right hand forget her cunning.
If I do not remember thee,
Let my tongue cleave to the roof of my mouth;
If I prefer not Jerusalem above my chief joy.

The verse of Walt Whitman, one of the greatest of American poets, was a tremendous influence in the freeing of English poetry from a too strict adherence to the old forms. You will find some of his poems in THE BOOK OF KNOWLEDGE. Read them aloud, and you will feel almost like singing or even shouting some of the lines.

There are many poets who prefer always to write according to the rules of metre and rime. There are others who write entirely in free verse. Most poets, however, like to use whichever form best suits the particular thought or mood that they wish to express. Any boy or girl who wants to write verses would be wise to study and practice all of the rules and forms of poetry. The more exacting forms, besides the fun they bring, give sureness and skill that is a great help when you turn to the freer forms. Metre and rime can not make a poem all by themselves, but they help. Really fine free verse is not easy to write. It is rather like learning to play the violin, which has no marks to show where to find the different notes on the strings.

On the following pages you will find poems that illustrate the forms that we have told about in this chapter, and there are many more in other parts of THE BOOK OF KNOWLEDGE. If you look for the rime and metre and the other characteristics we have discussed, poetry will have added interest.



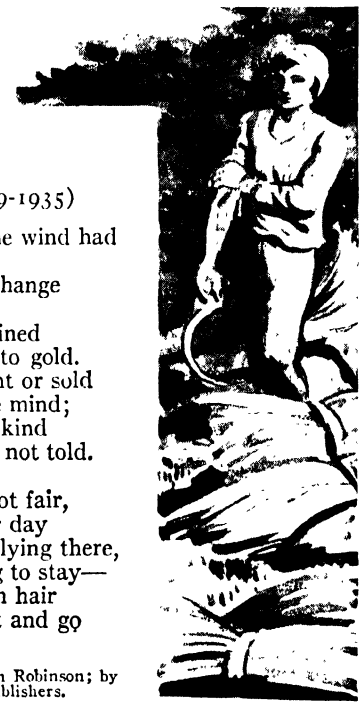
The Sheaves*

By EDWIN A. ROBINSON (1869-1935)

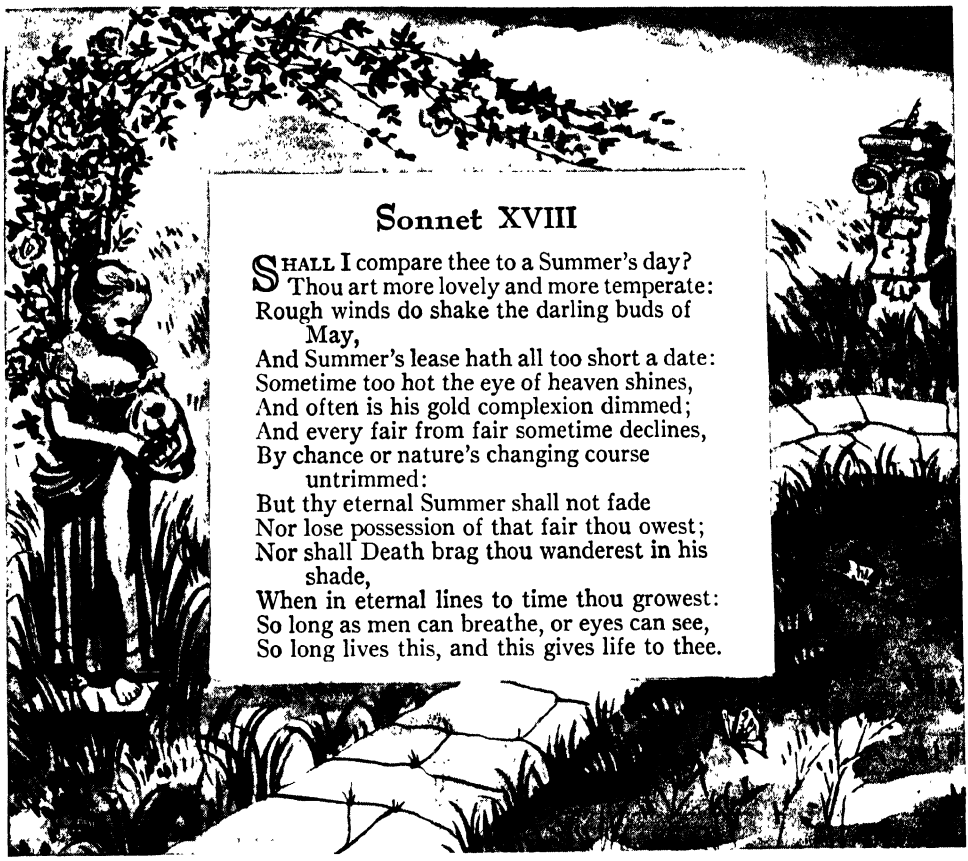
WHERE long the shadows of the wind had rolled,
Green wheat was yielding to the change assigned;
And as by some vast magic undivined
The world was turning slowly into gold.
Like nothing that was ever bought or sold
It waited there, the body and the mind;
And with a mighty meaning of a kind
That tells the more the more it is not told.

So in a land where all days are not fair,
Fair days went on till on another day
A thousand golden sheaves were lying there,
Shining and still, but not for long to stay—
As if a thousand girls with golden hair
Might rise from where they slept and go away.

*From Collected Poems of Edwin Arlington Robinson; by permission of The Macmillan Company, publishers.



THREE SONNETS BY SHAKESPEARE



Sonnet XVIII

SHALL I compare thee to a Summer's day?
Thou art more lovely and more temperate:
Rough winds do shake the darling buds of
May,
And Summer's lease hath all too short a date:
Sometime too hot the eye of heaven shines,
And often is his gold complexion dimmed;
And every fair from fair sometime declines,
By chance or nature's changing course
untrimmed:
But thy eternal Summer shall not fade
Nor lose possession of that fair thou owest;
Nor shall Death brag thou wanderest in his
shade,
When in eternal lines to time thou growest:
So long as men can breathe, or eyes can see,
So long lives this, and this gives life to thee.

XXX

WHEN to the sessions of sweet silent
thought
I summon up remembrance of things past,
I sigh the lack of many a thing I sought,
And with old woes new wail my dear time's
waste:
Then can I drown an eye, unused to flow,
For precious friends hid in death's dateless
night,
And weep afresh love's long-since cancelled
woe,
And moan the expense of many a vanished
sight:
Then can I grieve at grievances foregone,
And heavily from woe to woe tell o'er
The sad account of fore-bemoanèd moan,
Which I new pay as if not paid before:
But if the while I think on thee, dear
friend,
All losses are restored, and sorrows end.

LXXI

NO longer mourn for me when I am dead
Than you shall hear the surly sullen
bell
Give warning to the world that I am fled
From this vile world, with vilest worms to
dwell:
Nay, if you read this line, remember not
The hand that writ it, for I love you so
That I in your sweet thoughts would be
forgot,
If thinking on me then should make you
woe.
Oh, if, I say, you look upon this verse
When I perhaps compounded am with
clay,
Do not so much as my poor name rehearse,
But let your love even with my life decay;
Lest the wise world should look into your
moan,
And mock you with me after I am gone.

On First Looking into Chapman's Homer

By JOHN KEATS (1795-1821)

MUCH have I travell'd in the realms of gold,
And many goodly states and kingdoms seen;
Round many western islands have I been
Which bards in fealty to Apollo hold.
Oft of one wide expanse had I been told
That deep-browed Homer ruled as his demesne:
Yet did I never breathe its pure serene
Till I heard Chapman speak out loud and bold.

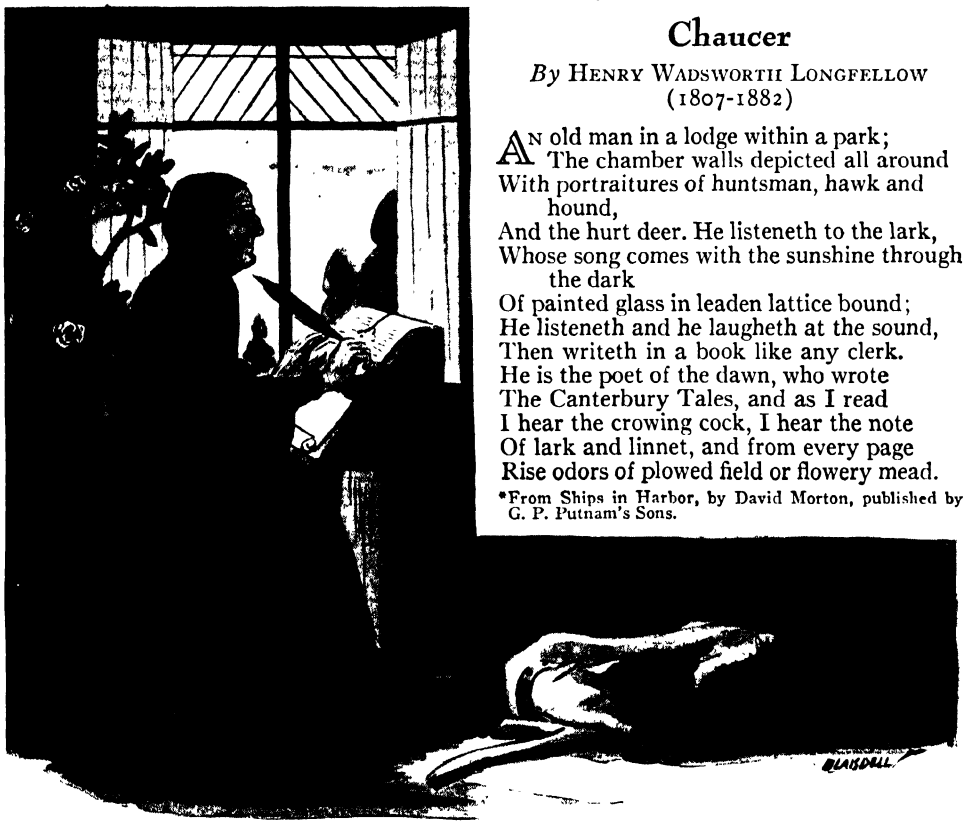
Then felt I like some watcher of the skies
When a new planet swims into his ken;
Or like stout Cortez when with eagle eyes
He stared at the Pacific—and all his men
Looked at each other with a wild surmise—
Silent, upon a peak in Darien.

The School-Boy Reads His Iliad*

By DAVID MORTON (1886-)

THE sounding battles leave him nodding still:
The din of javelins at the distant wall
Is far too faint to wake that weary will
That all but sleeps for cities where they fall.
He cares not if this Helen's face were fair,
Nor if the thousand ships shall go or stay;
In vain the rumbling chariots throng the air
With sounds the centuries shall not hush away.

Beyond the window where the Spring is new,
Are marbles in a square, and tops again,
And floating voices tell him what they do,
Luring his thought from these long-warring men,—
And though the camp be visited with gods,
He dreams of marbles and of tops, and nods.



Chaucer

By HENRY WADSWORTH LONGFELLOW (1807-1882)

AN old man in a lodge within a park;
The chamber walls depicted all around
With portraitures of huntsman, hawk and hound,
And the hurt deer. He listeneth to the lark,
Whose song comes with the sunshine through the dark
Of painted glass in leaden lattice bound;
He listeneth and he laugheth at the sound,
Then writeth in a book like any clerk.
He is the poet of the dawn, who wrote
The Canterbury Tales, and as I read
I hear the crowing cock, I hear the note
Of lark and linnet, and from every page
Rise odors of plowed field or flowery mead.

*From Ships in Harbor, by David Morton, published by G. P. Putnam's Sons.

Death, Be Not Proud

By JOHN DONNE (1573-1631)

DEATH, be not proud, though some have
called thee
Mighty and dreadful, for thou are not so;
For those whom thou think'st thou dost
overthrow
Die not, poor Death; nor yet canst thou
kill me.
From rest and sleep, which but thy picture be,
Much pleasure; then from thee much more
must flow;
And soonest our best men with thee do go—
Rest of their bones and souls' delivery!
Thou'rt slave to fate, chance, kings, and
desperate men,
And dost with poison, war, and sickness
dwell;
And poppy or charms can make us sleep as
well
And better than thy stroke. Why swell'st
thou then?
One short sleep past, we wake eternally,
And Death shall be no more: Death, thou
shalt die.

On the Grasshopper and Cricket

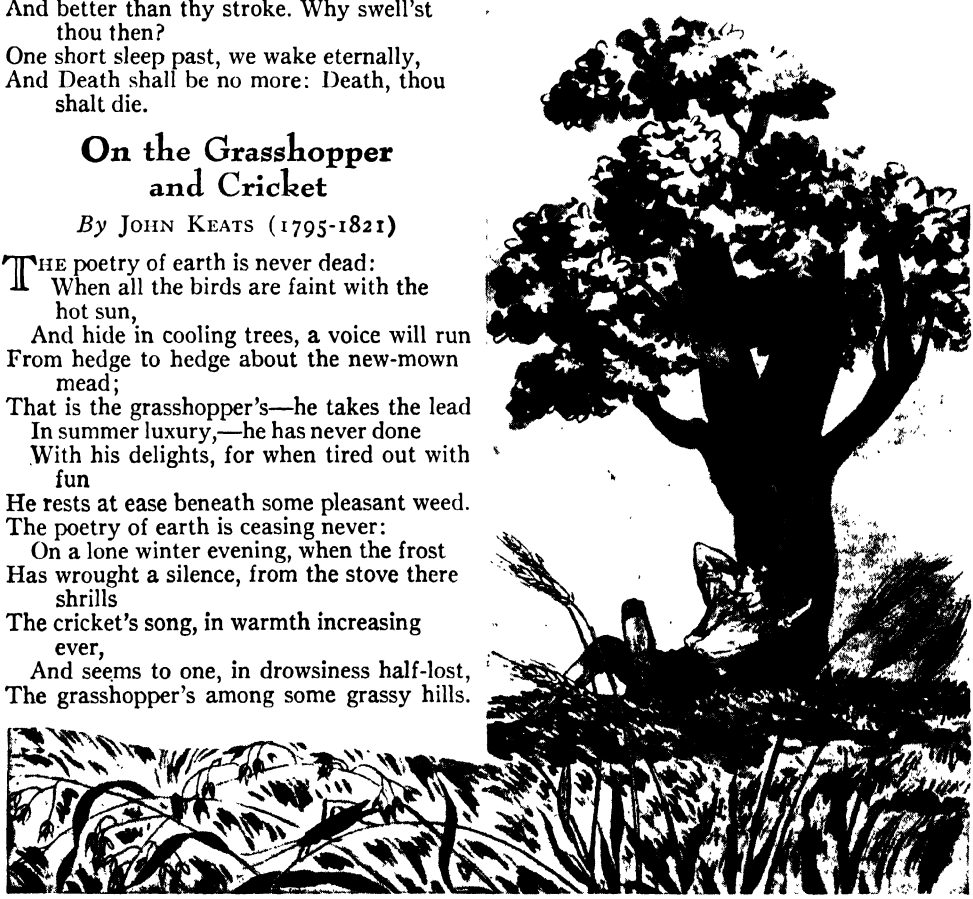
By JOHN KEATS (1795-1821)

THE poetry of earth is never dead:
When all the birds are faint with the
hot sun,
And hide in cooling trees, a voice will run
From hedge to hedge about the new-mown
mead;
That is the grasshopper's—he takes the lead
In summer luxury,—he has never done
With his delights, for when tired out with
fun
He rests at ease beneath some pleasant weed.
The poetry of earth is ceasing never:
On a lone winter evening, when the frost
Has wrought a silence, from the stove there
shrills
The cricket's song, in warmth increasing
ever,
And seems to one, in drowsiness half-lost,
The grasshopper's among some grassy hills.

Lucifer in Starlight

By GEORGE MEREDITH (1828-1909)

ON a starred night Prince Lucifer uprose.
Tired of his dark dominion swung the
fiend
Above the rolling ball in cloud part screened,
Where sinners hugged their spectre of repose.
Poor prey to his hot fit of pride were those.
And now upon his western wing he leaned,
Now his huge bulk o'er Afric's sands careened,
Now the black planet shadowed Arctic snows.
Soaring through wider zones that pricked his
scars
With memory of the old revolt from Awe,
He reached a middle height, and at the stars,
Which are the brain of heaven, he looked,
and sank.
Around the ancient track marched, rank on
rank,
The army of unalterable law.



The House on the Hill

By EDWIN ARLINGTON ROBINSON
(1869-1935)

THEY are all gone away,
The House is shut and still,
There is nothing more to say.

Through broken walls and gray
The winds blow bleak and shrill:
They are all gone away.

Nor is one there today
To speak them good or ill:
There is nothing more to say.

Why is it then we stray,
Around that sunken sill?
They are all gone away,

And our poor fancy-play
For them is wasted skill:
There is nothing more to say.

There is ruin and decay
In the House on the Hill:
They are all gone away,
There is nothing more to say.

Urceus Exit

By AUSTIN DOBSON (1840-1921)

I INTENDED an Ode,
And it turned to a Sonnet.
It began à la mode,
I intended an Ode;
But Rose crossed the road
In her latest new bonnet;
I intended an Ode;
And it turned to a Sonnet.

In After Days

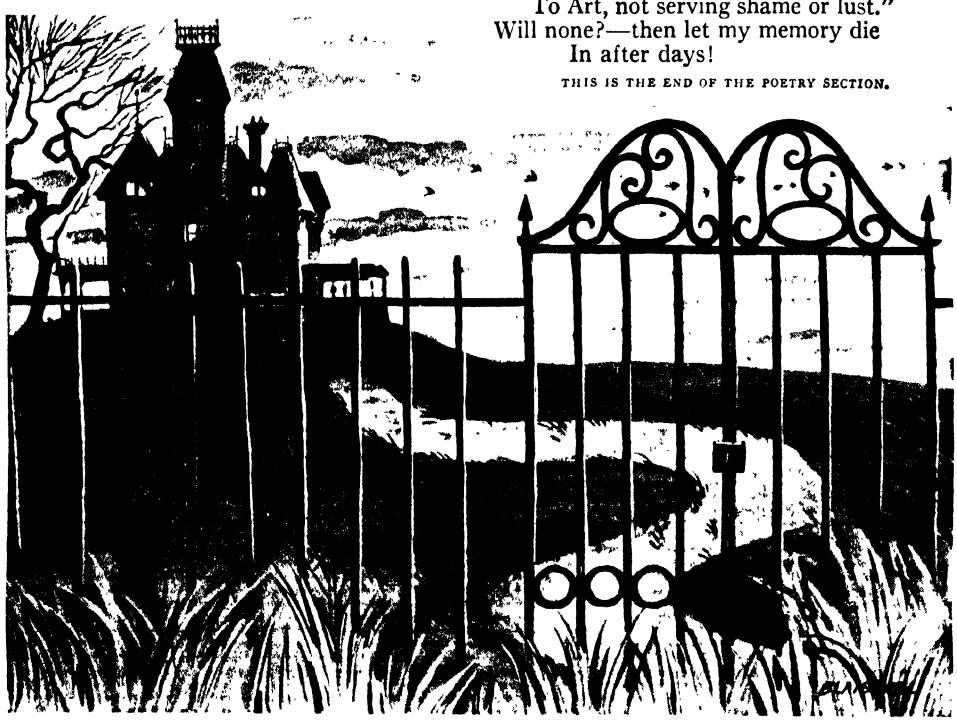
By AUSTIN DOBSON (1840-1921)

IN after days, when grasses high
O'er-top the stone where I shall lie,
Though ill or well the world adjust
My slender claim to honored dust,
I shall not question or reply.

I shall not see the morning sky;
I shall not hear the night-wind sigh;
I shall be mute, as all men must
In after days!

But yet, now living, fain would I
That someone then should testify,
Saying, "He held his pen in trust
To Art, not serving shame or lust."
Will none?—then let my memory die
In after days!

THIS IS THE END OF THE POETRY SECTION.









Here's a poor widow from Babylon
With six poor Children all alone;
One can bake and One can brew,
One can shape and One can sew,
One can sit by the fire and spin,
One can bake a cake for a King.
Come choose you East,
come choose you West,
Come choose you the One
that you love the best.





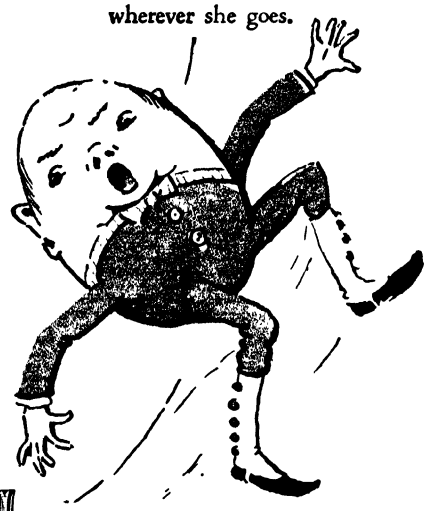








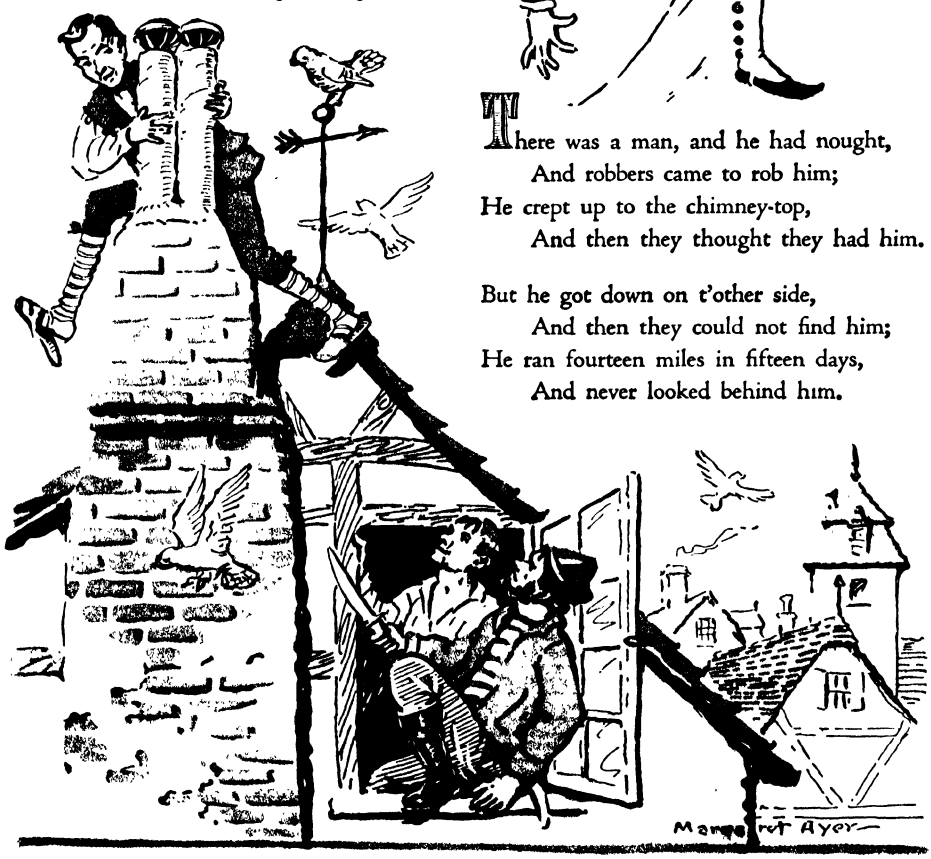
Ride a cock-horse to Banbury Cross,
To see a fine lady
ride on a white horse.
With rings on her fingers
and bells on her toes,
She shall have music
wherever she goes.



Humpty Dumpty sat on a wall
Humpty Dumpty had a great fall
All the king's horses and all the king's men
Couldn't put Humpty Dumpty
together again.

There was a man, and he had nought,
And robbers came to rob him;
He crept up to the chimney-top,
And then they thought they had him.

But he got down on t'other side,
And then they could not find him;
He ran fourteen miles in fifteen days,
And never looked behind him.





When good King Arthur ruled this land,
He was a goodly king;
He stole three pecks of barley meal,
To make a bag pudding.

A rare pudding the King did make,
And stuffed it well with plums;
And in it put such lumps of fat,
As big as my two thumbs.

The King and Queen did eat thereof,
And noblemen beside;
And what they could not eat that night,
The Queen next morning fried.

O DEAR, WHAT CAN THE MATTER BE?

O dear, what can the matter be?
O dear, what can the matter be?
Johnnie's so long at the fair.

He promised to buy me a bunch of blue ribbon,
He promised to buy me a bunch of blue ribbon,
He promised to buy me a bunch of blue ribbon,
To tie up my bonnie brown hair.

O dear, what can the matter be?
O dear, what can the matter be?
O dear, what can the matter be?
Johnnie's so long at the fair.

He promised to bring me a basket of posies,
A garland of lilies, a garland of roses,
A little straw hat, to set off the blue ribbons
That tie up my bonnie brown hair.

O dear, what can the matter be?
O dear, what can the matter be?
O dear, what can the matter be?
JOHNNIE'S SO LONG AT THE FAIR.



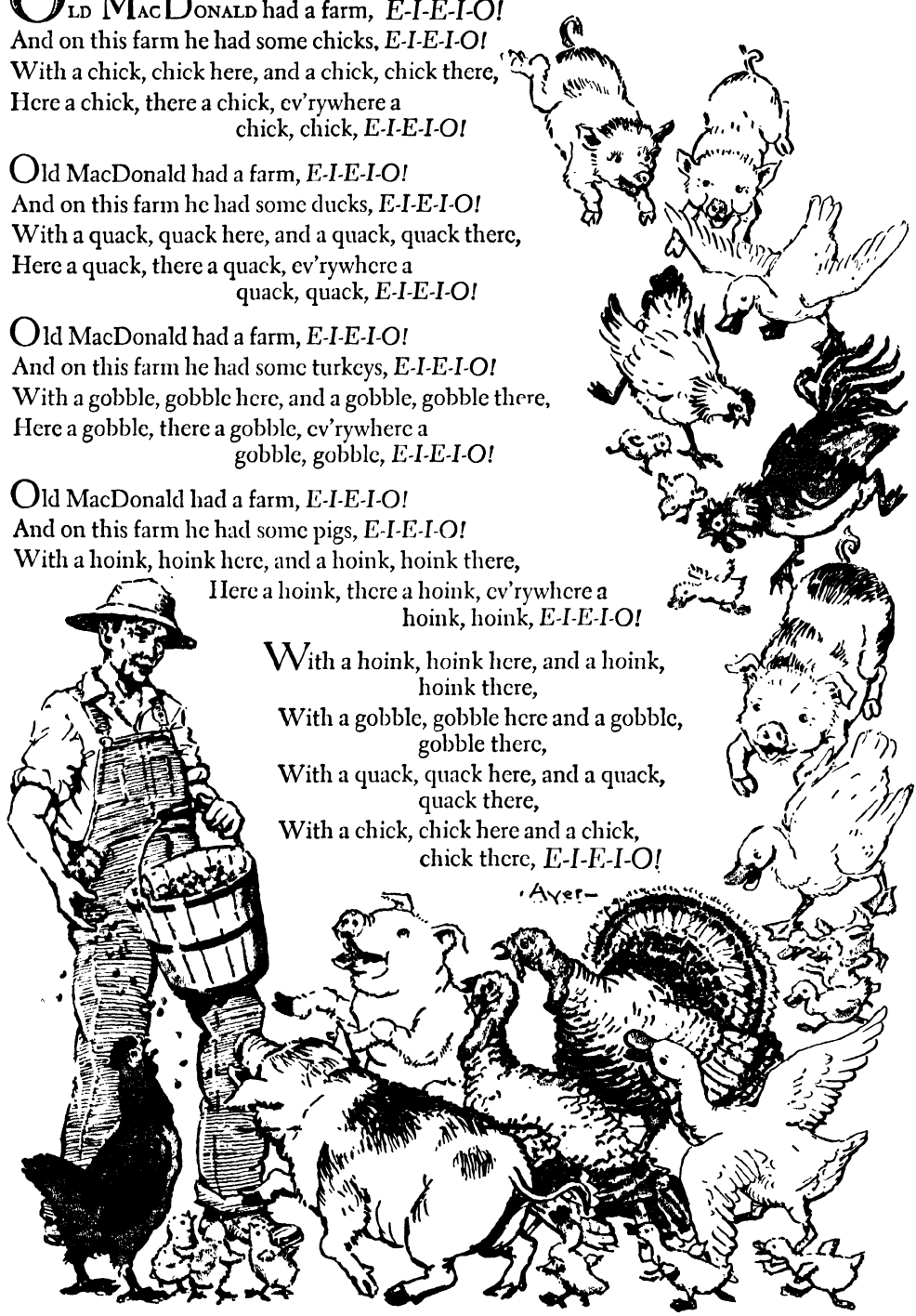
Old MacDonald had a farm, *E-I-E-I-O!*
And on this farm he had some chicks, *E-I-E-I-O!*
With a chick, chick here, and a chick, chick there,
Here a chick, there a chick, ev'rywhere a
chick, chick, *E-I-E-I-O!*

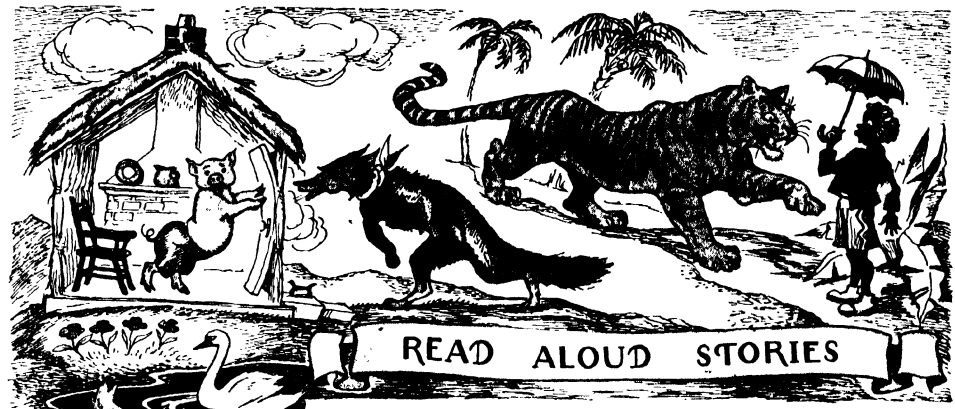
Old MacDonald had a farm, *E-I-E-I-O!*
And on this farm he had some ducks, *E-I-E-I-O!*
With a quack, quack here, and a quack, quack there,
Here a quack, there a quack, ev'rywhere a
quack, quack, *E-I-E-I-O!*

Old MacDonald had a farm, *E-I-E-I-O!*
And on this farm he had some turkeys, *E-I-E-I-O!*
With a gobble, gobble here, and a gobble, gobble there,
Here a gobble, there a gobble, ev'rywhere a
gobble, gobble, *E-I-E-I-O!*

Old MacDonald had a farm, *E-I-E-I-O!*
And on this farm he had some pigs, *E-I-E-I-O!*
With a hoink, hoink here, and a hoink, hoink there,
Here a hoink, there a hoink, ev'rywhere a
hoink, hoink, *E-I-E-I-O!*

With a hoink, hoink here, and a hoink,
hoink there,
With a gobble, gobble here and a gobble,
gobble there,
With a quack, quack here, and a quack,
quack there,
With a chick, chick here and a chick,
chick there, *E-I-E-I-O!*





The Fisherman and His Wife

(This is a folk tale from the collection of the Brothers Grimm. The verse used in summoning the fish is different in each translation; the one used here is that of Taylor's first edition, of 1823.)

THERE was once a fisherman who lived with his wife in a little hut near the sea, and every day he went a-fishing. One day, as he sat on the shore watching his line, all on a sudden his float was dragged away deep under the sea, and in drawing it up he pulled a great flounder out of the water. The flounder said to him: "Pray let me live. I am not a real fish; I am an enchanted prince. Put me in the water again and let me go."

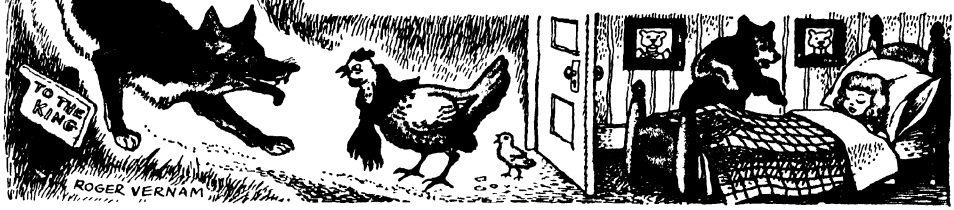
"Oh," said the man, "you need not make so many words about it. A flounder that can speak I would rather let swim." So saying, he put the fish into the water, and as it sank to the bottom it left a long streak of blood behind it. Then the fisherman went back to his wife in the hut.

"Have you caught nothing to-day, husband?" said she.

"I caught a flounder," he replied, "but he said he was an enchanted prince, so I threw him back into the sea, for surely he would not have tasted well."

"Mercy on us!" his wife cried. "And did you not ask him for something before you let him go? You are, in truth, a great ninny. Go catch him again quickly, and before you let him swim away, ask him for a cottage, for I am weary of living in this miserable hut."

The man was not much pleased, but he went down to the sea.





The wife said: "Husband, the cottage and garden are too small."

The water was green and yellow; it frightened him a little, but he stood by it and said:

"Oh, man of the sea, come listen to me,
For Alice, my wife, the plague of my life,
Hath sent me to beg a boon of thee!"

Then the flounder came swimming up and said, "What do you want of me?"

"My wife says I ought to have wished before. She won't stay any longer in her hut and desires a cottage," said the man.

"Go home," said the flounder. "She has it already."

The fisherman went home, and there was his wife sitting on a bench before a cottage. She took him by the hand, saying: "See! Isn't this much better?"

They went inside, and there was a beautiful parlor and a fine fireplace, and a bedroom and kitchen, with many dishes and silverware and copper pans, with everything clean and neat. In the back was a large yard, with hens and chickens, as well as a garden full of fruit trees and vegetables.

"Now we shall be quite content," the fisherman said.

"We will think about that," his wife replied.

Two weeks passed; than the wife said: "Husband, the cottage and garden are too small. Go to the flounder and ask him to give us a castle."

"Nay, wife," he said. "The flounder gave us the cottage at first, but if I go again he will be angry."

"My mind is made up," said the wife. "I shall not be content until I have a castle. Go and try."

Then was the fisherman greatly worried. He said to himself, "This is not right." But at last he set off.

When he came to the sea, the water was clouded and looked black and thick, yet it was quite calm. So he said:

"Oh, man of the sea, come listen to me,
For Alice, my wife, the plague of my life,
Hath sent me to beg a boon of thee!"

"Now what does she want?" said the flounder.

"She wants to live in a great stone castle," said the man, half frightened.

"Go home," said the flounder. "She is already living there."

The fisherman went home, and lo! where formerly the cottage stood, there was a great stone castle, and his wife called to him from the steps to come in. They walked inside together, and there the fisherman saw a great hall, and many servants came to show them through the rooms filled with golden chairs, and mirrors on the walls and pictures; and there was a banquet hall and a ballroom and many bedrooms. Outside, there were stables and a beautiful garden, and a meadow full a mile long covered with deer and oxen and sheep, as many as one could wish for.

"Ah," said the fisherman, "we should be content here!"

"We will think about that," said his wife.

The next morning, the wife woke up just as it was day, and looked over the fine country which lay before her. She nudged her husband and cried: "Get up, and look out here at the window. See, shall I not be queen over all the land? Go and tell the flounder we wish

to be King and Queen."

"I do not wish to be King," the man said.

"But I wish to be Queen," the wife said. "Go at once and tell the flounder I must be Queen of all this land."



The fisherman set out, shaking his head, his heart heavy. When he came to the sea, it was black and the water splashed up and smelled very bad. The fisherman's voice trembled when he said:

"Oh, man of the sea, come listen to me!
For Alice, my wife, the plague of my life,
Hath sent me to beg a boon of thee!"

"Now what does she want?" asked the flounder.

"She would be Queen!"

"Go home," said the flounder. "She is that already."

So the man went home, and when he came near the castle, he saw that it had become a palace, with a great tower and a gateway in front, and before the gate there were soldiers with trumpets. When he came into the palace, he found everything made of purest marble and gold. The great hall was hung with curtains fringed with gold, and he went on to a courtroom as large as a park where he found his wife sitting upon a high throne dressed in spun gold and ermine, with a crown of diamonds upon her head and a sceptre of precious stones in her hand. He stood looking at her for a long time, and at last he said: "You are Queen, indeed! Now we have nothing left to wish for."

"What are you saying?" replied his wife crossly. "I find that the Pope is greater than the Queen. Go at once to the flounder and tell him I must be Pope."

"Now this you can not be," said the fisherman. "There is but one Pope who is the head of Christendom, and the flounder can not make you that.

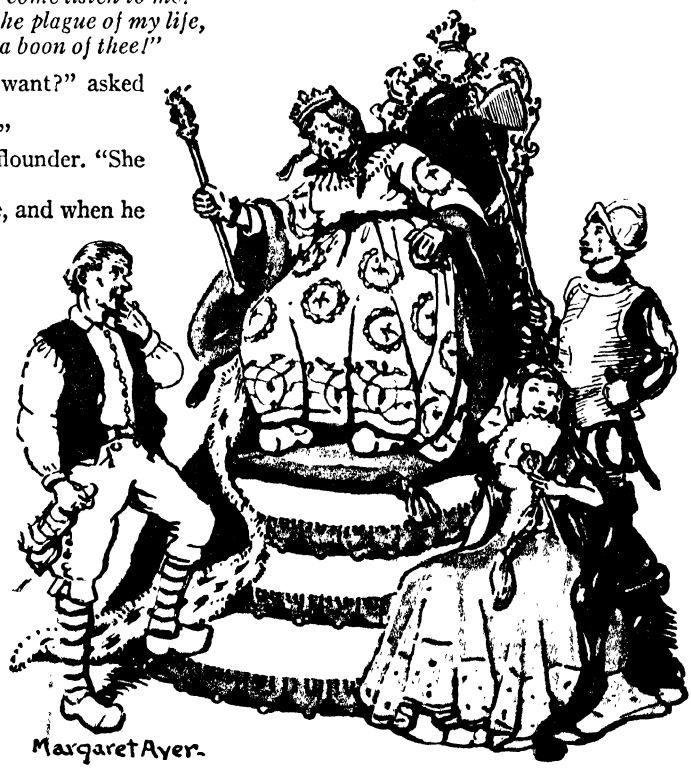
"I will be Pope!" shouted his wife, and the man was obliged to go, for now his wife was Queen and he had to obey her.

When he came to the seashore, the sea was running mountains high and the sky was so black that he was greatly frightened and his voice was only a whisper when he said:

"Oh, man of the sea, come listen to me!
For Alice, my wife, the plague of my life,
Hath sent me to beg a boon of thee!"

"What now?" asked the flounder.

"She wants to be Pope," said he.



His wife was sitting upon a throne, with a crown of diamonds upon her head.

"Go home and find her so!" was the reply.

So the fisherman went back and found a great church in which his wife was sitting upon a throne a half-mile high, with two rows of candles on each side, some as thick as towers and some no bigger than tiny rush-lights. Before her footstool were kings and queens kneeling.

"Wife," said the fisherman sadly, for he knew this was all wrong, "now you must be content. Since you are Pope, you can not be anything else."

But his wife was looking toward the stained glass windows where the sun was shining through in long rays of light that touched her gold and ermine robe and shone upon her discontented face.

"Why should the sun shine without asking my permission!" she cried in a great temper. "Husband, go at once to the flounder and say I wish to be able to tell the sun when to rise and when to set. I must be Ruler of the Universe!"

When the wretched fisherman got down to the sea, a great storm was raging, and the ships were tossing about. The sky was black, and the lightning flashed and the thunder rolled; and you might have seen in the sea great black waves like mountains with a white crown of foam among them. The fisherman could not hear his own words when he said:

"Oh, man of the sea, come listen to me!
For Alice, my wife, the plague of my life,
Hath sent me to beg a boon of thee!"

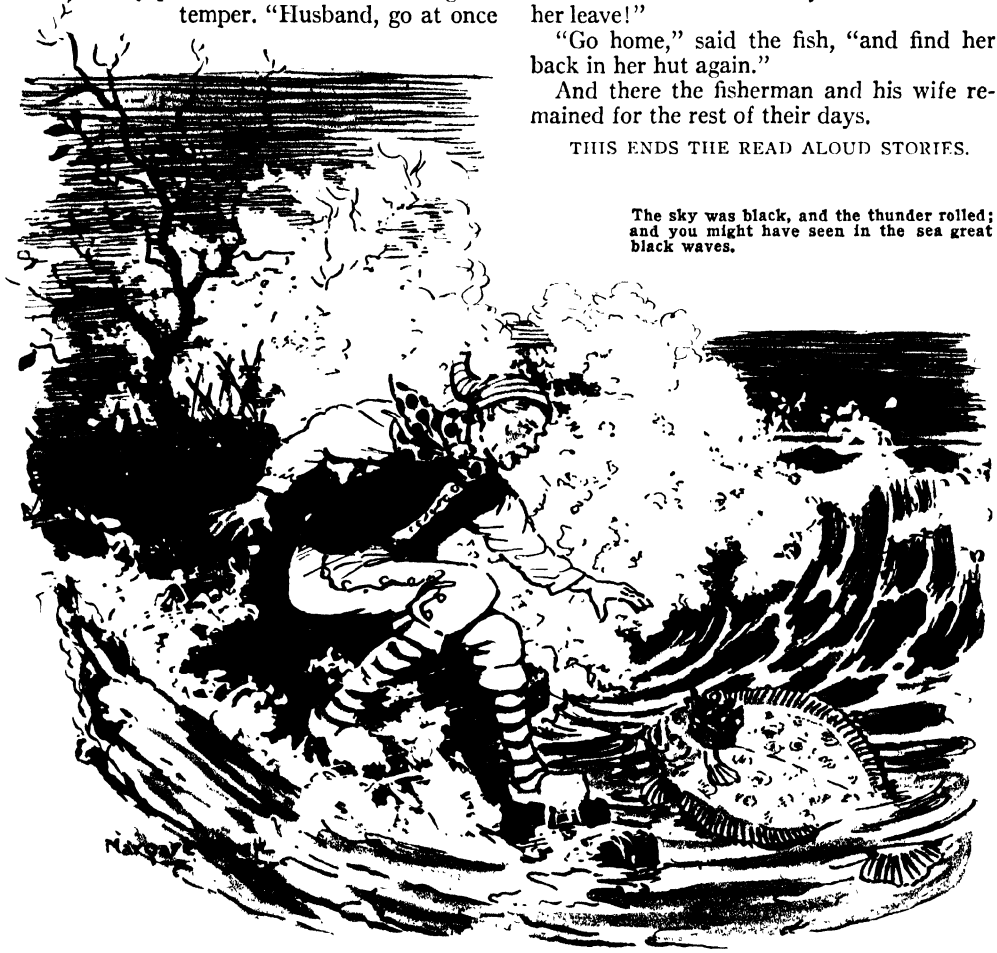
"What would she have now?" said the flounder.

"She wants to be Ruler of the Universe, that the sun and moon may not rise without her leave!"

"Go home," said the fish, "and find her back in her hut again."

And there the fisherman and his wife remained for the rest of their days.

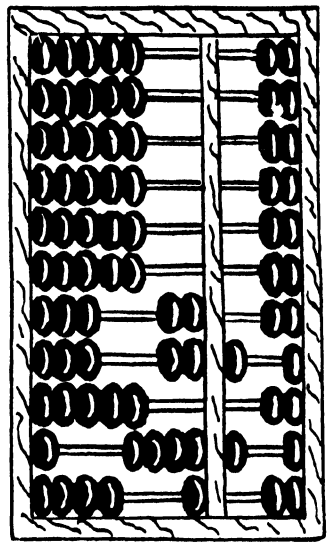
THIS ENDS THE READ ALOUD STORIES.



The sky was black, and the thunder rolled; and you might have seen in the sea great black waves.



Courtesy, Burroughs Adding Machine Co. A modern automatic adding machine. It can not make a mistake if the proper key is struck.



An ancient abacus. The lowest rod represents units, the next tens and so on. Each bead of the left group is a one, and each of the right group is a five. This number is 27,091.

The STORY *of* MATHEMATICS

MATHEMATICS is a long word; and it stands for a very big subject. It is like a tree with many branches. Arithmetic, algebra, geometry, trigonometry, calculus—these are some of the branches. Some of the things we do in mathematics are as simple as:

One, two, buckle my shoe;
Three, four, shut the door. . . .

Other mathematical tasks require some of the most difficult thinking mortal man does.

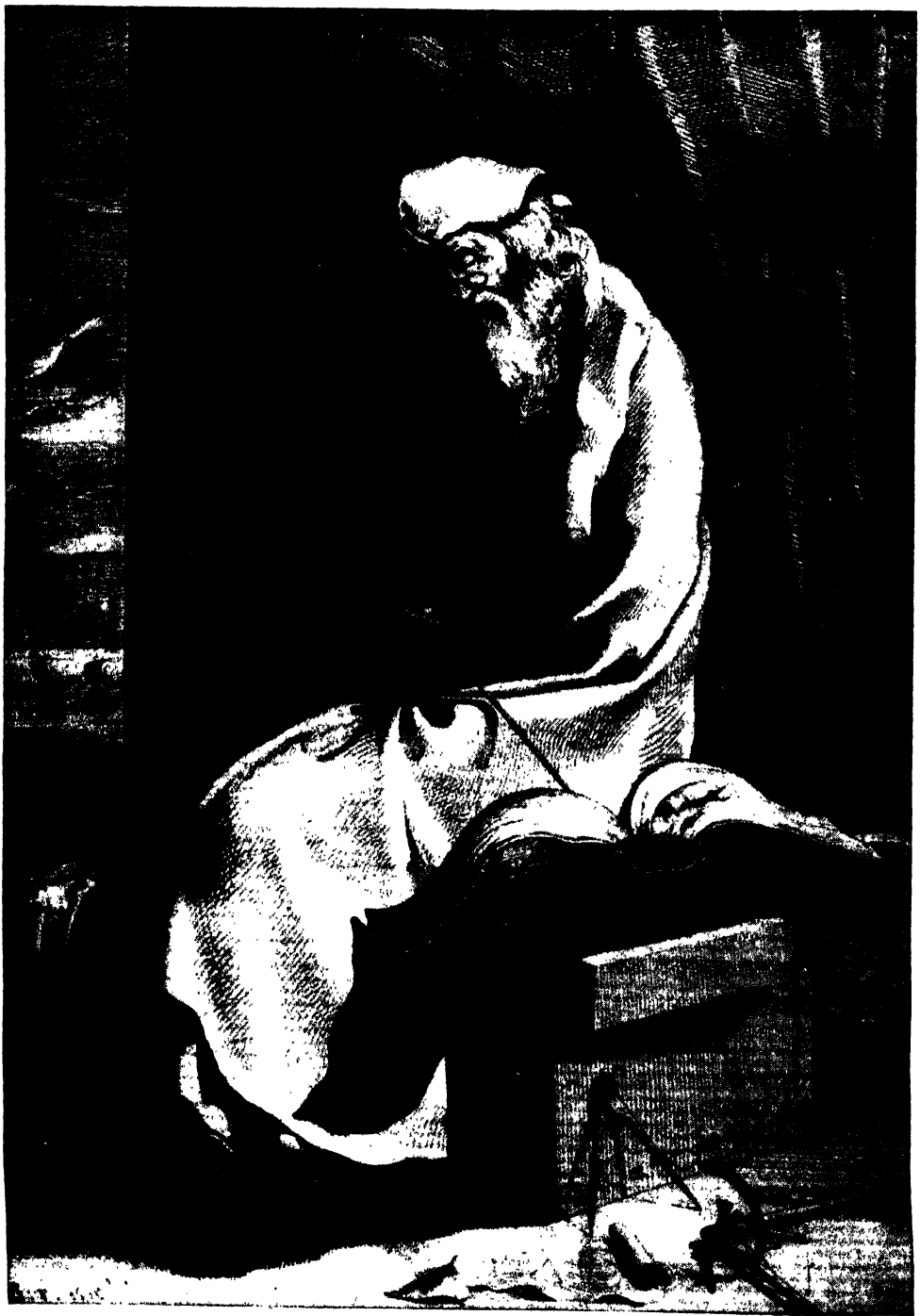
Mathematics is used, in some form or other, in everday life all over the world. The grocer and the bus conductor use mathematics when they take your money and give you back change. In fact, the entire business of paying for things with money is a matter of mathematics. The carpenter uses mathematics when he figures out how much lumber he will need to build a house or to repair a porch. Your little brother uses mathematics when he calculates how many candies, at two cents apiece, he can buy for his ten cents. Your father uses mathematics when he makes up his income tax. The gas and electric company's bill is arrived at by mathematics from reading your meter.

You yourself can not go through a single day without using mathematics—if it is only figuring the time you'll have to wait before dinner.

Mathematics is a science based on thinking in quantities. In arithmetic the quantities are expressed in numbers, and we can write every number there is from the smallest to the biggest, by using ten figures, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0. We sometimes call these ten figures digits—after our ten fingers and thumbs, or digits.

In algebra the quantities are expressed in numbers and in symbols. Algebra is really a short-cut to difficult problems in arithmetic. You probably know one of the symbols in algebra — x. x stands for an unknown quantity. The other letters of the alphabet are also used as symbols. Addition is shown by + as in arithmetic; and subtraction is shown by —. When you put two symbols together, as *ab*, you are multiplying them. When you put one over the other $\frac{b}{a}$ you are

ONE OF THE FATHERS OF GEOMETRY



Thales, ancient Greek philosopher and mathematician. This quaint old drawing shows him wearing glasses. The artist evidently did not know that spectacles were not made until the time of Roger Bacon—centuries later.

dividing b into a. Algebra has many practical uses. The art editors who design the pages for THE BOOK OF KNOWLEDGE use algebra when they order an engraving that is to be smaller than the picture from which the engraving is made.

SOME OF THE BRANCHES OF MATHEMATICS AND THE SUBJECTS WITH WHICH THEY DEAL

Geometry has to do with quantities of space—solids, surfaces, lines and angles. Analytical geometry combines algebra and geometry. Trigonometry deals with the measurement of triangles and angles. Calculus is a method of working problems by means of quantities which stand in close relationship to one another. All these represent some of the more important branches of what we call pure mathematics; that is, mathematics which we study for its own sake. The words arithmetic, geometry and trigonometry all have the syllable *met;* the root of the verb *to measure.*

Mathematics is also used to solve problems in other branches of science: in astronomy; in physics and chemistry; in surveying; in mechanics, which deals with the action of forces on bodies; in thermodynamics, which deals with the action of forces caused by heat; and in many other sciences. This kind of mathematics is called applied mathematics.

The story of mathematics goes back to a very early period in the history of mankind, when men first counted by making notches in sticks or scratches on stone. Later they learned to count on their fingers. Since he had ten fingers, early man found it convenient to count by groups of ten. That is what we do today. When we say forty-five, we are really saying four tens and five. In the same way ninety-seven stands for nine tens and seven. The system of counting by twelves was also introduced in ancient times. We still use it in some of our measures. We say, for example, that twelve inches make one foot and that twelve ounces make one pound troy weight.

THE PEOPLE OF SOME COUNTRIES COUNT BY TWENTIES

Sometimes men would use both fingers and toes in calculating. Such men would learn to count by twenties. Lincoln was really using this method of counting when he began his Gettysburg address with the words "Four score and seven years ago," for score means twenty. Counting by twenties is now rather rare in our country. But in the French language 87 is always written four-twenties-seven (*quatre-vingt-sept*); 95 is always written four-twenties-fifteen (*quatre-vingt-quinze*). The French count by twenties from 60 to 100.

When men began to write, they used various signs to indicate numbers. The ancient Egyptians used a separate mark—a vertical line—for each number until they got to 10. That is, to indicate 5, they set down five marks; to indicate 8, they set down eight marks. They had a special sign for 10; it resembled a capital U turned upside down, or two marks joined together at the top.



Euclid, one of the world's greatest mathematicians. His books on geometry have served as a basis for almost all textbooks on the subject, even to the present day.

Two of these signs standing side by side stood for the number 20. The Babylonians had a somewhat similar system.

The Egyptians were pioneers in mathematics. They learned something about geometry, and this is how. Every year the Nile River rose, spread over the land and wiped out the boundaries of the fields. These fields had been laid out in different ways. Some had formed squares; others, rectangles; still others, triangles. In marking out the boundaries of the fields anew, the Egyptians learned something about squares, rectangles, triangles and the other figures which form the subject matter of geometry. So this science had its beginning in a series of measurements of land. Thus we can see why it is that the word geometry is derived from two Greek

words meaning "measurement of the earth."

The Egyptians did not go very far in geometry, but they made a beginning at least. They also laid the foundations for the study of algebra. Their disciples, the Greeks, went far beyond them. The Greeks did more, perhaps, to advance the study of mathematics than any other ancient people.

In the early days the Greeks counted by making separate marks for each number until they reached ten, just as the Egyptians had done before them. Later they developed certain other methods for indicating numbers. In one of these systems they used the first letters of the Greek names of numerals. For example, since *pente* is the word for five in the Greek language, the number 5 was written P.

About the third century B.C. another method came into use. In this system the first nine letters of the alphabet stood for the numbers from 1 through 9; the second nine, for the numbers 10, 20 and so on through 90; the third nine, for the numbers 100, 200 and so on through 900. Since there were only twenty-four letters in the Greek alphabet, the Greeks added three characters taken from the Phoenician alphabet. The Hebrews also represented numbers by the letters of the alphabet.

The ancient Greeks thought that numbers had certain special properties. The number 6, for example, was supposed to be perfect, because 1, 2 and 3, its divisors (the numbers that can go into it evenly), when added up make the number 6. The number 7 was supposed to indicate harmony; 4 was supposed to correspond to the human soul. Some wise men seriously believed that odd numbers (1, 3, 5 and so on) were masculine and godlike, whereas even numbers were feminine and earth-bound.

Very few people take such notions seriously today. However, though the old Greeks had some odd ideas about numbers, they found out many useful facts about them. They also made considerable progress in algebra.

They made the greatest advance, however, in the science of geometry. Unlike the Egyptians, the Greeks studied geometry for its own sake and not merely in order to solve practical problems. The first important figure in this field was Thales (thay'-leez), who lived in the sixth century B.C. He was a merchant in his younger days and he traveled

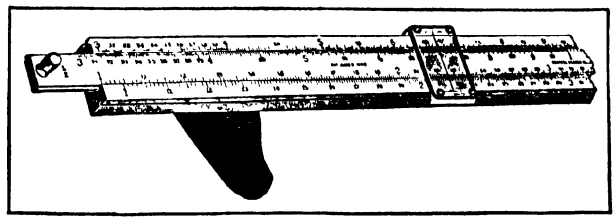


Gramstorff Bros., Inc., Malden, Mass.

Pythagoras, a student of Thales, was also a teacher. Everybody who has studied geometry will remember the name of Pythagoras because it was he who discovered the famous law known as the Pythagorean theorem.

far and wide. He went to Egypt, among other places, and he mastered the primitive geometry of the Egyptians. He used this as the basis for may important discoveries.

His most famous pupil was Pythagoras (pih-thag'-oh-rass), who died about 500 B.C. Pythagoras taught that mathematics was the basis of all science. His name is known to every schoolboy who studies geometry; for he discovered a famous theorem, or geometrical law, still called the Pythagorean theorem. The great Greek thinkers Plato and Aristotle made important contributions to the study of geometry; so did many others who came after them.



Courtesy, Keuffel & Esser Co., N. Y.

The slide rule, companion of the engineer and others who use mathematics in their work. It performs rapid calculations by means of a moving ruled slide and an indicator.

By the fourth century B.C. a great body of geometrical knowledge was availabe to the men of Greece. But the science was in a state of great confusion. There was no unified system, but a mass of more or less independent laws. It was the task of Euclid (yoo'-clid) to bring order out of all this confusion.

We know almost nothing about the life of this man, except that he taught and wrote in Alexandria, Egypt, about 300 B.C. He industriously collected the geometrical works of others, revised and improved them and added to this body of knowledge a number of things that he had found out himself. Then he arranged all this material in an orderly way and published it in the form of a book called THE ELEMENTS.

This work dealt principally with plane geometry—that is, the geometry that has to do with flat surfaces. Euclid's book has formed the basis of practically all elementary books on plane geometry from his day to ours. He wrote several other textbooks on mathematical subjects; but none of these has come down to us.

The renowned Archimedes (ar-kih-mee'-deez; died 212 B.C.) carried the study of geometry further than any other man in antiquity. He made many important discoveries about spheres and cylinders and cones—their relation to each other and to plane, or flat, surfaces. His treatise on the spiral is so complicated that even today only specialists in the subject can follow his arguments. We tell you more about this great man in the chapter called Scientists of Ancient and Medieval Times.

The Romans contributed little that was original to the science of mathematics. We are particularly interested in their method of indicating numbers by letters, because we still use these "Roman numerals" for certain purposes. We use them with names of monarchs. We use them to indicate the number of a chapter or a volume. We say Louis XVI (16) or Chapter V (5). Dates carved out on our monuments or public buildings are sometimes in Roman numerals. Formerly these numerals were used for the numbers on the faces of watches and clocks; but this practice is no longer common.

The Romans probably derived their numerals from the Etruscans, who used Greek letters to form numbers. In time the Romans substituted for these letters certain Latin letters which resembled them. And so in time, I came to stand for 1; V, for 5; X, for 10; L, for 50; C, for 100; D, for 500; M, for 1,000. The number 10,000 was indicated by CCIↃↃ; 100,000, by CCCIↃↃↃ.

A Roman schoolboy would write the first ten numerals thus: I, II, III, IV, V, VI, VII, VIII, IX, X. You will notice that a smaller sign placed *before* a larger sign means that it is to be subtracted from it. Thus IX stands for X (10) minus I (1), or 9. A smaller sign placed *after* a larger sign means that it is to be added to it. Thus VII stands for V (5) plus II (2), or 7.

The Roman numerals continued to be used in Western Europe after the fall of the Western Roman Empire in 476. In general they were left unchanged. However, thousands came to be indicated by a bar placed over a number.

When we wish to multiply 738 by 949, we simply set down these numbers on paper and make a few rapid calculations, also on paper; in just a minute or two we have the answer: 700,362. A written calculation of this sort would have been a tremendous undertaking for an Egyptian or a Greek or a Roman. Imagine a Roman schoolboy faced with the problem of multiplying DCCXXX-



Courtesy, Bell Laboratories

An accountant busily working on the complex numerical records required in modern business practice.

VIII by CMXLIX! Would you like to try?

Merchants and others who had to work with numbers a great deal availed themselves of a reckoning apparatus called an abacus (ab′-a-kuss). There were various kinds of abacuses. One kind consisted of counters, or beads, sliding along wires set in a frame. The beads were set at one end of the frame; the reckoning was done by moving the appropriate number of beads to the other end of the frame. Generally the separate wires represented units, tens, hundreds and so on. We show how this sort of abacus works on page 7001. It is still to be found in China and several other countries. American schoolmasters once used the frame abacus to help children master arithmetic.

The Romans used an abacus consisting of a table marked out with ruled lines, representing units, tens, hundreds and so on. Upon these lines were placed counters, called *calculi*, or pebbles. From this practice of reckoning by *calculi*, the Romans formed the verb *calculare*, meaning to reckon, and this has given us our own words "calculate" and "calculation" and also "calculus." The marked-table kind of abacus was in common use in Western Europe during the Middle Ages.

Why is it that we never have to use an abacus? Why is it that Americans and Englishmen and Frenchmen with just an ordinary education and with no special apparatus can easily divide and multiply amounts that would have been considered terribly difficult in ancient times? It is because we have adopted the place-value system of numbers.

IN OUR SYSTEM THE POSITION OF A NUMBER DETERMINES ITS VALUE

What do we mean by place value? Let us take the numeral 2,457. Each of the individual numbers that makes up this numeral has a certain *value* according to its *place*. The last number shows how many ones there are; the next to the last, how many tens; the second from the last, how many hundreds; the third from the last, how many thousands.

In the number 2,457 then, the 7 stands for 7 ones, or 7; the 5, for 5 tens, or 50; the 4, for 4 hundreds, or 400; the 2, for 2 thousands, or 2,000. We use only ten numbers in all in the place-value system—the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 0. By putting these in the appropriate places, we can write down any amount and perform calculations very effectively.

The Hindus were the first to use ten numbers in a place-value system. They learned many other things about arithmetic; they also made progress in algebra and trigonometry. Most Hindu textbooks on mathematics were in verse.

THE ARABS IN THE MIDDLE AGES WERE GOOD MATHEMATICIANS

The Arabs took over the ten-number place-value system from the Hindus. The first Arab writer to discuss this method of reckoning was the mathematician Mohammed al-Khowarizmi, who wrote a famous textbook on arithmetic about the year 800 A.D. This work came to be so well known that the word algorism (a greatly changed form of al-Khowarizmi) came to stand for calculating by means of ten numbers. The term is still used in mathematics.

The Arabs of those days developed a wonderful civilization not only in Bagdad and Damascus and other cities of the East, but also in Spain, which they and other Mohammedan peoples conquered in the eighth century. There were many learned mathematicians among the Arabs. They learned much, as we have seen, from the Hindus. They also learned from the Greeks, whose mathematical works came to them by way of the Byzantine Empire. (See the story on the Byzantine Empire, which is listed in the Index.)

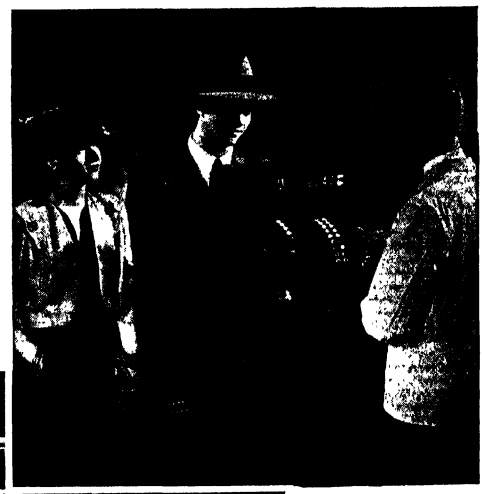
The Arabs made particularly great progress in algebra and gave that subject its name. Algebra comes from *al-jabr,* an Arabic word meaning binding together. This word was part of the title of a work on algebra by al-Khowarizmi, and it came to be used for the subject itself.

While Arabic scholars were deep in the study of mathematics, the science was in a pretty sad state in Western Europe. Like most other branches of learning, mathematics had been neglected after the fall of the Western Roman Empire. It was the monks who kept alive a certain knowledge of the subject in the first few centuries after the fall of Rome; for whatever learning there was in those days had found a place of refuge in the monasteries.

As time went on, the fame of the Arabic universities in Spain spread among the learned men of the West, and some of them went to Spain to study. Among these was the French monk Gerbert (died 1003), who is thought to have invented the clock. Gerbert mastered the mathematical science taught by the Arabic professors of that day. After he was elected pope, under the name of Silvester II, he encouraged the study of mathematics in Western Europe. He himself wrote a number of works on the subject, particularly arithmetic and geometry.

About this time the numerals used by the Arabs (1, 2, 3, 4, 5, 6, 7, 8, 9, 0), and the place-value system as well, began to win favor among certain learned men of Western Europe, particularly in Italy. These numbers came to be known as Arabic numerals, and that is what we call them today. It should be noted, however, that most people continued to use the Roman numerals throughout the greater part of the Middle Ages. It was not until the fifteenth century that the Arabic numerals were widely accepted.

In the course of time more and more Arabic works on mathematics were translated into Latin and thus were made available to the learned men of Western Europe —for all educated men knew Latin in those





A cash register adds up the cost of items you buy in a store, and presents the total in large numbers at the top of the machine and also on a slip of paper.

Pictures, courtesy, National Cash Register Company

The teller in a bank uses a complicated calculator to record your deposits and withdrawals. It performs many mathematical functions accurately and in a very short time.

days. However, the study of mathematics did not become really widespread until the introduction of printing in the latter part of the fifteenth century.

Euclid's ELEMENTS, printed in the year 1482, became one of the "best sellers" of those days. Another important work on mathematics was printed in Venice in 1494. The author was a Franciscan monk, named Paccioli (died about 1510). His work, called A COMPLETE TREATISE ON ARITHMETIC, GEOMETRY AND PROPORTION, was in two volumes; it contained about all that was known of mathematics at the time.

DESCARTES, A FRENCHMAN, IS RESPONSIBLE FOR OUR MODERN ALGEBRA SYMBOLS

The sixteenth century saw the rise of modern elementary algebra. The title of Father of Modern Algebra is often given to François Vieta (1540-1603), a French mathematician. Among other things he adopted a workable system of letters to be used as symbols. This system was not the same as our modern one. The present system was the work of the Frenchman René Descartes (1596-1650), one of the greatest names in the history of science and philosophy.

The seventeenth century was a glorious one in the history of mathematics. The foundations of modern pure geometry were laid by Johannes Kepler and Gérard Desargues. In 1637 Descartes invented the branch of mathematics known as analytical geometry. In the latter part of the century the Englishman Isaac Newton and the German Gottfried Wilhelm von Leibnitz gave the world the science of calculus. There were many other great names in mathematics in that century: Napier, Briggs, Fermat, Pascal and Cavaliere, to name only a few.

LOGARITHMS, INVENTED BY JOHN NAPIER, ARE A GREAT AID IN COMPLICATED PROBLEMS

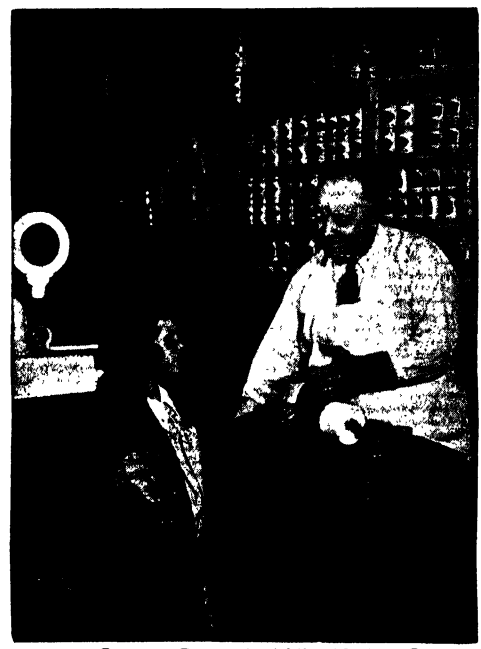
The seventeenth century saw the introduction of various methods for simplifying calculation. In 1614 John Napier, a Scotchman, invented the system of calculating by logarithms. By using logarithms we can perform all kinds of arithmetical problems—multiplication, division, finding the square root, squaring and so on—with great ease. For example, in order to find the square root of a number we do a simple problem in division instead of going through with the complicated calculations that would be necessary if one used the ordinary method. The use of logarithms enables one to save much time.

It was in the seventeenth century that the decimal method of indicating fractions (.3 for $\frac{3}{10}$, .023 for $\frac{23}{1000}$ and so on) came into use. It was then, too, that men first adopted the common signs $+$, $-$, $\times$, $\div$, and $=$. It seems strange, indeed, that the wise men who made such wonderful mathematical discoveries in the preceding centuries did not perfect these simple signs which shorten our work so much.

Since the seventeenth century progress in mathematics has been great. Men like Euler, d'Alembert and Cramer in the eighteenth century, Gauss, Lobachevski and Möbius in the nineteenth and Hilbert, Poincaré and Einstein in the twentieth have opened up new fields for mathematical investigation and application.

We realize today that Pythagoras was hardly exaggerating when he claimed that mathematics is the basis of all science. The chemist, the physicist, the astronomer, the engineer could not get along without mathematics. The banker, the insurance man, the accountant must know well certain branches of mathematics; so must many a skilled worker. No other subject is more useful than mathematics; and those who know it best agree that no other subject is more interesting.

THE NEXT STORY OF SCIENCE IS ON PAGE 7137.



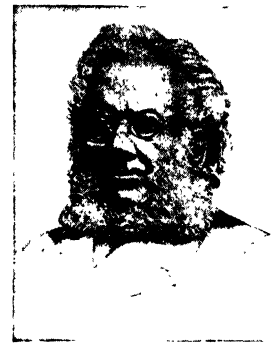
Courtesy, Burroughs Adding Machine Company

When you go to the store you and the clerk use mathematics to figure the cost of your purchases.



Björnstjerne Björnson.

The LITERATURE *of* SCANDINAVIA



Henrik Ibsen.

THE languages of Denmark, Norway and Sweden have been slowly growing farther and farther apart during the last thousand years. They started, however, from a common ancestral language, and that original language is the one still spoken, with comparatively little change, in Iceland. It has a considerable literature that was preserved in men's memories by frequent recitation until about the time when William the Conqueror was reigning in England. Then it began to be written down, and was recorded on vellum and expanded as time went on.

These ancient written stories, called sagas, exist in a language once in use in Denmark, Norway and Sweden, but now superseded by the Danish, Norwegian and Swedish developments of the old speech, so that they can not be understood there except by special study. But in Iceland the original tongue of the Norse sea-rovers, who settled in the island over a thousand years ago, has been retained so faithfully that any Icelandic child can read and understand the tales told in the ancient tongue.

Thus the Scandinavian nations owe the preservation of their own ancient literature to their long-time-ago kinsmen in Iceland. It was chiefly Icelanders who told the stirring stories of the days when the Scandinavian peoples served strange gods of war. It was the Icelanders, too, who preserved the stories when they had been written down. Many of these stories are about heroes of Norway and Denmark and Sweden, and they reveal to us today how the people in all these northern lands lived and thought and believed. The collections of sagas, called the Eddas, or "things said at the tale-tellings," are the ancient literature of all the northern peoples.

We must look at this ancient Norse literature a little more closely, for it shows us how poetry and history came into being everywhere, and it forms a mass of fanciful material from which poets and musicians of later times have selected the themes of their poems and dramas and operas.

The sagas go back into dim, distant times. They reveal to us the doings and beliefs of the ancient northern peoples before they had heard of Christianity, and also when they were hearing of it and it was changing their hearts and lives and hopes. They cover a period of three or four hundred years.

We do not know who wrote the sagas, except one or two of the latest. First there were tales about the ancient gods, prophecies, snatches of song and proverbial sayings. Then, as men did heroic deeds and died, clever tale-tellers (the saga-men) described their lives, introducing their words at exciting moments, with now and then a song. The next step was to tell the deeds of living men, and preserve the genealogies, or histories, of families.

The subjects of the sagas were often not good, according to Christian ideas. Bitter quarrels and revenge, admiration of strength and bravery as supreme qualities, disputes that led to primitive trials by ordeal—these are the features of a rough, forceful life, ending heroically in unfeared death, which make up a large part of these ancient tales.

But they include much finely imaginative legend and varied poetry, even when the narrative is in prose, as is generally the case. They were made not to be read, but to be said, and the words swell and sing in fine stirring sounds that have some of the effects of music or thrilling recitation. Often they were drama expressed in narrative form.

Listening to the saga-men telling stories of the past and present, with skill in the building-up of the tale, was the chief indoor amusement of the leaders of the Norsemen. A story having been told and retold till it had reached perfection in its form, perhaps after repetition by several generations, was finally written down. Thus it has reached us across the ages during which the old language has changed into Danish, Swedish and Norwegian.

Though we do not know who made up more than one or two of the forty sagas that have been preserved in Iceland, we do know who collected them and transmitted them to us. They are now preserved in the capitals of the present Scandinavian countries, a literature rescued from oblivion.

ARI THORGILSSON THE LEARNED, WHO COLLECTED ANCIENT SAGAS

It was Ari Thorgilsson the Learned, who, living as a contemporary of William the Conqueror, wrote the BOOK OF THE KINGS OF NORWAY, and collected many sagas. He also wrote the BOOK OF SETTLEMENTS, mentioning four thousand people of his stock and the places where they lived, and a book of the laws of Iceland.

Snorri Sturlason, who lived a century after Ari Thorgilsson, continued the work of historian and saga-collector. He describes Ari as "a man wise and of good memory, and a speaker of the truth." He himself passed on his knowledge through the famous Sturlung family, who further continued the preservation of the old language and literature. Finally came the poet and historian Sturla Thordsson, who lived between 1215 and 1284.

Thus we see that before the perfecting of the new languages of the Scandinavian countries, and cut off from modern life by the Middle Ages during which those languages were growing, there existed one of the world's most curious and impressive literatures, secluded, as it were, in Iceland. It may seem curious that a people which found a voice so eloquently in the sagas should not continue the cultivation of dramatic and poetic speech. The truth is that literature almost lapsed in the Scandinavian countries for fully four hundred years.

The explanation is that Christianity brought with it Latin as the language of the Church and as the international language of learning. Everyone who could write knew some Latin. The spoken language of the people came very slowly into literary use. This was more particularly so in the smaller nations. Latin was the highway of correspondence by which people reached the outside world. The larger nations used their own language in their books much more quickly than the smaller nations. English, through Chaucer, had become a literary tongue in the year 1400. But in Sweden the two most widely known Swedes—Swedenborg, who died in 1772, and Linnaeus, who died in 1778—wrote their books to the last in Latin, and are not known as users of their native tongue, which, however, had been in literary use for some time.

Of the three northern countries, Denmark, Norway and Sweden, which have been linked together in history in varying ways, the first place in literature must be given to Denmark, though a remarkable number of writers who rank as Danish were really Norwegians. They had been drawn to Copenhagen when it was the educational center of the Danish-Norwegian state, before Norway joined Sweden in 1814, on her way to complete independence in 1905.

In poetry particularly the Norwegians have been conspicuous as might be expected from the inspiration given by the rugged grandeur of their natural surroundings compared with the tameness of the Danish landscape. It was only when Norway was withdrawn from the Danish partnership that national pride suggested a distinctive literature for her.

BARON LUDVIG HOLBERG, THE FIRST GREAT NAME IN DANISH LITERATURE

The man who first gave Denmark (with Norway) a literature of her own was Baron Ludvig Holberg, a Norwegian born at Bergen in 1684. He went to the University of Copenhagen in 1702. Before the eighteenth century Danish literature consisted of ballads and hymns. It was said that a Danish gentleman wrote to his friends in Latin, talked to ladies in French, called his dogs in German and swore at his servants in Danish. When Holberg died, in 1754, six years after he had been made a baron, he had written, in an attractive style, books on history, law, politics, science and philosophy, all in the national language, and he had furnished the first Danish theater with thirty-six dramas from his own pen, while his poems covered a wide range in style and subjects. He was, in short, one of the greatest literary forces in Europe, and his influence has been felt in Denmark to this day.

From such a start Denmark could not well go back, and the eighteenth century brought a succession of poets with lyrical genius of a high order. Christian Tullin, also a Norwegian, introduced the poetry of nature. Johannes Ewald wrote the first Danish tragedy, and a lyrical drama, THE FISHERS, which still lives as a national poem, while as a lyrical poet he remains unexcelled. He also revealed to the Scandinavian nations the neglected sources of their own early literature. Ewald died in 1781, at the age of thirty-seven, after a tragic life.

Herman Wessel, another Norwegian, a brilliant but short-lived poet of genius, so ridiculed on the stage the revival of the pompous style of French tragedy that it was laughed out of fashion. In its place the national language and a national spirit were established there. Later, Jens Baggesen (1764-1826), the comic poet of Denmark, gave flexibility to the language by his satires and wit, but lessened his fame by the fierceness of his jealousies.



Georg Brandes, a great Danish critic, of Jewish ancestry.

The most deservedly popular poet of the nineteenth century was Adam Öhlenschläger, who, by the power of his romantic appeal ranks as a literary influence with Baron Holberg. Öhlenschläger went back for his subjects to the Icelandic Eddas. He so stirred the imagination of his countrymen that in 1829 he was crowned with laurel in Sweden as the Scandinavian King of Song. His masterpiece is his tragedy HAKON JARL.

Other notable poets were Steen Blicher, whose realistic pastoral verse has points of resemblance to Crabbe; Christian Winther, whose studies of country life and rural scenery recall Wordsworth; Henrik Hertz, a dramatist and lyrist of Jewish birth; and Frederik Paludan-Müller, a writer whose personal modesty and retiring nature contrasted with the keenness of his satire and the loftiness of his dramas.

It will be noted that much of the literary art of the Danes has been expended on the stage; but it has not been lacking elsewhere. For instance, Hans Christian Oersted, the discoverer of electromagnetism, and Denmark's greatest scientist, was also such a clear writer that he claims a place in the literature of his country.

The Danish philosopher, Sören Kierkegaard (1813-55), is as notable for his command of style in writing as for the subtlety and originality of his thought.

Among novelists, Herman Frederik Ewald (1821-1908) must be named for his historical stories, and his son, Carl Ewald (1856-1908), not only for his finer fiction but, above all, for his unique skill in teaching science and morals by means of fairy lore.

Two men who did a great deal toward giving Danish thought and literature to the world were Hans Christian Andersen (1805-75) and Georg Brandes (1842-1927). The first was a writer for children, and the second was a literary critic of world-wide fame.

Hans Andersen was a poor boy who taught himself much by reading the works of Holberg and Shakespeare. His formal education, after he had failed on the stage, was long and unsatisfactory; but his real education was in travel. No man ever understood himself less than he. He tried to be a poet, dramatist, novelist and descriptive writer, with only moderate success. What he could write, but did not value, were his exquisite sketches of fairy lore and human character in his books for children. They won the heart of the world, and they have kept it and will keep it, for they are among the best literature of the kind ever penned and the choicest product of Danish literature.

Georg Brandes was born in Copenhagen, of Jewish ancestry. He has been called the universal critic. He visited many countries, he knew the literature of most countries and most ages and he wrote about it with brilliance and understanding. He was as painstaking as a German and as clear and bright as a Frenchman. He was generally considered the most learned literary expert of his time, and though he was of Denmark, he belongs to the whole world.

The literature of Norway, apart from Denmark, does not really begin until the nineteenth century; but Norway had before that time a remarkable share in the joint literature of the two countries. A sense of national pride in her writers began to grow in Norway after the establishment of a university at Oslo in 1772. After 1814, when the political separation from Denmark was made, the demand for an independent Nor-

wegian literature became insistent. For many years it took the unfortunate form of trying to separate the Danish and Norwegian tongues, though the literary form of the languages was the same, and Norway had contributed richly to its development. It was true that Norway had its own dialects, but they had no literature of any account.

HENRIK WERGELAND TRIES TO FASHION A NEW NORWEGIAN LANGUAGE

Henrik Wergeland (1808-45), an impulsive young poet, son of a professor, carried his desire for a separate Norwegian tongue to such lengths that he tried to weld the various Norwegian dialects into a new tongue, leaving the joint Danish-Norwegian language to the Danes. In this he was helped by a poet, Aasmund Vinje (1818-70), who wrote peasant poetry in a rural dialect with attractive effect; and by a novelist, Arne Garborg, who wrote stories of country life in the peasant speech.

Then Johan Welhaven, who had some power as a descriptive poet, and far more as a bitter satirist, attacked Wergeland for disowning the language which had given Norway substantial fame. Gradually the view held by Welhaven prevailed, and Norway retained as her literary language practically the same tongue as Denmark, though there was a great increase of dialect fiction. It was an unfortunate quarrel springing from false pride.

Norway has always had an abundance of poets, but her increasing literary fame has been gained chiefly through fiction and the drama, though all the novelists and dramatists have touched poetry.

Her two writers most widely known throughout the world were managers of theaters during a considerable part of their lives, and the most famous of them, Henrik Ibsen, who lived from 1828 to 1906, made his great reputation entirely as a writer of plays.

Ibsen was very slow in gaining the recognition his remarkable literary gifts deserved. He was embittered by delayed success to such an extent that much of his writing is an exposure of his countrymen for being a smug, hypocritical, conventional, unromantic people who could not or would not appreciate life as he saw it. He was at war with a world that would not understand him. In the end he won, and he broadened his view as he succeeded, till he died in a blaze of triumph, with his statue erected in the capital of his country.

The stormy character of Ibsen's career is accounted for by the fact that he was a critic of his fellow-men, and particularly of his own people. He persisted in showing what was mean and wrong in them. His was the power of exposing weaknesses, and he was in a rage with his countrymen because they did not like it. They, too, were often angry with him. Foreigners recognized the scathing cleverness of his plays, and presently his fame abroad exalted him in the eyes of Norwegians, and their pride in their son conquered their anger.

The son of a Bergen merchant, Ibsen was in his youth a gloomy apprentice to an apothecary, and a writer of romantic verse. He turned to journalism and then to the stage. In this his instinct was true, for no man has ever had a clearer understanding of how simple language can be used dramatically to produce great effects. His first great success was in a saga-drama, THE WARRIORS IN HELGELAND. But it was in social dramas that Isben made his world-wide fame, his principal plays being BRAND, PEER GYNT, THE MASTER BUILDER, PILLARS OF SOCIETY, A DOLL'S HOUSE, GHOSTS, AN ENEMY OF THE PEOPLE and HEDDA GABLER. In PEER GYNT, which was started as a satire on Norwegian weaknesses, Ibsen became mastered by his interest in his character sketch, and reached the highest flight of his poetical power. As a lyrical drama PEER GYNT is further known through the music of the Norwegian composer Edvard Grieg.

The fashion for Ibsen is not now what it was, though always there have been admirers who have had reservations about his moral influence. Of the intensity of his genius few will doubt, but it lacks breadth. His plays show Ibsen at war with the world rather than interpreting it in a generous, understanding spirit.

BJÖRNSTJERNE BJÖRNSON, NORWAY'S MOST WIDELY KNOWN NOVELIST

Björnstjerne Björnson, who was born in 1832 and died at seventy-eight, was Norway's most widely known novelist. He was reared in the Romsdal, and after writing poetry as a boy he became a journalist, and then a manager of theaters—like Isben—at Bergen and Oslo. Björnson was a man with enormous vitality—a true poet, a writer of fine dramas, both social and heroic; an eager politician, eloquent and fearless. But he reached his highest distinction as a writer of stories of peasant life, with ARNE OF SYNNÖVE as his masterpiece. He it was who

turned the scale in the dispute over Norway's classical language. Admitting that the peasant life of Norway is its real life, he showed in his own writings that it can be more fully pictured in the literary language of the country than in the rural dialects, which have their interest and use, but are incomplete.

The most popular novelist of his time in Norway itself was Jonas Lie (1833-1908), who, after living as a boy in Tromsö, became a lawyer, turned to poetry, tried journalism and failed; but he won popularity by his pictures in well-observed detail of the life of the seafaring people of the Norwegian fiords. Jonas Lie's stories won a large circulation by their truthfulness rather than by their literary power.

Ibsen, Björnson and Jonas Lie all obtained from the Norwegian Parliament pensions for life as writers of national importance. Thus they were enabled to give their best work to their country and the world without anxiety as to their fate when old age came.

Later in the twentieth century, Norwegian fiction received a new strength from the work of Knut Hamsun and Hans Aanrud, both of whom have the power of building up a gradually increasing impression of intense reality as they picture the life of their countrymen in closest touch with nature.

THE POWERFUL NOVELS OF KNUT HAMSUN FOUND READERS IN MANY LANDS

Knut Hamsun has been read much more extensively in English-speaking countries since he was awarded the Nobel Prize for literature in 1920. The first of his novels to become fairly well known abroad was HUNGER. It was an outcome of Hamsun's early experiences during a wandering life on both sides of the Atlantic, when he was depending on manual labor for a living. It was restless and impulsive, and lacked the steady thoughtfulness demanded by good art. It seemed to be an explosive outburst from an embittered man. But it attracted attention in his own country, and gained him a hearing that brought a deeper sense of responsibility.

Seldom has a novelist shown a greater change than Hamsun between the time when he wrote HUNGER and the time when he wrote the book that won for him a well-deserved European reputation—THE GROWTH OF THE SOIL. His hero in this fine story is a Norwegian peasant, who, with the slenderest resources, gets a footing on the soil, and with it a firm grip of life. The slow, firm progress of the man settled on the land seems



Courtesy, Alfred A. Knopf, Inc.
Sigrid Undset, one of Norway's foremost novelists.

to be the very counterpart of the author as he builds up his theme with strength and patience.

Fridtjof Nansen, the famous explorer, who died in 1930, has a place in the literature of his country through his epic narratives of adventure in Greenland and the Polar seas and his account of the early Norse explorers who discovered America long before the days of Columbus.

Sigrid Undset (1882-1949) was a Norwegian writer whose works are famous in many other lands beside her own. Her father was a well-known archaeologist, and Sigrid early became interested in the pre-historic and historic past, especially of Norway. While she has written novels and non-fiction works about the present day, her greatest fame rests upon her historical novels, especially KRISTIN LAVRANSDATTER and THE MASTER OF HESTVIKEN, stories of Norway in the thirteenth and fourteenth centuries. She was awarded the Nobel Prize for literature in 1928.

Sigrid Undset revealed her loyalty to her homeland in her life as well as in her writings. For many years she lived in Lillehammer, in a house built in the year 1000. When, in 1940, the town was destroyed by German bombers, she became a volunteer worker for the Norwegian Government. Later her son was killed fighting against the Nazis, and she herself was forced to flee to Sweden. From there she finally managed to get to the United States, where she carried on her work for a free Norway.

Sweden has as long a literary history as Denmark. In its modern form, after a period producing chiefly folk lore, it began with Georg Stjernhjelm (1598-1672), who wrote

a poem on Hercules. His writings covered a very wide range of subjects, mostly serious, but including masques, then a popular form of royal entertainment. He became poet laureate.

Early Swedish literature was powerfully influenced from abroad, and was imitative, first of German and Italian, and then of French and English writers. The leading Swedish writer who wrote according to English models, and was the best writer after Stjernhjelm, was Olaf von Dalin (1708-63). Addison, Pope and Swift were his models, and his style had a graceful finish like theirs. He wrote a HISTORY OF THE SWEDISH KINGDOM and an epic poem SWEDISH FREEDOM. He was a copyist, it is true, but a very clever copyist, and he decidedly added to Sweden's literature.

In the reigns of Gustavus III and Gustavus IV (1771-1809) literature flourished in Sweden. Gustavus III wrote some sound plays himself. But the writing of this period was conventional in style. Bellman, Oxenstjerna, Kellgren and Leopold had more originality as poets, and Kellgren and Leopold were writers of strong prose.



Selma Lagerlöf.

A little later Esaias Tegner (1782-1846) became perhaps the most widely known Swedish writer, his works being translated into all European languages. His patriotic poem SVEA won the prize of the Swedish Academy and its author a university professorship. It was his STORY OF FRITHIOF, a saga-poem, that carried his fame through Europe.

A writer whose works vied in popularity with Tegner's poems was Fredrika Bremer (1801-65), a Finnish woman with a graceful pen, whose stories were translated into English by Mary Howitt. In later life Miss Bremer became an active philanthropist and an advocate of women's movements. Then she weakened her literary position by writing poems with a purpose.

The leading Swedish poet after Tegner was Ludvig Runeberg (1804-77), a Finlander born. His poems tended to link Sweden and Finland together, and include most charming idyls of Finnish life. In drama he was less successful.

In connection with Finland we must mention Professor Elias Lönnrot, to whom the world owes the recovery from oblivion of the remarkable Finnish folk-lore poem KALEVALA. This gave to Longfellow the rhythm used in his HIAWATHA, and probably suggested the writing of that well-known poem.

Johan August Strindberg, who died in 1912, wrote satirical novels which were widely discussed during his lifetime, although they never became really popular. Strindberg was a fine literary workman, but a blunt realist in what is objectionable. He wrote under the sway of a violent pessimism.

Vernher von Heidenstam, lyrical poet, romantic novelist and thoughtful critic, was a contrast to the pessimism of Strindberg.

A writer whom we must mention for her thoughtful essays and her striking writings on education is Ellen Key (1849-1926). Miss Key, whose ancestry was Scottish, was for many years lecturer on the history of civilization in the University of Stockholm, but became more widely known as a speaker on social reform and kindred subjects.

Another great woman writer of our century was Selma Lagerlöf (1858-1940) of Sweden. She wrote about the life of the Swedish country people, a life which she knew well and loved. Especially she loved the home of her childhood days, Marbacka, and when, in 1909, she became the first woman to receive the Nobel Prize for literature, she used the money to buy back the estate and lived there for the rest of her life.

THE STORY OF GÖSTA BERLING is one of her best-known books, but even more interesting than her novels are her published diary and her MEMORIES OF MY CHILDHOOD. At the request of the Swedish school authorities she wrote two books for school children, THE ADVENTURES OF NILS, and THE FURTHER ADVENTURES OF NILS. These books tell the story of a Swedish boy who was turned into an elf and traveled all over Sweden with a flock of wild geese. During his travels the boy had many fascinating and a few frightening experiences. He learned the geography and history, the folk lore and the nature lore of his country in the most interesting possible way, and in the end was restored to his home and to his natural size. Many American and Canadian children have read these stories and love them as much as the Swedish children do.

THE NEXT STORY OF LITERATURE IS ON PAGE 7125.



This Chrysler four-door Windsor sedan has fluid drive and many other advanced features.

HOW MOTOR CARS ARE MADE

THE title of this story is really too large, for we can not tell how motor cars are made in one story, or in a dozen, for that matter. The motor car as we see it in the streets consists of thousands of parts made from many different materials. It is manufactured in great shops with the aid of much complicated machinery. We shall try, however, to give you an idea of the way a car is put together.

A motor car is simply a car that moves of itself. A locomotive is a motor car, and so is a steam roller. We now mean by the words, however, a car that travels on an ordinary road and carries passengers or freight. In fact, we usually mean a passenger car, and call the freight car a motor truck. Nowadays almost all passenger automobiles are run by gasoline engines, but formerly there were many electric and steam cars.

The idea is not new. Over two hundred years ago Sir Isaac Newton thought of the idea, and in 1770 a Frenchman built two steam cars which ran. Other men built cars in England. All of them were very heavy and very clumsy and soon went out of use. For a long time men had to depend upon horses to carry them over the roads.

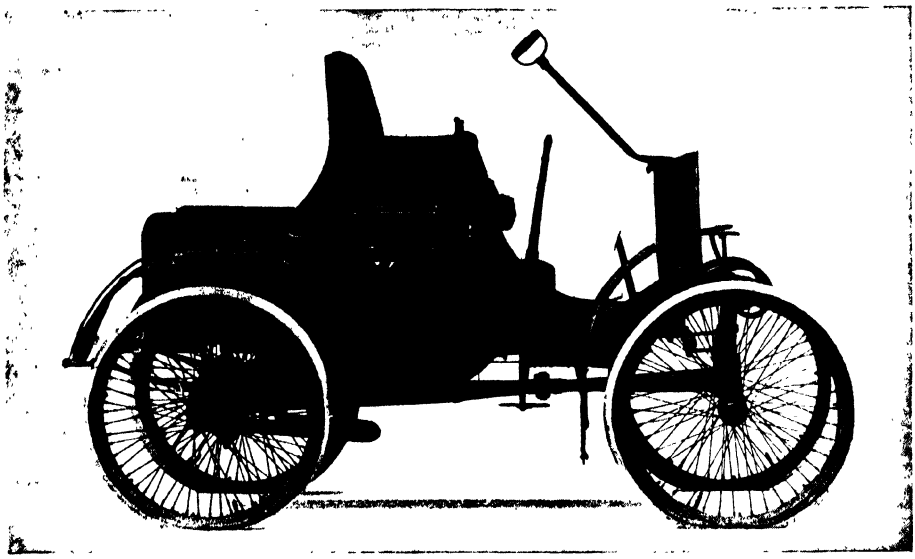
Not until the internal-combustion engine was invented did men again try to make a motor car. You know the difference between an engine of this kind and a steam engine. In the steam engine, heat is applied on the outside of the boiler to make steam, which pushes out the pistons of the engine. In the internal-combustion engine, gas is admitted to the cylinders and set on fire. The explosion drives out the pistons. On pages 7030 and 7031 you will find a diagram which shows you how such an engine works.

It seems that the first fairly successful internal-combustion engine was made by a German, Dr. Nicholas Otto, who lived near Cologne. He was assisted by Gottlieb Daimler, who about ten years later made an engine for himself and attached it to a bicycle. So we see that really the motorcycle came before the motor car. Soon many men were experimenting and trying to attach an engine to a vehicle.

These engines were not perfect. The first and the second had only one cylinder, and they often got out of order, but men worked on them for years, and many improvements were made. When such engines began to

work well, the motor car as we know it became possible. No one man can be given the credit for the engine. It is not even certain who first thought of the idea, but our motor cars, motor boats and airplanes all depend upon it.

Though Europe took the lead in the development of motor vehicles, the United States was not far behind. Frank Duryea, Elwood Haynes, Alexander Winton and Henry Ford are some of the men who before 1895 made cars that would run. Other



The first Packard car was made in 1899. Notice how clumsy it seems to us now, and how uncomfortable it must have been. Compare it with the picture on the preceding page, which represents a recent model.

inventors followed. Of these only Ford continued as an active manufacturer, but now the United States has more cars in use than all the remainder of the world together.

In making the first motor cars men tried to make them as much like vehicles drawn by horses as possible. On this page we show you a picture of a car made in 1899. Later, when better roads were made, so that the body could hang lower, the wheels were made smaller, and they were fitted with pneumatic tires which made riding much easier. In the beginning the engine often got out of order, and the sight of a car being pulled into town by horses was a common occurrence. Reliable cars were not manufactured until after 1900. Many inventions have gone into the car, until now it seems as if there is little more to be done.

In a great factory there are several departments. Some manufacturers buy some or all of their metal parts already cast, but others melt their own iron, steel and brass, and cast the parts they need. This operation is very interesting and is about the same, no matter what the metal. Boxes without top or bottom are prepared. One is filled nearly full of a particular kind of sand which is kept just a little moist. Then a pattern, generally made of wood, though sometimes of metal, is laid on it. A second box is placed above the other and sand is filled in around the pattern and packed closely. Then the upper box with its sand may be lifted off, even though it has no bottom. The pattern is then taken out of the lower box. The upper box is then replaced above the other. The sand holds its shape, and inside the boxes is a hollow the exact size and shape of the pattern. The molten metal is then poured through a hole left for the purpose and fills up the mold. When the metal has cooled, the sand is taken away, and the part is taken out.

Some of the castings go to great ovens where they bake for hours. This makes them stronger or tougher. Some go to machines which pound them and shape them further, some go to be polished or to be joined to still other parts.

More motor cars are manufactured in the United States than anywhere else, and it has the largest single factories. They make cars of different prices, from a few hundred to

many thousands of dollars. All, whether they make cheap or expensive cars, use much machinery. In the shops there are machines larger than an ordinary room. Some stamp out great pieces of metal as if they were so much cheese. Lathes cut off shavings of steel as if they were soft wood. Some machines grind pieces (that were purposely made a little too large) until they are the proper size. Some of the parts must be accurate to a ten-thousandth of an inch. Some machines drill holes into steel, a dozen or twenty at a time, all exactly the right distance apart. It would be almost, if not quite, impossible to drill them so accurately by hand. Others cut cogs into wheels so that they fit exactly. There are hundreds of machines in the different rooms, and they work with wonderful precision.

THE AUTOMOBILE BODY IS MADE ALMOST ENTIRELY OF METAL

Much wood was once used in building automobile bodies, but to-day it has been almost entirely replaced by steel and other metals. To-day the entire body is bolted, riveted and welded together from large sections of steel, making a strong and rigid unit. There are great paint rooms where the various parts are given their glossy finish. Much of the painting is done by a spray, but for some parts work with a brush is necessary. There are upholstering rooms where the cushions for the seats and backs are fastened on.

So far you have not seen anything which looks much like a motor car. You have seen thousands of pieces of iron, steel, brass, bronze, nickel, wood, rubber and leather—some large, some small—which you are told are required to make a car, but that is all. Let us go now to one of the rooms where parts are assembled, or put together. We wander into the room where engines are being assembled. We find here something like an engine raised conveniently above the floor. Part after part is added until the complicated machine, built as delicately as a watch, is completed. We are told that each machine is taken to another room, tested in every possible way, and then made to run for hours.

THE ASSEMBLY-LINE SYSTEM IS USED IN MANY INDUSTRIES

Let us now see how the car itself comes together. This is done by the famous assembly-line system developed in America largely by Henry Ford and to-day used all over the world. This system is now also applied to many other products besides automobiles. It was further developed in making airplanes, ships and other products in World War II. We are told that some of our houses will be partly built on assembly lines in the years to come.

TIMING IS IMPORTANT IN AN ASSEMBLY LINE

In the automobile assembly line the car takes shape while slowly traveling down a belt along which the workmen do their various jobs. Every part of the car has to reach the assembly line at precisely the right time and place. Moreover, it has to be exactly the right kind of part, in color and size. Every man does just one particular kind of job at which he is expert. It must all be worked out to the last detail, for if anything goes wrong, the entire line stops.

First comes the strong steel frame, often made in special factories by automatic machines. The engine is swung down from above and fastened firmly to the frame, now called a chassis. This continues moving down the line, and as it moves the right parts arrive from the stock rooms in the order in which they are needed and are quickly placed, fastened and connected just where they belong. Each man, or set of men, attaches something as the car moves along. The body swings down from above. The wheels, tires, lamps, the clock suddenly appear. Perhaps a man rides on the car, working all the time until his job is done. Then he drops off and goes back to the place where he started, to begin again. If you ever get an opportunity to see how cars are made, do not fail to take advantage of it. They are put together with wonderful speed.

NOW THE CAR IS READY FOR ITS TRIAL RUN

The car has finally traveled a long distance. Every few yards an inspector has tested some part. It now comes to the end and is rolled off on the floor. Fill the tank with gasoline and it is ready for the road.

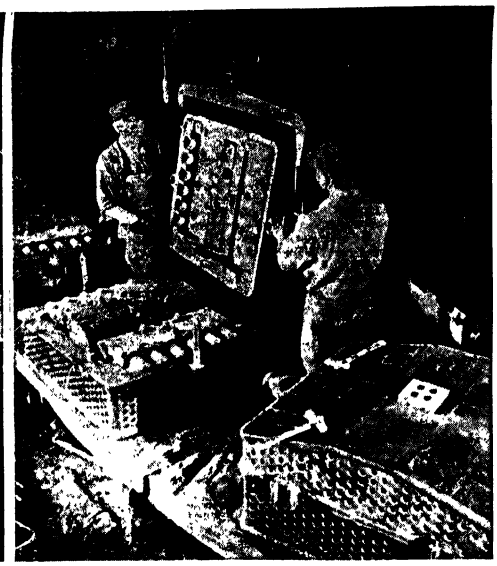
The modern motor car, no matter whether cheap or expensive, is a great achievement. Though made up of thousands of parts which must work together if the car is to run perfectly, it is surprising how seldom anything gets out of order. It would seem that only an expert machinist could manage such a complicated machine, but it is so well built that we see many men and women without much knowledge or skill who successfully run cars day after day.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 7181.

MOLDING AND FORGING PARTS OF CARS



Crankshafts for engines are forged here. Hammers weighing 12,000 pounds are danced up and down to pound billets of red-hot steel into crankshafts.



On this huge turntable molds for engine-cylinder blocks and other parts are assembled and locked in flasks for casting on the foundry production line.

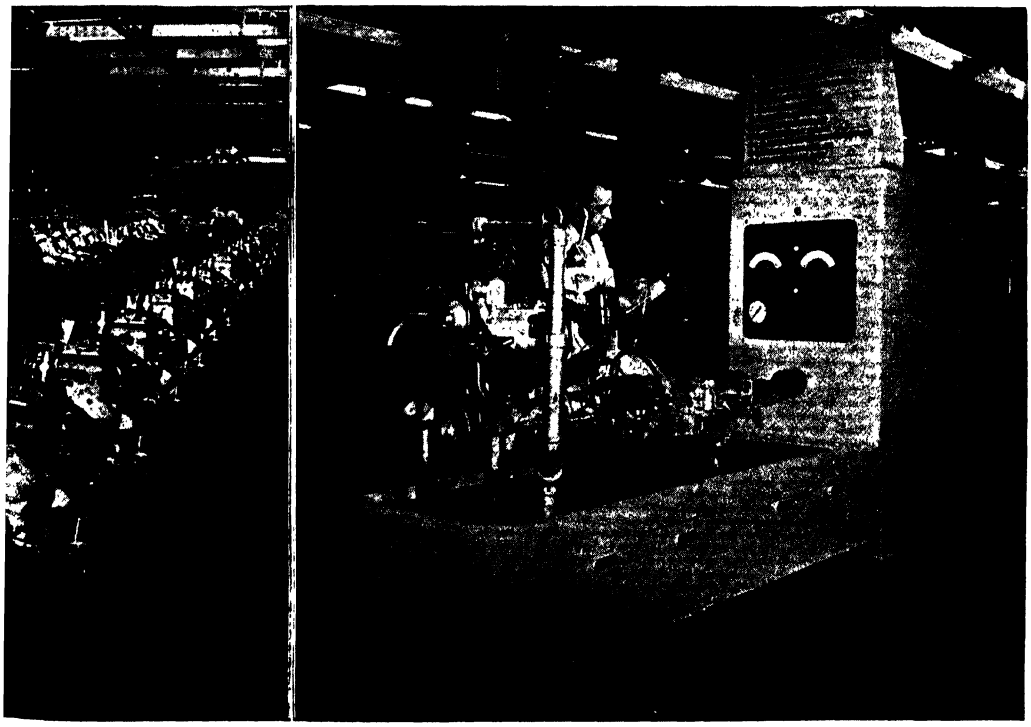


In this Engineer Testing Department every engine must first be run on test cradles and checked for leaks and general tightening up. Then on to the Dynamometer, where it must pass rigid horse-power tests, or be rejected.

BUILDING AND TESTING ENGINES



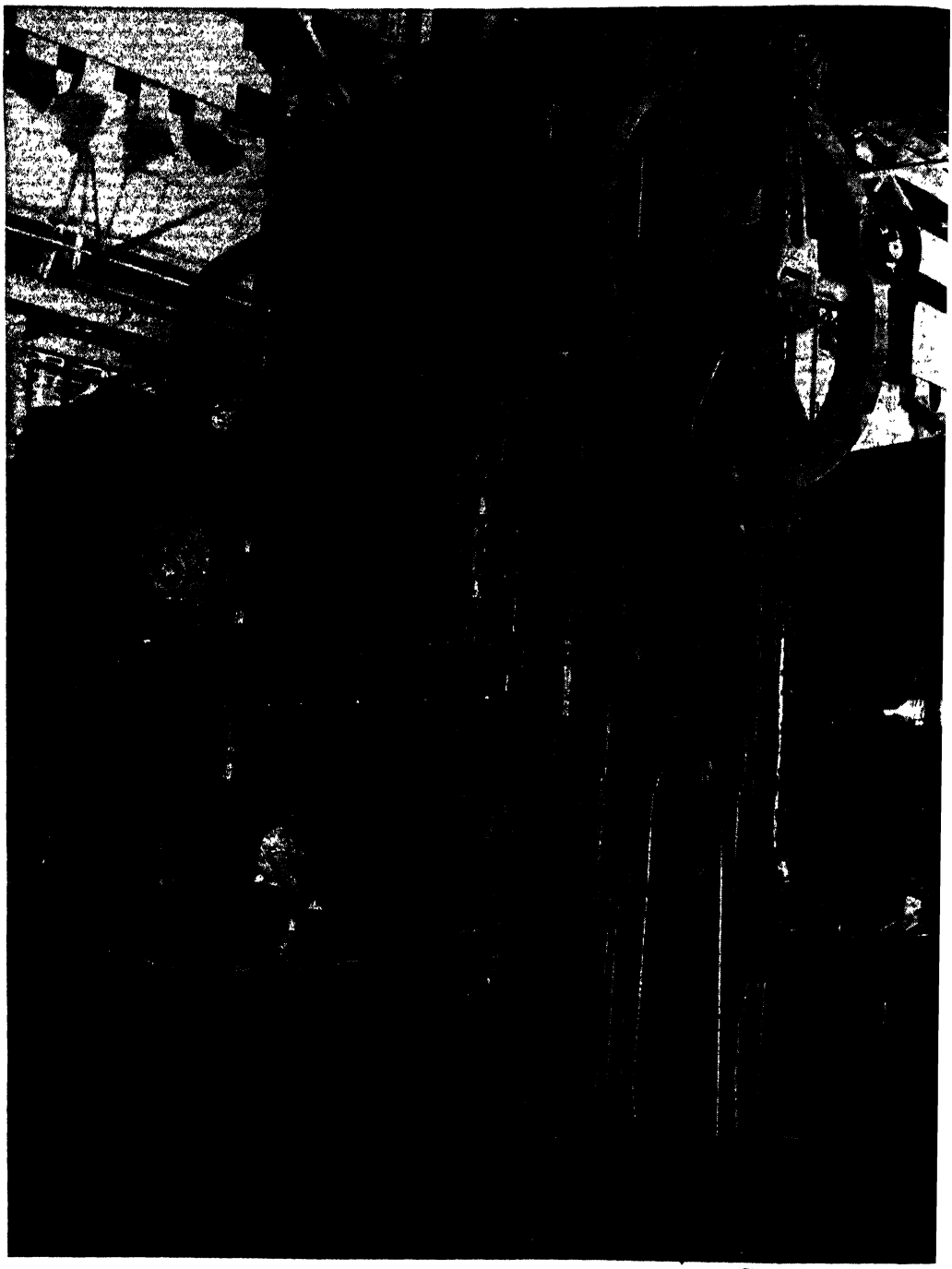
After being "block-tested," truck engines are sent to this "merry-go-round" sub-assembly line. Here, accessories and special equipment are installed, and the engine is then transferred by crane to the final assembly line.



All pictures, Chrysler Corporation

On the electronically controlled and fully automatic Dynamometer test stand, each engine is gradually stepped up to full load. An inspector checks the instrument panel showing many important things about engine performance.

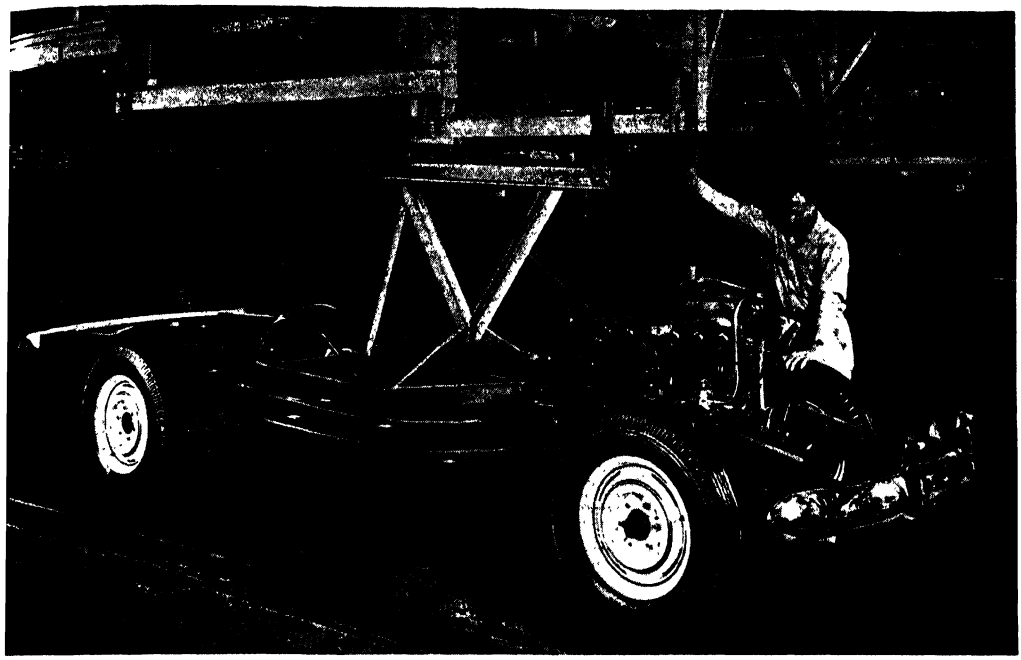
SHAPING THE BODY PARTS OF THE CAR



Chrysler Corporation

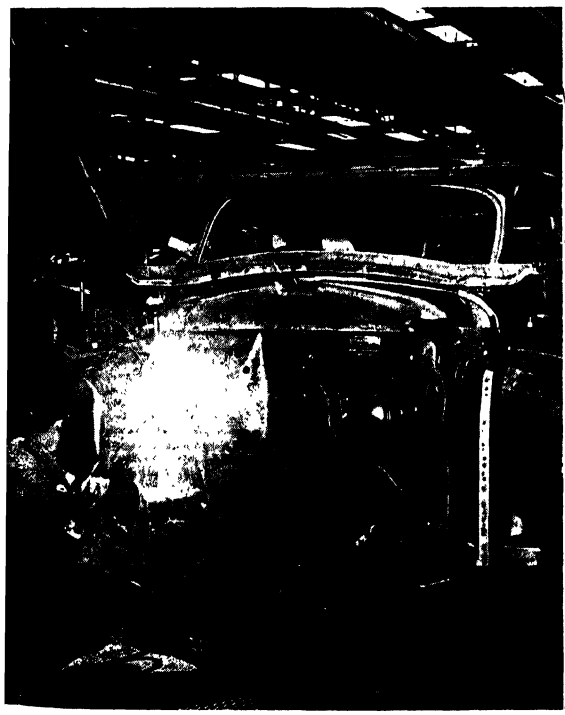
Much of the body of the finished motor car is made of thin sheets of metal which have been cut to the proper size and shape by great stamping machines. Giant doggle presses like these above stamp out thousands of fenders. Making the dies for these enormous presses requires much engineering and production study to avoid stretching the steel sheets too thin at one point or perhaps running out of metal at another.

VIEWS ABOUT THE ASSEMBLY PLANT



General Motors

A workman drops the suspended chassis, which contains all the running parts, down upon a floor conveyor.



Chrysler Corporation

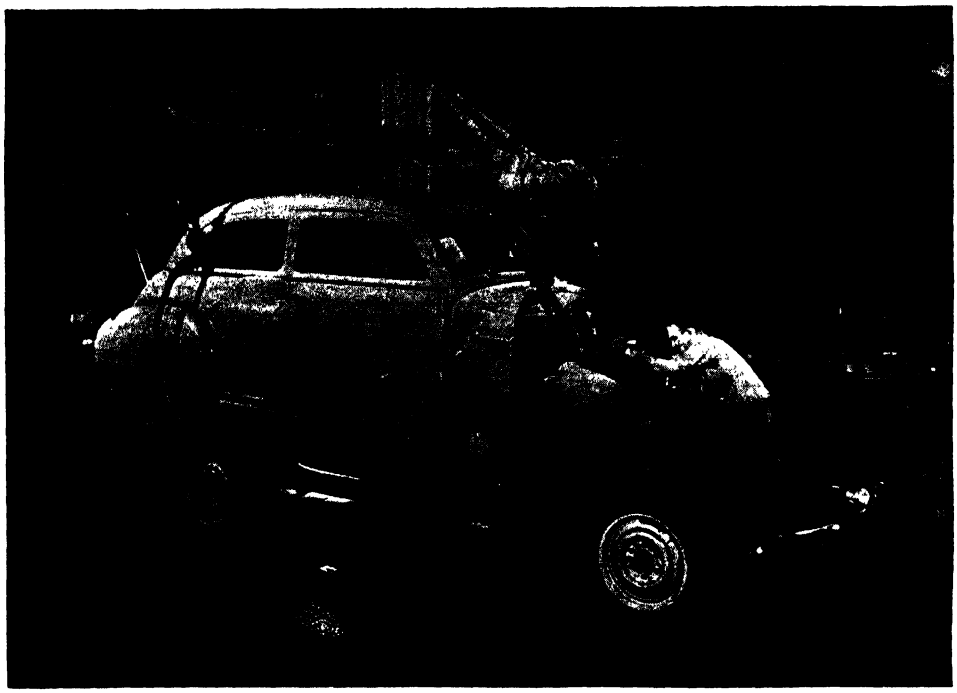
The auto body is held rigidly in a special vise as electric arc welding joins the sections together.



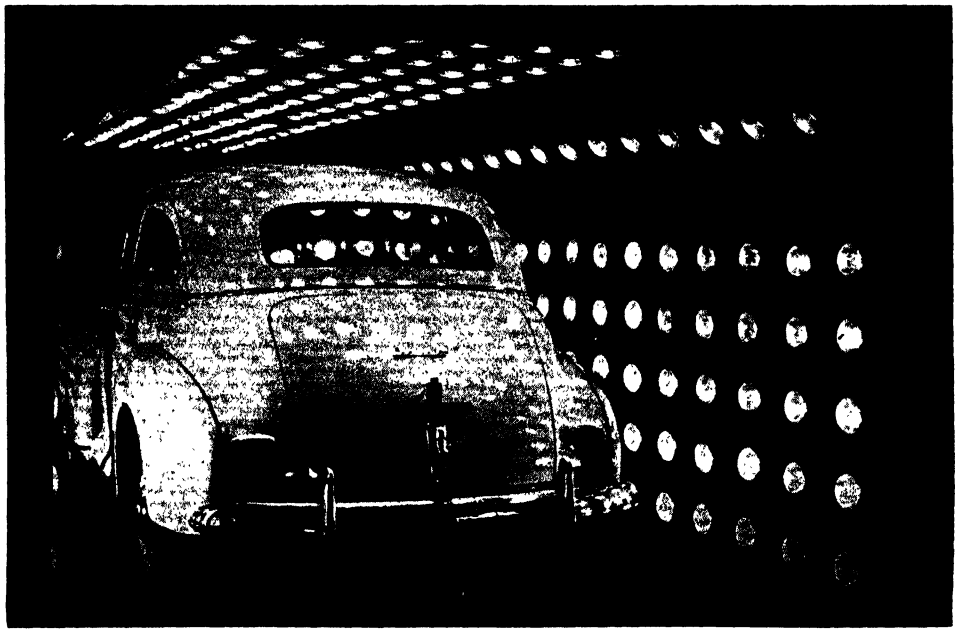
General Motors

By control of air flow, temperature and humidity, this paint spray booth is kept free of fumes.

COMPLETING THE AUTOMOBILE

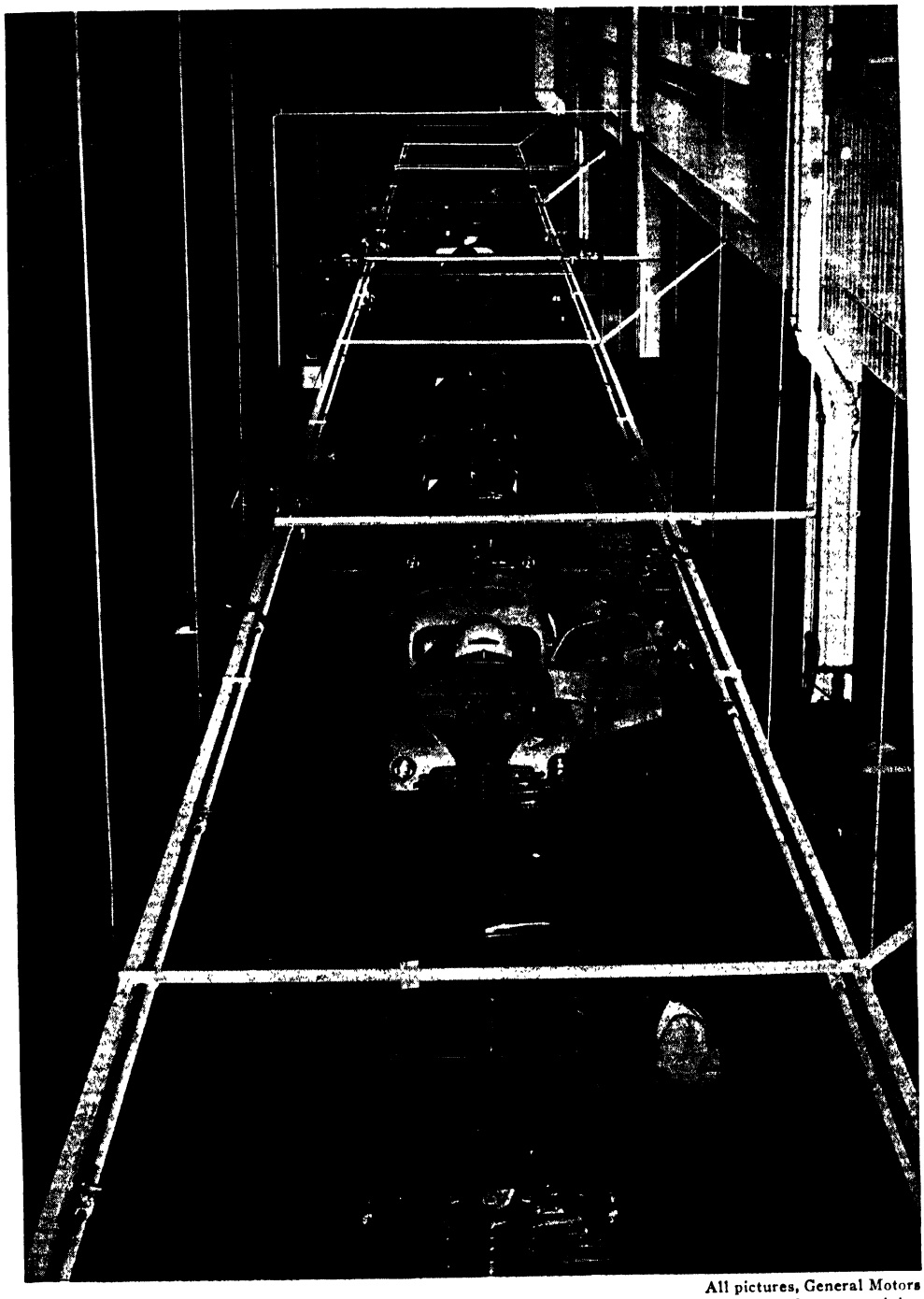


A dramatic moment as a team of assemblymen work the body drop, where the car body and the chassis first meet.



A bake booth where, under a battery of infrared lights, the car's paint is baked for glossy, durable finish.

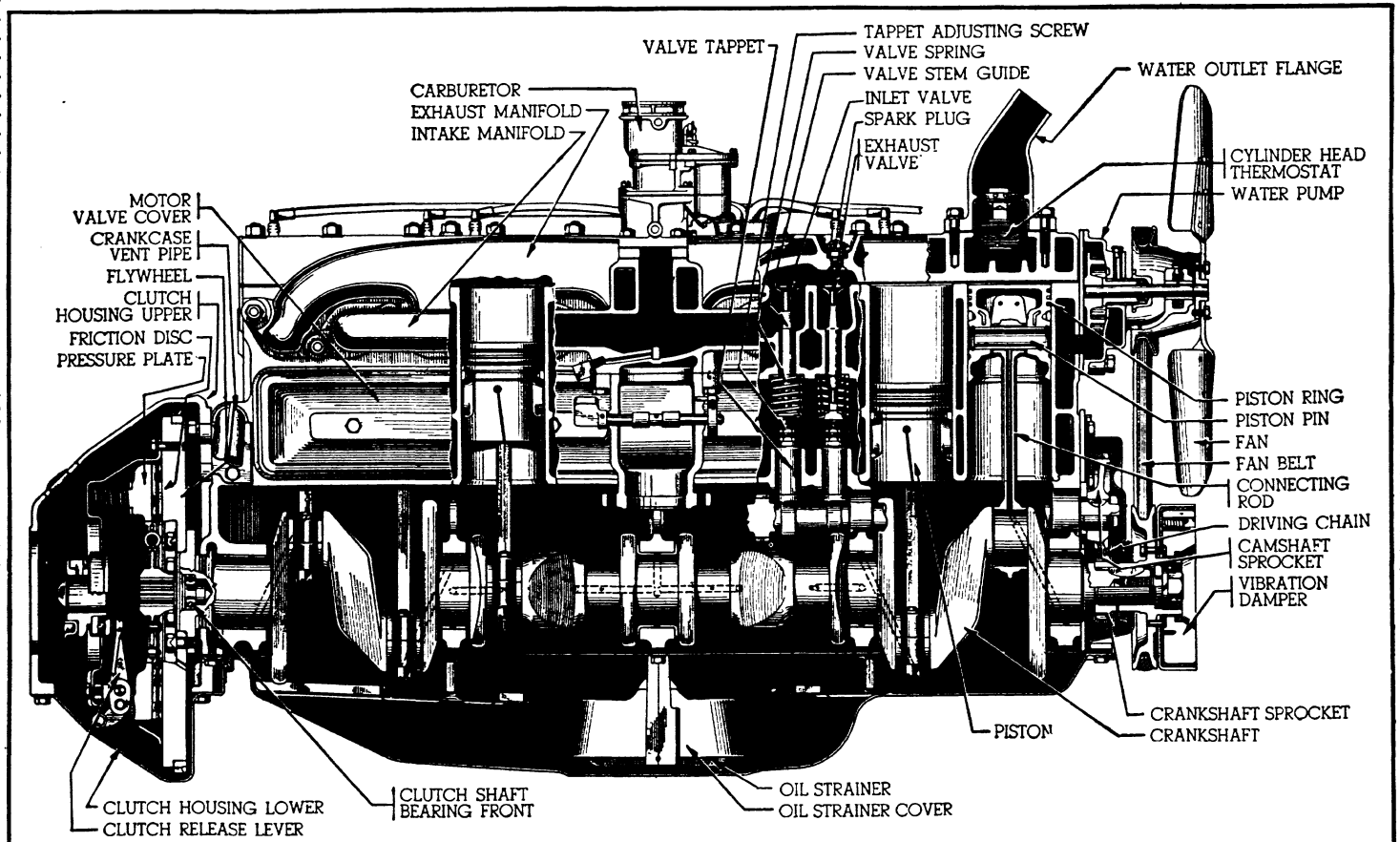
DOWN THE FINAL ASSEMBLY LINE



All pictures, General Motors

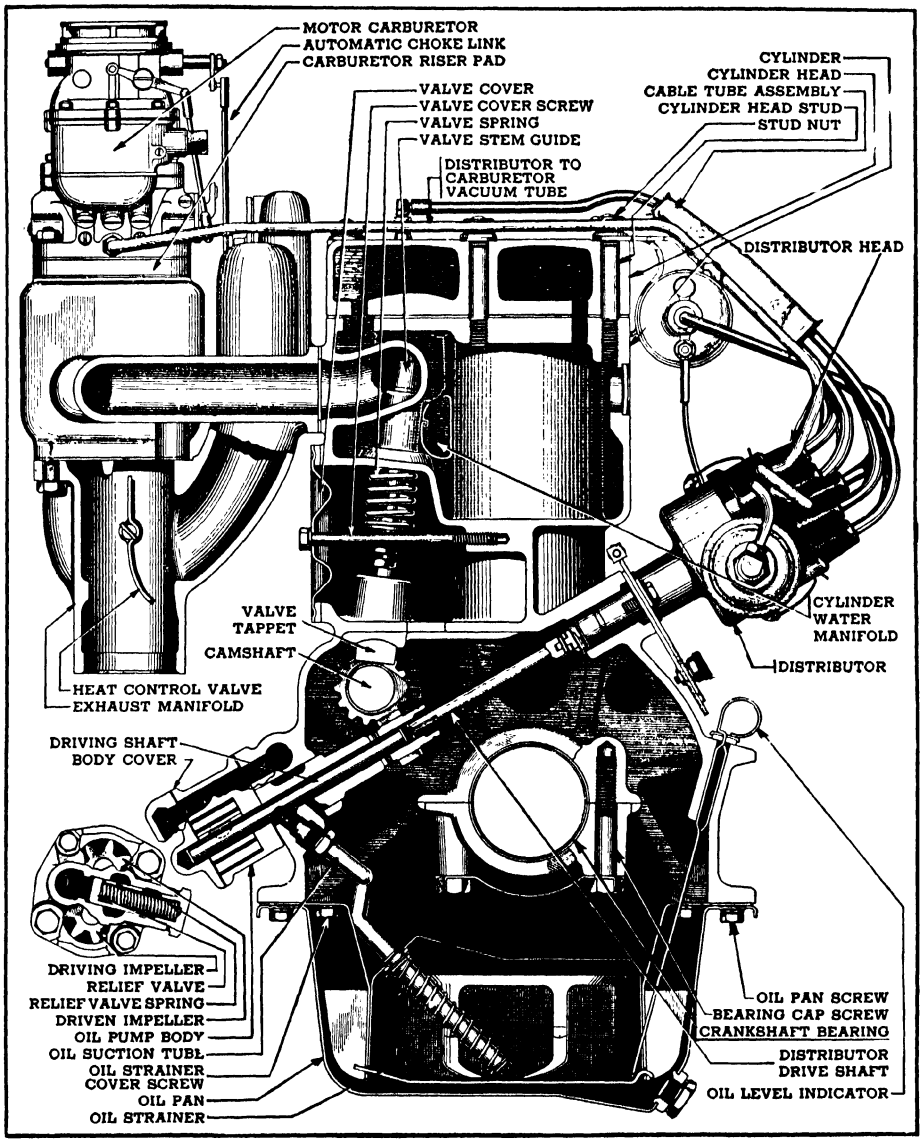
This view of a long final assembly line in a modern automobile plant shows nearly completed cars receiving finishing touches and preliminary inspection. Skilled workmen speed the new cars along to dealers and owners.

CROSS SECTION THROUGH A MODERN AUTOMOBILE MOTOR



7024

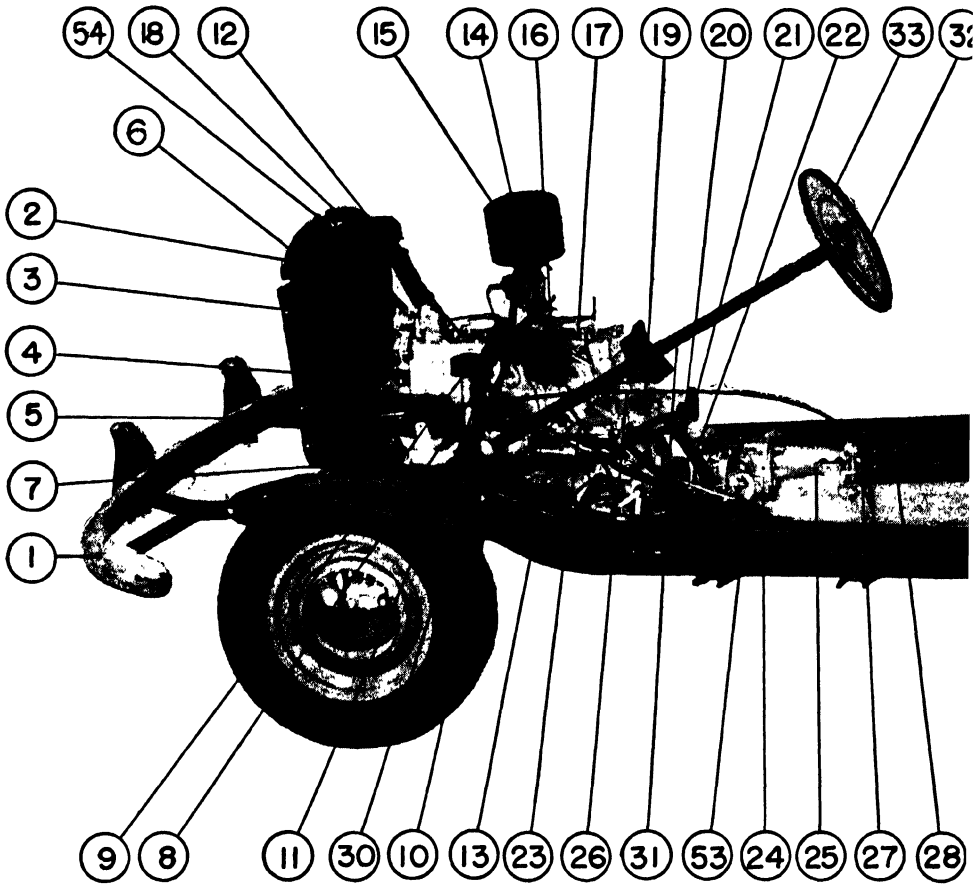
CUT-AWAY FRONT VIEW OF A MOTOR



The drawings on these two pages show sections through the Packard 120 eight-cylinder automobile motor. The cylinders are of the "L-head" type, that is, a cross section through the upper cylinder and combustion chamber is shaped like an L. The cylinders and the upper part of the crankcase are cast in one piece from an iron alloy of high resistance to wear. The cylinder head—the piece bolted over the top of the cylinders—and the pistons are of aluminum alloy. The power from the cylinders is transmitted to the crankshaft, and thence to the rear wheels. The crankshaft also turns another shaft—the camshaft—the projections or cams on which move the valves, admitting and expelling the gases to and from the cylinders. From this shaft also are driven the oil pump which takes care of the lubrication of the motor, and the timing mechanism which provides that each spark plug fires the gas in each cylinder at the proper moment. Details of the oil pump are shown above. For a proper understanding of just how such an automobile motor works, turn to pages 7031-32.

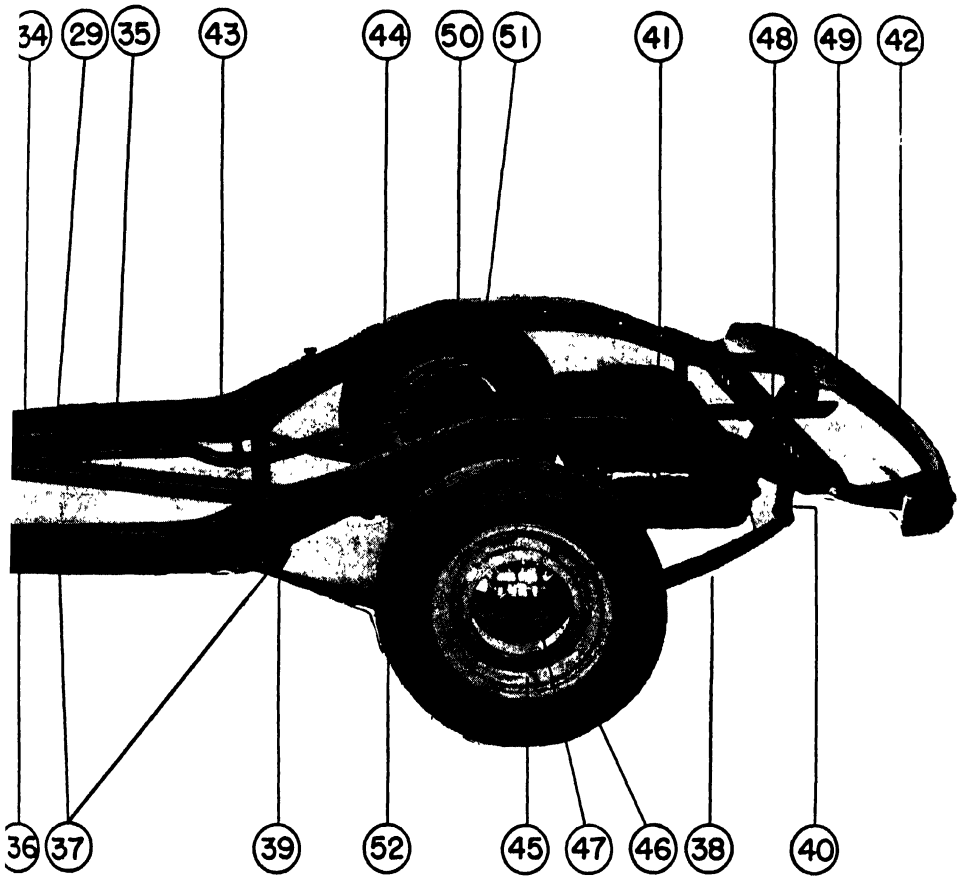
Courtesy Packard Motor Car Co.

FIFTY-FOUR PARTS OF THE CHASSIS



1. Front bumper
2. Radiator
3. Fan
4. Fan belt
5. Generator
6. Water pump
7. Upper control arm
8. Oil filler or breather pipe
9. Crankcase ventilator air cleaner
10. Ignition distributor
11. Ignition coil
12. Spark plug
13. Starting motor
14. Carburetor
15. Carburetor air cleaner
16. Oil filter
17. 6-cylinder engine
18. Radiator inlet hose
19. Clutch housing
20. Clutch pedal
21. Brake pedal
22. Accelerator pedal
23. Transmission gearshift control rods
24. Transmission
25. Transmission extension
26. Hand-brake control cable
27. Hand brake

In this picture many other parts are not shown. The bolts which fasten the wheels to the axles lie behind the hub caps; the brake drums and brake linings lie within each of the wheel brakes; the rear differential is hidden by the frame of the body as it arches over the rear wheel; the gearshift lies to the right of the



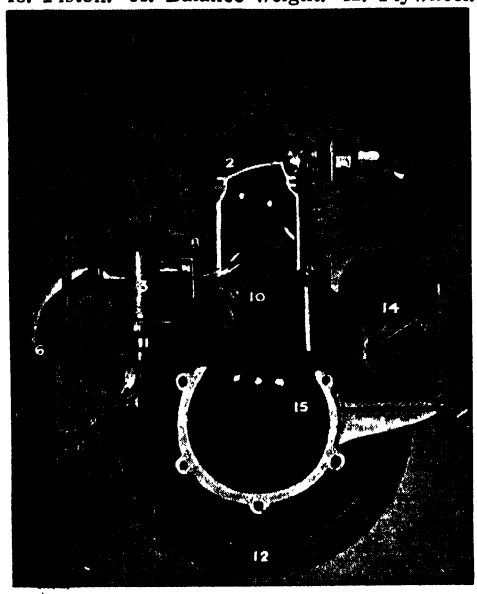
Chrysler Corporation

28. Ball and trunnion type front universal joint
29. Propeller shaft
30. Steering gear
31. Steering column
32. Steering wheel
33. Horn blowing ring
34. Exhaust muffler
35. Exhaust tail pipe
36. Fuel line
37. Body support brackets
38. Rear spring
39. Rear spring front hanger
40. Rear spring shackle
41. Fuel tank
42. Rear bumper
43. Frame
44. Rear shock absorber
45. Wheel
46. Tire
47. Hub cap
48. Fuel-tank filler tube
49. Fuel-tank filler cap
50. Rear axle
51. Rear-wheel brake
52. Rear universal joint
53. Hydraulic-brakes master cylinder
54. Radiator-filler cap

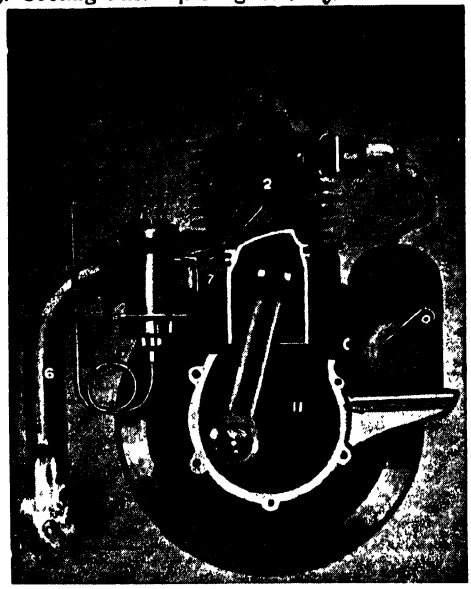
steering column. The parts in the motor that do not show are the pistons, piston rings, wrist pins, connecting rods, main and connecting rod bearings, and the crankshaft. In the water pump there is a revolving impellor that circulates the water. The instrument panel, battery and headlights have also been omitted.

TWO-STROKE STATIONARY OR MARINE ENGINE

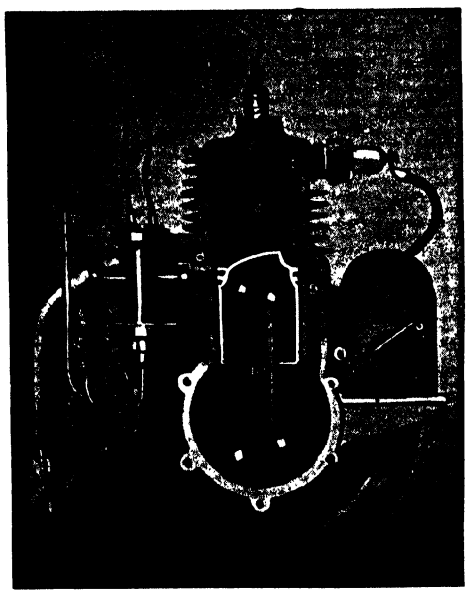
The numbered parts of the engine are: 1. Spark plug. 2. Cylinder. 3. Carburetor. 4. Carburetor control. 5. Gas line. 6. Exhaust pipe. 7. Inlet port. 8. Exhaust port. 9. Transfer port. 10. Piston. 11. Balance weight. 12. Flywheel. 13. Cooling fins. 14. Magneto. 15. Crank case.



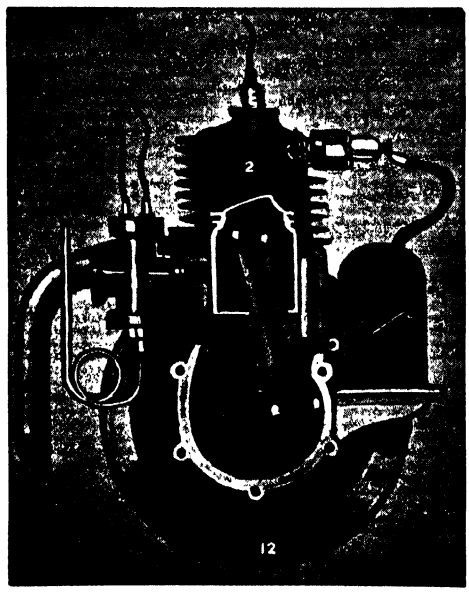
Here we see the piston at the top of its stroke with the gas above it highly compressed and ready for the spark which will ignite it. When the piston head is in this position, gas from the carburetor enters the lower part of the cylinder and the crank case. This is a right-hand engine.



The explosion of the gas has driven the piston down, closing the inlet port from the carburetor and opening the exhaust port to enable the burned gas to pass out. The transfer port on the right is closed by the piston head here and in the picture to the left; it is open in the lower left-hand picture.



The balance weight now brings the piston head still lower, opening the transfer port, and so allowing the gas (which is partially compressed) in the crank case to enter the upper part of the cylinder.



The force of the down stroke causes the balance weight and flywheel to continue turning and so pushes up the piston once more. The gas above the piston is compressed for the next stroke.



Courtesy, Chevrolet

The Chevrolet Fleetline Aerosedan, developed just before the United States entered the war.

WHAT MAKES A MOTOR CAR GO?

WHAT makes a motor car go? The engine. Yes, but how does the engine make the wheels go round? Is the principle that of the steam locomotive, which is explained in Volume 2? There used to be motor cars propelled by steam, and they were built on exactly the same principle as the steam locomotive, only, of course, they did not run on rails. On pages 406 and 407 are some diagrams which show how water heated in a boiler is turned into steam; the steam is admitted into cylinders, where it pushes the pistons forward and back; rods are attached to the pistons and the other ends of the rods are attached to the wheels in such a way that when the piston moves, the wheels turn.

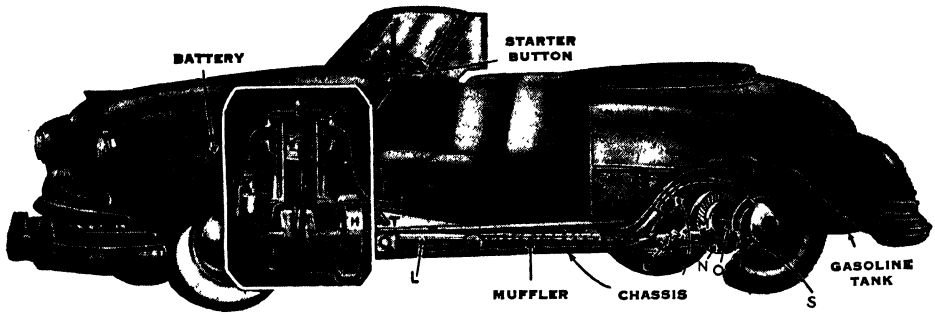
In the early days of automobiles, small electric cars also were popular. They were run by electricity supplied by storage batteries. Some electric delivery trucks are still used in large cities, but one rarely sees an electric passenger car any more.

The majority of modern passenger automobiles, trucks and motor busses are operated by internal combustion engines that use gasoline or oil for fuel. The oil-burning engines are called Diesels and are used mostly in large trucks and busses.

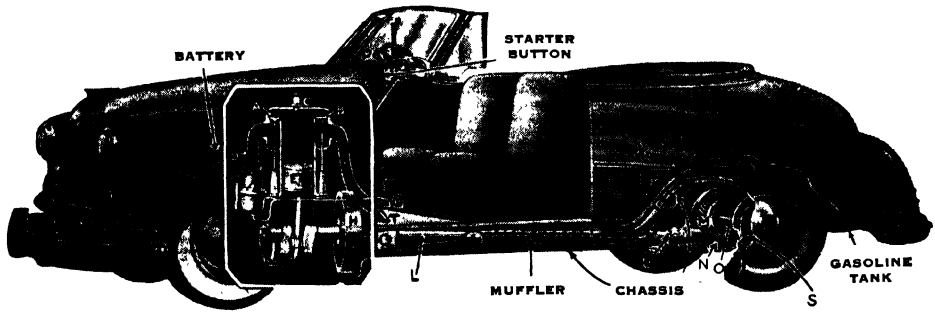
The pictures on pages 7024 and 7027, and 7030 to 7032 show quite well how an internal-combustion engine works. Like the steam engine, it has cylinders with pistons and rods, gears and a drive shaft that transfer the power to the wheels and so make the car move. In a gasoline engine, the gasoline is fed from the tank into an apparatus called the carburetor. In the carburetor it is mixed with air and becomes a vapor. The vapor is sprayed into the cylinders where it is exploded by an electric spark from the spark plug. The gas produced by the explosion expands enormously and drives the pistons downward with great force. These pistons are connected with the crankshaft and make it turn.

Study the pictures and their explanation on the two pages that follow. The fact that a real car has four, six or eight cylinders makes no real difference in the principle. The larger number of cylinders makes the engine more powerful and causes it to run

THE HEART OF A MOTOR CAR



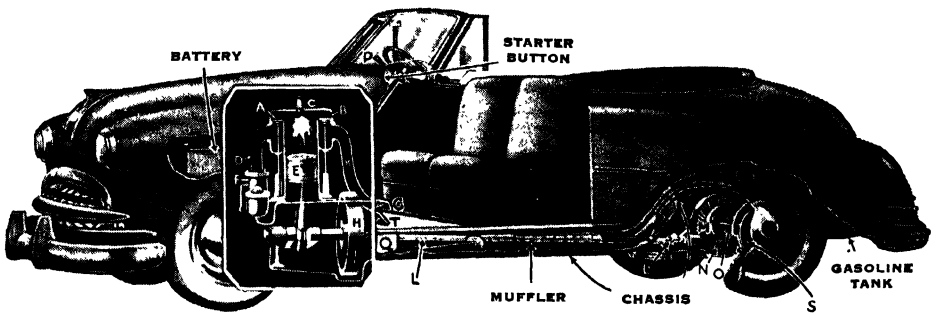
What you see in the front half of the picture is not the engine of an automobile, but the diagram of a small part of the engine. Furthermore, the parts which we have labeled D and K are really not at the front and rear of the engine, respectively, but at the sides; we have turned them around in this way in order to make the workings of the engine clearer. We show only one cylinder, much enlarged; the ordinary automobile engine has six or eight. The diagram omits the cooling and oiling systems and dozens of other important parts, but it shows, better than any picture of the whole engine could do, just what makes the engine run. Let us now learn the names of some of the important parts shown in the diagram. The intake valve A is shown open so that gas may be drawn into the cylinder; B is the exhaust valve, through which the used-up gas escapes; C is a spark plug; D is the intake pipe, through which gas passes on its way to the cylinder; E is the piston, which fits closely within the cylinder walls. It is joined by the connecting rod J to the crankshaft I, which is fastened to the flywheel H. The brake drums on the inner sides of the wheels are marked S; the foot-brake pedal is marked G. The names of some of the other necessary parts which you see lettered in the above diagram will be explained in the descriptions of the diagrams which follow this one.



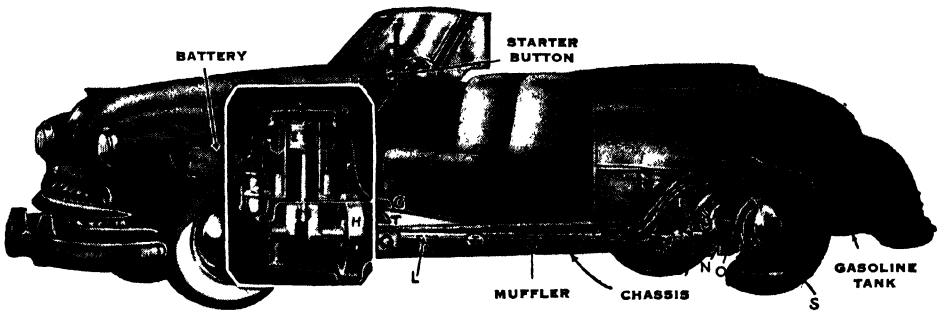
Now let us see what happens when we push the starter button, which may be on the instrument board or upon the floor. A current of electricity runs from the battery to the electric starter (not shown). The starter makes the flywheel H and the crankshaft I turn, and the piston E is pulled toward the bottom of the cylinder, thus creating a partial vacuum. Gasoline, which has passed through a pipe from the tank at the back into the carburetor F, is broken up into a fine spray as air rushes in to fill the vacuum in the cylinder. The spray is mixed with air in the proportion of about one part to fifteen of air. This mixture, which is a very explosive vapor, is drawn through the pipe D and the valve A into the cylinder. When the piston E has reached the bottom, both valves A and B are closed, and the flywheel, as it continues to rotate, pushes up the piston. As the piston fits very closely within the cylinder, the vapor is compressed into a much smaller space. Smooth but elastic metal rings encircle the piston and press against the smooth wall of the cylinder; they prevent the compressed vapor from getting past the piston.

Diagrams, copyright, The Grolier Society Inc.

THE HEART OF A MOTOR CAR



As the piston E nears the top of the cylinder, and the gas has been compressed into a very small space, the spark plug C, from which a wire runs to the ignition coil (not shown), and to the battery, gives off an electric spark inside the cylinder. The compressed mixture of gasoline vapor and air instantly explodes, and drives the piston down with tremendous force. This explosion furnishes the energy which turns the drive shaft and causes the car to move. The connecting rod and the crank shaft make the flywheel spin swiftly, and as it rotates it pushes the piston up again. Exactly the same things are going on in the other cylinders of the car, but the explosions are arranged to occur at different times, so that the flywheel may turn smoothly and with uniform speed. When the car is running rapidly the explosions take place a very tiny fraction of a second apart. The generator, which is not shown in the diagram, is a small dynamo, which is constantly furnishing electricity to the battery while the engine is running. Without the flywheel the piston might lose momentum and stop at the bottom of the cylinder after the first explosion. You can see the great flywheels on steam engines illustrated on other pages of our book.

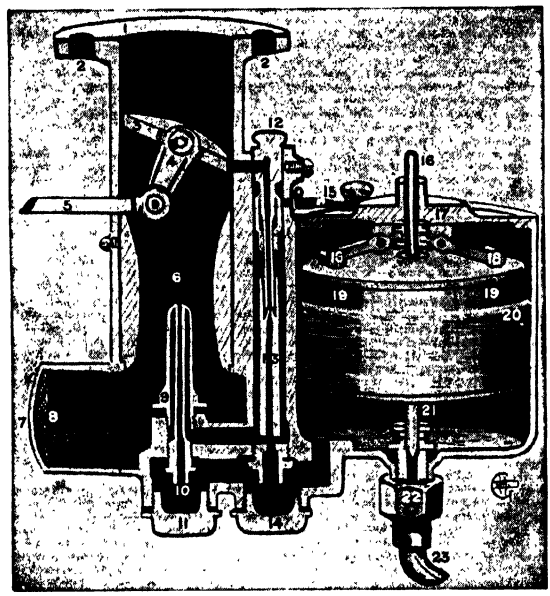


As the piston starts upward after the explosion, the exhaust valve B opens and the used-up gas is forced out through the exhaust pipe K and the muffler, which softens the noise of the explosion. As the flywheel continues to turn, the exhaust valve B closes, the piston starts downward, the valve A opens, more gas is sucked into the cylinder, as described under the first picture, and the whole process is repeated. The crankshaft and flywheel can run without moving the car, or can be connected with the drive shaft L in the transmission Q. The drive shaft L by means of the cogwheels M and N turns the rear axle O, and makes the car move. Whether the car stands still while the engine is running, goes backward, or moves forward at low, intermediate or high speed is governed by the gear shift lever P, which moves cogwheels inside of Q. The engine can be disconnected from the transmission by pressing upon the clutch pedal T; the engine can be connected to the drive shaft by releasing the pedal. Some cars use a different method of transmitting power from the engine to the wheels.

Diagrams, copyright, The Grolier Society Inc.

more smoothly, but the one cylinder of our diagrams shows the principle, and that is what you are after.

The next important thing is the carburetor. This little device furnishes the gasoline in such shape that it can be exploded in the cylinders. If you will study the diagram of a carburetor in this story and the diagrams on the other pages you will be able to understand how it works. There are many different types of carburetors, but all do the same thing; that is, they break up the gasoline into a fine spray and mix it with air. When the piston is drawn down, a partial vacuum is created in the cylinder and in the pipe which leads to it. Air rushes in from outside to fill the vacuum. As the air passes through the carburetor, gasoline is drawn through a tiny jet, at once breaks up into vapor and is drawn into the cylinder with the air. The carburetor is adjusted to furnish only a certain amount of gasoline. Usually the mixture is about one part of gasoline and fifteen parts of air. If there is more gasoline, we speak of the mixture as "rich." If there is less, it is "lean." Of course it is economical to use as little gasoline as possible and still keep the engine moving with smoothness and with sufficient power.



THE CARBURETOR, IN WHICH THE GASOLINE IS VAPORIZED AND MIXED WITH AIR

1. Flange. 2. Bolt hole. 3. Butterfly throttle. 4. Throttle spindle. 5. Throttle lever. 6. Choke tube. 7. Air inlet. 8. Gauze. 9. Main-jet cover. 10. Main jet. 11. Plug under main jet. 12. Knob of idling device. 13. Adjustment piece of idling device. 14. Plug under compensating jet. 15. Spring holding down cover of float chamber. 16. Tickler. 17. Float-chamber cover. 18. Counterweights. 19. Float. 20. Gasoline level. 21. Float needle. 22. Gasoline pipe union. 23. Gasoline pipe.

As you can see by the diagrams, after the mixture is drawn into the cylinder the piston comes up again and compresses it. When the piston is near the top of the cylinder an explosion takes place and drives the piston violently toward the bottom of the cylinder. How does this happen?

By the side of the engine is a tiny dynamo, similar to the great dynamos which drive heavy machinery to furnish the lights of a city. This generates electricity which is stored in the batteries. From this reservoir current is drawn for starting the motor, for lights, and even if the generator stops working, the battery can furnish enough current to keep the car going for a considerable distance. For exploding the charge, the current passes through the ignition coil and then by wires it goes to every spark plug. In the lower end of the spark plug, projecting into the cylinder, there is a gap in the wire about the thickness of a dime. As the current jumps this gap a spark is produced which sets the explosive mixture on fire. The resulting explosion drives down the piston. The current to the spark plug is not continuous, but is arranged to jump the gap only when the mixture has been compressed by the rising piston. The top picture on page 7031 explains this quite clearly.

Though a modern motor car is very complex, and hundreds of parts are required to enable it to do the things we have mentioned, these are really the essential things. That is, a mixture of gasoline vapor and air is drawn into the cylinders through the carburetor, and is there compressed. Near the point of greatest compression an electric spark, which has been generated by a small dynamo, explodes the mixture.

These are not all the important parts of a motor car, of course, but the gasoline system and the electrical system are vital, because they furnish the power. If either of these is out of order the car will not run.

THE NEXT WONDER QUESTIONS ARE ON PAGE 7245.



© Philip Gendreau, N. Y.

A shepherd of the pampas, Argentina.

THE REPUBLICS OF SOUTH AMERICA

PART II

IN the first part of our story of the South American republics we told you about the countries in the northwest and west, and the two little countries of Uruguay and Paraguay, and the struggles they have had to gain freedom and settled government. In this part we shall tell you the story of the A, B, C countries, as they used to be called, the three more powerful republics of Argentina, Brazil and Chile.

The old name for Argentina was the Viceroyalty of La Plata, and the viceroy had his seat of government at the city of Buenos Aires, the beautiful city which is now the capital of the republic. Trouble for the Spanish government began in Buenos Aires in 1806, some time before the revolution, for when Spain was in alliance with Napoleon, a British expedition invaded the province. The viceroy ran away, but the Argentines, under a Frenchman named Liniers, defeated the British, and captured a large force. They likewise defeated a second British expedition and took many prisoners. These were later freed and numbers of them settled in the country. It is said that their influence helped to bring on the revolution against the tyrannical rule of Spain.

The revolution began in Buenos Aires on May 25, 1810, when a *junta*, or committee, was appointed to take over the government from the viceroy, who, compelled to resign, was sent out of the country. But though the viceroy went quietly, the revolution was not peaceful. Not only were there Spanish garrisons in the towns, but the people were divided. Many who called themselves Royalists wanted the old conditions to continue, and the war began. It lasted for seven years.

At the beginning of the war the Patriots, as the revolutionists called themselves, had many ups and downs. But in 1812 the Patriot army, under General Manuel Belgrano, defeated the Royalists in the battles of Tucumán and Salta, and these two victories decided the independence of Argentina. The next year Colonel José de San Martín, an officer who had gained experience in the Peninsular War in Spain, gained command of the armies, and was able to keep actual fighting out of Argentina. There was much fighting in Argentina afterward, but it was among the Patriots themselves, and was caused by the mistakes made in learning how to govern themselves.

The Spanish Viceroyalty of La Plata had



Courtesy, Union Stock Yards, Buenos Aires

Scene at a cattle auction in Buenos Aires. Around four and a half million head of cattle are slaughtered in Argentina each year, about five and a half million sheep and almost a million hogs.

been made up of a number of smaller provinces, and now an effort was made to unite all these provinces into a confederation. There was jealousy among the provinces, however, and Bolivia, Paraguay and Uruguay declined to join, and set up governments of their own. The other provinces formed the Confederation of Argentina, and in 1825 they adopted a constitution, but it was long before there was any real unity in the country.

When we compare the Revolution in North America with the revolutions in South America, we must remember one great difference between them. In North America the Revolution was the result of the opinions of a large number of people expressed by their chosen representatives. In South America the leaders chose themselves and proceeded to make the revolutions. Naturally, in such a case there would be disagreement among the leaders, and even before the war of independence was won they began to quarrel.

For a while the quarrels among the Patriots in Argentina caused something like anarchy, and at one time some of the leaders thought even of turning the government into a monarchy. In 1826 Rivadavia, a statesman who had done much for the good of his



Courtesy, Union Stock Yards, Buenos Aires

An Argentine vaquero (cowboy) in his old-time picturesque outfit. His pony has silver-mounted harness.



© James Sawders

The skyline of Buenos Aires, one of the most beautiful cities in the world, with fine, imposing buildings, wide streets and handsome parks. It is the capital of Argentina and the third largest city in the western hemisphere.

country, was elected president. He tried to establish a strong government, and although his power lasted only a year, he succeeded in that short time in improving the laws. He was anxious that education should be improved and it was he who established the University of Buenos Aires.

Before long, some of the provinces in the Confederacy sought to make themselves independent, and for some years there was civil war, anarchy and tyranny. So that you may understand the cause of the trouble we must tell you that there are two kinds of republics. One is like the United States, which comprises a number of states united under one government, but in which each state has certain powers of self-government. The other kind is like that of France before 1940, which had only a central government. The provinces had no power to make laws. Some of the people of Argentina wanted the first kind of government, and were called Federalists. Others wanted a government like that of France, and were called Unionists. In the midst of the confusion there was a war with Brazil for the possession of Uruguay, which lasted for years.

All this trouble and confusion gave Juan Manuel de Rosas, the leader of the Federalist party, an opportunity of seizing the government, which he controlled for more than twenty years. During the greater part of this time he was a dictator. In 1852 Rosas was driven from the country, and immediately afterward a new constitution was adopted by all the provinces except Buenos Aires, which refused to accept it and was allowed to stay outside the Confederation. Ultimately there was a civil war, which ended by Bartolomé Mitre, the president of Buenos Aires, becoming president of the Confederation, and the city of Buenos Aires being again made the capital. During President Mitre's administration war was begun against Argentina by Paraguay. Uruguay and Brazil joined forces with Argentina, and Paraguay was defeated in the war, which lasted for five years, from 1865 to 1870. Since its close, Argentina has enjoyed many years of peace, and has prospered exceedingly.

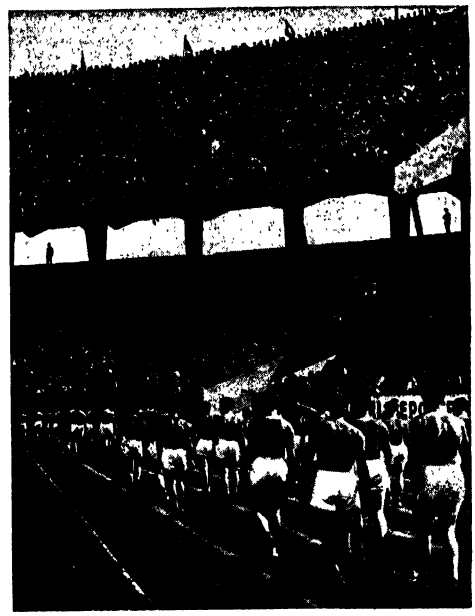
Argentina has great natural wealth in its fertile plains, or pampas, which provide grazing-ground for immense herds of cattle and horses and flocks of sheep. Large tracts of land are devoted to the cultivation of wheat and other crops. The northern part of Argentina is tropical, while the south stretches far down into the temperate regions, so that almost every kind of crop can be grown within the limits of the country.

The population is about 13,000,000, mostly whites of Italian and Spanish descent. The native Indian population is slowly dwindling. There are between 20,000 and

30,000 now. There is a certain amount of Indian blood, however, in the veins of many more thousands of Argentineans.

Chief cities are Buenos Aires, the capital, with 2,317,755 population; Rosario, 511,007; Córdoba, 288,916; La Plata, 190,577; Avellaneda, 230,775; Santa Fé, 142,327; Tucumán, 140,000; and Bahía Blanca, 108,310.

There are not many Indians in Argentina, and most of them live in the hot northern territory. Rosas made war against the wild Indians of the southern plains and reduced them to helplessness, and the tall Patagonians have almost died out. The picturesque *vaqueros*, or cowboys, of Argentina are of part Indian and part Spanish descent. The white people who were in Argentina at the time of the revolution were nearly all Spanish, with very little Indian mixture. Since then people from every country in Europe have gone to live there. Unfortunately these people live in numerous little colonies of their own, instead of mixing with one another to make one people.

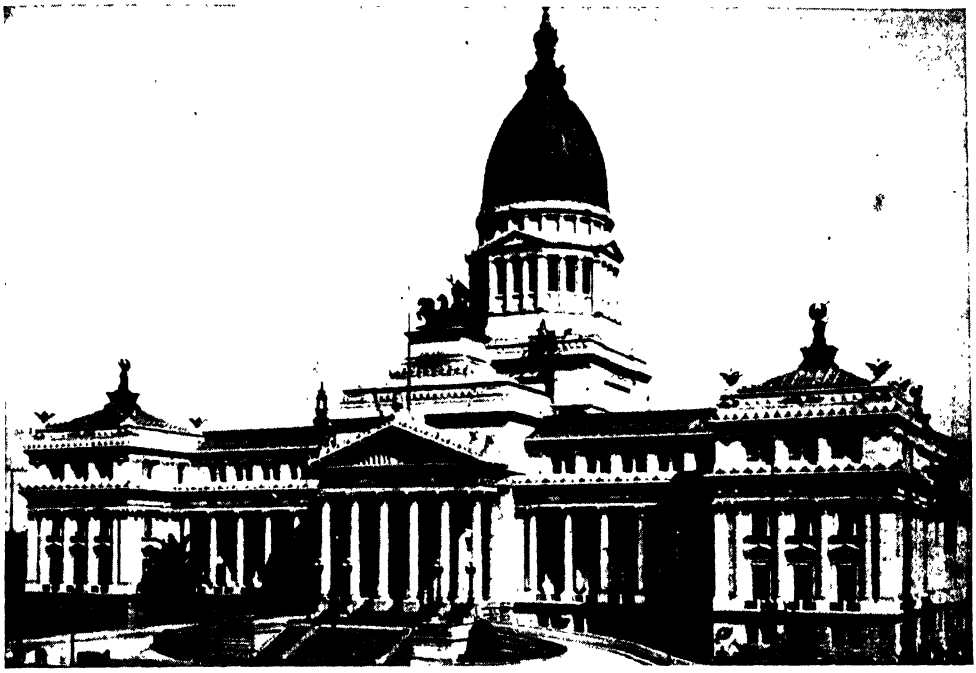


The people of Argentina are fond of sports.



Pictures, courtesy, Moore-McCormack Lines, Inc.

The Presidential Guard in Buenos Aires. The building with pillars is the cathedral, dating from 1752.



The Capitol of Argentina, called the Palace of the Congress, at Buenos Aires, opened in 1892.

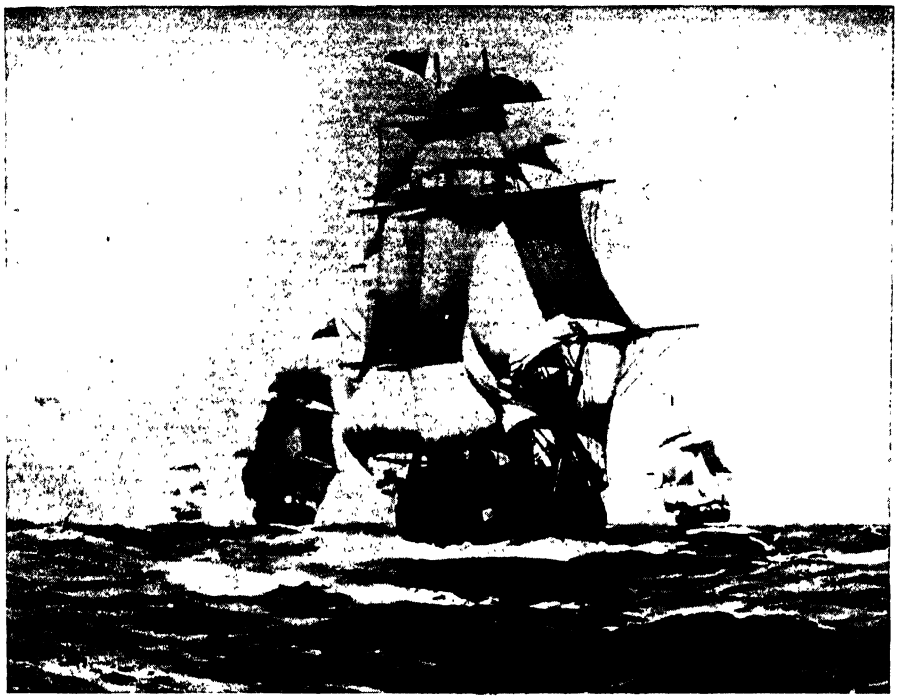
A few months after the revolution began in Argentina, Chile followed the example of the Argentines. The Spanish governor was forced to resign, and a Chilean *junta* undertook the government. Naturally, just as they did in the provinces, the Spaniards tried to retain their power by force, and for a time it seemed as if they might succeed. From the beginning the revolutionary leaders were jealous of one another, and because of their desperate quarrels it was impossible to make headway against the Spanish army. The Patriots, however, struggled on until 1814, but in that year they were badly defeated; the Spanish were enabled to take control of the government again, and the revolutionary leaders had to leave the country. One of them, Bernardo O'Higgins, fled to Argentina and took refuge in Mendoza, and there met José de San Martín, who had been made governor of the province.

Argentina, as we have seen, was already distracted by disputes. But San Martín, who sought nothing for himself, had not been drawn into the disputes, and therefore he was free to go to the aid of Chile, a task he was all the more willing to undertake because he knew, that with Peru and Chile in her power, Spain would soon be in a position to attack his own country. Before long he got together a well-trained army of Argentines, chiefly *gauchos,* and taking O'Higgins as his second in command, he made a great march through the Andes and defeated the Spaniards in a pitched battle not far from Santiago. The next year the Spaniards made another effort to subdue the Chileans, but were defeated in two battles, and from that time on there was no doubt of Chilean independence. Then the Chileans set to work to build a fleet, which, as we have told you, took San Martín north to Peru to free that country.

THE EARLY TROUBLES OF THE REPUBLIC OF CHILE

Meantime Bernardo O'Higgins was made director-general, or, rather, dictator, of the republic, and in spite of many dissensions he was able to organize the government and to keep peace for five years. At the end of that time he saw that the people had turned against him, and to save the country from revolution he resigned. A constitution was then adopted, but the new government did not last long. In fact, in the next seven years there were no less than ten changes of government, and three different constitutions

MAKING HISTORY IN CHILE



This beautiful picture shows the ships in Chile's first navy, commanded by Lord Cochrane, a brilliant Irish sailor. These ships took the Chilean ports of Valdivia and Valparaiso from the Spaniards, and carried San Martin and his army to the aid of Peru. As you have read, the army was successful.



When Bernardo O'Higgins, the first president of Chile, found that if he stayed in power there would probably be a civil war, he resigned his office and quietly went away to Peru, where he lived till his death. Chile has had fewer revolutions than any other Spanish South American republic.

were drawn up and adopted. There was an Indian war and there was civil war, there were quarrels between the Church and State, and there was trouble caused by lack of money, and the republic seemed to be drifting toward complete disaster.

At last, however, a strong conservative government took the reins of power. One conservative president after another ruled with a strong hand, and all power fell into the hands of a few great landowners, while great masses of the people were denied a share in the government. But for thirty years there was peace, and during this time the country made long strides in progress. Railway and telegraph lines were built, banks were established, and schools and libraries were founded. During this peaceful period at home Chile went to the help of Peru in the little war with Spain, of which we told you on page 6981. There were boundary disputes with Argentina which were peacefully settled for the time, and there was a boundary dispute with Bolivia, which in 1879 led to a war that was disastrous for both Bolivia and Peru, but that resulted in great territorial gains for Chile, as well as added prestige in South America as a military power.

In this war Chile found itself facing two foes, for Peru had gone to the aid of Bolivia. But the Chileans outgeneraled the Peruvians and Bolivians in every move. The Peruvians won one naval battle in the first year of the war, but they were hopelessly overmatched both on land and sea, and Chile won the war. The Peruvian province of Tarapacá and the Bolivian province of Antofagasta were ceded to Chile, thus shutting Bolivia off from the sea completely except for right of way over the railroad through Chilean territory. The provinces of Tacna and Arica remained in Chile's hands but the treaty provided that a plebiscite should be held after ten years to determine whether they should remain Chilean or revert to Peru. This plebiscite was put off again and again, but the matter was finally settled in 1929 by direct negotiations between the two countries. Tacna now belongs to Peru and Arica to Chile, while Peru has free use of part of the Bay of Arica.

In 1887 the peace that Chile had enjoyed at home was broken. In that year the president, José Manuel Balmaceda, who had roused opposition against himself, tried to carry on the government without calling a session of the legislature. This high-handed proceeding was followed by civil war. The



Courtesy, Chile Exploration Company

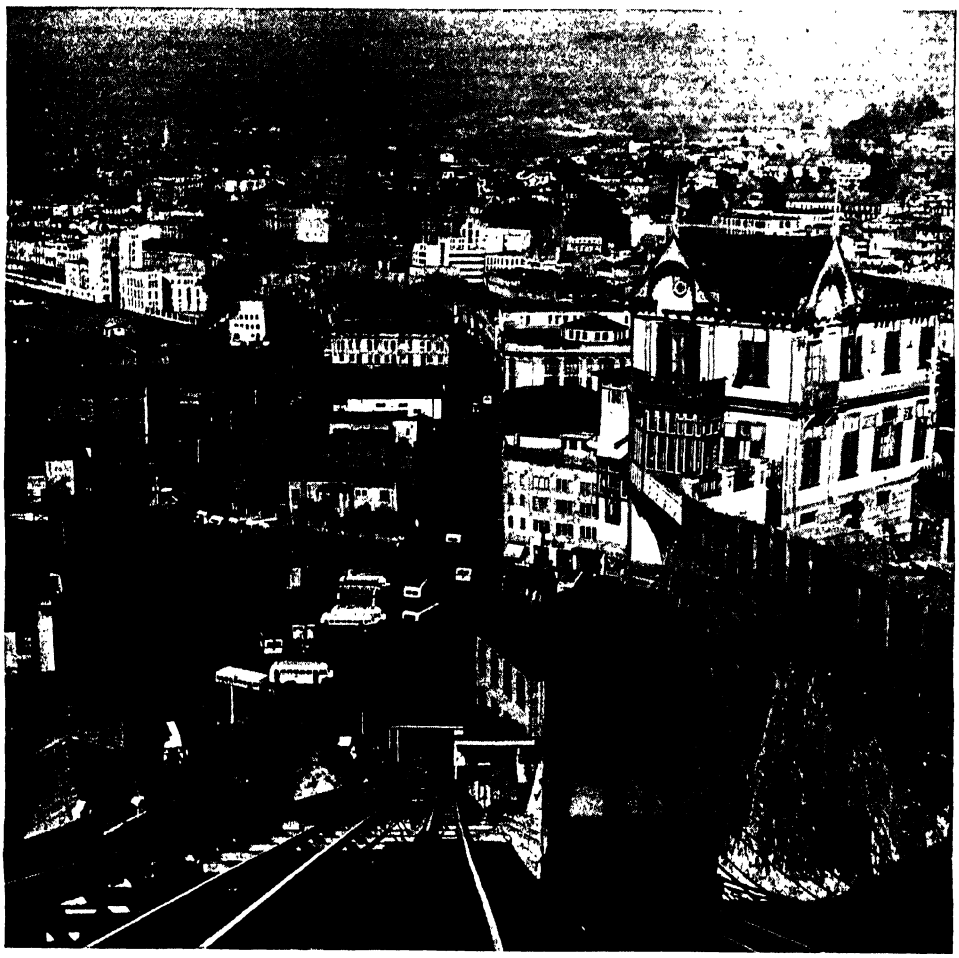
Chile is the second greatest copper producer in the world. (The United States is first.) Here is "copper mountain" at Chuquimata in the north. Other minerals found in Chile are nitrates, iron, gold, silver and coal.

president's followers were badly defeated, the war coming to a sudden end when the president shot himself to escape capture.

Once the civil war was ended, the republic went back to its peaceful course. Disputes about the southern Argentine boundary threatened to break the peace; but they were happily settled by arbitration and Chile was given a strip along the southern coast of the continent so that she should hold both coasts of the Strait of Magellan. In 1906 a terrible earthquake, followed by a fire, destroyed the city of Valparaiso and wrecked parts of Santiago and other towns. During World War I Chile remained neutral. Her nitrate export was at first seriously interfered with as a result of the war; its value afterward, however, was much increased by its use in explosives.

CHILE IS A VERY LONG NARROW COUNTRY

Chile is so long and narrow that it has been compared to an eel. Its breadth nowhere exceeds 250 miles, and in places it narrows down to less than 90, while its length exceeds 2,600 miles. The northern part of this long narrow country is within the tropics; the southern part is within the same latitude south as Labrador is north. You



Courtesy, Grace Line

Cable railway in Valparaiso, Chile's greatest port. The city is built on several levels. It has an enormous shipping trade and is a railway centre for lines going north and south and across the Andes Mountains. The population is around 200,000. Santiago, the capital (about 700,000 population), is only 75 miles away. In Viña del Mar, a suburb (50,000 population) there are very attractive homes and fine bathing beaches.



Courtesy, Grace Line

"Christ of the Andes," a majestic statue in the mountains, on the border between Argentina and Chile, a symbol of international faith. The inscription beneath it reads: "Sooner shall these mountains crumble into dust than Argentina and Chile shall violate the Peace they have pledged at the feet of Christ the Savior." The statue is as famous in South America as the Statue of Liberty is on our continent.

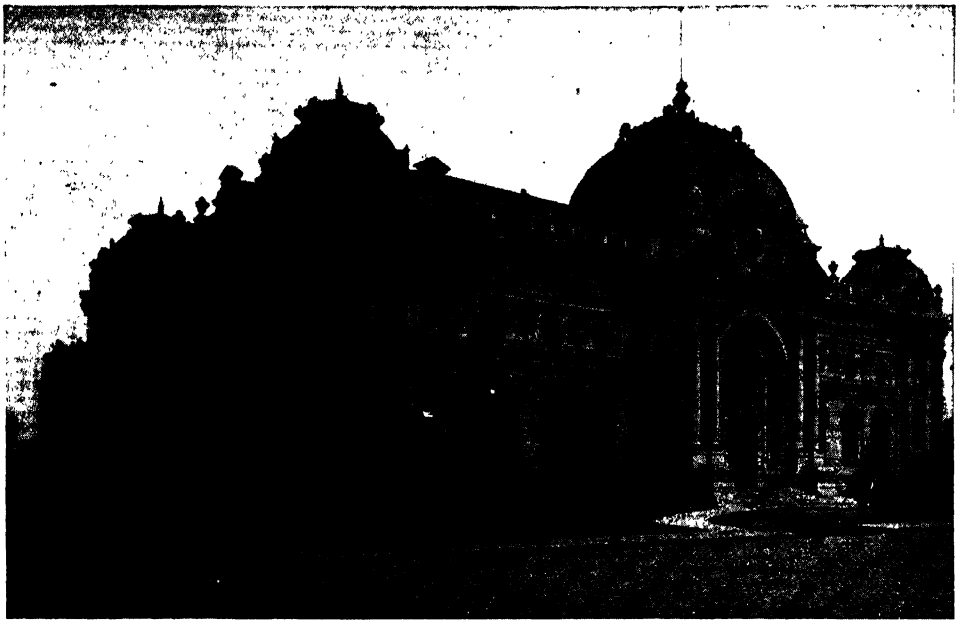
can see, therefore, that the climate is very varied. In the desert of the dry belt the heat is tropical, while the southern climate is like that of the north of Scotland.

This is a mountainous country. The Andes, which form the backbone of the continent, run through the entire length of Chile. But in central Chile the mountains divide into two ranges, and in between these ranges lies the great central valley, 600 miles long, and farther north there are smaller valleys. It is in these valleys that the agricultural wealth of the country is produced. They are all very fertile, and are watered by mountain streams and rivers, which leave a rich deposit of mud, brought down from the hills.

The central valley is in the temperate zone, and, by reason of both its size and its climate, produces the chief agricultural wealth of Chile. More than the amount of food required from the country can be raised on the valley farms, and Chile has large quantities of grain and wine for export. The chief wealth of the country lies, however, in the nitrate deposits found in the provinces of Antofagasta and Tarapacá which were taken from Bolivia and Peru. The nitrate is used to fertilize land. Around 1,500,000 tons of it are exported every year to North America and to Europe. Iodine is an important by-product. Chile also has great mineral wealth in her copper and iron mines. Coal is sent to Peru, and silver, lead, tin and other mines are worked. There are large forests in the southern country, and some of the wood is valuable.

The Spanish conquerors frequently intermarried with the Indians. This was especially the case in Chile, where, within the limits of the Spanish colony, the Araucanian people became fused with the Spanish people into a new race, which forms a large part of the population. About a quarter of the people of Chile are of pure Spanish descent, and there are, it is said, about a hundred thousand Indians. For some years emigrants

IN SANTIAGO, CHILE'S BEAUTIFUL CAPITAL



© E. M. Newman, from Publishers Photo Service

The Museum of Fine Arts in Santiago, which is the largest city on the western slope of South America. The city is ancient, having been founded in 1541 by Pedro de Valdivia, and some of the old buildings in Spanish style are yet standing. There are, however, modern public buildings of great beauty.



Courtesy, Grace Line

The school of Medicine at the State University of Chile, in Santiago. The city has a mild climate, being just about as far below the Equator as Los Angeles, California is above it. Santiago is in the rich central portion of Chile, where most of the country's crops are raised and where a large proportion of the people live.

went from Europe to the south of Chile, and many Peruvians and Bolivians work in the nitrate mines in the north. The population of Chile is about 4,600,000.

Education is free and compulsory and in recent years it has been making good progress. There are all sorts of special institutions, from schools of mines and industrial universities to schools for the deaf and dumb

THE DISCOVERY OF BRAZIL BY CABRAL

Perhaps you have wondered how it was that although the king of Spain claimed all the Western World, he allowed the Portuguese to make peaceable settlements in Brazil. This is a question that brings up a story so interesting that we shall tell it to you here before we go on to the real story of Brazil.

About the time that Columbus discovered America, the Portuguese were the great explorers of the world, and had already worked their way far down the coast of Africa in an endeavor to find their way to India by sea. When Spain took up the work of exploration, and Columbus discovered what seemed to be a new way to India from the west, the Pope feared that these two nations might quarrel over their discoveries and go to war. To avoid such a catastrophe he drew a line on the map, about a hundred miles west of the Cape Verde Islands, and said that the Spanish must not attempt to explore to the east of this line, nor the Portuguese to the west of it. Portugal was not satisfied with this rule, however, and so a treaty was made between the two countries which provided that the line should be drawn about eight hundred miles farther to the west. This imaginary line, which is famous in history as the Papal Line of Demarcation, ran about fifty degrees west of Greenwich.

At the time the treaty was made, no one knew that the continent of South America existed. It was discovered shortly afterward, and the Spanish people claim that Brazil was discovered by a captain named Vicente Pinzón in 1500. The Portuguese, however, claim that the Brazilian coast was first seen in the same year by Pedro Alvarez de Cabral, and it is this great man whom the Brazilians honor for the discovery. Cabral, who was on his way to India, found Brazil by sailing too far to the west. He knew that he had made an important discovery, and before he went on to India he sent a ship home to tell the king of Portugal that he



Courtesy, Grace Line

The steep, red porphyry Hill of Santa Lucia, in Santiago, the capital of Chile, is where the first settlers bravely withstood a siege. To-day, elaborate public gardens and the monument shown above commemorate the event.



After King John went back to Portugal the Brazilians determined to be independent, and made Prince Pedro their first emperor. On September 7, 1822, Pedro received orders from his father, which he read surrounded by his staff. When he had finished he raised his right hand in token of rebellion and cried "Victory or Death!"

had found a rich country inhabited only by naked savages.

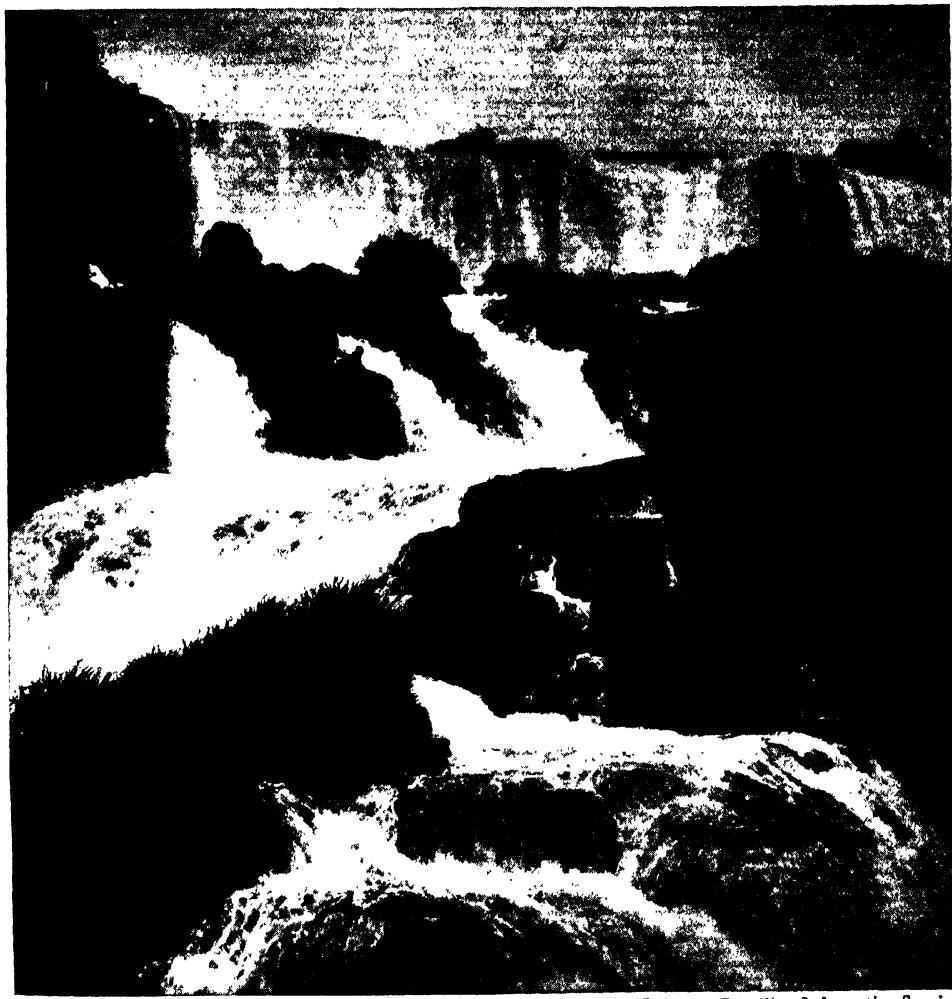
The king was quick to take advantage of the new discovery, especially as Vasco da Gama found that the land lay a long way to the southward. Navigators, of course, were able to assure the king that the land lay on their side of the Line of Demarcation, and as they had the right to make settlements, the Portuguese began to send out colonies. The first colony was established south of Bahia in 1503. A short time later another settlement was made on the Bay of Bahia itself, and these colonies became centres from which other settlements were made.

STORMY DAYS IN THE YOUNG COLONY

The early days of Portuguese occupation of the country were stormy, for the French and Dutch both tried to take part of the coast and build up colonies. The first-comers were the French, who discovered the bay of Rio de Janeiro and made a settlement there. It took some time to get rid of them, but at last they were driven out. The young country might then have been left in peace, but unfortunately King Philip II of Spain became King of Portugal. Both England and Holland were fighting against Philip, and when Portugal became part of his dominions, they began to look on Brazil as another place where they might carry on their war against him. The English made raids on the towns, but the Dutch were more persistent, and made every effort to drive out the Portuguese. A Dutch fleet actually captured Bahia, the capital of the colony, in 1624, and kept possession of it for more than a year before it was retaken. A few years later the Dutch sent out another expedition, but this time against the province of Pernambuco. Of this province they made themselves masters, and not only held it for years, but obtained a heavy ransom for it after they had been defeated by the Brazilians in

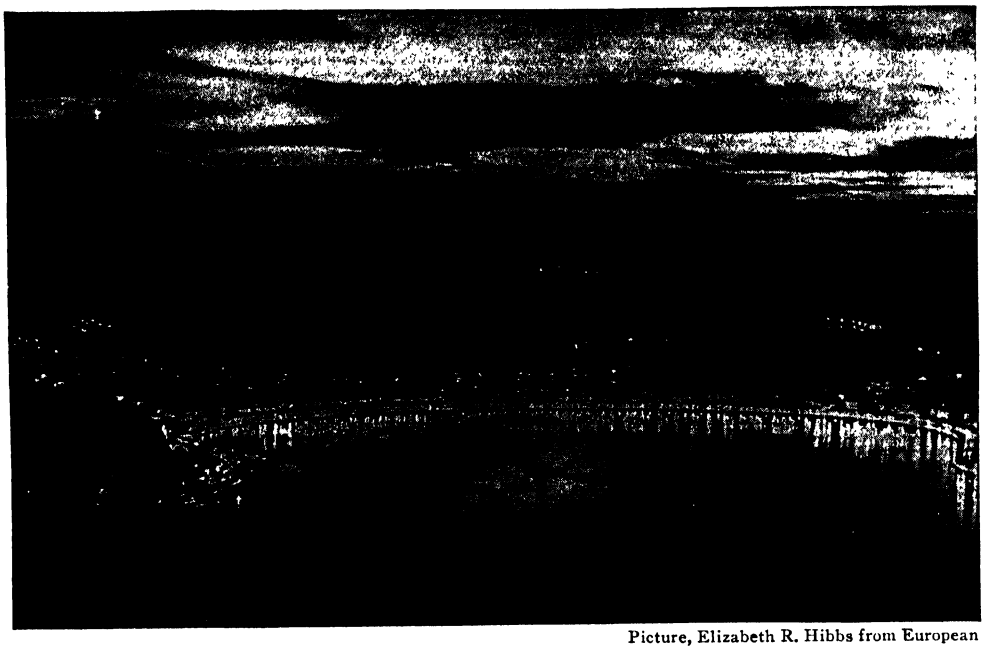
a sharp war. Meantime, the Brazilians had been spreading their settlements southward, and in the eighteenth century they came into touch with the Spanish colonies. You can understand that the southern part of the continent, away from the Equator, is more suitable as a dwelling-place for white people than the north. Realizing this, the Brazilians tried to gain possession of the country as far as the river Uruguay and the Rio de la Plata. The Spaniards resisted, and there was a constant struggle between them for Uruguay. While the Spanish colonies were fighting for independence Brazil succeeded in gaining possession of Uruguay, although that little country made a great fight for freedom under her brave leader Artigas and others. Finally, as we have told you, after a war between Argentina and Brazil, Uruguay obtained her independence.

Before this war events of great impc tance had happened in Brazil, where the Napoleonic Wars had just as much influence as in the Spanish colonies, but in a quite different way. In 1807, when Napoleon sent an army to conquer Portugal, the country was not prepared, and the French army marched so rapidly on Lisbon that the re-



Courtesy, Brazilian Information Service

The falls of the Iguassu River, between Brazil and Argentina. In the dry season there are more than twenty separate cascades, besides the two main falls, which are double, crescent-shaped drops. In the flood season the river hurls itself over the cliffs in a two-mile wide torrent which entirely covers the islets between the cascades.



Picture, Elizabeth R. Hibbs from European

Lovely Rio de Janeiro, photographed at dusk from Botafogo Bay. The city, as you see, lies between the bay and a ring of mountains. The lighted cross in left background is on Corcovado Peak (commonly called the hunchback), 2,300 feet high. Another famous peak is the Sugar Loaf which guards the entrance to the bay.

gent, Prince John, had to escape by sea, taking his mother, Queen Maria, and his wife and family with him. He had nowhere to go in Europe, so he sailed to Brazil, and made the city of Rio de Janeiro the seat of his government. This action made a great deal of difference to the country. From being a colony with all sorts of restrictions in its trade and commerce it at once became the centre of activity. Free trade was allowed with other countries. Prince John declared that Brazil was henceforth a kingdom, and after the death of the invalid queen, Maria, he was crowned king in Rio de Janeiro.

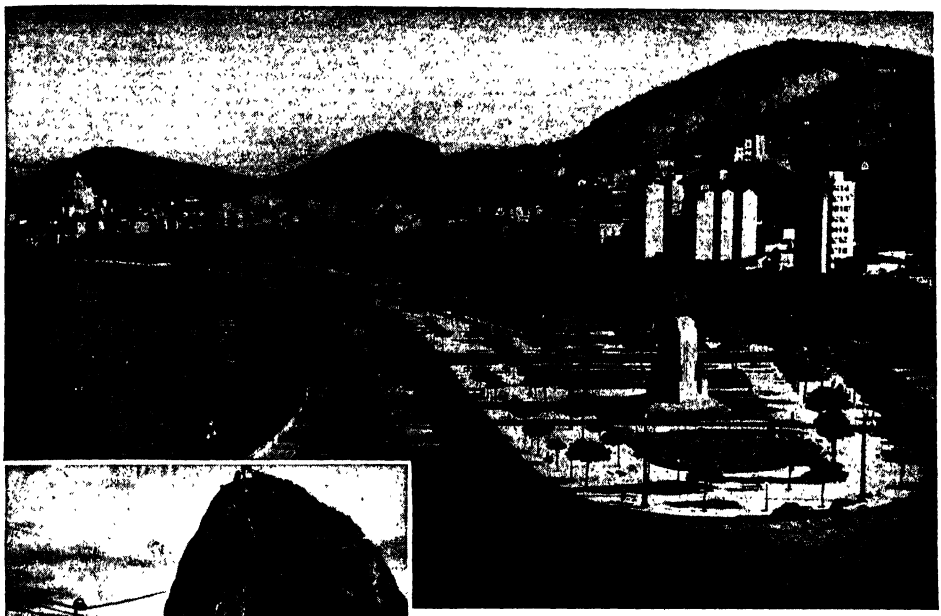
But when Portugal was freed from the French armies King John VI went back to Europe, leaving his son Pedro as governor. This did not please the Brazilians at all. They refused to become subject to Portugal again, and in 1822 they declared Brazil an empire, with Prince Pedro as the first emperor. There was a little fighting, but on the whole it was a peaceful revolution, and the next year the emperor was crowned as Pedro I. He tried to rule with wisdom, and gave the country a good constitution. But for various reasons his ideas became less liberal, and partly because of this and partly because of the loss of Uruguay, he became very unpopular. Strengthened by his unpopularity, republican ideas began to spread, and to avoid the danger of a revolution, Pedro I abdicated the throne in favor of his little son, a boy five years old, and left the country. He returned to Portugal, where he died not long afterward.

THE EMPIRE TURNED ITSELF INTO A REPUBLIC

Pedro II was at once proclaimed emperor, and the government was carried on by regents until he was fifteen years old, when, in 1840, he was declared to be of age. In spite of his youth he proved to be a wise and liberal ruler, and during his long reign Brazil grew slowly in importance. He was much beloved, but his only daughter, the Princess Isabel, who was to succeed him, was not liked. The people determined that she should not rule, and in 1889 the empire was overthrown and a republic declared. Slavery in Brazil was abolished in the last year of Pedro's reign.

The new republic went through the usual period of unrest and civil war that a revolution nearly always brings, but it did not last very long. Troubles with Great Britain and Bolivia about boundary questions were set-

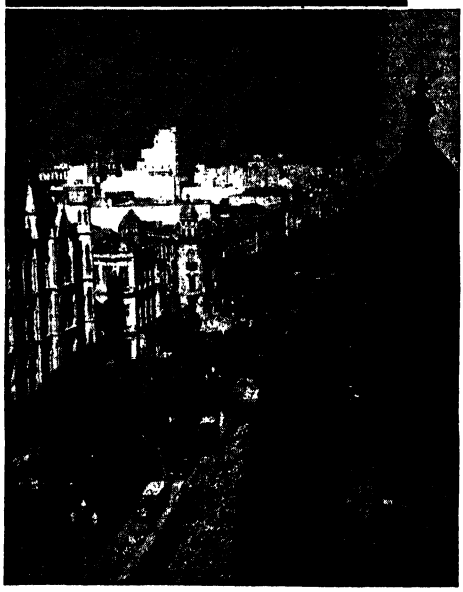
SOME VIEWS OF RIO DE JANEIRO

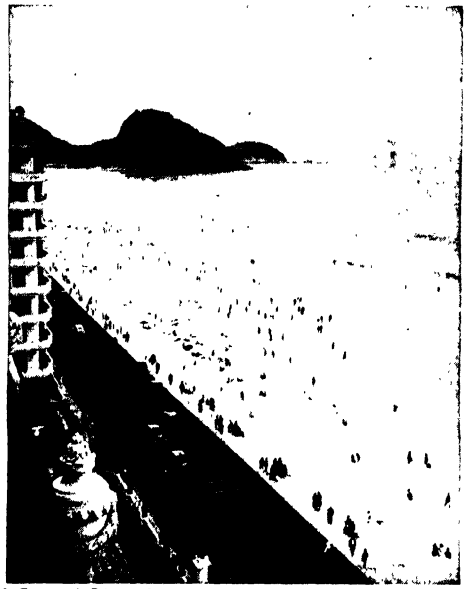




Above, the city's curving shore line. Rio de Janeiro means River of January. The first discoverers from Europe sailed up the bay on January 1, 1502, and thought, from its size, that it was the mouth of a mighty river.

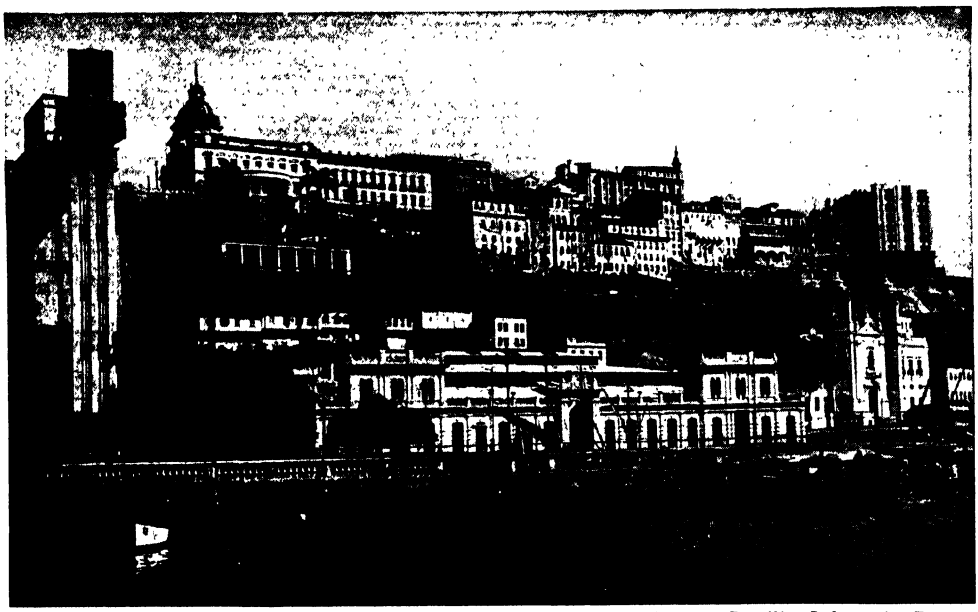
The Sugar Loaf and the aerial railway which carries passengers in a swaying car, on cables, up to the top.





Pictures, courtesy, Moore-McCormack Lines, Inc. and Brazilian Information Bureau

The Avenida Rio Branca, left, is one of the most beautiful streets in the world. It is the principal business street in Rio. The picture at the right shows one of the bathing beaches in a suburb of the city.



Courtesy, Brazilian Information Bureau

Bahia de Sao Salvador is the third largest city of Brazil, with a population of around 330,000. It is usually known simply as Bahia, or as San Salvador. It is built along a hill, with an upper and lower level. At the left you can see a big public elevator connecting the two levels.

tled by arbitration, and the course of the republic has been fairly peaceful. Of the South American countries Brazil alone took active part in the first World War, sending her warships to join the navies of Great Britain and the United States, after declaring war on October 26, 1917.

Brazil has manufactories which are able to supply the people with much of their needs in sugar, cotton materials and some other things. She has not yet become a manufacturing country, however, and most of her exports are products of the field, the forest and the mine. The state exports the most coffee and the best rubber. Other exports are cacao, cotton, hides and frozen meat. Brazil ranks second to the United States in oranges raised. Bananas, corn and Brazil nuts are important crops. Much of the Amazon plain is covered with forest, in which many valuable timber trees are found. Rubber is the most profitable forest product. Brazil also exports most of the world's supply of carnauba wax, from a palm tree. This is used in electrical insulation and in making phonograph records.

Gold and diamonds are exported from Brazil; manganese, a mineral which is of great importance in metal-working, is found in large quantities. There are large coal beds in the southern parts of the highlands. Iron is found, and has been mined; and lead, copper, zinc, quicksilver, marble, salt and kaolin and a little petroleum, make up the list of minerals found in the country.

The rivers of the highlands give plenty of water power, and southern Brazil may some day be a mining and manufacturing country.



Courtesy, Moore McCormack Lines, Inc.

How a Negro peddler of Bahia carries her basket.

This would be impossible in the north, where the climate is too hot and damp for white men to work in comfort.

The population of Brazil is said to be about 46,116,000 and of this number only about two million and a half are Indians. There are about three million and a half Negroes, so you see they greatly outnumber the Indians. Half the population is said to be white. Immigration into Brazil has been large, and was made up chiefly of Italians, Portuguese, Spaniards, Japanese and Germans.



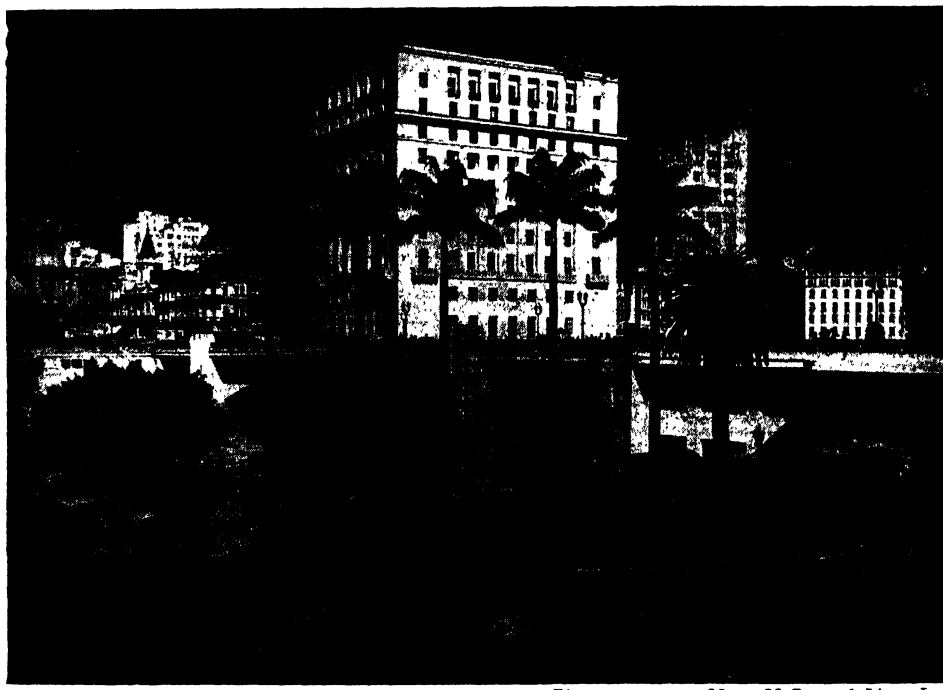
Three-fourths of all the coffee trees in the world are in Brazil. Here is one stage in coffee preparation. The berries are spread on drying platforms.

THE SOUTH AMERICAN COUNTRIES AND HEMISPHERE SOLIDARITY

For many years thoughtful people in both South and North America have felt that the independent countries of the Western Hemisphere would benefit greatly if they would adopt a policy of co-operation. This policy came to be known as hemisphere solidarity —that is, solidarity or union among the nations of this hemisphere.

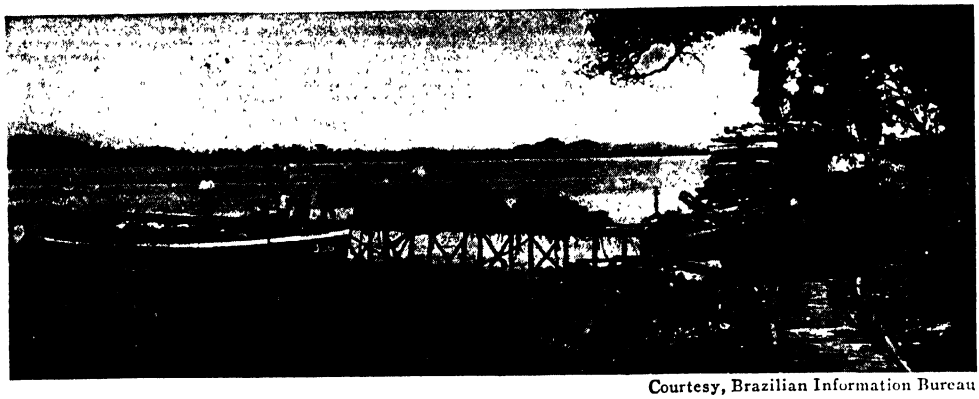
The first important step in this direction was taken in 1889 with the formation of the Pan-American union. This organization was intended to bring about closer diplomatic, commercial and cultural relations between all the independent countries of the two Americas.

Under the Pan-American Union progress in hemisphere solidarity was steady but quite slow for many years. It became much more rapid in the thirties of the present century. In part this was due to the "Good Neighbor"



Pictures, courtesy, Moore-McCormack Lines, Inc.

São Paulo, second largest city in Brazil, and the world's greatest coffee market, has a population of 1,000,000. São is Portuguese for Saint, and is pronounced San. You will see this word many times on a map of Brazil, the great Portuguese-speaking country of South America, for many places are named for saints.



Courtesy, Brazilian Information Bureau

A river dock on a banana farm near Santos, Brazil. The country is also an important orange-growing state.

policy of the United States (see page 3108); in part, to the gathering war clouds in Europe, which made all men uneasy for the future. Increasing hemisphere solidarity was indicated by a series of important conferences held from 1938 to 1940, while all the nations of the New World were still at peace (see page 3108).

The United States was finally drawn into World War II in December, 1941. Delegates representing the twenty-one independent nations of the New World met at Rio de Janeiro in January, 1942, and passed a general resolution recommending the breaking off of diplomatic relations with the Axis Powers.

Colombia later declared war on Germany; Brazil and Bolivia, on both Germany and Japan. All the other South American countries broke with the Axis.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 7097.



© Underwood and Underwood

The railroad connecting the port of Santos with São Paulo climbs 2,600 feet in 5 miles. This picture shows how the grade is surmounted by a cable road—the tracks winding over trestles and bridges and through 36 tunnels.



American Museum of Natural History

Roy Chapman Andrews, who brought back many fossils, including dinosaur eggs, from expeditions into The Gobi.

SOME MEN WHO LOVED NATURE

IN the chapters on Men of Science you may read about a number of scientists who studied the earth's rocks and its plants and its animals, and by their work carried forward men's knowledge. This is the story of certain other men who loved nature so much that they gave up most of their lives to studying butterflies and beavers, snakes, stones, trees and flowers. We call these men naturalists. Some of them dug into the earth to find the fossilized bones of giant reptiles. Others traveled thousands of miles to rivers and mountains where no civilized man had ever been. And some made thrilling discoveries without ever going very far from where they were born.

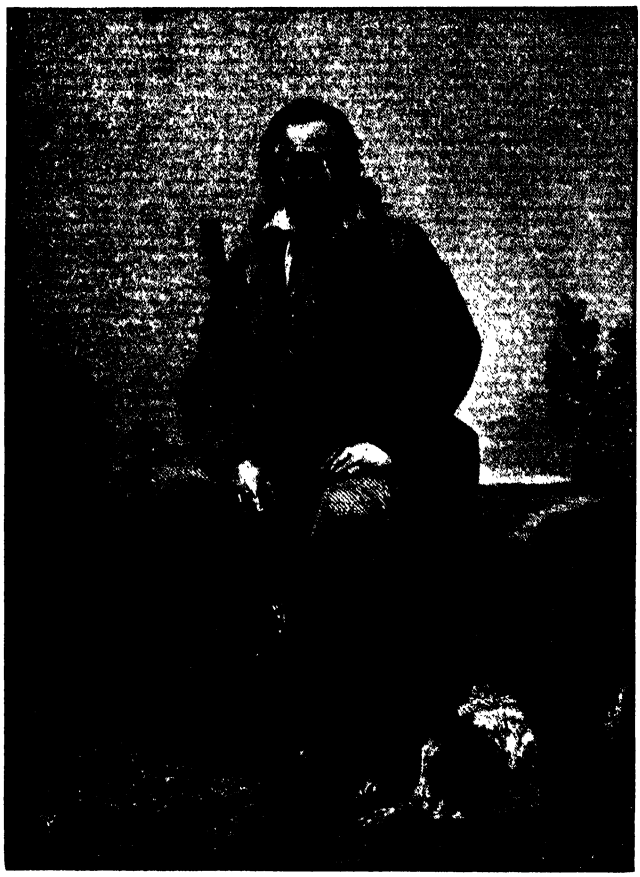
One of the early naturalists in America was Alexander Wilson, who wrote the first great book on the birds of North America. Wilson was born in Scotland in 1766. The family was poor and Alexander became a weaver's apprentice at the age of thirteen. His real ambition was to be a poet. Some humorous verses caused him to be tried for libel and fined. Since he did not have money enough to pay the fine, he had to go to prison.

At the age of twenty-eight Wilson emigrated to America with no possessions but a gun and the suit on his back. For ten years he taught school in villages near Philadelphia. Most scientists show a love of science in their very early years, but it was not until 1803, when Wilson was thirty-seven, that he was urged by William Bartram, the botanist, to collect the birds of eastern North America. His book AMERICAN ORNITHOLOGY contains many pictures drawn by Wilson himself. The work cost $120 a set, a good deal of money in those days. The author traveled up and down the United States, west to the Mississippi River and south to New Orleans,

to find subscribers for his book and to see more birds. This meant hundreds of miles of travel on horseback and on foot through swamps and meadows and through forests where the ancient trees had not yet been cut by the woodman's ax.

Wilson died in Philadelphia in 1813, soon after the seventh volume of the ORNITHOLOGY had appeared.

Three years before Wilson's death, he strode into a little store in the frontier village of Louisville, Kentucky, hoping to find a subscriber for his ORNITHOLOGY. The handsome young storekeeper studied Wilson's drawings (although he did not buy the book) and then showed Wilson a large collection of his own drawings of birds, drawings far more lifelike than Wilson's. The storekeeper was John James Audubon who was to become the most famous of all artists who ever studied birds. There is some mystery about Audubon's early years, but the most probable story is that he was born in Santo Domingo about 1785. As a child, he was brought to France by a French sea captain, who later adopted him. The lad attended a military school and studied drawing in Paris. His adopted father owned some property in France, Santo Domingo and Pennsylvania; and when only seventeen Audubon came to the United States to look after his father's farm near Philadelphia. There he started his life-work of drawing birds. By the time Audubon was twenty-one most of his father's property had been lost. The young man married soon afterward and set up store in Louisville. But he was not made for a business career; his ventures failed, and his wife insisted that he devote himself to his work on the study of birds.



John James Audubon created beautiful, detailed pictures of many North American birds. His entire life was devoted to the study of wild life.

For the next few years Mrs. Audubon struggled to help support their children while Audubon sold portraits drawn by himself and gave lessons in drawing, dancing and fencing. Whenever he could he roamed the wild new country to find new birds. An interview with Charles Lucien Bonaparte, nephew of Napoleon, encouraged Audubon to publish his drawings.

When Audubon's great work, THE BIRDS OF AMERICA, was finally published (over a period of eleven years, from 1827 to 1838) it made a sensation among lovers of both art and science on both sides of the Atlantic. There were 435 hand-colored plates, each about three feet high by two and one-half feet wide, containing 1,065 pictures of birds, all life-size. All the birds were shown in natural poses, flying, catching insects and so on.

Presently Audubon's two sons were helping him, Victor acting as the business man of the family, and John collecting birds and helping with the drawings. The complete work was one of the most costly publications ever issued, the price being about ten times that of Wilson's

earlier work, AMERICAN ORNITHOLOGY.

With the success of this work Audubon became one of the most famous and popular figures of the times. Yet there had been weeks, while the work was under way and Audubon paced the streets of Edinburgh, London and other cities seeking subscribers, when his conscience assailed him for carrying on such a venture while his wife and children were in need. When Audubon died, in 1851, he was at work with the father-in-law of his two sons, the Reverend John Bachman, on a publication about four-footed animals, THE QUADRUPEDS OF AMERICA.

The Audubon Society for nature lovers is named for John James Audubon. So is the magnificent park which extends to the Mississippi River in New Orleans. The home he built near the Hudson River still stands. New York City has grown and spread until this home, which in Audubon's day was in the country, is now in the city.

VON HUMBOLDT, WHOSE GREAT MIND WAS STIMULATED BY TRAVEL

One of the scientists who went to remote regions to study nature was Baron Friedrich Heinrich Alexander von Humboldt (1769-1859). Born in Berlin, he rose rapidly in the Prussian government service, but left this promising career in 1796 to give all of his time to science and travel. He had hoped to be one of the group of scientists taken along when Napoleon invaded Egypt in 1798; but at the last moment there proved to be no room for Humboldt on the ship. Finally, he sailed in 1799 with the French botanist Aimé Bonpland (1773-1858) for a five-year expedition through Spanish America. They explored Cuba, Mexico, Venezuela, Colombia, Ecudaor and Peru. Humboldt plunged into the almost uninhabited country between the Orinoco and Amazon rivers, hacking his way some 1,725 miles in four months to trace out the water connection between the two river systems.

Humboldt collected many specimens of birds, fishes and mammals previously unknown in Europe. He studied the crocodiles, jaguars and howling monkeys at first hand, and wrote the first good description of the terrible little fish, the piranha, that will attack and kill large animals and men. He let himself be shocked by the electric eel.

Humboldt returned to Europe with a partly crippled right arm; but he had collected material for thirty great volumes. Besides his work with animals he laid the foundations for the later development of physical geography and meteorology (study of the weather). He became the most famous man in Europe after Napoleon.

At the age of sixty, Humboldt went on another great expedition, traversing 9,614 miles in northern Russia and Siberia. One result was the discovery of diamonds in the Ural Mountains.



Metropolitan Museum of Art

Baron Alexander von Humboldt, explorer, scientist and writer, taught men much about the physical world.

Humboldt's greatest published work was KOSMOS. In it the scientist explained the physical universe and the forces holding all parts of it together in a wonderful harmony.

Humboldt received great honor during his lifetime, and after his death. Cities and lakes and bays have been named after him. The cool Peru Current which moves northward along the west coast of South America was for a time called the Humboldt Current, and you may still see it so marked on some maps.

Humboldt's old companion, Bonpland, was captured by Francia, the mad dictator of Paraguay, and kept prisoner for ten years. However, he was treated well and allowed to continue his study of plants.

Not all of the great naturalists were great travelers. Count George Louis Leclerc de Buffon (1707-88) never went farther from his native France than to England and Italy. His great NATURAL HISTORY fills forty-four volumes. The volumes were published as they were written, the last one appearing

more than fifty years after the first. A friend of the famous Madame de Pompadour, and a favorite at the court of Louis XV, Buffon arose at six in the morning, dressed himself in full court costume, including ruffles, went to his writing desk and worked eight hours a day.

Gilbert White (1720-93) of Selborne, England, spent nearly his whole life in his native parish, as a country curate. His NATURAL HISTORY OF SELBORNE, a classic of literature, is the result of a lifetime's observation of the birds, beasts, flowers and trees of a few square miles.

You probably know that not long ago (as geologists figure time) there was a great Ice Age, when sheets of ice covered northern North America and northern Europe. The man who discovered this strange fact was Louis Agassiz (1807-73), son of a poor Swiss clergyman. Louis was a born naturalist. As a little boy he roamed the flower-filled valleys and the mountains near his home. When a student at the academy at Lausanne he would copy out whole volumes by hand to be sure of having precious books when he needed them.

The boy's father refused to believe that Louis could earn a living as a naturalist, and so young Agassiz studied medicine at the University of Munich. While still at the university he made a scientific report on the large Spix-Martius collection of fishes from Brazil. He did this work at night while studying medicine by day. This work made him well known as an author and naturalist before he was twenty-three years old.

However, he was still to spend some time in Paris as a poor student, living in the Latin Quarter until the friendship of Humboldt secured him a professorship at the University of Neuchâtel, Switzerland. In Neuchâtel he made a study of the fossil fishes and in 1836 began the study of the glaciers of Switzerland. As a result he was able to show that vast sheets of ice once covered not only Switzerland, but northern Europe and much of the United States and Canada.

When Agassiz came to the United States to lecture in 1846, he fell in love with the

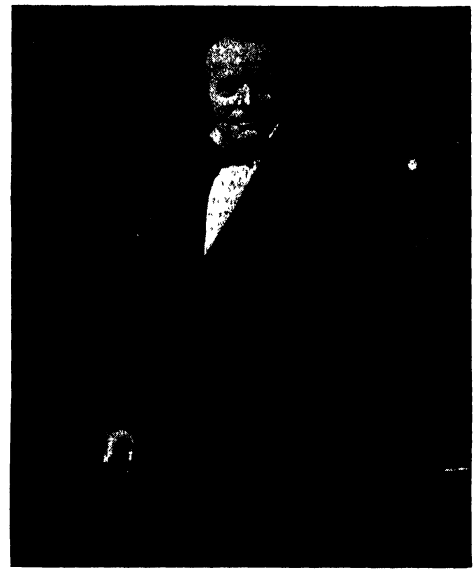


The Frenchman Buffon wrote the first work to cover all phases of natural history. As a young man his scientific interests turned in this direction by his appointment as director of the Royal Garden (now the Jardin des Plantes).

country and this affection was returned. He became a professor of zoology at Harvard at the age of forty, and zoology became one of the most popular subjects. Due to his influence the interest in natural history spread far beyond Harvard. Almost as fluent in English as in his native French he could hold an audience spellbound while he illustrated the various points in his lectures with marvelous chalk pictures which he drew rapidly on a blackboard. His warmth and friendliness were such that students remarked "one had less need of an overcoat in passing Agassiz's house than any other."

Agassiz explored most of the United States and made trips to Brazil and Cuba and around Cape Horn. In an old barn on the island of Penikese, Massachusetts, he started the famous Anderson summer school for marine research, which served as inspiration for the great American marine stations for biological research of today.

Many inducements were offered Agassiz to return to Europe; but he was happy in the United States, and he refused to go back.



Louis Agassiz, the beloved Swiss-American zoologist.

HENRY THOREAU, THE HERMIT OF WALDEN POND

Among those who made natural history collections for Agassiz was a New England boy of twelve, who, although not a scientist, was to become the most famous writer on nature ever born in America. Henry David Thoreau (1817-62) was born in Concord, Massachusetts. His father taught him the family trade of making lead pencils; and it was by making lead pencils and by work as a surveyor that Henry earned his living most of his life. After graduating from Harvard he became a teacher, but he decided he did not like teaching when the villagers insisted that he maintain discipline by beating his pupils. In Concord he became one of a famous group of scholars which included Ralph Waldo Emerson, Bronson Alcott, Nathaniel Hawthorne and Margaret Fuller.

When Thoreau was twenty-eight years old he decided to go to the woods and live alone. Near the shore of Walden Pond (now a state park) he built a tiny cabin on land belonging to Emerson. The total cost of his house was $28.12½. He planted beans and corn and proceeded to live largely on what he raised himself. His book WALDEN, OR LIFE IN THE WOODS, is the record of the two years he lived there. This book is one of the great prose works of the nineteenth century.

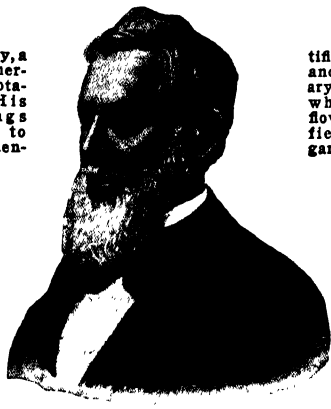
Some strange stories were told of Thoreau's knowledge of and friendship with animals. Birds were not afraid of him; squirrels and foxes did not avoid him. He caught fishes with his bare hands. After WALDEN, his most famous books are EXCURSIONS and A WEEK ON THE CONCORD AND MERRIMAC RIVERS. Thoreau never married.

If you decide to study trees or flowers in the northeastern United States or eastern Canada, you will doubtless have a recent edition of the MANUAL OF BOTANY first written by Asa Gray in 1848. Asa Gray (1810-88) was born in Sauquoit, New York, the son of a tanner. As a boy Asa helped to feed bark into the mill and drove the old horse that furnished the power. In those days spelling matches were very popular and Asa was a champion speller. His father persuaded him to study medicine, but by the time he graduated Asa had become so deeply interested in botany that he did not practice medicine. Instead he taught school in the winter and collected plants in the summer.

Gray had thought of going with the Wilkes Expedition to the Antarctic, but instead joined Doctor John Torrey (1796-1873), the best-known American botanist of the time, in writing a FLORA OF NORTH AMERICA which described all the plants of the country known at that time. By this time Gray had become so well known that he was appointed professor of botany at Harvard. When the Darwinian theory was published, Agassiz and Gray took opposite sides. Agas-

siz always opposed Darwin's theory; while Gray, a very religious man, stoutly defended Darwin.

The greatest American geologist of the nineteenth century was James Dwight Dana 1813-95), who was born in Utica, New York. Dana went on the Wilkes Expedition which



Asa Gray, a great American botanist. His writings appeal to both scientific men and ordinary readers who love flowers of field and garden.

spent the years 1838-42 searching for the Antarctic continent. He made important studies in geology, mineralogy and zoology, and did original work on volcanoes and coral islands. He was professor of geology at Yale from 1850 until his death.

Another great geologist was the Canadian John William Dawson (1820-99), who became Sir William Dawson. Dawson's father, who came from Crombie, Scotland, met business reverses about the time of John William's birth. Lack of money could not prevent the ambitious boy from seeking an education. He attended Pictou Academy in his birthplace, Pictou, Nova Scotia, and then crossed the ocean to study science, especially geology, at Edinburgh University.

Like Charles Darwin, Dawson was a collector of insects, plants and birds from a very early age. One morning he was making a slate pencil from a piece of shale rock when he discovered in the stone a fossil leaf like that of a fern. From that moment he began to collect rocks and minerals, always hoping to find more fossil remains. By the time he was sixteen he had lectured before a local society on the structure and history of the earth.

On returning to Canada from Scotland, Dawson met Sir Charles Lyell and the Canadian geologist, Sir William Logan (1798-1875), and with these scientists he carried on important geological work. Investigating the fossil forests of the coal measures, Logan was able to show that remains of the original soil in which the coal-forming plants grew could still be traced beneath the seams of coal. Dawson found primitive reptile fossils and beautiful prints of leaves and stems of strange, extinct plants. In 1854 Dawson became principal of McGill University, and in 1882 Queen Victoria made him a companion of the Order of St. Michael and St. George.

Sir William Dawson's son, George Mercer Dawson (1849-1901) was also famous as a geologist. Dawson City, of gold-fields fame, was named for him.

The distinguished Canadian explorer and naturalist, John Macoun (1831-1920), was born in Ireland, but migrated to Canada when he was nineteen. After a few years of farming he became a school teacher, at a salary of $14 a month. In his spare time he studied the different sciences; but his special love was plants.

MACOUN'S EXPEDITIONS RESULTED IN A GREAT MUSEUM COLLECTION

When an expedition was sent across the prairies and the Rocky Mountains to find a route for the Canadian Pacific Railway, Macoun went along as botanist. In the following years he made journeys of scientific exploration all over Canada from the Yukon to Nova Scotia. His two sons, William and James, were often his companions and scientific co-workers. Macoun's collections of animals and plants were the foundation for the Victoria Memorial Museum in Ottawa. Other scientists honored Macoun by naming species of plants, insects and fish after him.

One of the policies of which both the United States and Canada are most proud has been the establishment of national parks to save some of the marvelous beauties of nature for the people for all time to come. A great fighter in this cause was John Muir, born in Dunbar, Scotland, in 1838. When he was eleven years old the family came to America and settled on a backwoods farm in Wisconsin. John plowed, chopped down trees and did all the other kinds of farm work, and enjoyed it. But even while plowing he was also enjoying the beauty of wild flowers and trees and the antics of wild creatures. John was the best plowman in the neighborhood. Once he dug a ninety-foot well without assistance.

John's father had very different notions about reading from those of that other Scotsman, the father of William Dawson. Muir's

father objected to his boy's sitting up late at night to read. But he finally told John that he might get up as early as he pleased and read then. So John would get up at one o'clock in the morning and read or work on mechanical inventions until time for the day's work to begin.

When John entered the University of Wisconsin he had to provide his own living expenses. He often lived on fifty cents a week. An accident nearly blinded him after leaving the university. This determined him to travel and see as much of "God's beauty" as he could before his sight was completely gone. Fortunately he did not lose his sight. In his travels Muir wandered through thousands of miles of prairie, mountain and forest. He tramped the Sierra Nevada Mountains until they were as familiar to him as the farm where he was raised. Muir's journeys were made for his own pleasure, not to get material for books. After his marriage to Louie Wanda Strentzel, the daughter of a Polish revolutionist, he took up fruit farming. Near the end of his life he began to write books that make all nature lovers want to repeat Muir's wanderings.

Muir Woods, a forest of gigantic redwoods across the bay from San Francisco, and Muir Glacier in Alaska, are named for John Muir. It was largely due to Muir that the Yosemite Valley became a national park.

Muir did not dislike city life; in fact, he had considerable inventive genius and liked the turmoil of factories. It was simply that he loved nature more. Several universities invited Muir to accept professorships, but his reply was always that there were already too many men teaching the things that they had learned out of books. He died in 1914.

When President Theodore Roosevelt took a trip through Yellowstone National Park, he chose as companion one of America's best-loved students of nature. This was John Burroughs, called "John o' Birds" by his friends. Burroughs was born in Roxbury, New York, in 1837. In his youth he tried farming, fruit raising, teaching, journalism and then for nine years was a clerk in the Treasury Department at Washington. Dur-



Photo by the National Museum

Sir Charles Lyell. This great British geologist discovered more about rocks and their relation to earth's history than any other man. Modern studies of the earth's crust owe much to the pioneer work done by Lyell.

ing all these years he spent his spare time in studying nature and in writing about it. In Washington he became friends with Walt Whitman, and his first book was NOTE ON WALT WHITMAN AS POET AND PERSON. Beginning with WAKE ROBIN in 1871, Burroughs published a series of books of flowers, birds and other wild life which have caused him to be regarded as the successor of Thoreau as a writer on nature.

Later in life Burroughs engaged in fruit farming at West Park, New York, where he worked in a cabin built on a hill near his house. This cabin, Slabsides, became a center for visitors from all over the world. Burroughs died in 1921.



American Museum of Natural History

This old man with a white beard is John Burroughs. Readers have loved his charming nature essays for half a century. He kept his outdoor vigor for most of his long life.

Some of the men who loved nature have faced handicaps which only the greatest courage could surmount. The French entomologist, Jean Henri Fabre (1823-1915), the "Homer of the insects," made his wonderful observations of insect life with no official encouragement until near the end of his life. Most of this life was spent in poverty. Fabre was an underpaid teacher and to support his family he had to give private lessons and do all sorts of hack work. Yet he found time to study the lives of hundreds of insects and to write the story of these creatures in such a sparkling style that his work was finally crowned by the Institute of France.

François Huber (1750-1831), the Swiss naturalist, was blind, yet he worked out many of the details of the life and structure of bees. He was greatly aided by his wife, and by a faithful, intelligent helper, François Buruens. After the death of François Huber his son, Pierre Huber, carried on his work.

Both Huber and Fabre eventually received great honors. More unfortunate in many ways was that strange adventurer, Constantine Samuel Rafinesque (1783-1840), half French, half German, born in Greece and brought up in Italy. Rafinesque was a man of many talents, great learning and much originality. Yet he almost starved on two continents. Although he discovered many new species of plants in what was then the wild west of Kentucky he was never able to hold a position for very long. When he died in Philadelphia, worn out and disillusioned, eight truckloads of his specimens, papers and other effects were sold at auction for so little that instead of there being any net proceeds his estate owed its administrators $14.43. But anyone who studies the plants of America finds the abbreviation *Raf.* printed after the scientific names of many—meaning that poor Rafinesque was the first to describe them.

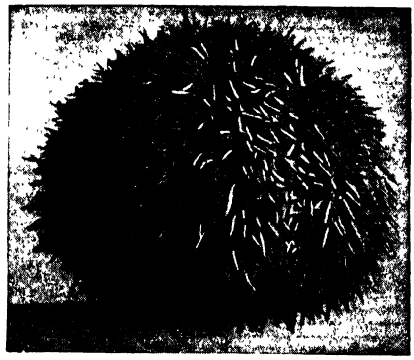
In recent years scientist have gone into the jungles, mountains and ice-fields in elaborately equipped expeditions, sponsored by museums. Roy Chapman Andrews (1884-) plunged into The Gobi, Asia, in 1921-22 and 1925. There he discovered new geological formations and numerous fossils in country which is now too dry to support such a population (which indicates that the climate must have changed). Among other spoils he brought back fossil dinosaur eggs, with remains of the parent dinosaurs, and fragments of the Baluchitherium, a giant relative of the rhinoceros, the largest mammal of all.

William Beebe (1877-), another distinguished American naturalist, dropped down into the ocean in a water-tight globe, called a bathysphere, to observe the mysterious inhabitants of the dark, cold, silent depths. Man for the first time observed the deep-sea fish—some with living headlights, some blind, some with enormous eyes—in their ocean homes.

A whole world of wonders waits for the boy or girl who observes nature with curious and sympathetic eyes. Most of the species of larger animals, birds and plants have been described; but a still more fascinating problem remains—the way in which animals and plants live together and affect each other in nature. It is a problem that can be studied by the Antarctic ice, in green jungles, in cactus deserts—and in your own backyard.

By THOMAS G LAWRENCE.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 7201.

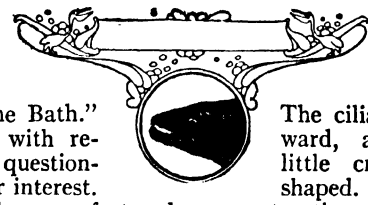


A typical Sea-urchin.



A beautiful Sea-anemone.

QUEER AND LOWLY CREATURES



ONE of the oddest things that ever was alive is surely the Sponge, the "Companion of the Bath." Let us examine him with respect and intelligent questioning. He will repay our interest.

Like ourselves, to whose comfort and cleanliness it ministers, it once had life, movement, appetite, and, in its early youth, extreme activity.

This curious honeycombed substance, so light and elastic when dry, so soft and collapsible when wet, is simply the silken, fibrous skeleton of an animal. If we catch that animal young enough, we may see it scurrying about in the sea as if it would "sail beyond the sunset and the baths of all the western stars" until it dies.

The lower half of this fuzzy little navigator is bearded with hair-like processes waving like tiny oars or arms, and so propelling it through the water. When it desires to progress in a straight line, it does so fairly well, but when it no longer directs its course, it stops and its still-waving cilia make it spin like a whirligig beetle.

This consuming activity lasts but a short while. Like the baby oyster, the youthful sponge thinks better, or worse, of its days of adventure; it sinks to the bottom of the sea, attaches itself to rock or weed, or to some shelled animal, and its roamings are at an end.

The oval body with which it set out in life undergoes marked changes. The ciliated part is drawn inward, and the globe-shaped little creature becomes cup-shaped. Within there is busy reconstruction of parts. The cell masses are changed into canals in which there is a jelly-like mass of flesh equipped with more of the vibrating processes to draw water and food into those canals.

The tiny pinhole-like perforations in our bath sponge open into the canals by which water is conveyed to bear life-sustaining oxygen to the sponge and also to feed it. Each draft of water taken in holds organic and vegetable matter which, caught and strained away by a delicate membrane at the junction of the little canals, is digested in the sponge's alimentary system. The exhausted water, together with waste products of the body, is then forced out of the large openings which we observe, and so all is well.

The sponge grows as it feeds; it gives rise in due course to eggs which at the right time are washed out of the parent body in the flood of water ejected from the main channels through the larger openings. These hatch into free-roving little animals which later on become sedentary.

Catch a sponge alive, confine it in a sea-pond, and let it have enough water for breathing and nutriment, and it will continue its growth. When sponge-fishers have little sponges or too many larger sponges in hand, they do keep them in this way and feed them. Thus, you see, it is really true about giving the sponge his breakfast.

So far we have mentioned only the sponges which are important for trade, and but one method of reproduction. In most cases multiplication is effected by the budding-off of tiny sponges from the parent. We can watch this process for ourselves in the case of one of the fresh-water sponges, the Spongilla. Life passes from the parent sponge with the fading of summer, but from its substance new life takes rise, to drift away with the spring and form new sponges.

As Nature takes more than one means to increase her store of sponges, so she has claimed many different situations for this branch of her children—inshore waters, deep-sea abysses, and all the ranges of soundings between. Silicious spicules, or needles, enter into the composition of many species, but these are not of commercial value. In the so-called glass sponges the silica is of the thinnest, most brittle texture and interwoven or fitted to form a glass network of great beauty. Yet this extraordinary substance serves as an anchorage in the Japanese *Hyalonema,* which is attached to the mud by a bundle of strands of "glass rope," which might have been produced by a human glassblower of unrefined art. In the *Semperella* the attachment is not a glass rope but an amazing glass-like spicule as thick as a man's little finger and nine feet long.

Many sponges bore into the solid rock of limestone cliffs and destroy it. They bore deep in the yielding chalk, open the way for disrupting water, and make destruction sure, if slow. Others bore into various shells—the oyster, mussel, scallop—causing them to go to pieces. *Cliona sulphurea* has even been found penetrating a little way into hard marble, and it is very destructive with coral.

Of course, we must not lay the blame for this sort of work to the account of all the sponges which we see by the sea between high tide and low; each genus has its station, its own sea-keep, its home in fresh water, its way upon the rock. There is the Breadcrumb Sponge, a colony of many sponges, living on our shores; there are the Mermaid's Gloves cast up, living, every rough tide, and sponges of all sorts through all seas, till we come to the tremendous Neptune's Cup, a marvelous piece of architecture three or four feet high, built up by many sponges which act as one, which raise the great stalk, then the vase-shaped cup, and make it lovely as the work of an old Etruscan potter.

Now let us turn to the very opposite of the horny sponges, the coral's relatives, those flimsy, transparent disks of life that float in every sea, the Jellyfishes.

These, with the corals and anemones, are called the *Cœlenterata,* and share the common peculiarity of an all round structure, so to speak. That is, they have no "sides," but are circular and symmetrical to a central axis. Moreover, they have no complicated internal divisions of the body like the higher animals, but are furnished with a digestive system which is not a closed canal, as we should expect to find, but is practically the entire interior of the body. At first sight they appear the most defenseless of creatures, but they have their stings and poisoned barbs most powerful.

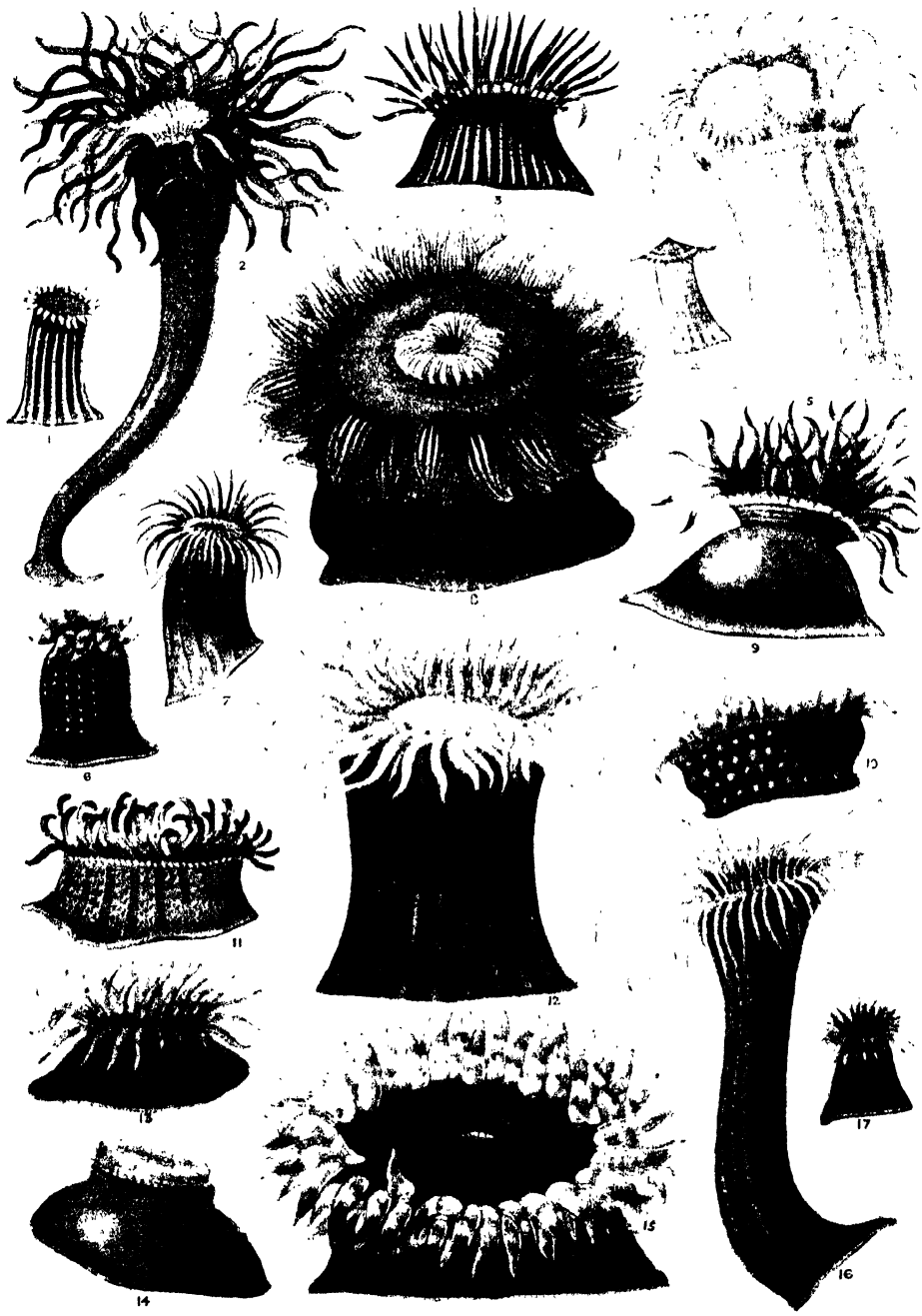
THE DISKS WITH WHICH THE COMB-JELLIES CATCH THEIR PREY

All our rules have their exceptions, and we must hasten to note some here. For the *Ctenophora,* or comb-jellies, have no stinging cells, but multitudes of tiny adhesive disks which clutch and secure minute prey. Then, another of the exceptions, the lovely Venus's Girdle, is not circular, like the rest, but exists as a broad ribbon of exquisite life, fringed with cilia which bring food within range. Some of this group have taken to creeping along the sea-bed, and so have assumed a drawn-out two-sided form.

Among the *Cœlenterata* we have an example of a dazzling contrivance on the part of Nature for distributing her family, in what is called "alteration of generations." It is not peculiar to this group, but here we may examine the method. Suppose we have a jellyfish mass which, as with the sponges, includes many individuals which budded from the original parent but remained attached to it. If these went on budding and growing, the mass would become inconveniently large. If the component parts all produced eggs,

LIVING FLOWERS OF THE SEA

Sea-anemones are well named, for they are remarkably like flowers, and in form and color are almost as widely varied as a garden. Here we show about sixty of these beautiful creatures.



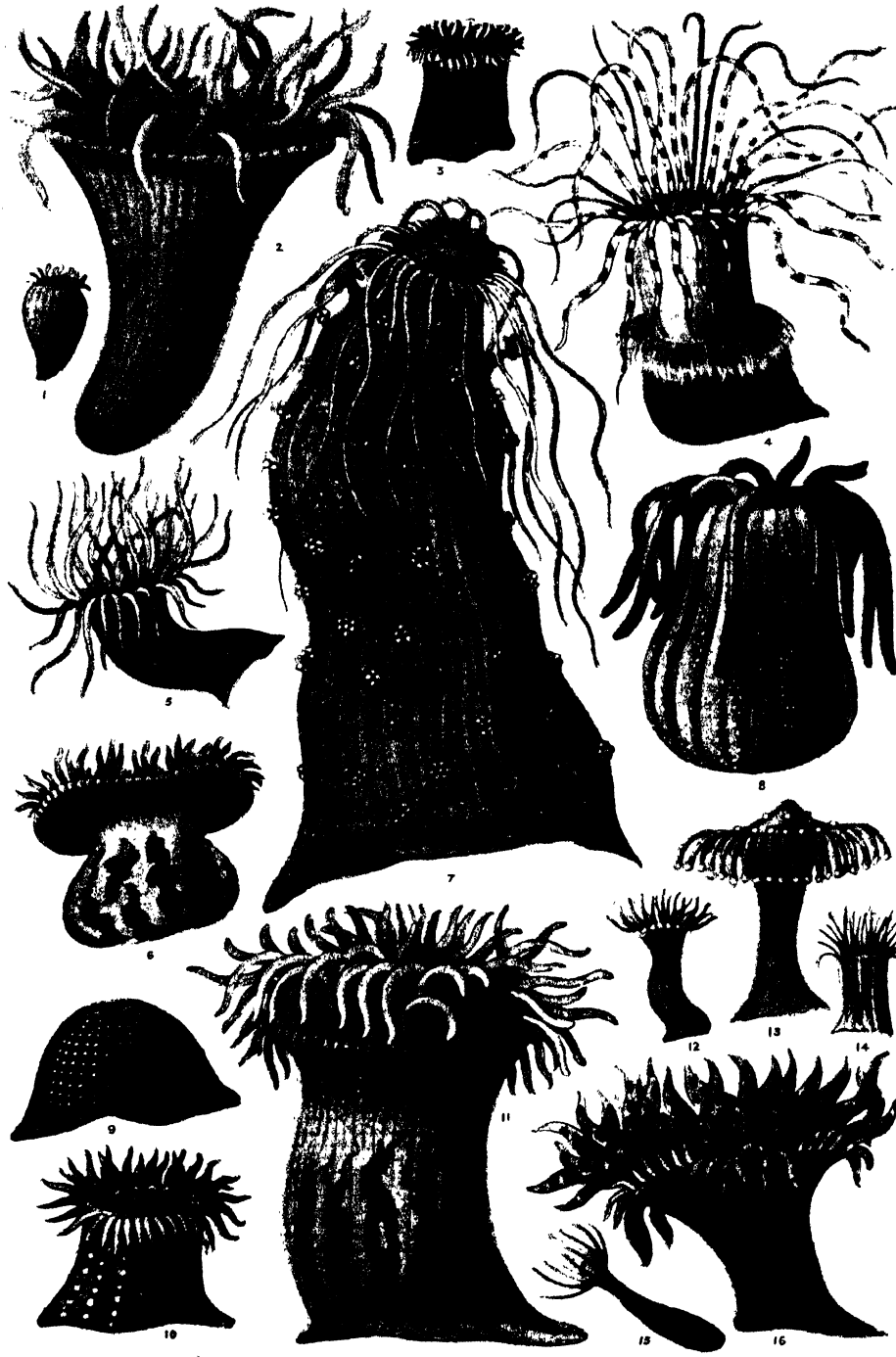
NORTH ATLANTIC ANEMONES

1. Eyed Anemone. 2. Trumplet. 3. Cave-dweller. 4. Latticed Corklet. 5. Plume Anemone. 6. Gold-spangled Anemone. 7. Rosy Anemone. 8. Deeplet. 9. Opelet. 10. Marigold Wartlet. 11. Red-speckled Pimplet. 12. Parasite Anemone. 13. Glaucous Pimplet. 14. Yellow Imperial. 15. Dahlia Wartlet. 16. Snake-locked Anemone. 17. Scarlet-fringed Anemone.



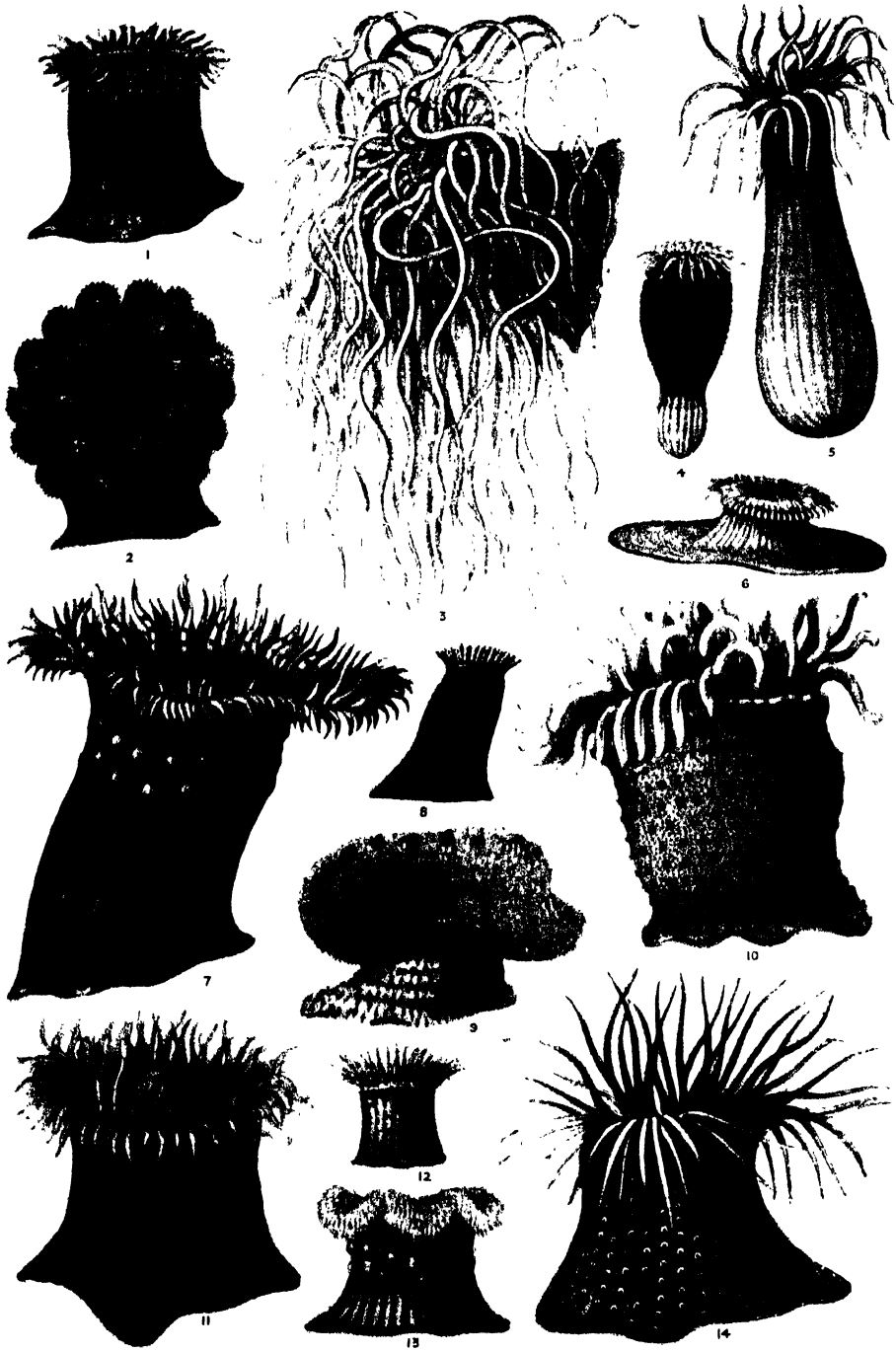
NORTH ATLANTIC ANEMONES

1. Necklet. 2. Walled Corklet. 3. Scarlet Pearlet. 4. Diadem Pimplet. 5. Painted Puffet. 6. Arrow Muzzlet. 7. Orange-disked Anemone. 8. Gem Pimplet. 9. Ringed Deeplet. 10. Gapelet. 11. Waved Muzzlet. 12. Variety of Opelet. 13. Crock. 14. Crimson Imperial. 15. Vestlet. 16. Beadlet. 17. Variety of Beadlet. 18. Eyelet. 19. Snowy Anemone.



AMERICAN AND EUROPEAN ANEMONES

1. Variety of Eloactis Mazelli. 2. Neapolitan Mud Flower. 3. Variety of Horse Beadlet. 4. Vestlet. 5 Crimson Trumplet. 6. Beautiful Ragactis. 7. Margined Cladactis 8. Eloactis Mazelli. 9. Hard Pimplet (closed). 10. Variety of Gem Pimplet. 11. Orange Cereactis. 12. Transparent Trumplet. 13. Globehorn. 14. Cloak Anemone. 15. Pufflet. 16. Color-changing Trumplet.



MEDITERRANEAN AND ALTANTIC ANEMONES

1. Parasitic Anemone. 2. Mossy Heterodactyle. 3. Opelet. 4. Slimy Corklet. 5. Snake-locked Anemone 6. Variety of Daisy Sun-ray. 7. Daisy Sun-ray. 8. Elongated Corklet. 9. Hemprich's Heterodactyle 10. Solid-furrow Anemone. 11. Horse Beadlet. 12. Sandy Pimplet. 13. Variety of Daisy Sun-ray. 14. Hard Pimplet.

they would overcrowd the sea in their neighborhood and bring about starvation for themselves and all their kind thereabouts.

HOW THE JELLYFISH FAMILIES ARE DISTRIBUTED OVER BIG AREAS

Now see what happens. The many-in-one are called a "stock." Parts of the stock, charged with eggs, break away, like the gemmules of the sponge, float off and colonize some new area of water, where the eggs are produced. Some of these sink and form new stocks, which will bud off new attached members. Others of the eggs, however, will hatch straightway into free-swimming jellyfish. The plan is ancient and has been employed in many forms of life by Nature. In the jellyfishes it has succeeded wonderfully.

The type is represented in all waters, from our own shores, through the tropics, and away toward the waters of both the Poles. One would expect the warm-water regions to produce the giants, and mighty forms are there, but probably the chill waters of the Far North and South have the Titans, for one of the recent Antarctic expeditions hauled up from the water at the foot of the Great Ice Barrier a jellyfish which was twenty inches across the upper part and weighed over ninety pounds, while the great pink stinging *Cyanea* of the North Atlantic sometimes measures eight feet across its umbrella!

THE FLOATING UMBRELLAS WITH A MASS OF WAVING ARMS

How much such a monster would weigh after its watery contents had escaped, one cannot venture to guess, but we have all heard of farmers carting jellyfish in loads, a ton and more at a time, as manure for their land, only to find, as children find by the shore, that their sea-booty resolved itself into watery films.

Jellyfish life extends into many species and is complicated and fascinating. In general we know that the body, a mass of glassy jelly inclosed between the upper and lower sides of the bell, or umbrella, bears a number of arms, or tentacles, and that from these issue the abominable stinging barbs. These are tiny threads with a dart-like head which lie coiled lasso-like in batteries of minute "thread-cells." They are violently ejected when touched, and cause a severe aching pain as they penetrate the skin.

In the jellyfish, of which the *Siphonophora* are the highest form, we have the same system of stocks and single individuals as in the former species, but still more remarkably developed. Here in a single floating mass we have congregated together a series of individuals united, yet recognizable as many in one.

THE DIVISION OF LABOR IN THE JELLYFISH COLONY

Such a jellyfish colony is more socialistic than a community of ants or bees; its labors are subdivided yet co-ordinated, as in mass production in a factory. There are jellyfish in the united mass which propel the whole colony along, their function being to take in water, contract and squirt it out, and in that way row the living city about. Then there are others which guard the colony from offense, like the huge-jawed soldiers of the warrior ant colonies. In addition there are the members which produce eggs, or buds, and finally those which collect the food, digest it and pass the nutritive result from end to end of the entire body of many individuals in one.

Of the *Siphonophora,* the Portuguese Man-of-War is the climax of jellyfish perfection, a thing of exquisitely radiant colors supported at the water surface by a float like a luminous inflated sack, eight or ten inches long and six inches in diameter, with a living nursery attached to its under-side, and stinging tentacles many feet long streaming like a corrosive battery far in the water.

There are free-swimming jellyfish, in the *Hydromedusæ,* which are solitary and must fight and fend for themselves. Extraordinary facts regarding food supply have been discovered concerning these. Not only do they show instinctive genius in catching food with their tentacles: they are known to collect food which falls on the upper side of the bell, securing this supply partly by the rhythmic movements of the bell and partly by the action of minute cilia.

The united result is that the prey or organic matter is gathered into little heaps, mixed with mucus, brought to the finely fringed edge of the upper side of the bell, then, by means not yet discovered, conveyed to the under-side, and so to the tentacles and thence to the slit-like mouth.

THE TINY ORPHANS WHICH GO TO THE JELLYFISH FOR PROTECTION

Included in the diet of these jellyfish it is surprising to find the tiny larvæ of oysters, whelks and the like, eggs of fish,

little crustaceans, tiny bristleworms and multitudes of algæ. So the jellyfish is a free feeder, and takes things that might become food for man. On the other hand, he swallows the enemies of our fishes and molluscs, and in some cases is a benevolent nursemaid to many kinds of fishes.

Baby herrings, baby codfish, and a multitude of other friendless orphans which later may come to table in breadcrumbs or batter, look to the jellyfish for shelter. But why does it not sting them to death as it stings other fish?

Certain crustaceans whose hard coats make them indifferent to its stings play the brigand to the jellyfish; they attach themselves to it and actually take the food out of its mouth. That is disastrous to the jellyfish's prospects of long life. Now, the little fishes which it shelters are the very ones which need crustaceans as the main part of their diet. So, when the robber is pillaging the mouth of the jellyfish, the welcome fish swim up and devour the intruder.

For that service they are entertained without harm by the master of barbs and stings. But let an enemy of those fish pursue them within range of the jellyfish, then out go the stings, and the foe is either stunned and caught, or so severely punished that it is glad to escape with bare life.

THE QUAINT ANIMAL WHICH IS LIKE A FLOWER IN APPEARANCE

A similar plan of mutual aid extends between the Sea-anemones, on the one hand, and some other types of life—crabs, whelks, fishes, even actual vegetation—on the other hand. For, in spite of the name, the sea-anemone is not a vegetable, like the plant with which it co-operates. It is a true animal, low down in the scale like the sponge, but with a somewhat flower-like appearance.

Anemone it certainly is not, even in outline. We might liken it to some exquisite daisy, chrysanthemum or dahlia, perhaps, but not accurately to the delicate wind-flower. No matter, a sea-anemone flourishes as lustily by this name as any other, and it is a thing of rare beauty and wonder to all who have eyes to see and access to its home.

The body, with its leathery covering and strong muscular substance, is always heavily fringed with tentacles about the mouth, and these tentacles are armed with minute thread-cells which bear poison, so that the arms not only cling but sting. The strength of a single tentacle may be insignificant, but the drawing power of the entire assembly is astonishing. They cannot pull our finger into the interior of the animal, but the force is noticeable even in the small species which are found round our coasts.

THE ANEMONE WHICH MADE A MEAL OF A PENNY

The anemones are sightless, but the possession in some species of brightly colored bead-like prominences at the base of the tentacles around the mouth suggests that they are sensitive to light.

Touch and the power to absorb seem the chief senses of the anemone. One has been known to swallow a penny. Another was fed with eleven small crabs in succession. This one was exposed in a rocky pool whence the tide had retreated, and it clung, neatly folded in, looking like a large red jujube.

But it needed only a touch to cause it to thrust out its tentacles and to take in the offered crab. Again and again it accepted the offering, till it bulged with live stock. Why did not the desperate little crabs eat their way out? The anemone, before it swallows them, is able to paralyze their action, and thus they are helpless.

THE NEW ANEMONES WHICH GROW LIKE BUDS ON A STALK

All the anemones are sedentary, attached by the suction of the basal disk to rock or sea vegetation, unless they anchor themselves to a moving animal, or, as happens with several species, burrow into the sand.

Sometimes new anemones arise by an actual division or splitting of the original animal, but as a rule eggs are laid within the parent body and hatch there, and the larvæ swim out when ready, or are ejected in a jet of water which passes out of the adult's mouth.

Great interest attaches to the feeding and general life habits of the anemones, but if one would preserve his poetic conception of their beauty and charm he had better not attend their dinner-table. No siren, no monster of the sea, could ever have been so frightful to ancient human imagination as an anemone must be to the fishes and crustaceans which it draws helpless into its insatiable maw.

Nevertheless, there is nothing lovelier

NATURE'S LOWLY CHILDREN



An umbrella-like jellyfish with its eggs.



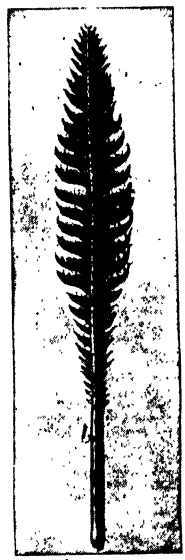
A sea-anemone in a rock pool.



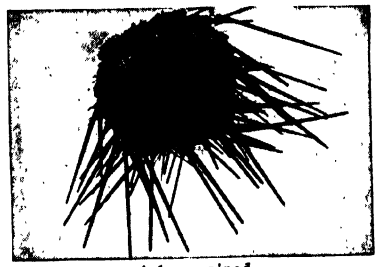
A starfish opening an oyster shell.



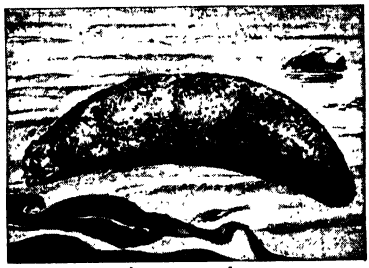
A beadlet sea-anemone on a cockle shell.



A sea-pen.



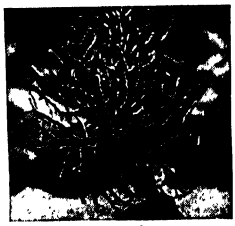
A long-spined sea-urchin.



A sea-cucumber.



Venus's girdle.



A sea-fan.



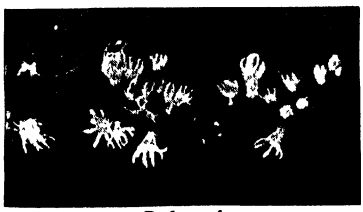
A disk jellyfish.*



Bird's-foot starfish.



Beadlet sea-anemone.



Red coral.



A starfish.



Brain coral.

The pictures on this page are by Messrs. Berridge, Martin Duncan, Johnson, Ward, and others.
*Courtesy American Museum of Natural History.

in the seas than the anemone, no richer hues in the rainbow. There is no garden in the world more rich and varied in color and design than sea-deeps where tropical and subtropical varieties spread their gorgeous filaments and ravenously prey. Off the coasts of California and the islands of the West and East Indies there are wonderful sea-gardens which, because of the clearness of the water, we can look right down into from a glass-bottomed boat.

It is but a step from an anemone to a Coral Polyp, though no anemone ever furnishes itself with a hard skeleton. The coral polyps, on the other hand, are the foremost builders in the realm of Nature. Dead, minute shelled animals have formed mountain ranges, but living, the polyps have changed the bed of many a seaway.

They take mineral matter from the sea, and they take it also from the myriads of microscopic animals with limy coverings which form part of their food; and the whole they convert into coral as hard as rock. Having studied the bee with its waxen cells, the spider and caterpillar with their webs, the molluscs with their shells, and the birds with their lime-coated eggs, we are now prepared to contemplate even these massy marvels of coral with reasoned philosophic belief.

The little animals, flower-like in appearance, grow together in countless profusion in their colonies. Instead of thinking wax, like a bee or a wasp, they think this lovely limy coral. That is only a way of putting the matter, of course, for they cannot think at all: they are very lowly organisms, in spite of the marvels they achieve.

THE ISLANDS MADE BY TINY CREATURES IN THE SEA

They work together night and day, secreting the material and building it into reefs, into islands, into barriers, into crater-like atolls. They have given us hundreds of islands on which men dwell and make their homes of the material that these minute animals have created. They alter the depths of seas by changing the levels of sea-beds. They nearly cost the lives of Captain Cook and all his crew when a piece of coral from the Great Barrier Reef off the east coast of Australia penetrated the hull of his ship, and then, by remaining fast in the hole thus caused, saved him from the wreck which must have resulted had the mass become dislodged before he gained harbor.

Age after age these great structures rise beneath warm seas. Coral polyps are born and die. They are eaten by fishes which, like sheep on the hills, browse where the polyps thrust out their bodies with waving tentacles to gather food from the water. But their work goes on, century after century, epoch after epoch. Coral polyps are growing at the bottom of the Red Sea to-day whose ancestors were at work there when Pharaoh and his host were drowned in its returning waves.

Many illustrious names are associated with the problem of coral structure. Everybody believed the substance to be sea vegetation, that the polyps were the blooms, and that the mineral, covered with a sort of skin, was the trunk of the plant or shrub.

But how were they to account for the rock-like consistency of a living shrub? "Ah," said the wise ones, "the coral is soft and flexible, like plants of the earth, till it reaches the air, then it instantly hardens into this rock-like substance."

THE GREAT BARRIER REEF WHICH IS 1,250 MILES LONG

Eventually a French scientist conducted experiments with professional coral-fishers. He made them dive and feel at the coral. They came up reporting that the under-sea coral was as hard as that out of the sea. He could not, dared not, believe it; so, slipping off his clothes, he, too, dived, groped among the coral, and found that what had been reported was true.

The amount of coral created by these puny animals is beyond human calculation. The animals are found developed sparsely in colder waters and it is in warm seas that they attain their greatest luxuriance. On some coasts they appear merely as scattered groups or mounds of coral rock, but west of the Fiji Islands is an area of coral reef 3,000 square miles in extent, and the Great Barrier Reef of Australia attains a length of 1,250 miles, all the work of these minute animals. It seems unbelievable.

Engineering so terrific as this naturally spells jeopardy to navigation, and the menace grows from age to age as the unflagging builders toil. But they have fashioned many a sweet sanctuary for ships by their atolls, many a home for man in the midst of blue and sunny seas. On and on, up and up they build.

THE TIDE-BORNE LIFE WHICH COMES TO THE NEW ISLANDS

Fish tear and rive at the coral, worms tunnel, waves break and crumble the rock, wrench off boulders of it and use these as battering rams to demolish still more. At last a fine detritus is formed to which one day a voyaging coconut comes and takes root, rises into a tree from which new nuts fall and create a grove. Birds, weary of sea flight, arrive and make their nests; tide-borne seeds and drift-carried animals reach the island.

None of us forgets that not all corals build reefs or barriers and islands. Some lovely isolated forms exist, marvelous in beauty of design, dainty as flowers in color. There are the extraordinary Star Coral, the Brain Coral, the branching *Dendrophyllia,* the massive *Astroides,* the exquisite Sea-pen, the Sea-fan, and hundreds more, an inexhaustible study in themselves.

THE HUNDREDS OF SUCKERS IN EACH FINGER OF THE STARFISH

Another important group of sea animals turn the mineral properties of sea-water to account in a different way. They have put on a lime-charged mail which is either prickly or of a gritty, leathery texture. The prickly ones give the name to the sub-kingdom. That name is *Echinoderm,* which is derived from two words meaning "spiny skin." The whole class is limbless, though the Starfish would seem to be five-limbed.

These are not legs in the ordinary way, but finger-like parts of the central body. Yet it is by their aid that it moves and gains its livelihood; not by walking, however, but by suction. Under each of those fingers are some hundreds of suckers, which, withdrawn when the starfish is at rest, can be protruded to grip the ground and pull the whole body forward. The starfish does not walk, then: it glides, following every inequality of the surface and slithering forward.

THE MIGHTY PULL WITH WHICH THE STARFISH OPENS THE OYSTER

Children have a horror of starfish, thinking that the little animals sting. We have no reason to fear them: they do not hurt us, except commercially. Molluscs should fear them—the mussels, oysters and cockles. The starfish can do what a man cannot: it can open an oyster with its fingers. Raising itself on the tips of its fingers, it grips the shells of the oyster firmly with its multitudinous suckers and pulls. The oyster is very strong, as we all know, but that steady pull wearies it. The shells are forced apart, and the starfish eats the oyster.

Enormous damage is done to shellfishes in some years by starfishes. In 1918 they attacked the shellfish beds on the east coast of England in such swarms that one small trawl alone dredged up thirty-seven tons of the five-rayed foes, but not till the latter had devoured every mussel and cockle in the channels of the low-lying areas on which they had advanced. And that followed the destruction, two years earlier, of seventy-five tons of starfish in the same area.

There is no such charge of damage to urge against the starfish's cousins, the sea-urchins and the sea-cucumbers. It is generally possible to find a Sea-urchin without going to the sea. One has only to gain access to a chalky formation and dig, and fossil urchins are practically certain to be there. These are the creatures which, in addition to a limy shell, possess the spines, like a hedgehog, which give the name to the whole group.

THE STRANGE CREATURE WHICH SHEDS ITS INSIDE WHEN FRIGHTENED

The Sea-cucumbers lack the spines, but lime enters largely into the composition of their covering. The proportion of this mineral in the sea-cucumber determines its value in countries where these animals are eaten. The sea-cucumber has the faculty of dismembering itself. A lizard can snap off its tail, a brittlestar can shiver its fingers to pieces, a lobster or a crab can shed its shell and the lining of its digestive system while preserving its soft body-form; but the sea-cucumber, if it is frightened, or angry, or unwell, can discard its entire interior—stomach, intestines, tentacles—everything, one would think, which makes life either tolerable or possible.

Away go all its physical possessions save the mere empty skin. There lies this apparently lifeless husk, for weeks, perhaps months—a husk in which the life principle alone remains, the tendency to grow and regenerate. The creature cannot eat or drink or in any visible way take nourishment. Yet, as the lobster regrows its claws, the lizard its tail, the starfish its fingers, so this lowly marvel develops new internal organs.

THE NEXT STORY OF ANIMAL LIFE IS ON PAGE 7131.

THE MORNING HYMN AT JOHANN SEBASTIAN BACH'S



This picture, from a painting by T. E. Rosenthal, shows the great composer in the midst of a family group. Descendant of musicians and father of musicians, he presided over a household where music was a familiar language. For the clavichord he wrote in the scale which we use to-day.

7070



The Nuremberg Town-band, from a wall-painting by Albrecht Dürer.

THE DEVELOPMENT OF MUSIC

II. GREAT CLASSIC COMPOSERS AND THEIR WORKS



HOW much more interesting the history of music seems to us when we think of it as something real and vivid, taking place side by side with the history of peoples and nations! For, at the very time that the English people were struggling for the reforms that rid them of the tyranny of the Middle Ages and gave them the England we know to-day, changes in music, too, were being brought about—changes which mark the beginnings of "modern music." In 1685 King Charles II died, and, after three years of James II, the English people were ready for William and Mary to come to the throne. That marked the birth of modern England. And in the same year, 1685, were born the great and famous composers Bach and Handel. Together they may be called the fathers of modern music.

In what way did Bach and Handel transform their music into something modern? For one thing, they no longer wrote in the church modes as Palestrina had done, but used the major and minor modes, which we use to-day. They also used strong and interesting rhythms. When we hear their compositions played we do not think they sound old-fashioned and queer as we would if Palestrina's music were played.

Of the two, the greater and more influential was Johann Sebastian Bach. He came from an illustrious musical family. His father, grandfather and great-grandfather were also noted musicians; but Johann Sebastian was by far the most famous.

When Bach began composing there were three kinds of music with which he was familiar. There was Italian opera, which was written in the harmonic style, using melody supported by chords. There were the simple German folk songs. And there was complicated church music in counterpoint, like the music of Palestrina, which had parts that flowed along side by side, instead of chords. Bach combined these three kinds of music, but wrote chiefly in the contrapuntal style. Here he showed remarkable skill. Many of his pieces he wrote in accordance with strict and intricate rules; yet they still sound fresh and sparkling and not at all held down by hard-and-fast forms. His works, especially those for the organ, are noble and majestic.

Besides being composer, organist and teacher, Bach introduced a differently tuned scale, called the "tempered

scale," which made it possible to play in every key. This is the scale that we use to-day. Bach showed how practical it was by writing a series of preludes and fugues for the clavichord, an instrument something like a small piano. This series he called The Well-Tempered Clavichord.

To anyone who is not familiar with Bach the music of this great composer may sound strange and uninteresting, but that is because his style is so unlike that of most composers whose music we hear to-day. Once the strangeness wears off, there is endless enjoyment in following the parts of a Bach fugue.

Handel composed somewhat in the contrapuntal style of Bach, but his music was written more to meet the popular taste. Less complicated than Bach's, it met with greater immediate success. While Bach is most famous for his organ works, Handel is known best because of his beautiful oratorios. These oratorios were written on subjects taken from the Bible, and were sung by great choruses with solo voices and orchestra. The greatest of these, The Messiah, he took only three weeks to write, working under the spell of a great inspiration. He said afterward that when he began the Hallelujah chorus he felt that "all heaven and earth were lying open to his gaze."



George Frederick Handel, composer of great oratorios, from a picture by Hudson in the Bodleian Gallery, Oxford, England.

With the passing of Bach and Handel another change came over music. This time it was a difference in style rather than a growth of something musically new. Always it has been the habit of man to want new styles. And just as styles have changed in everything in the world, from clothes to buildings, so they have changed many times in the history of music.

About the middle of the eighteenth century people began to feel a reaction against the ornate and intricate music of Bach. They wanted something simpler. They preferred to have their music fresh and charming like folk songs. Not only in music, but in prose, poetry and architecture, too, people felt this desire to have things simple, regular and balanced, as they were in the days of the ancient Greeks. Writers in the eighteenth century began to use the classic Greek style. Poets like Alexander Pope aimed for balanced perfection of form. The Georgian style of architecture, which became popular, imitated the symmetry of the Greek temple with its regular design of columns.

It was exactly the same with music. Bach's works had been like towering, massive Gothic cathedrals—a network of pointed arches, vaults, buttresses and stained-glass windows—as vast and irregular as a mountain. Just as it takes a long time to study the intricate details of a Gothic cathedral, so it takes a long time to study the design and ornament of a Bach fugue. But with the change in style music became like the ancient Greek temples. Everything was simple. Melodies were regular in pattern.

So simple and childlike was the style of Franz Josef Haydn that he has been affectionately called "Papa" Haydn. His compositions were never powerful, but always bright and cheerful. Aside from his works, which are still effective enough

to be played somewhat in our own times, Haydn is famous as being the father of the symphony and of the modern orchestra.

Symphonies as we know them are lengthy compositions for full orchestra, usually in four parts, or movements. A symphony is the novel or the epic poem of music. Haydn's symphonies were much shorter than those of to-day, but they were written in the same form. Usually several of the movements—most of the time the first and last—are in "sonata form." Haydn was the first composer to make something definite of this particular musical structure, which has since been used by nearly all the great composers. Its chief distinction is the use of two themes, the second in strong contrast to the first.



Franz Josef Haydn, who is looked upon as the father of the modern symphony and of the modern orchestra.

Modern symphony orchestras are much alike, and composers to-day can write for the instruments they know will be in the orchestra, but in Haydn's day each orchestra was different. He had to select what instruments he thought would go best together. The combination of instruments for which he wrote has since been enlarged, but it formed the backbone of our present symphony orchestra.

Haydn's humor sometimes crept even into his serious works. Once when he was writing a symphony he was feeling annoyed that his audiences paid so little attention to his compositions, so he decided on a joke to make them sit up and take notice. When the symphony was played it started with a quiet, dainty little tune. Suddenly, without warning, came a loud, crashing chord! The effect was startling. From that time on, the piece has always been known as the "Surprise Symphony." Haydn is remembered chiefly for his symphonies and for his string quartets (which are pieces in symphonic form for two violins, viola and cello). His oratorio The Creation is also famous.

MOZART HAILED BY MANY AS THE MOST PERFECT MUSICIAN

Following in the footsteps of Haydn, Mozart also wrote in the symphonic form, composing not only symphonies and quartets, but violin-and-piano sonatas, concertos for piano and other instruments, and quintets. He was an unusually fine musician. As a child prodigy he started to compose at the age of four; although he died at thirty-five, he wrote a large number of works.

Many musicians have considered Mozart the greatest, or at least the most perfect, of composers. Once, at a dinner given to Brahms, a toast was made to "the greatest composer," referring, of course, to Brahms. Whereupon Brahms immediately jumped up, raised his glass, and replied: "Yes—to Mozart!" Like Haydn, Mozart made his symphonies clear and flowing with melody. But there is less childlike brightness and more seriousness in them. Mozart's music was never overpowering in vigor or towering in size; but what he tried to do he did perfectly. He wrote several operas. His music for them is delightful, but the operas themselves are old-fashioned.

The man in this period who was most famous for his operas was Gluck. Before

Gluck's time opera had become little more than a concert to display the voices of the singers. But Gluck thought that it was more important for the opera to tell its story in a dramatic and exciting way than to "show off" the singers' voices. He wrote his operas with that end in view, and did much to improve opera.

A GREAT RESTLESS SURGE IN BEETHOVEN'S MUSIC

But now there emerged a great figure who took over the form and style of Haydn and Mozart and made, not dainty and simple compositions, but huge, rugged musical works of such a stormy nature that his fellow-musicians marveled and shook their heads. That man was Ludwig van Beethoven, who was born about 1770. Beethoven was a pupil of Haydn. His music at first was much like Haydn's, but before long it developed into a powerful style that "Papa" Haydn could never have reached. Beethoven put great intensity and expression into his compositions. They were still simple and direct, but it was a noble, glorified simplicity.

What was the difference between Beethoven and those who went before him? The music of Haydn and Mozart was beautiful, like a lovely hand-painted vase, but it had no personal feeling. It was not alive. Beethoven, with his strong personality, could not help putting his emotions and moods into all his music. He wrote in the same forms in which Haydn did, but filled his compositions with love, hate, anger, restlessness, the quiet of the country and the din and turmoil of war. Instead of picturing the beauty of a vase, his music was like the beauty of a rocky mountain or a dark and stormy landscape. Beethoven had humor, too. One movement in each of his symphonies he called "scherzo," or joke. The scherzo of his Fifth Symphony has a passage for double-basses—the huge stringed instruments which men play standing up—in which the music frisks around in lively fashion like the capers of playful elephants!



From childhood a favorite of royalty and nobles, Mozart is here shown as playing before members of the court of Vienna.

BEETHOVEN'S FIFTH SYMPHONY: "FATE KNOCKING AT THE DOOR"

Among Beethoven's works are nine great symphonies, the last one written not only for orchestra but for chorus as well. The most famous is the Fifth, in which the musical idea has a *rap! rap! rap! rap!* rhythm, described by Beethoven

A MOMENT OF DRAMATIC INSPIRATION



This dramatic picture suggests the rush of imagination sweeping Schubert along as he composed his thrilling song, The Erl-King. Courtesy of Steinway & Sons.

as "Fate knocking at the door." His sixth Symphony, called the Pastoral Symphony, gives us the atmosphere of life in the country. It is the first great piece of "programme music," or music that describes some event or mood. Beethoven also wrote overtures, string quartets, and an enormous amount of piano music. One of the tragedies of his life was his deafness. However, it did not prevent his composing, because even when entirely deaf, he could still hear *in his own mind* the pieces he wrote!



In this statue by Robert Weigls, Ludwig van Beethoven has a rugged, stormy and impetuous mein, reminding us of his music.

About this time—the opening of the nineteenth century—a new movement, known as the romantic movement, was slowly starting among the arts. It was another change of style! People had become tired of the stiffness and lack of feeling of classic art, both in literature and in music. They wanted to use their imaginations. They wanted to express their own feelings. In literature, poems such as The Ancient Mariner stirred the people's fancies. Beethoven was partly romantic in his music because of the completeness with which he gave vent to his feelings, but the forms he used were still classic. Two other composers who were romantic in feeling but still kept to the classic structure of music were Schubert and Mendelssohn.

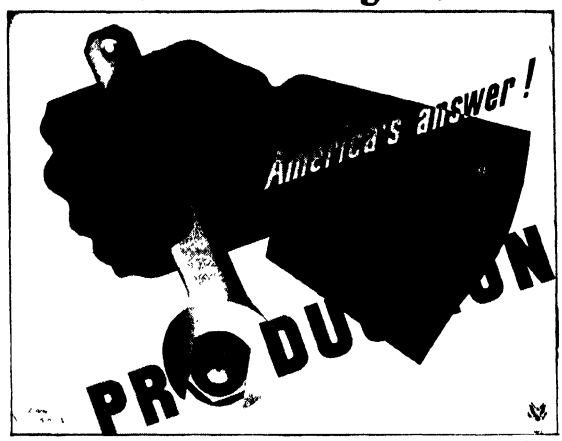
No one in the history of music has ever had a greater gift for melody than Franz Schubert. Music flowed from his pen day after day with wonderful rapidity, but he was too lazy to revise and perfect his work. The story is told of Schubert's writing his song Die Forelle late at night. When he reached for the bottle of sand, which was used then instead of a blotter, he was so sleepy that he seized the ink bottle by mistake, and before realizing what he had done, poured ink all over his manuscript. For a week or more afterward he refused to bother to rewrite it! Schubert is at his greatest as a song-writer. Even his symphonies are so brim full of melody that they seem like songs on a giant scale. His most widely known work for orchestra is his Unfinished Symphony, so called because he completed only the first two movements. Among his songs are the beautiful Hark, Hark, the Lark! and the dramatic and thrilling Erl-King.

Schubert was far removed from Beethoven's stormy compositions, but the dainty, charming and polished music of Mendelssohn differed still more widely. When quite young, Mendelssohn showed great talent for composing. At seventeen he wrote his Midsummer Night's Dream Overture, a beautiful and delicate work for orchestra. Besides other overtures he wrote symphonies and piano pieces and an important oratorio, Elijah. Mendelssohn was strongly impressed by a visit to Scotland, and much of his music contains Scotch atmosphere.

So Schubert and Mendelssohn, while keeping to the patterns used by the classic composers, gave music new feeling, new moods. But for the real and wholehearted beginning of the romantic movement in music we must turn to Robert Schumann, whose expression was more free and fanciful. He was not only a great musician but a great critic.

THE NEXT STORY OF THE FINE ARTS IS ON PAGE 7149.

LEARNING HOW TO MAKE A POSTER



OWI photo

1. An abstract poster, in which the message is in the form of a symbol. The gloved hand stands for American industry.

WHAT is the purpose of a poster? To put it briefly, it is to present a short message to the public in as striking a way as possible. Sometimes attention is aroused by bold or unusual lettering without any picture. More often the attention-getter is a striking picture or pattern or design. The message may consist of a word or two; or there may be a headline, followed by smaller lettering.

Posters have been popular for many years. They have been used to advertise articles of food and clothing, automobiles, theatrical performances, hotels—in fact, almost everything under the sun. They have also been used a great deal for non-commercial purposes. In school, for instance, they are used for safety campaigns and to advertise plays, dances and concerts. Elsewhere, posters urge us to buy savings bonds, to contribute to the Red Cross and various other organizations for charity. And what would an election be without posters boosting the candidates!

Boys and girls who have some knowledge of drawing and a fairly good sense of color can make attractive posters to advertise school activities (athletic events, dances and meetings), patriotic messages and so on. The student who can make interesting posters will find his services in constant demand.

A professional artist who specializes in poster work generally has a good deal of equipment. It is possible, however, to do good work with the following comparatively modest outfit:

Drawing board.
Pencils.
Art gum eraser.
Straitedge.
T-square.
Palette knife.
Assorted brushes.

About a dozen old plates or little bowls for mixing paints.

Water colors in tubes. The following selection will be quite sufficient: white, black, crimson, vermilion, ultramarine blue, carmine lake, sea green, lemon yellow, cadmium yellow, brown.

Paper. Heavy Whatman or cartridge paper will do for rough sketches. For finished work, use water-color board, with a fairly smooth surface. Ordinary cartridge paper pasted on strawboard will also do.

When you have the idea for your poster and have decided on the picture and lettering that are to represent it, you must then consider the design. Here are a few useful hints. Do not include too many useless details, or the eye of the reader will be confused. On the other hand, do not simplify your poster so much that it consists almost entirely of empty space. Try to avoid making an equal division of light and dark areas. One (either light or dark) should be more prominent than the other. Never have a straight line extend from one side to the other or from the top to the bottom in such a way as to cut the poster in two.

A design is often made more effective by a boarder set around the poster. The border

should be ruled in straight lines, with rounded or slightly decorated corners (see figure 2). The border should be drawn with waterproof ink or in color.

Posters come in certain standard sizes, referred to as sheets. These sizes are as follows:

1 sheet	28 x 42 inches
3 sheet	42 x 84 inches
6 sheet	84 x 84 inches
8 sheet	84 x 112 inches
12 sheet	112 x 126 inches
24 sheet	112 x 252 inches



2. Three corner designs for posters.

The one-sheet size is the most practical one for the beginner; you will note that it measures 2⅓ feet by 3½ feet. Posters may be made smaller than the above sizes; it would be well, however, to keep them in proportion. For example, to make a smaller poster on the same scale as the one-sheet poster, you might divide each of its dimensions by two; your poster would then measure 14 x 21 inches.

The design should be worked out in a rough sketch, one-half the size of your intended poster. When you enlarge your rough sketch, everything should be in proportion. To do so, divide your sketch into squares with a pencil, using as light strokes as possible (half-inch squares will be small enough). Divide the paper upon which you are to make the finished drawing into the same number of squares, each twice as large as those in the smaller drawing. The details in each of the larger squares should reproduce as closely as possible the details in the corresponding smaller square.

Generally speaking, the picture part of the poster may be either realistic or abstract. If it is realistic, it presents familiar objects in such a way that they faithfully illustrate the ideas represented in the poster. Thus, a poster calling on young men to enlist in the Marines would have a picture of a gallant Marine, armed with a business-like rifle. A poster advertising a football game would show a helmeted football player.

If the poster is abstract, it presents the idea in the form of a symbol; it suggests rather than describes. For example, a laurel wreath would be used to illustrate the idea of victory; a wing would indicate speed; a heavy circle would give the idea of a wheel and hence might be used for a railway advertisement.

Generally speaking, it is more difficult to make an effective abstract poster than a realistic one. For one thing, there is always the possibility that the reader will miss the point of an abstract poster. The beginner would do well to keep to realistic posters until he has acquired a certain amount of skill.

Of course, whether one chooses the realistic or the abstract method of approach, one should be able to draw at least fairly well. At this point, may we make a suggestion to our young artists? The professional artist keeps a file of photographs, drawings, prints, picture postcards and so on; these show all sorts of figures and objects in every possible position. He arranges this material according to subject—men, women, children, animals, houses, trees and so on. When the artist is called on to make a certain kind of drawing, he is not compelled to rely entirely on his memory, or on a model. One or more of the drawings or photographs in the file can be used as the basis for the sketch.

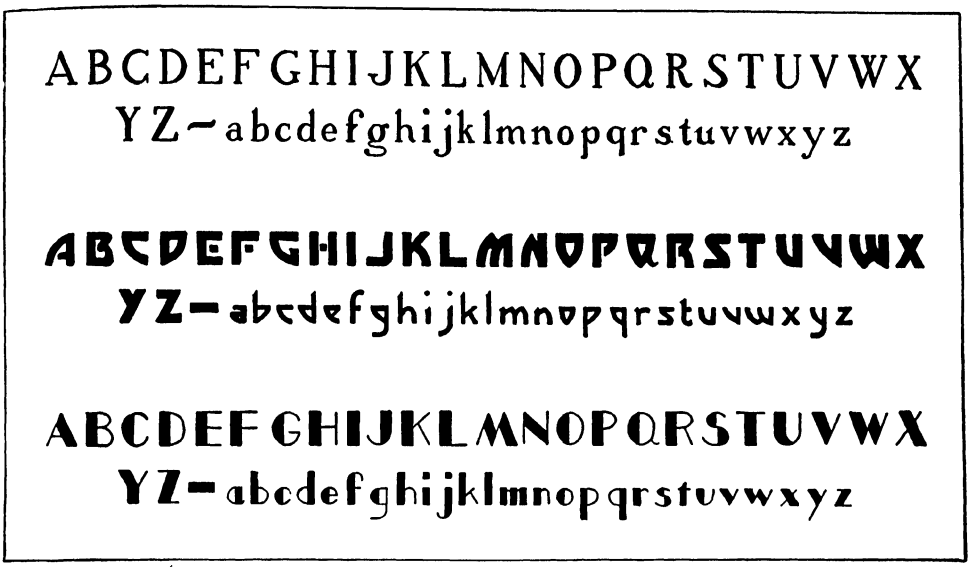
You will find it useful to start a similar file of reference material. You can keep this material in a number of scrap books. In one book keep male figures; in another, female figures; in a third, animals; in a fourth, flowers, and so on. When working on a drawing, you should not simply copy the reference material. It should serve principally to give you valuable suggestions.

A single large striking figure is generally much more effective than a number of smaller figures. Very often, too, you will find it advisable to give only a part of a figure—the head and shoulders; an arm and a hand.

The figure may be set at the centre of the poster or off at one side. The latter arrangement is better when there is a good deal of lettering to be done. Make the figure as large as possible. Complete the sketch in pencil, including every detail, before you begin coloring the poster. In this way you will have a series of definite outlines to work on.

While effective poster work may be done in black and white, most posters rely on striking colors to help attract the eye. It is best not to use too many colors in any one poster; you can produce fine work with from three to five colors.

Try to produce contrasting effects by means of such combinations as white on any



3. Three specimen alphabets that you will find useful in poster work. Professional poster artists keep a file of different alphabets; they choose the one (or ones) that will go best with a particular poster.

dark color, red on blue, yellow on brown. Use the more striking colors for the spots that need to be emphasized; for your backgrounds use deep values and grayish tones.

Prepare your colors on old plates or little bowls. Squeeze the desired color or colors from the tube and with the palette knife work the color in until you have a smooth paste. Then add enough water to obtain a creamy liquid. When applying paint, the drawing board should be propped up at a slight angle. Start by covering the surfaces that are intended to be white with white paint, thin enough to allow you to see the pencil lines underneath. Follow this with the next lighter color and then proceed to the deeper tones.

Always spread the color over the edges of a shape, when this is surrounded by a darker color. The shape will stand out clearly when the darker color is painted in. The colors should be kept fairly thin; otherwise the pencil lines underneath will be lost.

If you make changes after color has already been applied, you may remove the paint by means of a sponge and blotting paper. Rest your hand, while working, on pieces of scrap paper, so that you will not soil the poster.

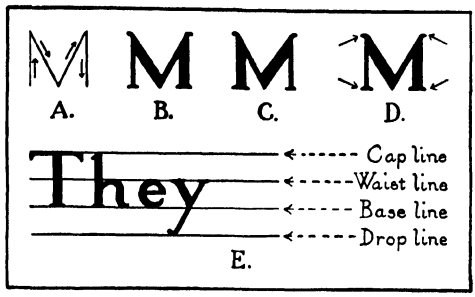
The lettering of your poster is very important. The alphabet you use should harmonize with the picture or design in the poster. A good general rule to follow is that you should always use a letter than stands out clearly. Avoid complicated patterns.

There are hundreds of different alphabets in common use. Many of these use lines of equal thickness throughout; this is called plain or block lettering (see second alphabet, in figure 3). Other alphabets combine thick and thin strokes (see first and third alphabets, in figure 3). These may be used with or without serifs (serifs are strokes crossing main strokes of letters; see D, in figure 4). On letters of this sort, the thick strokes are always those which would be down strokes if the letter were drawn in a continuous line (see A, in figure 4).

Roman (vertical) letters are favored when there are only a few words in a poster. If there is a good deal of lettering to be done, you should also use Italics (sloping letters), to avoid monotony.

In figure 3, we give you several specimen alphabets that you will find useful in poster work. You should have a great number of alphabets at your disposal. Make a constant study of the lettering found in modern posters or in the advertising pages of magazines; keep a file of different alphabets. When you have acquired skill in making letters, you will be able to make your own alphabets by adding a stroke here and changing another stroke there.

Lettering is done after the background has been painted in. The first step in making



4. Lettering details.

letters is to draw in guide lines, in pencil, for the letters (see E, in figure 4). Next, draw the outlines of the letters, also in pencil. You are then ready to make the letters in the desired colors.

Lettering should be done with a number 6 lettering brush; opaque colors should be used. (Opaque is the opposite of transparent.) All straight lines should be ruled; this is done by means of a straightedge. Hold this in your left hand, the thumb pressing one edge of the straightedge to the drawing board and the fingers lifting the other edge to an angle of 45 degrees.

The smooth metal part of the brush is held against this upper edge, with the tip of the brush touching the paper. The brush is then drawn along the straightedge with a swift, sure stroke. The curved lines of the letters should be done in freehand style.

Lettering should contrast sharply with the background. A light letter on a light background will be almost invisible when looked at from a short distance away. Crimson, yellow, white or pale green lettering will stand out well against a background of dark blue, black, dark green or chocolate; and dark letters on a light background will also stand out.

Sometimes it is well to outline the letters. For example, black lettering on a light background is particularly effective when it has a colored outline that will contrast with the background. On the other hand, a letter in a pale color on a dark background does not need any outline.



OWI photo

5. A realistic poster, in which the pictures of the soldier, worker and sailor serve to illustrate the idea.

HOW TO BUY MEAT

MEAT is one of the most important of all foods. It furnishes complete protein to build and to repair our body tissues; iron and copper to make rich red blood; phosphorus, a mineral which works with calcium to build strong bones and fine white teeth; and the entire family of B vitamins which are so necessary for both work and play. Meat helps to provide the energy that every one of us needs if we are to go about our daily tasks with vigor and zest.

If a family is to make the most of its meat budget these days, there are certain things that should be known about meat; otherwise, one will not be able to shop intelligently. One should know how to tell one kind of meat from another; one should be able to judge whether the meat one wishes to buy is the preferred quality; one should learn to recognize the different retail cuts.

HOW TO TELL ONE KIND OF MEAT FROM ANOTHER

There are four kinds of meat in all: beef, veal, pork and lamb.

Beef. Beef is the name given to the flesh of mature animals belonging to the bovine species (that is, cattle). The beef animal is the largest of the four meat animals that we named above. The color of this meat has often been described by authorities as a bright cherry red. The fat over the outside and between the muscles of the animal is creamy white and it is very firm.

Veal. Veal is the flesh of young bovines (that is, calves). This meat comes from calves which are six to twelve weeks of age; the most desirable veal of all is from milk-fed animals of six to eight weeks. The lean of veal is grayish pink; it is almost white. Since veal is from a young animal, it does not have a great deal of fat over the outside and deposited around the muscles. Veal fat is white and it is very firm.

Pork. Pork is the flesh of the hog. Most pork comes from animals of from seven to twelve months of age. The color of the lean pork is a grayish pink in young animals, turning to a delicate rose color in the older animals. Pork fat is white, but not quite so firm as beef fat.

Lamb. Lamb is the meat from young ovine animals (sheep). Mutton is the flesh of mature sheep. In America lamb is generally preferred to mutton. For this reason about 93 per cent of the sheep in this country is marketed as lamb. The color of the lean is pinkish red, as contrasted with the deep red of mutton. Lamb fat is clear, white and brittle. A lamb is the smallest of the meat animals discussed in this article.



Courtesy, National Live Stock and Meat Board

1. This picture shows us how an up-to-date butcher displays his meat. The showcase displays the various appetizing cuts of meat to the best advantage. It is also a refrigerator that keeps the meat fresh.

HOW TO JUDGE QUALITY IN MEAT

A fine piece of meat means one which is tender and full of flavor. But how can one tell whether the meat purchased will have these qualities when it reaches the dinner table? There are certain characteristics which can be used as measuring sticks of quality when buying meat. These characteristics are described below.

Beef. Beef of high quality will have a smooth, even covering of brittle, creamy white fat over most of the exterior and a much thinner covering over the interior surface of the ribs. There will be liberal deposits of fat between the larger muscles and fine tracings of fat all through the lean. This mixture of fat and lean is called "marbling" because the cut surface has a marbled appearance. The lean is firm, velvety and fine in grain. The bones of young beef are porous and red; in older animals the bones are white and flinty.

Veal. Veal does not have any marbling. The lean is very fine in grain and velvety in texture. The bones are porous and red; the ends of some of them are pliable (that is, may be bent easily).

Pork. The flesh of pork is not so firm as beef, but it is fine in grain and free from excessive moisture. The lean is well marbled and the fat covering is firm and white.

Lamb. The flesh of lamb is fine in grain and velvety in texture. It has more marbling than veal, but less than beef and pork. Redness in the bones shows that the meat came from a young animal. The age of the animal may be judged by the appearance of the foreleg. In young lambs the fore feet are taken off at what is known as the "break joint." This joint will have four well-defined ridges, which are smooth, moist and red. When the lamb is nearly a yearling, the sawtooth ridges will still be noticeable, but the joint has become harder and more porous. When the mutton stage is reached, the break joint can no longer be broken and the fore feet are removed below the break joint at the "round joint."

Quality Stamps. In many markets, meat is marked with a stamp or brand which indicates its grade or quality. This stamp has been put on the meat by graders of the United States Department of Agriculture or by the packer in whose plant the meat was dressed. The purpose of grading and stamping or branding meat and meat products is to help the shopper to select the quality best suited to her needs. It should be remembered that meat of all grades furnishes complete proteins, essential minerals, natural vitamins and calories.

The grade stamp or packer brand should not be confused with the federal inspection stamp. The latter is a round purple stamp, which reads "U. S. INSP'D & P'S'D" (meaning U. S. inspected and passed). This stamp means that the meat is from federally inspected animals and is wholesome. All packing plants which ship meat from one state to another must have federal inspection. Plants which to business only in one state are subject to state and local inspection laws, though not to federal laws.

The ink used in putting on the inspection stamp and the brand or grade stamp is a pure vegetable dye and is absolutely harmless. It is not necessary to cut these stamps away before cooking the meat.

HOW TO IDENTIFY MEAT CUTS AT THE BUTCHER SHOP

At the packing plant where the animals are dressed, the carcasses are divided into the most convenient form for distribution to retail markets.

The beef carcass is split in two, lengthwise, into "sides." A side of beef, therefore, is half of a beef carcass. But a side of beef is heavy and hard to handle and so each side is divided by cutting across the side, usually between the twelth and thirteenth ribs. (The ribs are numbered from front to back.) The two sections which are thus made are called fore quarter and hind quarter. Sometimes the quarters are divided further into sections known as "wholesale cuts" (see diagram).

The retail meat dealer buys veal from the packer as a whole carcass, as wholesale cuts or as racks and saddles. To divide a veal carcass into rack and saddle, the division is made by cutting across between the twelfth and thirteenth ribs. The rack is the unsplit front half and the saddle the unsplit back half of a veal carcass.

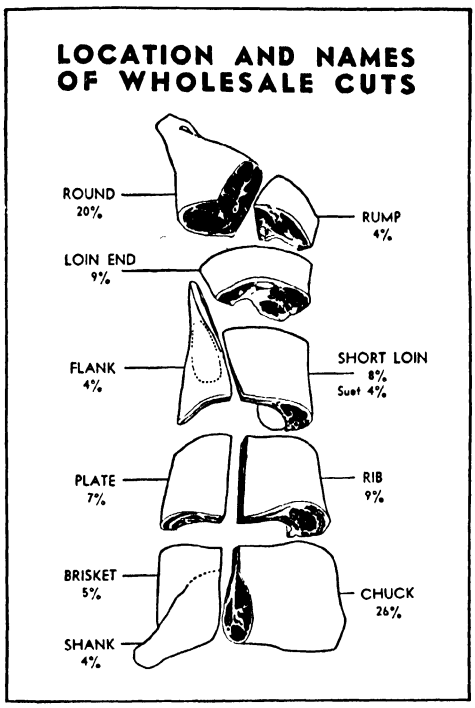
Lamb reaches the retail market either as the whole carcass or as wholesale cuts. Like veal, lamb is often divided into rack and saddle.

Nearly all pork is divided into cuts at the packing plant. This is because so much of the pork is cured and smoked as bacon or ham, rendered into lard and manufactured into sausage at the packing plant.

The meat retailer cuts the large pieces which he buys into small portions or house-

hold size cuts, known as the "retail cuts." Perhaps the hardest of all lessons in meat buying is learning how to recognize the many retail cuts of beef, veal, pork and lamb. One very good way is to study the cuts which are displayed in the retail market; another is to ask questions of the market man.

Meat cuts have certain features by which they may be identified. These are their size, shape, muscle structure and bone formation. Corresponding cuts of beef, veal, pork and lamb are similar in shape, muscle structure



2. Chart showing wholesale cuts of beef.

and bone formation. The chief difference between them is size, because the animals from which they come differ from each other in size.

A comparison of the major cuts of beef with the corresponding cuts of veal, pork and lamb will show why the retail cuts made from them are similar in appearance.

Round of beef. The round of beef is the hind leg. In veal and lamb this is called the leg and in pork is called leg of pork or ham. Each of these contains the round leg bone. Everyone is familiar with round steak with its flat round bone. Slices cut from leg of veal or lamb or from ham will have a flat round bone because the slice is cut across the leg bone.

Rump of beef. Because a leg of beef is so large, the rump is considered a major cut. The rump contains the rump bone, which is referred to as the "aitch bone." It also contains the knuckle bone. In cutting a veal leg into retail cuts the rump is sometimes removed for a roast. It is not removed from the leg of lamb or from a ham and so these two cuts contain all the bones found in the beef round and rump.

Loin of beef. The loin of beef is divided into two sections called the "loin end" and the "short loin." The loin end lies next to the rump. Sirloin steaks come from the loin end, which contains the hip bone and part of the backbone. All sirloin steaks do not look alike because each contains a different cross section of the hip bone. In fact, sirloin beef steaks take their names—"pin bone," "double bone," "round bone" and "wedge bone" —from the shape of the bones they contain. Sirloin steaks differ from each other in size and muscle structure and so a sirloin steak should be bought by its full name.

The short loin is cut into porterhouse, T-bone and club steaks. Both porterhouse and T-bone steaks have a T-shaped bone and two muscles, one lying above and one, the tenderloin, lying under the bone. The tenderloin muscle is larger in the porterhouse steaks. Club steaks are smaller and have little or nothing of the tenderloin.

Sirloin veal steaks are cut from the end of the loin nearer to the leg. These steaks resemble beef sirloin steaks. Veal loin chops are made from the section corresponding to the beef short loin and they look like small porterhouse or T-bone steaks.

Sometimes the sirloin section of lamb is left on the leg to make a larger roast, or it may be cut into sirloin lamb chops. Loin lamb chops look like miniature porterhouse steaks because of the bone and muscle structure.

A pork loin corresponds to the loin end and short loin and the rib section as well. From it are cut loin pork chops, rib pork chops and pork loin roasts.

Rib of beef. This wholesale cut of beef contains seven ribs and part of the backbone. A roast cut from the rib is easily identified by the presence of ribs and a large muscle, called the "rib eye." Rib steaks come from this section also.

The veal rib is cut into roasts or rib chops. These cuts are very choice.

The rib section of lamb is often called "hotel rack" and it contains from five to seven ribs. It is cut into rib chops. A crown roast of lamb is also made from this section.

Beef flank. This is a thin, triangular piece of meat, containing a part of the thirteenth rib. On the inside is a boneless steak, called flank steak.

Beef plate. The plate is a thin, long piece of meat, which is easily recognized by the layers of lean and of fat.

Beef brisket. The brisket also contains layers of lean and fat, but the presence of the breast bone identifies this section.

Beef for shank. Contains shank bone and varying amounts of lean meat.

Veal breast corresponds to flank, plate and brisket of beef.

Lamb breast corresponds to the flank, plate, brisket and fore shank of beef.

Side pork corresponds to flank and plate of beef. This is the section from which spare ribs and breakfast bacon are cut.

Beef chuck. This is the shoulder section. It contains five ribs, back bone, neck bones, the shoulder blade and the arm bone (bone of the foreleg). The retail cuts made from this section are blade, arm and neck pot-roasts and steaks.

In veal, lamb and pork this section is called the shoulder. A lamb shoulder may contain from three to five ribs. In both lamb and veal this section is cut into shoulder chops or roasts. Most people find these cuts of meat very tasty, and they are in considerable demand.

A pork shoulder corresponds to fore shank, fore part of brisket and chuck of beef. The pork shoulder is divided to give the Boston butt, which is identified by the shoulder blade. The picnic shoulder is another cut made from this section of pork. It is identified by the shank and arm bone.

Article prepared by Inez Searles Willson, Director, Department of Home Economics, National Live Stock and Meat Board.

NUMBERS AND CITIES

THIS game may be played at a party where there are quite a number of boys and girls present. The one who is giving the party (let's call her Mary Smith) prepares a number of pieces of cardboard, about six inches square. On each of these she writes a number and also the name of a city—(1) Chicago, (2) Montreal, (3) St. Louis, (4) London and so on. Mary writes the names and numbers not only on the pieces of cardboard that she has prepared but also on a sheet of paper that she keeps for herself. The pieces of cardboard are pinned to the backs of the players. Each player is given a pencil and a sheet of paper.

When a whistle is blown, each player tries to read as many numbers and corresponding names as he can, noting down each on his sheet of paper. At the same time, he must try to prevent the others from reading the cardboard pinned to his back by trying to move about as much as possible. The players are given from five to ten minutes to get as many numbers and names as they can (the greater the number of players, the longer the time that is given). Then the whistle is blown again and the players hand in their lists. The boy or girl with the longest list wins the prize.

Before awarding the prize Mary checks the prize-winning list with her own. She does this to be sure that none of the players has put down numbers and names of cities chosen at random.

FUN WITH PUNCTUATION MARKS

YOU would be astonished to read that "the condemned man talked and walked half an hour after he was hanged." Note how a semi-colon after *walked* and a comma after *after* would change the meaning.

Here is another amazing statement: "The old man entered the room on his head, a battered felt hat on his nose, old-fashioned spectacles on his feet, dusty shoes in his lapel, a wilted flower in his teeth, a briar pipe in his market bag, a dozen oranges in his hand; he held an old newspaper and he read it with great interest." Shift the punctuation marks, and you will have a quite ordinary statement of fact.

THE END OF THINGS TO MAKE AND THINGS TO DO



The Sea Oats which is always in motion.

FLOWERS OF NORTH AMERICA

WILD FLOWERS OF THE SOUTH

WHENEVER an American speaks of the "South," he really means the southeastern quarter of the United States. The great states of Texas, Arizona and California, while in the southern half of the country are, with the exception of Texas, never thought of as belonging to the South. They belong more to the West. So it will be the story of the wonderful wild flowers of the southeastern states which I shall tell—not the whole story, for that alone, were it all known, would fill a large house full of books. We can here tell of only a few things that grow in the Gardens of God down South.

One more word before taking up the wild flowers one by one. Down South there are all sorts of places in which different kinds of plants are found growing. There are mountain-tops where it is cold and the snows of winter lie deep, as in the North, and lowlands near the Atlantic Ocean and the Gulf of Mexico where the plants know little or nothing of Master Jack Frost. There are great dark swamps where the large wild flowers never look into the face of the sun, and open areas of white sand where the flowers are small so that the sun cannot burn them up. And there are great level stretches of dark wet land called "savannahs," upon which Nature grows one of the greatest wild-flower gardens in all America, and many, many other places equal in interest, all bearing their peculiar and distinctive types of plant life.

No matter what the northern children may think about it, it must be stated that there are many more different kinds of wild flowers, take it all in all, down South than there are up North. There is one thing, however, that will be of interest to all northern children, and that is that in the South the wild flowers do not come up with a rush in the spring as they do in the North. The southern boy and girl does not know, except in the mountains, what it is to see the woods bright with anemone, spring beauty, hepatica and white trillium. However, if our boy and girl in Dixieland should live near a savannah, they have the joy of watching a perfect procession of loveliness all summer long, or until late in November, when the dark blue savannah asters put on the last scene of the wild-flower show.

Darwin once wrote that the little plant of the eastern Carolinas which

catches insects by snapping its leaves shut upon them was the "most wonderful plant in the world." Of course all plant life is so wonderful that it is really a little risky to pick out one that is more wonderful than all of the rest. Yet if you could put your finger into the middle of the trap-like leaf of this remarkable plant and let it snap shut, though it would not hurt you, it would seem very uncanny. You would, perhaps, agree that this little plant with its almost human method of catching animals, chiefly insects, for food was more remarkable than all of the rest.

One day a carpenter was working in the writer's office, where there were a number of fly-trap plants. Without being told what they were, he was told to put his finger into the middle of one of the widely flaring "traps" to feel the surface of the leaf. When that weak little leaf closed on him, he jumped as though a bear might have bitten his finger, so surprised was he.

If one is to see these peculiar plants growing wild, he must go to the region about Wilmington, North Carolina, for these plants occur in numbers only within a radius of seventy-five miles of that city. And then when one goes into that district he must, to find them, look in a special kind of place. The plants grow only in wet, black sandy soil which is poorly drained.

SOME STRANGE THINGS ABOUT A STRANGE PLANT

The leaves are all attached to a common short little stem which is buried in the ground. The bases of the leaves, thus, after meeting at the centre of the cluster, turn down and meet an inch or so below the surface. This is an adaptation against fire, for very frequently in the winter fire sweeps over the areas, after which new leaves come up from the buried stem the following spring.

The outer part of the leaf is modified into the famous trap. Like other traps, this one has a trigger, or triggers, for there are, projecting from the centre of each half, three delicate tiny hairs, which, when touched by a wandering insect or spider, set the trap off, the halves snapping shut and pressing the unfortunate victim tightly. During the next day or two the trap-sides digest the soft parts of the body and absorb this food for the use of the whole plant.

To tell just how this wonderful leaf-trap works would take more space than we have to give. It is enough to say that the plant uses water pressure to hold the leaf open, which, when released, alters the natural spring in it to snap it shut.

The flowers of the Venus's fly-trap are modest white ones, each with five delicate petals borne in a cluster. There are no peculiar features about them; a dozen spring flowers are easily their equal. A plant with such a lovely innocent-looking flower is all the more remarkable to possess in its leaves such terrible traps lying in wait for the unwary insect. It is truly one of the most wonderful plants in the world.

THE PINE LANDS GENTIAN, WHICH BLOOMS LATE IN THE SEASON

From September to November, after the very hot days are over in the coastal plain, there comes forth here and there in the open pine woods one of the most beautiful wild flowers in America, the Pine Lands Gentian. Coming up from a slender underground stem, a rather delicate stalk develops through the summer, bearing narrow leaves placed opposite to each other. This stalk in the fall blossoms forth at the top into one lovely morning-glory-like flower. In this flower, however, the petals extend beyond the funnel part, and between the petals there also extends a fringed structure which the botanist calls "corolla-plaits," because at first this part of the corolla is folded like plaits in a dress.

The flowers frequently are over two inches long; as they wave about in the wind at the top of the slender stems they may be seen a long distance off. Within the corolla throat one finds a sprinkling of delicate brown spots which add much to the beauty of the flower when seen near at hand. It is very fine indeed for the children along the Atlantic border south of New Jersey to have such a wonderful wild flower to accompany the asters in the display which ends the great wild-flower procession of the year.

THE LIZARD'S-TAIL, WHICH HAS NO PETALS

Not everything in swamps is dark and gloomy. In the darkest places there is always something to relieve, partially at least, the solemn aspect—something which will "brighten the corner," even though it be a heavily shadowed one.

FLOWERS WELL WORTH FINDING



The high-mountain turtlehead is rose-purple in color and about an inch long. It grows on the Appalachians in Eastern United States. The turtlehead is classed in the pentstemon family.



The pine lands gentian has a flower which is frequently over two inches long, and may be seen a long distance off. There are more than 300 gentians. Most of them have blue flowers.



The white-bracted sedge grows in clumps on the savannahs. The flower inside the bracts is very small and inconspicuous.



The Venus's fly-trap showing the capture of a grasshopper to supply nourishment. This plant, as you know, eats animal matter.

It is certainly the business of the Lizard's-tail plant to chase Mr. Gloom out of the swamps. Standing from two to three feet out of the water, these plants bear aloft five wonderful white racemes (slender clusters of flowers), appearing like torch-bearers. The tip of these torch flames, however, do what flame cannot do, that is, bend over and point downward. Every raceme—and this is one of the most characteristic things about lizard's-tail flower-clusters—bends over at the end, the tip thus weakly nodding and dangling about in the easy-going breezes of the sheltered swamps.

If one looks closely at the white inflorescence, he will observe a remarkable thing about the tiny individual flowers. He will find that they have no sepals and no petals; only the stamens (pollen-bearing parts) and carpels (seed-bearing parts) are present. Scientists now believe that the ancestors of this plant had sepals and petals like most flowers, but in the evolution of this flower these were lost. It is interesting to note that the remainder of the inflorescence, including the stem and flower-stalks, becomes white, so that a very showy structure still is present to guide the insect to the little flowers for purposes of pollination.

THE WHITE-BRACTED SEDGE, IN WHICH THE FLOWERS ARE TINY

Everyone, I suppose, knows that the brilliant poinsettia, with its glowing red, owes its special beauty, not to the flowers at all, but to the upper leaves, or bracts, which, contrary to the rule, are of a striking crimson color. Similarly, the showiness of the White-bracted Sedge is due to the white drooping modified leaves, or bracts, which form a sort of receptacle for the cluster of inconspicuous flowers which all sedges normally possess.

This interesting sedge is one of many attractions on the savannahs—those remarkable areas in the low coastal country which are veritable wild-flower paradises. This sedge is likely to occur in clumps, or societies, so that as one walks across the savannahs he may see afar a gay company waving white banners in the languid breeze of the hot afternoon. He is certain at first to take them for a wonderful new wild flower, but, upon reaching them, a glance will show that here the display is made by the bracts.

To study the real flowers satisfactorily one must have a good lens and much patience, for these are very small indeed, and are put up in small packages called spikelets, which packages are in turn bunched together to form the head nestling in the base of the white bracts.

HIGH-MOUNTAIN TURTLEHEAD, FOUND IN THE MOUNTAINS

One of the most curious things about plants is the remarkable choice they sometimes make with regard to a place to live. The places they choose are, of course, sometimes very different from places where men would choose to live. Everyone knows that cold and dampness are bad for the health, yet it is exactly in such places that the High-mountain Turtlehead may be found. On and near the cold, damp high mountain-tops of the Appalachians from Virginia to Georgia is the "home, sweet home," of this hardy wild flower.

The beautiful turtlehead-like flower, which makes this plant famous, is of a rose-purple color and is large enough (one inch long) to make a very showy floral display, especially in the case of the larger plants, two feet or more tall; these will bear a number of flowers at the same time. The flower of this plant is a close relative of the common cream-colored turtlehead of the wet northern places, though this latter is also found in the South.

THE GALAX IS VALUED FOR ITS LEAVES, NOT ITS FLOWERS

The most interesting thing about Galax is the fact that this herb is far more widely known and enjoyed for its leaves than for its flowers. The high regard in which southern folk hold the leaves of Galax is well deserved; the foliar organs are truly unique in many ways. They are nearly round in outline, with a prominent heart-shaped base; the margin is irregularly wavy, with minute light-colored glands on the tips of the projecting parts. The main veins radiate from the base and divide by a simple system of forked branching. The blade is leathery and evergreen, shining on both sides. A rich bed of Galax made up of hundreds of these beautiful leaves is a sight never to be forgotten.

When the Galax leaves become a year or more old, they change to a rich bronze color, especially above. In this condition they are even more unusual than when green. The florists find a wide use for these deep reddish brown leaves. The

leaves thus have a value, and many a dollar has been earned by the mountain boys and girls in picking Galax leaves.

The flowers also are interesting. They are small, not over a fourth of an inch long, and are thickly borne on a single simple wandlike stem which comes out of the ground near the leaves. The Galax plant may be found in the southern Appalachians and eastward to the coast, though in the region near the coast it may be seen only in rich woods, generally on cool northward-facing slopes.

THE FLY POISON, ANOTHER FLOWER OF THE MOUNTAINS

In a thick forest of stunted red oaks over five thousand feet above sea-level, in the Mount Pisgah, North Carolina, country, the writer once saw a number of the finest specimens of the Fly Poison plant. Here, growing out of the rich leaf world, their wonderful white inflorescences, glimpsed here and there among the thick shrubbery, appeared like torches lighting up the cold, damp gloom of the high mountain woods.

The fly poison is a typical member of the Bunch-flower Family. Its small three-parted lily-like flowers are grouped much like those of the familiar hyacinth, which belongs to a related family. In the fly poison the flowers are smaller, more numerous, and arranged in a beautiful and very regular cylindrical inflorescence. Each flower on a slender stalk, which extends straight out from the central stem, faces directly outward, and with its fellows forms the exterior of a lovely floral cylinder.

The leaves of the fly poison are chiefly at the base, where they arise from the bulb-like rootstock beneath the surface of the ground. The plant gets its name from the reported statement that if the leaves are bruised and placed in water they will so poison the water that flies soon die after drinking it.

THE SAVANNAH WHITE ORCHID, FOUND IN THE LOWLANDS

One of the greatest wild-flower displays in Eastern America is that made by the Savannah White Orchids when they bloom in late June and early July. Hundreds of these pure white blossoms occur on an acre area. To the wild-flower lover no greater treat could be offered than a half-day in June spent wandering over a savannah covered by these exquisite flower-children of Nature.

If one plucks an inflorescence, he will note that the flowers are rather simple orchid types, except that these possess an unusually long spur. This slender structure extends from the lower petal toward the main vertical stalk and commonly passes it. The single flow r is about one-half inch long and the inflorescence about four inches.

THE DOG-HOBBLE, FOUND ONLY IN THE MOUNTAINS

Dog-hobble is the mountaineer's name for what is more elegantly known as the Catesby's Leucothoë (Loo-ko-tho-ee). This plant is a very attractive shrub which is found only in the Virginia, Tennessee, Carolina and Georgia mountains. One encounters it frequently along the mountain trails where, in masses sometimes attaining a height of a foot, its shining thick lance-shaped leaves furnish one of the most beautiful kinds of foliage found anywhere. When abundant, the shrubs form such a tangle of stems near the ground that it is difficult for a dog to go through it—hence the name dog-hobble.

In April, from the axils of the leaves there appears a showy raceme of white flowers, each flower having the simple shape of a hollow cylinder, flaring at the end, where the small petal tips turn back. It is odd that the plant hangs such showy masses of flowers downward from the stem, where they are almost hidden by the spreading leaves. One must bend the branch back to see the flowers well.

The leaves of this plant, like those of other leucothoës, are poisonous. Honey produced from the flowers is also reputed upon good authority to be mildly poisonous. The writer well remembers the account given by an old mountaineer who, upon having his attention directed to the dog-hobble abundant around the camp, told of his experience with dog-hobble honey. He described it as a kind of drunkenness—but of course in the mountains one must be cautious as to the source of inebriety.

THE ATAMASCO LILY, OR WILD EASTER LILY

In those warm humid days of spring, when buds are swelling and the flocks of warblers are trooping through the South on their journey to northern nesting sites, then it is that the farm boy, as he goes for the cows at evening, notices a fresh new thing in the low, marshy

places. A wonderful six-rayed star of the purest white color has appeared amid the damp wreckage of last year's vegetation. Upon close examination this apparition of the Easter time proves to be an Easter lily, smaller, to be sure, than the customary Easter flower, but suggesting it by its flaring corolla. It stands, just the single flower, on the end of a slim straight stalk which has lifted this bit of snow-white loveliness to gaze for a brief period into the depth of the sky.

It is little wonder that the children of the South are frequently seen in the spring trooping homeward with their hands full of the Atamasco Lilies. If one of these children would pause a moment and examine this lily closely, he would notice right away that at the base of the flower this lily is very different from the true Easter lily. The atamasco flower appears to be borne on top of the seed-bearing part, while in the larger and truer lily the seed-producing portion is inclosed within the white corolla tube. This difference is really a very great one; so great, indeed, that the botanist puts the atamasco lily and its relatives into the Amaryllis Family instead of the Lily Family. So our beautiful wild flower is not a lily after all, but it at first sight looks so much like a lily that its common name will always be atamasco lily.

THE CLIMBING MILKWEED, COMMON IN THE SALT MARSHES

Every boy and girl knows the milkweed plant, with its rounded cluster of purplish fragrant flowers and its oval, pointed pod, which in the fall bursts open and scatters seeds with the finest of long silken hairs attached to them.

The Climbing Milkweed, about which we shall tell you here, is in the same family with the familiar milkweed. It has flowers somewhat like this latter plant and a pod very much like it, although not so thick. But it differs very much in its vegetative parts. The stem is a twining, climbing one, as much so as a morning-glory. The leaves are very peculiar in that they are very narrow and hang languidly from the spirally wound stem. Another strange thing about this plant is the fact that it is found almost altogether in salt marshes—those great areas along the sounds where the salt or half-salt water covers the ground when the tide is in.

It may be known to the reader that plants having their roots in salty water from the ocean have a hard time to take up that water; the salt in solution tends to prevent the water from being absorbed. This makes it necessary for the plant to check the water from going out of the leaves, for if it did not, the water would pass off faster than it is coming into the plant below, with the result that the plant would soon wilt and die. Our climbing milkweed has solved this problem by reducing its leaf and covering it with a thick sort of skin which the water cannot readily go through. Its leaves have, of course, like all plants, a large number of tiny little holes, or pores, but these do not let too much water pass. The plant, like a good business man, does not spend more than its income will allow. The flower of the climbing milkweed is greenish white and is constructed somewhat like the milkweed flower, having the curious five-lobed crown in the centre of it.

THE NARROW-LEAVED SPATTERDOCK OF THE LOW COUNTRY

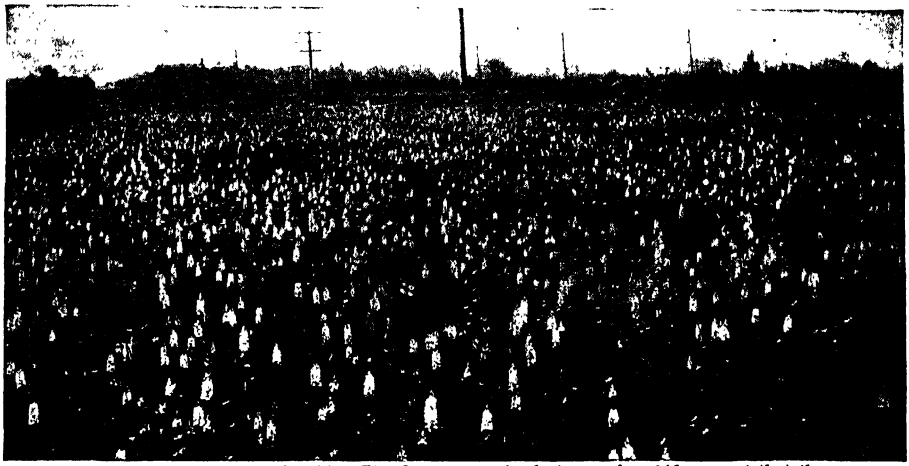
In quiet waters of rivers and ponds in the low country one is certain to see the long narrow leaves of the Narrow-leaved Spatterdock floating on the surface of the water, where they always point downstream if the water is moving. The leaves may attain a length of sixteen inches, when they look more like pieces of green ribbon than anything else.

Especially interesting, however, are the under-water leaves of this plant, for it is one of those remarkable aquatic forms which possess two kinds of leaves. The submersed ones are much broader, and the thin blades have a crisped or wavy edge like lettuce leaves. The flower is very much like the common spatterdock, although if one looks at the top of the central seed-bearing part, he will find that the interesting radiating lines there will not be nearly so numerous as on the common oval-leaved spatterdock.

THE TRUMPETS, RELATIVES OF THE PITCHER PLANTS

The Trumpet, a southern relative of the pitcher plant of the northern bogs, is one of the gayest and most interesting plants in Dixieland. It is best seen in certain dark soils of low, flat lands (savannahs) near the coast. On such areas thousands of the yellow trumpets, or slender horn-shaped leaves, stand stiffly erect in little groups, like prim maidens at a garden party. And each maiden carries a

FAIR ORCHIDS AND WAVING LIZARD'S-TAIL



A savannah covered with White Orchids. The flowers are simple types of orchids, except that they possess a very long spur.



The Dog-hobble, or Catesby's Leucothoë, grows on southern mountain trails.



The Climbing Milkweed lives in salt marshes. Its leaf is thin, and its flower greenish white.



The Lizard's-tail plant relieves the dark places of gloomy southern swamps with its white torch-like flowers nodding in every breeze.

parasol, for these remarkable vase-like leaves bear from one side of the vase rim a sloping cover, called the standard, which actually does much to keep the rain from filling up the open "trumpet."

The summer-time tourist in the South is certain to have his attention arrested sooner or later by a great savannah brightened with myriads of trumpets.

As you have perhaps suspected, the trumpet leaf, like its pitcher-plant relative, is adapted to catching insects and using the soft parts of their bodies as food. Attracted possibly by the bright standard and by odor, insects fly into the mouth of this innocent-looking leaf and soon find themselves slipping down the perfectly smooth sides to their death in the water with which the trumpet is half filled. In late summer one can tear open the leaves and be certain to find the water filled with unlucky insect victims; all kinds of "bugs" may be found therein, their bodies falling to pieces and becoming massed into an ill-appearing mixture of wings, legs and body parts.

In strong contrast to the unfortunate victims are the insects which use the interior of the trumpets for the purpose of rearing their young. These larvæ feed upon the dead insects until they attain maturity. In this way the plant is cheated out of some of its food.

The flower of the trumpet plant is very much like that of the pitcher plant. It is more showy, however, at a distance, due to its bright yellow color and its somewhat larger size. Perhaps the most striking part of the flower—and this is very unusual—is the huge stigma, which remains on the flower after the corolla disappears.

So unique and common a plant as this one is certain to have a number of names. The following common names have been applied to it: Trumpet-leaf, Water-cup, Watches, and Biscuits. But one should always use Trumpets, for by this name they are best known, and they really resemble certain kinds of trumpets, especially the kind used by angels, for I am sure every boy and girl has seen in the Bible-story books pictures of angels with simple, long narrow trumpets pointing toward the sky.

THE WILD HYDRANGEA ALONG THE MOUNTAIN STREAMS

In the mountains one of the most interesting trails up the slope is the natural one made by the mountain stream. If one goes up a mountain stream in the Appalachians, especially the southern Appalachians, in midsummer, he is certain sooner or later to have his attention arrested by the white flat-topped mass of flowers of the Wild Hydrangea. Especially will he notice the individual flowers at the margin of the cluster, for these have very much larger, flaring petals than do the seed-producing flowers in the centre. Upon a closer look our wanderer will realize that these larger showy flowers are almost exactly like the flowers which make up the showy "snowballs" which are produced on the cultivated hydrangeas in yards. It is an interesting fact that the showy flowers of the hydrangeas, both wild and cultivated, are sterile; that is, they cannot produce seed. In developing the fine display to attract insects which in the wild form pollinate the fertile flowers, the showy flowers apparently had to give up their most important function.

The wild hydrangea is a weak shrub; and its stems frequently lean upon those of stronger shrubs and young trees. At the nodes of the stem and clustered in the axils of the leaves one often finds a thick mass of tightly overlapping reduced leaves. This is an insect-gall and is formed by the larva, or worm, stage of a kind of fly. The mother fly laid an egg in the bud, and out of it was hatched a tiny grub. The effect of its presence was to make the bud grow excessively large and furnish it a comfortable home with plenty of food in the pantry. Just what the little larva does to make the bud do all this, is still an unsolved puzzle to scientists.

When the reader next visits the eastern mountains from New York south, if he will look along the margins of the cool, brawling mountain streams, it is to be hoped he will find the wild hydrangea, with its interesting flowers and its curious galls.

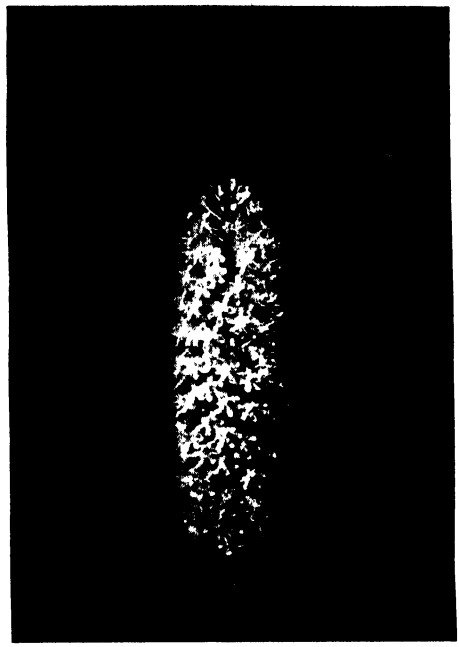
FINE-LEAVED THOROUGHWORT, OR DOG FENNEL

On the eastern side of the Appalachian mountain-system, from Virginia south to Florida, grows a species of Thoroughwort, or Boneset, which is so different from the common boneset of the northern United States that no one but a botanist would ever dream that they were first cousins. This southern species is a tall feathery graceful plant which comes up in old fields and occasionally along roadsides.

PECULIAR AND INTERESTING FLOWERS



The wild hydrangea which grows by the banks of mountain streams. The large showy flowers toward the margin of the cluster are sterile.



The fly poison is a member of the bunch-flower family. It grows in high mountain woods. The leaves are chiefly at the base.



The yellow trumpets grow in the dark soils of low flat lands near the coast. Notice the "standard" above the trumpet mouth.



The narrow-leaved spatterdock has two kinds of leaves, the submersed one being much broader, and the edges more wavy.

So plume-like is it that one might successfully decorate ostriches with it, though on second thought one fears the native verdure of the ostrich would still hold its own for beauty. There is little doubt about the fact that this plant is one of the most attractive weeds now growing in the United States. Growing always in the same places where weeds are found, it naturally is looked upon as a weed itself, and no one pays much attention to it. Yet landscape architects could use this plant to the greatest advantage in places where a soft feathery effect from foliage is desired.

Locally, in the region where it grows, the plant is known as Dog Fennel. This is not a good name for it, for this common name has already been long used for another fine-leaved member of the Sunflower Family with white ray flowers and yellow central flowers.



Fine-leaved Thoroughwort is commonly known in some localities as Dog Fennel. Its plumy foliage is very attractive, both while it is still green and after it has been killed by frost.

Speaking of the Sunflower Family, every boy and girl should learn early that all such "flowers" as the sunflower itself and those of its relatives, the daisy, black-eyed Susan, dandelion and boneset, are not single flowers at all, but a compact cluster of very tiny, yet perfect flowers. Nothing about flowers is more interesting than that Nature, in developing the highest of all the plant groups, condensed the flowers into "heads," and in so doing greatly reduced the size of each flower. For most of the *Compositæ* (the name of this remarkable family) one must use a good magnifying glass to study these tiny flowers satisfactorily.

In the Fine-leaved Boneset it is interesting to observe that not only are the flowers reduced to tiny little ones, but the heads, or flower-clusters, are reduced also. Each head has only from three to six flowers inclosed in the cuplike structure made by the bracts. To balance the decrease in the number of flowers in the heads the plant produces an extraordinarily large number of these small heads. Many hundreds may be counted on a single plant. The delicate branching system which carries all these heads is in entire keeping with the much-branched feathery leaves below.

After summer is over and the plant is killed by the early frosts, its brown stalk, leaves and tiny starlike bracts stand throughout the winter. There is no more lovely sight than an old field on a frosty morning, in the eastern part of Virginia or the Carolinas, covered by the fine-leaved boneset. The tall graceful white plumes make the deserted place into a real fairyland.

THE BRACTED BUNCH-FLOWER OF THE SAVANNAHS

If one could string together a half dozen stars and have each star peeping out of a little jacket, he would not have anything more charming than the slender cluster of starlike flowers which is the Bracted Bunch-flower of the southern savannahs.



The Bracted Bunch-flower of the southern savannahs blossoms in August and September.

Borne two and a half feet above the ground on a wandlike stem, one may observe the six-rayed white flowers peeping out of close-fitting bracts. None of the relatives of this plant has its flowers so wonderfully protected up to the time of full flowering. The purpose of the bracts is to hold the tender growing flower-head until it is ready to expand outside of the bract.

When one finds this beautiful member of the Bunch-flower Family in August and September he is almost certain to meet them in large numbers. Just like folks, they occur in quantities in the same places. One must, to see them, go to the low coastal country from the middle of North Carolina southward.

MARSHALLIAS, MEMBERS OF THE COMPOSITE FAMILY

Under the name Marshallias may be grouped a number of different species which occur in southeastern United States. The flowers are so much alike that once one gets acquainted with one flower he will know the rest of them to be Marshallias wherever he finds them.

The "flower" is a head made up of a number of the real but tiny white or purple flowers all sticking up and out like pins on a pincushion. As you may guess, this plant belongs to the great Sunflower Family. The Marshallias are unlike most of the members of that family in that the corollas of the small real flowers are remarkably long and slender. There are no ray flowers, so that this cluster of delicate little slender flowers borne alone at the top of the plant makes it a very distinctive wild flower indeed.

THE SEA OATS, WHICH IS ALWAYS IN MOTION

On the sand dunes of the Atlantic coast south of New Jersey there grows one of the most attractive grasses to be found anywhere in America, called Sea Oats. It is a tall slender kind, bearing in the summer and fall a loose cluster of very large spikelets (the compact groups of the grass flowers) which dangle about in the wind in the most care-free manner. And they are swinging about most of the time, for it is seldom that the wind stops blowing over the exposed dunes.

In the fall, when the spikelets are dry and hard, the stiff winds cause them to rattle so hard that at night their rustling is likely to keep the camper awake. But of more interest is the fact that if one gathers a bunch of this grass in the fall, he may set it in the corner in an empty jar at home. There, like an attractive sheaf of golden grain, it will last a long time and will continually bring to mind the glorious days enjoyed by the sea. On most of the southern coasts this grass is the most permanent plant on the dunes, so that when you go to the seaside you will have no trouble at all in recognizing it.

These are not all the flowers and plants of the South, but we have told you of some which grow nowhere else. A few we have mentioned grow farther north, and many of those mentioned as growing in Canada and northern United States also grow in some of the southern states. There is much overlapping with flowers, just as there is with birds.

THE NEXT STORY OF PLANT LIFE IS ON PAGE 7169.



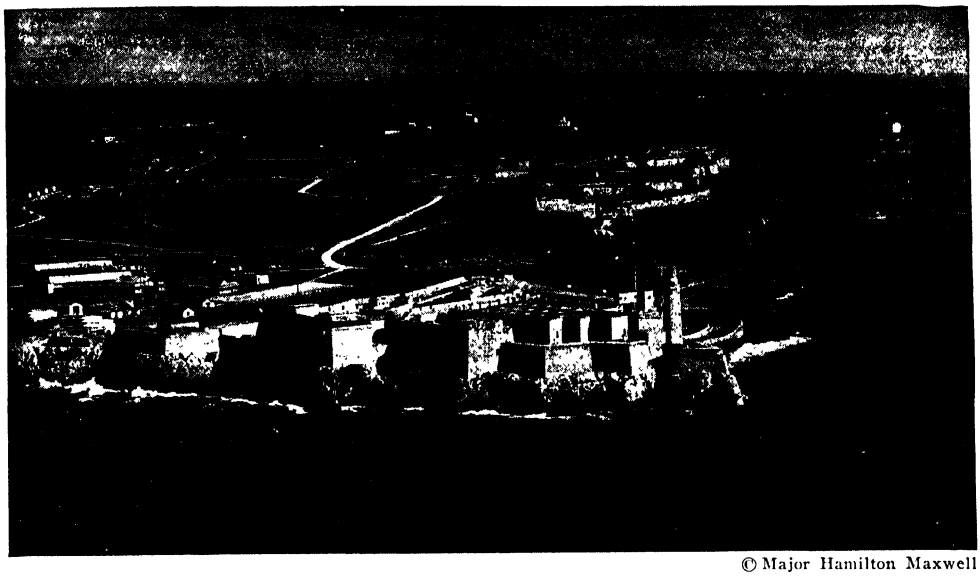
Though the Marshallias belong to the Sunflower Family, they have no ray flowers.

A TRINIDAD FAMILY AT HOME



Courtesy, Alcoa Steamship Company

The soil of Trinidad is rich, and produces sugar and molasses, copra (dried coconut), trees for timber and many kinds of fruit. Almost forty per cent of the British Empire's oil production is from this island. A great lake of asphalt supplies almost 100,000 tons of natural asphalt every year, without getting smaller.



© Major Hamilton Maxwell

Air view of Morro Castle, the picturesque old fortress at the entrance to Havana harbor.

ISLANDS OF THE WEST INDIES

THE West Indies is the name given to a group of large and picturesque islands that sweep in a graceful curve from the south of Florida to the northeastern coast of South America.

If you look at the map on page 7098, you will see that four of these islands—Cuba, Jamaica, Hispaniola and Puerto Rico—stretch more than 1,300 miles eastward from the entrance to the Gulf of Mexico. These four islands are called the Greater Antilles.

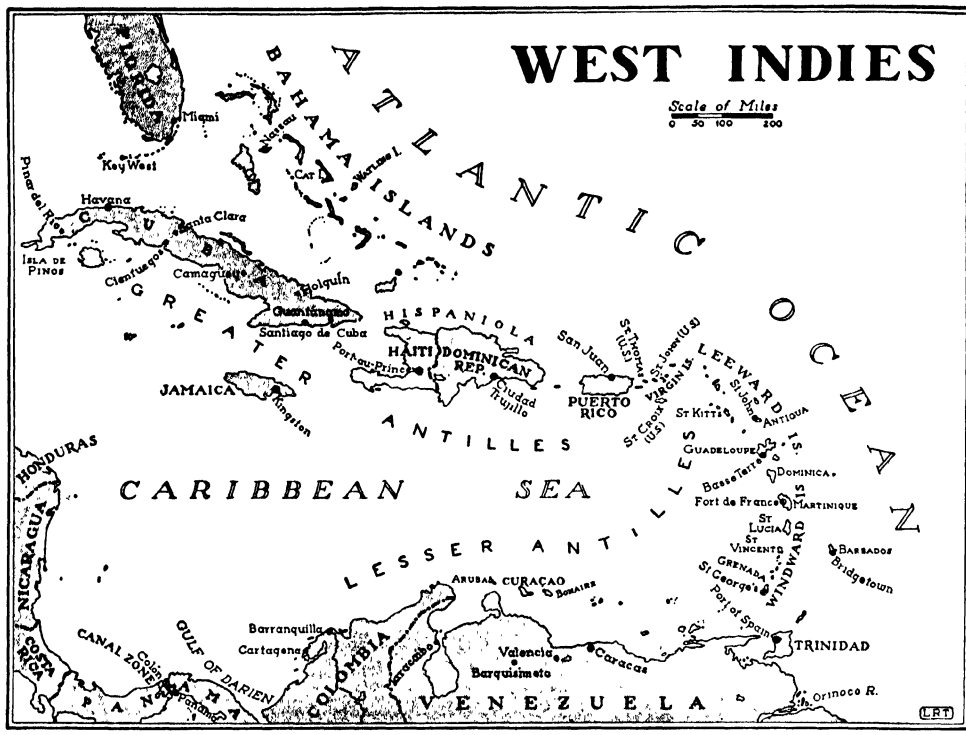
Here is the explanation of the name Antilles. Before the people in the Old World knew anything about the New World, some map-makers had decided that there was land between the Canary Islands and the Far East. On their maps or charts this land was named Antilia. When Columbus touched at one of these islands it was thought that he had come upon Antilia. Later, when not one but many islands were discovered, the name was made into the plural—Antilles.

Curving outward and downward from Puerto Rico until it almost touches the coast of South America is a chain of smaller islands which form the eastern end of the Caribbean Sea; these are the Lesser Antilles. There is a still smaller chain of islands, the upper end of which almost touches Florida; these are the Bahamas, which are not a part of the Antilles at all.

There are nearly 100,000 square miles of land in the West Indies, of which Cuba has almost one-half. Hispaniola, Jamaica and Puerto Rico are next in size. Trinidad, another of the larger islands, lies away down at the lower end of the Lesser Antilles, close to South America.

The Spaniards, who were the first to settle in the West Indies, were for the most part mere fortune-hunters. They did not want to till the soil; they did not even want to dig the gold which they hoped to bring back to Spain in such vast quantities. Work of any kind was unpleasant, and their purpose was to force the natives to dig gold for them. For this reason the first Spanish settlements were planted on the shores of Cuba, Hispaniola and Puerto Rico, for some gold had been found in the mountains of these big islands. The low and sandy islands of the Bahamas, though discovered first of all, were neglected and left to other nations to settle. Nor were the Lesser Antilles settled by the Spaniards.

The peaceful Arawaks, the Indian people whom the Spaniards found living in the Greater Antilles, were not of the stock of



The islands of the West Indies lie between the tip of Florida and the northern coast of South America.

which slaves are made. When they resisted the efforts of the Spaniards to force them to work in the mines, they were butchered. Those that were captured died soon after. In less than a hundred years after the first appearance of the Spaniards, the native Arawak population of Cuba was almost extinct. The Arawaks of the neighboring islands suffered in the same way.

As soon as the Spaniards found that gold was not so plentiful in the Antilles as they had hoped, the mere treasure-hunters among them went farther. Cortés entered Mexico, to rob the Aztecs. Others sailed to the Spanish Main, as the coast of the South American mainland from the mouth of the Orinoco to Darien was called, in search of the fabled kingdom of gold, which they named "El Dorado."

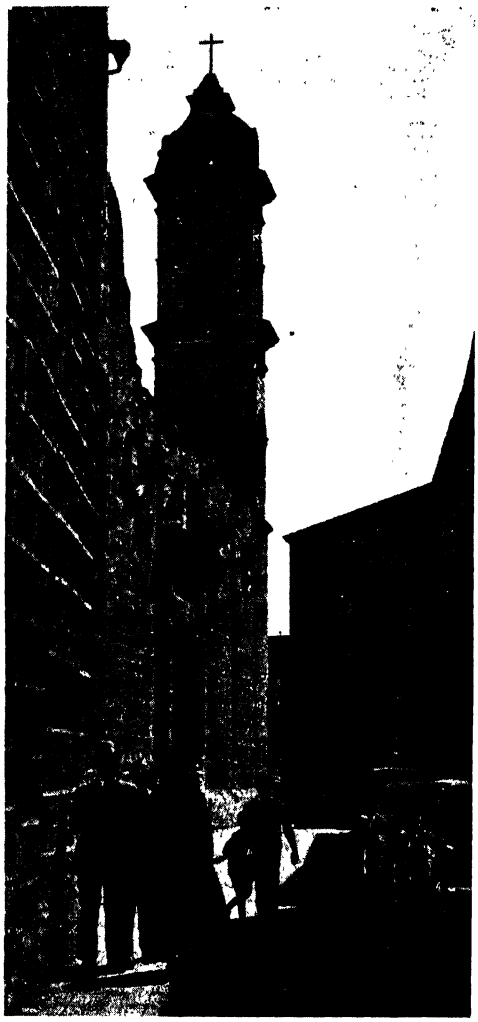
The Spaniards who remained behind gradually discovered that sugar, an expensive luxury in Spain, could be produced from the fertile soil of Cuba, Hispaniola, Puerto Rico and Jamaica at a large profit. They had learned from the Arawaks how to plant and smoke tobacco, and a demand for tobacco was growing at home. Cotton raised in the islands brought good prices in Spain. This was the beginning of the rich trade which sprang up between Spain and the West Indies. The need of labor to work the large plantations brought with it a trade in Negro slaves. As a result the Negro population of the West Indies is very large.

The ships of France, England and the Netherlands were at this time in search of new markets. They ventured to the Spanish islands, at first in the hope of picking up cargo. When the Spaniards would not allow this, the vessels were used as slave ships. Then these merchant pirates began arming their ships, and fell to plundering the settlements or to lying in wait for the treasure galleons of Spain and capturing them.

The French, the English and the Dutch began to occupy the smaller chain of West Indian Islands, the Lesser Antilles, shortly after the year 1620. The Caribs, the warlike inhabitants of the Lesser Antilles, resisted fiercely and they submitted only after much bittter fighting. Survivors of this brave people, from whose name the word Caribbean is derived, are still to be found in the West Indies, particularly in the island

of Dominica, in the Windward Islands.

For some three hundred years after the first settlements in the West Indies, the islands changed hands again and again. The history of these stirring days and of the centuries that followed is that of the gradual removal of the Spaniards as a factor in the islands. Spain has now withdrawn her flag entirely from the West Indies. Three independent countries (Cuba, Haiti and the Dominican Republic) now occupy two of the largest islands (Cuba and Hispaniola). The others are divided among the United States, England, France and Holland.



Courtesy, Hamilton Wright

An old street in Havana, Cuba. The city was founded by the Spaniards, on its present site, in 1519.

CUBA, THE LARGEST ISLAND OF THE WEST INDIES

Cuba, the largest and most important island of the West Indies, has had a long and interesting history. The Spaniards began the conquest of the island in 1511; except for one brief period (1762-63), it remained in Spanish hands until 1898. In its earlier days the island was frequently the prey of the blood-thirsty pirates who roved over the Spanish Main. In the latter part of the eighteenth century Cuba's natural resources began to be developed as never before. Wealthy planters from the South American colonies came and established rich plantations. Numbers of French colonists also came; they had been driven out of the nearby island of Haiti as the result of revolutions.

As Cuba grew in wealth, the Spanish overlords showed the same greedy tendencies that they had in the early days of their New World conquests. The indignant Cubans revolted again and again in the course of the nineteenth century. At last the United States intervened, and the Spanish-American War of 1898 broke out. Spain, thoroughly beaten in a few short months, had to abandon Cuba to the United States. In 1902 the latter country allowed the Cubans to set up their own republic.

The Cuban Republic has had its full share of revolutions and other disorders. In the early days of the republic the United States stepped in more than once when disorder became too widespread. In 1934, however, a treaty was signed between the United States and Cuba, in which the Americans agreed not to interfere again in the domestic affairs of Cuba. Though there has been occasional disorder in Cuba since that time, the United States has kept hands off.

As we have seen, Cuba is the largest of the West Indian islands; it is also the most populous, with its almost 5,000,000 inhabitants. The capital and largest city, Havana (population, 568,913), has one of the finest harbors in the world, with deep water up to the very piers. There are a number of other fairly large cities, including Holguin, Camagüey and Santiago de Cuba. Sugar is the leading crop; Cuba is one of the largest sugar producers in the world. Tobacco-raising and the manufacture of cigars and cigarettes rank next in importance. Other crops include coffee, pineapples, bananas, citrus fruits and coconuts. The forest lands of Cuba contain such valuable cabinet woods as mahogany and cedar. There

is considerable mineral production; the most important minerals are iron ore, copper, manganese and chromite.

HAITI AND THE DOMINICAN REPUBLIC

The island of Hispaniola is now occupied by two independent nations—Haiti and the Dominican Republic. The name Haiti was applied to the whole island for many years, but nowadays it is generally used to refer to the country in the western part of the island. As we have remarked, Hispaniola was settled by the Spaniards at a very early date. The western part of the island was left to the natives, who lived by hunting wild cattle and hogs.

In the seventeenth century an adventurous band of French rovers established a foothold in this part of the island. They were called *boucaniers,* meaning meat-driers. You see, these "meat-driers" came to the island originally to get supplies of smoked meat. The *boucaniers* frequently preyed on Spanish commerce. In time, the word and its English equivalent, buccaneers, came to refer to pirates of any nationality.

The little colony of *boucaniers* in Hispaniola became a flourishing one. The descendants of the earlier settlers were joined by other Frenchmen, who laid out plantations and brought slaves to work on the land. The Spaniards could never win a foothold in this part of Hispaniola and at last they definitely gave it up to the French (in 1697).

Ninety years later, on the eve of the French Revolution, this French colony had twice the population of the Spanish colony, and possessed more than twice its wealth and foreign trade. Then came the great French Revolution, which declared all men equal. A great Negro, Toussaint l'Ouverture, now came to the fore. The French recognized his great ability and made him commander-in-chief of the native forces. He drove out the English troops who, as part of the war against France, had made a landing on the island. He also conquered the Spanish forces and gave France mastery of the whole island. France made him governor-general.

As time went on he exercised more and more power. At last he proclaimed the absolute independence of the island, and he became its dictator. The French did not accept this state of affairs but sent a large army to the island to crush the bold Negro leader. Though he was treacherously seized by the French, his men fought on. Finally the French forces were penned in and forced to surrender, and so France lost the greatest of her West Indian colonies.

The Haitians declared their independence in 1804 and General Dessalines was proclaimed president for life. Soon he declared himself emperor with the title of Jean Jacques I. He proved to be such a brute that two years later his own soldiers waylaid and killed him. Several chiefs now fought over the succession to the throne. One of them, Henri Christophe, established himself in the northern part of the island and had himself proclaimed king of Haiti; he was known as Henri I. He attempted to restore the ravages of war; he erected a number of buildings notable for great size rather than for good taste. Though now in ruins, his palace and citadel, near Cap Haitien, still astonish the tourist with their vast proportions.

Christophe was a cruel ruler and at last the people rose against him; in despair the despot killed himself (1820). He had never succeeded in establishing his rule throughout the island; it was not until 1822 that the whole of the island was united under one government as the Republic of Haiti. Then there was a split (1844); the old Spanish colony became the Dominican Republic.

THE REPUBLIC OF HAITI

The little republic of Haiti has had a stormy history since its separation from the Dominican Republic. There have been revolutions in great number and many of Haiti's rulers—emperors and presidents—have met death by violence. In the first years of the twentieth century conditions grew steadily worse. A series of violent disorders in 1915 (including a terrible massacre of political prisoners) led to American intervention in that year. United States marines took over the task of maintaining order and they remained in the country until 1934. In the following year a new constitution was drawn up, providing for a highly centralized form of government. Under this constitution the country has enjoyed a period of comparative peace, except for a series of frontier clashes with the Dominican Republic in 1937.

The population of Haiti is about 3,000,000. Negroes form the majority of the population, most of the remainder being mulattoes who are descended from former French settlers. There are also a few thousand white foreign residents. The capital, Port-au-Prince, with a population of about 115,000, is situated on a large bay and has an excellent harbor. Other cities include Cap



Courtesy, Grace Line

The ruins of Christophe's wonderful fortress on a mountain-top in Haiti.

Haitien, Aux Cayes and Gonaives. The industries of Haiti are mainly agricultural; irrigation is extensively used. The most important product is coffee, which is excellent in quality. Other agricultural products are cocoa, cotton, sisal, tobacco and bananas. The cultivation of sugar is growing in importance. There are undeveloped mineral resources of gold, silver, copper, iron, tin, sulphur and coal.

THE DOMINICAN REPUBLIC

Like its sister republic to the west, the Dominican Republic has had a troubled history. Spain asserted her authority again for a brief period (1861-65). With that exception the many struggles through which the country has passed have been due either to revolutions or to difficulties with Haiti. Internal disorders became so serious in 1916 that at last the United States landed troops to preserve order. They withdrew in 1924, but United States officials continued to collect the customs until 1941. Within recent years the Dominican Republic has managed to maintain order and to make definite economic progress, particularly in the two administrations of General Rafael L. Trujillo (1930-38). This unusual man had the power of a dictator but he used it only to advance the interests of his native land.

The Dominican Republic is nearly double the size of the republic of Haiti, but it has only about 1,826,000 people. The capital and chief city of the Dominican Republic is Ciudad Trujillo, which has a population of 71,29-. Other important cities are Santiago, San Pedro and Puerto Plata. Agriculture is the chief source of the country's wealth; sugar cultivation is the principal industry. Rice, cocoa, coffee and tobacco are also grown. The country contains deposits of silver, platinum, copper, iron and other minerals, but comparatively little has been done to make use of these minerals, which are extremely abundant.

PUERTO RICO AND THE VIRGIN ISLANDS

Puerto Rico is the chief American possession in the West Indies. The beauty and wealth of Puerto Rico were overlooked by the Spaniards all through the seventeenth century and far into the eighteenth. At last, however, Spain began to wake up to the value of this rich possession. Spanish peasants were sent out as colonists and Negro slaves were imported. In 1859 Puerto Rico, which had been a colony, was made a province of Spain.

The United States gained possession of the island in 1898, after defeating the Spanish in the Spanish-American War of that year. Under American rule Puerto Rico has greatly developed its rich natural resources. The island is extremely fertile. Though the lower lands to the north are well watered, irrigation is carried on extensively in the south. The chief products are sugar, molasses, tobacco, coffee, pineapples, grapefruit and coconuts. The chief industries include the refining of sugar and the manufacture of embroideries, straw hats and cigars. Manganese ore is now being mined. Other minerals—particularly gold, silver, iron, copper, tin, mercury and platinum—are found in the island; but little has been done, however, to develop the mining industry.

Puerto Rico is one of the most densely populated areas in the world; its inhabitants,

numbering 1,869,000, are crowded into an area of 3,400 square miles. The three largest cities of the island are San Juan, the capital (population, 169,247), Ponce and Mayaguez.

To the east of Puerto Rico is another American possession, the American Virgin Islands (so called to distinguish them from the British Virgin Islands). The United States bought these islands from Denmark in 1917. The group consists of three main islands, St. Thomas, St. Croix and St. John, and about 50 smaller ones, most of which are uninhabited and unnamed. The population is about 25,000. The capital city is Charlotte Amalie (population, 9,801) on the island of St. Thomas. The chief agricultural product of the American Virgin Islands is sugar. Rum is manufactured on a large scale.

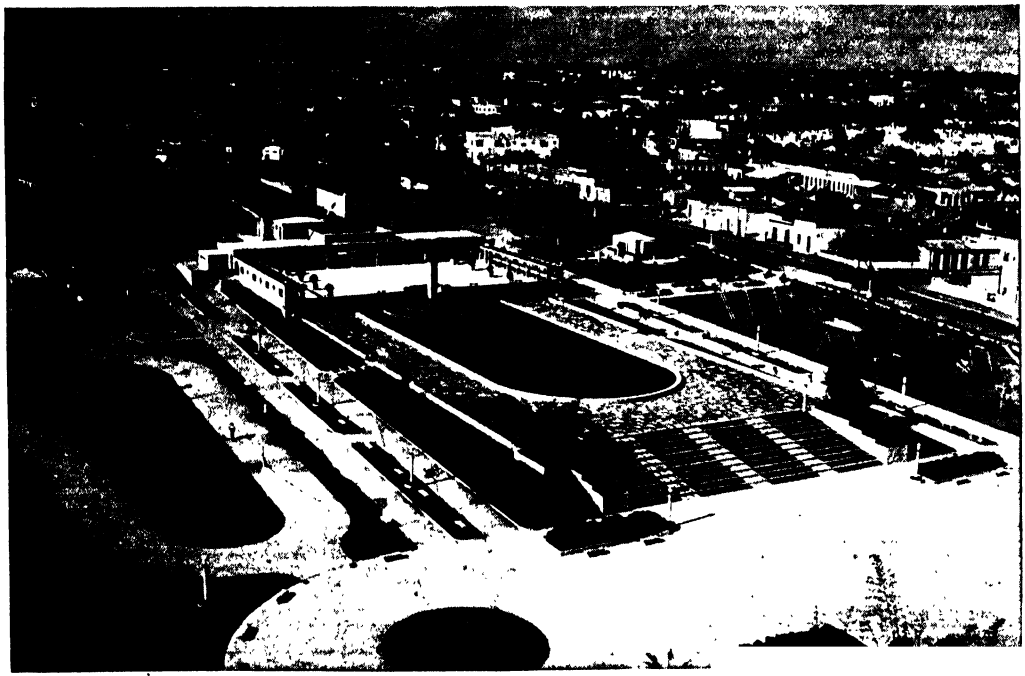
BRITISH POSSESSIONS IN THE WEST INDIES

The principal English possession in the West Indies is the island of Jamaica. Discovered by Columbus in 1494, it remained a Spanish colony until 1655, when the English took it over. Port Royal and Kingston, the chief ports, became the headquarters of cruising buccaneers and slave-traders. Jamaica was always a good customer for African slaves, who were set to work in the extensive sugar-cane fields.

In the nineteenth century two heavy blows were struck at the flourishing Jamaican sugar industry. For one thing, the emancipation of the slaves in 1833 caused heavy losses to the sugar-planters. Later came the discovery that sugar could be extracted from the beet as well as from the sugar-cane, and several countries which had imported vast quantities of sugar, now began making their own, from beets. The cane sugar industry never fully recovered.

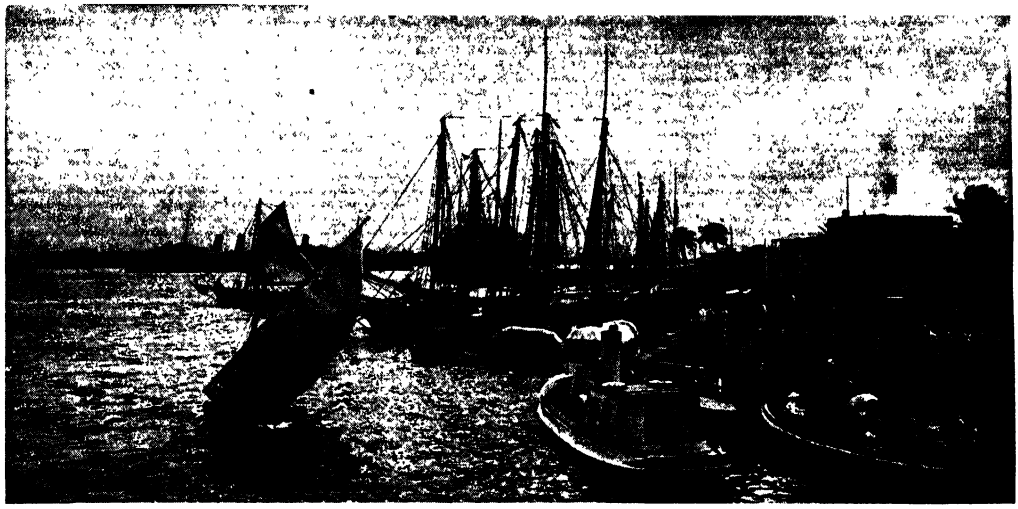
At present the banana industry is the most important one in the island. Other products include sugar, coffee, pimento, cocoa, coconuts, oranges, cigars, logwood and rum. Of the total population of Jamaica, estimated at 1,237,000, only about 15,000 are whites. There are about 20,000 East Indians, who for the most part work on the plantations. Kingston, the attractive capital of the island, is the seat of the English governor, who administers not only Jamaica but a number of other islands.

The Bahama Islands are a group of twenty inhabited islands and many uninhabited islets and rocks off the southern coast of Florida. Although Columbus first landed



Courtesy, Dominican Chamber of Commerce

The eastern part of the island of Hispaniola is the Dominican Republic. Its capital is Ciudad Trujillo (City of Trujillo). The picture shows Ramfis Park, a modern playground for children in Trujillo.



San Juan, on the northern coast of Puerto Rico, is the capital and largest city of this United States possession. It has an important military base. This is a view of San Juan harbor.

on one of the Bahamas (either on Watling Island or Cat Island), the Spaniards neglected the islands, which became the lair of buccaneers and smugglers. Settlements were few and far between until the latter part of the eighteenth century.

In the eighties of that century a number of American loyalists (that is, American colonists who remained loyal to Great Britain at the time of the American Revolution), came to the Bahamas, which became a British crown colony in 1787. It was the contraband trade (see page 3355) brought by the Confederate blockade-runners during the American Civil War that gave these little islands and especially Nassau, the chief port, their first prosperity.

The exports of the Bahamas consist chiefly of early vegetables, sisal and sponges. In time of peace tourist traffic, chiefly from the United States, is the mainstay of the islands. The population of the Bahamas is estimated at 68,000. The capital, Nassau, boasts of a splendid harbor; it is a popular health resort.

Great Britain possesses most of the islands of the Lesser Antilles. The Leeward Islands, situated to the southeast of Puerto Rico, include Antigua, Barbuda, Redonda, the British Virgin Islands, St. Kitts, Nevis, Anguilla and Monserrat. They have a combined area of 422 square miles and the population is estimated at 100,000. The principal products are sugar, molasses, cotton, fruits, tomatoes, tobacco and cigars. The seat of the colonial government is in the island of Antigua.

The Windward Islands to the south also belong to Great Britain. The group is made up of the islands of Grenada, St. Vincent, the Grenadines, St. Lucia and Dominica. The total population of the islands is about 265,000. St. George's, on Grenada Island, is the capital. The chief products are arrowroot, cotton, copra, sugar, molasses and rum. St. Vincent is particularly famous for its arrowroot.

The tiny British colony of Barbados lies to the east of the Windward Islands. Though its area is but 166 square miles, the island is very thickly populated, the latest estimate of the population being 203,000. Bridgetown (population, about 50,000) is the capital. The chief agricultural products are sugar, cotton and tamarinds. Molasses and rum are important manufactures. Barbados has a considerable fishing industry.

The southernmost English possession in the West Indies is Trinidad, a large island near the mainland of South America. The island boasts of a great asphalt lake, 114 acres in extent; it is extremely valuable and seems to be inexhaustible. The principal products of Trinidad are asphalt and oil. The population is 546,000; the capital, Port of Spain, has some 105,000 inhabitants. The small island of Tobago, to the north, is attached to Trinidad for government purposes.

American military bases have been set up on five of Britain's possessions in the West Indies—the Bahamas, Jamaica, St. Lucia, Trinidad and Antigua. The bases in question, together with three others in the West-

ern Hemisphere, were leased to the United States in 1940 for 99 years in exchange for 50 over-age American destroyers.

GUADELOUPE AND MARTINIQUE

Though France is no longer an important factor in the West Indies, she still has two outposts in the lesser Antilles—Guadeloupe and Martinique. Although Guadeloupe is sometimes called, inaccurately, an island, it is really a group of islands. There are two large islands, Basse-Terre and Grande-Terre (separated by a narrow channel) and five smaller islands. The population of the group is estimated at 178,000. The capital is the small city of Basse-Terre, which has less than 14,000 inhabitants. The chief products of Guadeloupe are sugar, coffee, cacao, rum, vanilla and bananas.

The island of Martinique has been French since 1635. Since 1946 it has been a department of France. Napoleon's first wife, Empress Josephine, was born here. Martinique has a famous volcano, Mt. Pelée. It erupted in 1902 and destroyed the flourishing city of St. Pierre and its 40,000 inhabitants. Martinique has a population of about 247,000. The *chef-lieu*, chief town, Fort de France (population, 52,000) is the main commercial city. The chief products are sugar, rum, bananas, pineapples and cocoa beans.

THE DUTCH COLONY OF CURAÇAO

The Dutch West Indian colony of Curaçao consists of two groups of islands, about 500 miles apart. The first group includes Curaçao, Aruba and Bonaire; the second group, Saba, St. Eustatius and the southern part of St. Martin (the northern part belongs to France and forms part of Guadeloupe. The entire colony has an area of 403 square miles and a population of about 124,000. The capital is the city of Willemstad (population, 37,000) on the island of Curaçao. The chief products of the colony of Curaçao are corn, pulse (the seeds of peas, beans, lentils and so on), cattle, salt and phosphate; the principal industry is the refining of oil.

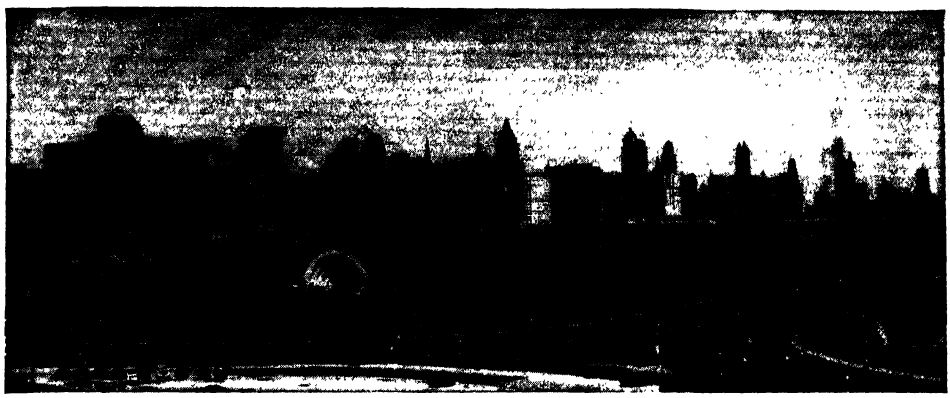
The harbor of Curaçao is very important. Before the spread of World War II to the Dutch West Indies over 5,000 ships a year entered the harbor. Included were many cruise ships from the United States.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 7155.



Courtesy, Alcoa Steamship Co.

St. Vincent is one of the Windward Islands. It is a British possession. The chief products are arrowroot, cotton, copra, coconuts, molasses, cocoa, coffee and spices. The capital is Kingston.



Courtesy, Chicago Association of Commerce

Chicago's lakefront skyline. The city has 101 miles of waterfront on Lake Michigan and the Chicago River.

CHICAGO, THE MAGIC CITY OF THE MIDDLE WEST

ON the bed of what was a vast sea many, many years ago, stands Chicago, the magic city of the West. Though the town has existed just over a hundred years, it had, in 1940, a population of 3,396,808.

The first railroad locomotive did not arrive until 1848, yet Chicago to-day is the greatest railroad centre in the world; the first bank was established in 1835, and to-day Chicago is the banker to the Middle West. The first store was opened in 1804, thirty-three years before the incorporation of the city; to-day Chicago is the great central market of the United States. The first school was established in 1816; to-day Chicago is a great educational centre. The first street cars began operation in 1856; to-day the local transportation systems take more than 600,000 people in and out of the Loop daily. The first harbor improvement was made in 1833; to-day Chicago is the greatest inland port in the world. The first health board was organized in 1837; to-day Chicago has the lowest death-rate of all the large cities in the world. The first telegram was received in 1848; to-day Chicago sends and receives more telegrams than any other city in the world.

We can see now that Chicago had to be. The Chicago River portage was used by the Indians long before any white man had seen it. The Chicago River, which flowed into Lake Michigan, and the Des Plaines, the waters of which reach the Mississippi, are only a few miles apart, and canoes could easily be carried across the short space. Perhaps some wandering fur-traders visited the spot earlier, but the first white men whom we know definitely to have stood on the ground were Father Marquette and Louis Joliet, in 1673. Joliet was quick to see the advantages of the spot and pointed them out in a letter. Father Marquette spent the winter of 1674-75 here and suffered many hardships, in spite of the friendly Indians. The site of his hut is believed to be Damen Avenue and the river, and it is now commemorated by a plaque at the north end of the bridge. The gallant La Salle was here perhaps as early as 1679, but we know that he dated a letter from "Checagou" in 1683. During the next hundred years the region came to be well known to explorer and fur-trader, and during that time was under three flags, that of France until 1763, that of Great Britain until 1783, and then that of the United States.

How the name Chicago arose we do not know with absolute certainty. We are told that the word meant in the Indian language "strong." So some people think it came from the wild onion which grew profusely in the neighborhood; others think it was from the skunk cabbage, which was also common, still others say there was an Indian chief named Chikagou who lived on the lake, and

think that the name came from him. At any rate, a map published in Quebec in 1784 gives the name "Chekagou" to a river, but in the wrong place. In 1796, however, a corrected map shows the name "Chicagou" in the proper position.

The first permanent house of which we know was a log cabin built about 1779 by a black man, Jean Baptiste Point de Sable, a native of Santo Domingo. This he sold about 1796 to Le Mai, a French fur-trader, who in turn, in 1804, sold it to John Kinzie, the first white man to make his permanent home here, though a few other fur-traders had cabins in the vicinity. Kinzie added some rooms and a porch, and it was long the finest home in the village, and was also the post office when the little village began to receive mail.

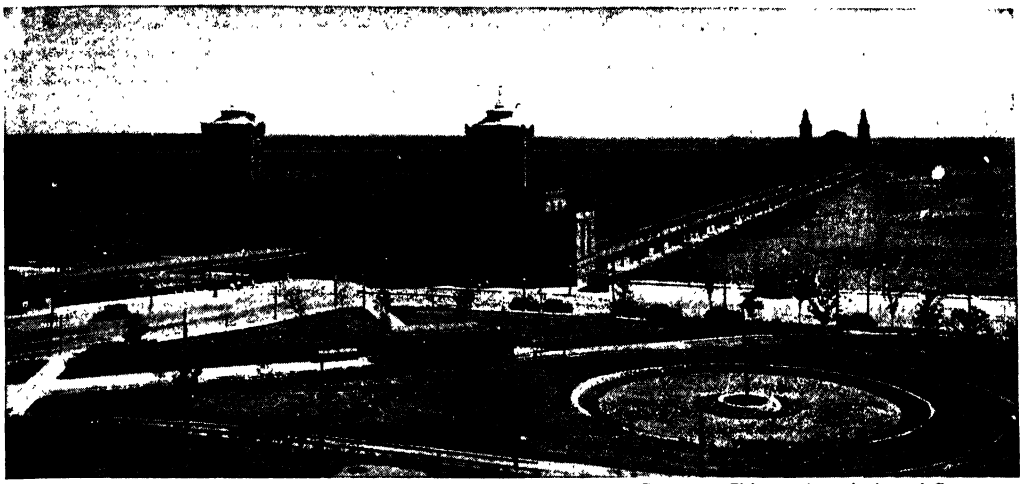
Kinzie, who traded with the Indians, probably felt safe in bringing his family because a fort had been ordered built in 1803. In 1795, when General Wayne forced the Indians to make a treaty, he required them to cede a tract six miles square at the mouth of the river. Fort Dearborn, so called in honor of the Secretary of War, General Henry Dearborn, a Revolutionary soldier, was built on the south bank of the river near the mouth. The fort which consisted of blockhouses and a stockade, was built during the winter of 1803-04 by the soldiers who dragged the timbers for miles over the snow. The abutments of the Michigan Avenue Bridge cover a part of the site, and there is a bronze tablet in the possession of the Chicago Historical Society which was for many years on a building at the corner of River Street, now called Wacker Drive. The first commander of the fort was Captain John Whistler, the grandfather of the famous artist James McNeill Whistler. Some of the little garrison had families, and a few settlers came; but there were more visitors —Indians, *voyageurs,* traders and wandering priests.

For fear of Tecumseh and his warriors Captain Heald, the commander in 1812, was ordered to evacuate the fort and proceed to Detroit. Captain Wells, with a few friendly Indians, came to help. The little band of soldiers and their families and a few citizens —less than a hundred in all—was ambushed about the present Eighteenth Street and Calumet Avenue. About half were killed at once, and the heart of Captain Wells was eaten by the Indians in order that they might gain his courage. Some of the captives were tortured and the remainder were spared, perhaps because of the influence of



Courtesy, Chicago Association of Commerce

State Street, "Main Street of the Middle West." Dozens of great department stores, shops, theatres and hotels border State Street and the big retail area has spread over to Michigan Boulevard. There are also about thirty important neighborhood shopping districts. Buyers come to Chicago from every section of the country.



Courtesy, Chicago Association of Commerce

The Navy Pier, extending out into Lake Michigan. It is a terminal for many of the Great Lakes steamship lines, a public playground and a convention and trade show centre.

Kinzie, who had sent his wife and children across the lake in a boat, but himself went with the party in the hope of being of service.

For several years after the massacre the region was desolate, but the fort, which the Indians had burned, was ordered rebuilt in 1816. From that time until it was permanently abandoned in 1836, there was sometimes a garrison, sometimes not. The danger of an Indian attack occasionally brought all the families in the neighborhood into the fort, to remain until the excitement subsided.

The Kinzie family returned to the house on the north bank of the river, which was not destroyed by the Indians, who seem to have had a high regard for John Kinzie. This famous house was torn down many years ago. It stood directly across the street from where the Wrigley Building is now. Kinzie, like Paul Revere, was a silversmith, but, as you can imagine, there was little work for him in the wilderness. He grew prosperous by trading and by selling land which he had bought for a song, but occasionally he worked at his trade, and a few specimens of his handiwork are still in existence. Many of his descendants have been prominent in the city.

Gradually a few more settlers came, but the total taxes paid in 1823 were only $11.42. In 1830 a map was made showing the residences of twelve families. Lots brought from $10 to $50, and some were sold for less. The settlement of the West was proceeding rapidly now. Ohio, Indiana and Illinois had been admitted to the Union as states. Michigan was being settled. In 1833, the little settlement had 550 people and was incorporated as a town, and new settlers arrived every week. Twenty-eight voters elected the first officers, August 10, 1833. Four years later there were over 4,000 people, the town received a city charter, and Chicago was on the way toward becoming a great city. However, it was not until 1843 that hogs were no longer permitted to run at large through the streets.

As elsewhere, the coming of the whites meant the going of the Indians. White men and red men could not occupy the same territory. The Indians agreed to move west of the Mississippi in 1833, after the Black Hawk War. To pay their claims $200,000 in silver was sent by wagon from Detroit. It is said that the money was all in half dollars, and that as soon as they were received most of them were exchanged for whiskey as long as the supply in the hands of the traders lasted.

Then the drunken Indians, daubed with paint, danced and yelled through the streets of the future city brandishing their weapons. They greatly outnumbered the whites, and another massacre seemed possible. From the windows of the Sauganash Hotel, the largest tavern in the place, a few strangers looked out fearing a fatal ending of their visit to the Wild West. However, the excitement died down, the Indians departed for their new homes, danger from this source never threatened the city again, and Fort Dearborn was abandoned in 1836.

The Sauganash Hotel mentioned above was named by its proprietor Mark Beaubien

in honor of a friend, a half-breed Indian. On its site was later constructed the Wigwam, a temporary structure in which Abraham Lincoln was nominated for the presidency in 1860. A bronze tablet now marks the site. When the fort was abandoned Beaubien's brother, John Baptiste Beaubien, bought from the United States the land now bounded by the river, the lake, State and Madison streets for the sum of $94.61. It is worth to-day at least $500,000,000, probably more.

This Mark Beaubien was an interesting character. He was fond of his fiddle and played at dances until he was an old man. It is said that he had twenty-three children, fifty-three grandchildren and lost count of the number of his great-grandchildren.

After incorporation the city grew, but it could not become a great city until railroads were built. The first line was the Galena & Chicago Union Railroad, ten miles in length, which ran to the Des Plaines River. The equipment consisted of one second-hand engine, two second-hand passenger cars and six freight cars. This was the beginning of the great Northwestern Railway system.

Four years later the Michigan Central and the Michigan Southern entered the city, and communication with the East was established. From this time the growth of the city was rapid and continuous. No railroad passes through Chicago. Thirty-seven lines (twenty-two trunk line railroads and fifteen terminal, belt and industrial lines) end here, and three electric lines serve the city; and there are so many roads and so many side tracks that if they were put end to end they would make a double-track road from New York to San Francisco and have some miles left over. The city is now the greatest railway centre in the world.

THE FIRST WATER SUPPLY SYSTEM WAS BUILT IN 1837

In the early days the rivers flowed sluggishly between banks only a few feet above the water. Much of the land was swamp, or else was so low that it was easily flooded when the rivers were swollen. A satisfactory water supply was a problem when only a few thousand people had gathered. In 1837 water works were built by private capital, and at Michigan Avenue and Water Street a reservoir was constructed and water was pumped from Lake Michigan. Customers were supplied through pipes made of logs through which a hole was bored. In 1851 the city took over the water supply, and as the refuse of the city polluted the water near the shore, the intakes were moved farther out into the lake.

To-day Chicago obtains an abundant supply of good, pure water from the lake, through six intake cribs, located from two to four miles off shore. Water flows by gravity through some sixty-five miles of water tunnels varying in diameter from four to sixteen feet. In the city above these tunnels are ten pumping stations which lift the water and pump it under pressure into the distributing system consisting of some 3,723 miles of water pipes.

THE RIVER THAT WAS MADE TO FLOW BACKWARD

This early pollution of the lake was one of the chief reasons for the construction of the Chicago Drainage Canal, begun in 1892. This is one of the most important engineering works ever undertaken, in the course of which the Chicago River was made to flow backward and empty finally into the Mississippi and the Gulf of Mexico instead of into the St. Lawrence and the Atlantic.

The Chicago River was widened and deepened from its mouth to Damen Avenue, a little more than five miles. Then the canal proper was dug much of the way through rock, from Damen Avenue to Lockport, on the Des Plaines River, a distance of twenty-eight miles. A new channel was dug for the Des Plaines River between Lockport and Joliet, seven miles. Thence the water goes into the Illinois and then into the Mississippi. To relieve the southern part of the city the Calumet River has also been reversed and the smaller Calumet-Sag Canal leads from the lake to the main canal, about sixteen miles.

The main canal is 24 feet deep and has a minimum width of 162 feet. At Lockport electric power is developed where the water drops 41 feet on entering the Des Plaines River. It was long the dream of Chicago that this canal not only carry the drainage of the city, but also carry a great commerce between the Great Lakes and the Gulf of Mexico.

This dream was made a realty when the Lakes-to-Gulf Waterway was officially opened on June 22, 1933. The present annual commerce on this waterway is nearly 7,000,000 tons. The connecting link, the 65-mile channel from the end of the Drainage Canal at Lockport to the navigable portion of the Illinois near La Salle, was com-

WACKER DRIVE AND ITS TWO LEVELS



Courtesy, Chicago Association of Commerce

Skirting the south bank of the Chicago River is Wacker Drive, the first well-known two-level street in America. The wide lower deck is an express highway for trucks, and passenger cars use the upper deck. The London Guarantee and Accident Building in the left foreground is on the site of Fort Dearborn. The drive, which was completed in 1926, was named for Charles H. Wacker, who was chairman of the Chicago Plan Commission.

pleted at a cost of $20,000,000. Altogether the project cost $102,000,000. Five powerful locks make up the difference of 129 feet in elevation at the ends of the 96-mile waterway.

The diversion of water from Lake Michigan caused by the waterway affected the level of the lake. A Supreme Court decision rendered in 1929 called for a progressive reduction in Chicago's diversion from 10,000 cubic feet per second to 1,500 cubic feet per second by 1939. In addition, Chicago is allowed enough water for its other needs. These average 1,700 to 1,800 cubic feet per second.

HOW CHICAGO CLIMBED OUT OF THE SWAMPS

When Father Marquette and his two companions were spending that dreary winter of 1674-75 beside the river the ice in the river broke up and blocked the current, which spread over the land. The little group climbed trees with their belongings to save them. Such floods occurred occasionally after the settlement began, and early in 1849 came the "great flood." The water of the Des Plaines overflowed into the drainage basin of the Chicago River, and the water came down the river carrying bridges and buildings with it. This could not be permitted, and so, beginning in 1857, the level of the low-lying parts of the city was raised from ten to fifteen feet. The Tremont House was a four-story brick-and-stone building. A young building-contractor promised the proprietor that he would raise it and "your guests will not miss a single meal or a wink of sleep." He kept his promise. This was George M. Pullman, later to invent the car which bears his name.

In 1860 the Republican Convention which nominated Abraham Lincoln met in Chicago, then a city of 109,260 people. Stephen A. Douglas, the candidate of the Northern wing of the Democratic party, was a resident of the city. During the Civil War the city was filled with marching men and waving flags. Through Chicago a great part of the food for the Union armies passed. A large prison camp for Confederate prisoners, Camp Douglas, was maintained. With the great westward movement after the war thousands passed through Chicago, and many remained.

By 1870 the city was the fifth in size in the United States and had over 300,000 people. The next year came a disaster which might have shaken the confidence of a people less confident of the future. This was the "Great Fire," which began in a barn on De Koven Street, on the West Side, and raged for more than twenty-four hours. The section was one of small houses built largely of wood, and there were lumber yards in the vicinity. The weather had been unusually hot and dry for weeks. Mr. and Mrs. O'Leary occupied a house on De Koven Street, and in the barn behind were a horse and some cows. It seems that Mrs. O'Leary often milked her cows by lamplight, though she afterward claimed that on this particular day she had finished her milking by daylight. At any rate, the fire department found an overturned kereosene lamp in the ashes of the stable, and there is little doubt but that the fire began here on the night of October 8, 1871, about nine o'clock.

A stiff but variable wind was blowing and the flames swept on their conquering way. They leaped the river to the South and then to the North Side, destroying buildings supposed to be fireproof as well as those of flimsy materials. On the South the destruction was checked by blowing up buildings in the path of the fire with gunpowder, but almost the entire North Side had been wiped out when the welcome rain began to fall, twenty-seven hours after the alarm had been sounded. It was twenty-seven hours of horror and no one who shared in the experiences of that day and night ever forgot them.

THE ENERGY OF THE PEOPLE OVERCOMES THE DISASTER

Only the San Francisco fire of 1906 can be compared with this calamity. About 250 lives were lost, and 100,000 people were left homeless, and in many cases penniless. The number of buildings destroyed was 17,450, covering about one-third of the area of the city. The total loss of property was estimated at $196,000,000. Less than half of this was covered by insurance, and many of the insurance companies were unable to pay their losses in full, so that less than one-fourth of the loss was recovered.

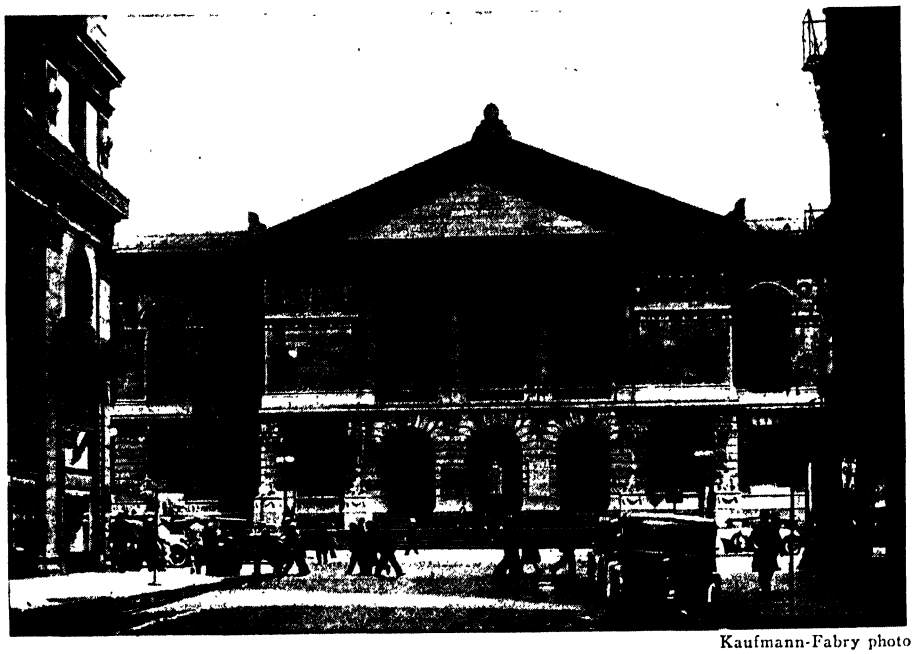
Relief poured in from all sides—about $5,000,000 in all—of which $1,000,000 came from Europe, half of this from England. Soon the worst cases of suffering were relieved, and the energy of the Chicago people did the rest. The story of one man is typical. He had had a flourishing business in a fine building. On the morning of October 10, while the bricks were still hot, he put up a board shanty with the sign: "Everything gone but wife, children and energy." Within three years most of the visible evi-

GARFIELD PARK AND THE ART INSTITUTE



Photo, Kaufmann, Weimer & Fabry Company

Garfield Park, on the West Side, is one of the most attractive of the many parks of Chicago. This is the Lagoon, which is usually more crowded than it appears in this picture. There is also an enormous conservatory in which flower shows are held.



Kaufmann-Fabry photo

The Art Institute is in Grant Park, facing Michigan Avenue. More than 3,000 students each year enroll here in various courses, including applied arts such as leather, pottery and metal work, and designing. The Institute contains a notable collection of paintings, sculptures and other works of art. On the south terrace is Lorado Taft's Fountain of the Great Lakes.

dences of the fire had disappeared. New buildings, better than the old, had gone up, and the Census of 1880 showed Chicago fourth in rank among American cities.

Chicago took up steel construction very early, and the first all-steel-frame building ever constructed is said to have been the building of the Home Fire Insurance Company, constructed in 1885 at the corner of La Salle and Adams streets. This was ten stories high and was truly a skyscraper in its day. Since that time many towering structures which overtop the modest ten stories of the first attempt have been built.

The most important landmark in the later history of the city was the World's Columbian Exposition. As the four-hundredth anniversary of the discovery of America approached, the idea of celebrating by a great exposition took hold of the American people. Several cities desired to be chosen as the site, but Chicago and New York were the chief contenders. Chicago won, and at once set to work to surpass anything ever accomplished in the past. It was not possible to get ready in 1892, and so the exposition was held in the summer of 1893.

THE LOVELY "WHITE CITY" ON THE LAKE FRONT

The site chosen was Jackson Park on the lake front. The leading architects, sculptors and landscape-artists of the nation were intrusted with the work. They had never had such an opportunity before, and the result was a miracle of loveliness and good taste. Though built of a mixture of plaster and fibre called "staff," the "White City" had the effect of being built of white marble, or, in the case of a few buildings, of colored stone. There were over 27,500,000 admissions to the grounds from May to November. From every part of the United States and from every country of the world visitors came to see and to learn. Chicago's contribution was about ten and a half million dollars, besides other millions spent in preparing the city for visitors.

The Fine Arts Building was not torn down when the exposition was ended, but for nearly thirty years held the collections of the Field Museum, since transferred to the beautiful new building in Grant Park. It is now called the Chicago Museum of Natural History. On the Wooded Island is the Cahokia Court House, the first public building in Illinois, brought from the southern part of the state and set up here. The Fine Arts Building now houses the Museum of Science and Industry in Jackson Park.

The millions of visitors to the exposition emphasized what thinking citizens already knew. Chicago had grown without any plan, except that the usual checkerboard system of streets so common in America had been followed. The business district, hemmed in on two sides by the river and on a third side by the lake, was crowded, and increasing population made the situation almost impossible. So the Chicago Plan was drawn up, after years of study, by a committee of experts. It owed much to the Chicago architect Daniel H. Burnham, who had so much to do with the development of the "White City."

HOW THE PLAN OF CHICAGO WAS CARRIED OUT

It was not expected that all the features would be carried out at once, but the whole was divided into convenient units. Carrying out any of these would give some relief and at the same time add to the attractiveness of the city, and the completion of each unit would bring the whole that much nearer. The plan was accepted by the City Council, and the Chicago Plan Commission was organized. This body has the power to advise but not to execute, and the members have given much valuable service to the city.

Chicago has always believed in her future and in the idea that public improvements promote prosperity. Paris underwent a transformation of unparalleled magnificence under the Emperor Napoleon III and George Eugène Haussmann, prefect of the Seine, which made that city the most beautiful capital in Europe. The improved area of Paris was about 31 square miles. The area of Chicago for which improvements are completed or are under way is 212.8 square miles, or nearly seven times that of Paris.

The first item was the widening of Twelfth Street, now called Roosevelt Road, which brings the traffic of the West Side to the lake. Then came the Michigian Avenue improvement, including the new double-decked Michigan Avenue Bridge. Part of the wide avenue is in two levels also, and some other double-decked streets will be constructed. Then came the improvement of South Water Street. A municipal pier, called Navy Pier, has been constructed. Wide diagonal streets will be cut some day. While progress has not been uniform, the determination to make Chicago the most magnificent city in the world has never been given up.

It has been mentioned that Chicago was

CHICAGO FROM EARLIEST DAYS



CHICAGO, OR WOLF'S POINT, IN 1832, WITH WOLF'S TAVERN ON THE LEFT AND MILLER'S TAVERN ON THE RIGHT

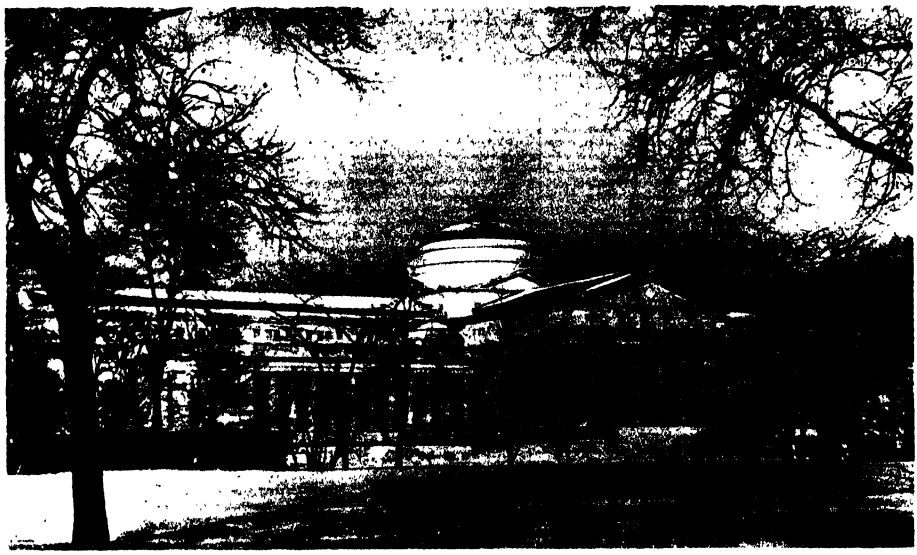


THE CITY OF 324,000 INHABITANTS BEFORE THE GREAT FIRE OF OCTOBER, 1871

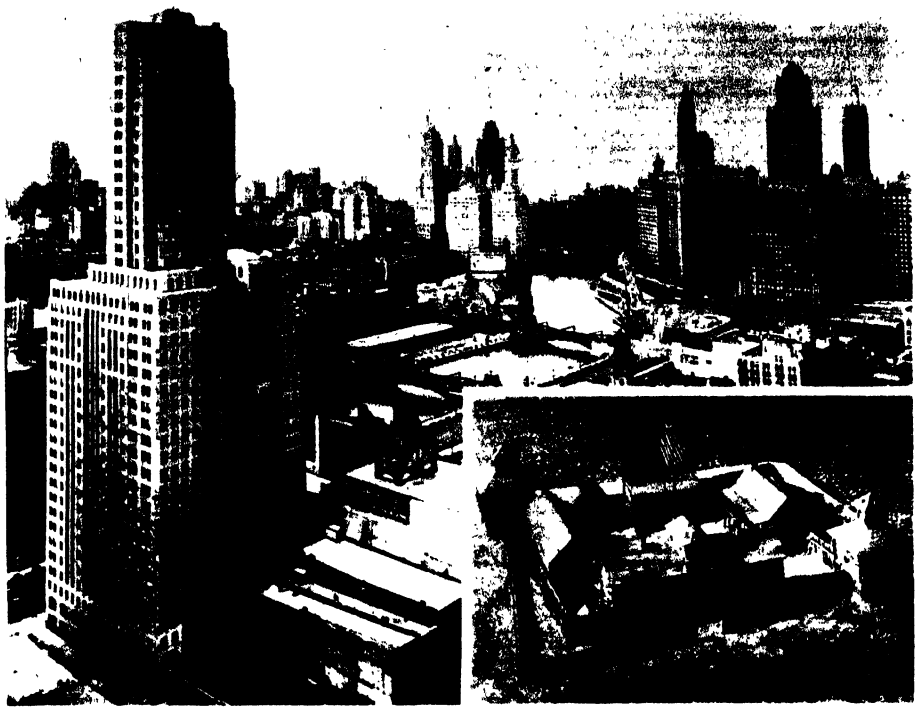


A VIEW SHOWING SOME OF THE DAMAGE DONE BY THE FIRE, WHICH SWEPT OVER 2,100 ACRES

These pictures and that of Fort Dearborn on page 7114, are reproduced by courtesy of the Chicago Historical Society

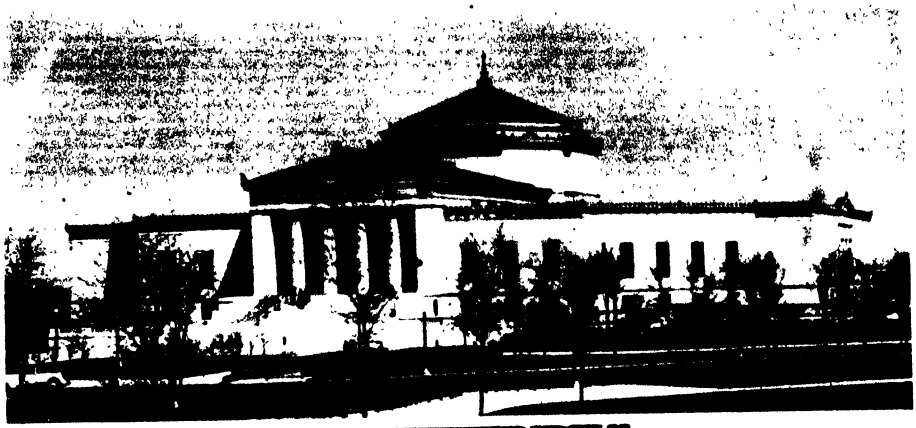


THE MUSEUM OF SCIENCE AND INDUSTRY HAS EXHIBITS COVERING ALL FIELDS OF SCIENTIFIC KNOWLEDGE. PEOPLE OF ALL AGES FIND THEM FASCINATING



Courtesy Chicago Association of Commerce

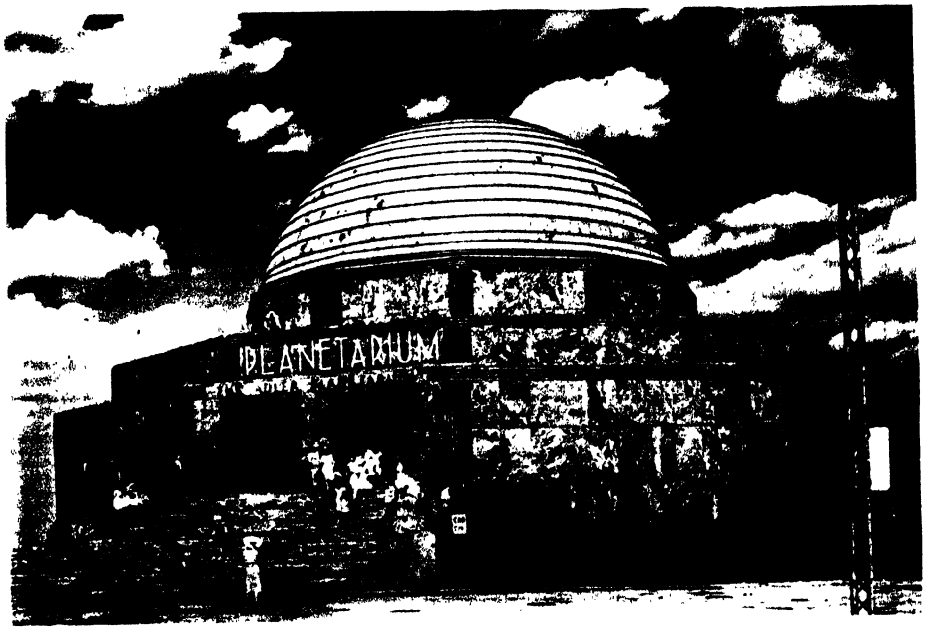
THE CHICAGO RIVER FLOWS THROUGH THE HEART OF THE CITY, CARRYING THE PRODUCTS OF THE WEST TO THE MISSISSIPPI AND THE GULF OF MEXICO. OLD FORT DEARBORN SEE INSERT ONCE STOOD ON THE RIGHT BANK OF THE RIVER. AT THE TOPMOST BEND SHOWN IN THE PICTURE A TALL BUILDING NOW STANDS THERE





THE SHEDD AQUARIUM IN GRANT PARK CONTAINS OVER 0,000 LIVING CREATURES OF THE WORLD OF WATER

THE CHICAGO HISTORICAL SOCIETY MUSEUM IN LINCOLN PARK, WHERE AMERICA'S STORY IS VIVIDLY PORTRAYED



Courtesy Chicago Park District

THIS IS THE ADLER PLANETARIUM, THE FIRST PLANETARIUM EVER BUILT IN THE UNITED STATES ON THE INDOOR SKY IN ITS DOME THE MOVEMENTS OF THE STARS AND PLANETS ARE SHOWN BY MEANS OF LIGHT



Courtesy Chicago Association of Commerce

BUCKINGHAM FOUNTAIN SET IN THE CENTRE OF GRANT PARK, BETWEEN THE LAKE FRONT AND THE CITY'S TOWERING SKYLINE, IS ONE OF THE LARGEST AND MOST BEAUTIFUL FOUNTAINS IN THE WORLD



Courtesy Chicago Association of Commerce

CHICAGO'S FAMOUS MICHIGAN BOULEVARD WHERE SKYSCRAPERS, STORES AND HOTELS ON ONE SIDE FORM A BACKGROUND FOR GREEN PARKS, MUSEUMS AND THE SPARKLING WATERS OF LAKE MICHIGAN ON THE OTHER SIDE

incorporated in 1833. As 1933 approached the citizens determined to celebrate the hundredth birthday of the city. After much discussion it was decided to hold another great exposition. It took the form of a pageant showing a Century of Progress. The site chosen extended for three miles along the lake just south of the Chicago Museum of Natural History. The dominant idea was the progress of the world in Science, Industry, Transportation, Agriculture and Social Relations. Discarding the old ideas of construction and materials, the buildings themselves were worth a visit to the exposition, and the effects of light and color have never been surpassed. The wheels were started by light from Arcturus which left that star forty years ago.

A Century of Progress sought to explain how the discoveries of science in the preceding hundred years or so have made available to humanity new and better ways of life, undreamed-of treasures of wealth and weapons for fighting disease. The architecture of the great exposition was one of its most interesting features. The builders made the Fair, through their designs, an expression of to-day's achievements and a vision of to-morrow. During 1933 the Fair was open from May 27 to November 12, and 22,320,456 persons attended. In 1934 it opened on May 26 and closed on October 31, having had 16,486,387 visitors.

WHO ARE THE PEOPLE WHO HAVE MADE CHICAGO?

We have now spoken of the history of Chicago. Who are the people that have done these things? Some would say that you cannot understand Chicago without knowing something of the early settlers of this part of the United States. They came from New England and the Northeast; they came from the Southeast. The two tides met and mingled in the old Northwest Territory, and the resulting blend had, so some residents of the Middle West say, the best qualities of both South and North. Naturally Chicago, as the metropolis of the region, would draw to itself some of the most energetic of this population.

Whether this explanation be the true one or not, Chicago was fortunate in the qualities shown by its early settlers, and their descendants reflect no discredit on their ancestors. But these descendants have long been in a minority. Chicago has attracted individuals from every state in the Union and from every nation in the world. Though the Census showed that 74.9 per cent of the population were born in the United States, only 27.9 per cent were native whites of native parentage, while 29.8 per cent were native-born of foreign parents, 9.6 per cent were native-born of mixed parentage, and 6.9 per cent were Negroes. The percentage of foreign-born was 24.9. Of the foreign-born, Poland furnished the largest number 149,622; Germany came next with 111,366; the Scandinavian countries together, 99,977. There were over 75,000 born in Russia, and nearly that number from Italy; there were nearly 50,000 British, Irish and Czechoslovaks, about 30,000 Canadians, and over 31,000 Lithuanians. No other country furnishes as many as 25,000, but, as said above, every country and every color in the world is represented. There were 233,903 Negroes, more than in any other city except New York.

Another interesting fact may be noted. Jealousy of a great city is often shown by the people of the smaller cities and towns of the section in which it stands, and the people of the rural districts often share in this feeling. Little of this feeling is shown toward Chicago. The people of the Central states are only less proud of the city than its inhabitants.

HOW THE PEOPLE MAKE THEIR LIVING

Now let us see what is in Chicago to-day. Our many pictures will serve, better than pages of text, to show you the extent and the immensity of the city, but we may tell you how the people make their living. The answer, of course, is commerce and manufacturing. There are nearly 10,000 factories of various kinds in and around the city, making it second only to New York. The product of these factories is valued at nearly $5,000,000,000.

The largest industry, and the one for which the city is best known, is meat products of all kinds. They are sent away, not by the car-load, but by the train-load or the ship-load, and go to every part of the world. The packing-plants are marvels of efficiency, and nothing is wasted. An old joke is that they save everything connected with a pig except the squeal. Skin, hair, bristles, bones, hoofs and refuse are all turned into useful articles.

There are dozens of other important industries. Immense quantities of iron and steel are made in the city and its immediate suburbs. Foundries make castings of

iron, steel and other metals. The manufacture of agricultural machinery and railway cars is very important, and we may mention also clothing, shoes, gloves, furniture and other lumber products, motor trucks, motor cars and motor supplies, electrical supplies, plumbers' supplies and many others, not forgetting the printing industry. The bakery products and the confectionery are worth millions, and so are the pianos and organs and the medicines.

Though manufacturing is important, commerce must not be forgotten. Chicago is the greatest grain market in the world, and the greatest produce market, as well as the greatest market for live stock. The warehouses can store 60,000,000 bushels of grain. Chicago buys a large part of the products of the Central states and distributes them to the world.

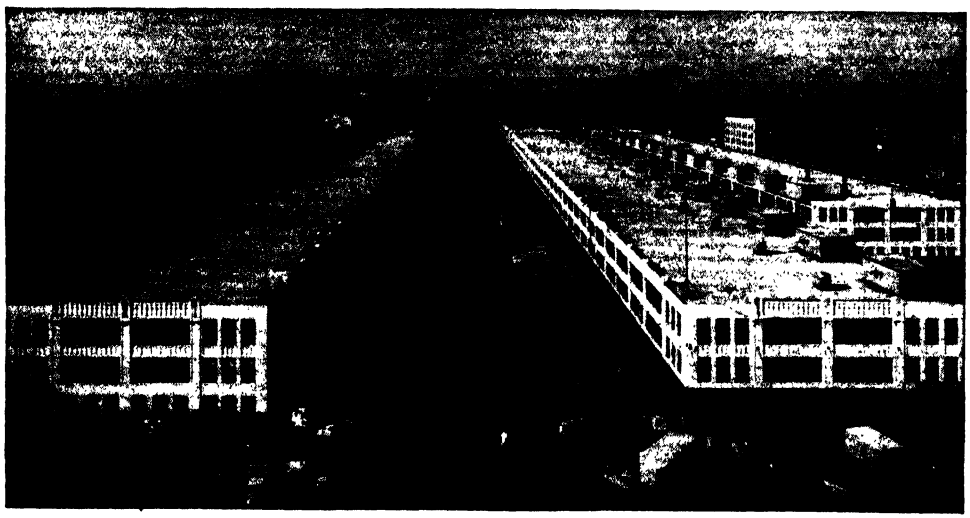
On the other hand, in addition to her own manufactures, the city collects the products of the world and distributes them over the great central region. The wholesale trade is estimated at six billion dollars a year. From Chicago go dry goods, general merchandise, foodstuffs, seeds, machinery, jewelry, musical instruments, wearing apparel, paint, household furniture and thousands of other things.

Chicago has some of the largest and finest department stores in the world. Buyers go to every part of the world seeking goods for customers of the great stores and in every important market there are buyers resident the year round to select fine merchandise.

The mail-order business is an interesting development. Starting originally by selling literally everything through the mails, they have developed to a point where many have their own stores, factories and warehouses at important trading centres throughout the country. They still print great catalogues, hundreds of pages with thousands of illustrations, and it is said that more copies of the catalogue of one firm are annually printed than of any other book published anywhere. In almost every home in the villages and rural districts you are likely to find a copy.

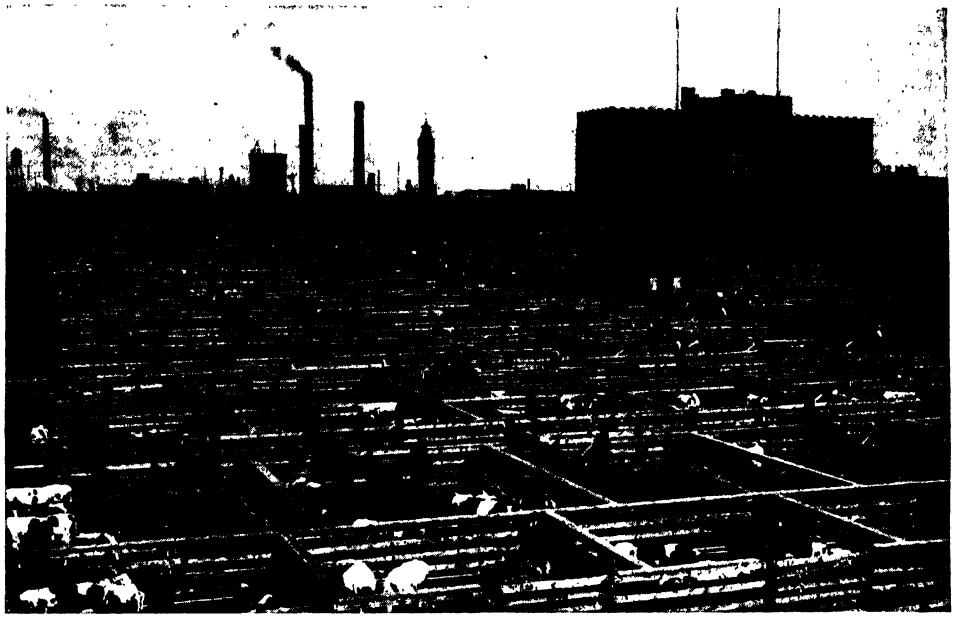
Local tunnels have been a great aid to commerce. The city is honeycombed with tunnels for many purposes. Some bring and distribute water, others carry street cars under the river, while far below the surface there are over 60 miles of freight tunnels. These carry goods to and from the freight stations, deliver coal and building material, carry away ashes and the dirt from excavations. They keep thousands of trucks off the crowded streets. In 1943 the first trains ran in a system of underground railways (subways) within the city.

No great city can exist to-day which does not possess advantageous means of transport by rail or water. Chicago has both. Those who discovered the site of Chicago, as well as its first citizens, arrived by water, and water was the first means of transporta-



Courtesy, Chicago Association of Commerce

South Water Market, a produce market where crops from an extensive farming area are sold. This is a clearing house as important in its way as Chicago's Board of Trade and its Stock Yards.



Courtesy, Chicago Association of Commerce

Chicago's Union Stock Yards cover several square miles. Millions of head of livestock are bought and sold here every year. It is the most famous food centre in the world, and attracts a constant stream of visitors.

tion. Early trade was on an east-and-west line from Chicago to the Atlantic coast through the Great Lakes. The Illinois and Michigan Canal, opened in 1848, exercised an important influence on the early life of the city as well as on the development of northern Illinois. Then came the railroad-building era, and the fact that Chicago with its thirty-seven railroads is the leading railway centre of the world is no accident, but the direct result of economic advantages of location. Its position at the foot of Lake Michigan, in the centre of the country's richest agricultural area surrounded by coal, iron, lumber, and other natural resources, made this inevitable. Further, the possible water competition by way of the Great Lakes has kept Chicago's freight rates reasonable. To-day, though continuing to support its railroads, Chicago is looking once more to water transportation to supplement its rail facilities.

Though the sand bar at the mouth of the river originally allowed nothing larger than a canoe to pass, the harbor now provides for large ships. Steamers connect the city with all the other ports of the Great Lakes, and freight vessels ply between Chicago and Europe. The governments of Canada and the United States are now considering the Great Lakes-St. Lawrence Waterway. At present some of the canals around the rapids are but 14 feet deep, and so only smaller vessels can pass. If the waterway can be deepened so that the largest vessels may pass, Chicago and other lake ports will have the advantages both of ocean ports and of inland cities. Some day we may see great steamers sailing from Chicago for the Gulf of Mexico and South America, and others for Liverpool.

Now that we have spoken so much of the size of the city, let us look at the city itself. It stretches for more than 26 miles along the southwestern shore of Lake Michigan and has an area of 212.8 square miles. The site is a flat plain through which the Chicago River, a stream made by the junction of the North and South branches, used to flow into the lake. These rivers divide the city into North, South and West sides.

The centre of the downtown business district is known as the Loop, because the tracks of the elevated railroads encircle the greater part of it. It is a very busy section, including, as it does, the United States Courthouse, the City Hall, the Board of Trade and other public buildings, the most important stores, wholesale and retail, most of the leading banks and many hotels, and

THE INTERIOR OF THE BOARD OF TRADE BUILDING



© Kaufmann and Fabry

The Board of Trade Building is the nerve-centre of the grain-and-provisions trade of the world. Every day millions of bushels of grain, as well as much pork, lard and cotton are bought or sold. The picture shows the trading floor with the "Wheat Pit" in the foreground. On the tables at the left are small paper bags of grain, each bag representing a carload of grain which has been inspected, graded and certified.

fine office buildings, besides important railway stations. It is hard to realize that this whole section was a pasture less than a hundred years ago. Recently some of the finest office buildings and some fine hotels have been erected on the North Side of the river, as you can see from the pictures.

In recent years tours of the parks and boulevards have rapidly gained in popularity among the throngs that visit the city. As we start north on Michigan Avenue two levels—the lower one for heavy traffic, the upper one as a light traffic-way and main-entrance thoroughfare to the store and office buildings. The approaches to the two-level section are very gradual slopes, and one hardly realizes that he is passing from the city grade to an upper level. The link involved the partial or total demolition of many buildings.

On top of the Palmolive Building, on North Michigan Avenue, is the most power-



Courtesy, Great Lakes Transatlantic, Inc.

Chicago is an inland port for ocean steamships that come through the Great Lakes. This Norwegian freighter, the Taborfjell, is loading cargo for Europe. The man at the far left is a U. S. Customs officer.

opposite Grant Park, the first point of interest reached is the Michigan Avenue Bridge, opened to the public in May, 1920. Michigan Avenue from Randolph Street north improved from a 66-foot gap of squalor to a thoroughfare 130 feet wide, which completed the chain of boulevards from Jackson Park on the south to Lincoln Park and Sheridan Road on the north, and in addition relieved congestion at one of the most crowded points to be found anywhere. The Wrigley Twins and the Tribune Tower are at the north end of the bridge. Both the bridge and the avenue at this point have

ful aviation beacon in the world. It has two billion candlepower, and aviators have seen it at a distance of nearly three hundred miles. On the North Side at the foot of Grand Avenue is the Navy Pier; and still further north, Lincoln Park, with its zoo, bathing-beaches, bridle-paths, tennis courts, golf links, baseball diamonds and yacht harbor, and Saint Gaudens' famous statue of Abraham Lincoln.

Encircling the city, the boulevards lead through Humboldt Park, Garfield Park, Douglas Park and Washington Park. Here the road turns and runs along the famous

Midway, whose name is derived from the great "side shows" of the World's Fair, the Midway Plaisance, where in 1893 lived more different races of men than probably ever were gathered before or since. In this section are the beautiful buildings of the University of Chicago.

Jackson Park, scene of the World's Fair of 1893 is reached next. At the present time the Fine Arts Building and the structure on the Wooded Island are about all that remain of the "greatest show on earth." The way north leads through Hyde Park and finally Michigan Boulevard, and along "automobile row" till Grant Park is again in sight; or you can cross the new bridge at Twenty-third Street and follow the outer drive past the fine homes of the Chicago Museum of Natural History, Shedd Aquarium, Adler Planetarium and Soldier Field.

Within the city are 7,327 acres of parks and playgrounds. There are 208 parks ranging in size from less than an acre to more than 542 acres, the larger ones connected by the boulevard system, more than 162 miles in length. Every section of the city has a park that is easily accessible. In addition, the city maintains, usually in connection with a public school, 72 public playgrounds equipped with various sorts of apparatus, where the child and even the grown-ups may find diversion. Chicago is one of the pioneer cities in recognizing the needs of childhood and is meeting these needs on a scale unequaled in any other American city.

SCHOOLS, COLLEGES AND UNIVERSITIES IN THE CITY

Chicago is a great educational centre. There are 400 public schools, with nearly half a million pupils. The many high schools are of every sort—literary, commercial and technical—and their standards and courses of study compare favorably with those of the ordinary college not many years ago. There are also many good private schools.

The University of Chicago is one of the largest and wealthiest institutions of higher education in the country, and its fame is world-wide. The buildings, which are located along the Midway of World's Fair days, form an imposing group. The professional schools of Northwestern University are also in the city, though the undergraduate departments are at Evanston. Loyola University and the De Paul University, Catholic institutions, offer a wide variety of courses to thousands of students. The Illinois Institute of Technology offers courses in engineering, architecture and science. There are also several medical and dental schools, theological seminaries, schools of law and pharmacy, and a veterinary college.

The Art Institute in Grant Park contains a priceless collection of paintings, sculpture and other objects of art, and also holds many special exhibitions. More visitors enter its doors than those of any other similar institution. It conducts the largest art school in America, and the instruction is intended to fit every need. Indeed there is much to support the statement of one of the university presidents that in number, character, standards and wide range of courses offered, Chicago may claim to be the leading educational centre of the whole country.

OTHER IMPORTANT MEANS OF EDUCATION

In a modern city the library facilities are important from the standpoint of education. The Chicago Public Library on Michigan Avenue occupies an imposing building and has one of the largest collections of books in the country. It has 47 branches for circulation. The city is also fortunate in having important privately endowed libraries. The John Crerar Library, on Michigan Avenue, opposite the Public Library, has more than a half million books, and the Newberry Library, on the North Side, is especially strong in music, genealogy and religion. The Library of the Chicago Historical Society contains valuable collections.

Another educational institution of value is the Chicago Museum of Natural History, endowed by the late Marshall Field. For nearly thirty years the collections were housed in the Fine Arts Building of the World's Fair, but are now in the new building in Grant Park, said to be the largest marble building in the world. The collections are visited by thousands seeking instruction, both children and adults.

The old Fine Arts Building has been generally acclaimed by art authorities as an excellent modern example of Grecian art. For some years its fate was undecided and the building went untended. Now its beauty has been preserved and its usefulness renewed as the Museum of Science and Industry.

The city has shown a keen interest in good music. The Chicago Symphony Orchestra was founded by Theodore Thomas in 1891, and was under his direction until his death in 1905. His name was then given

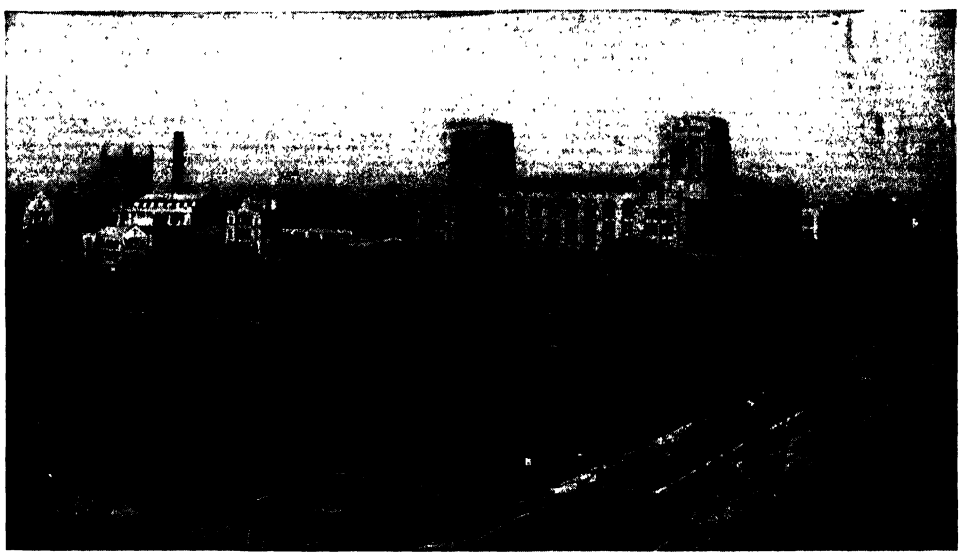


The Chicago Museum of Natural History has a very complete exhibit of geology, zoology and anthropology.

to the orchestra and was kept until 1913, when the old name was revived. The high standard set by the founder has been maintained, and the semi-weekly concerts are well attended. The hall in which the concerts are held was built by public subscription. Since 1910 the Chicago Grand Opera Company (now the Chicago Opera Company) has given a yearly season of grand opera of the highest quality in the Auditorium. Some distinguished European artists have been introduced to America, and at the same time opportunity has been afforded to Americans of talent.

Many other well-known musicians have been residents of Chicago. Among them may be mentioned George Frederick Root, composer of The Battle Cry of Freedom, and Tramp, Tramp, Tramp, the Boys are Marching, and many other songs popular in their day; Reginald de Koven, the composer of Robin Hood, whose father wished him to be a banker; Jessie Bartlett Davis, a delightful singer in light opera; and Fannie Bloomfield Zeisler, the famous pianist. Among the singers that have made grand opera in Chicago glorious have been Amelita Galli-Curci, Claudia Muzio, Rosa Raisa, Tito Schipa and Mary Garden. Frederick Stock, who was Director of the Chicago Symphony Orchestra from 1905 until 1942, was one of the most famous orchestra conductors in the world.

Among other educational influences, Chicago has one that is unique. In 1905 Benjamin F. Ferguson left in his will a mil-



Pictures, courtesy, Chicago Association of Commerce

The University of Chicago, founded in 1891, is built on the Midway of the great Columbian Exposition of 1893. The architecture is English Gothic. The University's Oriental Museum is a treasure-house.

lion dollars, the income of which is to be used for the "erection and maintenance of enduring statuary and monuments" in the city. The fund is under the control of the Art Institute, and from time to time some historic event is appropriately commemorated, or some thing of beauty is added to the possessions of the city.

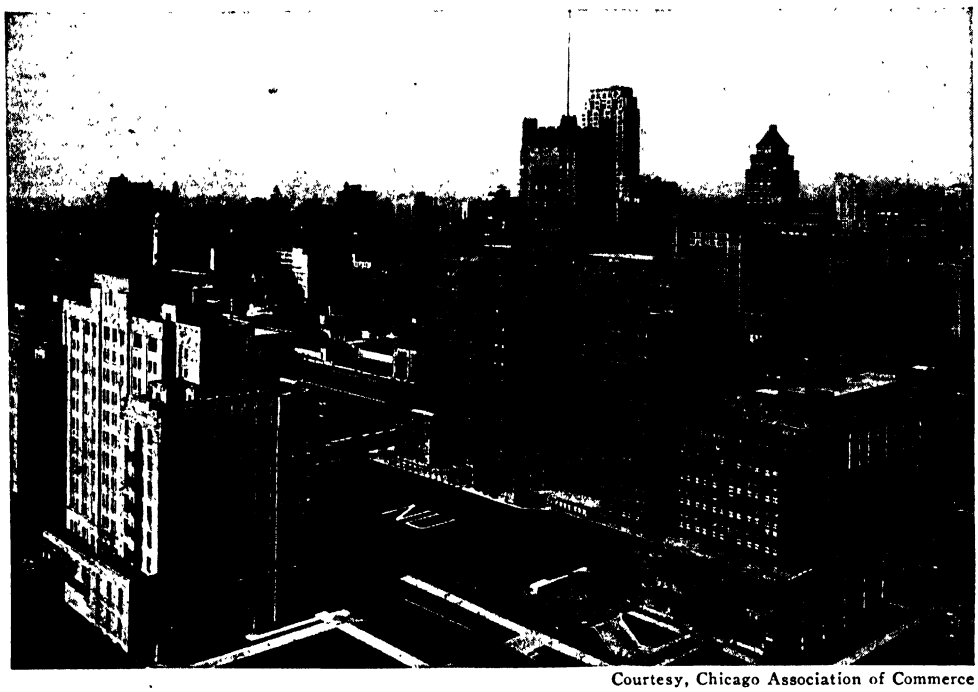
Among the objects purchased wholly or in part from the income of the fund are the Fountain of Time in Washington Park, and the Fountain of the Great Lakes, south of the Art Institute, both by Lorado Taft; the Eugene Field Memorial in Lincoln Park, by Edward McCartan; the Statue of the Republic in Jackson Park, by Daniel Chester French; and the Marquette Monument on Marshall Boulevard, by Hermon A. Mac Neil.

Much important literary work has been done in Chicago. Hamlin Garland wrote many of his best stories while a resident of the city. Eugene Field, "the poet of childhood," did his best work while on the staff of a Chicago newspaper. Finley Peter Dunne, the creator of "Mr. Dooley," found his inspiration here. Henry B. Fuller, Frank Norris, George Ade, William Vaughan Moody, Robert Herrick, Carl Sandburg and Emerson Hough, all lived in Chicago.

The central situation, the unequaled railway facilities, the size and quality of the hotels, together with the hospitable attitude of the people, make Chicago a favorite convention city. Since 1856 the Republican National Convention has met here eleven times, and the Democratic Convention six times. In 1904 Theodore Roosevelt received the Republican nomination here, and in 1912 that of the Progressives. Many organizations choose Chicago for a meeting-place. In one recent year 830 conventions met in the city, with an estimated attendance of 1,000,800 delegates who spent approximately $60,000,000.

It may seem that we have used a great many superlatives in telling of Chicago. It is true, but the story is so unusual that it cannot be avoided. Chicago is unique in history. Never has any other city grown so rapidly and never has so much desire for the finer things of life developed so rapidly along with material success. Chicago values success in business, but it appreciates the fact that there are other things in life.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 7193.



Courtesy, Chicago Association of Commerce

Northwestern University is at Evanston, near Chicago. On McKinlock Campus, however, in the heart of Chicago, are these buildings for post-graduate work and for working students who are completing their education at night.



This is Don Quixote, hero of Cervantes' romance, whose "quixotic" deeds have added a new word to our vocabulary.

The LITERATURE *of* SPAIN *and* PORTUGAL

IT might be supposed that the two countries of Spain and Portugal, once leaders in the world's exploration and colonization, would be distinguished as centers of literature; but they do not fulfill such an expectation. Both countries have been prolific in books for a thousand years, except in periods of depression, yet only two individual writers stand out as great in a survey of the whole world's literature. On that scale Cervantes stands for Spain and Camoëns for Portugal.

From Spain, however, come two interesting collections of poetical and prose records of medieval romance, THE CID and AMADIS OF GAUL, which have a place in world literature. Later, in the days of her greatness, Spain produced two dramatists and poets, one of whom, Calderón, has achieved considerable European fame, and the other, Lope de Vega, is regarded by Spaniards as their greatest man of letters. Outside of THE CID, AMADIS, Cervantes, Calderón, Vega and Camoëns, both Spain and Portugal have a literary story of only an average kind.

Why has Spain not had a fuller literature with a wider influence? Well, for one thing, the country has always had serious divisions in territory and dialects. The speech of Castile developed as the grandest and most beautiful of the dialects, and slowly came to be accepted as the literary language of Spain. Yet the people of other provinces were slow to give in to it, and so for a long time Latin was kept alive as the language of serious writing. The first Spanish history of any importance, written by Juan Mariana and finished in the early seventeenth century, was written in Latin and translated only into Spanish.

Spain has always been a country where freedom of thought, with its frank expression in literature, was restricted—a state of things unfavorable to great literature. And lastly, the Spanish language, by reason of its

abounding rimes, makes versifying extremely easy. The form of poetry, therefore, can be so readily achieved that there is a temptation to be satisfied without the choiceness in expression essential for true distinction. For all these reasons Spain has failed to produce a large body of noble literature.

As a part of the Roman Empire, Spain had great importance. Famous Roman rulers and writers were born there. Latin became so completely the language of the peninsula that, in all the centuries that followed, no invaders except the Moors ever introduced their language.

But when Imperial Rome lost her hold the country was divided by its sundering mountains into a number of kingdoms, each of which developed its own language from the Latin. Thus, by the time the Middle Ages were reached and romance was blossoming into literature, as in the legends of Arthur and Charlemagne farther north, Spain had formed at least three provincial languages from the old Latin foundation.

They were Galician, allied to Portuguese, in the northwest; Catalan, allied to the French dialect of Provence, in the north and east; and Castilian in the center. In the south Arabic held such sway that there came a time, in the ninth century, when it seemed possible that it might eventually become the language of Spain. Averroës, the most famous of the Arabian philosophers, was born in Spain in 1126, when the Moors vied in civilization with the most advanced nations of Europe. Within a century, however, the Moors had been thrust back farther south, and the Castilian tongue had gained a wider currency through the spread of the POEM OF THE CID, the writing of national Chronicles under the supervision of Alphonso X (1252-84), and his publication of a national Code of Laws.

HOW CASTILIAN CAME TO BE REGARDED AS THE LITERARY LANGUAGE OF SPAIN

The POEM OF THE CID, the Chronicles, and the Laws were the nucleus round which Spain gradually formed itself as a proud nation. Later the predominance of the Castilian tongue was strengthened by the fact that the most popular of all medieval romances in Spain, AMADIS DE GAULA, first gained wide currency in the Spanish of Castile.

When and where this famous romance of AMADIS originated is an unsolved problem of literary history. It is firmly claimed by Portugal and by the allied dialect of Galician Spanish. It is clearly derived in subject from France. But in its first traceable published form it is written in Castilian Spanish. For centuries it was freely added to by unknown writers, who made up marvelous knightly adventures for the fabulous Amadis. The Spaniards were deeply in love with these unreal stories of chivalrous doings long after they had ceased to stir the northern peoples. Cervantes laughed them out of fashion in his DON QUIXOTE. But AMADIS, in its twelve books, contained some fine passages, and is the first substantial Spanish book.

We will give you here a short extract which will enable you to judge somewhat of its style:

Not many years after the passion of our Redeemer, there was a Christian king in the lesser Britain, by name Garinter, who being in the law of truth, was of much devotion and good ways. This king had two daughters by a noble lady, his wife. The eldest was married to Languines, King of Scotland; she was called the Lady of the Garland, because her husband, taking great pleasure to behold her beautiful tresses, would have them covered only with a chaplet of flowers. Agrayes and Mabilia were their children, a knight and damsel of whom in this history much mention is made. Elisena, the other daughter, was far more beautiful, and although she had been demanded in marriage by many great princes, yet she would wed with none, but for her solitary and holy life was commonly called the Lost Devotee, because it was considered that for one of such rank, gifted with such beauty and sought in marriage by so many chiefs, this way of life was not fitting.

King Garinter, who was somewhat stricken in years, took delight in hunting. It happened one day, that having gone from his town of Alima to the chase, and being separated from his people, as he went along the forest saying his prayers, he saw to the left a brave battle of one knight against two. Soon had he knowledge of the twain, and that they were his own vassals, who being proud men and of powerful lineage, had often by their evil customs offended him. Who the third was he knew not, but not relying so much in the worth of the one as he feared the two, he drew aside and waited the event, which sorted to such effect, as by the hand of that one the others were both slain. This done, the stranger came towards the king, and seeing him alone, said, "Gentle sir, what country is this wherein knights errant are thus assailed?"

The king replied, "Marvel not at this, knight, for our country yields as others do, both good and bad: as for these men, they have often offended, even against their lord and king, who could do no justice upon them because of their kindred, and also because they harbored in this covered mountain."

"This king you speak of," replied the stranger, "I come to seek him from a far land, and bring him tidings from a dear friend. If you know where he may be found, I pray you tell me."

The king answered, "Befall what may, I shall not fail to speak what is true. I am the king." The knight then loosing his shield and helmet, gave

them to his squire, and went to embrace Garinter, saying that he was King Perion of Gaul, who had long desired to know him. Greatly were these kings contented that their meeting was in such a manner, and conferring together they took their way through the wood towards the city, when suddenly a hart ran before them which had escaped the toils. They followed at full speed, thinking to kill it, but a lion, springing from a thicket before them, seized the hart, and having torn it open with its mighty claws, stood fiercely looking at the kings. "Fierce as you are," said King Perion, "you shall leave us a part of the game!" and he took his arms and alighted from his horse, who being affrighted at the wild beast, would not go near him, and placing his shield before him, went towards the lion sword in hand. The lion left his prey and came against him; they closed, and Perion, at the moment when he was under the beast and in most danger, thrust his sword into his belly. When Garinter saw him fall, he said within himself, "Not without cause is that knight famed to be the best in the world." Meanwhile their train came up, and then was their prey and venison laid on two horses and carried to the city.

The queen being advised of her guest, they found the palace richly adorned, and the tables covered. At the highest the kings seated themselves: at the other sate the queen with Elisena, her daughter, and there were they served, as in the house of such a man beseemed. Then being in that solace, as that princess was so beautiful and King Perion on his part equal, in that hour and point they so regarded each other, that her great modesty and holy life could not now avail, but that she was taken with great and incurable love; and the king in like manner, though till then his heart had been free, so that during the meal both the one and the other appeared absent in thought. When the tables were removed, the queen would depart to her chamber; Elisena rising dropt a ring from her lap, which she had taken off when she washed her hands, and in her confusion of mind forgotten. She stooped for it, and Perion who was near her stooped down also, so that their hands met, and he taking her hand prest it. She colored deeply and thanked the king for his service. "Ah, lady," said he, "it shall not be the last, for all my life shall be spent in your service."

THE CID is not a book, but rather a collection of ballads and romances which surround the largely legendary history of The Cid, the national hero of Spain, pictured by the imagination of later generations as the possessor of all knightly virtues. The earlier of these literary tributes to a fearless man have a fine, rough, poetic strength.

As a matter of fact, The Cid, whose name was Rodrigo Díaz de Bivar, a knight of the eleventh century, was a soldier of fortune who fought both aganist and for the Moors, according to his opinion of the treatment he received from the other side. He appeared with his band of free lances on many battlefields. Before he died, in 1099, he had ruled four years as a king in Valencia. His name The Cid (pronounced Theed in Spanish) is derived from the Arabic *el seid,* meaning "the lord," and he is often called *El Campeador* (the Champion) because he overthrew in single combat the champion of the enemy. In Spanish poetry he is *Cid Meo* (My Lord), or *Cid Campeador.* Two hundred ballads tell his virtues, and to this day Spaniards are roused to national fervor by them.

The early literature of romance, prevalent in Spain in the fifteenth and sixteenth centuries, was accompanied by miracle plays, early forms of novel-writing and lyrical verse, mostly imitations from the Italian.

The first writer of regular drama, Lope de Rueda, was an actor; the first notable poets were Garcilaso de la Vega, Fernando de Herrera, and Luis Ponce de León, the great religious poet. The first historians were Juan de Mariana, a Jesuit priest, and Diego Hurtado de Mendoza, a statesman of the sixteenth century. The two last-named placed Spanish prose on a firm foundation.

To Mendoza was attributed the novel LAZARILLO DE TORMES, which began the distinctive Spanish style of fiction known as picaresque; but later opinion denies him its credit—or discredit. The picaresque novel is one which has a rogue for its hero. It was deliberately practiced in Spain, and attained its highest point of skill in France in Le Sage's GIL BLAS. There are English specimens in Defoe's COLONEL JACK and in Fielding's JONATHAN WILD.

THE ADVENTURES OF CERVANTES IN REAL LIFE RIVAL THOSE OF DON QUIXOTE

Late in the sixteenth century and the earlier part of the seventeenth, Spanish literature reached its culmination in the works of Miguel de Cervantes and Lope de Vega. Cervantes was born of an old Spanish family, in 1547, seventeen years before Shakespeare, and he died in 1616, on the day Shakespeare died. He lived an active, adventurous life. At twenty-one his first poems, on the death of the Spanish queen, were published. When he was twenty-four he was a soldier fighting in the great battle of Lepanto against the Turks, and was severely wounded. Later he served in Tunis and Italy. On his return he was captured off Marseilles by a squadron of Barbary pirates and taken as a prisoner and slave to Algiers. The pirates knew he was a man of importance, and though he repeatedly attempted to escape, his life was preserved, for his presence in Algiers was believed by the corsairs to prevent the town from being bombarded by the Spanish fleet.

Finally, after five years of captivity, he was ransomed for five hundred gold ducats, and returned home to Spain.

He wrote a number of plays, but only two of them have been preserved. At this time he was writing for a living in imitation of Italian models, and not in the style natural to him. As writing did not afford him a living, he found employment in helping to provision the Invincible Armada, which was about to sail for the conquest of England. After the defeat of the Armada he sought in vain for service that would preserve him from a life of poverty, but apparently he was more than once imprisoned for debt or other money difficulties. During this period he was occasionally writing poems, for which he was ill qualified. But in 1605, when he was sixty years old, DON QUIXOTE appeared and was instantly successful. The people of Spain were delighted with the tale, and soon it was being read with joy in other lands.

A FALSE SEQUEL TO DON QUIXOTE MADE THE AUTHOR WRITE A REAL ONE

Notwithstanding the popularity of his book, Cervantes remained poor, and apparently lived partly through the patronage of richer friends. He continued writing poems and plays with indifferent success, but his EXEMPLARY NOVELS are notable books. He had promised to write a sequel to DON QUIXOTE, but delayed until a sequel was published by an anonymous abusive writer who reviled the author of the immortal first part. Spurred on now by the insult, Cervantes concluded the book with a second part, even finer in its humor and humanity than the first part. Six months later he died, and the place where his body rests remains unknown.

No book except the Bible has been more frequently translated into other languages, or has more completely sustained its reputation. Beyond any comparison it is the masterpiece of Spanish literature, yet Spain neglected its author almost as ungratefully as she neglected Columbus, who found a new world for her.

DON QUIXOTE was written to make fun of the outworn practices of chivalry that had become a thoroughly insincere fashion in Spain. As the author went on with his work it grew into a survey of the people who made up the Spanish nation, as they appeared to a man of humor and broad sympathy, seeing life from many points of view, with a mixture of sadness and amusement. It is a book that you can read many times, always with fresh joy.

Lope de Vega, who lived from 1562 to 1635, was the successful contemporary of Cervantes, sometimes his enemy and sometimes his friend. He was the most prolific writer of plays that has ever lived in any country. It is known that he wrote two thousand plays, long and short, and more than four hundred are still in existence. Vega understood what the Spanish public needed in a play: they judged it by its power of producing continuous excitement.

He was a born master of plot-making, and so he was popular. He was feted, rich, and had the world at his feet throughout a life that was far from admirable. He and Cervantes make one of the most glaring contrasts in all literature, judged by their contemporaries and their countrymen, and judged also by posterity and the world at large.

Lope de Vega not only wrote plays, often at the rate of an act a day, but he wrote everything that other men had written or were writing, with public appreciation. He hastened to challenge comparison with the EXEMPLARY NOVELS of Cervantes by stories of his own, and as an epic poet he boldly entered the lists against the great Italian Tasso. But his fame is that of a clever craftsman of plays to suit the Spanish temperament, setting a new standard of stagecraft in his country.

As a young man Lope de Vega fought in the Spanish Armada. In his old age he tried to make atonement for the wildness of his earlier years. He entered the priesthood and became an officer of the Inquisition, giving all of his wealth to the Church and living a life of self-denial and even self-torture.

CALDERON IS THE BEST KNOWN SPANISH DRAMATIST OUTSIDE HIS NATIVE LAND

Pedro Calderón de la Barfca (1600-81), the Spanish dramatist who has the greatest fame in other countries, belonged to the generation after Cervantes and Lope de Vega. He was a boy of sixteen when Cervantes died and a man of thirty-five when Vega died.

It is said that, in his youth, Calderón served for ten years as a soldier, but this is not a certainty. He had begun to write plays as a boy, and he gained such fame as a playwright that, when Lope de Vega died, the King called him to Madrid to be court master of amusements. Here he lived in high honor until he was fifty-one, when he entered the priesthood. But later he was recalled to the court as the king's chaplain, and he continued his writing of plays, chiefly

religious. When he died, at eighty-one, he had a notable funeral.

Though Calderón was a Spaniard through and through, imbued with the national ideas and writing to suit the national temperament, which loves eloquence, his writing has appealed more strongly to European taste than any other Spanish writer except Cervantes. He is recognized as an impressive poet as well as a skillful playwright. A considerable number of the 118 Calderón plays that are preserved have been reproduced in other countries in the form of adaptations, and, except Cervantes, no other Spanish writer has been so widely translated. Among his English translators have been Shelley and Edward Fitzgerald, who sought to reproduce Calderón's effects in a free translation, true in spirit rather than in verbal exactness. A fine example of Calderón's form in tragedy is translated by Fitzgerald as THE MAYOR OF ZALAMEA. The play was based on a sketch by Lope de Vega.

Calderón and Lope de Vega had many followers and imitators. Of these one of the most brilliant was Agustin Moreto, who was born in 1618 and died in 1669. He was sixteen years younger than Calderón, and the older playwright helped and encouraged him in his career. Moreto's plays, of which he wrote more than a hundred, were immensely popular. They were chiefly of the "cloak-and-sword" type, filled with action and excitement. Moreto frequently borrowed his plots and situations from the works of other playwrights, but his versions were so skillfully done that they had the effect of brand-new plays. His most famous play, EL DESDEN CON EL DESDEN, was made up of episodes taken from four different plays of Calderón and Lope de Vega.

TWO DISTINGUISHED MODERN NOVELIST-STATESMEN OF SPAIN

For nearly two hundred years Spanish literature suffered an eclipse, but the twentieth century brought it to new brilliance. Among the leading modern writers we find the poets Ramón Pérez de Ayala (1881-) and Miguel Unamuno (1864-1936). Pérez de Ayala has been heavily involved in Spanish politics during most of his life. In his young days he was a radical republican but in his later years he became extremely conservative. His political views have been reflected in his novels. His poetry was a product of his youth. Miguel Unamuno was a poet, philosopher and novelist whose TRAGIC SENSE OF LIFE is a philosophical study of the Spanish mind and its problems.

Another highly distinguished novelist who has combined literary work with a political and diplomatic career is Salvador de Madariaga (1886-). Madariaga was ambassador from Spain to the United States in 1931, under the republic, and later was ambassador to France. He was for many years an important member of the League of Nations council in Geneva, Switzerland. Pío Baroja (1872-) is especially famous for his trilogy of novels dealing with the life of the poor people who live in the slums of Madrid. The trilogy is called THE STRUGGLE FOR LIFE. In his youth Baroja had worked as a baker in Madrid, and he came to know and sympathize deeply with the poor people among whom his days were spent.

A SPANISH HISTORICAL NOVELIST WHO STANDS HIGH IN THE REGARD OF CRITICS

Many critical writers, in Spain and in other countries, consider Benito Pérez-Galdos (1843-1920) to be the greatest of modern Spanish writers. Pérez-Galdos, like Calderón and Vega, had an enormous capacity for writing. Early in his career he resolved to write a series of novels based on Spanish history. The project included forty-eight volumes in all, four groups of ten volumes each and one group of eight. These he wrote at the rate of about one every three months, and the whole series was given the title NATIONAL EPISODES. While he was writing these novels he also found time to publish a number of realistic novels of his own period. Of these, one of the best known to English-speaking readers is DONA PERFECTA. Pérez-Galdos also wrote plays, one of which, ELECTRA, is an allegory of early twentieth-century Spain, and it is intensely interesting to all students of Spanish political and economic life.

Unlike some of the other Spanish novelists we have spoken of, Pérez-Galdos took little active part in party politics, though at one time he did undertake some important missions for the Spanish Government. Throughout most of his career he lived a secluded life, devoting himself entirely to his writing.

A Spanish novelist whose works attained great popularity in English-speaking countries was Vicente Blasco-Ibáñez (1867-1928). Two of the most widely known in translation are BLOOD AND SAND, a dramatic and colorful story of a young bullfighter, and THE FOUR HORSEMEN OF THE APOCALYPSE. The scenes of this novel are laid in Argentina and in Paris during the first World War. It

deals with the members of two Argentine families, one of French and one of German ancestry. The novel was made into one of the most distinguished motion pictures of the early 1920's.

Many modern Spanish plays have been translated into English and performed with great success in the United States and Canada. Among these are THE PASSION FLOWER by Jacinto Benavente (1866-), who received the Nobel Prize in 1922, and THE CRADLE SONG by Gregorio and Mariá Martínez-Sierra. Benavente was interested in the theater from his early childhood, and although he studied law to please his family, he soon gave it up to devote his life to the writing of plays. Altogether he wrote nearly a hundred plays and he has been called the King of the Spanish Drama. At one time he established a children's theater, and wrote for it such delightful fairy plays as THE PRINCE WHO LEARNED EVERYTHING OUT OF BOOKS. Gregorio Martínez-Sierra (1881-1947), and his wife, María, wrote romantic, tenderly humorous plays with a strong religious quality.

Many gay, charming comedies were written by the brothers, Serafín Alvárez-Quintero (1871-1938) and Joaquín Alvárez-Quintero (1873-). In a number of ways their dramas are like those of Lope de Vega. Such plays as THE LADY FROM ALFAQUEQUE, THE WOMEN HAVE THEIR WAY and THE FOUNTAIN OF YOUTH are as delightful to read or to see enacted in English as in Spanish.

THE MOST FAMED LITERARY WORK OF PORTUGAL IS THE LUSIADS

Portuguese literature, so far as the general world of books is concerned, is concentrated in Camoëns, the writer of its great epic poem, THE LUSIADS. Until comparatively modern times the leading Portuguese wrote their books in Spanish, as it afforded the best outlet to European notice. Thus Jorge de Montemayor, the sixteenth-century prose writer, who started a European fashion in pastoral fiction by his pastoral romance DIANA, used Spanish, and his book was published in Spain.

Luis Vaz de Camoëns was of Spanish ancestry, but the family had been in Portugal for several generations. It was of noble origin but untitled, and Camoëns had the education of a gentleman. He was born in 1524, probably at Lisbon. He was educated at the University of Coimbra, where his uncle was chancellor. The youth must have been a very diligent student, for his great poem was written far away from books, and yet it contained a wide range of classical, historical and scientific knowledge. His poetry was at once recognized as being more masterly than anything yet known in his country, and he had reasonable hope of securing some suitable appointment. But it was not to be. Because of a duel arising from a love episode he was banished from Lisbon. His reply was a play which aggravated his offense, and, not expecting forgiveness, he went to North Africa as a soldier, lost an eye in a skirmish, and was disfigured for life.

Returning to Lisbon, he joined a band of young ruffians who were always ready to draw their swords, and he boasted that he had seen the soles of the feet of many men running in retreat, but no one had seen his. Finally he wounded one of the palace servants and was imprisoned. He was eventually pardoned on the condition that he serve as a soldier in India, which was closely connected with Portugal by sea trade.

THE LANGUAGE OF THE LUSIADS IS WHAT HAS SINCE BECOME PORTUGUESE

He sailed in 1553 and did not return for seventeen years. During those years, which he spent in travel, adventure and constant poverty, he wrote THE LUSIADS, which tells the story of Portuguese discovery in the East. The language in which it is written became established as the Portuguese national language. The judgment of the world has given Camoëns a place among the great poets because of the poetic beauty and classical grace of his language. On his return to Europe Camoëns was pensioned by the Portuguese king because of his literary distinction.

Camoëns died in Lisbon at the age of fifty-six, a victim of the plague, and was buried in the common grave which received the bodies of all who died of that terrible affliction. The monk who attended him in his last moments wrote: "What more grievous thing than to see so great a genius thus unfortunate. I saw him die in a hospital in Lisbon without a sheet to cover him."

Three hundred years afterward some bones that were supposed to be his were recovered and placed in the national pantheon. It was well, for no nation has gained greater distinction in literature from the writings of a single man than Portugal has from Camoëns, and his country was his theme.

THIS IS THE LAST STORY OF LITERATURE.

THE WONDER OF THE MODERN ZOO

THE STORY OF WILD ANIMALS IN CAPTIVITY



U. S. National Zoological Park
Aoudads or Barbary Sheep.

FROM the very dawn of history, man has surrounded himself with beasts and fowl that he has domesticated and adapted to his own use: horses, dogs, sheep, cattle, poultry. But we do not know when man first hit upon the idea of keeping wild animals in captivity to gratify his curiosity or to add to his knowledge.

The first collection of captive animals that history mentions was that founded by a Chinese emperor in the 12th century B.C. This pioneer zoological garden was called the Intelligence Park. As its name indicates, it was intended by its wise founder to instruct as well as to amuse his subjects. The ancient Egyptians also had collections of animals, such as baboons, cats and crocodiles, which were attended by selected slaves. These animals, however, were kept mainly for religious purposes. The practice of keeping collections of birds also goes back to a remote period. It was the ancient Romans, however, who first used large bird-houses or aviaries to house these collections.

The Romans also, at this time and for many centuries to come, collected large numbers of wild animals, such as lions, tigers, bears, antelopes, giraffes, hippopotamuses and ostriches. These were intended, however, not for exhibition purposes but for the bloody combats of the arena. Elephants would be pitted against tigers, and leopards against wild boars. Sometimes the animals would be hunted in the arena by men armed with bows and arrows or with hunting spears. It is said that the Emperor Commodus slew over a hundred lions in the arena in a series of single combats.

With the downfall of the Roman Empire and the abolition of wild animal fights, under the influence of the Christian Church, the steady stream of wild animals ceased to flow into the large cities of Europe. Wild animal collections became rare in the next few centuries.

In the Middle Ages they were generally for the enjoyment of the favored few—sovereigns, princes and great feudal lords. In the eleventh century Henry I of England established a menagerie at Woodstock, in the county of Oxfordshire. Later, this collection was transferred to the Tower of London, where it was housed in a number of outbuildings. Other European princes also had interesting animal collections.

In the 15th and 16th centuries, the explorers who arrived in the New World in increasing numbers found that animal collections were by no means unknown among native rulers. In the middle of the 15th century King Nezahalcoyotl had a collection



Courtesy of Highland Park Zoo, Pittsburgh, Pa.

This large polar bear den at the Highland Park Zoo, in Pittsburgh, is a splendid example of a modern animal enclosure, in which the animals have ample space and considerable freedom of movement.

of this sort at Tezcuco, Mexico. In the following century the explorer Hernando Cortes found beautiful aviaries at Iztapalapan, in Mexico, and a wild animal collection in the capital city, Tenochtitlan, which stood on the present site of Mexico City.

The number of wild animal collections increased greatly in the centuries that followed. In almost all cases, however, these were for the enjoyment of the favored few. The idea of maintaining a zoo for the public at large is a comparatively recent development. It was in the year 1793 that the first zoo of this sort was established, in Paris. This was the famous menagerie of the Botanical Garden (in French, *Jardin des Plantes*) which had been founded originally, a century and a half before, as a plant collection. Some forty years later another public zoo was established at Regent's Park, in London. Other zoos were founded soon afterward at Clifton, England, at Amsterdam, Holland, at Edinburgh, Scotland, at Antwerp, Belgium, and at Berlin, Germany.

The history of the zoo since that time has been one of steady progress. Every civilized country boasts of its zoological collections. The United States has its huge New York Zoological Park; there are also zoos in Washington, Philadelphia, Cincinnati, Pittsburgh, Chicago and many other cities. Canada has interesting zoos at Toronto and at Montmorency, near Quebec. England has the largest zoo in the world, now that the Regent's Park Zoo has acquired almost 500 additional acres of land at Whipsnade, in Bedfordshire. France has its collections of the Botanical Garden and of the Bois de Boulogne, both in Paris; Germany had the "Tiergarten," or Animal Garden in Berlin and the famous Hagenbeck Zoo in Stellingen. And there are many notable zoos in these and other countries which cannot even be mentioned in the few pages to which we are limited in the present article.

Zoos at the present time are serious business enterprises, which are run on business principles. In certain cases the zoo is a national institution, like that of the Botanical Garden in Paris. Other zoos, like that of Regent's Park, derive their incomes partly from the subscriptions of zoological society members, partly from paid admissions and partly from the sale of animals.

DINNER TIME FOR A LION OF THE DEEP



Courtesy of Zoological Society of Philadelphia

This big sea lion, from the Pacific coast, eats about 30 pounds of fish daily. He is skilled in catching the ones thrown to him. Unless they are very small, he turns them around and then swallows them head first.

Still others, like the New York Zoological Park, supplement the income derived from subscribers with a grant given by the public authorities. Certain zoos on the continent are owned by private companies.

But after all, if its finances are a matter of great importance, what the public craves are animals and these the zoo offers in great abundance. Yet, however large a collection may be, the authorities are constantly seeking new animals. The inmates of the zoo die in the natural course of events and must be replaced. New and unusual species must be added to answer the public demand: okapis, giant pandas, vampire bats.

ACQUIRING ANIMALS FOR THE ZOO

These animals are acquired in various ways. A certain number are born each year in the zoo. Sometimes animals are obtained by exchange with other zoos. Some animals are donated. Or else the zoo may equip an expedition to round up a supply of wild animals; or one or several individuals may be commissioned to obtain certain rare types of mammals or reptiles.

But all these means of acquiring animals would not suffice to keep up an adequate collection. Fortunately a zoological park in need of animals can always apply to that very useful person, the animal dealer. At many great ports all over the world, at New York, Liverpool, Marseilles, Hamburg and Calcutta, dealers maintain large supplies of animals and birds. When these supplies fail to meet the demand, the dealers will occasionally organize expeditions of their own to bring in fresh supplies. But this method of securing wild animals is not nearly so common as it once was. Generally dealers operate through agents in all parts of the world. A big animal dealer may have an agent in Singapore for apes and pythons, another in Tanganyika, East Africa, for giraffes and antelopes, a third in the Congo for orang-outangs and smaller monkeys, a fourth in India for Bengal tigers and cobras. These agents, in turn, generally order the animals from the natives, for they are the finest hunters.

Animal dealers stand ready to supply any animals that may be needed; a modern zoo with adequate funds will have little difficulty in maintaining a supply.

The question now arises, How are these animals to be housed? This question did not greatly concern the zoos of an earlier age. At that time it sufficed if the animal were kept in a cage strong enough to prevent its escape and open enough so that the public could see the animal without difficulty. The curiosity of the public was the main feature to be considered; the comfort of the animals was a minor matter.

In the present century, however, there has been a marked change in viewpoint. Constant efforts are now being made to give the animal quarters that will be as comfortable and sanitary as possible.

INNOVATIONS OF A FAMOUS DEALER

One of the greatest innovators in this field was the famous German animal dealer, Carl Hagenbeck. When he decided to establish his own zoo, at Stellingen, on the outskirts of Hamburg, about the beginning of the present century, he resolved to do away with iron bars and to make the animal's quarters as similar to its natural haunts as possible. He constructed a series of terraces, rising in tiers, in which the animals were confined without bars. The background was formed of artificial rockwork, resting on wooden scaffoldings. The animals were kept from escaping by means of deep and wide ditches, filled with water; these ditches were concealed from the public by rock-work.

Certain zoos adopted Hagenbeck's innovations. But in most cases the expense involved and certain other considerations made it impossible for the average zoo to introduce the terrace system of housing on a large scale. At the present time, therefore, bars and wire netting are still widely used to confine animals.

THE ADVANTAGES OF FRESH AIR

In other respects, many real advances have been made. For one thing, it has been discovered that fresh air is essential for the health and happiness of the animals of the zoo. It is true that in moderate climates, artificial heating is necessary at times. But in the case of the majority of mammals and birds, it has been found that they can endure the extremes of heat and cold with astonishing success and that they thrive in the open air. Most animal quarters are constructed, therefore, so that the animal has access both to the open air and to shelter at all times. These quarters are of many kinds. Sometimes animals are housed in buildings which have indoor and connecting outdoor cages. Other animals live in open air enclosures, which reproduce to a certain extent the natural features of their native haunts.



Courtesy of Zoological Society of Philadelphia

Baby prong-horned antelopes can now be flown from western plains to eastern zoos in a few hours. Above we see two specimens for the Philadelphia zoo being unloaded at the Camden, New Jersey, airport.

Birds are often housed in large aviaries, which are liberally supplied with miniature brooks or cascades, moss-grown shrubbery, large trees and pebbles galore. As for the parks in which the animals are kept, these vary in extent from a few acres to several hundred. The huge New York Zoological Park covers no less than 264 acres.

The problem of feeding the animals is one of the most serious of all. It is truly a staggering undertaking. For example, the animals of the New York Zoological Park, in one year, ate approximately 170 baskets of apples, 1,350 bunches of bananas, 51½ tons of beef, 20½ tons of bread, and huge quantities of other products.

As far as possible animals are given what they would normally eat if they were at liberty. Thus, lions are fed on raw meat, monkeys eat bananas and nuts, vampire bats are given blood, supplied by slaughterhouses. In most cases, however, the animals are given a substitute as similar as possible to its food in a state of nature. The elephants are satisfied with their rations of timothy or clover hay. Birds that feed on insects are given ant-eggs and dried waterflies from Mexico, as well as domestic crickets and grasshoppers. In certain cases, indeed, an animal will thrive on a diet that does not in the least resemble its natural fare. The giant ant-eater, for example, is all that its name indicates, in its native wilds. Yet in captivity it is fed a mixture of chopped meat, hen's eggs and milk, and it lives contentedly for years on this unaccustomed diet.

The intervals at which animals must be fed vary widely. The most incessant eater is the tiny humming-bird, which requires food every five minutes or thereabouts. Most animals must be provided with food at least once every day; the large flesh-eating animals, however, generally go foodless one day in the week. On the other hand, most of the larger reptiles are fed only once a week, and this is quite sufficient for their needs.

The feeding problem is complicated by certain peculiarities and whims of the animals. Snakes, for example, in a state of nature shun all but living prey. They were formerly fed live animals at the zoo, first before the public, then behind closed doors. But the efforts of humane societies have made it impossible to supply live animals for the snakes at many zoos. Consequently, some have to be forcibly fed. In other cases, a freshly killed animal is placed in the snake's cage and stirred with a stick. The snake, evidently thinking that the animal is alive, seizes and devours it.

Certain animals will thrive for a time on a fixed diet, then will mope until they are fed some dainty to stir their appetites.

A handful of banana-flies tossed into the humming-bird's glass cage will do wonders for that dainty little creature's disposition. A nightingale will sing all the more sweetly after a meal of house-spiders.



Courtesy of Brookfield Zoo, Chicago, Ill.

A baby giant panda. This interesting animal, from the mountainous districts of Tibet and Western China, is rarely exhibited. Its frolicsome disposition makes it a great favorite.

Still another complication of the feeding problem is the entirely unofficial feeding by visitors to the zoo. To be sure, an occasional treat of peanuts will not do the elephants any harm, and monkeys too have a tremendous peanut capacity. On the other hand, chewing tobacco is not a proper food for wild goats. Ostriches were never intended to eat the copper coins, nuts and bolts, pocket combs and other dainties with which their admirers sometimes regale the unsuspecting creatures.

KEEPING CAPTURED ANIMALS IN GOOD HEALTH

Another absorbing problem at the zoo is that of looking after the health of the animals. The veterinary doctor who has charge of these arrangements is a very important person in the zoo.

Realizing that an ounce of prevention is worth a pound of cure, he carefully watches over the animals who are in good physical shape and corrects any conditions that might lead to serious complications later. Elephants are oiled from head to foot at the first approach of winter, so that their hides will not crack. The claws of the "big cats," the lions, tigers, leopards and the like are occasionally trimmed, so that in growing they will not curve back and penetrate the animal's foot. As for new arrivals at the zoo they are often quarantined, that is, put under observation, until it is certain that their health is good.

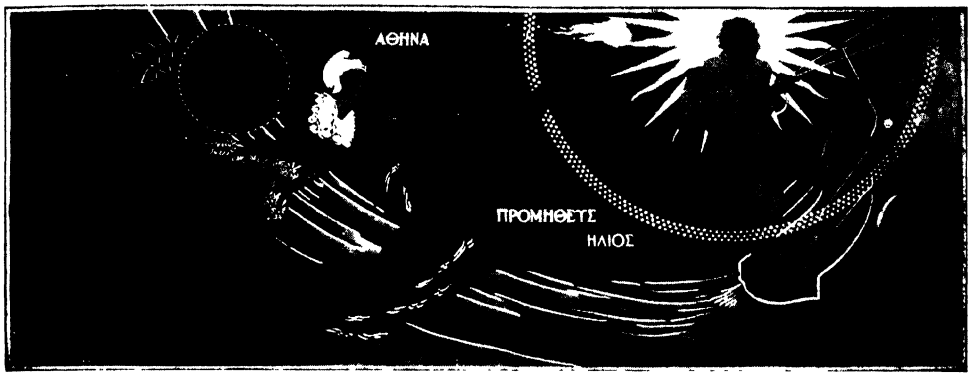
MEDICAL TREATMENT AT THE ZOO HOSPITAL

But in spite of all these precautions, animals sometimes become sick. Elephants are liable to have stomach-ache. Giraffes sometimes have sore throats and their long necks must be swathed in bandages. The apes and monkeys are liable to develop pneumonia. In short, animals suffer from as wide a range of ailments as humans; they are treated as carefully as humans could possibly be. The latest medical and surgical appliances are available; anesthetics are used in all painful treatments.

Sometimes animals are treated in their own cages; often they are given quarters at the zoo hospital. This suggests in every respect an up-to-date hospital for humans. It is generally equipped with a receiving room, cages for its patients, an operating room and a laboratory. This hospital is kept spotlessly clean and the most modern of equipment is used.

The zoo is a wonderful source of amusement of a very wholesome sort for millions of people, old and young, all over the world. But the zoo is more than a mere source of entertainment. It contributes a great deal to our knowledge of medicine, zoology, stock-breeding, agriculture, animal behavior and the like. It has decided educational value; it makes real and vivid many studies which otherwise might seem theoretical and tame.

THE NEXT STORY OF ANIMAL LIFE IS ON PAGE 7143.



Greek legend said that the goddess of wisdom, Athena, helped Prometheus, a man, to steal fire from the sun-god.

THE ROAD AHEAD *in* SCIENCE

PERHAPS never before in history has a career in science looked so attractive to young people the world over. The war gave a tremendous forward thrust to scientific thought. The atomic bomb, radar and countless other scientific discoveries and inventions helped to win and shorten the struggle.

Science has given far greater gifts to peaceful living than to destruction. It has given us the full and rich and abundant life we have now, the freedom from want enjoyed by so many of us. Science and our own good sense and good will can make it possible for all peoples to enjoy freedom from want.

People are beginning to look into the future toward years of peace, and they begin to see that science is going to become more and more important. Many governments are taking steps to encourage education in science. In the United States, for instance, the Federal government, the various states and a great many industries and business corporations are planning to help in the education and training of future scientists.

The making of the atomic bomb helped people to realize clearly that science is more than just inventing devices, new washing machines, potato peelers, cotton pickers and rocket planes. All such engineering triumphs are applications of science; and they help to make our modern life so wonderful. But none of them would ever have been possible if it had not been for scientists puttering around in their laboratories, making experiments and formulating theories. Let us give you two examples of such "impractical" work.

Half a century ago an astronomer at Harvard wanted to make studies of certain stars. These stars could not be seen from the observatory in Cambridge, Massachusetts. They could best be observed from a point in the Southern Hemisphere, and so the astronomer set up an observatory where the air is clear, at Arequipa, Peru, 8,000 feet above the sea. And so the pictures were taken, by the camera and the telescope.

For some of the pictures the spectrograph was also used, an instrument that "unscrambles" mixed light and lays out in a band the various colors that were in the mixture. Scientists call this "unscrambling" by a more dignified word—analyzing. The color band is called the spectrum. All light is the result —direct and indirect—of the disturbance of atoms, and each kind of atom makes its own fingerprint on the color band when light is analyzed. In that way, scientists can tell, when looking at the spectrum of a star's light, what elements are in the star.

Let us return now to the astronomer at Harvard, looking at the picture of a star, taken on the mountain in Peru. He saw something strange on the plate, a set of dark lines which looked like the fingerprint of hydrogen. Many stars have hydrogen; but these particular lines were in the wrong place in the spectrum for hydrogen. An element's fingerprints are always in a set position in relation to the fingerprints of other elements in the spectrum.

You may think the astronomer was wasting his time in puzzling over this riddle. Of

what possible use could the lines in a star's spectrum be? But scientists all over the world began working on the problem. They found the answer, sixteen years later. The lines were of helium gas, but gas so hot that it had begun to break up and behave like hydrogen. This gave us a very important clue in our picture of what matter is really like and how it is built. More practically, the solution of the puzzle of the dark lines in that star was a very important step in the invention of our present radio tube.

One more story. Some hundred and fifty years ago a mathematician playing with his equations, numbers and lines and circles, thought of something new—a number which, when you multiply it by itself gives you minus one. This was so useless at the time that even other mathematicians called it imaginary. No "sensible," practical person would have bothered with it. But again sensible persons would have been wrong, for later on a physicist found out that if you use this queer, imaginary number, $\sqrt{-1}$, then the very difficult equation that describes what goes on in a long-distance telephone cable suddenly becomes very simple. Before that, only great mathematicians could have solved the problem; now anyone can learn how to do it. And so, thanks to that mathematical dream of long ago, we have our enormous and efficient telephone networks.

You see, then, that the real scientist works because he is curious. He wants to know the secrets of nature, how things work, why they work and even very often he begins to speculate on what nature would do if we could make some things different from what they actually are—that is, he builds what we call conjectures.

The scientist never worries whether what he does today will build a better automobile tomorrow, or next year. He does not have to worry about such practical matters, for he knows that if he helps to add a little to all the things we know about nature, then, in the end, what he has done will some day help mankind to live a happier life. His work is



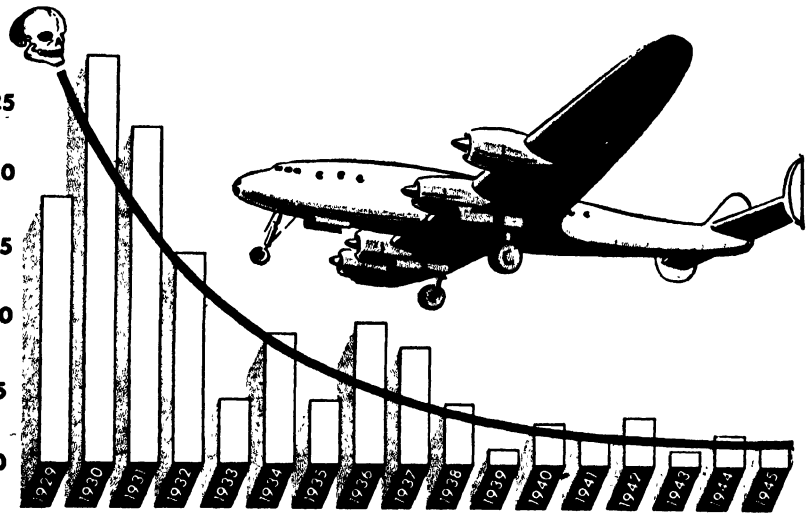
H. Armstrong Roberts

Here, in a school laboratory, begins the actual work that may some day lead to solving one of nature's riddles. New facts in science are usually discovered only after countless experiments and observations have been made.

what we call fundamental science, because it is the base on which all engineering and industry are built. If in the future our industry and engineering are to continue to go forward, then we must build this base as large and as firm as possible. Engineers can not build a towering skyscraper on a base of quicksand or in a peat bog.

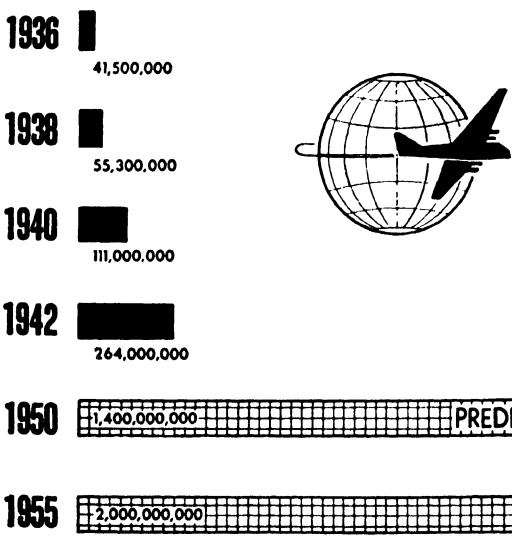
are reading THE BOOK OF KNOWLEDGE today may be our scientists of the future.

In the training of scientists two things are important. First, the scientist must be completely and wholly honest, because in nature things are just so; you can not be half right and half wrong. Second, if we really want to understand nature and make use of what we know, we must be able to put things down in numbers. We must learn to write out equations and do all the things the mathematician can do. So if you want to



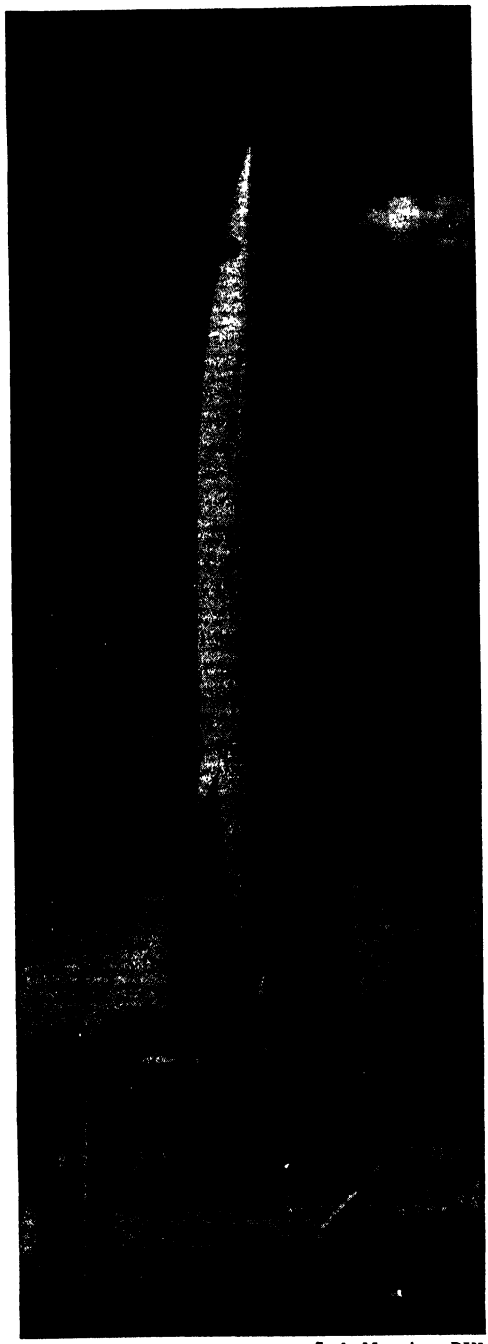
U. S. Dept. of Commerce

Science makes air travel ever more safe through better signaling devices, weather reports and plane design. The figures to the left of this graph indicate the number of deaths per 100,000,000 passenger miles flown in the United States. As shown by the heavy line, the general trend in recent years has been toward fewer accidents.



U. S. Dept. of Commerce

As flight becomes safer, more and more people take to the air. This graph, of international air-line traffic, shows that between 1936 and 1942 the number of miles flown per year increased more than six times. With further advances in the design and operation of long-range aircraft, all based on work in science, it is expected that in only a few years air travel will amount to two billion miles per year!



Jack Manning—PIX

Rockets were developed as war weapons, but they have peacetime uses. Carrying instruments, they send back information about the mysterious upper atmosphere.

become a scientist, the best way to begin is to learn as much mathematics as you can. After that, study physics, which is perhaps the most important base of all things in nature. Later you can decide whether you want to be a chemist or an astronomer, a geologist, a biologist or any other kind of scientist—but learn your mathematics and physics first.

THE RELATION BETWEEN A SCIENTIST'S WORK AND THE LIFE AROUND HIM

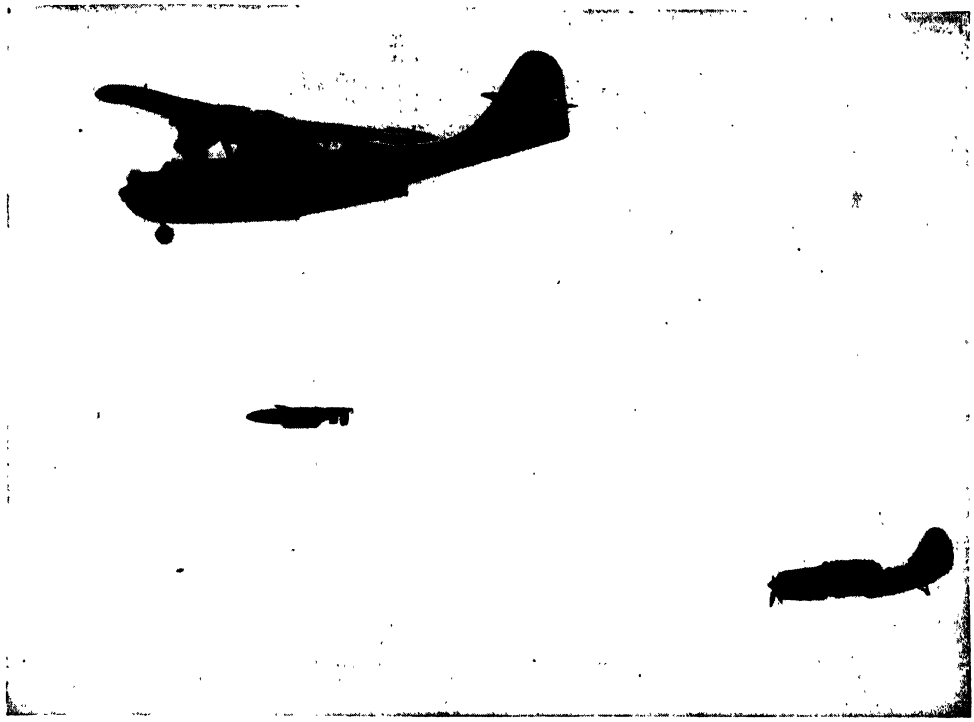
A scientist is a human person, a citizen of his country, and of the world; and he seems destined to play a more and more important part in the world. Therefore the scientist of the future must take a keen interest in what goes on around him. The scientist's work is too much tied up with the future of civilization for him to stay out of life and to live in his own "ivory tower," as we used to call a life of scholarly seclusion.

When Alexander the Great was a boy, so history tells us, he was once found crying because he felt that his father, Philip of Macedon, had won so many wars that there would be nothing left for Alexander to conquer. Do not ever feel that way about science. No matter how many and how great discoveries are made, science never ends. Every discovery that solves an age-old problem brings more problems to be solved, more things to be found out. Geographical discoveries and explorations on our earth may have nearly come to an end; there may be no more unknown areas in the world, but science can still be called the Endless Frontier. Here are but a few of many things we are still trying to find out.

SOME OF THE ASTRONOMERS' PUZZLES STILL TO BE SOLVED

Astronomers know that the present universe seems to be getting larger in size, but why? And when did it begin doing that, and what really happened? We do not know. How did the earth come into being? Was it thrown off the sun or was it born with the sun? Or was there a collision with another star, or something like that? Or did something happen inside the sun that caused our earth? How long ago? Are there other worlds where beings exist? We do not know.

Ernest Rutherford and Niels Bohr and other scientists have explained very well how the atom is put together; and in the last thirty years we have learned much about protons, electrons and neutrons. And we have some understanding of where light comes from. But now we are beginning to



Both pictures, Press Association, Inc.

Pilotless planes, or "drones," mark another scientific advance. A "mother" plane, upper left, has just dropped a drone, below. Radio control of the drone is shifted to the plane on the right, which directs the drone's course. In the atomic-bomb tests, drones carrying instruments were sent near the explosions without risk of life.

wonder about the central core of the atom, the nucleus. How is it put together? What keeps all these protons together, when normally protons always try to run away from each other? How do the protons and the neutrons fit together?

We know that on our earth there is a great deal of silicon, oxygen and iron; while in the sun and the stars there is more hydrogen than anything else, and perhaps a good deal of helium, too; but lead and gold and platinum are rare. Why? Why are some atoms a million times as plentiful as others? We do not know. We know now what cosmic rays are, but we do not know where they come from, or why. We know we can change matter into energy, but can we also work the other way around? We do not yet know.

In the atom bomb we have exploded uranium, but can we also get atomic energy out of the lighter elements, such as hydrogen? And can we ever learn to do it slowly, so we can keep it under control and use atomic power to run railroad trains and airplanes and to cook with?

We know that all plants make sugar and



The take-off of a drone is controlled from the ground.

starches out of carbon dioxide and water, but how exactly do they do it? We have some very vague ideas as to how magnetism, electricity and gravitation are tied up together, but how?

All of this questioning lies in the field of pure science. But in the applications of science, too, there are still many, many important problems waiting to be solved. How can we use all the energy and power the sun is pouring upon the earth? How can we best harness the tides, and put them to useful work? Rocket-driven planes that can travel a thousand miles an hour or more and can climb twenty or fifty miles into the air are almost possible now. But can we ever travel to the moon? Think of the wonderful improvements that can still be made in radar, television and color photography. Think of the blessing it will be if some day a chemist invents a method of "dry" photography, so we can do away with messy developing, fixing and printing, and can get our picture directly from the first film by treating it with a gas. What an advance this would be!

Consider Vannevar Bush's suggestion, a "Memex," or automatic system of storing and filing information which will all but think for us. Consider the discoveries that still need to be made in medicine: why do people get cancer, and how can it be cured, and prevented? What about diabetes, high blood pressure, arthritis, and that dread disease, infantile paralysis?

These are only a few examples of the many, many things that still need to be done. You need only to look around you or to read the papers to find any number of other things the scientist needs to do. Above all, remember clearly that the road to the future in science is wide, and points straight ahead; there is room on it for any and all who want to join up, and there is no end to it. Our horizon and our vision are forever growing wider; our goal is perpetual progress and a better and fuller life for all mankind.

By WILLEM J. LUYTEN.

THIS IS THE END OF THE DEPARTMENT OF SCIENCE.



Press Association, Inc.

All the instruments in this room are part of a single electronics machine which can make the most difficult calculations with lighting speed. It is called the Electronic Numerical Integrator and Computer—Eniac for short. In its 18,000 vacuum tubes and several miles of wire, nothing moves except electrons.



Earthworms and their casts.

THE WONDERFUL EARTHWORM



WHAT an unmerited reputation for evil the worm has had to live down! If any creature was evil, men called it a worm, and posterity asked for no further evidence of its villainy.

Forty times and more Shakespeare slanders this poor tenant of the earth as the worker of mischief, or as the symbol of misdoing and fatal melancholy. Vile worm, poor worm, viperous worm, gnawing worm, eyeless venomed worm, worm of the Nile (which means a snake), there is no goodness in the worm, the worm is not to be trusted—so runs the master's pen.

Shakespeare was clear-eyed and accurate in all things he observed at first hand, but he took the worm's character at second hand, and lo, it was very bad. The standard books on natural history available to him asserted that worms "be full evil and malicious; some be footless, and some have six feet and be enemies to mankind."

Yet out of the very wickedness of worms men were to distil antitoxins against "shrinking of sinews and biting of serpents and scorpions." Also, if the armorer stamped upon worms, strained them through cloth, then added an equal quantity of oil of radish-roots, and used the mixture in the making of swords or daggers, "the same shall cut through iron after, as though it were lead."

"If I but *see* a worm, I have no appetite for the next three days," said a lady once, not realizing that but for worms there would be little food to satisfy her appetite. How does that boneless, limbless creature, the earthworm, discharge its great service to the earth, to vegetation, and so to all animals and to ourselves who depend on them? It is a living mill, grinding up soil day and night, reducing the mountains of other eras, with the verdure and carrion of yesterday, to the fine compost from which all plant life springs and grows.

The body of the earthworm is segmented, ringed throughout, and through the interior of its long body runs the astonishing digestive system. The thin, pointed end of the earthworm is the head, bearing the mouth, which has neither jaws nor teeth, but a lip for grasping. A muscular sac, called the pharynx, leading to the gullet, or food-canal, supplies suction to aid in taking in food. The matter eaten, as it passes down the gullet, comes in contact with glands, not found in any other animal, which secrete a large quantity of carbonate

of lime and aid in the breaking-down process by which the food is reduced to digestibility.

From the crop to the gizzard the meal progresses, and, arrived in this powerful mill, it undergoes a grinding similar to that to which the food of a bird is subject. In the gizzard, as we should expect, are numerous small stones, varying between one-twentieth and one-tenth of an inch in diameter. Many small stones must be swallowed with the earthy material absorbed in the ordinary act of feeding, but a battery of stones is maintained here just for the purpose of grinding; they are, in fact, the millstones of the miller of the soil.

Having been revolved and ground in the gizzard, the food passes on into the long food-canal beyond. When all nutriment which can be extracted has been obtained, the residue passes on and is expelled from the earthworm's body, and issues from the opening of its burrow in what we all know as wormcasts.

The earthworm has no eyes, but it has quick-acting sense organs. It can detect the difference between light and dark. It never shows itself in bright daylight unless it is frightened from its hole, or unless it is sick and ailing, or threatened by the flooding of its dwelling.

How the Earthworm Prepares for Its Future Generations

With no nose, it can smell; with no ears, it can detect vibrations. It breathes through its skin; it feels heat and cold; it is keenly sensitive to touch; it displays a decided sense of taste in the choice of its food, showing preferences for various types of vegetation over other kinds, choosing the fat of flesh before the lean, and liking fresh meat better than foul, though not disdaining to eat the bodies of its dead kind. The thickened ring of color lighter than the rest of the body near the head is not, as may be supposed, the scar of an injury; it marks the presence of a gland from which is poured out the fluid composing the cocoon in which the eggs of the earthworm are laid.

Eggs so laid produce little earthworms resembling their parents in all but size; there is none of the wonderful changes of form such as mark the career of the insects. It is not true that if we cut an earthworm in half and apply the head to the tail, the two parts will unite, though many people believe it. It is true, however, that if an earthworm is halved, the head portion will produce a new tail, but, strange to say, the tail portion will also produce a tail, and not a head as we should expect, unless the cut is less than eighteen or twenty segments from the head.

The Remarkable Body of an Earthworm and Its Burrowing-Power

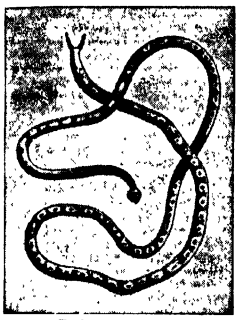
The powerful cylindrical body of the worm is ideally fitted for burrowing. Its muscles endow it with thrust, and bristly appendages springing from the segments like microscopic claws increase its power of locomotion. But the worm does not butt its way through the soil. It eats as it goes, swallowing the earth particles with their contained nutriment; and the head, obstructed by a stone, finds a way round. There are few obstacles too difficult for its passage.

By absorbing the soil the earthworm has a less difficult task than many animals whose ways we have followed, which have to throw out the matter which they have excavated while burrowing through the soil. The ordinary burrow runs from a foot to a foot and a half in depth, though to escape frost or flood the earthworm goes far deeper, and exceptional burrows have been found between five and six feet in depth. In many directions it tunnels, but, let us remember, it cannot do this without eating the soil. The soil itself is heavily charged with vegetable and mineral débris, and it is this which the earthworm extracts during the complicated process of digestion.

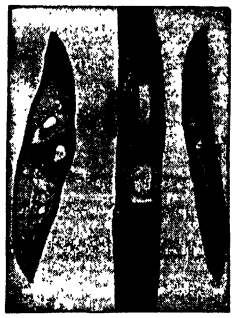
No matter how deep the earthworm goes, the process is always the same—the soil must be eaten before it can be cast out of the burrow. So the earth in which it works is continually being brought up to the surface, exposed to the air, freshened, fertilized by the absorption of atmospheric gases, and receiving new deposits of organic matter to increase its fertility.

Now, as the earth which has been eaten is expelled from the end of the earthworm's body, and the wormcast is always brought to the surface, how can the earthworm manage to turn round in its almost straight cylindrical shaft? Turn it must, for we know that the normal attitude of the animal is head uppermost. We have but to go out on to the lawn with a lantern on a warm, dark evening to see the grass covered with earthworms.

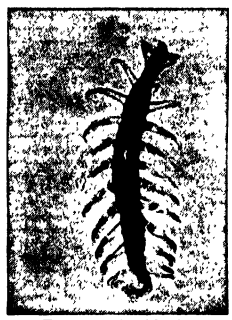
Rarely, however, do we find an earthworm free of its burrow. The tail end remains within the shaft, and a flash of direct light or the vibration caused by a footstep sends the earthworm down into its hole with amazing swiftness. Its retreat has been likened to the withdrawal of a tortoise's head into its shell.



Polygordius, a segmented worm.



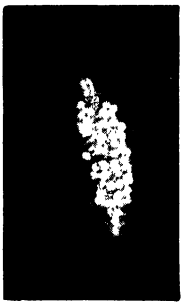
Magnified sections of Liver flukes.



Tomopteris Marine Worm.



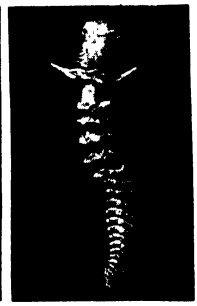
The beaked Nais.



A Bristleworm and its eggs.



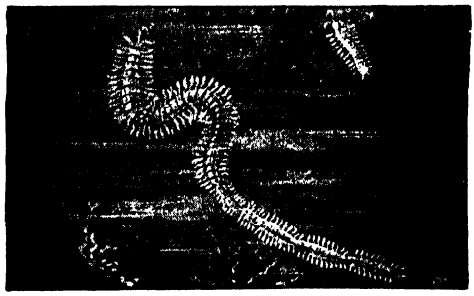
The Sea-mouse, a marine worm common round our coasts.



Chætopterus, a marine phosphorescent worm.



The Rock Leech.



Myrianida, a sea-worm.

RELATIVES OF OUR FRIEND THE COMMON EARTHWORM

Earthworms do roam about the surface; their tracks can be followed in many directions, but they are found mostly in the position indicated—heads out, tails at home. How, then, do they perform this marvelous somersault which enables them to bring the soil to the surface—how do they turn upside down in their tube?

The probability is that at the lower end of their perpendicular shafts they nearly always have a more open chamber in the earth in which to turn. Such chambers have repeatedly been found, lined with stones of minute size, with seeds and other smooth substances. They have been regarded as the retreats of the earthworm from great cold and equally deadly drought, but they must, one would think, serve this other necessary purpose.

Whatever the method, the turn is performed, and out into the open comes the eaten soil, as fine as these living grinding mills can make it. Not quite all of it is thus thrown out, however; a little re-

mains in the shafts. The earthworm is a comfort-loving creature. It cannot bear a rough surface to its tunnel-lining.

THE LITTLE UNDERGROUND TUNNEL WITH ITS LINING OF CEMENT

To avoid this it lines the burrow with a cement of fluid mud, adding here and there smooth particles of stone and glass or whatever may be found on the surface, with tiny pieces of leaves and other vegetation, and smoothing all with a covering of moistened soil. As this hardens it becomes quite polished by the movement of the earthworm up and down, and so allows that swift withdrawal into the hole which we have noted.

In addition to eating earth, the earthworm feeds on dead leaves, fallen blossoms, seeds and other vegetable substances lying near the mouth of its burrow. It draws the leaves down its hole in such a manner that the small end always goes first, so taking the line of least resistance. Many of these leaves and other substances it eats; many, or parts of many, it leaves to decay and form new material for the regeneration of the soil.

THE LOWLY EARTHWORM AND THE WORK IT HAS DONE FOR MAN

There we have two valuable processes, the bringing-up of old soil to the surface and the addition of leaves and other substances to the soil. In addition to this the earthworm is constantly opening out channels in the earth which allow air and moisture to enter, thus preventing it from caking and becoming non-porous.

Moisture comes through into these little canals; it penetrates through their walls and so affords a wide distribution of the dampness necessary to plant life. All these perforations and dampings of the soil open up ways for the germination of seeds, for the spread of the tender root-hairs of plants which, in hard, unbroken soil, would only with difficulty make their way about to find nourishment for the growths they feed.

Up above, the wormcasts are blown by the wind or in other ways broken down, and so are carried through cracks and little channels down into the soil again as rain falls and makes its way into the earth. The earthworm's quest for food and homes has the effect of mixing soil and vegetation and animal remains into an ever-increasing mass of vegetable mold which becomes the seed-bed of the richest plant life.

It is reckoned that there are about fifty thousand earthworms to an acre of land, and that they raise from fourteen to eighteen tons of soil to the surface every year, adding an inch a year in this way to the depth of the vegetable mold.

In temperate climates they burrow deep to escape frost and drought, as we have seen. When frost or drought come they must send fifty thousand earthworms an acre burrowing down three, four and five feet deep, three or four times a year, each descent being achieved only by eating and bringing up the soil excavated.

THE RICH BLACK SOIL WHICH PRODUCES THE WORLD'S BEST WHEAT

The consequence is that air and moisture reach down far deeper than plow or spade, and wherever air and moisture go the soil is enriched and fertilized. How many earthworms must have worked for ages to give Manitoba her matchless area of rich black mold! No other agency but earthworms can have done it, and Manitoba should give its earthworms a monument.

It is not only in temperate climates that earthworms are at work. They are scattered all over the world. Some of the earthworms of tropical countries are quite alarming in their dimensions—five feet long and of prodigious girth. If our little worker worms bring up their twenty ounces of soil per annum, how much more will these giants pass through their bodies for the ultimate benefit of agriculture, or even a natural wild growth!

HOW THE EARTHWORMS HAVE RECLAIMED THE WAR-RAVAGED LAND

During the World War certain parts of Belgium were so long flooded and other parts so ravaged by the mechanism of conflict that it was doubted if these parts would be of service again for the purpose of agriculture within our own lifetime. But great areas, practically all that was flooded and much more besides, are again yielding crops, thanks to the work of the earthworms which have returned to their old haunts, have burrowed and tunneled, sweetened and fertilized, and prepared the way once more for the arts of man.

Vast tracts of land have been left to lie waste in the United States where careless farmers took out of the land more than they put in; they reaped and harvested, without manuring the land, till it became sterile. Then they moved on to fresh land. The earthworms will have

to restore that exhausted soil, and in time they will.

It has been noted that in certain districts of Africa the natives look for worm-casts as the Indians used to look for the trail of men and animals. Where worm-casts are plentiful these skilled sons of the wilds settle for brief cultivation, knowing that they will secure a harvest for their labors. Where wormcasts are few they do not attempt to grow crops.

THE CHANGING FACE OF THE LAND THROUGHOUT THE CENTURIES

There is another important part played by earthworms. They may cause the stones on a field to sink into the earth. They preserve the sites of ancient buildings. Beneath the deep foundations of great pillars and columns they may not be able to penetrate, but beneath the floors, where cement and concrete decay and crack, they can work. And it is there that they dwell, devouring the soil and casting it up between the cracks, so that in the course of time the dried and scattered casts cover the floors, rise and cover the broken remains of walls, and bury all deep in soil, safe yet secret.

The very site and existence of such buildings pass from human knowledge. The plow does not go very deep, and harvests ripen over the site. Accident at last takes pick and shovel deeper than the plow, and there comes to light a fragment of wall, a stretch of an old tessellated pavement, and there, when careful search is made, is some fine old Roman villa whose sides and upper parts are gone, but whose floors and foundations have been preserved by the labors of generation after generation of earthworms.

SOME HARMFUL COUSINS OF OUR LOWLY FRIEND

But the earthworm is not the sole representative of its great class. There are worms in the sea, worms in still waters, worms on the shore, worms with almost unbelievable life-histories which live as parasites on animals and human beings. There are worms which, called flukes, arise from eggs in water, creep as larvæ into snails, and pass from these to vegetation eaten by sheep, in which the larvæ complete their course.

These creatures sometimes become a plague among sheep and periodically cause enormous losses among our flocks. Other forms infest minnows, frogs and birds. They are not harmful to adult birds, in whose crops they are killed, but if they are transferred unhurt by the old birds to baby birds, they develop in the nestlings and kill them.

The tiny worms which develop under the skin of human beings in hot countries; worms which penetrate human muscles and cause the disease known as trichinosis; the extraordinary U-shaped worms, formidable with bristles; all the leeches which suck human and animal blood—these are members of the great group to which the earthworm belongs, and may be studied in textbooks by all who desire fuller knowledge of the subject.

The earthworm is perhaps the least picturesque of them all, yet it is our only friend among them. We can all watch these for ourselves, for they thrive well in a pail of good garden soil. They can be observed at night by the aid of a shaded light, where we may see them collecting little stones, feathers and leaves with which to bar the entrance to their burrows. Not all the things they collect are taken below and devoured. They line their shafts with leaves, they make barriers to their front doors. Behind the barrier they lie with the head near the entrance, a habit which so often makes them prey to thrushes and robins.

THE WORK OF THE MASTER GARDENER OF THE EARTH

This fatal position which they assume in the burrow is supposed to arise from a desire to be near the open air, perhaps to snuggle up to the warmth which in such a position exceeds that of the damp earth below. When we see dozens of birds foraging on the lawn, tearing up earthworm after earthworm, we wonder how the stock of earthworms can be maintained, but it is constant. The numbers born equal the numbers eaten.

The heavy soil overlying the clay which is the foundation of the lawn is gradually worked over and over, the drainage is improved, sour soil sweetens, the advance of moss is checked, the rich green grass grows stronger, and we have turf soft, thick and velvety—a joy to tread, a delight to rest on.

It is the earthworm, our master gardener, who does the work. Out of sight and out of mind, he makes soil fruitful, fine and rich for the whole of our habitable earth.

THE END OF THE BOOK OF ANIMAL LIFE.

A MODERN ORCHESTRA IN POSITION TO PLAY



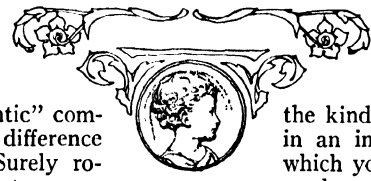
If you should go to a symphony concert to-day you would see an orchestra that looks very much like the one in this picture. It is a symphony orchestra in New York, on the platform ready to play. Standing on the platform in the foreground is its conductor, Walter Damrosch, who contributed to this book. In the modern symphony orchestras, which play in many of our large cities, we can usually find nearly one hundred performers on all kinds of instruments—more than twice as many as there used to be in the orchestras of the days of Haydn and Mozart. The picture shows how the players are arranged. In front are the violins: the first violins on the left, and the second violins on the right. Behind them are the larger members of the violin family, the violas and cellos. Largest of them all, the double-basses in the very back, are so big that the men who play them have to stand up. In the midst of the orchestra are the wood-wind instruments and French horns. To their right are the trumpets, trombones and tuba, while behind them are the drums and cymbals.



Courtesy of the Æolian Company, Paul W. Furstenberg, artist.
Wotan's farewell to Brunnhilde in Wagner's opera The Valkyrie.

THE DEVELOPMENT OF MUSIC

III. ROMANTIC COMPOSERS AND THE MUSIC OF TO-DAY



SOME of the great composers of the past we call "classic" composers, others we call "romantic" composers. What is the difference between the two? Surely romantic composers wrote something more than just music of romance. As a matter of fact, what we mean by a romantic composer is one who puts into music his ideas and feelings, and is more interested in making his compositions beautiful and inspiring than he is in making them well-balanced in form. This does not mean that romantic music is always more beautiful than classic music. But we can be carried away in our feelings more easily by romantic music, for it appeals more strongly to our senses.

One way in which romantic music delights our ears is in changing keys. The keys in music are like the stories in a house: each key is a different level. If a piece starts in the key of C, it is like being on the ground floor. When it changes to C sharp, you are on the landing halfway up the front stairs. When it changes to D, you are on the second floor. Classic composers always changed keys very carefully, and only because they wanted to move to a different level. But the romantic composers moved suddenly from one key to another to make pleasant surprises—the kind of surprises you have in an interesting old house in which you are always going up or down a few steps from one room into another. Modern composers thrill us by whisking us from one key to another as if we were being suddenly dropped or raised in a fast elevator.

Though Beethoven, Schubert and Mendelssohn put romantic feeling into their music, it was still mostly classic. Not until Schumann appeared do we find a composer who was romantic through and through. Robert Schumann was a man full of enthusiasms, yet often whimsical and dreamy. His music is much like him. Many of his pieces are as alive with vigor and spirit as a young horse; others show a gay humor; still others are fanciful and dreamy. Schumann liked to have his music tell stories or describe things. He gave his compositions names such as "Carnival," "Butterflies," and "Scenes from Childhood."

At first Schumann did not want to study hard at music. He thought a composer could write just as well without doing any hard work. Later he

found this was not true, and he made up for what he had missed. But he never learned thoroughly how to write for the different instruments in the orchestra, and so his orchestral pieces often sound muddy.

Besides being a composer, Schumann was a music-critic. He wrote about other composers and their music, and started a musical magazine. By doing this he helped people to learn to appreciate romantic music. He also helped young composers to success, and praised, among others, Chopin, Brahms and Wagner, who later became very famous. Among Schumann's works are four symphonies, a beautiful piano concerto, and many piano pieces and songs.

In opera romantic music began a little earlier, for at about the time of Beethoven a composer named Weber was writing romantic German operas. The stories of Weber's operas were old legends. The music was based on folk songs. This was a great change from the artificial operas that had been given before, and Weber's operas became very popular. His most famous one is the fairy story Oberon.

How Chopin Made Piano Music Sound Different

Another composer who lived about the time of Schumann was Frédéric Chopin, born in Poland but partly a Frenchman. His music is romantic, but without the humor of Schumann's. Much of it is delicate, dreamy and very beautiful. The most interesting thing about Chopin's music is that it is almost all written for the piano. He composed no symphonies. But he was so successful in those piano pieces that he has won a place among the greatest musicians. In writing for the piano Chopin invented a new style that made chords sound richer without becoming blurred and muddy. This style spaced the lower notes of a chord wide apart and the upper notes close together, instead of having them evenly spaced. If you notice a person playing a piece by Chopin you will see his left hand moving about in great skips, while his right hand runs over many notes near to each other. Ever since his day composers have followed more or less Chopin's style of writing for the piano.

With Chopin all music was like beautiful poetry, and he felt that it was to be played with great expression. His pieces were often extremely subtle. He was fond of dance rhythms and wrote not only waltzes, but polonaises and mazurkas, which were national dances of his native Poland.

Bright, Tuneful Operas by Italian Composers

In Italy opera was the popular form of music. Gaily-colored costumes and exciting action on the stage pleased the Italian people better than drab concert halls. Their operas were full of bright, cheerful tunes. One of the most famous of Italian composers was Verdi. His many operas are full of melodies. It is said that when he was a boy he loved to hear the hand-organs play. And to-day when we listen to the Italian hurdy-gurdy-man playing, it is very often the music of Verdi that we hear. In Verdi's opera Il Trovatore is the famous Anvil Chorus, in which the clanging sound of anvils beats time to the music.

While Schumann was composing in Germany a French musician called Berlioz was writing compositions which many people at the time thought strange, though they sound perfectly natural to our ears. He wrote for the instruments of the orchestra in new and interesting ways which attracted much attention. Among his best-known works is his Fantastic Symphony. This piece is different from the symphonies that had been written before, for it tells a whole story. The symphony pictures the life of an artist. In it the music represents a ballroom scene, a conversation in the fields between a shepherd and a shepherdess, a crashing thunderstorm, and many other things. This kind of musical story-telling we call *programme music*. Berlioz was not the first composer to write in the programme style, but he was the first to write in the elaborate story-telling way which many modern composers now use.

The Stirring and Difficult Piano Music of Liszt

One of the most popular musicians of the nineteenth century was Franz Liszt. He was a noted composer, but was even more famous as a pianist. When he was a boy he heard Paganini, a very remarkable violinist, play. Liszt was dazzled by the marvelous feats of the great violin-player, and resolved to be as great a performer on the piano as Paganini was on the violin. His ambition was realized. In later years Liszt traveled all over Europe, amazing his audiences by his

skill. Besides composing, Liszt arranged for the piano many works of other great musicians—songs, operas, organ fugues and orchestral pieces. These are called *transcriptions,* and are very famous. He also combined many of the folk songs of Hungary, the land of his birth, into pieces called Hungarian Rhapsodies.

While Chopin's style of piano music was delicate and dreamy, Liszt's was just the opposite—brilliant and showy. His pieces are full of sweeps, runs and crashing chords. Often they sound as if a whole orchestra were playing. Though some of the time Liszt's works are noisy and cheap, at other times they are very noble and stirring.

Of all the romantic composers, the one who deserves most of all to be called romantic was Richard Wagner—Liszt's son-in-law—who wrote emotional, dramatic music and many German operas with fascinating stories. Until the time of Wagner, operas had depended mostly on tuneful music and famous singers for their success. The stories were forgotten while the operatic stars displayed their highly trained voices. But Wagner did not at all approve of that kind of opera. In fact, his operas are so different from the older operatic works that they are sometimes called by a different name—*music dramas.*



Wagner's music seemed so strange to those who first heard it that he was sharply criticized and ridiculed. In this caricature he is shown murderously attacking the human ear with a note.

Wagner wrote not only the music of his operas, but the words, too. Their stories he took from medieval tales or old German legends, and these were in many places exciting and dramatic. Wagner then composed the music to fit the action. So well did he do it that even when his music is played without scenery, singing or acting, we can imagine the stories that go with it. In one scene in The Valkyrie a magic ring of fire appears. The music Wagner wrote for this scene makes us imagine at once tiny flames darting here and there. Because he wanted to create such effects Wagner made the orchestra much more important than the singers. He also helped to describe his stories in music by using *leading motives.* Different persons in the operas are described by different "motives," or bits of music. Whenever we hear a motive played by the orchestra we are reminded of the person whom it describes.

Many persons at first made fun of Wagner's music because it was new and strange and they could not understand it. But now people recognize its emotional richness and beauty. And since Wagner became famous many composers have followed his ideas in writing operas.

BRAHMS ADDS NEW RICHNESS AND BEAUTY TO CLASSIC MUSIC

In the midst of the musical successes of Liszt and Wagner there quietly emerged the figure of another composer, whose music is of a totally different nature—not so strangely new or dramatic, but nobler and more majestic. This man was Johannes Brahms. Instead of fol-

lowing other musicians of his time and writing in a purely romantic manner or composing programme music, Brahms turned back to the classic style of Haydn, Mozart and Beethoven. But he did not imitate these composers: he used classic forms, and to them added a richness and beauty they had never had before. His was a happy combination of classic and romantic music.

Too often we hear people say Brahms is too intellectual, too academic—that his music is dry and hard to understand. No wonder many of us are frightened away from Brahms before we have had a chance to find out what he is like. True, when we hear the masterpieces of Brahms we have to keep awake and use our minds to enjoy them fully. And much of his music seems very dull until we get to know it better. But many of his shorter pieces, such as his waltzes and Hungarian dances, are delightfully gay, and charm us instantly. All of Brahms's music grows more lovely each time we hear it.

Brahms cared nothing for popular praise. He wrote, not to please the public fancy, but to create beautiful and perfect music. When Cambridge University offered him the great honor of a degree, and suggested that he compose something for the occasion, Brahms replied that if any of his old works seemed good enough to them he would be glad to accept the honor, but he was really too busy to write anything new. So high were his ideals that he destroyed all the music he wrote which seemed to him not good enough.

Brahms wrote symphonies, concertos, chamber music for small combinations of instruments, piano pieces, songs—almost everything except operas. And in all these forms his compositions are never commonplace, but tower before us like rugged and nobly beautiful mountains. Many people say that there are three great B's in music—Bach, Beethoven and Brahms.

A composer whose music was more emotional and less studied than Brahms's was the Russian Tschaikowsky. With Tschaikowsky music was an eloquent language. His compositions are often mournful and gloomy, like many other Russian pieces, and his melodies are so appealing as to stir our feelings. In one of his symphonies, called the Pathetic Symphony, he seems to be crying out in distress against Fate itself. Tschaikowsky was an expert in writing for the orchestra. He combined instruments to produce rich effects, and wrote gloomy passages for the bass instruments.

Meanwhile Franck was writing music in France of quite a different sort. He divided his time between playing the organ, teaching and composing. His music was dignified and lofty, and often marked by religious feeling. Franck was inspired by the old church music of the time of Bach. He himself wrote often in the counterpoint style made famous by Bach and Palestrina.

THE WONDERFUL AND ENDLESS BYPATHS OF MODERN MUSIC

Music of to-day has branched out in so many directions that it is impossible to follow all the bypaths by which it is leading us continually into unknown and marvelous lands. To describe a very few paths and a few composers who are walking them will have to be enough.

When we hear a huge symphony orchestra, with its many rows of instruments, play a work by Richard Strauss, we are thrilled by the tremendous volume of sound and the dramatic and exciting passages. That is one thing Strauss did. He started where Wagner had left off in making the orchestra more powerful. He wrote in Wagner's thrilling style. Then, too, Strauss wrote his works as programme music, making them tell stories. In Don Quixote the orchestra even imitates the bleating of a flock of sheep, and, by a special machine which imitates the whistling of wind, suggests a ride through the air.

Another new style of music came into being shortly before the beginning of the twentieth century—*impressionism*. Its inventor was the French composer Debussy. Among Debussy's friends were a number of artists who were interested in impressionistic painting. This type of painting *suggests* objects by spots of color instead of outlining objects clearly. Debussy decided that music as well as painting could be impressionistic, and tested out his ideas by writing some. His compositions, because of their unusual harmonies, sound queer to us beside the music of the past century. All sorts of rich and strange chords are used, even to the "whole-tone" scale, and the effect is that of soaring among the clouds. An-

other French composer often classed with Debussy is Maurice Ravel, whose work is noted not only for its soft and rather sentimental delicacy but also for unexpected, humorous effects, for swirling exciting rhythm and for the strange dissonant cords we call "modern harmonies." His Bolero is a fascinating piece of orchestration, while another well-known composition is the ballet called Daphnis and Chloe; the latter was written for the famous Russian Ballet which toured Europe and America in the days before the World War.

Many of the ballets performed by the dancers were written by Stravinsky, a Russian composer who has aroused a great deal of discussion and controversy. Some of his pieces are as delightful as fairy tales, and some are almost brutally harsh and dissonant, so that to many listeners they sound like nothing but weird noise. His earlier and more colorful ballet music is more popular than The Rite of Spring, which is not easy to understand; it describes a primitive celebration of the coming of spring. The work of Scriabine sometimes resembles that of Stravinsky in its use of strange, unclassical harmonies that would have driven Mozart distracted, but much of Scriabine's music is marked by a mystical religious fervor. Prokofieff is a younger Russian who has written some very clever music and is usually described as a follower of Stravinsky. His music is tinged with satire.

The great Finnish composer Sibelius has published a great deal of music, and his pieces differ from each other so much that it is hard to believe they come from the same man. His best work, such as the Fourth Symphony, is very fine indeed, and possesses an austere quality not often found in modern music. Very different from Sibelius is Arnold Schönberg of Austria, who is known for his experiments with new forms of musical expression. Some of his work is exceedingly powerful and filled with a bitterness which threatens to overwhelm us as we listen, while other pieces seem like nothing but a queer jumble of sound. Yet when he wishes to do so he can write melodies which are as soft and lovely as something of Mozart's. His pupil Alban Berg has produced an amazingly effective opera, Wozzeck, which is cruelly ironic like so much of Schönberg's own work.



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Following the noble classic forms without being enslaved by them, Brahms gave them a new touch of romantic beauty and richness. Here you see the composer in his study.

Among Englishmen, Frederick Delius and Edward Elgar stand out for different reasons, since Delius has written music of a sweetness which suggests the Celtic folk-melodies, while Elgar's productions have splendor and an air of importance, as though they knew they belonged to the British Empire. Both died in 1934. Vaughan Williams writes pieces filled with a vivid sense of London streets and English countryside.

There are dozens of other composers

working away in every country of Europe, all struggling to express their ideas in music, and each hoping that he will succeed in making his compositions so lovely or so powerful that they will never be forgotten. Van Dieren and Busoni are outstanding, even though the critics quarrel about the value of their music, then there are Casella, Respighi and Puccini in Italy; Bartok and Kodaly in Hungary, Granados in Spain, Weinberger in Czechoslovakia, Holst in England, Hindemith in Germany; yet others are Gliere, Liadow, Shostakovitch, Honegger, Ibert, Wladigeroff.

In America there have been very few men who have even given promise of living for all time as great composers. So far, the most gifted American musician is MacDowell, whose short pieces describe country scenes, the ocean, and music of the American Indians. Great composers of all ages have been inspired by the folk songs of their native lands, and have written music which we call "national." English sea ditties, old German songs, Viennese waltzes, Hungarian dances with their dashing rhythms—all have been used in symphonies or other orchestral works. But what is the folk music of America? Perhaps it is the Indian melodies, which Cadman and Farwell have written down for us; or the negro "spirituals" which are so sadly beautiful when sung in harmony by a group of rich voices; or jazz, which is called the music of Broadway but which everybody sings and whistles. Surely from this varied material some composer will create music that is truly great.

Something of a beginning has already been made, for negro melodies are the inspiration behind several of John Powell's piano and orchestra pieces, while George Gershwin has won recognition for himself by means of serious music clearly based on the jazz to which modern folk dance. Among his compositions are a jazz Concerto in F and the famous Rhapsody in Blue. Other composers who are American by birth or by education (or both) are Gruenberg, Carpenter, Hill, Sessions, Thompson, Citkowitz, Harris, Taylor, Stokes, Hanson, Mason and Converse. They have produced a variety of work for orchestra or for solo instruments or voices, besides several operas of which the most notable are Peter Ibbetson, by Deems Taylor, The Emperor Jones, by Louis Gruenberg, and Merry Mount, by Howard Hanson.

The growth of music in the United States is stimulated by composers of other countries who now live and work here. One of these is Charles Martin Loeffler, a native of Alsace. Another is Ernest Bloch, who was born in Switzerland; his best-known music is written on themes from Jewish history and shows a strong religious feeling. Werner Josten, who is considered one of the most "modern" composers of all, came to this country from Germany.

One reason why we have been slow to develop a national music is that until recently it was impossible to obtain a good musical education outside of Europe, which meant that our musicians and composers were trained with a foreign background and viewpoint. By now, however, there are several excellent schools where students may receive guidance from the foremost musicians and teachers. American symphony orchestras and American opera companies, too, are as fine as any in the world and the opportunity to hear good music well performed is quite widespread. The radio has helped to spread the knowledge of music—both good and bad—and certainly more people now than ever before can and do listen to the finest concerts. Talent, opportunity and the force of example are all present in this country to-day, and we may hope before long to produce really distinguished composers of our own, who can translate the spirit of America into sublime music.

There is so much music in the world that we are sure to hear not only good music but quantities of indifferent music and much that is really bad. The *type* of music is no guide to the worth. There is good band music and bad band music, good and bad opera, good and bad jazz, good and bad music for symphony orchestras and string quartets. If we listen to enough of it we can learn to tell what is poor from what is fine. And when we do that, we can better appreciate the fine. The way to enjoy music most is not to sit back and dream while it is being played, but to try to remember the tunes and to notice how composers change their tunes and develop them. Music will give us the greatest pleasure if we listen to it not only with open ears but with open minds and open hearts.

THE END OF THE STORY OF THE FINE ARTS.



Ptolemy Philadelphus, a third century Egyptian ruler, freeing the Jews. From a noted painting by Noël Coypel.

The STORY *of the* JEWS

THE Jews of today are the descendants of an ancient people, whose early history is set forth in the Bible. The Old Testament tells us that about four thousand years ago a man called Abram, who dwelt in southern Babylonia, left his native city in order to settle with his father in Haran, farther to the north. In Haran the Lord appeared to Abram and told him to go to the land of Canaan, where he would become the founder of a great nation.

Abram led his family and followers across the desert of Arabia and into the land of Canaan, now known as Palestine. He changed his name, at the bidding of the Lord, to Abraham, which means "father of nations." He taught his followers to worship the Lord, and God favored him in all ways. And so Abraham became the founder of a new nation called the Hebrews.

After the death of Abraham his people lived more or less like nomads, or wanderers. During a period of drought and famine a number of the Hebrew tribes migrated to Egypt, and they were given permission to settle on the borders of that country, in the district known as Goshen.

After a number of years a new Pharoah, or monarch, Rameses II, came to the throne of Egypt. He made slaves of the Hebrews dwelling in his land. One reason was that he needed vast numbers of slaves in order to build cities, palaces and monuments. Besides, Rameses feared the growing numbers of the Hebrews. And so these freedom-loving desert tribes toiled under cruel task-masters.

After nearly two hundred years of slavery, a leader arose who helped the Hebrews escape from Egypt and find their way back to the land of Canaan. This leader, Moses, molded the Hebrews into a more united people. He gave them a set of laws by which to live—the Ten Commandments; and he taught them many other things about religion and goodness. The Bible tells us that Moses died at the very borders of the Promised Land toward which he was leading his people.

It was Joshua, a disciple of Moses, who led the Hebrews into Canaan. They gradually conquered the Canaanite tribes and established themselves in the land. They also had to fight the Philistines, a people who entered Canaan at about the same time as the Hebrews and who settled along the southern seacoast. This period of conquest and settlement lasted about two hundred years.

During this time the Hebrews changed their way of life; they became an agricultural people. They learned much about planting and harvesting from the Canaanites among whom they lived. They became more closely united as they worked and fought together under their leaders, called judges. Among the outstanding judges of this era were Deborah, Gideon, Samson and Samuel.

SAUL, THE FIRST KING OF THE HEBREWS, LEADS THEM AGAINST THE PHILISTINES

To strengthen still more their growing unity, the Hebrews decided to have a king. Their first king was Saul, chosen by Samuel. This monarch helped the tribes unite for their common defense against the Philistines and other hostile invaders of the land. King David, who ruled after Saul, succeeded finally in establishing the Hebrew kingdom as a strong and united nation. He captured the city of Jerusalem from the Jebusites and made it his capital. King Solomon, David's son, who succeeded his father, did much to build up the country and develop industry and trade. He built the famous Temple in Jerusalem and made this city the chief religious center as well as the governing center.

After the death of Solomon, the land was divided into two kingdoms: Israel, in the northern part of the land; and Judah, in the southern part. Unfortunately for these kingdoms, Palestine occupied an important position geographically. It served as a bridge across the desert, connecting Mesopotamia with Egypt. Therefore it became the pathway for many conquering armies.

The Assyrians invaded Canaan many times, exacting heavy tribute from the people. In 722 B.C. they finally overcame the northern kingdom of Israel. The Assyrians led away the flower of the population as captives, far beyond the Euphrates River. These people lost their separate identity as Hebrews and became known as the Ten Lost Tribes.

The smaller kingdom of Judah remained in existence for 136 years longer than its northern sister. It was crushed at last in 586 B.C. by the Babylonians. A large part of the population of Judah was taken captive and brought to Babylonia. The Temple in Jerusalem was destroyed and the entire land was laid waste. This was the period of the Babylonian Captivity.

Fifty years later the Persians conquered Babylonia. The Persian ruler, Cyrus the Great, permitted the Hebrews to return to their land and to rebuild their Temple. It was at that time that the name Jews was first applied to all who accepted the teachings of the Hebrew religion. Formerly this name had referred only to the members of the tribe of Judah. The Jews enjoyed a period of comparative peace under the Persian rule, which lasted for about two hundred years (536-332 B.C.).

The Persian Empire, which seemed destined to endure for many centuries, was overthrown by Alexander the Great of Macedonia in the latter part of the fourth century B.C. Palestine fell to the Macedonians in the year 322, and it became one of Alexander's vassal states. After Alexander's death his empire was divided among his generals. The Macedonian rulers of Egypt and Syria each claimed Palestine as a prize; and that unhappy land was often a battlefield.

In the year 165 B.C. Palestine, then ruled by Syria, rose in rebellion against the tyranny of its ruler, Antiochus Epiphanes, who tried to force the Jews to give up their religion and worship the Greek gods. Under the leadership of Judas Maccabeus a small handful of untrained guerrilla fighters defeated the mighty Syrian hosts. The Temple in Jerusalem, which had been defiled by the Syrians, was re-dedicated to the worship of God. This event is celebrated in the festival of Hanukkah, which occurs in the month of December.

For a brief period the Jewish state maintained its independence under the leadership of the Maccabean family. But in a world of mighty empires, it was almost impossible for a small nation to remain free. Palestine fell to the conquering armies of Rome and paid tribute for a while. Then it rose in rebellion against the Roman officials, who interfered with their religion, reduced a large part of the population to poverty through execessive taxation and tried to destroy the self-respect of the people.

THE JEWS HOLD OUT AGAINST THE ARMIES OF ROME FOR THREE YEARS

The small Jewish state fought with amazing courage and persistence against the mighty armies of the Roman Empire and held out for three years—from 67 A.D. to 70 A.D. The Temple in Jerusalem, which was the last point to be yielded to the enemy, went up in flames, and the city itself was utterly destroyed. The treasures of the Temple and many prisoners of war were carried back in triumph to Rome by Titus, the conquering general. Thus ended the Jewish state of ancient times.

About fifty years later, in 132 A.D., the Jews made another effort to regain their independence. Under the leadership of a bold warrior, Simon bar Kochba, who was inspired by Akiba ben Joseph, the greatest rabbi of his day, the revolt spread quickly throughout Palestine. Effective guerrilla warfare was carried on. Rome had to send its best general to quell the uprising, which lasted until 135 A.D.

The Jewish homeland was laid waste, the Temple was destroyed, the Jewish people was scattered far and wide. Yet a number of Jews continued to dwell in Palestine, which remained the chief center of Jewish life. Judaism now flourished in the many synagogues—houses of worship and study.

In the early part of the fourth century, the Roman emperor, Constantine the Great, accepted Christianity and made it the state religion of all Roman dominions, including Palestine. With the zeal of a new convert, he oppressed the Jews, forbidding them to study their religion or even to build synagogues. Their religious life was in peril.

While the Jews of Palestine were suffering persecution, a large Jewish population was living in comparative freedom in the land of Babylonia. Babylonia became the most important center of Jewish life, and continued to hold that position from the fourth century to the eleventh—that fateful entury which saw the beginnings of the Crusades.



Photo by Anderson

Moses, the greatest leader of the Jews, receives the stone tablets containing the Ten Commandments on Mount Sinai, from a painting in the Vatican by Raphael. The painting follows the account given in Exodus, the second book of the Old Testament. Mount Sinai (modern Mount Serbal) is a peak on the eastern coast of the Red Sea.

Both in Palestine and in Babylonia, the Jews remained united through the influence of the Bible and the Talmud. The Talmud is a collection of writings in twelve large volumes, containing explanations of the laws and customs of the Jewish religion, as set forth in the Bible. The Talmud developed during a period of over five hundred years, from the days of the great Rabbi Hillel, who lived in the century before the birth of Jesus, to the time of Rab Ashi, at the end of the fifth century. It contains not only explanations of the religious laws of Judaism, but also numberless legends, stories and words of wisdom on all sorts of topics, by the greatest rabbis and teachers of Israel.

During the seventh century, Babylonia was

conquered by the rising might of the Moslem armies, made up of Arabs who had accepted the new religion founded by Mohammed. At first, the new rulers treated both Jews and Christians badly, but in time they became more tolerant and allowed the subject peoples comparative freedom. In the course of the years that followed, Jews and Arabs influenced each other greatly in the fields of science, philosophy and literature.

For many years, small groups of Jews had been moving westward across the Mediterranean. Even in ancient times, Jewish communities had been established along the coast of North Africa and throughout Europe. It was not until the tenth century, however, that large groups of Jews began to move toward the west. In Spain, particularly, a large and influential Jewish community grew up. The leadership of the Jewish world passed westward to the land of Spain. There, under the kindly rule of the Mohammedans, Jewish learning flourished.

In the eleventh and twelfth centuries there was a Jewish Golden Age in Spain. There were famous poets in those days, including Yehuda Halevi, perhaps the greatest Hebrew poet since Biblical times. There were famous philosophers and grammarians and mathematicians. The foremost Jew of that era was Moses Maimonides, born in Córdoba in 1135. His studies in the Talmud are still prized by Hebrew scholars. His GUIDE FOR THE PERPLEXED is an outstanding contribution to the philosophy of religion. In addition Maimonides was a noted physician; he later became one of the royal physicians in the court of Saladin in Egypt.

The Jews of Spain fell upon hard times toward the end of the fifteenth century. This is how it came about.

THE JEWS ARE PERSECUTED IN SPAIN IN THE REIGN OF FERDINAND AND ISABELLA

Ferdinand, Prince of Aragon, and Isabella, Princess of Castile, were married in 1479. This union soon brought together a large portion of central Spain. As king and queen, Ferdinand and Isabella determined to bring the rest of Spain into the union, and bit by bit they succeeded in doing so. Last region to hold out was southern Andalusia, where the Moors had their dwindling kingdom. Not until 1492 did the Moorish capital, Granada, fall to the Christians. During these years of struggle, Isabella and Ferdinand ruled their expanding kingdom with strong hands. They were determined to strengthen and unify it in every possible way, and one of their plans

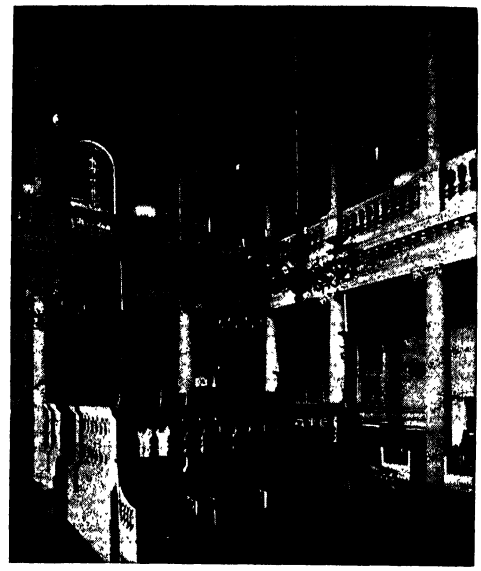


Photo by John Rugen

Interior of the old Jewish synagogue in Newport, Rhode Island. It was the first built in America.

was to bring all subjects into the fold of the state church. Jews, Moors and Christians who were suspected of religious rebellion (heresy) were severely punished if they did not conform. Many Jews became Maranos, or secret Jews. These New Christians, as they were also called, accepted the Christian religion outwardly, but continued to practice Judaism secretly in their homes. To search out these and other "heretics," Ferdinand and Isabella set up a court known as the Inquisition.

When the Inquisition pronounced a person guilty of heresy, he was turned over to the civil authorities for punishment, and cruel indeed were many of the punishments. Hundreds of persons were burned at the stake, and the victims included many Jews. Finally, in 1492, all Jews were expelled from Spain.

In other countries of Europe Jews were badly treated during the Middle Ages. In some cities they had to live in districts called ghettos. These quarters were walled off from the rest of the city and the gates were locked at night. In other lands Jews were expelled for long periods. England drove them out in 1290; France, in 1394.

Throughout the Middle Ages European Jews were not permitted to own land. They had no place in the feudal system of that day. (See Feudal Ages in the Index.) They could not belong to the guilds. The only

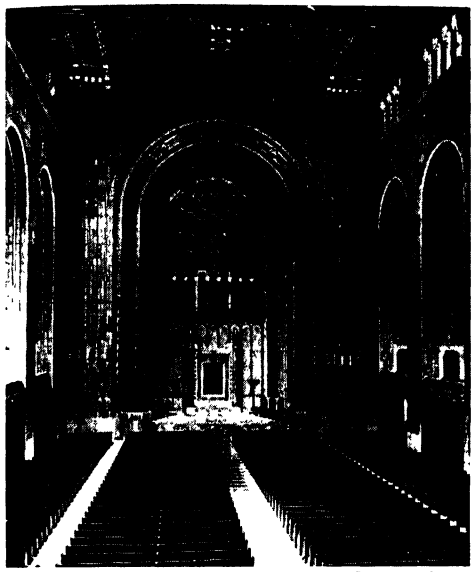


Photo by Richard Southall Grant

Interior of Temple Emanu-El, in New York. This is one of the finest synagogues in the whole world.

sources of livelihood open to many Jews were dealing in second-hand clothes and money-lending; the latter occupation was forbidden to Christians.

The Crusades, which began at the end of the eleventh century and continued over a period of several hundred years, brought great suffering upon the Jews. The Crusaders, sweeping across Europe in big and little bands, on their way to Palestine, "lived off the land," as we say of a modern army. Jews, who had little protection from the law, were robbed and massacred. Many popes tried to stop the killing of these helpless victims, but in vain.

Thus, the period from the eleventh century to the fifteenth was a tragic one for many Jewish communities in Europe. Even in those years, however, the inner life of the Jews, in their homes and synagogues, was a source of inspiration to them. Religious holidays and customs added joy and color to their lives. The study of the Bible and Talmud raised the standards of Jewish education considerably above those of the peasants and serfs around them.

After the Jews were driven out of Spain at the end of the fifteenth century, they found refuge in other lands. One of these countries was the Netherlands, where a flourishing Jewish community developed. In Turkey, also, Jews were welcomed; they helped to build up the prosperity of that land. One of the important figures at the court of Suleiman the Magnificent was the Jewish statesman, Joseph Nasi, Duke of Naxos.

The most important center of Jewish life in the sixteenth and seventeenth centuries was Poland. Many Jews fleeing from western Europe, in the years of the Crusades, settled in Poland. Most of these refugees came from Germany. The German language which they spoke gradually became mixed with Hebrew, the language of the synagogue and school, and became the dialect that we call Yiddish —a dialect spoken today in many Jewish communities all over the world. Jewish learning and culture reached a high peak in Poland.

In the year 1795 Poland lost her independence. Yet because of her large Jewish population she continued to be an important force in Jewish life until the invasion of the land by Germany in September, 1939. In the terrible days that followed the Nazis carried out a program of mass slaughter of Polish Jews. Comparatively few survived.

Although Jews had lived in Russia since the early Middle Ages, most of the Jewish population came under her rule through the annexation of eastern Poland by the Russians in the eighteenth century. Russia was under the strong influence of the Greek Orthodox Church and was unfriendly toward people of other faiths. She confined her Jewish subjects to a certain part of the country known as the Pale of Settlement, which thus became a sort of huge ghetto. This territory, consisting of provinces along the western border, became highly overpopulated, particularly in the large cities. Poverty and ill health became widespread. Though they had few rights in the government, Jews were forced to serve in the army. Persecution took many forms. Toward the end of the nineteenth century thousands of Jews left Russia and came to the United States, the land of freedom and opportunity.

THE BOLSHEVIK REVOLUTION CHANGES JEWISH LIFE IN RUSSIA

The czarist Russian Government was overthrown in March 1917, and was replaced by a provisional (temporary) government. In November 1917, the radical Bolshevik party seized control, and not long afterward set up the Union of Soviet Socialist Republics. All religions were openly discouraged, and as a result Russia ceased to be a center of Jewish learning. However, persecution of the Jews as a people was wiped out. In Soviet



At work in a flourishing orange grove in Palestine.

Russia today Jews serve their country on equal terms with all other elements of the population.

The first permanent Jewish community in England was established in the second half of the eleventh century. Until the period of the Third Crusade (1189-92) Jews lived in various parts of the land, enjoying peace and prosperity. The period from the Third Crusade to 1290 was a very unhappy one for Jews, for they were persecuted and taxed heavily. They were expelled from England in 1290 because they had grown so poor that they were no longer of any value as taxpayers.

Jews were again admitted to England in the seventeenth century, while Oliver Cromwell was in power. Since that time, Jews have found England a land of peace and opportunity; and many have risen to high positions in the British government.

Jews have lived in Germany since ancient times, when small groups of them came as traders from the East, together with Syrian and Greek merchants. During the Middle Ages Jewish communities increased in Germany, and for several hundred years, from the eighth to the eleventh centuries, they lived peacefully. Then came the period of the Crusades. The Jews of Germany suffered a great deal and many of their communities were wiped out. Later, they were confined to ghettos in many of the German cities. It was not until 1871 that all the Jews of Germany were finally granted full citizenship and equal rights. They entered all occupations.

Jews played an important part in the republic that was set up in Germany after World War I. But when Adolf Hitler's National Socialist, or Nazi, party came into power in 1933, the Jews of Germany were cruelly persecuted. Their lot became even more unbearable when Germany started a second world war in 1939. They were the victims of a mass murder policy that, as in Poland, left few survivors.

The first Jews to settle in what is now the United States came to New Amsterdam in 1654. Jews came to America in three large waves of immigration. The first brought Spanish and Portuguese Jews, who settled in the colonies before the Revolutionary War. The second, in the first half of the nineteenth century, brought Jews from Germany and other lands of central Europe. The third and largest wave of Jewish immigration started in the 1880's and continued until 1920. Most of the immigrants of this last group came from eastern Europe, chiefly Russia.

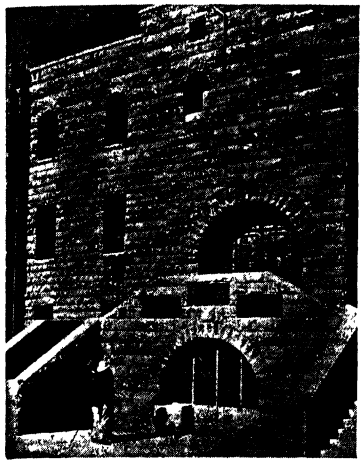
Jewish immigrants have responded eagerly to the opportunities for work and education in the new and beloved land of their adop-



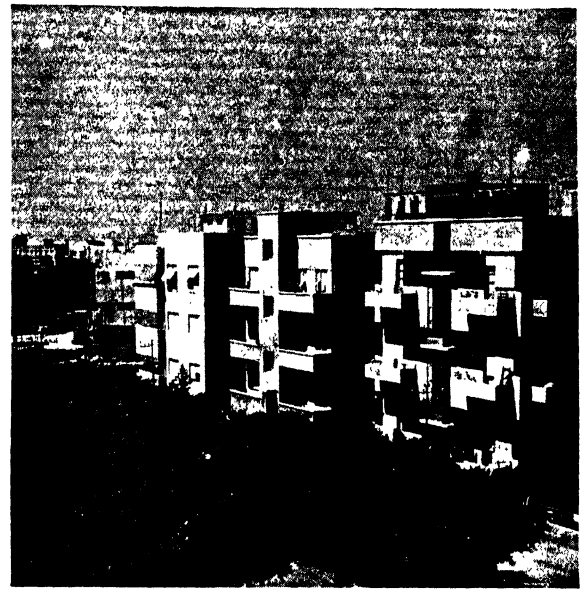
Pictures, courtesy, Hadassah

A youthful German refugee on a farm in Palestine.

MODERN BUILDINGS OF THE HOLY LAND

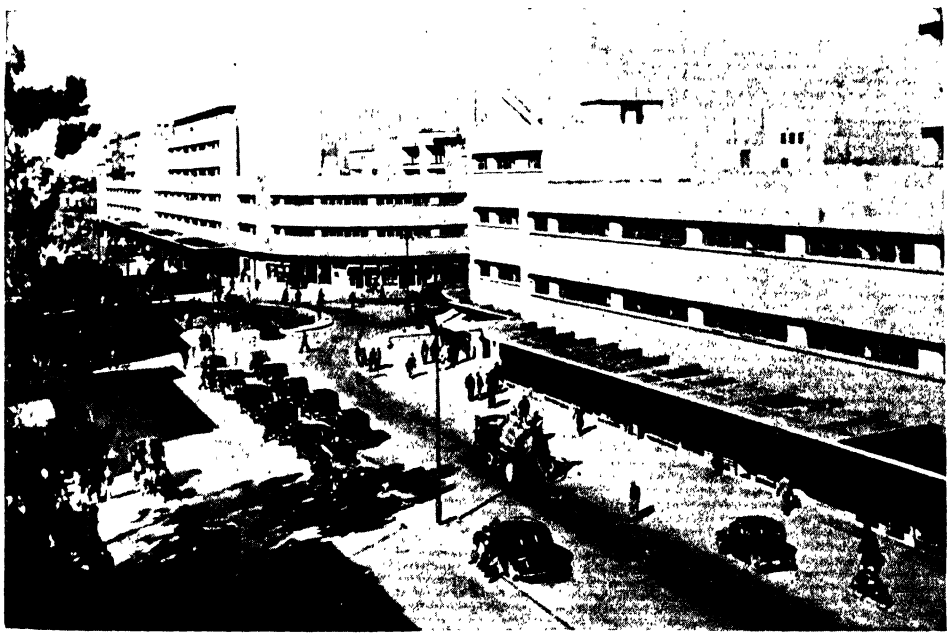


The Nathan Straus Health Center in Jerusalem. The center, which is open to people of every faith, is under the supervision of Hadassah, a group of representative Jewish women of America.

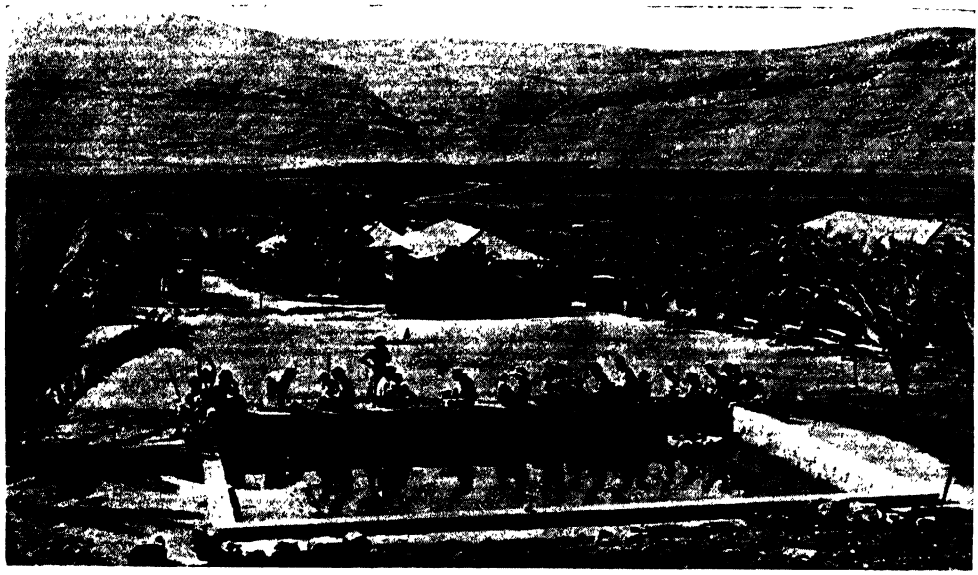


New apartment houses at Tel Aviv. This all-Jewish city was built on a sand dune in the period between the two world wars. After World War II it became the center of the Zionist movement; and now it is the capital of the state of Israel.

Upper left picture, courtesy, Hadassah; upper right picture, Ewing Galloway, N. Y.; bottom picture, courtesy United Palestine Appeal



Modern buildings along the Kingsway, the busiest street in Haifa. This seaport, which lies at the foot of Mount Carmel, is about 70 miles north of Jerusalem. With its modern harbor and its thriving industries, the city has become one of the most important ports in the Middle East. The population is over 100,000.



Courtesy, United Palestine Appeal

The fertile district of the Emek Jezreel, in Israel. These flourishing fields were once a swampy waste.

tion. They have taken an active part in the building and development of this land. They have fought for it on the fields of battle in every war. Haym Salomon, one of the heroes of the Revolution, devoted his life and fortune to the revolutionary cause, raising money for the needs of the army and reducing himself to poverty in the effort. Jews took a part in the westward movement, as pioneers and traders, helping to blaze new trails through the wilderness. There is hardly a town in the Middle West that did not have some Jewish families among its early settlers. They reached the Far West, too, settling chiefly in Wyoming, Texas and California.

There are about 5,000,000 Jews in the United States at the present time; they form about 3.5 per cent of the total population. They have made important contributions to the life of the United States. Together with the immigrant peoples of other lands, they have helped make it the mighty land that it is today.

Palestine has occupied a unique place in Jewish life from the days of Abraham to the present. It was the national home of the Jewish people from Biblical times to 70 A.D. Since that time, Jews have lived in Palestine continuously, in greater or smaller numbers. It has always remained a Land of Promise for many Jews and a source of inspiration. All through the Middle Ages and in modern times, too, the belief has prevailed among certain Jews that a happy day would come when the scattered people of Israel would be gathered once more in the land of their fathers, to live in peace and happiness.

This ancient ideal has at last been realized. The struggle was long and, at times, bitter, but the end was happy. In 1948 a free Jewish state rose in Palestine. Its name is Israel. It became the fifty-ninth country to join the United Nations. We tell you about Israel in Volume 18. In the present chapter we are tracing the story of the Jewish people; and their efforts to win a homeland of their own is part of the story.

As far back as the 1880's Jewish pioneering in Palestine had begun. After the first World War it became more vigorous. Jewish men and women of all lands, inspired by the ideal of rebuilding the Holy Land and also of developing there new forms of community living, settled in Palestine. Many of them formed co-operative agricultural colonies. They drained swamps, tilled the long-neglected soil, irrigated arid lands, built roads. Others came to develop industry and to build towns and cities. The all-Jewish city of Tel Aviv, a beautiful, modern town, now stands on what had been desolate sand dunes.

The Jewish population of Palestine increased from 57,000 in 1919 to 600,000 in 1945. The Arab population also increased during this period. In 1922, the Arabs num-

IN FORWARD-LOOKING PALESTINE

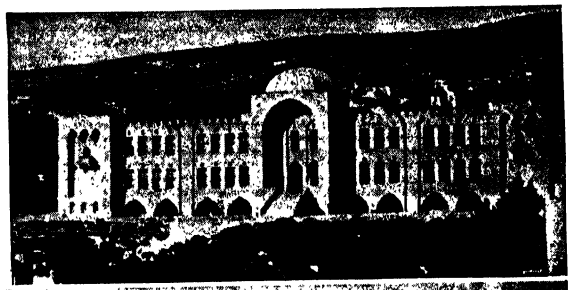


Diamond cutting is a new industry introduced to Palestine by refugees from Holland. Skilled workers and mechanics from many lands have done much to develop the industrial life of Palestine.



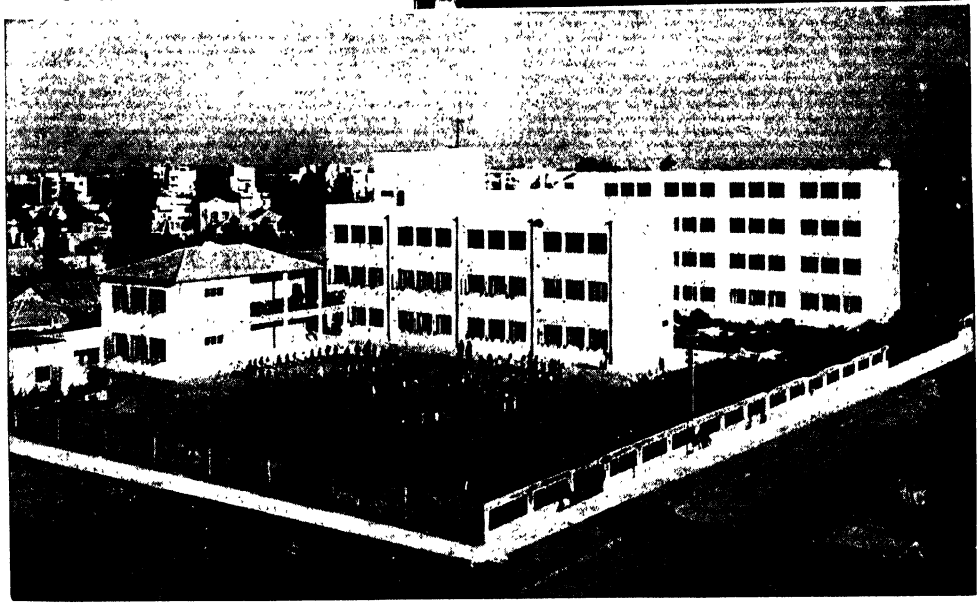
A student in a secondary school of Palestine with a prize-winning model glider that he built in a class in aeronautics.

The Haifa Technicum, the leading technical school in Palestine. Some of the outstanding agricultural leaders of the Jewish community have been trained here.



All pictures, courtesy, United Palestine Appeal

The Bialik School, shown below, is one of the many educational institutions in Palestine receiving financial assistance from the Jewish Agency, a world-wide body.



bered about 664,000; in 1945, their number was about 1,098,000.

Palestine became a place of refuge for the stricken Jews of Europe during the Nazi terror. This small land provided shelter for more Jewish refugees than all the other countries of the world put together.

In World War II, Jewish Palestine proved to be an important source of strength to the Allied nations. It served as an all-important base in the Middle East; it provided manpower, materials and scientific help for the Allies in the most critical period of the war.

THE JEWS HAVE CONTRIBUTED MUCH TO THE PROGRESS OF CIVILIZATION

The total number of Jews in the world is perhaps 11,500,000. Yet, although their numbers are so small, Jews have contributed greatly to the progress of mankind and the development of the good life for all peoples. Their most important contribution, perhaps, has been in the field of religion. Judaism, the religion of the Jews, was the first to teach monotheism, the belief in one God. Out of Judaism grew the great religions of Christianity and Mohammedanism. The teachings of Judaism are set forth in the Old Testament and in a number of other writings. It is a creed based upon the belief in the fatherhood of God and the brotherhood of man.

During the Middle Ages the Jews, living in many different lands, kept open the routes of trade and communication between the East and West. As we have seen, Arabic civilization was at its height at that time. Jews did much to make the science and literature of the Arabs available to the Christian world by translating hundreds of books from Arabic into Hebrew and from Hebrew into Latin and other languages of western Europe.

The works of the great Greek thinker Aristotle had been preserved in Arabic translations. Jewish scholars translated many of these works from Arabic into Latin in the twelfth and thirteenth centuries. As a result, Aristotle became widely known to the men of western Europe, and his teachings were quite generally adopted in the universities of those days.

Jews played an important part in the geographical discoveries of the fifteenth century. Jewish men of science helped to develop and perfect the quadrant and the astrolabe, used in navigation. The astronomical tables used by Columbus on his first voyage to the New World were drawn up by Abraham Zacuto of Salamanca, Spain. Abraham Crescas and his son, Jahuda, known as the Map-Jew, supplied many of the maps used by the navigators who sailed boldly into unknown seas.

In modern times Jewish genius has left its mark in many fields. Jewish writers have contributed much to the study of religion. Jewish philosophers have helped men to gain a clearer idea of the world in which we live. Two of the greatest names in the history of philosophy are those of the Dutch Jew, Baruch (or Benedict) Spinoza, who lived from 1632 to 1677, and the French Jew, Henri Bergson, who was born in 1859 and died in 1941.

Jewish scientists have made many outstanding contributions. The English astronomers, Sir William Herschel and his son Sir John Frederick William Herschel, added greatly to our knowledge of the heavens. Albert Einstein's theory of relativity gave men a new idea of the universe. Albert A. Michelson, the first American Jew to win a Nobel Prize, invented instruments to measure the length and speed of rays of light. Gabriel Lippman, a French scientist, received a Nobel Prize for his amazing work in color photography.

Paul Ehrlich, August Wassermann, Jacob Henle, Moritz Schiff, Robert Frank and Simon Flexner made important contributions in the field of medicine. In psychology, the study of the mind, the name of Sigmund Freud stands out. He was the founder of that branch of medicine and psychology known as psychoanalysis.

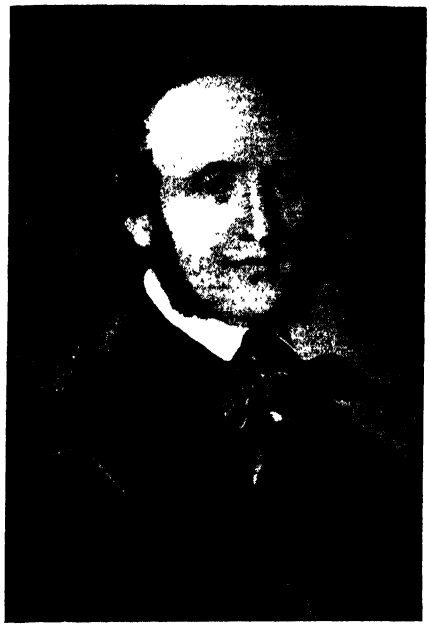
Jews have also been eminent in the world of music. One of the greatest of nineteenth-century composers was Felix Mendelssohn-Bartholdy. Some of the operas of Giacomo Meyerbeer, Jacques Offenbach and Georges Bizet are still favorites. The nine symphonies of Gustav Mahler rank high; so do the compositions of Karl Goldmark. George Gershwin and Ernest Bloch are among the leading composers of the twentieth century.

THERE HAVE BEEN MANY OUTSTANDING JEWISH VIOLINISTS AND PIANISTS

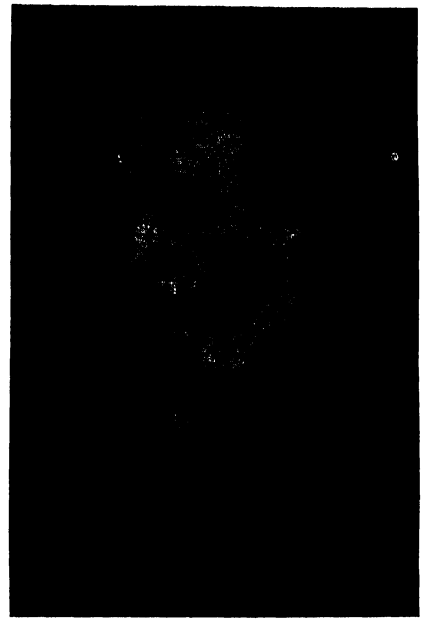
Among the great virtuosi (musical performers) of the past and present we find the Jewish violinists Joseph Joachim, Henri Wieniawski, Fritz Kreisler, Mischa Elman, Jascha Heifetz, Yehudi Menuhin and Joseph Szigeti. Eminent pianists include Anton Rubinstein, Myra Hess, Ossip Gabrilowitsch, Artur Schnabel, Vladimir Horowitz and Artur Rubinstein.

Jews have been prominent in the fields of painting and sculpture. One of the founders of the impressionistic school of painting in

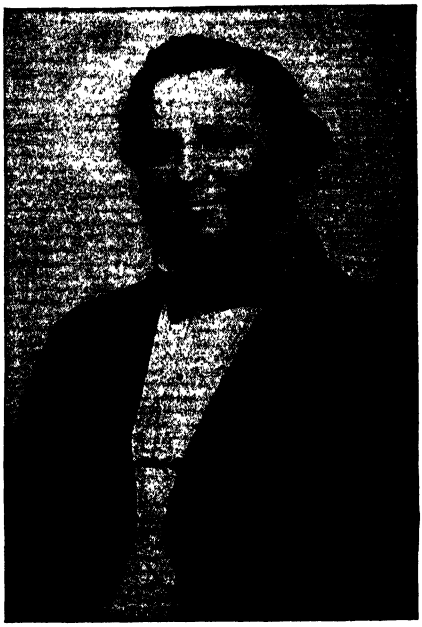
FOUR WORLD-FAMOUS JEWS OF THE PAST



Felix Mendelssohn-Bartholdy was one of the most popular musicians of his time, and his compositions are still much admired. He was a grandson of Moses Mendelssohn, the great reformer.



Benjamin Disraeli was for a long time prime minister of Great Britain and was raised to the peerage as Lord Beaconsfield. He also wrote many novels and was a brilliant talker.

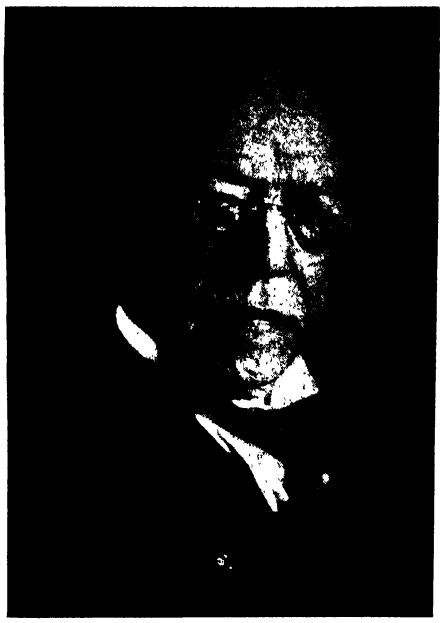


Judah P. Benjamin, of Louisiana, was a Senator of the United States, and then a member of the Confederate States Cabinet. After the Civil War he went to England and became one of the most successful lawyers in London.



Sir Moses Montefiore was one of the greatest philanthropists the world has ever known. He used his wealth for those less fortunate than himself, but always gave wisely. Evidences of his generous gifts are seen in every country.

FOUR NOTABLE AMERICAN JEWS



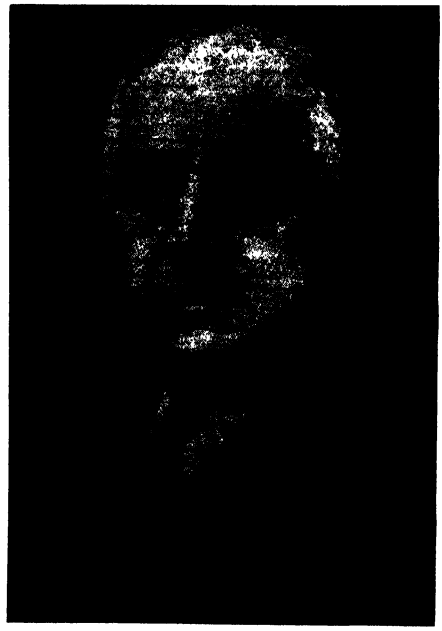
Samuel Gompers, a cigar-maker by trade, was president of the American Federation of Labor for over forty years, and had world-wide influence. He died in 1924.



Albert A. Michelson, professor of physics at the University of Chicago 1892-1929, was awarded the Nobel Prize for Physics in 1907. This picture was made in his laboratory. He died in 1931.



Louis D. Brandeis studied law at Harvard and practiced in Boston, gaining a wide reputation. He was appointed a justice of the Supreme Court by President Wilson. He died in 1941.



Adolph S. Ochs was the publisher of The New York Times and The Chattanooga Times. He made possible the publication of a scholarly encyclopedia of American biography. He died in 1935.

Photos of Ochs, Michelson and Gompers, Underwood & Underwood; that of Brandeis, Brown Bros.

France was Camille Pissaro. Impressionism was introduced into Holland by Josef Israels, into Russia by Isaac Levitan and into Germany by Max Libermann. Other famous Jewish painters include the Englishman, S. J.



Courtesy, Simon & Schuster, Inc.

George Gershwin (1898-1937), one of the foremost composers of the twentieth century. He excelled in popular music and in classical music as well.

Solomon, the Frenchman, Eugène Vichel, and the Belgian, Carl Jacoby. The most eminent Russian sculptor of the nineteenth century was Mark Antokolski. Jacob Epstein, Jacques Lipschitz, Ossip Zadkin and Chana Orloff also created wonderful statues.

The roll call of Jews eminent in literature is a long one. Among them we would have to include the Englishmen, Sir Arthur Wing Pinero and Israel Zangwill; the Germans, Heinrich Heine, Jakob Wassermann and Lion Feuchtwanger; the Austrian, Artur Schnitzler; the Frenchmen, Catulle Mendès and Gustave Kahn; the Americans, Fannie Hurst, Ludwig Lewisohn, Edna Ferber and Gertrude Stein. There are countless others.

Among the most famous of all Jews in public life was Benjamin Disraeli, the Earl of Beaconsfield, who was one of Britain's ablest prime ministers. Another distinguished British statesman was Sir Rufus Isaacs, who became Marquis of Reading. He served as Britain's Lord Chief Justice; and from 1921 to 1926 he was viceroy of India.

American statesmen of Jewish descent include three members of the United States Supreme Court: Louis D. Brandeis, Benjamin Cardozo and Felix Frankfurter. Henry Morgenthau served as Secretary of the Treasury from 1934 to 1945. Herbert H. Lehman was governor of New York State from 1932 to 1942. In 1943 he was named director-general of the United Nations Relief and Rehabilitation Administration (UNRRA).

A number of Jews have won great success in the fields of business, banking and manufacturing. Some of these successful Jews rank among the world's greatest philanthropists. We might mention here the Rothschild family, Sir Moses Montefiore, the Guggenheim family, Jacob Schiff, Nathan Straus, Otto Kahn, James Loeb, Julius Rosenwald, Herbert Lehman and Bernard Baruch.



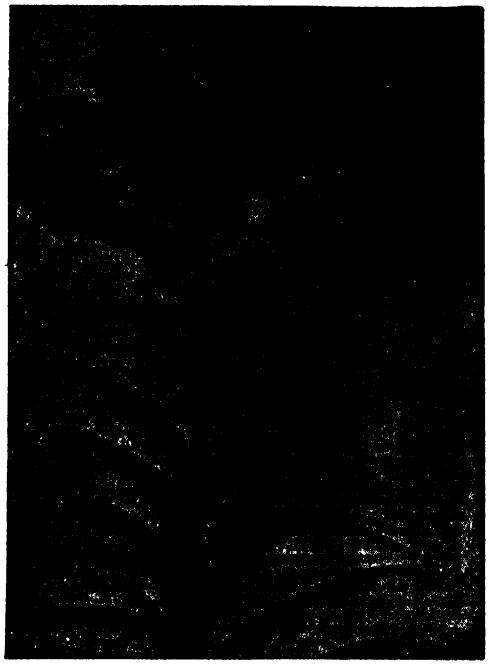
Courtesy, Hadassah

Henrietta Szold, founder of Hadassah, the women's Zionist society. Among other things, Hadassah has done much to improve health conditions in Palestine.

We have mentioned only a few of the Jews who have won fame as philosophers, scientists, musicians, painters, sculptors, men of letters, statesmen and philanthropists. These few names, however, will give you some idea of the great contribution that the Jewish people has made to the civilization of the world.

By DOROTHY F. ZELIGS.

THE END OF THE DEPARTMENT OF ALL COUNTRIES.



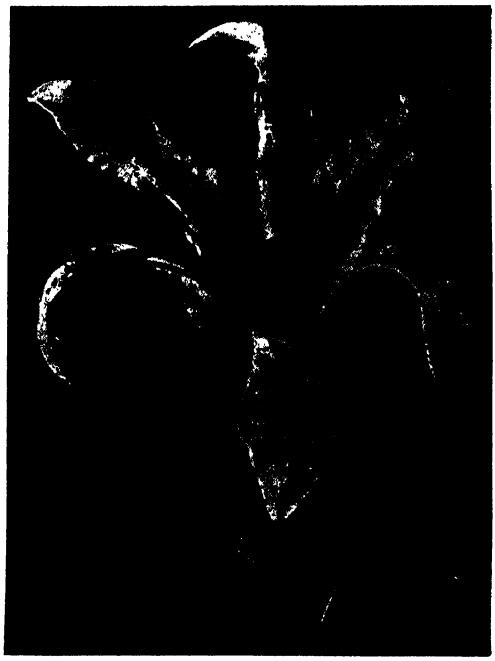
THE TIGER-LILY

This lily is very stately, and is a great ornament in any garden. It is easily cultivated, and needs a deep, sandy loam with an open but sheltered position. It was taken to England from China.



YELLOW LILY

All lilies are very stately and graceful. Many of them are much alike, but particular varieties are adapted to particular soils and situations. Some are admirably suited for the rock garden.



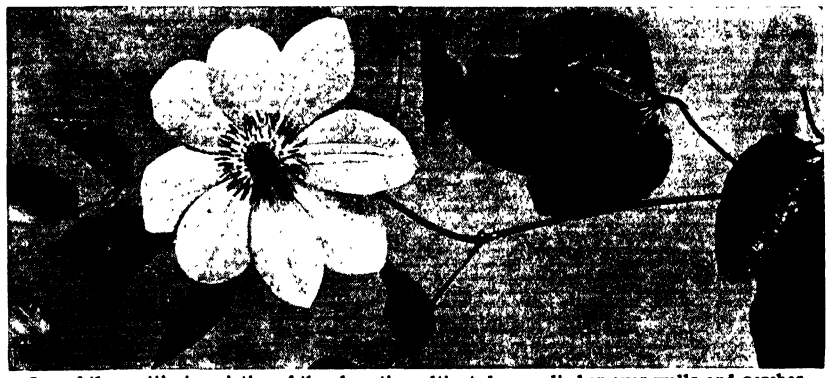
THE GOLDEN LILY

This is one of the handsome lilies that have come to us from the East. There used to be a belief that the health of the household in whose garden this lily grew corresponded with the condition of the lily.



THE MADONNA LILY

The madonna is one of the best-known lilies, and also one of the loveliest. It will thrive well for years if left undisturbed in good soil. It was dedicated to the Virgin Mary.



One of the prettiest varieties of the clematis, cultivated as a climber over walls and porches.

THE FLOWERS OF THE GARDEN

THERE is no such thing in wild nature as a double Rose. All Wild Roses have only five petals, a great number of stamens, and several pistils. The gardener has so coaxed and petted the rose that he has induced it to turn nearly all its stamens into petals, and he has changed its color so often that now we may have roses of almost any tint, from yellow and white and pink to the darkest of purple crimsons. He has been trying for long years to grow a blue rose, but, so far, has always failed.

To-day there are the names of innumerable varieties of roses in the catalogues of the nurserymen. Owing to the fact mentioned, that the "doubling" of the rose has meant the loss of most, or all, of its stamens, these flowers, lovely as we may consider them, are, after all, imperfect flowers. The pistils are mostly there, but if they produce seeds, it is, in most cases, through pollen brought by the bees from wild roses in the fields; so that the seeds grow into plants with flowers more or less like the field rose. Roses like the parent plant can seldom, or never, be raised from seed.

So, when a flower appears that is better than others of that particular kind of rose, the gardener has to cut off the shoot that produced it, and to get it to take root. Then, when it has grown into a little bush, he cuts out a number of the shoot-buds from the stems, and fixes them under the skin of a wild rose, and when the wound has healed and the bud has grown into a shoot, he cuts off all the other shoots and buds of the wild rose, and allows only the new parts to grow. In this way he makes a number of specimens of his new rose out of the one little cutting he induced to root. Some of the shoots he may cause to grow on wild-rose stems, or "stocks," as he calls them, by grafting; by this means all garden roses have to be increased.

One of the most popular of all garden flowers is the Sweet Pea. It grows wild in Sicily, and was first grown in our gardens a little more than two hundred years ago. There is no need to describe the flower, except to point out that its structure is the same as that of the narrow-leaved everlasting pea, and of the broad-leaved everlasting pea of the garden. These, however, are perennials, and bear their flowers in clusters, or racemes; while the sweet pea is an annual, bearing only two or three blossoms on each flower-stalk.

The Carnation, in its wild state, is, of course, always single, and it is a native of the countries around the Mediterranean. It is believed to have been taken to England as far back as the middle of the thirteenth century. Owing to its strong, clove-like scent it used to be called the clove, or clove-pink. As a wild flower its color is always lilac; but by careful selection and crossing between the best of the varieties that appeared in gardens we now have all sorts of tints.

Garden pinks of all kinds are closely related to the proud carnation; so is the old-fashioned Sweet-william, which has broader and greener leaves, and the brilliant Chinese Pink, so frequently grown as a garden annual. The pink and the sweet-william came from Europe long, long ago, and the Chinese, or Indian, pink was brought here from China just about two hundred years ago.

THE GERANIUMS, THE REAL NAME OF WHICH IS PELARGONIUM

Then there are the Geraniums used for bedding in the summer months, but which are too tender to stand our winter climate out of doors. The proper name is *pelargonium,* but the gardener persists in calling it geranium. We have a number of wild geraniums in this country, but no pelargoniums. The latter were introduced from South Africa about two hundred years ago, and have been so changed and improved by crossing that they have little resemblance to the original South African plants. They may be ranked in three distinct classes: the show pelargoniums of our greenhouses, with large, richly colored flowers; the zonal, or bedding, pelargoniums; and the ivy-leaved pelargoniums that look so well trailing over the sides of window-boxes.

THE SWEET STOCKS HAVE BEEN BROUGHT FROM EUROPE

Brompton and Ten-week Stocks are cultivated forms of plants that grow wild in the south of Europe, and they have grown in our gardens for a hundred and fifty years. They are annuals. The Wall-flower belongs to the same family—*Cruciferæ*—and is also a European plant; but it has been known in English gardens for over three hundred years. It will not survive a North American winter. Arabis, that produces masses of pure white flowers in early spring on rockeries and in border edgings, is another member of the same family. It was taken to England from the Caucasus a little more than a century ago, and soon was brought across the Atlantic.

MANY FLOWERS BELONG TO THE BUTTERCUP FAMILY

The Buttercup Family has given us many garden flowers, among them all the beautiful forms of Clematis that climb over our walls and porches, covering them with white or purple flowers. One of the best of the white-flowered kinds is the Mountain Clematis from India. The big-flowered purple and blue kinds are cultivated forms of a Japanese species. There are no petals in any clematis, the showiness of the flower being due to the four sepals. The noble Larkspurs also belong to this family.

Often in our gardens we shall find a larkspur with leaves divided into hair-like portions, and with a spike of blue, red or white flowers. This is also a field weed in the east of England. But in larger gardens we shall frequently see a larkspur that towers up to six feet or more, and ends in a long, thick column of brilliant blue flowers. Its parents grew wild in North America a hundred and fifty years ago.

The Christmas Rose is another of the Buttercup Family, nearly related to the wild hellebores. It is no rose at all. Its bold white flowers appear in winter, and so are greatly esteemed. All the brightly colored *Ranunculi,* seen in the flower shops, are true buttercups with larger flowers than any of our wild yellow kinds; they came from Turkey and Persia, where they had been cultivated long before. The garden anemones, too, are relatives.

There are Poppy Anemones also, and Japanese anemones, the latter tall-growing, with handsome leaves and large white or pink flowers. Poppy anemones are real old-fashioned garden flowers, for we have grown them for three hundred years; but the scarlet anemone and the Japanese anemone are quite modern introductions.

Columbine, Monk's-hood and Peony all belong to the Buttercup Family, although they are so unlike in general form. The Columbines come near to the larkspurs. Up to the middle of last century the garden columbines were mostly forms of the European kind, but in later years, owing to the coming of the beautiful long-spurred yellow columbine from California in 1873, a good deal of crossing has taken

place. The peony, though a native of south Europe, was grown in English gardens at least three hundred and fifty years ago. These peonies were the large-flowered, dark crimson kind, and a smaller white-flowered one from Siberia; but toward the end of the eighteenth century the shrubby tree-peony was brought from China and Japan, and became popular on account of its more delicate tints.

THE VIOLETS AND PANSIES OF THE GARDEN

Garden Violets are improved forms of the wild sweet violet, and the Pansies and bedding Violas have been produced from the little wild pansy, or heartsease. Many of the garden violets are double; but the growers of flowers do not appear to have tried to get double pansies—they seem to have tried to keep the flower as flat as possible.

THE FUCHSIA, A NATIVE OF SOUTH AMERICA

Except as a summer bedding plant, the Fuchsia is seen only in gardens in sections where the climate is warm. In California we shall find it is one of the common garden bushes, and it often becomes a small tree. It is a South American plant that was unknown in this country until near the end of the eighteenth century.

THE SWEET OLD-FASHIONED POLYANTHUS AND THE AURICULAS

The Polyanthus is to-day rather a forgotten and neglected flower, but we shall still find it treasured in old-fashioned gardens and in gardens of country houses. It is believed to have had its origin in a crossing of pollen between the primrose and the cowslip. The result is the large flowers of the primrose on the tall flower-stalk of the cowslip, with a greater variety of rich tints than either of its original parents possessed. The Auricula is another kind of primrose that was formerly a great favorite of gardeners. All the many varieties of rich coloring have been produced from the yellow-flowered auricula that grows wild in the Swiss Alps.

Among the wild flowers that have been taken into the garden without its being thought necessary to improve them is the dainty Forget-me-not.

THE SEDUMS, OR STONECROPS, FROM EUROPE

Several wild Sedums, or Stonecrops, of Europe have been admitted into the garden; not only the yellow and white stonecrops, but also the taller crimson-flowered Orpine. A beautiful sedum with bright crimson flowers is the trailing stonecrop from the Caucasus region.

THE THISTLES OF OUR GARDEN BEDS

We have even taken into the garden several Thistles, among them the handsome blue-flowered Globe Thistle from the south of Europe, which has been with us for more than three hundred years. The Cotton Thistle, which is a tall, branching plant, with purple flowers and huge, but handsome, spiny leaves, covered with white cotton-like hairs, is wild in some parts of the country. Another fine thistle is called the Holy Thistle, or Milk Thistle. Its large leaves are marked with white along the midrib.

GREENISH WHITE FLOWERS OF SOLOMON'S SEAL

Solomon's Seal is a real wild flower and is much more frequently seen in our woods than in the garden. It is one of the Lily Family, though its habit is so very different from most of the lilies. Its tall, arching stem, set with a row of leaves on each side, looks more like the frond of some palm. The greenish white, narrow, bell-like flowers present a very singular appearance.

LILIES AND TULIPS FROM FAR-OFF LANDS

The Lily Family figures largely in our gardens, and of the lilies proper we have introduced several. There is, perhaps, none of them so fine as the hardy Madonna Lily, or White Lily. It is wild in the south of Europe. There is also the Tiger-lily, with its dark-spotted, orange-red flowers, that came from China a hundred years ago, from which country and Japan we have received several other lilies.

The strongly scented Japanese Lily, with the golden stripe down the middle of the large white petals, is, perhaps, the favorite, though it is not hardy and can be turned into the garden only in summer. It is usually planted in tubs and grown in the greenhouse, until the flower-buds have formed. This lily was unknown to us fifty years ago.

Very similar, except for the golden stripe, is the Showy Lily, a smaller but more hardy kind that came from Japan nearly eighty years ago. Then there is the Giant Lily, that has large, heart-shaped leaves, and a stem ten feet long that ends

in a cluster of drooping white, trumpet-shaped flowers. The Star of Bethlehem is another plant of the Lily Tribe, which, though a native of Europe, has become naturalized in damp places. It is one of the prettiest of our smaller bulbous plants, its numerous grass-like leaves spreading around a stem crowded with white star-like flowers.

Among other lilies we must not forget the Tulip, of which we have a great number of varieties of diverse forms and colors. Most of them have descended from three wild tulips found in south Europe, Siberia and Asia Minor. The fragrant white Day Lily is from Japan, as well as some of its relatives. The sweet-flowered Lily-of-the-valley is a wild plant of the woods which is much more frequently seen in gardens than outside of them. The stately Red-hot-poker, which makes so fine a display in parks and gardens at the end of summer, is also a lily, coming from South Africa.

HYACINTHS FROM EUROPE AND THE ORIENT

The garden flowers that arise from bulbs, like these lilies, might well take up an article to themselves—they are so many. Many of them are known under the general head of Dutch bulbs. Among these are the wonderful trusses of sweetly perfumed Hyacinth-bells that spring from the onion-like bulb in all sorts of charming tints. The original stock from which all these varieties have been produced is the Oriental Hyacinth, which is wild in Syria.

The Grape-hyacinth belongs to another section of the Lily Family, and grows wild in Europe and the Orient. Instead of the bell-shaped flowers of *the* hyacinth, these are globular, and, as they are dark blue in color, resemble little grapes; so the plant has been called grape-hyacinth. The wild hyacinth, or bluebell, of English woods, belongs to another branch of the family—the Squills. The kind more generally seen in borders is the early-flowering, bright blue Siberian Squill, often planted with a somewhat similar flower called the Glory of the Snow, which came to us from the island of Crete less than fifty years ago.

FLOWERS OF THE AMARYLLIS FAMILY

Another group of bulbous plants comes near to the lilies, but belongs to the Amaryllis Family. Well-known garden examples of this family include the Snowdrop, Narcissus and Belladonna Lily.

The Narcissus group includes many of our loveliest spring flowers, which we know as Narcissus, Jonquil and Daffodil. None of them is native to America, though in many places the Daffodil has escaped from gardens and brightens the meadows with its golden bells. There are many varieties of each and all are lovely. In Europe the Jonquil has been used for many years in making perfumes.

THE STATELY IRIS AND GLADIOLUS, AND THE EARLY CROCUS

Then there are so-called bulbous plants whose rootstocks are solid corms, instead of being made up of fleshy scales as the real bulbs are. These belong to the Flag, or Iris, Family, and include the Crocus and Gladiolus. The Iris Family is a huge one, and its members range from tiny little bulb-rooted affairs buried in the baked soil of Africa and Palestine to hurry frantically into bloom in a burst of purple petals and fragrance when moistened by rains, to the English and Spanish Irises, with narrow rush-like leaves which spring from underground corms; from the Bearded Irises with broad sword-like leaves and thick rootstocks that creep along the surface, to the great double flowers that Japanese tend so carefully in their muddy fields, and for which they hold regular festivals for admiring their beauty. It is these Japanese flowers that we see so often painted or carved in Oriental art. The pale purple Florentine Iris is thought to have been the original of the well-known fleur-de-lis—the lily of France—which appeared on the French arms and flag. This flower furnishes, in its root, the perfumed stuff with an odor as of violets, which we call orris root (that is, iris root).

We have a quantity of garden irises growing in dry soil, but practically all of them bear veinings in a different color, or of a different shade from their background, on the lower parts of the perianth called "falls." Sometimes, moreover, there is a "crest," usually yellow or orange, like a narrow brush. This lovely flower is found in almost every marsh as far as the Middle West. Our garden Crocuses are cultivated forms of species found growing wild in the south of Europe and Asia, while the Gladioli originally came chiefly from South America.

THE END OF PLANT LIFE.

FLOWERS OF THE GARDEN



A FINE PLUME OF SPIRÆA



SCABIOUS



BARTONIA



MIGNONETTE



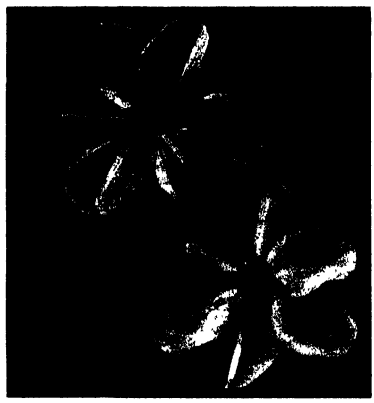
FLEABANE



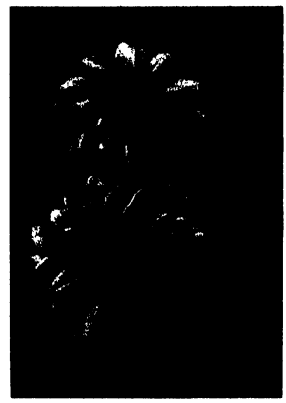
HYBRID DELPHINIUM



LORD NEVILLE CLEMATIS



POET'S NARCISSUS



DOUBLE CLEMATIS



PINK BEAUTY DAHLIA



DOUBLE TULIP



VERBENA



SNAKE'S-HEAD



HOLLYHOCK



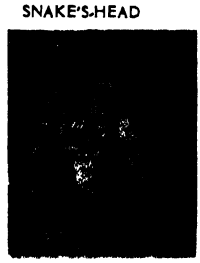
CACTUS DAHLIA



COREOPSIS



GOLDENROD



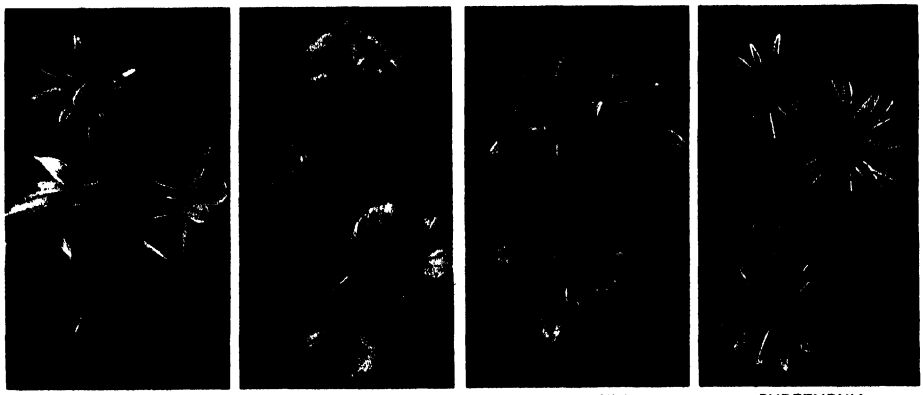
SINGLE FUCHSIA



IRIS SINGLE VIOLET ALLWOODII OMPHALODES TULIP



SINGLE DAHLIA AURATUM LILY LOS ANGELES ROSE



COLUMBINE VIOLA CAMPANULA PYRETHRUM



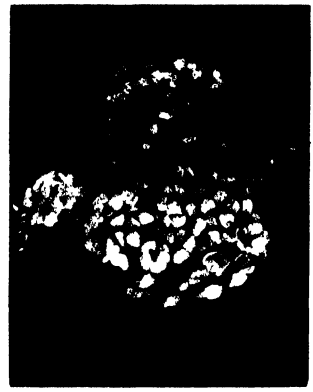
CANTERBURY BELLS MALOPE RED-HOT POKER MADONNA LILY SWEET PEA



GOAT'S-RUE



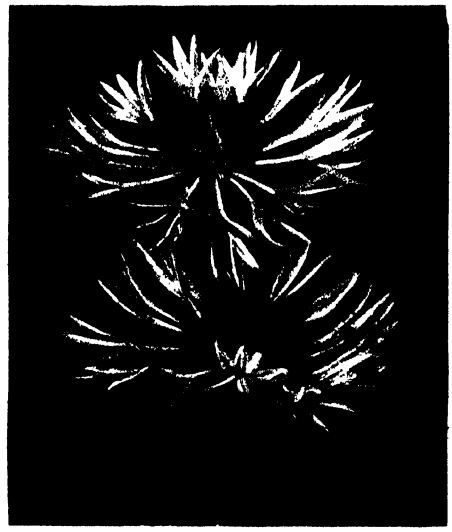
MACBETH ROSE



PERENNIAL PHLOX



PINK-PEARL RHODODENDRON



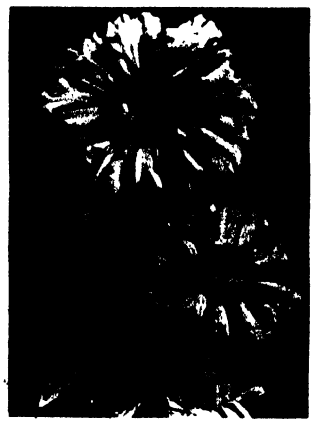
PERENNIAL CORNFLOWER



EDITH JONES DAHLIA



NEMESIA



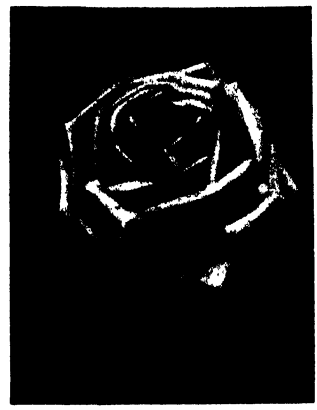
AN AFRICAN MARIGOLD



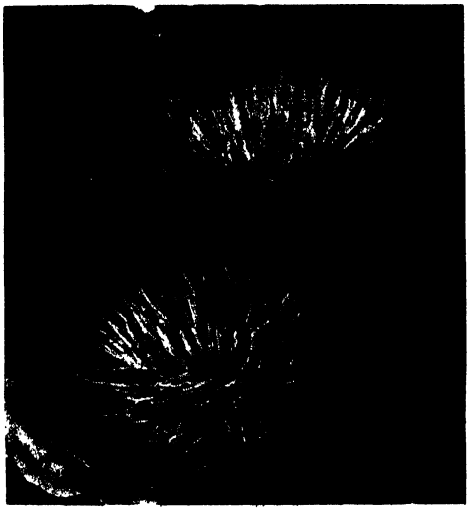
BLUSHING-BRIDE ROSE



COLLARETTE DAHLIA



LADY MOND ROSE



GREAT GOLDEN KNAPWEED



CHILDERLEY PRIDE CHRYSANTHEMUM



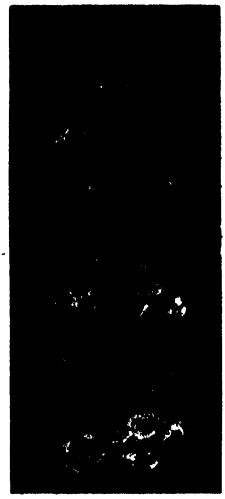
SINGLE ASTER



TURK'S-CAP LILY



ANNUAL CHRYSANTHEMUM



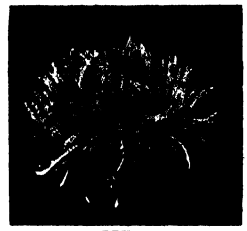
VIBURNUM PLICATUM



A FINE SPECIMEN OF LYON ROSE



A BORDER CARNATION



WHITETHREAD CHRYSANTHEMUM



PARROT TULIP



PENTSTEMON



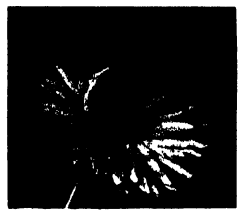
GIANT POLYANTHUS



NEMOPHILA



FOXGLOVE



A TYPICAL ACROCLINIUM



FRILLED BEGONIA



JESSIE MURRAY CARNATION



POMPON DAHLIA



LILY-OF-THE-VALLEY



ANTIRRHINUM



GEORGE MITCHELL PANSY



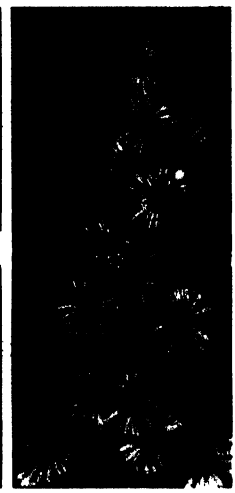
EMPEROR DAFFODIL



RED HYBRID SUNFLOWER



DOUBLE ZINNIA



MICHAELMAS DAISY



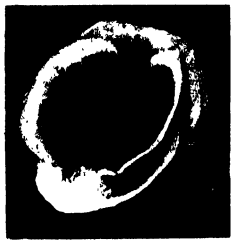
ORNITHOGALUM



PERFECTION STOCK



BUDDLEIA



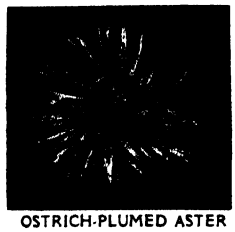
SHIRLEY POPPY



MRS. CAIRNS BEGONIA



CARNATION



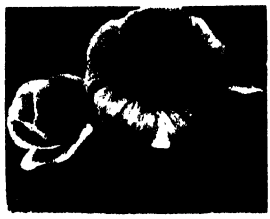
OSTRICH-PLUMED ASTER



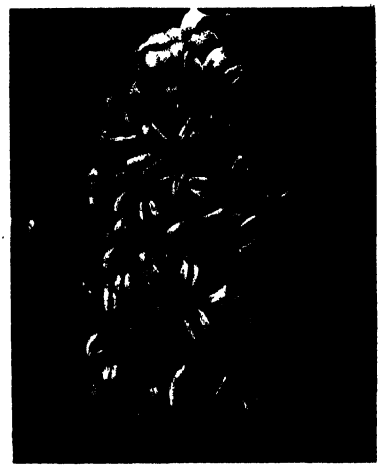
PEARL HYACINTH



ESCHOLTZIA SEDUM MAMMOTH ASTER MYOSOTIS GAILLARDIA

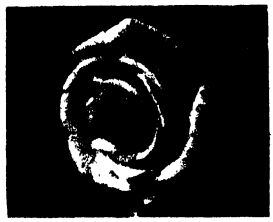


LAVATERA



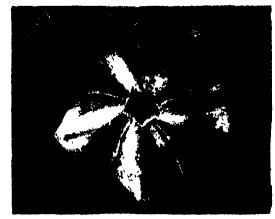


DOUBLE SUNFLOWER



A BURBANK ROSE

CITY OF HAARLEM HYACINTH



VARIEGATED PERIWINKLE



DOUBLE WALLFLOWER



WHITE SPIRAL CANDYTUFT



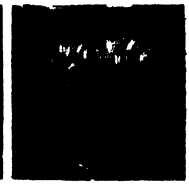
GRAPE HYACINTH



WINTER ACONITE



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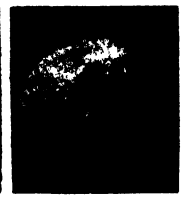
WATER LILY



GODETIA



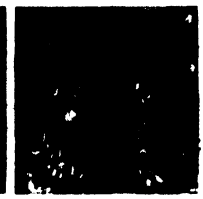
DOUBLE FUCHSIA



AFRICAN MARIGOLD



GLADIOLUS



DOROTHY PERKINS ROSE

Many of these flowers are from blooms in the famous Sutton Nurseries at Reading, England.

THE STORY OF THE AMERICAN FLAG



Courtesy, Boy Scouts of America

LONG before men had learned to build houses and churches and cities, and long before they knew how to manufacture the bunting and silk of which our flags are made to-day, they used the skins of animals or the feathers of a bird fastened to a long pole to show the tribe or band to which they belonged, and to signal to one another. Men traveling long distances through the forest knew by this whether they were meeting friends or foes.

The Egyptian armies carried standards in battle. These were metal images of birds, animals, fans, boats or simply emblems attached to poles. The Assyrians and the Jews had similar customs. Banners are mentioned in the Bible. The Greeks carried sacred emblems of metal, while a purple cloth on the end of a spear was the signal to charge.

In the early days of Rome figures of many different animals were carried by different bands; later the eagle was the only one used. But the Romans also began to use cloth, and the later emperors had a special purple banner. From this time onward the banner became more and more common. During the colorful period of the Feudal Ages, every nobleman had his own banner, and in some cases the standard of the king became in later times the national flag.

When you go to a football game between two great universities or colleges, you know at once by the flags and colors displayed by each team to which side they belong, and when the game is won the winning team rejoices more over the honor of its college and its flag than over the gain to itself.

We know to what nation a ship belongs by the flag it displays. In the language of flags, white indicates a truce and red, danger, as when explosives are being transported. Dipping the flag is a sign of respect, flying it at half-mast, a sign of mourning, hoisting it upside down, an appeal for help. Striking, or hauling down, a flag is a signal of surrender.

When the President of the United States is cruising or traveling in any vessel of the Navy, we know, even at a long distance, that the President is on board because his ensign flies from the mainmast. Important work of the Army and Navy is done by the Signal Corps with a system of flag signals and wigwagging. The Boy Scouts and Camp Fire Girls know how to talk to one another in this way. Different flags tell us many different kinds of things, but there is one flag which always tells us the same thing, and that is *the flag of our country.*

The colors—red, white and blue—are symbolic. "Red is for courage, zeal, fervency; white is for purity, cleanness of life and rectitude of conduct; blue is for loyalty, devotion, friendship, justice and truth."

The star is an ancient symbol of India,

Persia and Egypt, and signifies dominion and sovereignty. Even the tassels which hang from the flag and the fringe which surrounds it have a meaning, for they are symbols of a very early rite, and the colors were first used by the Christian Church. When we see the flag we think of what the men and women of the past have done to uphold its honor and glory, and we vow in our hearts that they shall never grow less.

HOW THE BRITISH UNION JACK GREW FROM A SIMPLE BANNER

The ancient national flag of England was the cross of St. George in red on a white banner. In 1606 it was united with the white cross of St. Andrew in "the king's colors." This was the "Union" of Scotland and England, which was not finally established until 1707, when this became the official flag and was used until Ireland was united to the kingdom in 1801. Then the red cross of St. Patrick was added to make the present Union Jack. Although the American colonies used the British flag for a hundred and fifty years, none used the present Union Jack, as it was not adopted until after they had gained their independence.

SOME FAMOUS FLAGS USED IN THE REVOLUTION

In the early days of the Revolution several states carried special banners. It is said that a flag was carried at Bunker Hill which bore the motto: "Come if you dare." In Trumbull's celebrated picture of the battle the flag is red with a white canton (corner) with a green pine tree. Other pictures show a blue flag with a white canton, the cross of St. George and a pine tree. Probably both were used. Connecticut soon raised a flag bearing the arms of the colony, and General Putnam carried a flag bearing on one side the motto of the state: *Qui transtulit sustinet,* which may be translated, "He who brought us here will sustain us." On the other side was: "An Appeal to Heaven." Rhode Island adopted a white flag bearing a blue anchor with the word "Hope," and the blue union carried thirteen white stars. In speaking of flags, the word union means a special device, or design, such as a circle of stars, or the combination of two or more symbols in one design, such as the Union Jack.

Soon after arriving in Boston in 1775, Washington purchased several small cruisers to prey upon British commerce. They bore for several months a white flag with a green pine tree and the motto: "An Appeal to Heaven." This, then, seems to have been the first American flag with more than a local meaning. In 1776 it gave way to the "Congress Colors."

THE CONGRESS COLORS. FIRST OFFICIAL AMERICAN FLAG

You will find on page 1157 of this work how the thirteen colonies revolted from the mother-country and became the thirteen original states of the United States of America. The first official American flag was called the Congress Colors, or the Grand Union Flag, or the Navy Ensign. This ensign was composed of thirteen equal stripes, alternately red and white in color, to signify the thirteen original colonies, and in the upper left-hand corner was a small Jack, the flag of Great Britain, which showed that the colonies still felt their union with the mother-country, whose children they were, but children who had grown up into an independence which could not be suppressed by the edicts of an unjust king.

THE RATTLESNAKE FLAG THAT FLEW WITH THE CONGRESS COLORS

This flag, not the Stars and Stripes, was flown for the first time, December 3, 1775, from the stern of Commodore Hopkins' flagship, the Alfred, one of eight vessels bought or built by the Continental Congress. John Paul Jones, America's great naval hero, at that time senior lieutenant, raised the flag with his own hands. Perhaps it was at that proud moment that he exclaimed: "That flag and I are twins. We can not be parted in life or in death. So long as we can float, we shall float together; if we must sink, we shall go down as one." From the mainmast of the ship, Commodore Hopkins hoisted a flag of yellow silk with a coiled rattlesnake and the warning: "Don't Tread on Me." This was called the Gadsden flag because it was presented to Congress by Christopher Gadsden, a delegate to the Continental Congress from South Carolina. The jack hoisted at the same time was alternate red and white stripes with a gliding rattlesnake. In this sense, a jack means a small flag used as a signal, usually the same as the union.

Another rattlesnake flag is described by an English writer: "A separate flag has lately appeared in our seas bearing a pine tree with the portraiture of a rattlesnake coiled up at its roots with this daring motto: 'Don't tread on me.' We learn that vessels bearing this flag have a sort of commission from a society of people at Philadelphia, calling themselves the Continental Con-

gress." This was a Massachusetts flag, and was flown by the vessels of the navy of that state. At least two other flags showing a rattlesnake were used about that time.

THE STARS AND STRIPES, ADOPTED BY CONGRESS IN 1777

A month after the Congress Colors were raised on the Alfred they were raised over the Continental army at Boston, January 2, 1776. The flag, however, was never carried in battle. After the Declaration of Independence this flag bearing the British Jack was no longer appropriate, but there seems to have been no other legislation until nearly a year later. On the first real birthday of the Stars and Stripes, June 14, 1777, the Continental Congress passed the following resolution:

"Resolved: That the flag of the United States be 13 stripes alternate red and white, that the union be 13 stars, white in a blue field, representing a new constellation."

It was just at this time that Paul Jones was placed in command of the Ranger, and in November was sent to bear to France the news of the surrender of Burgoyne. The flag which was flown from the staff of the vessel was made, with much excitement and rejoicing, by a group of the girls of Portsmouth, New Hampshire, out of their silken gowns. When the little fleet was in French waters in February, 1778, Admiral La Motte Picquet gave this flag the salute which France accorded to all other republics, which was the first recognition of American independence by any foreign power. A Dutch officer in the West Indies had saluted the colors in 1776, but had been rebuked by his government.

THE STORY OF BETSY ROSS AND THE FIVE-POINTED STARS

There are many stories as to who was the designer of the first American flag, in which the names of Francis Hopkinson and Captain Paul Jones are mentioned. One is that a commission was appointed, consisting of General Washington, Robert Morris and Colonel Ross, to decide upon our national flag. We are told that they consulted with Mistress Ross, a flag-maker who lived in Philadelphia, and that, benefiting by her suggestions, the flag was made from a drawing handed to her by George Washington. The story of Mrs. Betsy Ross is interesting. It is said that she suggested making the stars with five points instead of six, and that she made all the flags for a time. Most students of history do not think that the story is proved. More think that Francis Hopkinson designed the flag.

An interesting account of the making of the first flag, about which there is no doubt, tells of an attack on Fort Schuyler (on the site of old Fort Stanwix, at Rome, New York) made by the British, August 3, 1777. Two hundred men of the Massachusetts regiment sent forward to reinforce the garrison brought word of the "flag resolution," and immediately a flag was made, from soldiers' white shirts, the red petticoat of a soldier's wife and the blue cloak of Captain Abraham Swartout. This is the first occasion when the Stars and Stripes were fired upon.

THE DESIGN MAY HAVE BEEN SUGGESTED BY WASHINGTON'S COAT-OF-ARMS

It is not known whether the stars were borrowed from the flag of Rhode Island, or whether the idea was borrowed from the Netherlands. It is natural to suppose that our forefathers may have been influenced by the flag of Holland, to whom they were so much indebted, and it is also quite possible that the stripes and stars upon Washington's own coat-of-arms may have suggested the stars and stripes of our flag.

It does not really make much difference where the idea of the flag came from. The stripes were used, as we have seen, long before the stars were adopted, and the stars were on the Rhode Island flag. Perhaps the idea did come from Washington's coat-of-arms, but it seems more likely that the flag simply grew, and that no one person is really responsible.

WHEN THE FLAG HAD FIFTEEN STARS AND FIFTEEN STRIPES

When the new states Vermont and Kentucky entered the Union, two new stars and stripes were added to the flag by act of Congress, to take effect May 1, 1795. The circle of stars was replaced by five rows of stars, three in each row. This was the flag which was flying over Fort McHenry at Baltimore twenty years later when the British bombarded it, September 14, 1814. The states admitted immediately after Kentucky were not represented upon the flag, and they demanded that they be given a place also. However, no change was made for years.

It is plain that the addition of a new stripe for each new state which entered the Union would make the stripes too narrow, and on April 4, 1818, Congress enacted that the stripes in the flag should be always thirteen in memory of the thirteen original colonies, and that each new state should be

represented by a new star added to the flag on the Fourth of July following the admission of the state to the Union. There were twenty states then. At the time of the Revolution the flag had 13 stars; of the Mexican War, 29; of the Civil War, 35; of the Spanish-American War, 45; and the number to-day is 48. So you see that the arrangement of the stars has been frequently changed as the number of the states has increased.

Each state now has its own flag, though in a few cases the flag has not been officially adopted by the legislature. During the Revolution and the War of 1812 troops fought under the state flags, though they were not the flags in general use today. It was not until the war with Mexico in 1846 that our national standard was regularly carried into battle.

Most of the present state flags, even of the older states, are not more than fifty years old. Some are very attractive, though many are very much alike. Many states use the seal of the state on a blue ground as the state flag. Unless one looks very closely it is difficult to tell them apart. Other states use different colors as a background, and still others have different arrangements of stars, stripes and devices. You should know your own state flag.

There should not be a child anywhere in the United States who does not know how and when our national song, which gave the name to our flag, The Star-Spangled Banner, came to be written. Francis Scott Key, a statesman and attorney of Maryland, living in Baltimore at the time the British bombarded Fort McHenry, was asked by President Madison to secure the release of a certain Dr. Beans, who was being held on unjust charges. He went on board the Minden for this purpose, and was held overnight during the bombardment. In the morning, when he saw the flag was still flying, inspired by the intense feeling of that hour, he wrote the first draft of our national song. The Star-Spangled Banner still floats over his grave in silent majesty.

But the name which we love best for our flag is "Old Glory," and it is said that the man who gave it this name was Captain William Driver, who was in command of a brig, the Charles Doggett, sailing from the port of Salem, Massachusetts. No man loved the flag of the Union more than Captain Driver, and when he first sent it aloft he christened it "Old Glory," which he called it ever after, so that he came to be spoken of as "Old Glory Driver." After his death in 1886 the flag he had hoisted was presented to the Essex Institute of Salem, the same port from which it sailed away so proudly in 1831.

In the United States Army a distinction is made between colors and standards. Mounted troops carry standards, while unmounted troops carry the colors. Standards are smaller and have no cords and tassels, which are usually attached to the colors. If you have ever been to West Point to see that wonderful review of the cadets, you will remember how the colors are escorted to and from the field by a special color guard.

At military posts reveille and taps are played at the raising and lowering of the colors, morning and night. When not in use they are kept at the quarters of the commanding officer, and when in camp are set up in front of the commanding officer's tent —the national color or standard on the right as you face outward, the left as you approach. Each regiment has both a national and a regimental silk standard or color, and a battalion or squadron has, in addition, the same flag made of bunting, of a larger size.

Our flag is the oldest national flag in existence, except that of Denmark. Ours is older than the flag of Great Britain, adopted in 1801, than the flag of Spain, 1785, than the French tricolor, 1794, than the flag of Portugal, established in 1830, and the flag of Germany. It is older than the Swedish or the Norwegian ensigns, or the recent flags of the old empires of China and Japan, or the flags of South America.

SALUTE TO THE FLAG

I pledge allegiance to the Flag of the United States of America, and to the Republic for which it stands.

One nation indivisible, with liberty and justice for all.

In starting the salute, stand looking toward the flag, your right hand over your heart. At the words "to the Flag" stretch out your right hand toward the flag, palm upward, and remain in this position to the end of the salute.

YOU AND YOUR FLAG

YOU have many times seen the flag of your country hanging from its staff or waving proudly in the breeze. You say that it is your flag, but have you ever stopped to think what it means? Your country's flag! Do you think of it simply as a bit of colored cloth, or do you have for it a deep devotion?

The flag of your country stands for the country itself. We say that the "Stars and Stripes" is the symbol of the nation to which we belong. All those who have gone before have helped to make the nation what it is, and hence have helped to make the flag. While the Indian and the wild beast still held possession of our land, men on the other side of the ocean were making the flag of the United States. The spirit of those who wished to be free from the bonds of Europe and were willing to risk their all to build homes in a new land is the very basis of the flag.

The flag of the United States stands for the first settlers who left their homes and came across the seas to hew out homes in the wilderness. It stands for the hardships of Jamestown and Plymouth; it stands for the hardy pioneers who climbed the Alleghenies and began to conquer the boundless West; it stands for the Declaration of Independence; it stands for Concord and Lexington, Valley Forge and Yorktown; it stands for those who formed and guided the new government — Washington and Adams, Hamilton and Jefferson, Madison and Marshall, and hundreds of others; it stands for all those who died to make this land free. All the blood and treasure that have been poured out to make this a land of liberty and opportunity are a part of this flag.

The flag means the nation that guards and protects you. The city, the town and the county are parts of the state, and the state is a part of the nation, and the nation means more than a few officers. The nation is all the people of your country acting together. It is not something far above you which you must obey and with which you have nothing to do. The nation is you, your father and your mother, your brothers and sisters, the people around you, and the people far away, in Maine or California, Florida or Idaho, all those who live under the flag and love it. All of them help to make up the nation as it is today; and it is what it is because of them and because of those who have gone before.

How difficult and inconvenient it would be if your family lived apart from everyone else! You would have to do without most of the things that make life pleasant. Your family could not build roads and bridges, could not keep up schools, and could not protect itself. All the people working together can do these things; and we call them, acting together, the State.

For you, policemen walk the streets, firemen are always ready to save you, doctors are trying to make the land healthful, brave soldiers and sailors are guarding the coasts. Thousands of men, and women, too, are working for you, and other young citizens like you — working to make this world a better place for you to live in, working to give you a better opportunity to grow up strong, healthy and wise.

All of these are a part of what the flag means. It is a flag that floats over a free nation, where the will of the citizens is the law of

THE AMERICAN'S CREED

"I believe in the United States of America as a government of the people, by the people, for the people; whose just powers are derived from the consent of the governed; a democracy in a republic; a sovereign Nation of many sovereign States; a perfect union, one and inseparable; established upon those principles of freedom, equality, justice, and humanity for which American patriots sacrificed their lives and fortunes.

"I therefore believe it is my duty to my country to love it; to support its Constitution; to obey its laws; to respect its flag, and to defend it against all enemies."

The American's Creed was written in these simple, beautiful phrases, in 1917, by William Tyler Page, who was Clerk of the United States House of Representatives. On April 3, 1918, it was accepted, in the name of the American people, by the House of Representatives.

the land. In some countries the national flag is the flag of a few who enjoy the good things of life, while the great majority must live without opportunity. Here the poorest boy may rise to the highest position in the nation. No law will keep him down. No law will interfere with his religion. No one will decide where he must work and what he must dō. The long arm of the government will protect him while he is doing right.

The flag of the United States has brought hope to those who were oppressed. Under that flag men have gone to free the world from dread. Under that flag millions of brave men have gone to the outer parts of the earth to defend you. The freedom purchased in battle under that flag will ever be held, by battle if necessary.

Now, every right or privilege carries a duty with it. You say that you have a right to walk along the street without harm. This is true, but have you ever thought that if it is your right to walk in peace, it is your duty not to interfere with another? If the public library offers you books to read, it is your duty not to tear or deface them. The other side of every right or privilege is a duty, and one who is always demanding his rights and never thinks of his duties is either stupid or selfish, or both.

Boys and girls do not always understand this fact, which is at the very foundation of all society. They expect their parents, the city and the state to give them everything they may desire, and never think that they owe something in return. One who always takes and never gives is not an admirable person.

Then, if the nation protects, guards and helps you, it is your duty to conduct yourself properly. Every time you do something you know to be wrong you are dragging the flag of your country in the dust. You are being ungrateful to the nation of which you are a part. You are making it harder for the nation to do the work it must do. But it is not enough to be passively good. If you are to be worthy of the flag you must be a good citizen, and a good citizen is not one who sits still and does nothing. Someone said that people could be divided into those who lift and those who lean. By lifting instead of leaning you can show your love for the flag and all that it stands for.

Standard Oil Co. (N. J.) photo by C. Brooks



You may say that one person in a hundred and fifty million does not matter. This is a very foolish statement. The very fact that our country *is* a democracy makes the actions of each individual important. The nation is made up of more than a hundred and fifty million people, to be sure, and many of them are boys and girls like you. If every boy and girl grew up thinking "I do not matter among so many," what kind of nation would we have? How long would the United states be one of the great active nations of the world? Soon the world would learn to know that nothing high or noble was to be expected from America.

Think of your flag as the symbol of your nation. Show reverence for the flag because it represents the nation, which has done so much for you and for the world. Then, when you grow up and can have a voice in the nation's affairs, you will be a good citizen. In the United States there can be no higher title of honor than this.

THE ETIQUETTE OF THE FLAG

THERE are certain rules in our conduct toward the Flag which should be followed. Below are given the rules which are drawn from the code adopted by the National Flag Conference.

1. The Flag should be displayed only from sunrise to sunset, or between such hours as may be designated by proper authority.
2. When carried in a procession with other flags, the Flag should be either carried upon the marching right or in advance of the other flags in the centre.
3. When displayed on a staff against a wall with another flag, the Flag should be on its own right (the left as you look at it) with its staff in front of the other staff.
4. When displayed in a group of state or city flags, the Flag should be in the centre or at the highest point.
5. If more than one flag is flown on a staff, the Flag should be uppermost.
6. When suspended over a sidewalk, the Union should be outward.
7. When displayed flat against a wall or in a window, the Union should be uppermost and to the observer's left.
8. When displayed over a street, the Union should be to the North in an east-and-west street and to the East in a north-and-south street.
9. When used in a church or hall, note the following rules:
   a. If displayed flat, the Flag should be above and behind the speaker, never draped over the desk.
   b. If displayed from a staff on the platform, it should be placed at the speaker's right.
   c. Flags carried by the congregation or audience should be placed upon their right.
10. The Flag is flown at half-staff to indicate mourning. It should, however, be raised to the peak for an instant in the morning, and again before lowering at night.
11. When used to cover a casket, the Union should be arranged to cover the left shoulder.
12. When a Flag is no longer in condition to be flown, it should be destroyed privately and never thrown away.

THINGS NOT TO DO

ABOVE you are told what you should do with the Flag. Here are some things you should not do.

1. Do not permit disrespect to be shown to the Flag.
2. Do not dip the Flag to any person or any thing.
3. Do not place any other flag above the Flag of the United States.
4. Do not use the Flag to cover a statue or monument to be unveiled.
5. Do not let the Flag touch the ground or floor, or trail in the water.
6. Never use the Flag to cover a table or a desk or as drapery. Use bunting of blue, white and red, and place blue uppermost.
7. Do not drape the Flag over the sides or back of a vehicle or boat.
8. Do not use the Flag as part of a costume or an athletic uniform.
9. Do not put lettering of any kind on the Flag.
10. Do not use the Flag in any form of advertising.
11. Do not display, use or store the Flag so that it may be easily soiled or damaged.

THE MAKERS OF THE FLAG*

THIS morning, as I passed into the Land Office, The Flag dropped me a most cordial salutation, and from its rippling folds I heard it say: "Good morning, Mr. Flag-maker."

"I beg your pardon, Old Glory," I said, "aren't you mistaken? I am not the President of the United States, nor a member of Congress, nor even a general in the army. I am only a government clerk."

"I greet you again, Mr. Flag-maker," replied the gay voice; "I know you well. You are the man who worked in the swelter of yesterday straightening out the tangle of that farmer's homestead in Idaho, or perhaps you found the mistake in that Indian contract in Oklahoma, or helped to clear that patent for the hopeful inventor in New York, or pushed the opening of that new ditch in Colorado, or made that mine in Illinois more safe, or brought relief to the old soldier in Wyoming. No matter; whichever one of these beneficent individuals you may happen to be, I give you greeting, Mr. Flag-maker."

I was about to pass on, when The Flag stopped me with these words:

"Yesterday the President spoke a word that made happier the future of ten million peons in Mexico; but that act looms no larger on the flag than the struggle which the boy in Georgia is making to win the Corn Club prize this summer.

"Yesterday the Congress spoke a word which will open the door of Alaska; but a mother in Michigan worked from sunrise until far into the night to give her boy an education. She, too, is making the flag.

"Yesterday we made a new law to prevent financial panics, and yesterday, maybe, a school teacher in Ohio taught his first letters to a boy who will one day write a song that will give cheer to the millions of our race. We are all making the flag."

"But," I said impatiently, "these people were only working!"

Then came a great shout from The Flag:

"The work that we do is the making of the flag.

"I am not the flag; not at all. I am but its shadow.

"I am whatever you make me; nothing more.

"I am your belief in yourself, your dream of what a people may become.

"I live a changing life, a life of moods and passions, of heart-breaks and tired muscles.

"Sometimes I am strong with pride, when men do an honest work, fitting the rails together truly.

"Sometimes I droop, for then purpose has gone from me, and cynically I play the coward.

"Sometimes I am loud, garish, and full of that ego that blasts judgment.

"But always I am all that you hope to be and have the courage to try for.

"I am song and fear, struggle and panic, and ennobling hope.

"I am the day's work of the weakest men and the largest dream of the most daring.

"I am the Constitution and the courts, statutes and the statute-makers, soldier and dreadnought, drayman and street sweep, cook, counselor, and clerk.

"I am the battle of yesterday and the mistake of to-morrow.

"I am the mystery of the men who do without knowing why.

"I am the clutch of an idea and the reasoned purpose of resolution.

"I am no more than what you believe me to be and I am all that you believe I can be.

"I am what you make me; nothing more.

"I swing before your eyes as a bright gleam of color, a symbol of yourself, the pictured suggestion of that big thing which makes this nation. My stars and my stripes are your dream and your labors. They are bright with cheer, brilliant with courage, firm with faith, because you have made them so out of your hearts; for you are the makers of the flag, and it is well that you glory in the making."

* Delivered by the late Franklin K. Lane (died 1921), when Secretary of the Interior, on Flag Day, 1914, before the employees of the Department of the Interior, Washington, D. C. By special permission of Mr. Lane.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 7225.

FLAGS OF THE UNITED STATES

On these four pages are some of the flags used by different individuals, organizations and departments of the national government, the flags of the states, some historical flags, and finally, the flag which belongs to all of us.


NATIONAL FLAG & ENSIGN


FLAG OF THE PRESIDENT


SECRETARY OF WAR


SECRETARY OF THE TREASURY


ASSISTANT SECRETARY, TREASURY

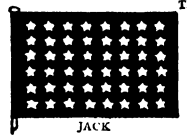

SECRETARY OF THE NAVY


SECRETARY OF COMMERCE


ADMIRAL SENIOR


ADMIRAL JUNIOR


VICE-ADMIRAL


JACK


REAR-ADMIRAL


COMMODORE


SENIOR OFFICER


NAVAL ARTILLERY ASHORE


NAVAL INFANTRY ASHORE


NAVAL MILITIA


LIEUT.-GENERAL

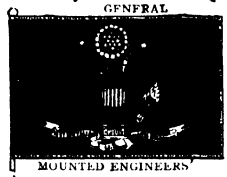

MAJOR-GENERAL


BRIGADIER-GENERAL


CONSULS

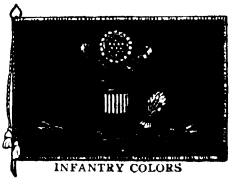

CAVALRY STANDARD


FIELD ARTILLERY STANDARD

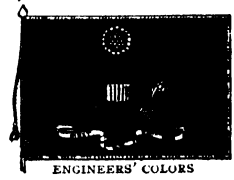

MOUNTED ENGINEERS' STANDARD


SIGNAL CORPS STANDARD


CHIEF OF STAFF COLORS


INFANTRY COLORS


COAST ARTILLERY COLORS

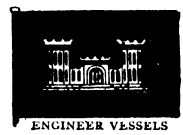

ENGINEERS' COLORS


TRANSPORT SERVICE


MINE PLANTER


NAVAL RESERVE


ORDNANCE VESSELS


ENGINEER VESSELS


ASSISTANT SECRETARY, NAVY


ASSISTANT SECRETARY, COMMERCE


MARINE CORPS


MAJOR-GENERAL MARINES


BRIGADIER-GENERAL MARINES


HARBOR DEFENSE COMMANDER


COMMISSIONER OF NAVIGATION


BUREAU OF NAVIGATION


COMMISSIONER OF FISHERIES


BUREAU OF FISHERIES


COMMISSIONER OF LIGHTHOUSES


BUREAU OF LIGHTHOUSES


PUBLIC HEALTH SERVICE


SURGEON-GENERAL PUBLIC HEALTH

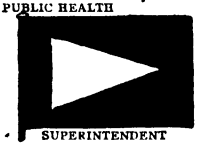

COAST-GUARD

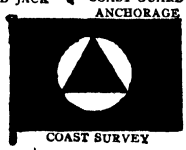

COAST-GUARD JACK


COAST-GUARD ANCHORAGE

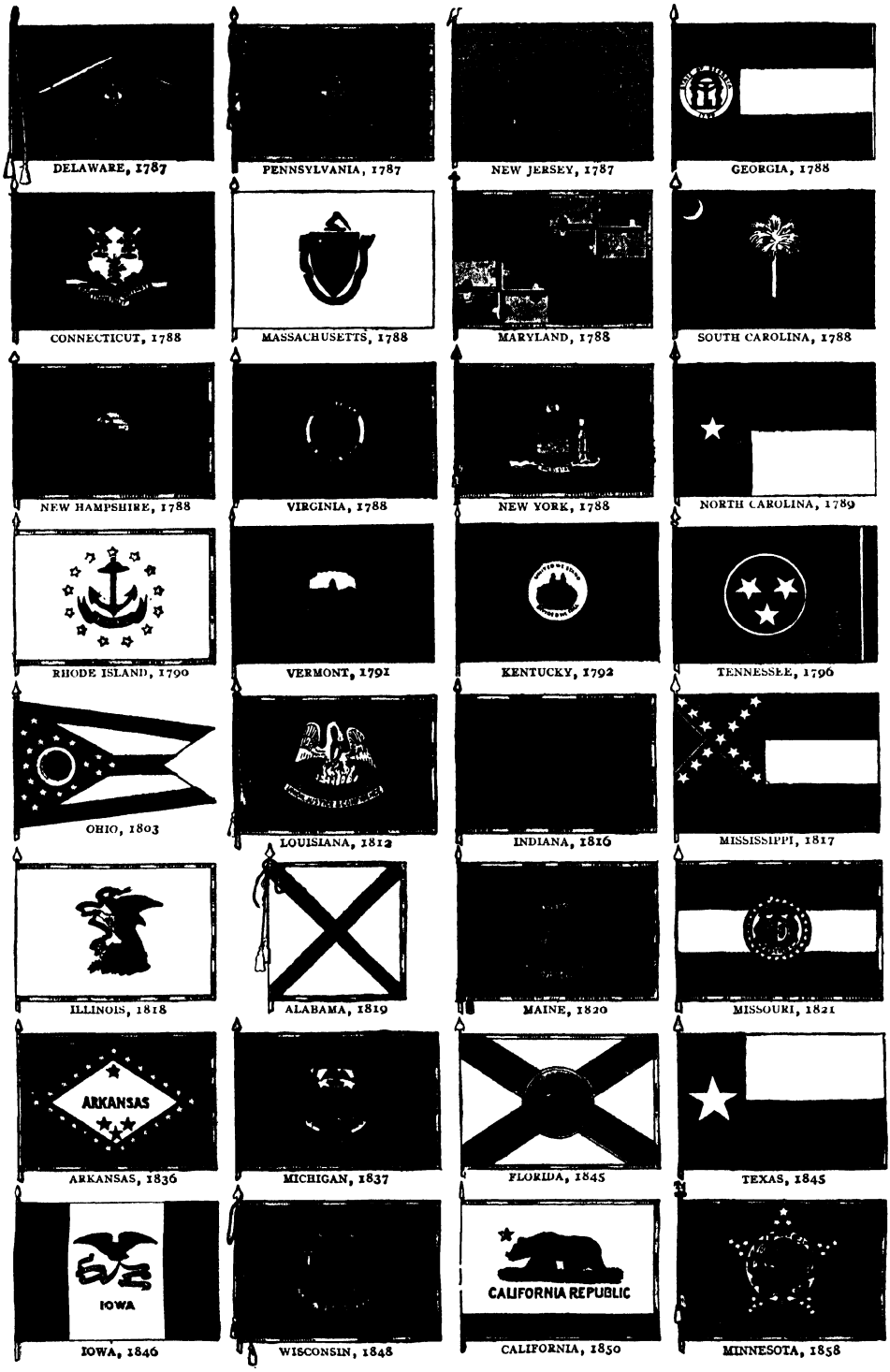

POWER SQUADRONS


CUSTOMS

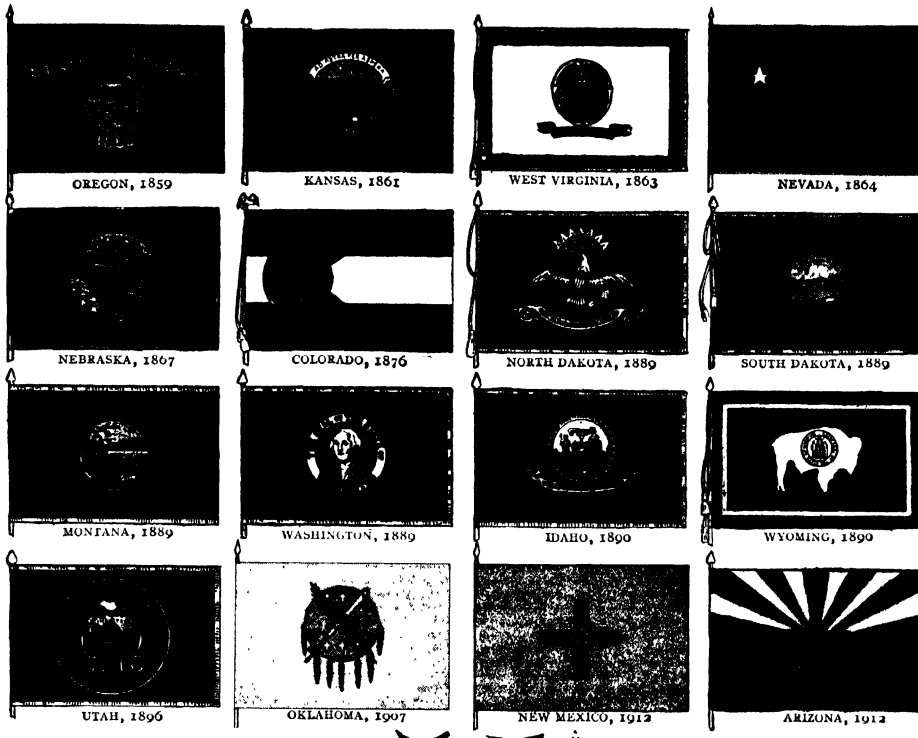

SUPERINTENDENT COAST SURVEY


COAST SURVEY

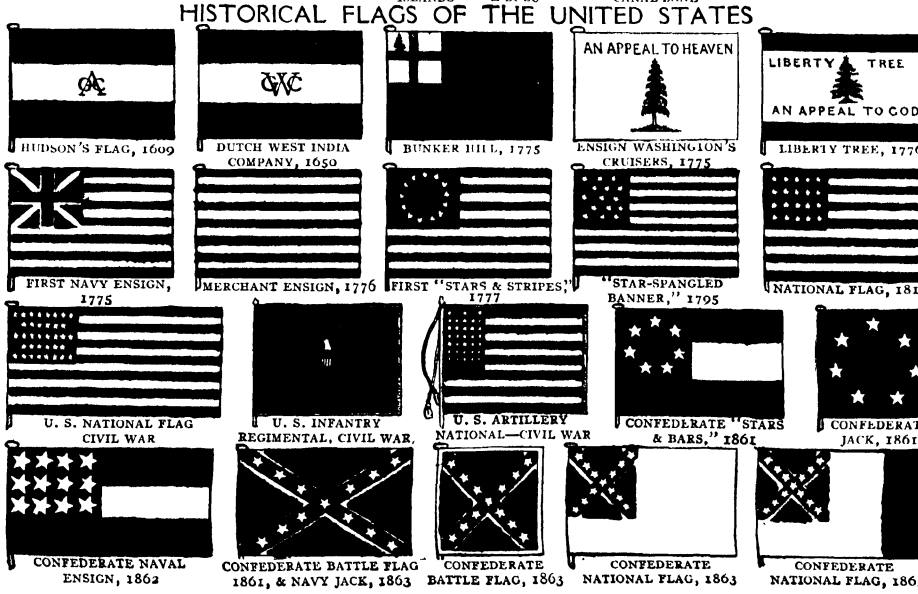

YACHT ENSIGN



The first thirteen flags are arranged in the order in which the states they represent ratified the Constitution. The remaining thirty-five (from Vermont through Arizona) are arranged in the order in which the states they represent were admitted to the Union.



HISTORICAL FLAGS OF THE UNITED STATES



The date of the admission of the state does not indicate the age of the flag, as many have been adopted only recently.

THE UNITED STATES FLAG

On June 14, 1777, Congress adopted a flag of thirteen stripes, alternately red and white, with thirteen stars in a blue field. On January 13, 1794, after the admission of Vermont and Kentucky, it was provided that after May 1, 1795, the flag should consist of fifteen stripes with the same number of stars. No other change was made until 1818. Then, April 4, it was decided to reduce the number of stripes to thirteen with twenty stars, the number of states then in the Union, and that on the Fourth of July following the admission of a state a new star should be added. On July 4, 1912, the stars representing New Mexico and Arizona, the last states admitted, were added.



By courtesy of the
United States Flag Association

THE AMERICAN FLAG

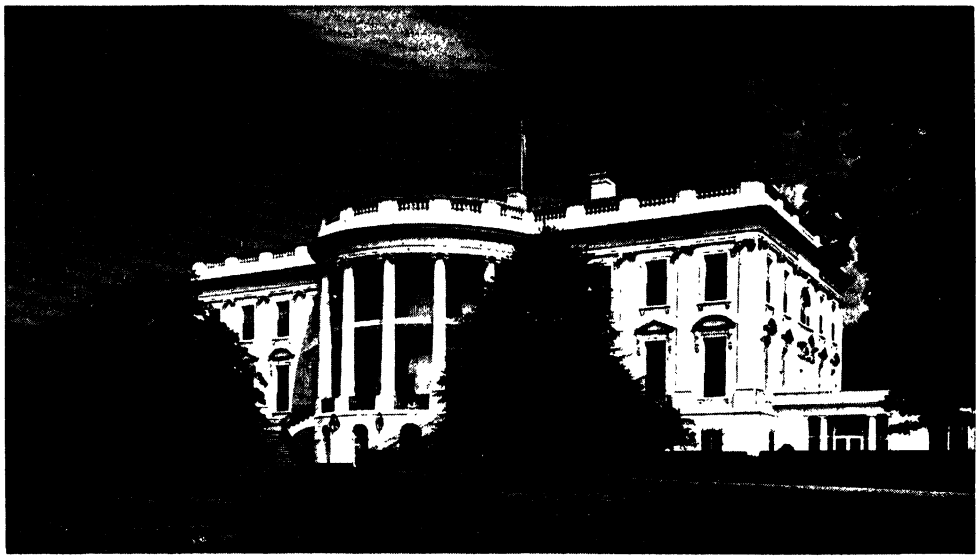
I

WHEN Freedom, from her mountain height,
Unfurled her standard to the air,
She tore the azure robe of night,
And set the stars of glory there;
She mingled with its gorgeous dyes
The milky baldric of the skies,
And striped its pure, celestial white
With streakings of the morning light;
Then, from his mansion in the sun,
She called her eagle-bearer down,
And gave into his mighty hand
The symbol of her chosen land.

V

Flag of the free heart's hope and home,
By angel hands to valor given;
The stars have lit the welkin dome,
And all thy hues were born in heaven.
Forever float that standard sheet!
Where breathes the foe but falls before us,
With Freedom's soil beneath our feet,
And Freedom's banner streaming o'er us?

—JOSEPH RODMAN DRAKE (1795-1820)



Harris and Ewing

The stately White House, where each president of the United States resides during his term of office.

SOME OTHER FAMOUS PRESIDENTS

GROVER CLEVELAND, WOODROW WILSON AND THE TWO ROOSEVELTS

JUST thirty-two men have filled the office of president of the United States. Some of our presidents have been men of great ability; others were ordinary men who were nominated or elected almost by accident. Some of our greatest men with the largest number of followers failed for one reason or another to gain the desire of their hearts. Webster, Clay, Calhoun, Benton and Douglas all failed of election before the war between the states. Horace Greeley, James G. Blaine, William Jennings Bryan and Thomas E. Dewey, who had millions of enthusiastic admirers, failed in later years.

All our presidents have been men of high character, though some were considerably wiser than others. Some lacked the ability to manage men and did not have successful administrations on that account. Unfortunate circumstances interfered with the popularity of others. We can be proud, however, that in the long line there has not been a bad man or one who did not prize the welfare of his country.

We have already told you of the lives of two, George Washington and Abraham Lincoln, in the chapter beginning on page 1647. In another chapter (page 3487) you may read about John Adams and his son John Quincy Adams, Thomas Jefferson and Andrew Jackson. The last of these, Jackson, went out of office in 1837.

Of the later presidents, historians are agreed that four stand out above the others. These are Grover Cleveland, Theodore Roosevelt, Woodrow Wilson and Franklin Delano Roosevelt.

On March 18, 1837, a baby boy was born in the house of a Presbyterian minister in the town of Caldwell, New Jersey, and was baptized Stephen Grover Cleveland. His father, Richard Cleveland, was an educated man, a graduate of Yale College. His mother, Ann Neal, was a native of Baltimore and a woman of high character and much charm. Four years after the boy was born the family moved to Fayetteville, New York, and lived there for ten years.

There were nine children to be supported upon a small salary, for the father never received more than a thousand dollars a year. In the home were no luxuries, but the chil-



© Underwood & Underwood

Stephen Grover Cleveland, the twenty-second president of the United States, and his young son.

dren were brought up in an atmosphere of obedience, learning and religion. The Sabbath was strictly kept, and attendance at church and Sunday school was required.

Young Grover learned Latin and mathematics well, but he never was a brilliant student, either at Fayetteville or at Clinton, where the family moved in 1851, when he was fourteen years of age. Hamilton College is in Clinton, and the boy expected to enter as soon as he was prepared. However, it seemed necessary that he should earn money. So he returned to Fayetteville and worked in the village store for two years. For the first year he received his board and lodging and fifty dollars in cash; the second year he received a hundred dollars.

Just as he was resuming his preparation for college his father died, and the dream of college was given up. For a year he worked in a school for the blind. Then he borrowed the money to go to Cleveland, Ohio. (This city was named for one of his relatives.) On the way he stopped at Buffalo to visit an uncle, who gave him employment. This was in 1855. Later the same year he secured a position as clerk and copyist in a law office. There he began the study of law. He had no instruction. The law books were there, but he had to dig everything out himself. Here he developed that stubborn perseverance for which he was noted later.

In 1859, when twenty-two years of age, he was admitted to the bar, and four years later he was made assistant district attorney. For two years he held this office and then went back to private practice. People trusted him, and in 1870 the Democratic party nominated him for the office of sheriff because they thought him the only man who could be elected. He was elected and was a good officer.

In 1881 he was elected mayor of Buffalo, and at once attracted attention by his demand that the business of the city should be honestly and economically conducted. He vetoed many bills and stopped several corrupt schemes. The people believed in him, and in 1882 chose him for governor of New York by the largest majority ever known up to that time. At Albany he was the same man he had been in Buffalo—honest, industrious and fearless—and people all over the United States began to hear of the honesty and the wisdom of the bachelor governor of New York. He made some enemies, but more people admired him.

In 1884 the Democratic Convention in Chicago nominated Grover Cleveland for president on the second ballot. The Republican nominee was James G. Blaine, and the campaign which followed was fiercely fought. Cleveland carried New York by a narrow majority, and this gave him the election—the first Democratic president chosen in twenty-four years.

PRESIDENT CLEVELAND REFUSES TO GIVE ALL OFFICES TO DEMOCRATS

The President showed in Washington the same qualities he had displayed in Buffalo and at Albany. His position was difficult. The Democrats had been out of office for a long time; practically every office was filled by a Republican. The President was urged to "turn the rascals out," and give all offices to Democrats. On the other hand, it was his belief that fitness should be the chief test for appointment, but he did feel it to be wrong that half the people should have no part in the government. In his attempt to steer a middle course the President pleased neither Democrats nor Republicans.

President Cleveland was a hard worker. He was never satisfied to sign a paper until he knew all the facts, and the light in his study burned until late in the night. He did not hesitate to veto bills if he suspected or disapproved them, and in this way he made many enemies.



Courtesy, Grover Cleveland Birthplace Association

In this pleasant frame house in Caldwell, New Jersey, Stephen Grover Cleveland was born on March 18, 1837. His father was a Presbyterian minister. Grover had eight brothers and sisters.

Then came the question of the tariff. The rates of duty on foreign goods were high and brought in more money than was needed to run the government. President Cleveland was convinced that this was wrong and advocated lowering the tariff, but the Senate was Republican and refused to consent. In those days the Republican party was in favor of charging high tariffs on imported goods, in order to keep manufactured goods from coming into the country to sell cheaply. As you doubtless know, workers in many foreign countries received very small wages at that time; so the articles they made could be sold at a smaller price than similar articles made in the United States where the cost of labor was higher. This was true even when foreign goods were shipped great distances. Even when the cost of transportation was added to the manufacturing cost, the foreign articles could be sold to the public more cheaply.

The Republican party, therefore, wished to charge foreign merchants a high tax, or tariff, for the privilege of selling goods in America. This high tariff would bring the cost of the articles up near the cost of articles made in America. Such a tariff was said to "protect" the American manufacturer.

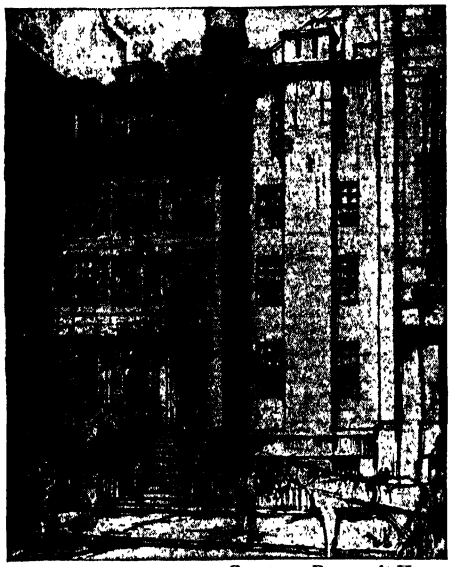
The Democratic party—Cleveland's party—was not so much interested in manufacturing as in producing raw materials, such as farm crops and animals, cotton, tobacco and minerals, to sell abroad. The producers of raw materials, that is, farmers and others, wanted to buy their manufactured goods as cheaply as possible; and, besides, they knew that if the United States charged high taxes at the ports, other countries would do the same thing, and this would make it hard for American producers.

This difference of opinion as to whether we should be chiefly a manufacturing country or chiefly a raw-materials country has not yet been settled. In Cleveland's day many people were very positive about what they thought on the subject and feelings ran high. However, many Democrats were not in favor of tariff reduction, and when it came time, in 1888, to nominate a president, some had turned against Cleveland. Still, he was renominated. At the election Benjamin Harrison, the Republican candidate, received a majority of the electoral vote, though Cleveland had a majority of the popular vote.

Cleveland, now a private citizen, moved with his family to New York and returned to the practice of law. On page 2811 we tell you of his marriage to Miss Frances Folsom. He was glad to be free from office, but it was soon clear that the people of the United States were not through with him. In 1892

he was again nominated for the presidency and elected. This is the only time in our history that a president has served two terms not in succession.

His second term was unfortunate. There was a great panic in 1893 and times were very hard. Many factories were closed and many men were out of work. The farmers could not sell their produce for what it had



Courtesy, Roosevelt House

The birthplace of Theodore Roosevelt, twenty-sixth president of the United States, in New York City.

cost them. In their despair they turned on the President and held him responsible for their ills. When he left the presidency in 1897 he felt that he was the most unpopular man in the country.

He had already bought a house at Princeton, New Jersey, and lived there until his death. He enjoyed the life of the university town and made many friends. Every year he lectured to the students, and was much liked by them. He was fond of fishing and hunting, and continued to enjoy these sports until near the end of his life. Occasionally he wrote an article for a magazine.

He was to perform one more public service before his death. Some of the great life-insurance companies had been extravagantly managed, and public confidence was shaken. Cleveland was made one of the trustees to transfer the management of one company to the policy-holders, and also acted as referee in differences which arose between several companies.

Cleveland lived more than eleven years after leaving Washington, and these were probably the happiest years of his life. He saw his popularity return among thinking people, he enjoyed his home and loved to see his children growing up around him. When he died, on June 24, 1908, the nation mourned.

In 1644 one Claes van Roosevelt came from the Netherlands to the little town growing up at the foot of Manhattan Island. There his descendants continued to live and prosper as the town grew into the city of New York. One of them, Theodore, married Martha Bullock, of Georgia. One of their four children, also called Theodore, the future president, was born October 27, 1858, in the family home, 28 East Twentieth Street, which is now a memorial museum.

THEODORE ROOSEVELT WORKS HARD TO STRENGTHEN BODY AND MIND

The boy was delicate almost from birth, and attended school very little, but his father's wealth provided the best of private tutors and the opportunity of travel in Europe. From boyhood the boy was interested in natural history, and seriously considered preparing himself to be a college professor. His father fitted up a gymnasium in the home, and the boy worked hard to strengthen his frail body. He improved so much that he was able to enter Harvard College in 1876, and graduated with honors four years later. While in college he continued to work at strengthening his body as well as his mind. He was always fond of hunting, horseback-riding and other outdoor sports.

Soon after leaving college he married Miss Alice Lee, of Boston. There was no need for him to work for a living, as his father had left him a comfortable fortune, but he could not be idle; he began the study of law and also worked upon a History of the Naval War of 1812. He was offered the Republican nomination for member of the Assembly in 1881, was elected and served three years. While in Albany he attracted much attention by his courage and his independence.

Just then his mother and his wife both died. He determined to leave public life; in 1884 went to northern Dakota, where he had an interest in two cattle ranches. For two years he remained at the Elkhorn Ranch at Medora, working, hunting and taking part in the primitive life of the region. While still on the ranch he was nominated for mayor of New York, but was defeated. After the election he went to Europe and married

in London a playmate of his childhood, Miss Edith Kermit Carow. On his return to the United States he settled at his country place, Sagamore Hill, at Oyster Bay, Long Island. For a time he gave himself to writing history, biography and his hunting experiences.

In 1889 President Harrison appointed Roosevelt to the United States Civil Service Commission, in which he served six years. Then he was a police commissioner in New York, and did much to expose and wipe out corruption in the police force in the city by methods that attracted much attention and made his name known all over the United States.

On the election of President McKinley, Roosevelt was appointed Assistant Secretary of the Navy, and here his energy did much to prepare the Navy for the war with Spain which he believed was coming. As it drew nearer he resigned from the Navy Department and became lieutenant colonel of the First Volunteer Cavalry, soon nicknamed the "Rough Riders." This was made up of men who could ride and shoot—cowboys, ranchers and hunters from the West, with a few college men from the East. His good friend Dr. Leonard Wood was colonel; later Colonel Wood was promoted to general and Roosevelt became colonel.



After retiring from the presidency, he lived at his home, Sagamore Hill, at Oyster Bay, Long Island.



Both photos, Underwood & Underwood

Theodore Roosevelt in Cuba, as a lieutenant colonel of cavalry regiment, in the Spanish-American War.

In Cuba the regiment saw some sharp fighting under the command of Colonel Roosevelt. The reputation he won in Cuba led to his nomination for governor of New York in 1898, and he was elected.

In 1900, rather against his will, Governor Roosevelt became Vice-President Roosevelt. On the death of President McKinley in September 1901, Roosevelt became president, with nearly three and a half years to serve before the next election. He was the youngest man who ever served as president.

The story of his seven and a half years—for he was elected for a full term in 1904—is too long to tell. He started the Panama Canal, he made peace between Russia and Japan, he prosecuted the trusts, he settled a great coal strike, he urged the conservation of natural resources, he took an active part in foreign affairs, and did dozens of other things. At the end of his term he and his son Kermit spent a year in Africa collecting big game for the Smithsonian Institution. On his return through Europe he was received with great honors.

President Taft had been nominated and elected largely through the influence of President Roosevelt. When the latter returned from Africa his friends informed him

that Taft had not continued the Roosevelt policies. They demanded that Roosevelt should become a candidate in 1912. Finally he agreed, but did not win the nomination.

Six weeks later a new convention made up of Roosevelt's friends met and organized the Progressive party. Roosevelt was nominated, of course, and began a hard campaign. While in Milwaukee he was shot by a lunatic, but not seriously injured. With two Republican candidates in the field to divide the votes, the Democratic candidate, Woodrow Wilson, easily won the election, though the popular vote of Taft and Roosevelt together was much greater.

The last years of Theodore Roosevelt's life were busy. He wrote books, magazine articles and editorials for a newspaper, and continued to spend much time out-of-doors. He wished the United States to enter World War I almost as soon as it began, and was very impatient with President Wilson's conduct of affairs. When the United States did enter the war, he asked to be permitted to lead a volunteer force, but the request was denied. His four sons enlisted, and one was killed. Meanwhile he was far from well, and on the day of the armistice he went to a hospital; and on January 6, 1919, he died in his sleep. He was buried in the cemetery at his beloved Oyster Bay, and every year thousands visit the great man's grave in that lovely spot.

Woodrow Wilson, like Grover Cleveland, was the son of a Presbyterian minister. His father, Joseph R. Wilson, was born in Ohio, and spent part of his life as a college professor and the remainder in the ministry. His mother, Janet Woodrow, was the daughter of a Scotsman who was a distinguished Presbyterian minister in Ohio.

On December 28, 1856, while his father was pastor at Staunton, Virginia, the future president was born and christened Thomas Woodrow in honor of his mother's father. While at college he dropped the first name and was known afterward as Woodrow Wilson. There seems to be little to tell of his childhood, which was spent in Augusta, Georgia, and Columbia, South Carolina. The boy was not strong, and much of his teaching came from his father.

In 1874 he entered Davidson College,



Courtesy, Virginia State Chamber

Woodrow Wilson was born December 28, 1856, in the manse (pastor's house) at Staunton, Virginia. His father, like Grover Cleveland's, was a Presbyterian minister. The boy was baptized Thomas Woodrow Wilson, but later (again like Cleveland) he dropped the first part of his name.



Underwood & Underwood

Woodrow Wilson as a young university professor, when he was lecturing on the science of government.

North Carolina, but his health broke down before the end of the year and he returned to Wilmington, North Carolina, where the family then lived. In 1875 he entered Princeton, where his father had studied before him. He was a good student, and also showed much interest in writing for the college papers, in debating and in athletics.

After his graduation in 1879 he studied law at the University of Virginia and completed the course in spite of another physical breakdown. Then in 1882 he opened a law office in Atlanta, but found that he was more interested in the study of government than in the practice of law. So in 1883 he entered Johns Hopkins University in Baltimore, from which he was to receive the degree of Doctor of Philosophy. In 1885 he married Miss Ellen Axson and began to teach at Bryn Mawr College. Then he was at Wesleyan University, Connecticut, two years, and was called to Princeton in 1890.

There he taught government, wrote books and magazine articles, lectured and had much influence in all university affairs. In 1902 he became president of the university. He was nominated for governor of New Jersey in 1910, and triumphantly elected.

In 1912, in a hard-fought convention, he won the nomination for president. At this time, as we have said, the Republican party was divided between the followers of President Taft and those of former President Roosevelt. As a result of the division, Governor Wilson received 435 electoral votes to 88 for Roosevelt and 8 for Taft, though he received only about 42 per cent of the popular vote. He was re-elected in 19 6 over Charles Evans Hughes, of New York, a justice of the United States Supreme Court.

INCOME TAXES, FARM LOANS, AND TROUBLE WITH MEXICO

The eight years of Wilson's administration were packed full of important events. In the first years the Federal Reserve Bank was set up and also the Farm Loan Act, intended to secure money for the farmers on easy terms; the tariff was reduced and an income tax was imposed. War with Mexico was prevented with difficulty. However, interest in home affairs was almost swallowed up by the importance of World War I, which broke out in Europe in 1914.

President Wilson was a man of peace, but the United States entered the war April 6, 1917.

When the war ended President Wilson himself attended the Peace Conference in Paris. Many differences of opinion arose in the conference, but President Wilson considered the creation of the League of Nations the most important thing and was willing to sacrifice some of his other ideas of a proper peace to obtain it. The League became a part of the Treaty of Versailles, but when he returned home he found much opposition to both, and the Senate hesitated to ratify the treaty. While on a trip to the West to explain the League to the people and to arouse sentiment in its favor, his frail body collapsed. From this time, September 25, 1919, until his death, he was a broken man.

The first Mrs. Wilson had died in 1914 just as World War I began. In December 1915, he and Mrs. Edith Bolling Galt were married. Mrs. Wilson accompanied the President in his triumphs, and cared devotedly for the invalid until he died, February 3, 1924.

A FUTURE PRESIDENT IS BORN AT HYDE PARK, NEW YORK

We come now to Franklin Delano Roosevelt, a descendant, like Theodore, of the Dutchman Claes (or Klaes) van Roosevelt, who came to America around 1644. Franklin's father, James Roosevelt, was a wealthy man, interested in railroads, banking, canals, steamboats and steel. Franklin's mother was Sara Delano. Franklin was her only child

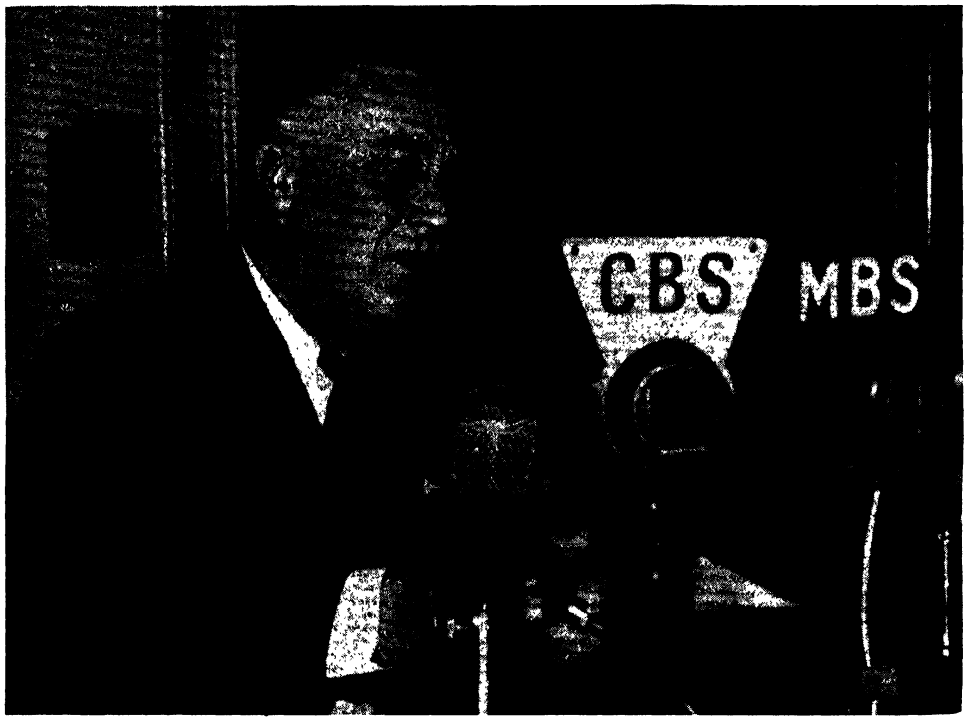
(James had another son by an earlier marriage), and Sara devoted much of her life to her talented son. Franklin was born on the family estate at Hyde Park, New York, on January 30, 1882. He attended Groton School, then Harvard University, where he graduated in 1904. The following year he married his fifth cousin, Anna Eleanor Roosevelt, niece of Theodore, who was president at the time. The Franklin Roosevelts had six children, one of whom died in infancy.

Franklin, like Theodore, studied law after graduating from Harvard. In fact, these two had much in common. Theodore was Assistant Secretary of the Navy in McKinley's administration. Franklin held the post under Wilson, from 1913 to 1920. Theodore served in the New York State Assembly; Franklin served in the State Senate from 1910 to 1913. Franklin was governor of New York from 1929 to 1932; Theodore had been governor, as you know. Both were interested in ships.

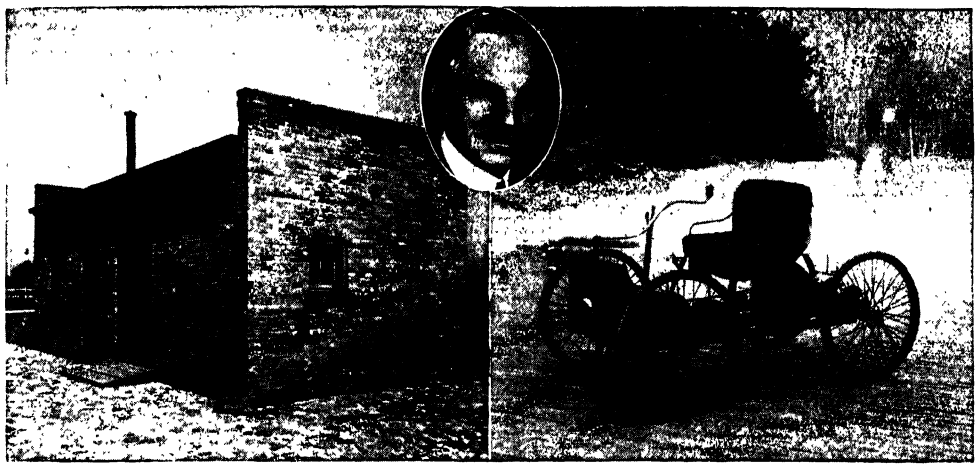
However, great differences in the careers of the two men are clear when you consider them as president. Theodore came to the high office at a time of comparative peace and prosperity. Franklin was elected for the first time in 1932, when the whole civilized world was suffering from a major depression. Millions were out of work, and despairing. Trade and finance were in the doldrums. Manufacturing was slowed down, and many factories were closed. Farmers could not sell their produce. Upon this stage stepped Franklin Delano Roosevelt, fifty-one years old, and not strong, for he had been stricken by infantile paralysis in 1920 and had only partially recovered. Yet he had certain qualities that make for leadership: confidence, and willingness to take responsibility. On pages 3954c to 3954d, in Volume 11, we tell you of Franklin D. Roosevelt's three administrations. He served his country through twelve fateful years. Opinions vary as to the wisdom of some of his acts; but the facts remain that during his first two terms as president the depression abated, and that in his last years the United States and her allies came gloriously through World War II.

Roosevelt died on April 12, 1945, at the beginning of his fourth term of office, and a few days before Germany and most of her allies gave up the fight.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 7235.



The personal characteristic of President Franklin D. Roosevelt that is probably remembered most vividly was his clear, flexible voice. On the radio it gave Americans the feeling of close contact with their Government.



Henry Ford, his first automobile, and a reproduction in Greenfield Village of the little shop where he built it.

SOME OTHER FAMOUS INVENTORS

THE little three-letter words "why" and "how" are very important in the lives of some people. In fact, these words have guided the very existence of many of our most important men and women. And thus they have influenced your life, too.

In the history of the world's progress there have been many men and women who have never stopped asking—and trying to answer—the questions: "Why is this so?" "How can that be done?" "Why can't this be done?" Those men and those women are our scientists, our research experts and our inventors. Their curiosity was never satisfied.

All our lives we have been surrounded with the products of this curiosity. Our world is filled with wonderful inventions which we do not notice because they are so familiar. We seldom stop to think how much they affect everything we do. Yet if we just take a minute to consider what it would be like to live without them—without the telephone, the automobile, the radio, without steel, or the movies, or the cotton-gin, or steam power—then we see that there should be a high place in history for the inventor.

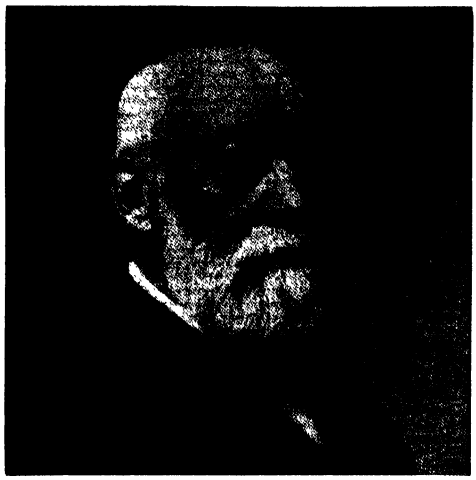
Without him we might be living very primitive and very uncomfortable lives. Both food and clothing would be scarce, and the people who did manage to exist would have few of the comforts and luxuries that we have today.

We sometimes hear it said that only labor produces wealth. This is not true, for labor produces little unless it is wisely directed. An invention which enables the same number of men to produce more goods may have either of two effects. It makes the goods cheaper, or else it permits fewer men to make enough goods for everybody, thus freeing some workers for other tasks.

The inventor sometimes makes it possible to use resources of the world which, without his invention, might have been worthless or wasted. Of what use would a mountain of iron be to anyone if we did not know how to refine it? The power in boiling water has always existed, but it did no valuable work until the steam engine was invented.

Much of the inventor's labor has been devoted to making machines that do the work of men and animals. He has made fingers of steel that do the work of human fingers—and do it faster, better and cheaper. The sewing machine can run up more seams in a day than the busiest woman could do with thread and needle. The cotton-gin picks cotton from the seeds with the speed of a thousand fingers. The reaper cuts more wheat than many men, and it never grows tired; the tractor works more powerfully than teams of straining horses.

We have meant to give full credit to the inventor in our book. You have read the story of the men who gave us light. You have seen how railways came to be. We spoke



Brown Brothers

John Wesley Hyatt, who invented the first plastic.

of those who helped to discover and harness electricity, of those who made the telegraph, the telephone and the radio. We told you also of the bridge-builders, the aviators, the scientists, the physicians, the printers, the shipbuilders, the locksmiths and many other great men who helped the world to grow.

However, the entire BOOK OF KNOWLEDGE is not big enough to tell about all the inventors we should like to mention. But we did set out to tell of the most important. Now near the end of our book we find that we have neglected some who must not be omitted. In this story, therefore, we are going to tell you a little of the lives and the work of a dozen or more men. Some lived in Europe, some in America; some were trained engineers; some were educated men, while others were poor workingmen. They invented many different sorts of things, and there is little connection to be found in the story except that the men are all important figures in the story of the world.

One of the first men behind the textile industry of England was a Lancashire genius who could neither read nor write—James Hargreaves. Born at or near Blackburn in 1745, he entered a mill owned by Sir Robert Peel's grandfather, where, as a shrewd and able man, he was set to work to improve a machine for carding cotton in order to abolish the old system of clearing and straightening the fibers by hand.

He worked at home, too. The cotton trade at that time depended largely on work done in cottages and little farms. Part of the cotton had to be spun into thread to make the warp, and part into the weft (or woof) which crosses the texture. It happened that one day Hargreaves knocked over the simple little machine his wife was using for spinning weft, and to that action we may trace the work he did for himself, for his country and for the world at large.

The machine was fitted with a wheel and spindle which spun only one thread at a time. When dislodged, the wheel and the spindle, thrown from a horizontal into a vertical position, continued to revolve, tangling the thread.

Hargreaves saw that by widening the wheel and employing several upright spindles he might spin a number of threads at the same time, instead of one, as heretofore. He did so in secret, never dreaming that he was to found a new industry, but simply that he might have more material with which to work, and so earn more money to provide food and clothing for his family.

He made his first machine, the original spinning-jenny, and secretly began to manufacture yarn in such quantities as no other spinner had ever made before. The result was that the Hargreaves household was soon making eight times as much material as before, and so helping the prosperity of everybody concerned in the mill, for yarn was the one thing they all needed.

THE HAND-SPINNERS FEAR THE LOSS OF THEIR LIVELIHOOD

But the narrow jealousy of the people of the neighborhood was aroused at the suggestion, whispered abroad, that Jim Hargreaves was using machinery. Machinery—why, it would rob honest hand workers of their living; it would drive all folk away from Blackburn and the surrounding towns! The tidings ran like fire, and the weavers of Darwen, Mellor, Tockholes and Oswaldtwistle assembled at Blackburn. With the local men, they marched, an army of execution, to the poor cottage where Hargreaves lived.

They forced a way into the house, they smashed the machine, they demolished the furniture, and then they marched down to Peel's mill, where Hargreaves was at work, and they wrecked that.

Hargreaves went to Nottingham and joined hands with a man named Thomas James, who had a little capital and a great faith. Together they began the manufacture of the spinning-jennies, but having hounded him out of home and occupation, Lancashire was now using his jennies wholesale without paying him a farthing royalty.

The desperate inventor began an action to recover damages, but when his lawyer found how many dishonest cotton-manufacturers in Blackburn alone had stolen the device, he gave up in dismay, saying he could not fight an army. Hargreaves did not die in poverty, but we know that wealth did not come to this man who had placed at the disposal of his native country a device for building up unparalleled prosperity.

The word "plastics" means much in our modern world. Every day seems to bring forth a new plastic, or at least a new application for an old one. We have plastic picture frames, cups and saucers, combs and brushes, telephones and soon, perhaps, plastic automobiles. Today the plastics industry is a fast-growing child; it has many prosperous years ahead.

Perhaps the one man most responsible for the birth of plastics was a young American printer, John Wesley Hyatt. He invented what is now known as celluloid. And he did it while working in his spare time to win a contest! This is what happened.

In the middle of the nineteenth century the quantity of ivory available in the world was decreasing, due to the fact that elephants were being killed faster than young ones were being born. The valuable material was becoming scarcer and scarcer, and more and more expensive.

A manufacturer of billiard balls, which were made of ivory, offered a prize of $10,000 to anyone who could produce a substitute for use in his product.

Hyatt, working with his brother Isaiah to find the answer and win the money, discovered cellulose nitrate, the oldest of synthetic plastics. Although he failed to win the prize, Hyatt did lay the groundwork for a wonderful field of modern synthetic products.

The demand for his plastic became so great that the Celluloid Manufacturing Company was formed in 1871. This was the forerunner of the Celanese-Celluloid Corporation.

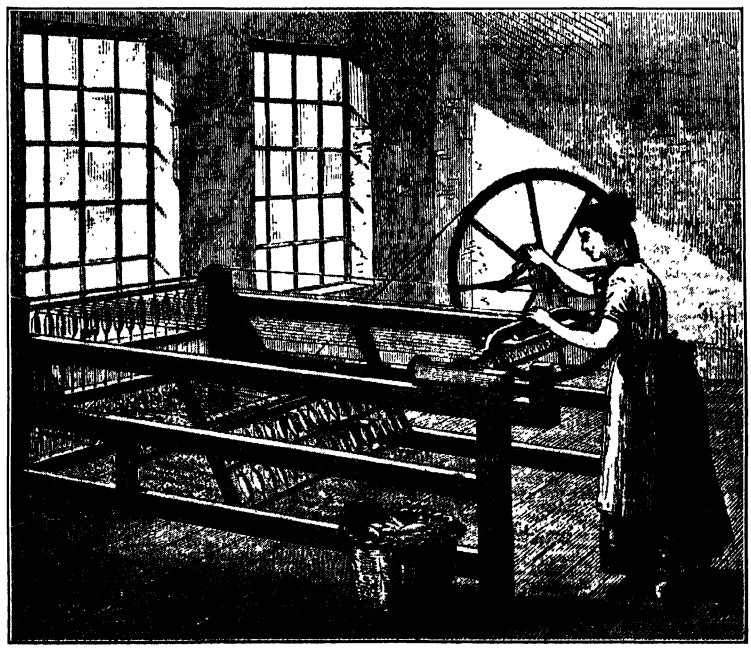
The uses to which cellulose nitrate were put were many and varied. It was used greatly in dental work. It was also one of the first plastics to be employed in automobile manufacture, being used in sheet form as windows.

Your parents will tell you of the years gone by in which men wore high celluloid collars. It was used also for hair brushes and combs, spectacle frames, buttons, brush handles, typewriter keys and innumerable other things.

John Hyatt continued to turn out inventions; and although he was not a formally educated chemist, he achieved great honors in the field of chemistry.

Among other things, he invented a machine for making billiard balls, a sugar-cane mill, a type of roller bearing, a water-purifying system, a sewing machine and a machine for cold-rolling and straightening steel shafting.

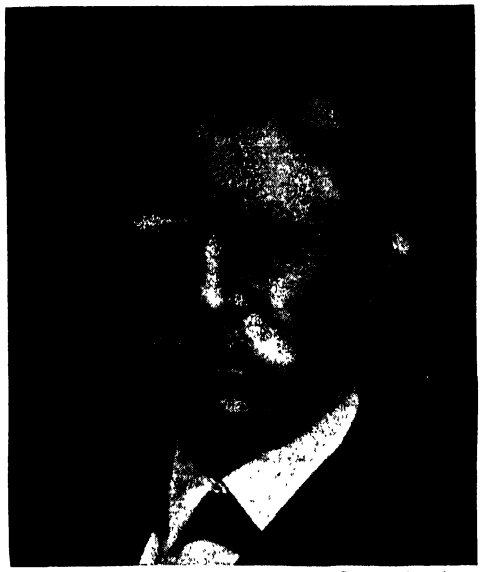
David Edward Hughes inventor of the microphone, was an Englishman by birth. He moved to the United States with his family when he was only seven, and was educated at a small college in Kentucky. He was very talented in music, and taught this subject, along with philosophy, for some time.



James Hargreaves' spinning-jenny, one of the most important inventions in history.

In the middle of the nineteenth century Hughes patented a machine for type-printing by means of telegraphy. It was adopted in the United States almost immediately, but quite a few years passed before it was accepted in Europe.

In 1878 Hughes brought forth a new invention from the laboratories he had estab-



Brown Brothers

David Hughes, who invented the microphone.

lished in London. It was the carbon microphone, an ingenious little device which is used in the telephone.

A microphone is based on what can be divided into two distinct operations. First, the sound-waves created by variations in our speech act on a diaphragm. The diaphragm is a thin, vibrating disc which is sensitive to very tiny fluctuations in air pressure. Second, the small motions of the diaphragm act as a factor in an electrical circuit, producing current changes that vary with the way we talk.

Carbon microphones have been used commercially for years in telephone systems. Radio and phonograph work require a finer quality of reproduction, however, and different microphones are manufactured for these purposes.

David Hughes did not stop with the microphone. He made many experiments with electrical apparatus, resulting in several other important inventions. He was among the first to become interested in wireless telegraphy, and his work along those lines preceded the discoveries of Marconi and Hertz in later years.

Even today it is difficult to write without indignation of Samuel Crompton, one of the most lovable of pioneers. Born near Bolton, Lancashire, in 1753, he received as good an education as the local day school afforded; but the family was desperately poor. There was musical genius in Samuel, but no money with which to buy him instruments. He made himself a fiddle and learned to play so well that he was able to earn eighteen pence a night by working in a Bolton orchestra.

With this money he bought books and materials for the making of his famous spinning-mule. This was a contrivance of great ingenuity which gave a better yarn than had ever been produced before by machine. He worked at cotton-spinning by day with the rest of the family, and played his fiddle at the theater in the evening. Then, when all the rest had gone to bed, he sat working far into the night, year after year, on his mule.

The machine-smashing frenzy was running through the land, and poor Samuel used to take his machine to pieces and hide it, part by part, in a little secret chamber which he had made in the roof by cutting a hole through a ceiling.

It was perfected at last, and he turned out wonderful yarn with it, secretly made of course, so that workmen would not rush in and smash his machine. The fame of his yarn soon spread, and from far and near men were sent to spy on him. He saw that he was in danger, that he could not preserve his secret, yet he was too poor to obtain a patent. "I was reduced to the cruel necessity of either destroying my machine," he said, "or of giving it to the public. To destroy it I could not think of; to give up that for which I had labored so long was almost unbearable."

CROMPTON MADE OTHERS RICH BUT NOT HIMSELF

A Bolton manufacturer persuaded him that if he would make his secret public eighty manufacturers in the town would each give him a guinea. All took the invention; sixty paid. Everybody pounced on it and made fortunes from its use. It extended all over Lancashire and right through the cotton-manufacturing districts of Scotland. No one outside Bolton gave a penny to the creator of the splendid labor-saving device.

At last he appealed to the Government, showing that there were over four million Crompton mules in use. The man who had made huge fortunes for the cotton industry



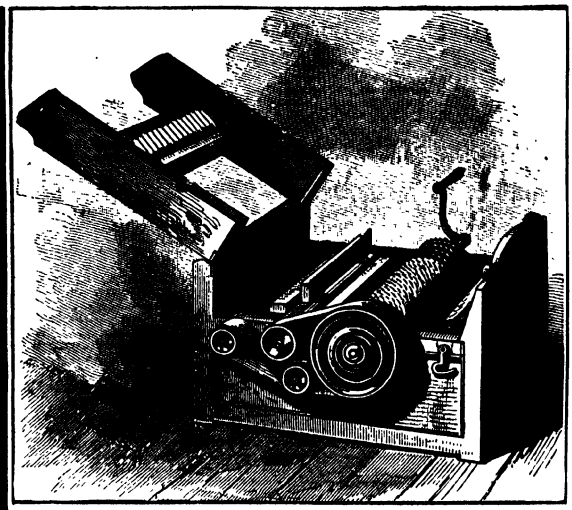


Photo at left by Brown Brothers

Eli Whitney and the original model of his cotton-gin. While living on the Georgia plantation of General Nathanael Greene, whose children he tutored, Whitney studied the problem of separating the cotton fiber from its seeds.

was at last awarded $20,000, not by the men who had profited from his invention, but by the British Government. Finally, in his poverty-stricken old age, the manufacturers of Bolton subscribed a sum which brought him in a beggarly $315 a year.

A number of inventions had come forth which improved the method of turning cotton into cloth. Finished products were being manufactured faster than ever, and this raised a great demand for more and more raw cotton. The need brought forth the man who supplied the answer. He was Eli Whitney, born at Westborough, Massachusetts, in 1765.

Whitney worked to pay most of his own expenses through Yale University and was graduated from that school in 1792. He went to the southern states with the purpose of teaching, turned to studying law and finally set to work on inventing.

The cotton-picking procedure at that time was a slow, difficult process, due to the fact that the cotton had to be separated from the seed by hand. Whitney visioned a machine that could do the work faster.

He labored under great disadvantages, because, as in the cases of Hargreaves and Crompton, jealous and dishonest men tried to steal his ideas. However, even under these conditions, and with home-made tools, he succeeded in producing the mechanical separator known as the cotton-gin.

Various lawsuits defending his rights as inventor cut his profits on the gin to almost nothing. He set up in business, therefore, as a maker of firearms, and produced great quantities of guns cheaply and well. It was Whitney who introduced the system of division of labor, by which each part was made separately. He seems also to have started the idea of standarization, or changeability, of parts. He died a wealthy man.

A means of making high-grade steel cheaply was invented by an Englishman. Sir Henry Bessemer, the originator of the steel process bearing his name, was born in Hertfordshire, England, in 1813.

After a childhood that was filled with workshop tinkering he went to London at the age of seventeen. There he poured forth invention after invention; his mind fairly sang with ideas.

One of his first big successes was a machine for perforating and dating the stamps embossed on legal documents. It saved his country $500,000 a year, for up until that time dishonest people had used the stamps again and again.

For this service to his government he was promised a profitable position. But governments, like men, sometimes forget. Bessemer never got the job, and he never made a cent from his invention. So, he toiled on at other things to earn a livelihood.

At that time bronze powder for "gold" paint sold to printers and painters for $27.50 a pound. It was made by a process that in-

volved much work by hand, and consequently cost a great deal. Bessemer invented a machine that did the job better and more easily. He then sold the powder at about $20 a pound, with no limit on the quantities available. The method remained secret for many years, and the inventor reaped huge profits, even though the price eventually dropped to one sixteenth of its original cost.

Armed with a generous supply of money, Bessemer turned to other things. Experimenting with artillery projectiles, he became interested in metals. In his work he accidentally discovered the key to what is now known as the Bessemer steel process.

Before we tell you of this process it might be well to explain the difference between iron and steel.

Iron is an element, and it very rarely occurs by itself in nature. It is very plentiful throughout the world, however, in various compounds known as iron ores. They are oxides of iron.

HOW IRON ORE IS PURIFIED AND THEN MADE INTO STEEL

When heated in furnaces with quantities of coke and limestone, the iron oxide is reduced (the oxygen removed) and molten iron metal is produced. This then combines with a small amount of the coke (carbon) to form pig iron. (The commercial name for molded pig iron is cast iron. Chemically, they are the same.) But this pig iron has too much carbon and too many impurities. To change it into steel, the basic principle is simply to remove all the carbon and then to put back the proper quantity; or else to remove just enough carbon to leave the correct percentage present. The quantity of carbon is the important factor. When specially treated, as in the Bessemer process, the carbon and impurities are removed in a converter, and then the proper amount of carbon is added again. This product is steel. Other substances, such as manganese or chromium, may be added to produce a special type steel.

One method of removing and adding substances to the molten pig iron is the Bessemer process. The inventor developed a furnace through which it was possible to force steam or a blast of air. This system, he found, made it possible to cleanse molten pig iron of its impurities, converting it to high-grade steel.

The plan was at first given out in an imperfect form, and it failed. The industry laughed and scoffed, but Bessemer worked on to perfect the process. When the corrected formula was refused by the steel manufacturers, he built his own mills. Soon he was supplying the world with top-grade steel at $100 a ton cheaper than any other that could be made.

Not long after this mill owners throughout the world acknowledged Bessemer's genius and sought to make use of his process. He made a fortune, but his generation profited still more, for it had abundant and excellent metal for bridges, railways and buildings, the like of which no man had ever dreamed.

HOW KELVIN SOLVED THE PROBLEM OF THE ATLANTIC CABLE

William Thomson, who later became Lord Kelvin, the brilliant scholar of Glasgow and Cambridge universities, the most famous professor of natural philosophy of his age, and one of the greatest physicists of all time, was also an inventor. He lived from 1824 to 1907.

The first Atlantic cables were useless because far too great a current was sent through them, a current which destroyed the cables meant to carry them. Kelvin saw that the plan must be weak current and intense power of magnifying the faint signals received.

To this end he invented his mirror galvanometer, a dainty marvel weighing a few grains. For the advantage of mariners he made a new compass and a deep-sea sounding machine for use in any waters by ships traveling at any speeds. These are outstanding revolutions in science known to all the world, but other strokes of his commanding genius are too many and too technical for discussion in these pages.

It is perhaps strange to add the name of Henry Ford to a roll which bears that of Kelvin, yet this American manufacturer was, in his way, as considerable a wonder as Kelvin in his. He was born in 1863, as poor as Edison; he toiled on a little farm, hoeing and cultivating and pondering deeply. "I hoed ten thousand miles," he said, and he hated the monotony and toil.

His own experiences made him yearn to bring into existence machinery which would relieve human beings of this dreary labor. His escape was gained by way of one of the Edison factories, where he became a good mechanic, dreaming of a cheap motor tractor for the farm.

He saved up a little money and determined to start in business for himself. Realizing that farmers were conservative and opposed

to new ideas, he first had to make them familiar with cars which they could drive before they would think of farm tractors.

So began the building of Ford motor cars —cheap, ugly, but efficient. He had an enormous untapped market in America, and half the world beyond. To supply it, he saw that he must standardize his productions, do everything by machinery. He brought to perfection the task of departmentalizing industry, which Whitney had long previously begun.

In order to secure efficiency from the workers he cut down their hours from twelve to eight per day, and gave them all $5 a day as a minimum wage. That was in itself an industrial revolution, but it was followed by still more benefits in unending succession.

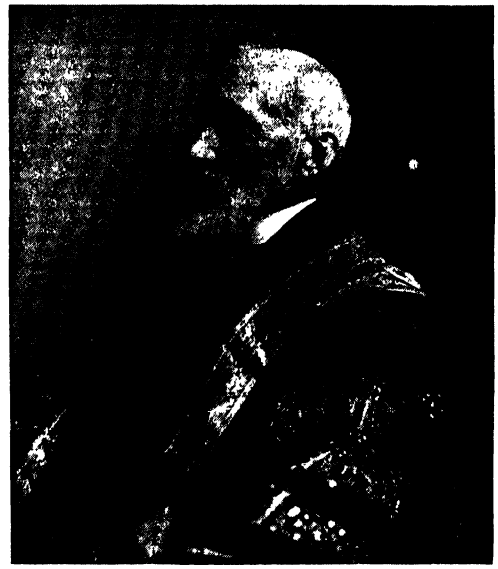
The work grew to such an extent that he ceased to be merely a manufacturer. He used tons and tons of iron every year; and, as he could not get regular supplies he bought his own iron mines. He bought his own coal mines, he bought a railway for the transport of supplies and finished cars, he bought forests, he bought rubber plantations for his tires, cotton plantations for the fabric of the top; he bought stretches of riverway which gave him immense horse-power in flowing water for driving machinery.

THE FORD PLANTS TURN TO WAR PRODUCTION

During the second World War, Ford industries turned entirely to war production. The gigantic Willow Run plant in Michigan was built, and Ford directed manufacture there of B-24 Liberator bombers for the United States Army Air Forces. They poured from the assembly lines at rates up to one every hour, proof again of the feats possible with Ford's mass-production methods. His factories also turned out jeeps, armored cars, gliders, airplane engines and tanks.

Henry Ford had retired in 1918 in favor of his son, Edsel Ford. However, in the midst of his company's furious war work he resumed his post as the head of about 160,000 workers. Edsel died in 1943 and the father again took over until, in 1945, his grandson, Henry Ford 2nd, succeeded him. Nevertheless the elder Ford kept up his interest in research work. The founder of one of the greatest industrial organizations in the world died on April 7, 1947.

In the early days of North America, grain was cut with a sickle. You may have seen a picture of one somewhere; it is shaped like a question mark. A man gathered grain by holding it in one hand and cutting it free with the sickle in the other. Next, a "cradle" was used. This was a long curved knife at the end of a handle; it had wooden fingers which kept the grain from falling. Some of them are still used on small farms.



Brown Brothers

William Thomson, Lord Kelvin, invented the galvanometer, which made the Atlantic cable a success.

The first attempts to make a grain-cutting machine were made in Great Britain. Henry Ogle, a schoolmaster of Rennington, made a mechanical reaper in 1822, and Patrick Bell, a young Scottish student, invented a more advanced type four years later.

Obed Hussey and Cyrus Hall McCormick, two Americans, worked at the same time on a new machine to cut grain. Both received patents, one in 1833 and the other in 1834. McCormick's was the more successful. This machine, which was drawn by horses, cut more than could be cut by the hands of many men. At once others began attempts to improve the McCormick invention; and just before the American Civil War, John E. Heath invented a machine which not only cut the grain, but tied it into bundles, thus saving much more labor.

In 1875 John F. Appleby, who had invented a successful twine-knotter some years before, made a binder which has proved to be the basis for modern machines of this type. In later years a threshing machine was added to the reaping operation, thereby separating the grain from the chaff as the farmer moves along the fields.

There have been many other improvements in agricultural machinery. A hundred and thirty years ago, the plows used on the continent of North America were little more that crooked sticks. In 1797 Charles Newbold, of New Jersey, invented an iron plow, but the farmers would not use it, as they feared that the iron would poison the soil. Besides, it was very heavy and expensive.

Jethro Wood, of Scipio, New York, in 1819 invented an iron plow made in several parts; if one part broke, it could be replaced without too much trouble. This came into common use. Then the plow was put on wheels, first drawn by horses and later by tractor (engine).

A TRACTOR IS THE MODERN FARMER'S BEST ALL-AROUND HELP

Tractors can do many things on a farm, and few modern farms are without at least one of them. They draw agricultural machinery; they pull heavy wagons along the roads and through the fields; they pull up tree stumps. They also furnish power to run threshing machines, corn-shellers and the like, besides the hundred-odd incidental jobs that always turn up in the busy day of a farmer.

Only a few years ago all hay was raked by hand. Now a mechanical rake does as much as twenty or thirty persons could do. We also have machines that sow the seed, and then cover it with earth so that it can grow. There are "mechanical men" to gather corn, to husk it and to separate it from the cob. If corn had to be separated from the cob by hand, it would take all the people in the United States over a hundred days a year to do the job.

In 1931, Price C. McLemore of Montgomery, Alabama, saw in a newspaper a photograph of an Italian army flame thrower. Being a farmer, and a clever man, his thoughts turned to the possibilities of using such a device to aid him in producing his cotton crop.

Various machines up to that time had simplified and speeded up the cotton-picking procedure. However, it was still necessary to employ many hands for the purpose of hoeing weeds. And besides that, there was always the boll-weevil, a persistent enemy of cotton farmers for over fifty years.

The day after he noticed the picture McLemore took a plumber's blowtorch and decided to put his ideas to work on the weeds in his cotton patch. To his great delight, the theory proved to be entirely practical.

Over the space of years the inventor worked on many different types of blowtorch weeders. His perfected model has been tested at agricultural stations and universities throughout the United States.

Results from the experimental farm at Stoneville, Mississippi, indicate that the labor cost of $4 to $12 per acre for hand-weeding is reduced to $.48 an acre with the McLemore "Sizz Weeder."

A flame, ten inches wide by twenty-two inches long, is squirted out in a stream that reaches a temperature of over 2000° F. One burner uses Diesel fuel or kerosene, another uses butane or propane gas. The heat kills the bothersome weeds and the pesky weevil, but does not harm the cotton plant.

The machine may be drawn by tractor, animal or hand. It can de-weed ten acres in four hours, where a man with a hoe would need two hundred hours for the same job.

Someone has calculated that it now takes on the average only ten minutes of labor to grow a bushel of wheat, while about seventy-five years ago it took three hours. It takes about forty minutes of labor to grow a bushel of corn, while then it took four and a half hours. About a hundred years ago nearly three-fourths of the people in the United States lived on farms. Today somewhere around one-fifth are able to raise food enough for the whole population, plus some to spare for other nations. The chief cause of this advance is farm machinery.

Land can be plowed in less time; seed is sown by a drill instead of by hand; there is less hand work in cultivation, and reaping takes less time, too. More and more crops are being raised by fewer people.

A BLIND MAN'S WONDERFUL GIFT TO THE SIGHTLESS

It was a blind man who established the most common method of reading now used by other blind people. Yes, Louis Braille, the founder of the Braille system of raised lettering, was himself blind.

Born near Paris in 1809, Braille lost his sight at the age of three. Sent to a school for the blind, he learned to read by interpreting raised letters through the sense of touch. He became an instructor at the school by the time he was seventeen.

But Braille was not satisfied with the systems of reading that were then being taught. He felt that they could be improved. They had not been designed by the blind, and therefore did not take into full enough account the delicate variations in the sense

of touch which only a sightless person can fully appreciate. So, he resolved to establish a new system.

Up to Braille's time the raised letters were presented as a smooth, embossed surface. Their shape was the same as that of the letters in the normal alphabet. Braille had studied probably every system that had ever been originated, and he decided that none of these was the complete solution.

Before he reached twenty Braille laid the foundation of his work. In the next five years it was perfected. Here at last was a blind man's answer to the problem of the blind.

In Braille's system there was no attempt to shape the raised figures to the form of the alphabet's letters as you and I know them. He used raised dots, in different numbers and positions, to indicate the various letters. In this it is something like the Morse code, which uses dots and dashes of sound to indicate letters.

Each letter of Braille is made up of some combination of only six dots. These dots are always arranged in a rectangular outline—two dots across and three dots down. See the picture on page 7210. By presenting various combinations of dots, it is possible to have sixty-three distinct "touch-pictures."

Those extra combinations above and beyond the twenty-six letters of the alphabet are used for punctuation marks and for the simple little words like *and* or *with* which occur so often in our language.

The Braille system possessed a feature that no other method had—it could be written by the blind as well as read. With the special frame and punching apparatus that is available, a sightless writer can put his thoughts and ideas on paper very easily. At first it seems strange to write from right to left, as you must do in punching the dots in the paper. You see, the dots are pressed inward from the back of the paper. So, when the paper is turned over, they are raised, and can be read in the usual direction, left to right.

It is possible to read and write music just as satisfactorily. Braille himself became a very good organist, and played often in one of the Paris churches. He died at the age of forty-two.

Charles Goodyear, who was born in New Haven, Connecticut, in 1800, was a hardware merchant, but was not successful. He became interested in rubber and made many experiments. It is said that in 1838 or 1839 he accidentally dropped some rubber and sulfur on his kitchen stove and found that



New Holland Machine Co.

The Sizz Weeder, invented by Price McLemore, uses a jet of flame to destroy weeds without injuring the crop.

he had by chance succeeded in doing what he had failed to do by experiment. This process is called vulcanization, and its discovery marks the beginning of the rubber business. We tell you the story of rubber on page 1404.

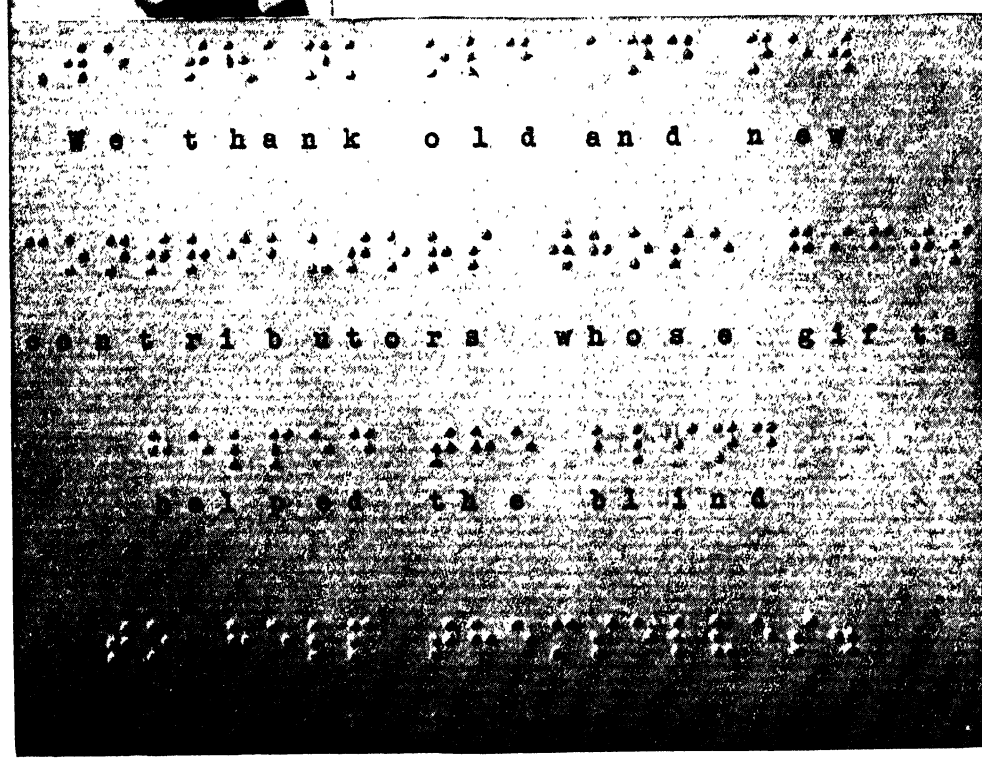
Goodyear and his brother, who was also interested, attempted next to make hard rubber. They were successful in 1851, and now combs, buttons, bottles, inkwells, penholders, fountain-pen barrels and many other things are made of hard rubber. The chief difference in the processes of making hard rubber and elastic rubber is in the amount of sulfur and the degree of heat used.

Goodyear seems to have been a poor business man. Although he took out sixty patents on his inventions, he did not gain much money and eventually died a poor man.



The Lighthouse of the N. Y. Assn. for the Blind

Reading the dots of a message in Braille with the finger tips. Below we see a sample of this writing for the sightless, with a translation.



It is not true that all inventors have been poor boys. There were many men who did make their discoveries because of financial necessity, but still there were some, like Peter Cooper Hewitt, who were rich. Hewitt's grandfather was Peter Cooper, the builder of the first American steam locomotive. The boy's father was a very successful iron manufacturer. So, you see, not only did young Hewitt have money, but he also possessed a heritage of mechanical and inventive ability.

Most men are not fortunate enough to have the valuable combination of practical and theoretical education which Peter Cooper Hewitt gained. Tools were his playthings during youth; in later years a sound engineering education taught him the value of calculation and planning. Add to this all that he learned working in his father's plants —the foundry, the machine shop and the forge—and you can see that Hewitt did indeed have a remarkable background.

After several early successes with a glue-making plant and in jewelry work, he turned to the study of illumination. The electric lamps of that time were crude devices that wasted too much power as heat. Hewitt began to investigate the possibilities of a new

A THRILLING DISCOVERY



The Goodyear Tire & Rubber Co.

The toughness and elasticity that makes rubber such a useful material is obtained by heating the rubber with a certain amount of sulfur. It was Charles Goodyear who made this discoverey and thus laid the foundation for the whole modern rubber industry. It is said that he found this secret quite accidentally during his experimenting.

light source. The mercury-vapor lamp is the result of his efforts. It is one of the cheapest means of artificial light that we have in the world.

In its present form, the lamp is a glass tube of any convenient shape. The negative terminal is a bulb containing a small pool of mercury, located at one end of the tube; the positive terminal is at the other end. When air is removed, the tube becomes filled with mercury vapor. Direct-current electricity applied to the terminals then makes the lamp glow with an incandescent blue-white light.

This mercury-vapor lamp is a cool, remarkably efficient and economical source of light. It is used a great deal in lighting textile mills, foundries, paper mills and other industries. Because of the fact that it contains no red rays, the lamp tends to distort colors. Some of the rays it does contain in abundance, however, make the lamp valuable in taking pictures.

This invention of Hewitt's gave rise to two others. In this same mercury-vapor lamp the inventor noticed that when alternating current was applied to the terminals, the electricity flowed only one way! This discovery gave rise to the mercury-vapor rectifier (a rectifier changes alternating current to direct current) and to an electrical interrupter for use in telegraphy.



Brown Brothers

Peter Cooper Hewitt in his experimental laboratory.

Hewitt was a business man as well as inventor. He was a director of Cooper, Hewitt and Company and also of the Cooper Hewitt Electric Company. Cooper Union, the school founded by his grandfather in New York City, listed him as trustee.

Dynamite was invented by Alfred Nobel, a Swedish engineer. As a result of this discovery, and others, he was able to build a great fortune, out of which has come the fund that provides for five annual Nobel Prizes to outstanding world benefactors.

Born in Stockholm, Sweden, of a father who was also an inventor, he moved early in life to St. Petersburg, now Leningrad, Russia. He was educated there and in the United States, where he studied engineering under the great John Ericcson, the man who designed the screw propeller and the iron-clad Monitor.

Both father and son were much interested in nitroglycerin. Though it was a dangerous substance to handle and had caused countless accidents and deaths, they spent much of their time on its study. Together they set up a plant for manufacturing the explosive on a commercial scale, the first time that this had ever been done.

Young Nobel was a born research man and a good chemist. He was continually experimenting with things, new compounds, old compounds and mixtures of various explosives. But as so often happens, it took an accident to lead him to the development of dynamite.

THE YOUNG NOBEL'S INVENTION OF DYNAMITE

One day he noticed some nitroglycerin that had run out of its container into the sand. His curiosity drove him to test the nitro-sand mixture, work with it and study it closely. It took time and courage. The fruit of his labors was dynamite—an explosive that could be handled as safely as candy, but which could still rip open the side of a mountain with the force of lighting.

The new "safe" explosive proved a boon to civilization. Rock-bound coasts became harbors, canals linked together bodies of water and tunnels pierced mountain peaks—all because the great blasting power of dynamite was available.



Brown Brothers

Alfred Nobel, peace-loving inventor of explosives.

Further hard work and the blessing of another accidental discovery brought Nobel the invention of blasting gelatin. He was treating a cut with collodion and happened to mix some of that compound with nitroglycerin. (Collodion contains guncotton, another explosive.) The product of the two was gelatin-like material half again as powerful as dynamite.

Nobel became a rich man through his inventions, his factories, his oil-well interests and other sources of income. When he died his estate was about nine million dollars. In his will he left the great bulk of his fortune in a special fund that provides a group of five yearly prizes. Awards are made in each of the following fields to the person who during the preceding twelve-month period has done the most for the benefit of mankind: (1) physics, (2) chemistry, (3) medicine, (4) literature and (5) promotion of peace. The value of each prize varies between $40,000 and $50,000.

The business man of today would not know how to get along without the typewriter. On it letters are written quickly and legibly, and copies can be made, so that much trouble may be avoided. Yet the typewriter is a modern invention, and most men of seventy years ago knew nothing of it. They wrote their letters by hand.

Christopher L. Sholes, an editor of Milwaukee, felt the need of a machine to number tickets, coupons and blank books, and set to work to invent one. He succeeded, and then decided to make a writing machine. Several men had already tried, but their machines were clumsy and got out of order easily. With two friends, Sholes secured a patent in 1868. The machine was heavy and clumsy, and corrections could not be made, but the right idea was there. One of the letters written on this machine fell into the hands of James Densmore, and he bought a share in the patent. Model after model was built, each a little better than the one before, and in 1873 the invention was bought by Remington and Sons, who owned a fine machine shop and gave the new machine their own name. Sholes sold his share for $12,000 but Densmore preferred to receive a small sum on every machine made. He is said to have received a million and a half dollars before the patent expired. Many changes and improvements have been made in the Remington machine, and in many others which have been patented, but to Sholes is due the credit of the first practical typewriter.

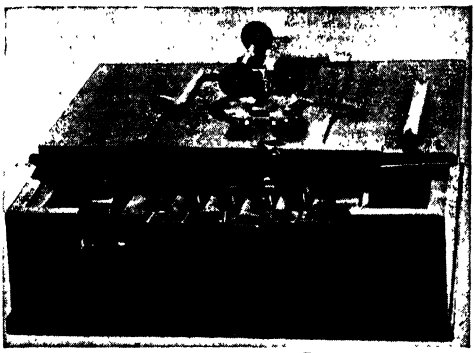
An inventor who turned his mind to many things was Thomas Blanchard; who, while only a boy, invented a machine to pare apples. Next was a machine to count tacks, then made by hand. Soon he invented a machine to make the tacks. It is still in use, though somewhat improved. His most important invention was the copying lathe, which copies exactly the model placed in the machine. This was first used to make gunstocks and lasts for shoes. For many years Blanchard was employed in the United States Arsenal at Springfield, Massachusetts, and there the original lathe may be seen today. Another machine, which bends wood for shipbuilding, or for making curved handles for plows and other tools, and shaping wooden wheels, brought him more money than his more important inventions.

ENIAC: A MARVEL OF THE ELECTRONIC AGE

Eniac is the name given to one of the electronic marvels of the age. It is a short title for Electronic Numerical Integrator and Computer.

Two young University of Pennsylvania engineers, Doctor J. W. Mauchly and J. Presper Eckert, Jr., invented this wonderful calculator.

In the beginning of the second World War Mauchly had an idea, an unrealized ambition. He was a meteorologist who believed that great advances in the art of weather prediction were possible. Toward that end, some means had to be developed of dealing with complex mathematical problems involving huge numbers Mauchly turned to engineering, and to electronics.



Remington Rand Co.

Few of us would recognize this strange machine as a typewriter. It is the first model constructed by Sholes, Glidden, and Soule, and it is now in the Smithsonian Institution at Washington, D. C.

Together with his associate, Eckert, he worked hard and long. United States Army Ordnance experts who were interested in a calculator to solve complicated ballistic problems joined with some other University of Pennsylvania engineers to render assistance.

The Eniac is the result—an invention that is an electronic miracle. It uses about 18,000 vacuum tubes and takes 150,000 watts of power, three times more than one of the largest broadcasting stations in the world. It has no moving mechanical parts.

In a second's time the machine can take a number like 6,587,432,975 and multiply it by itself 360 times. It divides, adds and subtracts, too, as well as performing many other mathematical chores much more difficult.

A problem which would take one hundred trained men a year to finish is answered by the Eniac in two hours. Its inventors are trying to find problems that it can not solve.

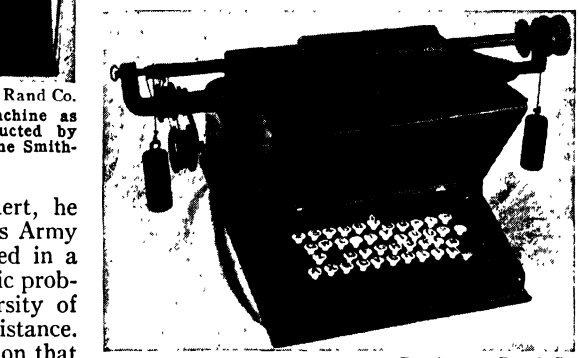
The Electronic Numerical Integrator and Computer promises much in any field dealing with large numbers and involved computations. Atomic physics, meteorology, banking and finance, electronics, stress and strain analysis, rocket research and ballistics are only a few that will benefit from the work of Mauchly and Eckert.

Wages in Canada and in the United States are among the highest anywhere in the world. This has been true from very early times, and the fact has had great influence upon the growth of the countries.

In Europe wages are generally lower than they are in some of the newer countries, and many things are done by hand in all the countries of Europe which here are done by machines. In India and in the Orient wages are still lower, and there you will find very little machinery at all. You can see why this is true. An employer who can use much hand labor does not need to put much money into expensive machinery, and does not need to construct buildings at high cost.

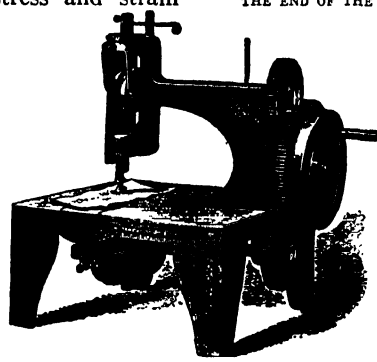
Where wages are high, employers will try to get their work done with as few workmen as they can. This is one of the reasons why North America is ahead of the world in labor-saving machinery.

THE END OF THE DEPARTMENT OF MEN AND WOMEN.



Remington Rand Co.

In 1873 the Sholes typewriter was bought by Remington and Sons, who owned a machine shop and could manufacture it. This is the improved model which was shown to the Remingtons by Sholes and Densmore.



The development of the sewing machine brought about a complete change in the clothing habits of the civilized world. It led to the creation of entirely new industries and ways of selling, and brought style and fashion within the reach of all classes of people.

Many attempts were made to perfect a workable sewing machine, both in England and America, but it was not until 1846 that a really practicable machine was patented by Elias Howe in the United States. Later, in 1851, Isaac Singer patented the improved machine pictured here.

Singer Sewing Machine Co.

Aladdin and the Wonderful Lamp

From ARABIAN NIGHTS ENTERTAINMENT

IN one of the large cities of China there once lived a tailor named Mustapha. He was very poor, but he was not without hope, for he had a son, Aladdin by name, who was strong and well-favored. But Aladdin, as he grew older, showed no interest in tailoring which was the only trade his father could teach him, and at last, worn out by poverty and worry, Mustapha fell ill and died.

Then Aladdin, having no trade, fell into bad habits and was seldom out of the streets. One day, as he was standing with idle companions in the market-place, a stranger, passing by, observed him. This stranger was an African magician who was seeking a certain kind of youth to use as a tool for his own evil purposes. After looking at Aladdin for some time, he inquired who he was; then he went up to Aladdin and taking him aside, said to him with pretended eagerness:

"Is not your father called Mustapha, the tailor?"

"He was so called," Aladdin replied, "but he has been gathered to his ancestors."

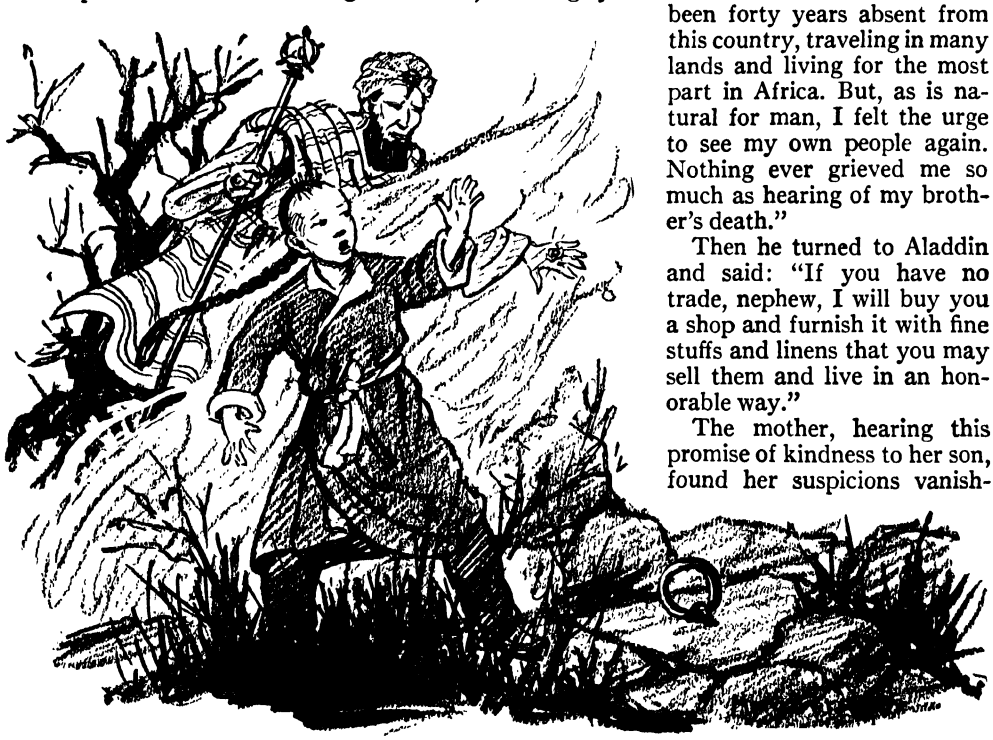
At these words, the stranger threw his arms about Aladdin's neck and pretended to weep, saying: "I am your uncle! I knew you at first sight, you are so like my brother. Let us go, my boy, to your dear mother that I may pay my respects to her."

Overjoyed at being claimed as nephew by a stranger so richly dressed, Aladdin led the magician to his home. But his mother, greatly puzzled, only shook her head and kept repeating: "My husband had no brother! My husband had no brother!"

"Dear sister," said the magician, "it is not strange you have never heard of me. I have been forty years absent from this country, traveling in many lands and living for the most part in Africa. But, as is natural for man, I felt the urge to see my own people again. Nothing ever grieved me so much as hearing of my brother's death."

Then he turned to Aladdin and said: "If you have no trade, nephew, I will buy you a shop and furnish it with fine stuffs and linens that you may sell them and live in an honorable way."

The mother, hearing this promise of kindness to her son, found her suspicions vanish-



A dense smoke arose; the earth opened before them and revealed a great stone with a brass ring fixed in it.

ing. She prepared a supper, and when the magician took his leave, she invited him to return.

Early next morning, he called again and said he would take Aladdin to spend the day in the country, and on the next day he would purchase the shop. He led Aladdin out at one of the city gates, and talking all the while to beguile him, led him on and on, until they came at last to a place between two mountains divided by a narrow valley.

"I think so highly of you, nephew," the magician said, stopping there, "that I am resolved to show you some African magic. First you must gather a heap of sticks and kindle a fire."

Aladdin collected a heap of dried sticks, and when they were in a blaze, the magician threw in some incense, at the same time uttering magic words. A dense smoke arose and the ground shook under their feet. The earth opened before them and revealed a great stone with a brass ring fixed in it. Aladdin was frightened and turned to run, but the magician gave him a blow that knocked him down.

"No person but yourself," said he, "is permitted to lift this stone or take the treasure which is under it, so you must do what I command. Take hold of the ring and lift up the stone."

"I am not strong enough to do that alone," said Aladdin, getting to his feet but trembling in every limb.

"If I help you, we shall not get the treasure," answered the magician. "Take hold of the ring; you will find the stone will come easily."

Aladdin did as he was bade, and to his surprise he was able to raise the stone with ease. Beneath it, there appeared a staircase leading to a door.

"Descend the steps," commanded the magician, "and open the door. It leads into a cave divided into three great halls. Wrap your robe about you and pass through them without stopping or without touching the walls so much as with your clothes, or you will die instantly. At the end of the third hall, you will find a door which opens into a garden of fruit trees. Walk directly across the garden to a terrace where you will see a niche before you. In that niche is a lighted lamp. Put out the light and throw away the wick and the oil. Put the lamp in your waistband and bring it to me."

Then the magician drew a ring from his finger and put it on one of Aladdin's fingers, saying: "It is a charm which will protect you so long as you obey me. Go, therefore, boldly, and we shall both be rich all our lives. Go down, Aladdin."

Aladdin descended the steps, and opening the door found the three halls within. He went through them, crossed the garden, and found the lamp in the niche. He threw out the wick and the oil, put the lamp in his waistband, and started back. But as he crossed the garden, he stopped to admire the fruit which hung, sparkling, from the trees. Never before had he seen fruit of so many colors and of so hard and shining appearance. Though he did not know it, the white fruits were pearls, the transparent ones were diamonds, the red ones were rubies, the green, emeralds, the blue, turquoises, the purple, amethysts, and the yellow, sapphires. Quickly Aladdin filled his pockets, his girdle, and even the space between his robe and his shirt with the largest of each color. Then he hurried through the three halls and arrived at the mouth of the cave where the magician awaited him impatiently.

"Give me the lamp!" cried the magician, reaching down his hand.

"As soon as I am up," answered Aladdin, who was so weighed down with the jewels that he could not hold up the lamp.

"Give me the lamp!" cried the magician again, falling into a fury.

"As soon as I am up," repeated Aladdin,



Seizing the lamp, Aladdin turned toward the genie.

expecting his uncle to help him. Instead, the magician, in a great rage, threw incense into the fire and said two magic words. Instantly the stone moved back into place, trapping Aladdin under the earth. He was in complete



The genie brought a tray laden with delicious foods.

darkness, alone in an underground prison.

Frightened almost out of his wits, Aladdin felt his way to the bottom of the stairs intending to return to the garden, but the door which had been opened by magic was now closed by the same means. Giving up to despair, Aladdin clasped his hands to pray, and in doing so, he rubbed the ring which the magician had put on his finger. Immediately an enormous genie appeared, who said: "What wouldst thou have? I am ready to obey thee who possesseth the ring."

Although frightened at so terrible a figure, Aladdin managed to whisper: "Whoever thou art, deliver me from this place." He nad no sooner spoken these words than he found himself above ground, and there was no sign of opening or disturbance of the earth. Hurrying home, he told his mother all that had happened, and they knelt in prayer of thankfulness for his escape.

The next morning, Aladdin's mother said. "There is no food for our breakfast, but I have a little cotton which I have spun. I will go and sell it and buy something for us to eat."

"Nay," replied Aladdin. "Keep your cotton for another time, and let us sell instead the lamp I brought home yesterday."

His mother brought the lamp, and, finding it dirty, she took some sand and water to clean it, for, said she: "I believe it would bring more if it were cleaner." No sooner had she begun to rub than a genie of gigantic size appeared and said in a loud voice. "What wouldst thou have?"

Aladdin's mother fainted, but Aladdin snatched the lamp from her hand and said boldly: "Bring us something to eat."

The genie disappeared, but in an instant returned with a large silver tray holding twelve silver dishes of meats, cakes, and fruit. This he placed upon the carpet, and vanished. Aladdin aroused his mother, but although she ate of the food, she declared she would have nothing further to do with the lamp. "Genies are devils," she warned Aladdin. "We must never touch that lamp again."

But Aladdin, saying nothing, only hid the lamp away in a safe place.

When the food was gone, Aladdin sold the silver dishes one by one, and when all the money received for them was spent, he summoned the Genie of the Lamp a second time and demanded twelve more silver dishes of food. In this way Aladdin and his mother continued to live for many years, and Aladdin, forsaking his idle ways, studied to grow in wisdom and learning.

Now one day when Aladdin had reached his nineteenth year, he heard a public crier commanding all the people to go indoors as the Princess Buddir al Buldoor, the sultan's daughter, was on her way to the bath. Curious

to see the princess, Aladdin concealed himself behind the door of the bath, and as she had taken off her veil he had a full view of her face. The moment he saw her, he fell deeply in love with her.

Hurrying home, Aladdin took a large porcelain bowl and arranged in it the jewels he had brought from the trees in the garden of the cave. Their brightness and beauty dazzled the eye.

"Mother," he said, "go to the palace of the sultan and present him with these jewels and beg him to give the princess to me in marriage."

"Alas, my son," cried his mother, "you must be mad to talk thus!"

"I am not mad," replied Aladdin. "I am resolved to marry the princess, and do not forget that I have the slaves of the lamp and of the ring to help me."

His mother could not dissuade him, and at last she went off toward the palace of the sultan with the porcelain bowl hidden under her coat. When she came to the gates, the people were just going in to the great hall where the sultan was holding court, and she followed after them and placed herself before the platform where the sultan and the great lords sat in council. Many matters of state were attended to; then the sultan, rising to retire, saw the woman standing there with something wrapped in a napkin.

"Good woman, what business brings you here?" he asked.

Aladdin's mother fell to her knees and said: "King of kings, I beg you to pardon the boldness of my request. But my son, Aladdin, hath sent me to you with this gift, and he begs the hand of your daughter in marriage."

So saying, she untied the porcelain bowl and presented it to the sultan. Great was his amazement when he saw so many large and valuable jewels. He turned to his grand vizier exclaiming: "Behold! The smallest of these jewels is larger than any in my coffers. Tell me, ought I not to bestow my daughter upon one who values her so highly?"

"If it please your majesty," said the grand vizier. "But should you not find out first who this Aladdin is? He may be the worst rascal in all of China!"



The princess sent an attendant to find out what the strange old man at the palace gate was calling.

But the sultan's eyes were dazzled by the jewels, and greed was rising in him to possess more of them. "Good woman," he said to Aladdin's mother. "I must have proof that your son would be able to support my daughter in royal state. Tell him to send me forty gold trays full of the same jewels as are in this bowl, and carried by forty black slaves, led by the same number of young and handsome white slaves, all magnificently dressed."

The mother went home and told Aladdin the conditions upon which the sultan consented to the marriage, believing he could not fulfill them. But Aladdin immediately summoned the Genie of the Lamp and ordered him to prepare the gift before the sultan closed his morning audience.

In a short time, a train of forty black slaves led by the same number of white slaves, appeared opposite the house in which Aladdin lived. Each black slave carried on his head a gold tray full of pearls, diamonds, rubies and emeralds, all of enormous size and

beauty. As soon as the magnificent procession, with Aladdin's mother at its head, began to march from Aladdin's house, the whole city turned out to see so grand a sight. The graceful bearing of the slaves walking gravely two paces apart, the luster of their jeweled girdles, and the brilliancy of the precious stones caused all the people to marvel greatly. When the procession entered the hall of the sultan, the slaves formed a semicircle before the throne, placing the golden trays on the carpet, and, bowing low, stood back with their arms crossed over their breasts.

Overcome by the sight of such riches and wondrous beauty, the sultan beckoned to Aladdin's mother to approach the throne, and said to her: "Go and tell your son that I await him with open arms. He, and no other, shall marry my daughter."

Aladdin had already prepared for this summons which he knew would surely come. He had been dressed by the Genie in a rich robe that shone like the sun, and was mounted on a charger that surpassed in beauty the best in the sultan's stables, with a saddle, bridle, and trappings of gold. He rode through the streets accompanied by twenty slaves, all mounted, who carried purses of gold which they threw in handfuls among the people who made the air echo with their cheers. Thus did Aladdin come to the sultan's palace, and the sultan was amazed that so handsome and rich a young man had not been known to him before this time. He commanded a feast to be prepared, and sent for the chief judge to draw up a marriage contract between the Princess Buddir al Buldoor and Aladdin. But Aladdin said: "I beg you to permit me to first build a palace worthy of your daughter. Only grant me the land and I will have it completed with the utmost speed."



"New lamps for old! Who wants new lamps for old?"

Readily the sultan gave him a large piece of land adjoining his palace grounds, and Aladdin retired to a chamber, took the lamp from his girdle, and summoned the Genie.

"I command thee," said he, "to build me a palace fit for the princess. Let its walls be gold and silver bricks laid alternately. Let each front contain six windows with lattices enriched with diamonds, rubies, and emeralds. Let there be kitchens and storehouses and gardens, and stables filled with the finest horses. And let there be a treasure house filled with silver and gold."

When Aladdin gave these commands, the sun was setting. The next morning at daybreak the palace was completed and well attended by grooms, pages, and slaves. Then Aladdin said: "Genie, lay a fine carpet for the princess to walk upon from the sultan's palace to mine."

That evening the marriage ceremony was performed, and the princess, pleased with so young and handsome a husband, went gladly to her new home. Bands of music led the procession, and four hundred of the sultan's young pages carried torches to make the night as bright as day.

Now Aladdin and the princess lived for many years in happiness, but there came a day when the African magician learned that the tailor's son had escaped death and was making use of the lamp. He returned to China at a time when Aladdin had gone on a hunting trip. With his plans all formed, the magician bought a dozen copper lamps, handsome and well polished, and putting them in a basket, went toward Aladdin's palace, crying: "New lamps for old! Who will exchange old lamps for new?"

A crowd of children collected, hooting at him, but he paid no heed, walking backward and forward in front of the palace calling: "New lamps for old!" At last the princess

sent an attendant to find out what the strange old man was calling.

"He says he will give new lamps for old!" the attendant came back to say. "I know not how he can be so silly. We should try him."

Laughing, the princess remembered that there was an old lamp pushed far back in a closet of her husband's room, and she sent an attendant to bring it and exchange it for a new one. Thus did the magician recover the magic lamp he had sought for so long. He hastened with it out of the city and when he reached a lonely place, he rubbed the lamp and the Genie appeared. "I command thee," said the magician, "to carry me to Africa, and with me the palace which thou hast built in this city, and the princess and all others who are now in the palace." And immediately it was done.

When Aladdin returned from his hunting trip, he could scarce believe his eyes. Where his palace had been was only empty ground, and his wife was gone and all their attendants. More than that, he learned that the sultan's guards had been ordered to seize him, for the sultan blamed him for his daughter's disappearance.

Barely escaping with his life, Aladdin wandered in the country for three days. On the third day, tired and footsore, he sat down by a river to rest, and chanced to rub his ring against a rock. Immediately the Genie of the Ring, whom he had forgotten, appeared and said: "What wouldst thou have?"

"Carry my palace back to where it stood," said Aladdin.

But the Genie answered: "I can not do that. I am the slave only of the ring and not of the lamp."

"Then I command thee, by the power of the ring," said Aladdin, "to carry me to the spot where my palace now stands."

Instantly Aladdin found himself in Africa in the midst of a large plain. And there before him was his palace, its proud towers rising to the blue sky. He hastened to enter its gates and to find the princess. Great was her happiness at seeing him. When they embraced, Aladdin said: "Tell me, my Princess, what has become of the old lamp I had hidden in my chamber?"

Then the princess told how her slave had exchanged the old lamp for a new one, and said that the evil man who had her in his power always carried that very lamp in his bosom. Aladdin was then sure that this man was no other than his old enemy, the magician, who had pretended to be his uncle.

He told the whole story to his wife, and they hit upon a plan for getting back the lamp. Disguised as a slave, Aladdin went into the city and bought a certain powder. Then the princess invited the magician to sup with her. She entertained him with great kindness; then handed him a cup of wine in which she had mixed the powder. He drank it, and fell back lifeless on the sofa. Now Aladdin came out from hiding, took the lamp from under the magician's vest, and summoned the Genie whom he commanded to transport the palace back to China.

At break of day, the sultan who had risen early to mourn for his daughter, saw the palace shining again upon the spot which had been empty for so many days. He hastened to embrace his daughter, and he gave a feast in honor of Aladdin. But Aladdin was not happy. He felt within himself that all was not yet well. "Why do I feel we are still in danger?" he asked himself.

While Aladdin communed thus, a stranger was crossing plains, rivers, mountains and deserts to reach China. This was the brother of the African magician who, by consulting his magic, had learned of his brother's death and was seeking revenge. Finally he reached the city where Aladdin lived, and he went to the home of a holy woman by the name of Fatima and killed her while she slept. Then he dyed his face to resemble hers, and dressing himself in her clothes, he went to the palace of Aladdin. Now Fatima had the power to cure people of disease by laying her hands upon them and blessing them, so when the people saw this person dressed like Fatima, they crowded about him begging his blessing and kissing his hands.

He came at last to the square before Aladdin's palace, and the princess, who had often heard of the holy woman, sent attendants to request that the supposed Fatima would honor the palace with her presence overnight.

The pretender was conducted to the hall where the princess sat, and while she knelt for his blessing, he glanced about the great chamber.

"Princess," he said, "forgive the liberty I take, but my opinion is that if a roc's egg were hung in the middle of the dome, this hall would have no equal."

"Where may I get a roc's egg?" asked the princess.

"A roc," replied the false Fatima, "is a bird of vast size which inhabits the top of Mount Caucasus. The person who built your palace can get you an egg."

That evening the princess asked Aladdin to get her a roc's egg to hang in the middle of the dome, and Aladdin, wishing to please her, readily consented. He went to the hall of four-and-twenty windows and summoned the Genie of the Lamp. "I command thee in the name of the lamp," said he, "to bring a roc's egg to be hung up in the middle of the dome."

The moment Aladdin uttered these words the hall shook as if ready to fall, and the Genie said in a loud and terrible voice:

"Is it not enough that I and the other slaves of the lamp have done everything for you, but you must command me to bring my unborn child and hang him in your palace."



Then Aladdin fell on his knees and begged the Genie to forgive him, asking him to wait in peace for only a moment. Rushing from the room, he sought his wife and bade her tell him who had urged her to ask for a roc's egg.

"It was the holy woman, Fatima, who lodges tonight within the palace," answered his wife.

"Send for her," commanded Aladdin.

When the pretender appeared, Aladdin said: "Good mother, I am tormented with a violent pain in my head. Will you cure me?" He arose and held down his head. The false Fatima advanced toward him, and Aladdin saw a dagger concealed in the girdle of the supposed holy woman. He seized it and plunged it into the pretender's heart.

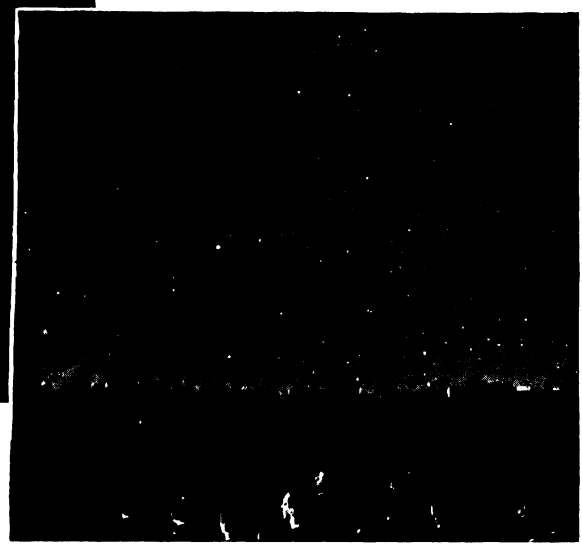
Thus was Aladdin saved from the evil designs of the African magician and his wicked brother. Within a few years, the sultan died, and the Princess Buddir al Buldoor succeeded him, and she and Prince Aladdin reigned together in happiness and prosperity.

THIS IS THE END OF THE STORIES.

A VISIT *to a* PLANETARIUM



The domed ceiling of the Hayden Planetarium showing the Aurora Borealis.



Displaying part of the southern skies to a navigation class.

A PLANETARIUM is a strange-looking building with a dome for a roof. An evening spent beneath that dome is a very exciting experience, for you will seem to be spending the time beneath the majestic sky, far away in space and time. You may suddenly find yourself carried back a thousand years. Or perhaps you will discover yourself strolling about near the North Pole in the year 15000 A.D.; or even landing on a crater of the moon!

The word planetarium can mean a model of the planetary system which uses a projector to display the movements of heavenly bodies on a domed ceiling; or it can mean a building containing such a machine. The plural of planetarium is planetaria. There are not very many planetaria in the world—less than thirty in all. Almost half are in Germany, where the great projector was invented. Italy and Japan have two; France, Belgium, Sweden, the Netherlands and Russia have one each. There are five in the United States: the Adler Planetarium, Chicago, opened in 1930; Fels Planetarium, Philadelphia, opened in 1933; Griffith Planetarium, Los Angeles, opened in 1935; Hayden Planetarium, New York, also opened in 1935; Buhl Planetarium, Pittsburgh, opened in 1939.

The projectors are alike (except for two in Germany) in all their main features, so that the show which we are presently to describe could take place in any of them. The outer halls and rooms are different in each planetarium. The one we are now visiting is the Hayden Planetarium, New York.

In the great Hall of the Sun on the first floor there is a model of the solar system suspended from the ceiling. In the center of the model is an illuminated ball representing the sun; and moving around it at

different rates of speed are balls of varying sizes which represent the planets. In order of their nearness to the sun these are Mercury, Venus, Earth, Mars, Jupiter and Saturn. Uranus, Neptune and Pluto, which are not visible in the real sky to the naked eye, are not shown here.

Moving around some of the planets are little white balls which represent the "moons" of the planets that have moons.

THE CONSTELLATIONS OF THE ZODIAC ARE PICTURED ON THE WALLS

Around the blue walls of this circular room are twelve pictures showing the constellations of the zodiac: Fishes; Ram; Bull; Twins; Crab; Lion; Virgin; Scales; Scorpion; Archer; Goat, and Water-Bearer.

On the floor in the center of the Hall of the Sun is a copy of the Aztec calendar stone. This monument contains much of the advanced knowledge which the Aztec Indians possessed about calendar-making and time-keeping. It is based on the motions of the heavenly bodies, as our own calendars are.

In the corridors of the planetarium there are many things which will interest you. Set in cases in the walls are large photographs on glass—photographs for the most part made by attaching very powerful cameras to large telescopes. There are galaxies like our own Milky Way Galaxy, but much farther away; there are distant star clouds and great gaseous nebulae which look like faint clouds, exceedingly remote. There are photographs of comets, fire balls, planets, observatories and astronomical instruments. There is also a fascinating model of Mount Wilson Observatory, showing the great telescope and all its trappings.

Some of the finest astronomical artists have made, for the corridors of the planetarium, paintings of the sky—paintings of eclipses, planets, northern lights, the sun and many other subjects.

A COLLECTION OF METEORITES THAT WERE SHOOTING STARS

How would you like to put your hand on a shooting star? You can do that, in the planetarium, when you visit the fine collection of meteorites, for meteorites, while they are still in the sky and before they have landed on the earth, are called meteors or "shooting stars." They are not really stars at all but small detached bits of matter which travel around the sun in orbits more or less like those of the earth and the other planets. Occasionally something happens—one of these bodies leaves its path and falls within the earth's atmosphere. Then you may see it as a meteor, streaking down the sky in a fiery path. These bits of material travel so fast that friction is caused with the air and that makes the meteor glow.

IF YOU MOVED TO MARS, HOW MUCH WOULD YOU WEIGH?

Would you like to see how much you would weigh on the moon, or on Jupiter or Mars, compared to your weight on the earth? A set of specially prepared scales makes it possible for you to find this out. As you have probably guessed, your weight is less on planets which are less massive than the earth and which therefore have less gravitational attraction for objects at their surface.

When it is time for the main show in the planetarium, you and your friends climb the stairs to the second floor and enter the room. The ceiling is a great dome, nearly fifty feet high in the center. It is painted white (to be used as the projection screen in a motion-picture theater is) and around the base of the dome, above the heads of the audience, is represented the sky line of New York City.

Music is playing and the people are taking their seats. Soon the music stops and the lecturer enters the room. He steps into a box behind a wooden desk on which there is an electrical control panel which controls the planetarium projector in the center of the room. This projector looks like a great dumbbell with a huge globe at each end. It contains more than 120 stereopticon lenses through which rays of light pass to the dome above, making the images of the stars and other heavenly bodies. The great instrument turns on three different axes as the lecturer controls it from the desk.

DAYLIGHT FADES, AND THE STARS COME OUT ONE BY ONE

As the lecturer begins to talk, the lights in the room are dimmed slowly, until at last you are sitting in a faint evening twilight, with a bit of color left in the western sky after sunset. The speaker is quiet for a few minutes as one by one the stars come out overhead until, with the fading of the last light of day, the whole sky is star-spangled. The effect is so beautiful that you catch your breath, and perhaps for a moment you wonder why you do not take the time to look at the real sky more often. You realize that you are indoors and under the great dome of the planetarium; yet, at the same time, you have trouble in believing that you are not actually under the real dome of heaven.

Slowly the stars grow brighter, and as you

watch, soft music plays, giving you time to pick out the Big Dipper and the North Star and to recognize whatever other stars you know. Then the music stops and the lecturer speaks again. He tells you that these stars are suns like our sun, except for the fact that they are very much farther away from the earth. That, of course, is why they seem so small, because the very nearest of the stars is about 26 trillion miles from us, while the sun is only a small 93 million miles. Truly, he says, the sun is not so big as many of the other stars you see each night. He points out some of the constellations, perhaps the Lion and the giant Orion.

Soon you begin to think you are moving, and you hang on to the arm of your chair. But, no, the lecturer goes on talking, telling you that now, here in the planetarium, the earth is turning as it always does, and because it is turning toward the east, spinning like a great top, it seems to you that the sky is turning the other way. And so you see the stars rising in the east and setting in the west, as you do out-of-doors if you watch long enough.

Each month the lecturer shows you different things about the sky. Sometimes he shows you how to find some of the stars, starting from one star group, perhaps the Big Dipper. You learn the names of these stars —queer names, some of them, such as Aldebaran and Sirius and Canopus.

At other times the lecturer shows you just how the planets travel around the sun; and you take an imaginary journey with him through time for three or four years, watching the planets whizzing around the sky, Mercury always beating all the others because it is closest to the sun. Jupiter and Saturn are so far from the sun that they move along like dignified old gentlemen.

In December the planetarium show takes you back nearly two thousand years, to the first Christmas; and you see the sky as it was about the time Jesus was born. No one knows what the Christmas Star, or the Star of Bethlehem, really was, but you see in the planetarium all the different things it might have been. Was it a comet, an exploding star, a bright planet, a meteor, or several planets coming together in the same part of the sky?

Sometime each year, too, the planetarium show will be a Trip to the Moon. Then you climb inside a big rocket ship (which is actually the inside of the planetarium dome, lighted up from behind) and you travel in imagination to the moon. You land in one of the lunar craters and there you discover, in a visit of about a month (planetarium time), that there isn't any weather on the moon, because of the lack of air, and that for the same reason you can not hear or smell anything there. After you have seen an eclipse of the sun by the earth you travel safely home again to the earth, and land right back where you started from.

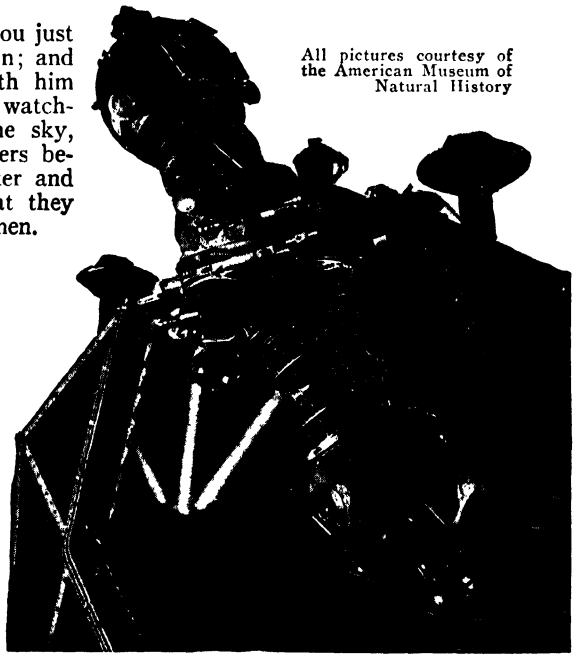
It may be that the show in the planetarium will have to do with the things that happen in the air around the earth. You will see a rainbow and learn what makes it shine with color in the sky; or you may see the northern lights as the Eskimos see them.

Now you hear faint music far away. It grows louder and louder as the clouds in the east turn gray and then rose color. At last the sun shines brightly again behind the buildings of New York. It is morning in the planetarium.

By MARIAN LOCKWOOD.

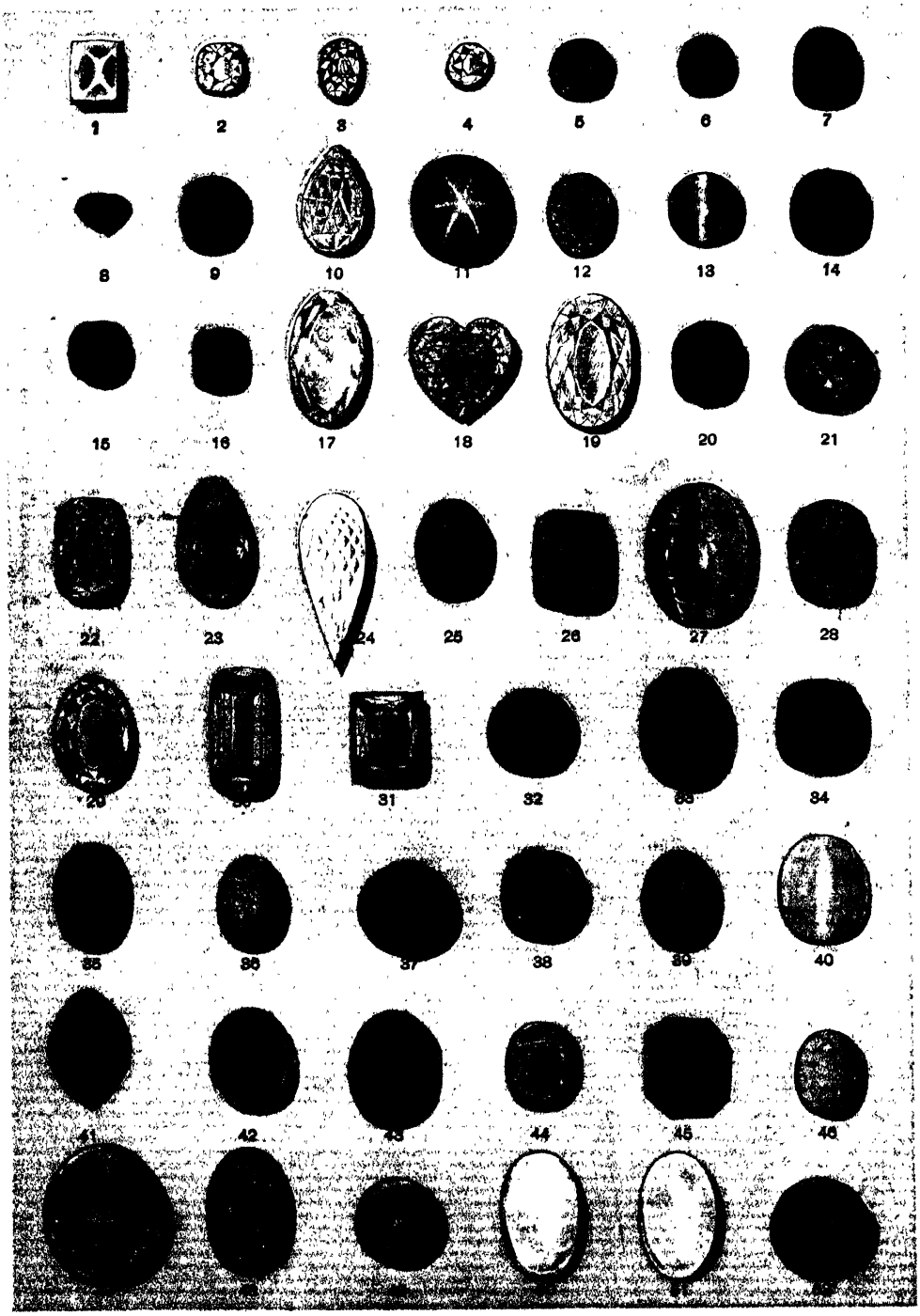
THIS IS THE LAST STORY OF THE EARTH.

All pictures courtesy of the American Museum of Natural History



The huge, intricate instrument which projects the "views" of the stars and planets on the white ceiling screen of the Hayden Planetarium. This machine is controlled by the lecturer as he guides you on your imaginary journey through the sky.

PRECIOUS, SEMI-PRECIOUS, AND GEM STONES



The precious, semi-precious and gem stones, fifty-two in number, illustrated in color on this plate, were selected from the finest gems of these sizes in the Morgan-Tiffany collection of the American Museum of Natural History, and from the collection of Messrs. Tiffany & Company. They were assembled and arranged by Dr. George F. Kunz, and include the precious stones of nearly every part of the globe. The weight of each stone is given opposite the name. You can identify the stone by the number and select the text relating to it by the key which appears on the opposite sheet.

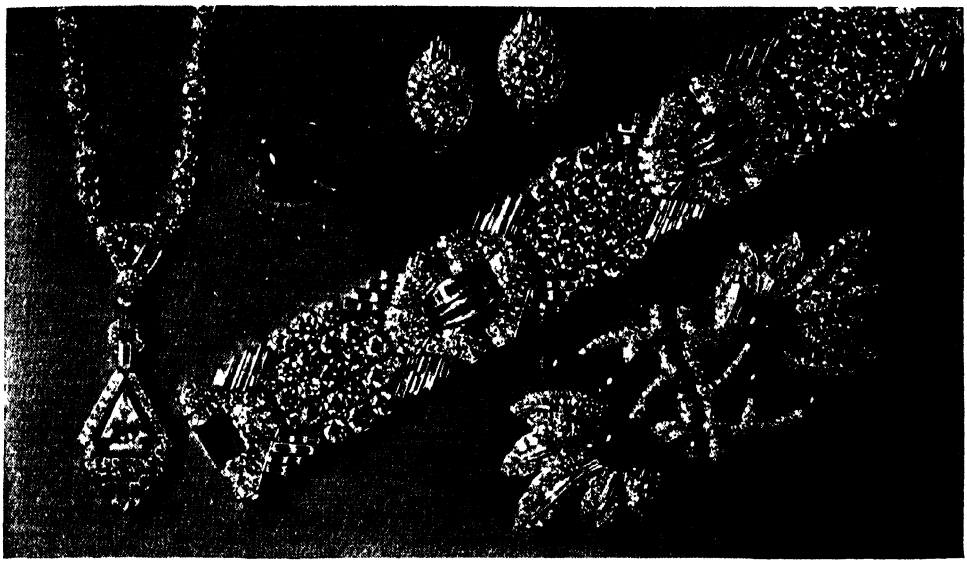
© The Grolier Society—1921

Key to Stones Shown in Colored Plate with Weight of Each

		Carats
1.	Diamond, Crystal, white..	5.94
2.	Diamond, white, Brilliant Cutting	2.07
3.	Diamond, pink	1.85
4.	Diamond, green	1.45
5.	Diamond, black	3.50
6.	Sapphire, blue, Fergus County, Montana	3.27
7.	Sapphire, blue, Burma...	5.94
8.	Ruby, Burma	1.16
9.	Sapphire, green, Siam	4.40
10.	Sapphire, yellow, Ceylon, Briolette	12.75
11.	Star Sapphire, Ceylon ...	27.33
12.	Chrysoberyl, Brazil	5.91
13.	Cat's-eye, Ceylon	7.93
14.	Alexandrite, Ceylon	8.05
15.	Spinel, Burma	4.12
16.	Emerald, Colombia	2.08
17.	Aquamarine, Brazil	12.05
18.	Golden beryl, Connecticut	10.65
19.	Morganite (pink beryl), Madagascar	14.89
20.	Zircon, green, Ceylon	7.74
21.	Zircon, blue, Ceylon	12.63
22.	Topaz, yellow, Brazil	9.75
23.	Topaz, pink, Brazil	10.74
24.	Topaz, white, Briolette, Brazil	20.83
25.	Tourmaline, green, Paris, Maine	9.35
26.	Rubellite (var. Tourmaline), Mesa Grande, Cal.	11.43
27.	Tourmaline, bicolored, Mesa Grande, Cal.	22.17
28.	Zircon, brown, Ceylon ...	18.00
29.	Kunzite (var. Spodumene), Pala, California	10.90
30.	Hiddenite (var. Spodumene), North Carolina.	9.29
31.	Peridot, Egypt	10.92
32.	Garnet, precious, East Africa	8.96
33.	Carbuncle (var. Garnet), India	14.63
34.	Hessonite (cinnamon garnet), Ceylon	10.72
35.	Lapis Lazuli, Persia.....	
36.	Amazonite, Virginia	4.42
37.	Amethyst, Uruguay	10.55
38.	Spanish Topaz (var. Quartz), Spain	7.60
39.	Precious jade (Jadeite), Burma	6.57
40.	Chalcedony, scaraboid, Persia	
41.	Sard, scaraboid, Greece...	
42.	Sardonyx, India	7.13
43.	Bloodstone, India	5.29
44.	Chrysoprase, Silesia	5.19
45.	Carnelian, India	6.37
46.	Turquoise, New Mexico..	5.79
47.	Flame Opal, Mexico.....	17.40
48.	Black Opal, New South Wales, Australia	7.69
49.	Fire Opal, Queretaro, Mexico	6.24
50.	Moonstone, blue, Ceylon..	11.99
51.	Rose quartz, Madagascar.	13.34
52.	Malachite, Russia	8.47

Reproduction (actual size) of Precious, Semi-Precious, and Gem Stones

belonging to The Morgan-Tiffany Collection of the American Museum of Natural History and to Tiffany and Company, New York. Prepared under the supervision of Dr. George F. Kunz, Research Curator of the Department of Mineralogy of the American Museum of Natural History, Gem Expert of Tiffany and Company.



PRECIOUS STONES

By SYDNEY H. BALL, Ph.D.

A PRECIOUS stone is a mineral used chiefly for personal adornment or other decorative purpose. To be considered precious a stone must possess beauty of color; it must not be too common; and it must be hard enough to withstand ordinary wear. Some stones are opaque, that is, light will not go through them; others are translucent and light will go through them. Some of the translucent gems are actually transparent, you can see through them as you can through glass. Turquoise and lapis lazuli are opaque and derive their beauty from their color. Translucent gem stones are valued not alone for their beauty, but also for their brilliancy and fire. While more than 100 minerals have been used as precious stones, the noble gems are the diamond, emerald, ruby and sapphire. These noble gems, even if they are of first quality, may, however, be no more beautiful than fine opals, spinels, aquamarines, tourmalines, chrysoberyls (especially cat's-eye and alexandrite) and spodumenes (more particularly hiddenite and kunzite).

Early man made jewelry from gay berries, beautiful shells, the teeth of wild animals and bright colored pebbles. Among the pebbles were certain precious stones, the earliest used being members of the quartz family. Later obsidian, amber, the jade minerals, jet, turquoise, lapis lazuli and garnet were found and used. The noble gems were not known to man until much later: emerald between 2000 and 1800 B.C., and sapphire, ruby and diamond between 600 and 500 B.C. The mining of gems came before the mining of metals, and the first mining on a large scale was begun about 3400 B.C. These were the turquoise mines of the Sinai Peninsula. The Afghanistan lapis lazuli mines may be almost as ancient.

We sometimes make the mistake of thinking that all of the American Indians were savages, but in the time of Columbus some Indians were using as many precious stones as the European people of that day. The Indians, however, were still using stone for many purposes for which the Europeans used metal. While the Indians got many of their gems from the gravels of rivers or the sea, they also operated underground mines for turquoise, emerald, obsidian and quartz. Some of these mines were large, particularly Los Cerrillos turquoise quarry near Santa Fe, New Mexico, which reached its greatest production about 1,200 years ago.

Precious stones contain great value in small weight. For example, a troy pound of

gold is worth $420, a pound of uncut diamonds as they come from the mine is worth about $18,000, and a pound of fine cut diamonds of one carat each is worth about $1,120,000. Most other gems have less value, but a pound of even the less rare precious stones is concentrated wealth. Because of this precious stones have always been a prime factor in international trade. This was more true in early days, when China's products came to Asia Minor by camel, and the products of India and Ceylon were brought to the head of the Red Sea in small boats. The Roman writer Pliny, who lived at the time of Christ, tells us of the importance of the Indian precious stones as an item of trade. Benedict Goes, a Portuguese priest of the early seventeenth century, wrote in his tales of travel about the importance of the jade trade.

GREAT GEM CENTRES, FROM ANCIENT BABYLON TO MODERN NEW YORK

Babylonia was once the great centre of the precious stone trade; later, about 2,000 years ago, Alexandria and Rome were centres. Venice in the Middle Ages, and, later still, Amsterdam and Antwerp were great jewel markets. To-day, London, Paris, New York and Bombay are the great gem markets: Paris, London and Bombay for colored stones, and London and New York for diamonds.

To-day diamonds represent 95 per cent of the world's production of precious stones, and the Diamond Corporation, a South African company with its principal office in London, sells through its subsidiary, the Diamond Trading Company, about 95 per cent of the world's diamonds. All the principal mining companies sell their output to this corporation, and it sells to brokers who, in turn, sell to the cutters.

In civilized countries most stones are sold by the metric carat (derived from the name of an Eastern seed which is so uniform in weight that goldsmiths and jewelers used it as a standard). A carat is equal to 200 milligrams, or about 3.7 grains, troy weight. A one-carat brilliant diamond is one-fifth of an inch in diameter; a nine-carat stone, one-half inch. Since most other gems are lighter than the diamond, stones of the same weight are larger. A one-carat emerald, for instance, would be something more than one-fifth of an inch across.

Precious stones are found in many places throughout the world, though profitable deposits are few. Africa, because of its diamond deposits, is the most important producer, followed by Asia and South America. Burma, Thailand, Ceylon, the Ural Mountains, Madagascar, Brazil and southern California are notable for the variety of precious stones they produce.

The United States, in comparison with its wealth in most other minerals, is poor in precious stones, having no deposit of the first rank. No other country, however, has produced as many different kinds of precious stones as the United States. Since 1880 the country has produced gems to the value of some $12,000,000. The sapphire deposits of Montana, the turquoise mines of the Southwest, and the tourmaline and kunzite mines of southern California produce a few gems each year, while the moss agate of the Yellowstone River is unusually fine. The United States to-day, as a producer of turquoise, is probably even more important than Persia. There are two fine gems that occur nowhere else in the world, hiddenite, an attractive yellowish-green spodumene from North Carolina, and benitoite, a lovely and rare blue gem from California.

Diamonds have been found in at least eighteen states. The Arkansas diamond deposit near Murfreesboro has produced at least 10,000 stones, many of them gem stones. The stones occur in a pipe, which is a core of rock filling the throat of an ancient, dead volcano, and often extending far down into the earth. It has not yet been proved, however, that these Arkansas deposits can be mined at a profit.

THE DIAMONDS THAT THE GLACIERS BROUGHT DOWN FROM THE NORTH

Perhaps the most interesting diamond occurrence in the United States is in the Middle West. In the states of Minnesota, Wisconsin, Illinois, Indiana, Ohio and Michigan a number of fine, relatively large diamonds have been picked up by farmers on the youngest moraine: the area of earth and stones left by the glaciers that once scoured their way down from the north. This means that somewhere up near Hudson Bay, in Canada, where the glaciers came from, there is an original source of diamonds. There are two questions: first, will this deposit ever be found; and, second, will it contain enough diamonds to justify the cost of mining it?

Gems occur in practically all kinds of rocks, in veins and in shallow cavities in the rocks, and in river and marine gravels. Amber and jet are fossil vegetable matter. Diamonds, sapphires, red garnets and the lovely peridot are found in dark-colored, heavy

rocks; while the coarsely crystallized granite called pegmatite furnishes us with a bewildering array of gems, among them aquamarine, topaz and amazonstone. Marbles give us lapis lazuli and ruby; opals occur in light-colored lavas or in sandstone saturated by the hot water from the lava.

Most gem stones are hard and heavy and do not dissolve readily; for this reason they are found in gravels, especially those of streams. With the exception of a few places like Kimberley, South Africa, where diamonds occurred in pipes, river gravels have always been the most important source of gem stones. Such stones are always of superior quality. This is because the more flawed and fractured stones in the river gravels are broken up into their purer parts as they travel downstream, battered by the current and by striking and rubbing against the rocks and pebbles in the stream. Even the extremely hard diamond is sometimes found to be rounded when it occurs in river gravels.

As you know, most gem stones are used for ornament, but many of them serve useful purposes. At present, well over 60 per cent of the world's gem stones are used in industry. The diamond is the most important, because of its hardness—it is more than twice as hard as any other substance, natural or artificial. So important is it in modern war that in the United States diamonds were placed on the list of critical war materials. They are used in the manufacture of machine tools, of engines for jeeps, tanks and airplanes; for drawing the miles of hair-thin wire used in precision instruments; for grinding-wheels and in cutting diamonds and other precious stones.

THE MANY INDUSTRIAL USES TO WHICH GEM STONES ARE PUT

Ruby and sapphire are used in making jewel bearings for watches, and in instruments by which aviators guide their planes. Rock crystal is essential as plates for radio and telegraphic systems, and clear calcite (Iceland spar) is used in other important instruments. Agate mortars and pestles, and bearings for balances, are found in every chemical laboratory; lapis lazuli was formerly ground up to make the beautiful blue pigment, ultramarine, but nowadays a synthetic substitute is more often used. Beryl, zircon and spodumene are, respectively, the ores of beryllium, zirconium and lithium. Gem stones are hard-working members of the mineral kingdom.

It has already been stated that precious stones are among the most valued of all human possessions. So valuable are they that a man could conceal about his person $10,000,000 worth of fine rubies, emeralds or diamonds. The most valuable gems are fine emeralds, rubies and diamonds, and fine sapphires come next. However, the "fancy" diamonds, those which rival the ruby, the emerald, the sapphire and the topaz in color, are the most expensive of all. After the noble gems, the other gems rank in about this order: alexandrite, star ruby, black opal, cat's-eye, star sapphire, demantoid, topaz, aquamarine, pink beryl, zircon, tourmaline and peridot.

THE PRICES OF GEMS HAVE RISEN OVER A PERIOD OF YEARS

Over a period of years, say ten years or more, the prices of most gem stones tend to rise. Until about 1880, a fine one-carat cut diamond was worth less than $100; to-day it is worth $600 or more. A two-carat ruby or emerald is worth much more than a one-carat stone, because the larger stones are rare. The prices of diamonds do not increase so greatly in the larger-size stones; large sapphires are common, so there is not much increase in price as the stones increase in size.

In normal years, gem mining employs some 150,000 men, of whom one-fifth are whites and the rest African blacks and other races of color. Gem mines vary from shallow pits, like the sapphire mines which are dug in the river gravels of Ceylon, to mines more than 3,000 feet deep, like the Kimberley pipe diamond mines. Similarly, the gem may be separated from the worthless substance about it in either a rattan basket or in a most complicated modern mill. At Kimberley, for example, diamonds are separated from the enclosing rock by the following steps; crushing in several stages, concentration in pans, screening into different sizes, and then jigging—shaking the crushed rock in a mill. Jigging causes the heavier substances, such as diamonds, garnets and olivine, to go to the bottom, and they are then fed into a stream of water at the top of a sloping table with descending steps. The table is coated with grease (hence it is known as a grease table) and this grease has a queer attraction for diamonds. They stick to it, while the other substances travel down and finally off the table. The grease is melted and the diamonds are cleaned in acid and then sorted.

Although many gem stones are beautiful as they are found, all must be cut and polished to bring out their full beauty before

they are mounted. The cutting of all gems except the diamond is an ancient art dating back to Babylonian and Egyptian times. The ancient lapidary (cutter of gems) knew how to smooth off the faces of rough diamonds, but cutting skillful enough to bring out the real beauty of these stones originated only 400 to 500 years ago.

SKILLFUL CUTTING BRINGS OUT THE BEAUTY OF THE STONES

Gems are cut in many different forms, among them cabochon, trap- or step-cut, brilliant-cut or square-cut. The first two forms are used for colored stones, the last two for diamonds. The cabochon cut shows a smoothly rounded top above the girdle (the part of the stone where the setting usually begins). Among the noble gems, rubies, sapphires and emeralds are often cabochon cut. The other forms of cutting are all facetted (cut with little "faces"), for such cutting brings out the "fire" of a stone. The trap- or step-cut is oblong, with a relatively large, flat table on top. From this table a number of sloping facets extend down to the girdle. Below the girdle are a number of similar facets, becoming smaller as they near the small bottom, or culet. The table, instead of being oblong, may be lozenge- or heart-shaped, rounded or oval.

The brilliant cut shows the fire of the diamond to the greatest advantage. It looks like two pyramids with their tops cut off, joined together at their bases. The pyramid that extends below the girdle is twice as high as the upper one. A brilliant usually has a total of 58 facets, 33 above, including the table, and 25 below the girdle. The facets are of various forms and sizes and each has its name among the cutters. The brilliant cut was invented late in the seventeenth century by Peruzzi, a diamond cutter of Venice. Many fine diamonds are to-day shaped into the emerald cut. This is a modification of the step cut with, to give fire, the proportions of the brilliant retained. Other diamonds are cut into the boat-shaped marquise form, or the egg-shaped pendeloque, in addition to many other irregular forms.

In the process of diamond cutting, after careful study of its crystal constants, to see how the "grain" goes, so to speak, the piece of rough diamond is given an eight-sided shape by cleaving or cutting. Then follows the process of bruting, giving the diamond the shape of the facetted brilliant. This is done by rubbing two stones against one another, or by using one stone as a cutting tool to a stone held firmly in a rapidly turning lathe. For only a diamond will cut a diamond. Polishing, by which the facets are perfected and smoothed, comes next. This is done on a soft iron wheel fed with olive oil saturated with diamond dust. The wheel makes about 2,000 revolutions per minute.

Before World War II, Antwerp and neighboring parts of Belgium had some 20,000 cutters; Amsterdam had 5,000; Hanau and other near-by German cities had about 5,000. New York, the Jura Mountains, London, Paris, Rio de Janeiro and the cities of Borneo and India were less important cutting centres.

Colored stones, particularly agates and related stones, are engraved. If the design is sunk into the stone it is called an intaglio, and if the design is raised it is called a cameo. The intaglio is the earliest form of cutting, for many of the Chaldæans and Egyptians, as early as 5,500 years ago, used seals cut in intaglio (this word is pronounced in-tal/-yo). Many people to-day have seal rings made, often with a monogram or a family crest engraved in intaglio. The earliest cameos date from about 500 B.C. and were used for ornament only. A gem stone with layers of different colors was usually chosen for this work, so that the cutter could make part of the design in one color, part in another color, and sometimes still another in a third color. Many of the finest examples of Greek and Roman art are intaglios and cameos.

As precious stones are valuable, not everyone can afford to own them; so from ancient times human ingenuity has tried to imitate them. Pliny, the ancient Roman writer whom we have mentioned before, considered the imitation of gems so dishonest that he refused to describe the process.

MAN-MADE GEMS HAVE NEVER EQUALLED NATURAL STONES

Certain gem stones have been produced by man. Synthetic rubies, sapphires and spinels have the chemical and most of the physical properties of real gem stones. They are used in jewelry, and also for bearings in watches and other precision instruments. Beautiful synthetic emeralds are also on the market. It is questionable whether a diamond has ever been made by man; certainly none have been made that were suitable for ornamental or for industrial use.

The color of some gems is improved by heating. Practically all blue zircons are produced from unattractive zircons by careful heating; many of them remain permanently blue, but, alas, some go back to their original

unattractive color. The brownish-yellow topaz, by "pinking," is given an attractive rose-pink color. A yellow quartz is produced by heating mediocre amethyst crystals. The color of agates is often heightened by chemical means; the more porous layers absorb the chemical and, through heat, the reds are intensified, or a black that contrasts well with the white layers is produced. Most imitation jewelry is made of colored glass.

Myths about precious stones are myriad. Some of them originated a long time ago with the Babylonians, Egyptians, Greeks and Hindus; others first appeared in the Middle Ages. Even to-day, some otherwise educated people believe the superstition that the opal is unlucky. One of the popular old myths was about garnets or rubies that shone so brightly at night that no other light was needed to illumine the buildings that they were in. In the Middle Ages, if you wore a turquoise, your horse would never stumble, and if by chance you should fall off, you would escape injury. If you were about to become ill, your ruby ring would foretell the event by losing its color.

Long ago gem dealers liked to enhance the value of their stones by telling wonderful legends about them. These may be called gem dealers' stories, and one of the most famous of them is the story of the Valley of Diamonds, which you will find in the Story of Sinbad the Sailor, on page 1843.

Precious stones have been used for medical purposes by all barbarous peoples, and, up to a short time ago, even among civilized men. In parts of Italy, the peasants still believe that wearing an amber necklace will prevent goitre. It is said that when Lorenzo de' Medici, the fifteenth century ruler of Florence who was called the Magnificent, was dying, his physicians tried to save him by giving him a powder of crushed rubies, sapphires and other gems. Lorenzo was not cured by this costly medicine.

THE DIAMOND
(COLORED PLATE Nos. 1-5)

The diamond, King of Gems, is commercially the most important gem. It is chemically pure carbon; it is the hardest substance in the world, and when cut has more brilliancy and fire than practically any other gem. It occurs in all colors, the most prized being the colorless, transparent stones, and the much more rare "fancies"—diamonds of distinctly blue, red, green or canary yellow color.

The diamond was probably first found in India, not earlier than 800 B.C. In 73 A.D., the Roman writer Pliny wrote that it was so rare as to be "known only to kings." The diamond did not become generally used until the fifteenth century, when the art of diamond cutting had progressed far enough to show the beauty of the stone. Before that time the stone had been largely used by men. Agnes Sorel, a famous beauty of the French court who lived in the time of Joan of Arc, was one of the first women to wear diamonds lavishly.

For a long time most diamonds came from India, with a few from Borneo. In 1720 the Brazilian fields were found, and Brazil was the great producer until 1867, when the South African fields were discovered. For about sixty years South Africa dominated the trade. In 1907 the Belgian Congo fields were discovered, and then, in turn, those of Southwest Africa, Angola, the Gold Coast and Sierra Leone. To-day most of the world's diamonds come from the Belgian Congo, which produces about two-thirds of the world's output, by weight. The Gold Coast, Sierra Leone and Angola are the other main producers, for the pipe mines of South Africa are shut down. In all of these fields, except South Africa, diamonds occur as pebbles in stream gravels. The diamond mines of the world now produce from $40,000,000 to $80,000,000 worth of diamonds a year, weighing some 10,000,000 carats, or, roughly, 2½ short tons. Only a small part of this output is suitable for cutting into fine gems; after cutting, about 100,000 fine large stones are obtained.

RUBY AND SAPPHIRE
(COLORED PLATE No. 8 AND Nos. 6, 7, 9, 10, 11)

The ruby is the red, transparent variety of corundum and the sapphire the blue, although under this name we also include the green, pink and yellow corundum gems. Next to the diamond, corundum is the hardest mineral. Fine rubies are rarely large, but fine sapphires of considerable size are relatively common. Both gems contain parallel fibrous structures. When this is highly developed and the stones are cut cabochon, a star sapphire or star ruby results, with its gleaming six-pointed star floating in the stone. Fine large rubies and emeralds are the most valuable of all stones; the price of sapphires is appreciably less.

The finest rubies come from upper Burma. Sapphires, spinels, blue tourmalines and other gems also come from Burma. The mother rock is a marble from which come the

gravels which are worked by the natives. Ceylon also produces rubies, usually of a rather pale color; from southern Thailand we get rubies with a purplish brown tint; and from Afghanistan, some fine stones. Sapphires come largely from southern Thailand, Ceylon and Kashmir, while Burma, New South Wales and Queensland produce a few. In the United States, Montana produces some attractive, rather steely, light blue sapphires.

THE EMERALD
(COLORED PLATE No. 16)

The emerald is the deep velvety grass-green variety of beryl. The best come from the state-owned emerald mines of Colombia, which, however, now are shut down. These mines were worked by the Indians long before the discovery of America. The ancient Egyptians operated emerald mines in Egypt near the Red Sea, and the Russians produce some fine emeralds from mines in the Ural Mountains. Some of the finest emeralds in the world were in the Russian crown jewels. Other sources of these gems are Habachthal (Austria), Australia, South Africa, Brazil and the United States (North Carolina). There is an old Eastern tradition that a snake, if it looks on an emerald, becomes blind: hence in Thomas Moore's Lalla Rookh we find the couplet:

> Blinded like serpents when they gaze
> Upon the emerald's virgin blaze.

AQUAMARINE, GOLDEN BERYL AND MORGANITE
(COLORED PLATE Nos. 17, 18 AND 19)

These attractive gems are first cousins of the emerald, being, respectively, the light greenish-blue, the golden-yellow and the rose-pink variety of beryl. The aquamarine is so named from its resemblance to sea water. The golden beryl is sometimes called heliodor, from the Greek word meaning "gift of the sun." Morganite was named after Mr. J. Pierpont Morgan. The finest aquamarines come from the Urals, Siberia and Brazil, although some fine ones are found in the United States, notably in Maine and Connecticut. Some extraordinarily large aquamarines have been found in Brazil; for example, in 1910 a crystal was discovered 19 inches long and 16 inches in diameter, weighing 243 pounds. Golden beryl comes almost exclusively from Southwest Africa; a few fine ones have been found in North Carolina. Unusually magnificent specimens of morganite come from Madagascar, and from the mines near San Diego, California.

CHRYSOBERYL, CAT'S-EYE AND ALEXANDRITE
(COLORED PLATE Nos. 12, 13 AND 14)

Chrysoberyl is a pleasing greenish-yellow, transparent gem. Cat's-eye is a distinct variety containing many parallel channels, which, when the stone is cut cabochon, show a changeable glow like that in the eye of a cat; hence the name. The ground-mass is honey-yellow and the "pupil" whitish. Alexandrite is a most fascinating gem; by day it is bluish green or dark green; at night, under artificial light, it turns raspberry red. It was named after Tsar Alexander II of Russia, on whose birthday it was first found in the Ural Mountains. Because of this, and because its colors were the imperial Russian colors, the stone was very popular in Russia in the days of the tsars. All three of these stones are found in Ceylon; the Urals still produce alexandrite and Brazil produces chrysoberyl. Alexandrite is the most valuable of the three and may be sold for as much as $125 a carat; cat's-eye may sell at one-fourth that amount and chrysoberyl at one-sixth.

SPINEL
(COLORED PLATE No. 15)

Spinel has two gem forms, the rose-red balas ruby and the deep red spinel ruby. The spinel ruby closely resembles the true ruby, and some of the most famous "rubies" of the world have recently been proved to be spinel. Ceylon, Burma, Afghanistan and Thailand are the principal producers. Spinel is very hard, and for this reason and because of its beauty, its use as a ring-stone should be more general. The name balas comes from Balascia, the old name of Badakshan in Afghanistan.

SPODUMENE
(COLORED PLATE Nos. 29 AND 30)

Spodumene, which is the principal ore of lithium, has three attractive gem forms: first, the rare yellowish green hiddenite from North Carolina; second, the more common lemon-yellow spodumene from Brazil; and third, the rose-pink or lilac-pink kunzite from near San Diego, California, and from Madagascar. Because of its structure, the stone is difficult to cut. Hiddenite is one of the two gems found only in the United States, the blue benitoite being the other. Kunzite was named after the famous American gem expert, the late Dr. George F. Kunz.

OPAL
(COLORED PLATES Nos. 47, 48, AND 49)

The opal is a transparent to translucent gem traversed by myriads of tiny veinlets of

later opal, which reflect and refract the light, resulting in a lovely play of all colors of the rainbow. Nineteen hundred years ago Pliny said it was, of all gems, the most difficult to describe as it displayed "at once the piercing fire of the garnet, the purple brilliancy of the amethyst and the sea-green of the emerald, the whole blended together and refulgent with a brightness that is incredible." The ground may be colorless to almost black, the latter type from Australia being particularly esteemed. Hungary was once the principal source of opals, but the Australian gems are much finer. The yearly output of Australia some twenty years ago was worth $225,000, but it is less now.

TOPAZ
(COLORED PLATES 22, 23, AND 24)

Topaz shows some "fire" and the colorless, blue, sherry-yellow and pink varieties are attractive gems. The rose-pink variety is usually a yellow stone changed in color by careful heating. Brazil and Siberia are the principal sources of topaz. Colorado produces some good gems. In the nineteenth century it was a popular gem; then for a time it ceased to be fashionable, but it has regained its vogue. Russian yellowish topazes from the Urulga River fade in time on exposure to strong sunlight.

PERIDOT
(COLORED PLATE 31)

Peridot is the transparent olive-green variety and chrysolite is the greenish yellow variety of olivine. The color of peridot is charming, but the stone is too soft for use in rings, although it serves well in brooches. The finest stones come from Zebirget Island in the Red Sea, which has been the principal source of the gems since before the Christian Era. Peridot and attractive red garnets are recovered by Navajo Indians from ants' nests in Arizona. The color of the gems evidently attracts the insects. Peridot and diamonds are among the gems found in meteorites.

TOURMALINE
(COLORED PLATE 25, 26, 27)

Tourmaline appears in practically all colors. Often several colors appear in bands or rings. The deep green and rose-pink varieties are particularly attractive. The pink stones are popular among the Chinese. Maine, California (near San Diego), Brazil, Madagascar and Russia are the principal producers. The gem occurs in giant-granites or pegmatites, although it is also recovered from gravels. The stone is rather soft for use in rings, but is admirably fitted for pendants and brooches. The stone first became known in Europe as one of the gems which arrived in Amsterdam from Ceylon in 1703. Its remarkable electric properties soon attracted the attention of scientists, and Benjamin Franklin did some interesting research on the subject.

ZIRCON
(COLORED PLATE 20, 21, 28)

Zircon has, next to the diamond, the greatest "fire" of all stones, and brilliant-cut colorless zircons are sometimes mistaken for diamonds. It occurs colorless ("matura diamonds") and yellowish red (jacinth). Certain brown Siamese stones, when heated, change to a rather metallic sea-green-blue. Siamese, Ceylonese and Australian gem gravels are the principal source of supply. The stone is particularly popular in Ceylon. It is one of the principal ores of zirconium, used as an alloy in making certain steels.

GARNET
(COLORED PLATE 32, 33 AND 34)

The garnet family includes several members which are used as gems, notably pyrope (blood-red with yellowish tinge), almandine (violet-tinged crimson), hessonite (orange-yellow), demantoid (emerald-green with highly developed "fire"), and spessartine (orange-red). The attractive raspberry-red rhodolite from North Carolina should also be mentioned. One often hears of carbuncles. These were usually red garnets cut cabochon. Garnets are found in many countries, India, Ceylon and Russia being particularly important.

TURQUOISE
(COLORED PLATE 46)

Turquoise, although opaque, is attractive to us because of its robin's-egg-blue color. Certain people of the East prefer turquoise with a greenish hue. The Persian mines near Nishapur are very old; and the stone was a great favorite with the American Indians long before the Spaniards reached America. To-day, Nevada and Persia are the great producers. The Navajo Indian silversmiths made much attractive jewelry with turquoise set in Mexican coin silver.

JADE
(COLORED PLATE 39)

The name "jade" includes two distinct but quite similar minerals, nephrite and jadeite. An emerald green is the most desired color (and I have seen specimens that almost equal the finest emerald), although jade also occurs in other shades of green, as well as yellow, black, white and rose. The stones vary from

translucent to opaque. Always a favorite in China, and in India to a somewhat less extent, jade became popular in the West a generation ago. Prehistoric man valued jade even more than we do. The principal localities of nephrite are Chinese Turkestan, Russia and New Zealand. Most jadeite comes from Burma. Until sources of jade were found in the Western Hemisphere, German archæologists were sure that the jade articles found in America indicated a widespread trade between America and distant Asiatic sources.

MALACHITE
(COLOR PLATE 52)

Malachite is a carbonate of copper which occurs in copper mines. It consists of alternating bands of deep green of varying shades. It is cut into various objects of art and even into mountings for rings, although it is soft for this purpose. The Ural Mountains, Arizona (Bisbee), and the Katanga copper mines in the Belgian Congo are famous places where malachite is found.

LAPIS LAZULI

Like turquoise, lapis lazuli is opaque and its beauty depends on its color, a deep Prussian blue. Indeed, in the Middle Ages ultramarine pigment was made from it and the glorious blues of the Old Masters are due to it. Its attractive color, often flecked with grains of "gold" (in reality, iron pyrite cubes), have for thousands of years made it a favorite for seals and brooches. Afghanistan is the principal source; a less attractive material comes from Lake Baikal and from Chile. Colorado has also produced some fine material. In very ancient times there was active trade between the Afghanistan lapis lazuli mines and the gem markets of ancient Egypt and Chaldæa. Lapis Lazuli was the "sapphire" of the ancients; our sapphire was certainly not known to them much before the Christian Era.

FELSPAR
(COLORED PLATE 36, 50)

The felspar group is a large family of minerals differing slightly in physical and chemical characteristics. Most of them are unattractive, but among them we have: amazonstone, a beautiful light bluish-green variety; aventurine, a reddish or greenish variety filled with small mica flakes which pleasantly reflect light; and labradorite, which shows beautiful gleams of greens, blues and purples.

Moonstone, the most attractive of all felspars, when cut cabochon, shows a bluish white spot which floats in a transparent background. It is particularly popular in India and Ceylon, and for some years rightly has had a vogue in America.

The United States produces fine amazonstone (Virginia and Colorado); India is the home of aventurine; most of the fine moonstones come from Ceylon, although some of them come from Burma, and the best labradorites come from Labrador.

QUARTZ GEM STONES
(COLORED PLATE 37, 38, 51)

Among the cheaper but more lovely of the precious stones are the members of the quartz family. Rock crystal is transparent and colorless and no finer material exists for beads and objects of art.

Amethyst is a lovely purple stone. Two centuries ago its price was high but an oversupply, first from Siberia and later from Brazil, has caused the law of supply and demand to work so that amethysts are not now expensive.

Citrine is an attractive yellow, transparent quartz, and cairngorm is a deeper yellowish brownish variety, very popular in Scotland.

Rose quartz has a pleasing pink color, but it is rarely transparent. Direct rays of the sun bleach it. Much rose quartz is produced in the Black Hills of South Dakota.

Iris is rock crystal much shattered, each fracture reflecting iridescent light. Artificial "iris" is formed by plunging quartz, heated to a high temperature, into cold water.

CHALCEDONY AND ITS SPECIES
(COLORED PLATE 40, 41, 42, 43, 44, 45)

Chalcedony and its species are composed of minute crystals of quartz and hydrated amorphous silica, that is, opal. This group was much used by the ancients for seals. Chalcedony is gray or bluish in color.

Carnelian is red or yellowish red chalcedony. Sard is similar but verging towards brown.

Bloodstone is a greenish chalcedony, or jasper, with reddish spots. In the Middle Ages it was believed that these spots originated when Christ was crucified, and the stone was highly regarded.

Jasper contains many impurities. It may be red, yellow, green or black.

Prase is a leek-green chalcedony; chrysoprase is an apple green variety; and plasma a less clear green variety.

Agate is a banded chalcedony; onyx is a variety with regular bands contrasting in color; sardonyx is an onyx, some of the bands being red.

Before World War II most chalcedonies were cut at Idar and Oberstein, Germany.

AMBER

Amber is the fossilized resin of an ancient pine tree. The recovery of the fossil gum and its manufacture into jewelry and objects of art was a big industry in Germany before the second World War.

JET

Jet is a fossilized wood. Its blackness suggested its use as a mourning stone. The jet-cutting industry of England, drawing the rough jet from English cliffs, France and Spain, was once large.

FAMOUS STONES

Large precious stones have had histories as romantic as the biographies of the most colorful men of history. Wars have been fought over certain jewels, murder has been committed to possess them, bold robbers have attempted to stéal them.

One of the earliest large stones known to us was one of the most prized gems of Roman times, Nonius' opal. It was only the size of a hazelnut and to-day probably would not be an outstanding gem, but the Roman senator preferred exile from his beloved Rome to giving up his opal to Mark Antony. It was valued by the Romans at a price equivalent to $100,000 in our money.

The Hindus say that the Koh-i-nur diamond was known some 5,000 years ago, but this is a mere legend. We first know definitely of it in 1304, when the Sultan Ala-eddin of the Khilji dynasty gained it by defeating the Rajah of Malwa, in whose family it had long been an heirloom. It passed into the hands of Baber, the founder of the Mogul Empire in 1526, when his son presented it to him, it being, we are informed in the Emperor's memoirs, "a free-will offering" by the family of one of the rajahs he had defeated. From that date to the present, we know its history in detail. Shah Jahan embellished his gorgeous Peacock Throne with the stone. When Nadir Shah invaded India in 1739, the stone momentarily disappeared; but at last one of the women of Mohammed Shah's harem told Nadir that Mohammed had concealed it in his turban. Then Nadir craftily suggested that, to seal their mutual friendship, they should perform the time-honored Oriental custom of exchanging turbans. Tricked, Mohammed gracefully yielded and when Nadir saw the stone, he cried: "Koh-i-nur" (Mountain of Light).

Nadir's feeble son, Shah Rokh, suffered his eyes to be put out and even greater tortures rather than give the gem to one of his enemies, but on his death gave it to his ally, Ahmed Shah, the Afghan. In this dynasty it remained for three generations until the Emperor was deposed and blinded by his usurping brother, Shah Shuja ul-Mulk. When asked the value of the stone, Shuja replied: "At good luck, for it has ever been the associate of him who has conquered his foes." Later the stone was temporarily lost, for Shah Zamân had imbedded it in the plaster of his prison wall, but by accident it was found. Misfortunes in turn caused Shah Shuja to arrive as a suppliant at the court of Runjît-Singh, the "Lion of the Punjab." Singh, after using every sort of pressure, finally got the stone. Runjît-Singh on his deathbed wished to present the stone to the famous shrine of Jagannath (Juggernaut), but his son Dhulîp-Singh held the gem until the British annexed the Punjab in 1849. The East India Company seized his treasure and the Koh-i-nur was given to Queen Victoria.

At that time the stone, while crudely cut, had tremendous value as an antique. Unfortunately, it was decided to recut it. The cutter did as well as could be expected, but the result is a shallow and rather lifeless brilliant with a grayish tinge, weighing 108.9 carats. During her life, the stone was worn by Queen Victoria as a brooch. Since then it has successively been set in the crowns of Queens Alexandra, Mary and Elizabeth.

THE DIAMOND THAT NAPOLEON WORE ON THE HILT OF HIS SWORD

The Regent, or Pitt, diamond was found in 1701 at the Partial diamond mine in southern India and weighed 410 carats in the rough state. The finder is said to have been a slave who escaped to the coast, the stone hidden in a wound in his leg. He offered the diamond to an English sea captain, provided the latter would help him to escape. The captain, however, threw the native overboard, sold the stone to Jamchund, a famous Parsee gem merchant, for £1000, a fraction of its real value. William Pitt, Governor of St. George, Madras, bought the stone from Jamchund for £20,400.

Pitt, the great-grandfather of Napoleon's opponent, on his return to England in 1710, had it cut into a magnificent brilliant of 140.5 carats, the operation taking two years. Pitt lived in continual fear of robbery and, until he sold the stone in 1717 to the Regent of France, is said never to have slept in the same bed on two succeeding nights. The

price Pitt secured was £135,000. In the early days of the French Revolution in 1792, the Regent diamond, along with much of the rest of the French crown jewels, was stolen. Soon, however, an anonymous letter suggested that the stolen articles were in a ditch in the Allée des Veuves in the Champs Elysées; the Regent was there, unharmed. Shortly thereafter Napoleon, fighting the English led by William Pitt, the younger, pledged the stone to Dutch bankers for enough money to carry on the war. Later he wore it in the pommel of his sword. Up to the beginning of the second World War, it was shown at the Louvre. The stone is a lovely one, but is particularly interesting because of its connection with great historic events. The stone is about 1⅛ inches long, one inch wide and three-quarters of an inch deep.

The Star of South Africa, or the Dudley, is not large (its weight, uncut, was 83½ carats, cut, 47.7 carats), but in one way it is the most important diamond of all time, for it changed South Africa from a poor to a rich country. The South African diamond fields were found in 1867, but for several years results were discouraging. Then a man named Van Niekirk bought this stone from a native for a whole menagerie of livestock (500 sheep, besides horses, etc.). He sold the diamond to the Countess of Dudley for £11,200. The story was out; men from all over the world rushed to the diamond field.

THE CULLINAN, THE LARGEST DIAMOND EVER KNOWN

The Cullinan, or Star of Africa, is by far the largest diamond known. It weighed, in the rough, 3,106 carats, or slightly over 1⅓ pounds. It was found by one of the company engineers in the Premier Mine, Transvaal, on January 25, 1905. It was a first-big diamond of fine quality, practically flawless. The Transvaal Government purchased it for £150,000 and gave it to King Edward VII on November 9, 1907, one of the most substantial birthday presents on record.

From it were cut a pendeloque (egg-shaped) brilliant of 530.2 carats, the largest cut diamond in the world, now set in the King's Royal Sceptre; a square brilliant of 317.4 carats, set in the State Crown, and a pendeloque brilliant of 94.45 carats and a square brilliant of 63.65 carats, both gracing the Queen's Crown. In addition, there were 101 smaller stones.

The Hope Diamond, said to be of deep sapphire-blue color, is the largest of colored stones, weighing 44.4 carats. It was found in the Killur mine near Golconda, India, and was sold to Louis XIV of France in 1668, its weight then being 67 carats. It disappeared when, in 1792, the French crown jewels were stolen. The present Hope diamond suddenly appeared in London in 1830 and was purchased by Thomas Philip Hope, a famous collector of magnificent gems. Later, two smaller stones of exactly the same color appeared on the market. To cover their crime, the thieves had had the original stone recut into three. The Hope collection was sold in 1867 and after changing hands several times, the diamond was purchased in January, 1911, by Mr. Edward MacLean.

THE RUBY WHICH WAS ONCE SOLD FOR TWENTY DOLLARS

One of the most beautiful stones I have ever seen is the Black Prince's Ruby, now set in the British Imperial State Crown. While called a ruby, it is, in reality, a spinel. That desperado, Pedro the Cruel, King of Castile, was visited by the King of Granada, who wore the stone, in 1367. Pedro obtained the stone by the simple expedient of killing his guest. The Black Prince, son of Edward III, shortly thereafter helped Pedro win the battle of Nagera and as a reward was given the stone. In Cromwell's days, the English crown jewels were sold and this remarkable gem was listed in the inventory at only £4 ($20). Who got the bargain we do not know, but it reappeared in the crown of Charles II. The stone is of irregular shape, about two inches long, and it is highly polished.

Mounted in the British Imperial State Crown are two famous sapphires: St. Edward's and the Stuart sapphire. The first is of good color and is supposed to have been mounted in the ring of Edward the Confessor, who became king in 1042. The Stuart, 1½ inches long and one inch wide, is of fine color. It was one of the stones in Charles II's crown, but in 1688 James II, when he fled to France, took it with him. His grandson, Henry Benedict, Cardinal York, bequeathed it with other Stuart mementoes to George III, in gratitude for financial aid.

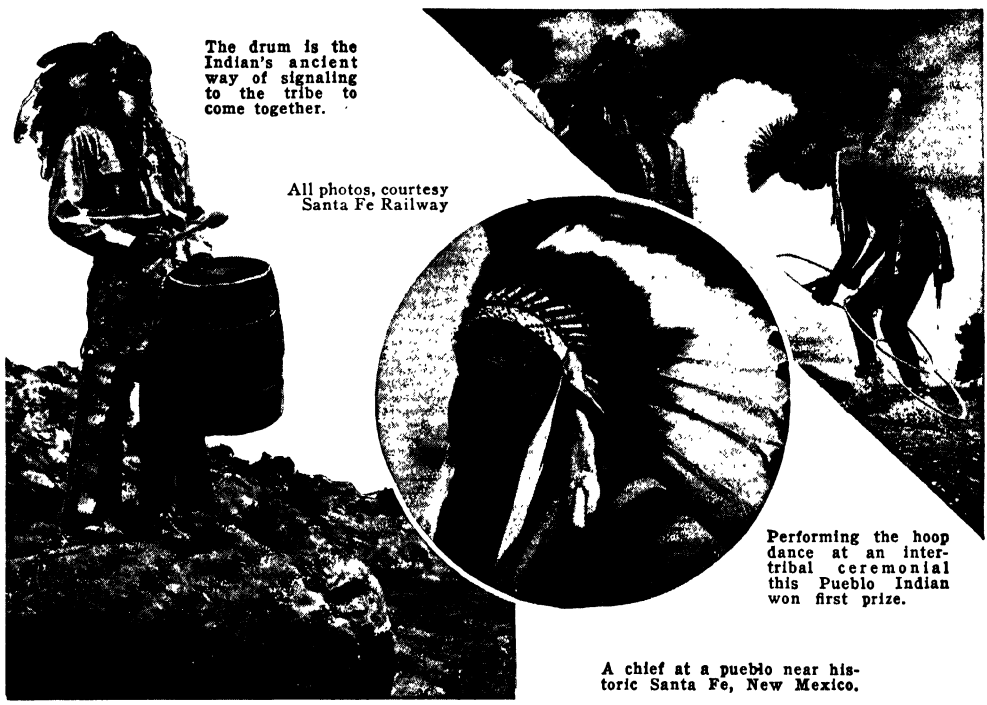
Many fine precious stones can be seen in American museums, the three outstanding collections being those of the American Museum of Natural History, New York City; the Field Museum, Chicago; and the National Museum, Washington. Hours can be profitably spent examining these displays of the beautiful "flowers of the Mineral Kingdom."

THE END OF THE BOOK OF FAMILIAR THINGS.

CHIEFS OF THE PLAINS INDIANS



These Plains Indians are wearing feather decorations awarded for feats of bravery. The headdress on the upper right could be worn only by a famous leader. The breast ornament on the bottom left is of pieces of bone, smoothed and sewn together with sinew. The bead ornaments of the Plains are in geometric designs.



The drum is the Indian's ancient way of signaling to the tribe to come together.

All photos, courtesy Santa Fe Railway

Performing the hoop dance at an inter-tribal ceremonial this Pueblo Indian won first prize.

A chief at a pueblo near historic Santa Fe, New Mexico.

INDIANS *of the* UNITED STATES

BEFORE we talk about the Indians who live in the United States, let us glance at a few of the contributions of the Indians to world civilization. They gave the world long-staple cotton, potatoes, corn, quinine and rubber. They taught the world methods of conserving soil and water by terracing. Some of the tribes (the Arizona Hopis, for example, and the fur-trapping tribes of Canada) practiced conservation of resources hundreds of years before Europe or the white men in America had faced this task at all. Indian tribes led the world by centuries in permitting women to have a part in government (in the tribes of the Iroquois, for example). They first showed the way to a league, or federation, of nations for enforcing peace while preserving the independence of the governments of the member tribes. Such a league was that of the Six Nations of the Iroquois.

The Indians developed methods of training their children with thoroughness and imagination. And since the days before Pericles in ancient Greece, the world has not seen ritual (religious) pageant-dramas, interweaving the whole range of the arts, more massive or impressive than the ritual dramas of the Pueblo Indians.

Now let us glance at the recent past of the Indians in the United States—the past which still, today, deeply enters into the present. For a hundred years after the Revolution, our relations with the Indians were, on the whole, unfriendly and unworthy.

When the thirteen colonies first became a nation, treaties with the Indian governments were negotiated with ceremony and were ratified (approved) by the Senate. By these treaties, the tribes surrendered the greater part of their ancestral lands to the United States Government in return for a pledge of permanent possession of smaller parts. And the treaties, together with various Supreme Court decisions and with the Indian Inter-

INDIAN LIFE IN THE WEST AND SOUTH



This Indian is inspecting beef which has been strung up in the sun to dry on the roof of a picturesque five-terraced pueblo at Taos, New Mexico. A pueblo is an Indian village of many-roomed dwellings made of sun-dried adobe brick, or of stone. The houses also are called pueblos.

Baking day at a pueblo in Taos. The squaw is taking the newly baked loaves out of the adobe oven, as the boy sniffs their delicious aroma.

Both photos courtesy, Santa Fe Railway



Seminole Indians at Silver Springs, Florida, hewing a canoe out of a cypress log. The chief with the axe is 81.

Courtesy, Helen M. Post



A grandmother of the Flathead tribe in Montana with three of her descendants.

course Act of 1832, committed the Federal Government to protect the tribes against inroads by states or communities, to preserve the Indian lands free from local land taxes, and to extend advice and assistance as needed.

The great Chief Justice John Marshall, in a case involving the Cherokees and the state of Georgia, in 1832, laid down the foundations of Indian law — which remain the foundations of present policy. Historical changes, Marshall said, had made the Indian tribes dependent on the Federal government, but the Indians' own tribal governments had not been put out of existence by any historical events. Only Congress, by special laws, could restrict the tribal governments. President Andrew Jackson, who wanted to drive the Indians west of the Mississippi River, and who did drive them, angrily commented: "The Supreme Court has made the law, let the Court enforce it."

For many reasons, the Supreme Court could not enforce the law. In making treaties with the Indians, the United States had made lavish promises, which were not carried out. The treaties were broken, and the tribes were hurled back on one another's hunting, fishing and planting grounds. This resulted in countless wars between the tribes and in border warfare with the United States Army, which flamed and smoldered along the frontiers for sixty years.

Let us pause over these Indian wars for a moment. Military art, as well as undying bravery, was shown by the tribes. The Seminoles, for example, from deep within the Florida Everglades, fought and defeated white armies five times as numerous as the whole Seminole population, through two long wars. At last their chief, Osceola, was lured by the white army under a flag of truce, and was kidnaped. This broke the hearts of the Seminoles, although to this day they have never surrendered. At the time of the Seminole wars, many white people still considered the Indians savages and believed that any methods which would defeat the tribes were permissible.

Indians fought, and fought superbly, because of their tribal organizations—which also were religious and educational organizations. Therefore, the Government swung away from John Marshall's position and undertook to destroy the tribal organizations, root and branch. The task of destruction passed from the Army to the civilian Bureau of Indian Affairs in 1853. The years that followed were tragic ones for the red men.

At the age of six Indian children were separated from their parents, and kept away until they were eighteen, in order to break the family ties. All tribal and community organizations, including the religious institutions, were stamped out or driven underground (practiced in secret). The tribal lands were "allotted in severalty." This meant that each Indian was given a small fragment of land, the balance of the land being "opened to white settlement." The allotted parcels became divided again and again, as a man would die and the land was shared by his children. Today, an Indian will be owner of rights in dozens or scores



U. S. Indian Service
This is our government hospital which serves the Pueblo Indians. It is at Santa Fe, New Mexico.



U. S. Indian Service

A Paiute Indian loading a fine crop of hay to feed the tribal cattle herd in Nevada.



Santa Fe Railway

A Pueblo Indian cutting alfalfa on a ranch belonging to his tribe, in New Mexico. The Pueblos are expert dry farmers.

of allotments, widely scattered. The strips are too far apart to be farmed. Under such conditions the Indian has no choice but to lease his land to whites.

These policies went far toward breaking up the tribes. The Indians were reduced to extreme poverty and despair. The first big investigation of Indian conditions ever made, that by the Institute for Government Research, in 1928, found the Indians by and large to be the most poverty-ridden group in the United States. Their land losses through forced "allotment in severalty" tell the story.

Between 1888, the date of the General Allotment Act, and 1933, the tribes lost 90,000,000 acres of their best land; they still possessed only 50,000,000 acres, two-thirds of this being desert or semi-desert land. Of the land suitable for agriculture which they still owned, more than half had become so divided through allotment that it could only be leased to whites.

Thus far it is a bleak and mournful record. Scores of tribes were utterly wiped out before this part of the story came to an end. The next chapter saw a change.

The Supreme Court never yielded in its position toward the Indians. At all times there were white friends battling for Indian rights, and here and there among the tribes were a few which could not be destroyed. Of these tribes we have space to tell about only one group, the Pueblos of New Mexico and Arizona. Their villages, or pueblos, are in the form of city-states. The people have farmed by irrigation or dry farming, in the desert, for more than a thousand years. They never waged aggressive war. Ages ago they developed social systems and methods of training and discipline which insured liberty within order, in a democratic form of government. They had strong religious feeling and expressed their devotion beautifully in dance, drama and song. The Pueblos are especially important because they represent a great historical bridge, or road, connecting the present story of the Indians with the policies of John Marshall, and connecting both of these with the great past of the Spanish colonial period.

Soon after 1500, Spain began to treat the Indians with great cruelty. She denied the right of the Indian societies and customs to exist at all. During the first part of this period, the Inca, Mayan and Aztec civilizations were utterly destroyed. Then the Church stepped in, to try to prevent further unchristian treatment of conquered tribes. The great monastic orders (Jesuit, Franciscan, Dominican) worked to rescue the Indians; and many times the popes intervened. Eventually Spain realized that it was a shortsighted business to massacre its labor supply in America. Finally the Laws of the Indies were made, which, on the whole, were put into force.

The Laws of the Indies recognized the human dignity of the Indians, and stated that these people had a right to land, a right

MODERN WAYS NEED NOT DESTROY THE OLD

American Museum of Natural History
Below, a Navajo Indian woman in Arizona is weaving a rug of the pattern for which her tribe is famous.





Santa Fe Railway
This Navajo mother asks a medicine man to chant for her baby's health.

Santa Fe Railway
Right, an Indian woman polishes pottery at San Ildefonso, a pueblo in New Mexico.

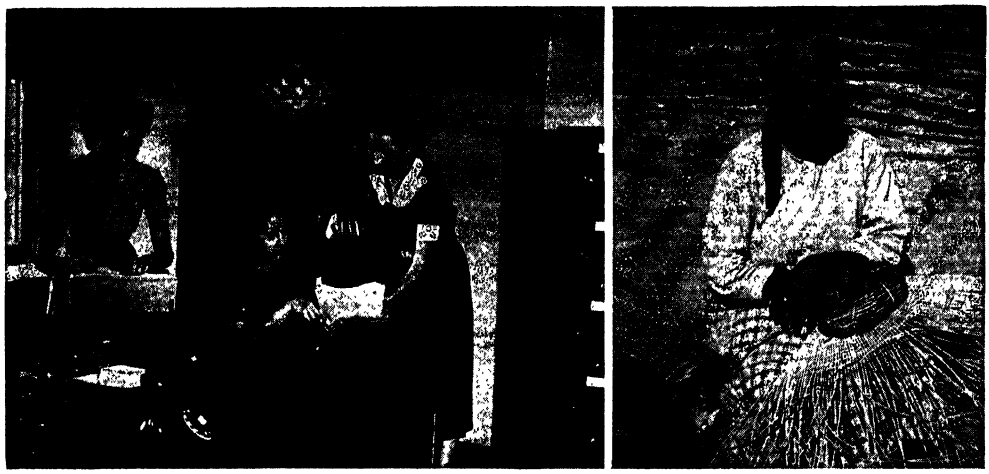


U. S. Indian Service
Below, showing Indian students how to use the white man's machinery, at Phoenix School.



Santa Fe Railway
A Picuris Pueblo drummer beats the call to his people.





U. S Indian Service

Indian girls may prefer office work, but native arts and crafts are kept alive by the older generation.

to tribal self-government and to liberty of conscience. Above all, the Laws of the Indies aimed to protect the Indian societies and to use them in Spain's colonial government. This is where the New Mexico Pueblos enter the story (the Hopi Pueblos of Arizona were only slightly touched by Spain).

In 1688, the Pueblos united and drove every Spaniard across the Rio Grande River, into what is now Mexico. Spain reconquered the tribes, and after that the Laws of the Indies protected all of the twenty-one New Mexico Pueblo groups. These groups live on into the present time; and so deeply did the traditions of the Laws of the Indies sink in that the Pueblos, thus safeguarded, survived the era of Mexican rule and the far more harsh period of rule by the United States after 1848.

Thus it came about that when a renewed movement for Indian welfare began, shortly after 1920, the Pueblos were there to show the way. Here were the ancient Indians, here the Stone Age lived on, here through Indian labors the desert was blossoming. Here were city-states where beautiful and strong personalities arose from age to age. Here were John Marshall's hopes and dreams come true.

But in 1922 disaster seemed about to overtake the Pueblos. Bills were proposed in Congress which would take the Pueblos' lands away from them and crush their religions. These bills were passed in the Senate; but in the House, at the last hour, they were stopped by a determined group of Pueblo leaders, influential statesmen, religious leaders and aroused women's clubs.

The Indian welfare movement thus became an Indian-and-white effort, nation-wide, to establish religious and cultural liberty for all Indians; to stop the allotment of Indian lands; to make secure democracy and self-government; to open the field of Indian affairs to research; to bring to the aid of Indians all Federal and local agencies of helpfulness; to stop the waste of natural resources still belonging to the Indians, such as timber, water and soil; and, in general, to bring the harsh treatment of the Indians to an end.

The unofficial effort for Indians became official in 1929, and was given full power in 1933. What has happened since?

The Indian death rate was cut from 28 per 1,000 each year to 13.6 per 1,000 each year, between 1928 and 1937.

The Indian tribes, from being the most disorganized population group in our country, became the best organized. One example is that of the Jicarilla Apaché tribe of northern New Mexico. Before 1934, the Jicarillas lived in a feudal state with practically no organization of their own. That is, they lived very much as the serfs did in medieval times, dependent on the Federal government as serfs were on a lord, and with almost no say in how they were governed. Today the Jicarillas form a co-operative commonwealth. They govern themselves. Their wholesale and retail buying and selling are completely co-operative. They run their own bank. They had been forced to take "allotments in severalty"; the individuals

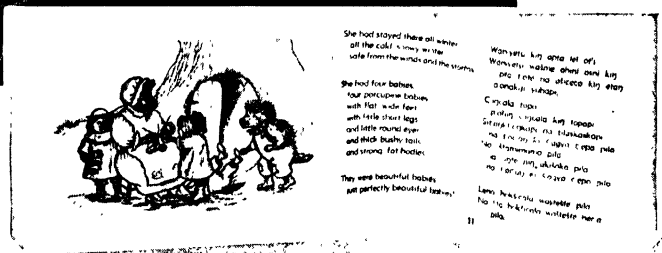
have now turned these allotments back to the tribe, so that their holdings are permanently secure. In the 1920's the Jicarillas were rapidly dying off; now they are increasing about 2 per cent a year, three times the white rate of increase.

Before 1933, the Indian was considered the worst credit risk in the whole United States, that is, he had the worst record for repaying loans. Now he is the best credit risk. Since 1938 he has borrowed from his own tribes (who received most of the sum from the Government) $7,150,000; of this amount only $2,746 has not or will not be repaid. This bright record is partly due to modern co-operative banking.

In 1933 the Indians' income from beef cattle amounted to $263,000; in 1943 it amounted to $6,318,000. The income from all livestock products had increased thirteen-fold. But a more significant fact is the following. The *number* of beef cattle owned by the Indians had increased since 1933 by only 105 per cent, while the *yield of income* from beef cattle had increased 2,300 per cent! Improvement in breeding stock, better methods and better marketing brought about this increase. The Indians own their cattle individually, but run them in co-operative stock associations. The Indians of the Southwest have faced and mastered terrific problems of soil erosion.

These material results are the outward





Education Division U. S. Office of Indian Affairs

Here are two pages from a book, printed in English and Sioux. It is a story of a porcupine.



Helen M. Post

Above, third-graders at Pine Ridge Indian School, South Dakota, listen as the story is read to them first in their native Sioux. Later on, they can read it themselves in English and Sioux.

U. S. Office of Indian Affairs

Some of the happy, healthy-looking Indian youngsters who live in Santa Ana Pueblo, New Mexico. This is one of the nineteen ancient pueblo villages in this state.



U. S. Indian Service

A tribal court in session on an Indian reservation in Idaho. Indian judges pass sentence on Indian offenders.

evidence of a deep change in the Indian spirit. The change has many other consequences. As we have mentioned, the death rate has dropped 55 per cent. Enlarged and better medical services, as well as better food, have helped; but the chief factor has been the rebirth of hope in the individual Indian's mind and in the groups. The Indian expected to die and now he expects to live. The full-blood tribes, which have no mixture of other races, mostly in the Southwest, have become the fastest growing populations in the United States. At the same time their arts and crafts have come to life again in a marvelous way.

There is not space enough here to tell you of the methods used today in the Indian service and by the self-governing tribes. But you may get this information from the annual reports of the Indian Office and in special publications of that office. There are many different methods because the problems of the various Indian groups differ so much from one another. The guiding principles, however, are those which were stated or implied in the Laws of the Indies and confirmed in the opinions of John Marshall: That the Government shall positively recognize the right of the Indian societies to exist; shall use these societies and build upon them, to make them a part of the larger commonwealth; shall give these societies authority and support them, because they bring about order; that the title of the Indians to their lands shall be held sacred; that the Indians shall be able to obtain knowledge of the world until, made strong by their own institutions, they can take their proper place in the world.

Let us glance at the historical record of the last four hundred years as it moves on into the future of North and South America. We have already noted the essential points of the Laws of the Indies. In the countries south of the Rio Grande, these laws were almost forgotten after the republics won their freedom from Spain. Strangely and sadly, the Indians in most of these countries gained no liberty when their countries were freed, but instead lost the few protections and liberties they had.

But in Mexico they did gain liberty, commencing with the revolution of 1910. Under former President Cardenas, great progress

was made both for and by the Indians. In 1940 there met at Patzcuaro, Mexico, the first hemisphere-wide conference on Indians ever held. Twenty-one governments were represented, including our own. Specialists on Indian problems attended from many countries, and Indians from places all the way from northern United States to Peru. At this conference many problems were debated thoroughly. The work in behalf of Indians—especially in Mexico, Brazil and the United States—was examined.

Out of this conference there emerged a strengthened belief, by all the nations represented, in the policies begun by the Laws of the Indies and later stated by the United States Supreme Court, now made broader and more clear in the Indian services of the United States, Brazil and Mexico. At Patzcuaro, the Inter-American Institute of the Indian was organized; its agreements have since been approved, by treaty, by fourteen of the American republics. The Indian welfare movement—the Indian life movement—is now a Western-Hemisphere movement in behalf of thirty million Indians.

Of these thirty million Indians, ours in the United States and Alaska are only one-seventieth of the whole. But our Indians have tremendous influence, because nowhere else in North or South America does the Indian record show such extremes of light and dark as in the United States. Good things, as well as bad things, done within a nation, never stay within that nation. In a roundabout way, but swiftly, good or bad, they flow out to the world; and the most remote countries and peoples are no longer very far away.

The Indians of the United States made great contributions to World War II. Like the Maoris of New Zealand, whose racial "comeback" has been similar to that of the red Indians, they have made records commanding the admiration of many lands. The records also show how wrong many beliefs are that used to be held about the Indians.

A greater proportion of Indians volunteered for the armed services than from any other group in our population. In some regions practically every Indian offered himself; and about 25,000 served in the Army and Navy. And the Indians at home turned to every type of war industry.

On the day following Pearl Harbor, the entire population of Santa Ana Pueblo, New Mexico, vanished from their fields and homes. They went into the desert, to their ancient pueblo city where no one had lived for more than a hundred years but which was always kept clean and new. It is the sacred shrine of the Santa Anas. There, in a vigil lasting two weeks, they prayed to the ancient gods and to the Christian God for wisdom and power; and their prayer was in behalf of all mankind.

By JOHN COLLIER.

THE END OF THE STORY OF THE UNITED STATES.

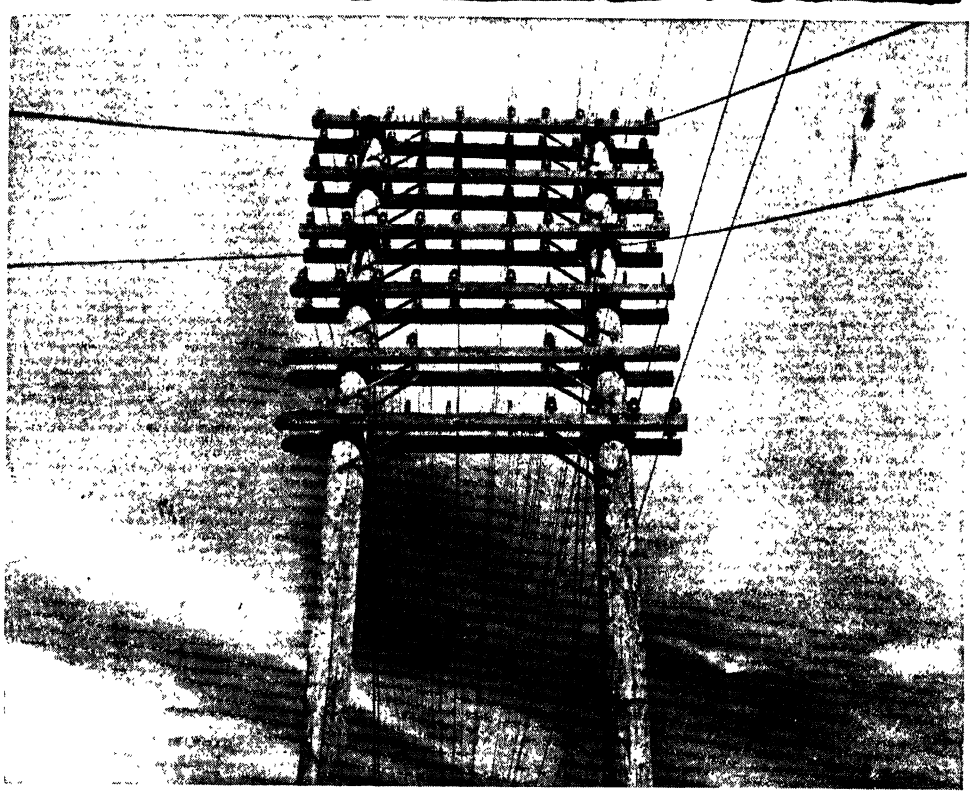
THE INDIAN POPULATION OF THE UNITED STATES AND ALASKA UNDER JURISDICTION OF THE FEDERAL GOVERNMENT, AS OF JANUARY 1, 1944

This list specifies in detail only those tribal groups of more than 100 members; total figures are given only for the United States, Alaska and the individual states. Many Indians live outside Federal jurisdiction, and these are not counted here.

UNITED STATES	387,970
ALASKA (estimated)	32,750
Total	420,720
ARIZONA	53,535
Apache	7,052
Chemehuevi	335
Havasupai	243
Hopi	3,558
Hualapai	504
Maricopa	425
Mojave	865
Navajo	27,639
Papago	6,534
Pima	5,704
CALIFORNIA	24,092
Hoopa	643
Miami	132
Mission	3,030
Paiute	1,390
Pit River	268
Pomo	354
Shoshone	184
Smith River	114
Washo	148
Yuma	962
Yurok	962
COLORADO	930
Ute	930
FLORIDA	652
Seminole	652
IDAHO	4,372
Bannock	338
Coeur d'Alene	614
Kootenai	106
Nez Perce	1,511
Paiute	127
Shoshone	1,666
IOWA	506
Sac and Fox of the Mississippi	506

THE INDIAN POPULATION OF THE UNITED STATES *(continued)*

KANSAS	2,211
Iowa	540
Kickapoo	357
Potawatomi	1,184
Sac and Fox	130
LOUISIANA	128
Chitimacha	128
MICHIGAN	5,170
Chippewa	585
Potawatomi	157
MINNESOTA	17,957
Chippewa	16,979
Sioux	978
MISSISSIPPI	2,232
MONTANA	18,291
Assiniboin	2,475
Blackfeet	5,046
Cheyenne	1,696
Chippewa	554
Cree	246
Crow	2,468
Gros Ventre	986
Salish and Kootenai	3,380
Sioux	1,382
NEBRASKA	4,820
Omaha	1,824
Ponca	401
Sioux	1,248
Winnebago	1,347
NEVADA	5,611
Paiute	3,201
Shoshone	788
Washo	539
NEW MEXICO	41,536
Apache	1,655
Navajo	25,872
Pueblo	14,009
NEW YORK	9,032
Cayuga	223
Mohawk	1,700
Oneida	346
Onondaga	706
St. Regis	1,820
Seneca	2,879
Tonawanda-Seneca	628
Tuscarora	430
Non-treaty Indians	300
NORTH CAROLINA	3,724
Eastern Cherokee	3,724
NORTH DAKOTA	12,625
Arikara	759
Chippewa	7,439
Gros Ventre	835
Mandan	384
Sioux	3,208
OKLAHOMA	110,503
Apache	385
Caddo	1,165
Cherokee	46,850
Cheyenne and Arapaho	3,062
Chickasaw	5,350
Choctaw	19,000
Citizen Potawatomi	2,981
Comanche	2,637
Creek	9,900
Delaware	162
Iowa	115
Kaw	536
Kickapoo	290
Kiowa	2,615
Miami	307
Osage	4,542
Otoe	882
Ottawa	460
Pawnee	1,114
Peoria	413
Ponca	916
Quapaw	605
Sac and Fox	989
Seminole	2,000
Seneca	861
Shawnee	1,039
Wichita	444
Wyandotte	826
OREGON	5,553
Cayuse	381
Klamath	1,040
Kus	231
Modoc	334
Paiute	356
Pit River	123
Rogue River	145
Tenino	524
Umatilla	123
Walla Walla	624
Wasco	260
SOUTH DAKOTA	30,347
Sioux	30,347
TEXAS	368
Alabama and Coushatta	368
UTAH	2,398
Goshute	243
Navajo	329
Paiute	168
Shoshone	132
Ute	1,526
WASHINGTON	15,089
Chehalis	131
Clallam	1,001
Colville	3,501
Kalispel	105
Lummi	743
Makah	443
Muckleshoot	250
Nooksak	267
Puyallup	468
Quileute	282
Quinaielt	1,280
Skagit	241
Skokomish	231
Snohomish	738
Spokane	925
Suquamish	177
Swindomish	329
Upper Chinook	115
WISCONSIN	13,638
Chippewa	5,180
Menominee	2,551
Oneida	3,551
Potawatomi	312
Stockbridge-Munsee	497
Winnebago	1,547
WYOMING	2,650
Arapaho	1,322
Shoshone	1,328
ALASKA (estimated)	32,750
Eskimo	15,716
Indian	11,385
Aleut	5,649



Canadian National Railways

What Are the Little Cups on the Telegraph Poles?

THESE cups are made of composition and are known as insulators. Their object is to prevent the electric current from escaping down the poles into the earth. Metals are good conductors of electricity; dry wood is a semi-conductor. If the telegraph wires rested on metal or wood, the current would at once pass through them into the ground and be lost. But some of the materials that make the composition are bad conductors of electricity and are therefore used extensively as insulators.

WHAT ARE PUBLIC-OPINION POLLS AND HOW ARE THEY MADE?

Democratic governments, like those of Canada, the United States and Great Britain, are really run by public opinion. In the long run, the men who govern can not make any big decision and "make it stick" unless at least the majority of the people agree with it. However, the representatives of the people, though elected by popular vote, may lose touch with their public while they are in office. To be sure, they receive letters from their voters, and they make tours for the purpose of talking to a large number of people; but these activities alone may not give the representatives an accurate idea of what the majority of the people want. Mistakes have often been made, and representatives have found out their errors only at the next elections.

Today it is not always necessary to hold an election in order to sound public opinion. A way has been found to take small sample votes that sometimes, but not always, tell quite accurately what a whole country is thinking. Sample votes, often called straw votes, are not new. They have been used since the beginning of the century. Most of them used to be conducted by magazines



American Institute of Public Opinion

A farmer and a city housewife, each representing a large group in the population, are interviewed for a poll.

and newspapers, and endeavored to find out in advance the results of elections. Sometimes they were fairly successful; often they were not. The chief reason for their failure was the belief that the bigger a straw vote was, the more accurate it was. The straw poll conducted by a magazine in the United States in 1936 fell into this error. Millions of ballots were sent out to selected voters, owners of automobiles or telephone subscribers, in the belief that these people were representative of the country as a whole. They were not. Their votes in the straw ballot gave an indication of the way in which the car-owning people would vote for president, but forgot the many millions of poorer folk, who saw life from a quite different angle. This straw vote was a dramatic failure.

The size of the sample vote is not so important. One thing that *is* important is the composition of the sample. Another thing to be watched carefully is the way the interviews are conducted. Finally, when the reports are in, they must be studied and analyzed with great care and skill.

Until the presidential election of November 1948, a great deal of faith was placed in several polls, especially in those conducted by Dr. George Gallup and Elmo Roper. The polls taken by their organizations had been accurate so often that it was assumed poll-taking was becoming very nearly an exact science. But the election of President Truman in that year upset practically all the predictions of results based on polls. From one point of view, the election was as much a defeat for the poll-takers as for the Republican candidate, Governor Dewey. Just why the polls went so far astray then is not fully understood.

The polls with which most of us are familiar have usually been based on the "quota" method of selecting a sample vote. That is, the sample must include persons in every age group; it must include rich and poor, workers in many fields, members of all political parties, all levels of education and so on. These groups must be included in the sample in the same proportion as they hold in the country's total population.

The quota method works something like this. Let us say that there are in the United States 10,000 Republican women under thirty years of age, graduates of college, working in offices in large eastern cities and earning more than $3,000 a year. This number, 10,000, is about 1/5000 of the voters in the country as a whole. Therefore 1/5000 of the sample vote should be from Republican women in the group as described above. This does not mean that all women of this description will vote alike, but rather that a group of them will be likely to represent the views of all 10,000.

One of the chief weaknesses of the quota method is that so many different things may influence a person's vote or his opinion. Even if it were easy to discover all these things about any one individual—and it is *not* easy—it would still be practically impossible to get exact information on the proportion of the population under each one of these hundreds of possible influences.

Another weakness is that bias can creep

in, so that the poll is "slanted," or weighed more heavily toward one group than another. For instance, interviewers are apt to poll the persons they can reach most easily, provided they fill the general requirements on age, sex, income and education levels. Such a sample is not truly representative. In typical quota samples taken in 1946 less than 10 per cent of the interviews were with persons in families with an income of $5,000 or more a year; yet in that year 15 per cent of all families had incomes of at least that amount.

Wording the questions asked presents another difficulty. There must be no doubt of the exact meaning of a question, and it must not give even the slightest hint at an answer in one direction or another.

Other methods than the quota are being used by some government agencies and also universities. It is claimed that these methods are more accurate. One is the "area sample." The counties and city areas to be polled are selected by chance. Then small parts of these areas are chosen, also at random. The final sample may include all the dwellings in the selected area, or, say, only every tenth dwelling. The choice of persons actually interviewed in each house depends on the purpose of the poll. If it is to predict an election, then the sample may consist of all the voters in each dwelling selected, or certain voters selected by chance.

A method of this sort is based on the laws of probability. It is a "calculated risk," or chance, worked out much as the rates on insurance are. The claim is made that the margin of error in any sample can be closely calculated.

When decisions must be made quickly, especially by democratic governments, a public-opinion poll fills a definite need. There is no doubt that, with time, we shall learn how to take more accurate polls.

WHAT MAKES THE WATER RIPPLE WHEN WE THROW A STONE INTO IT?

It is one of the great laws of nature that when anything is at rest it stays at rest until something moves it; and when anything is started moving it will go on moving till something stops it. If nothing stopped it, it would go on moving forever. This is true of the stone and of the wave the stone makes when it strikes the water. When a stone falls into water, it pushes water aside for an instant, to make room for itself as it falls through. The displaced water pushes aside, in its turn, water near it. That water pushes aside its neighboring water. So a wave-motion travels out in all directions and will go on traveling until something stops it.



One of the things that stop a water wave is friction, which simply means rubbing. There is considerable friction when the parts of the water push against each other. As the wave gets bigger and wider the strength of the push is spread out over more space, and the waves are not so high when they reach the bank as when they started.

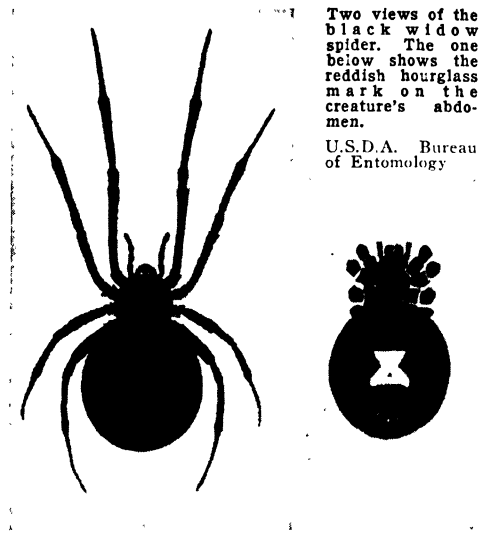
WHAT IS THE DIFFERENCE BETWEEN FAT AND OIL?

Oil is a misleading word for it is used in two senses. We describe as oil the substances that give plants their smell, such as turpentine, but they are quite different from other oils. We should always call these volatile oils, which means flying oils, because they readily fly into the air in the form of a gas. If we put a drop of such an oil on a piece of paper it soon disappears. But if we put a drop of any of the other kind of oils, such as melted butter, on a piece of paper, it makes a mark that stays. These oils are called fixed oils. The simple thing to remember is that fixed oils and fats are really the same thing. When they are solid we call them fats; when they are liquid, we call them oil. A fixed oil is melted fat, and fat is a fixed oil that has turned solid. Every fat has a melting point, when it is so warm that it melts and turns into oil. Every fixed oil has a freezing point, when it is so cool that it solidifies and turns into fat.

It is a very interesting thing about the fat of our bodies that its melting point is just the temperature of the blood. So the fat of our bodies is always just at a point where it is neither quite solid nor quite liquid. This is the state of it that suits us best. If the fat were quite solid, the blood could not easily help itself to the fat as it was needed. If it were quite liquid, it would not stay in one place.

WHAT IS THE BLACK WIDOW SPIDER?

It is the female of a small black spider, found frequently in the southern part of the United States. Coal-black in color, except for small red or yellow markings, it is commonly thought to have a very poisonous bite. Scientists have investigated the effects of the black widow's bite and state that it is very painful but seldom, if ever, fatal for a person in good health. One brave investigator allowed himself to be bitten just to see what the effects would be. He felt severe pain first in his hand, then in his whole arm up to the shoulder. Later it was hard for him to breathe. It took him four days to get well. The black widow won its name from the fact that it kills and eats its mate.



Two views of the black widow spider. The one below shows the reddish hourglass mark on the creature's abdomen.

U.S.D.A. Bureau of Entomology

WHY ARE SOME DAYS HOTTER THAN OTHERS?

There are several answers to this question. It may be that, though the sun itself has the same heat, its rays pierce the air much more slantwise on one day than on another. That is the difference between a winter day and a summer day. The less air distance the heat passes through, the more we feel it. If a warm wind is blowing past us, the day will be hotter than if a cold wind is blowing. That is to say, the heat of the day depends on the wind, as well as on the strength of the sun.

Lastly, if the air contains a great deal of water vapor, it can take up much less from our bodies, and our perspiration has no chance to evaporate. It is this evaporation of the perspiration from our skin that plays the chief part in keeping our bodies cool, though we are always making more heat as we live. If the evaporation is made slow by the fact that the air already holds nearly all the water vapor that it can, we are uncomfortable, and say the day is hot. It may not really be any hotter than another day that feels far cooler. But we judge by our feelings, and they are largely determined by the way we dispose of the water that is continually poured out by our skin and from our lungs.

THE END OF THE WONDER QUESTIONS.

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VOLUME XX

The Book of Knowledge

The Children's Encyclopedia

THAT LEADS TO LOVE OF LEARNING

Editor-in-Chief

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With an Introduction by

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E

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DIRECTIONS FOR USING THE INDEX

WITH this index, you can quickly find the information on any subject that is in The Book of Knowledge. The subjects are arranged alphabetically, like the words in a dictionary, and are printed in black type. The parts of each subject are printed below it, in ordinary type, and indented or set to the right a little. Usually these topics under the main subject are arranged alphabetically, but in some cases most important articles are placed first. Often parts of these main articles are also indexed below under their topics.

Whenever there is a line of entries indented, or moved to the right, it is understood that they all belong under the entry above. For instance, under the word *Agriculture* are several entries set a little to the right, including the entry *Regions.* Set to the right under this are names of regions. One of these is the entry *England.* Under this are several entries, still more to the right. This means that they are all about England only. Under *France* you will find main subdivisions, such as *description, history,* etc.; and under each of the main divisions you will find its subdivisions. Look under *France* and see if you understand the arrangement.

When you want to find a subject, look under its exact name, not under the large group to which it belongs. For instance, if you want to find *Violets,* look under that word, not under *Flowers.* Under *Flowers* are general articles about several kinds. For material on any person, look under his name; for places or countries, look under their names.

The figures after the entries tell the volume and page where you will find material. The volume number is printed in blacker type. If there is material on several pages in a volume, they are all given. If the article extends over more than one page, the first page is given, and the last one, in shortened form. For instance, **13**-4570-73 means vol. **13**, pages 4570 to 4573. If more than one page is given, with a comma between, it means to look on each page, but not on the ones between. For instance, **13**-4570, 4573, 4579 would mean to look on those three pages only.

In arranging entries, all the entries beginning with one word are put together, before any of a longer word that begins with the same letters. For instance, all the entries beginning with *In* come before all those beginning with *Into;* all those beginning with *The* come before those beginning with *There.* In the

arrangement of entries, a word with a hyphen is treated as if it were two words. For instance, *Sea-gull* is arranged as if it were *Sea gull,* and it goes with the entries beginning with *Sea.*

Sometimes there are two words for a subject or a person, and we have put all the index entries under one of them. In that case, we put an entry under the other word, telling where the material is. For instance, the author S. L. Clemens called himself, when he wrote, Mark Twain. We have put the entries under his real name, and have said, under Twain, "Twain, Mark, *see* Clemens, S. L." This means, "Look under Clemens." We have done the same for flowers that have several names, and in other cases. Such an entry is called a "see reference," and it means, "Look in the other place."

Sometimes you may not find all you want about a subject in the entries under it, and would like to look further. There may be other subjects that are similar, where you could find what you want. To help you find these, we have sometimes put in an entry which says, "*See also*" and then gives other good places in which to look. This means "Look also under these other subjects, and you may find more information." For instance, under *Antarctic regions,* we have said "*See also* South Pole."

If you want a list of stories, look under the word *Stories,* where you will find a general list, and then special kinds. For fairy tales, look under *Fairy tales;* and for myths, under *Myths and legends.*

Poems about a subject, questions, and pictures illustrating it, are all listed after the other entries. You will find it interesting to read over some of these questions, and if you do not know the answers to look for them. The word (gravure) after a picture means that it is reproduced by the gravure process, which makes an especially good picture. If the picture is in color, that is noted. All pictures are entered under artist as well as under subject.

The most important articles are marked with a star (*), and in most cases the articles thus marked are also illustrated.

Remember that the first figure, in black type, gives the volume, and the other figure gives the page.

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The Poetry Index, following the General Index, gives authors, titles, and first lines of poems. Directions for using it are given at its beginning. Poems are also entered under their subjects in the main index. For instance, if you wish to find a list of poems by Tennyson, look in the Poetry Index. If you wish to find the poems about flowers, look under the word *Flowers,* in the main index.

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Air conditioning
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What is air conditioning? **14**-5233-36
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Air mail, **8**-2661
Air pressure
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What makes water gurgle when it comes out of a bottle? **12**-4276
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Aira, grass. *Picture* (in color), **10**-3523

Aircraft carriers, of U. S. Navy, **18**-6816
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U. S. Navy aircraft carrier in World War II, **18**-6456
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Grumman Avenger torpedo bomber, **18**-6822
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Marine Corsair fighter, **18**-6458
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Airships
* ships that sail the sky, **1**-344-51
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Navy blimp being filled with helium, **1**-311
Airspeed indicator, airplane instrument, **1**-182, 184
Aistulf, king of Lombards, **4**-1435
Aix-la-Chapelle (Aachen) cathedral, **16**-5725
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cathedral, **16**-5723
Ajaccio. Capital of Corsica, with a considerable trade and a large harbor. The birthplace of Napoleon, it has a 16th-century cathedral.
Akbar, Mogul ruler of India, **8**-2827
Picture, **8**-2826
Akeley, Carl, naturalist and explorer
Picture
animal group of Nile, **2**-473
Akhenaten, king of Egypt, *see* Amenhotep IV
Akkadians, people of ancient Mesopotamia, **2**-652-53
Akron. City in northeast Ohio in the center of the lake district. Three rivers flow through it—Cuyahoga, Little Cuyahoga and Tuscarawas. It is the largest rubber industrial center in the world with three of the largest tire plants. It produces breakfast cereals, chemicals, pottery and paints, and has printing and publishing establishments. The city airport is one of the largest and busiest in the U. S. Akron has its own university. It was first settled in 1807 by pioneers from Connecticut. Population, 239,666.
Akron, airship, wreck of, **1**-349, 351
Akyab, Burma. *Picture,* mosque (gravure) **15**-5478
Alabama. Southern state; area, 51,609 square miles; capital, Montgomery. Cotton, corn, oats, wheat and sweet potatoes are produced. Birmingham is a centre of the coal and iron industry, and cotton is manufactured. Mobile is the chief port. Abbreviation, Ala. Nickname, "Cotton State." State flower, goldenrod. Motto, "We dare maintain our rights."
described in the Southern States, **13**-4517-28; **14**-4889-4900
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in Civil War, **7**-2430, 2439
made a state, **6**-1912
Pictures
Bienville Square, in Mobile, **14**-4898
cotton field, **1**-164
dairy cattle, **13**-4525
flag (in color), **19**-7190
iron works, **14**-4892
loading cotton at Mobile, **14**-5170
Wilson Dam, **7**-2314
Alabama Claims. Claims made by the United States upon Great Britain for damages done to
Alabama Claims (*continued*)
American shipping in the Civil War by privateers. One of the privateers, the Alabama, was a flagrant offender against the laws of neutrality. A court of arbitration meeting at Geneva in 1871-72 allowed claims to the amount of $15,500,000.
Alabama River. Its source formed by the junction of the Coosa and Tallapoosa rivers, Alabama flows into the Mobile River about 350 miles.
Alabaster, use in Gothic sculpture, **13**-4853
Aladdin and the Wonderful Lamp (story), **19**-7215-21
Alamance Creek, Battle of, 1771, **4**-1161
Alamo, historic site, San Antonio, Texas, **18**-6833
Picture, **18**-6839
Alaric I (?-410 A.D.). King of the Visigoths. The Roman emperor Theodosius gave him the command of the Empire's Gothic allies. After the death of Theodosius in 395, Alaric raided Greece and, somewhat later, Italy. He attacked Rome three times. Twice he was persuaded to withdraw from the capital. At last, in 410, he captured the city and his soldiers plundered it. He then left Rome with the intention of invading Sicily and Africa, but died at Cosenza before he could carry out his plans.
Picture
entering Rome, **4**-1252
Alaska
agriculture, **16**-5791-92
area, **8**-2674
as American territory, **10**-3582-85
fish and furs, **3**-998-1000
* history and description, **16**-5789-95
Kodiak bear, **3**-867
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Mount McKinley National Park, **7**-2290-91
population, **16**-5792
sheep, **4**-1373
Pictures, **10**-3583-84
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Alaska Highway, **1**-116; **8**-2781
Picture, **1**-116
Albania, account of, **17**-6348
conquest by Italy, **18**-6451
Pictures, **17**-6348
Albany. Capital of New York State and seat of Albany County. North of New York City 140 miles, it is on the bank of the Hudson River. Around the city is good farming land, and in the city are factories making felt and woolen goods, paper products, drugs, iron and brass castings. It is an inland port, connected to the Great Lakes by canals. Dutch settlers founded the city in 1624 for the Dutch East India Company. Population, 130,577.
founded 1615, **2**-549
in colonial times, **3**-1045
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Capitol, **11**-3778
Albatross, bird, account of, **2**-586; **11**-4126
Pictures, **8**-2759; **11**-4125
Albemarle, 1st duke of, *see* Monk, George
Albert, prince consort of Queen Victoria
promoted London Exposition of 1851, **6**-2073-74
Picture, **7**-2296
Albert I. Became king of the Belgians in 1909. The younger son of Philip, Count of Flanders. Married Princess Elisabeth of Bavaria; three children: Leopold (born 1901); Charles, Count of Flanders (born 1903); and Marie José (born 1906). During World War I he was the center of the active defense of his country; in the general offensive of October, 1918, commander of the northern army groups, consisting of Belgians and French. He died in an accident in 1934.
Albert Canal, Belgium
Picture, **3**-860
Alberta. Westernmost of the Canadian prairie provinces; area, 255,000 square miles; capital, Edmonton. Once a ranching district, it now produces vast quantities of grain besides being one of the chief coal-mining provinces in the Dominion. Edmonton is the largest town.
became province of Dominion of Canada, **4**-1488
Bow River Dam, **7**-2548
Junior Grain Clubs of, **13**-4641
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Banff ski jump, **10**-3697

Alberta—*Pictures (continued)*
Bow River (Bassano) Dam, **7**-2543
Columbia Ice Field, **1**-112
Jasper National Park, **1**-153
Turner oil-fields, **13**-4743
Waterton Lake, **1**-112
Albertus Magnus, early German scientist, **2**-596
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Albi, France, cathedral, **17**-6160
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cathedral, **17**-6172
Albino
Question about
What is an albino? **5**-1809
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Albumen, white of egg, **12**-4490-91
Albumin, a protein, **12**-4491
in milk, **7**-2321
Alcaeus, Greek poet, **16**-5749-50
Alcan Highway, *see* Alaska Highway
Alcatraz. Island, owned by United States government, in San Francisco Bay. On it is located a prison for the most desperate criminals of the United States.
Alcazar, Seville, *see* Seville
Alcestis, wife of King Admetus
sacrifice of, **8**-2703-06
Alchemy, medieval forerunner of chemistry, **2**-643
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medieval alchemist's laboratory, **2**-641
medieval laboratory, **2**-594
Alcibiades, Athenian general, **3**-923
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at banquet for Agathon, **3**-925
Alcohol
chemical composition and structure, **16**-5943
tax on, **13**-4556
use in perfume manufacture, **9**-3154
Alcott, Amos Bronson, American writer, father of Louisa May Alcott, **13**-4713
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Alcott, Louisa May, American writer, **14**-4958
Alcuin, English philosopher and teacher, **14**-5250
Aldehydes, class of organic compounds, **16**-5945
chemical definition, **16**-5947
Alden, John. One of the Pilgrim Fathers who came to America in the Mayflower. He was born in England in 1599 and was a cooper by trade. He settled in Duxbury, Mass. In 1621 he married Priscilla Mullens.
Picture
house in Duxbury, **2**-542
Alder, White, shrub called clethra, **15**-5608
Alder trees
Picture
flowers, **2**-509
Aldington, Richard, English novelist, **11**-4109
Aldobrandini Marriage, Vatican Museum, Rome, Greek wall-painting, **2**-451
Picture, **2**-447
Aldrich, Thomas Bailey, American writer, **13**-4792
Picture, **13**-4793
See also Poetry Index
Aldus Manutius, *see* Manutius, Aldus
Aleppo. City in Syria on the Kuwek River. Historically it is very interesting, for it was built centuries before the time of Christ and still has remains of the Saracenic Wall that surrounded it. Today beautiful gardens line the river. In the past it was famous as a trading center for the camel caravans, but now it is a commercial center, manufacturing silks, carpets, woolens. Population, 320,167.
Alert Bay, British Columbia
totem poles, **14**-5075
Picture
totem poles, **14**-5076
Alessandro Filipepi, *see* Botticelli, Sandro
Alessi, Galeazzo, Italian architect, **17**-6299
Aleutian Islands, 10-3584
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Alewife, herring, **16**-5776
Alexander I, Russian tsar, **16**-5694-95
Alexander II, Russian tsar, **16**-5697
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Alexander III, Russian tsar, **16**-5697-98
Picture
coronation of, **16**-5697
Alexander I, king of Scotland, **15**-5646
Alexander III, king of Scotland, **15**-5647-48
Alexander I, king of Yugoslavia, **17**-6347
Alexander VI, Pope
divided America between Spain and Portugal, **19**-6864
Alexander the Great (356 B.C.-323 B.C.). King of Macedon; son of Philip II.
conquest of Greece, **3**-925-29
conquest of Iran, **9**-3145-46
burned palace at Persepolis, **14**-5210
in Egypt, **3**-820
influence on Greek art, **12**-4459
slashes the Gordian knot, **7**-2603
Pictures
illustration of legend about Alexander, **3**-928
marriage to Statira, **9**-3143
sarcophagus of, **12**-4466
Alexander, Mrs. Cecil Frances (1818-1895), English hymn-writer; her best known works are: There Is a Green Hill Far Away and Once in Royal David's City.
See also Poetry Index
Alexander, Frances, Irish poet, **12**-4210
Alexander, Sir Harold R. L. G. (1891-). Governor-general of Canada. During the war he served as Allied Supreme Commander in the Mediterranean theater, where at one time he had a Canadian corps under his command. He was the last man to leave Dunkirk when the British and French troops were evacuated in 1940. A son of the Earl of Caledon, he was educated at Harrow and Sandhurst, and served in France during World War I. Other posts at home and abroad followed. He was appointed a field marshal in 1944.
Alexander, John W., American painter, **10**-3452
paintings in Library of Congress, **5**-1537
Pictures
Black and Green (gravure), **10**-3461
Alexander Archipelago, Alaska, **10**-3584
Alexander of Hales, early English scientist, **2**-596
Alexanders, flowers
Picture (in color), **14**-4982
Alexandretta (Iskanderoun). Turkish province. Following World War I Alexandretta formed part of the Syrian Sanjak of Alexandretta, held in mandate by the French. In 1938 this district became nominally a republic (the Republic of Hatay), though still under the control of the French. In 1939 Hatay was ceded to Turkey.
Alexandria. City in Egypt at northwest angle of the Nile delta. Situated on a ridge of land between the Mediterranean Sea and Lake Mareotis, it is the main seaport in Egypt. Has two harbors. In ancient times, trade to and from India passed through the city, but discovery of a sea route to India ruined the city's trade. It is still important for Egypt's importing and exporting, however. At one time the city had the greatest library in the world. It was founded by Alexander the Great in 332 B.C., and was named for him. The official name of the city today is Iskanderiya. Population, 928,300.
ancient center of learning, **2**-592; **3**-928
astronomers of, **11**-3845
lighthouse, ancient, **3**-821; **7**-2604; **10**-3581
sculpture of, **12**-4459
Picture
ancient lighthouse, reconstruction, **7**-2608
Alexandrite, gem stone, **19**-7230
Picture (in color), facing **19**-7225
Alfalfa, or **lucerne,** fodder plant, **7**-2413
Pictures, being mown, **7**-2409
Alfaro Siqueiros, David, *see* Siqueiros, David Alfaro
Alfonso I, king of Portugal, **14**-5183-84
Alfonso XII, king of Spain, **14**-4919-20
Alfonso XIII (1886-1941). King of Spain, the posthumous son of Alfonso XII and of Maria Christina, Archduchess of Austria, who became regent during his minority. Early reign marked by troubles abroad and dissatisfaction at home. War against the United States deprived Spain of colonial empire. He took the reins of government in 1902. Married Princess Ena in 1906, granddaughter of Queen Victoria. Retired in 1931 when Spain became a republic. *See also* **14**-4920.
Alfred the Great, king of England
* life and reign, **5**-1569-70
as a writer, **1**-299
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as a boy, with his mother, **1**-300
hiding in a cottage, **5**-1569

Alfred, ship, first carried Congress colors, **19**-7182
Algae, plants, **1**-218-20; **10**-3721-22
microscopic algae, **2**-661
See also Seaweeds
Algebra, branch of mathematics, **19**-7001, 7003
Algeciras. Nearest town in Spain to Gibraltar and first to be taken by the Moors. Here in 1906 an international conference for the regulation of Moroccan affairs was held.
Alger, Horatio, American writer, **14**-4960-61
Algeria, description, **18**-6809
Pictures
an oasis, **2**-467
date market, **6**-2157
town of Bouira, **2**-466
Algiers. Capital and seaport in Algeria on the Mediterranean Sea. Stands on hillside overlooking the Bay of Algiers. Part of the city is modern, but the old part known as the Casbah has dirty, crooked and narrow streets. This part was a fortress in ancient times. The city is the major port of the country and is popular as a winter resort. It was founded in 944, and was at one time a colony of the Roman Empire and at another the chief city of the Moors' African empire. Population, 519,200.
became French possession, **18**-6804
Algoma, West Virginia
Picture
coal miners, **3**-788
Algoma Central Railway, pioneer line in Canada, **4**-1490-91
Algonkian Indians. The most important linguistic stock of the North American Indians. They include the Algonkin, Blackfoot, Ojibway, Micmac, Abnaki, Delaware, Cheyenne, Arapaho and many other tribes. They occupied the territory from Labrador to the Rocky Mountains, with the exception of the territory of the Iroquoians and the Plains Indians.
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Algorism, term in mathematics, **19**-7006
Alhambra, palace in Granada
description, **15**-5469-70
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Alhazan, Arabian scientist, **2**-596
Ali Baba and the Forty Thieves (story), **11**-4136-44
Alice, famous circus elephant, **6**-2142
Alice in Wonderland (in part), **3**-1088-1102; **4**-1178-90
Poem from
The Walrus and The Carpenter, **6**-2038-39
Picture
of real Alice for whom story was written, **11**-3900
Alien and Sedition Acts, of 1798, **5**-1701; **11**-3938
Aliphatic (chain) compounds, term in chemistry, definition, **16**-5947
Alkali metals
chemist's definition of, **15**-5427
Alkalies
and irrigation, **7**-2555
chemist's definition of, **15**-5427
Alkaline-earth metals
chemist's definition of, **15**-5427
Alkane, chemical substance, definition, **16**-5947
Alkmaar, city in Holland
Picture
the "cheese house," **15**-5565
All-American Canal, 7-2552
Allahabad, ancient city in India, capital of district of the same name and of the Northwest Provinces. The native houses are of mud, but the English section is like a European town. It is on the Ganges and Jumna rivers, a large triangular fort standing where they meet. Being a holy city, it is one of the main resorts of Hindu pilgrims. It is not a manufacturing city, but is becoming important as a trading center. Rice, wheat and tobacco grow in the surrounding regions. Jawaharlal Nehru was born there and the Indian National Congress met there. The name means "abode of God." Population, 260,600.
Allegheny Mts. Low range running parallel to the east coast of the United States for 1,300 miles. Height from 1,500 to 5,000 feet. Here are great coal-fields.
Picture
pioneers crossing, **6**-1908
Allegheny River. American river. Rises near Raymond, Penna. Flows into the Ohio River, 315 miles.
Pictures, **11**-3777
Allegory, type of literary composition, in French literature, **18**-6561-62
Allen, Ethan (1737-89). American soldier born in Connecticut, but a resident of Vermont.
captured Fort Ticonderoga, **4**-1162; **6**-1906
Picture
capture of Ticonderoga, **6**-1906
Allen, Hervey, American writer, **14**-5011
Allen, James Lane, American writer, **13**-4790
Allenby, Edmund, Viscount (1861-1936). English general; conquered Palestine, 1918.
Allentown, seat of Lehigh County in eastern part of Pennsylvania; located on the Lehigh, Little Lehigh and Jordan rivers, 90 miles west of New York City. Heavy machinery and vehicles as well as textiles, clothing, and cigars are manufactured there. The surrounding country is rich farming land and also contains many important ores. Over half of the city's population is "Pennsylvania Dutch." People settled there in first half of the 1700's, and the town was named for William Allen, chief justice of the province of Pennsylvania. Population, 96,904.
Allergy
hay fever, **2**-685
Question about
What do we mean by the word "allergy"? **2**-685
Alligator pear (avocado), account of, **6**-2068
Alligator-wood, comes from sweet-gum, **12**-4510
Alligators, account of, **14**-5226-27
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alligator farm in Florida, **13**-4528
Allingham, William, *see* Poetry Index
Alliteration, a kind of rime in poetry, **19**-6869-70
Allosaurus, prehistoric reptile
Picture
skeleton, **1**-255
Allotropes, different forms of pure chemical elements, **1**-151
Alloys, account of, ***5**-1629-36
chemical properties of, **15**-5571
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Allspice, account of, **8**-2993
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of plant (in color), **8**-2998
Allston, Washington, American painter
life and work, **9**-3328, 3330
Picture
Spanish girl, **9**-3331
Alluvial plain, explanation, **1**-123
Allward, Walter S., Canadian sculptor, **14**-5080
Picture
Vimy Ridge War Memorial, **14**-5080
Alma-Tadema, Sir Lawrence. English classical painter; born, Dronryp, Holland, 1836; died, Wiesbaden, Germany, 1912.
Almagest, textbook on astronomy written by Ptolemy, **11**-3845
Almanacs, Nautical, 2-460
Almansur Billah, caliph of Cordoba, **14**-4911
Almohades, Mohammedan sect in Spain, **14**-4912
Almond, nut-bearing tree, **12**-4434
Pictures, **12**-4435
Almoravides, Mohammedan sect in Spain, **14**-4911-12
Aloes, medicinal plants, **8**-2911
Pictures, **8**-2909; (in color), **8**-2999
Aloha, Hawaiian word, meaning, **15**-5448
Alpaca, fleece-bearing llama, **5**-1600
Picture, (gravure), **5**-1604
Alpha Centauri, star, **11**-3784-85
Alpha particles, 13-4550, 4552
Alpha rays, result of radioactivity, **16**-5800, 5802, 5804-05, 5809
Alphabet
development of, **10**-3546-48
Greek, **11**-4016
in flag-wagging, **11**-4013-14
Phoenician alphabet introduced into Europe by Greeks, **3**-910
Question about
What letter is most commonly used? **1**-76
See also Writing
Picture
Phoenician alphabet, **10**-3548

Alpheus, in mythology, **9**-3236
Alpine plants, characteristics, **15**-5601
Alpine races. Branch of the white race that are typically round-headed; they are not so white in complexion as the Nordic, nor so dark as the Mediterranean branch of the white race. The Slavs are typically Alpine.
Alpine salamanders, **15**-5457
Alps, mountains of Europe, **3**-1023
geological formation, **2**-631
Swiss Alps, **16**-5997-99
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aerial railway in Alps, **16**-6005
bridge in Austrian Alps, **1**-29
cross-section diagram, **2**-632
dairying and haymaking on Alpine slopes, **16**-6000
French Alps, **10**-3416
Lötschberg and St. Gotthard tunnels, **2**-520
mountain climbing in Alps, **16**-6005
skiing in Alps, **16**-6005
Alps, Australian. Mountain range in New South Wales and Victoria, containing Mount Kosciusko, 7,340 feet.
Alps, Southern, New Zealand, *see* Southern Alps
Alsace-Lorraine. Old province of France, between the Vosges and Rhine. Formerly a confederation of independent towns, it was occupied by France in 1648, after the Thirty Years' War, remaining French up to 1871, when it was taken by the Germans. In 1918 it was again occupied by France, which has continued to hold possession except for the years 1940-1945 during World War II when it was once more occupied by German troops.
Picture, **17**-6166
Altai Mts., Asia, **18**-6586
Altamira, Spain, cave drawings, **1**-196
Altdorf, Switzerland
Picture
William Tell Square, **16**-6009
Alternation of generation, in plants, **3**-884
Alternative vote. System of voting for more than one candidate at elections. Each voter marks his ballot paper with 1, 2, and so on, against the names on the list, 1 being his first choice and 2 his second. The system secures fairer representation of the will of the electors.
Alticamelus, camel of Pliocene period
Picture, **6**-1925
Altimeter, airplane instrument, **1**-184
Altoona. City in Pennsylvania at the eastern side of the Allegheny Mountains, near the start of the Juniata River at the western end of Logan Valley. The famous and scenic Horseshoe Curve is four miles from the city on the Pennsylvania Railroad. The largest train manufacturing and repairing shops in the world are in Altoona; and brick, paper products, and textiles are also made. It was founded in 1849 as a base for construction of the Pennsylvania Railroad and the origin of the name is uncertain. It may have been named for Altona, Denmark, or for the Allatoona Indian. Population, 80,214.
Altsheler, Joseph Alexander, American writer, **14**-4962
Aluminum (Al). Chemical element, silvery, light metal. Atomic number 13; atomic weight 26.97; melting point 660°C.; boiling point 2057°C.; specific gravity 2.7. Its compounds occur in clay and many minerals. The metal is extracted from bauxite (hydrated alminum oxide) and is widely used, often in alloys, as a light metal suitable for airplanes, kitchen utensils and the like. Aluminum oxide, Al_2O_3, is used as an abrasive.
* sources and manufacture, **1**-137-40; **16**-5672-74
bauxite, source of, **13**-4525
use in house construction, **9**-3124
uses and production in U. S. **9**-3209
world distribution, industrial uses, **18**-6632-33
Pictures
aluminum furniture, **16**-5673
aluminum jewelry, **16**-5673
in process of manufacture, **18**-6633
molten aluminum being cast, **15**-5570
See also starred article
"Aluminum jam," counter-measure for radar, **14**-5149
Alumnus, a graduate (masculine). The plural is alumni. The feminine singular is alumna; feminine plural, alumnae.
Alva, Duke of, ruler in the Netherlands, **15**-5560
Alvárez-Quintero, Serafín and Joaquín, Spanish dramatists, **19**-7130
Alveoli, air sacs of lungs, **4**-1326, 1328
Picture, **4**-1329
Amadeus of Savoy, as king of Spain, **14**-4919
Amadis de Gaula, Spanish medieval romance account and short selection from, **19**-7126-27
Amarillo. Seat of Potter County in Tex s, it is in the Panhandle district. It has railroad shops, foundries and smelters, but it is better known for cattle-shipping, wheat and oil. Helium-gas fields are also found near by. Founded in 1887 as a cattle town, it was named from the Spanish word meaning yellow because of the yellow soil in the Amarillo Creek near by. Population, 51,686.
Amati, Nicolò, violin-maker, **5**-1796
Amati family, violin-makers, **18**-6700
Amazon River, account of, **18**-6780
fresh water at mouth, **2**-455
islands in estuary of, **18**-6777
Amazonite, semi-precious stone
Picture, (in color), facing **19**-7225
Amazons, legendary women-warriors
in Greek sculpture, **12**-4218
Pictures
sculpture (gravure), **12**-4334
Ambassador Bridge, connecting Canada and United States, **1**-34
Picture, **1**-30
Amber, mineral, **10**-3689
use as a gem stone, **19**-7233
Ambergris, perfume base found in whales, **7**-2345; **11**-4062; **12**-4405
Ambrose, Saint
adopted four scales from Greek music, **19**-6900
Ambrose Lightship, marks entrance to New York Harbor, **10**-3580
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American Academy of Arts and Letters. This organization numbers fifty members elected from the membership of the National Institute of Arts and Letters, to which the qualification for entrance is "a notable achievement in art, music or literature."
American blight, *see* Aphids
American Colleges and Universites, * **12**-4306-18
American Commonwealth, The, history by Bryce comment on, **9**-3224
American Federation of Labor. A non-secret confederation of trade unions on the North American continent. Its object is to work for improvement in the conditions and wages of labor. Founded in 1881, it now has almost 7,000,000 members.

American League, in baseball, **17**-6141
American Legion, The. An organization composed of men and women who served honorably in the armed forces of the United States in World Wars I and II. It was first organized in Paris, France, in 1919. The legion now has well over 11,500 branches, called posts, with almost 2,000,000 members, and is growing rapidly as veterans of World War II join. The national headquarters of the legion are in the War Memorial Building, Indianapolis, Indiana.
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American's Creed, The, **19**-7185
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Why are United States people called Americans? **17**-6173
Americium (Am). Chemical element. Atomic number 95. Americium was discovered in 1944 by Glenn T. Seaborg at the University of California. It can be formed by the radioactive decomposition of plutonium^{241} (plutonium of mass number 241).
Amethyst, account of, **19**-7232
Picture (in color), facing **19**-7225
Amherst, Jeffrey, Baron (1717-97). British general, captured Montreal from French 1760. Commander-in-chief and governer-general in America, 1761.
Amherst College
origin of college song, **18**-6514
Amiens. French cotton-manufacturing center on the Somme. It has a noble cathedral, built in the 13th century, with a spire 426 feet high; other fine buildings are the town hall and the Picardy museum. It was a battle center during the first World War. Amiens is also a railway center.
cathedral, **17**-6159
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Amman. Capital of the Arab country Jordan, it is on the east side of the Jordan River. The name during Biblical times was Rabbath-Ammon, but when the Greeks had the city it was called Philadelphia after the Greek ruler of Egypt, Ptolemy Philadelphus. It is at the northeast corner of the Dead Sea on the road from Damascus to Mecca. In the past it was a strong fort, but today it is a transportation center, noted mostly for its ruins of temples, baths and theaters. Most of the people are Arabs. Population, 15,000.
Ammeter, instrument for measuring electrical current, **12**-4290-91
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What is meant by amnesia? **16**-5958-59
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Amplitude modulation (AM), **14**-5123-24
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Amritsar. Capital of the district of the same name in the Punjab, India. It is the main center of worship of the Sikhs, one of the many religious groups in that country. It is noted for its Golden Temple where the Pool of Immortality is located. Carpets, cashmere shawls and silk goods are made there. The name means "Pool of Immortality." Population, 391,000.
Picture, golden temple (gravure), **8**-2833
Amsterdam. Capital and largest city of the Netherlands. It is a seaport, and is located on the Amstel River where that river joins the Ij or Y, which is an inlet of the Zuyder Zee. The location is low and has to be protected by dykes. The city itself is divided by dozens of canals that make it into a network of about 90 islands connected by almost 300 bridges. It is famous as a center of the diamond-cutting industry and as an art center. Rembrandt lived and painted there. The name means dam of the Amstel and used to be Amstelredam. Population, 798,400.
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Amundsen, Roald, explorer of the Arctic and Antarctica, **8**-2989
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Amur. River of Siberia and Manchuria, rising in the Yablonovoi Mountains and flowing into the Sea of Okhotsk. It has considerable fisheries. 2,900 miles.
Amyl nitrite, relieves angina pectoris, **8**-2730
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* some glands of external secretion, **7**-2459-61
* upper respiratory system, **10**-3554-57
Anaxagoras, scientist of ancient Greece, **2**-590-91
Anaximander. Greek philosopher; born, Miletus, Asia Minor, about 611 B.C.; died, about 547 B.C.; maker of the first map of the world.
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Anchisaurus, flesh-eating dinosaur
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* famous men of Ancient Rome I, **4**-1360-68
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* China, **2**-423-24, 429
* Egypt's fascinating story, **3**-807-21
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Andalusia, mountainous district in southern Spain; area about 33,650 sq. mi. Cereal crops and fruit, grapes, honey, silk and cochineal are produced. Minerals include copper, cinnabar, lead, silver and coal. Andalusian bulls, horses and hogs are famous. Important cities are Córdoba, Granada and Seville. *See also* **14**-4908, 4911
Andaman pig, of Andaman Islands, **5**-1720
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Andes, Mts., South America, description, **18**-6778-79
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"Christ of the Andes," statue, **19**-7041
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Andorra. Miniature republic in the Pyrenees; area, 191 square miles. It is under the joint suzerainty of France and Spain.
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* antelopes, giraffes and okapis, **4**-1440-48
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* horse family, **6**-2011-20
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Miocene epoch, **5**-1784
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Are all animals blind at birth? **16**-5842
Are animals in the zoo contented? **1**-142-44
Can any animal live for years without food? **2**-460
Do animals feel as much pain as we do? **6**-2252
Do animals have dreams as we do? **15**-5644
Do animals know when they are being treated kindly? **16**-5842
Do animals talk to one another? **6**-2010
How are animals made to perform? **8**-2715
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Which animals are the most intelligent? **8**-2718
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Why is a tiger striped? **16**-5841
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See also starred articles
Animals That Migrate, * **6**-1954-60
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Animals with Backbones, * **1**-255-59
Animators, artists in animated film production
* how animated films are made, **16**-5901-06
Anise, plant, **8**-2996
Ankara (Angora). Capital of the Turkish Republic. It is now a modern city and is built on the site of a very ancient one—Ancyra. Ancyra was a leading Asiatic city in the third century B.C. Before World War I Ankara was a village of mud-brick houses, but most of the old town was torn down and new buildings of modern design were put up. The chief industry is the making of mohair cloth from the wool of Angora goats. Population, 226,700. *See also* **13**-4808, 4810
Pictures, **13**-4805
Ankle
sprained, treatment for, **13**-4851
Annam, state in French Indo-China, **2**-438-39
Annapolis. Capital of Maryland, seat of Anne Arundel County, and port of entry. It is two miles from Chesapeake Bay on the south bank of the Severn River. Its fame comes from the U. S. Naval Academy that is located there. It is not an industrial city, but has fishing, boat-building and dairying. Puritans from Virginia first settled there in 1649. The town was called by several names during its early years, but in 1694 it was named for Princess Anne who later became queen of England. Population, 13,069.
* United States Naval Academy, **18**-6707-10
See also West Point and Annapolis
Annapolis Royal. A town in Nova Scotia. Name changed from Port Royal in honor of Queen Anne when Nicholson captured it from the French in 1710. It is the export town for the fruitful Annapolis Valley.
Anne, queen of England
reign, **6**-2103
furniture in reign of, **17**-6258
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Anne of Cleves, wife of Henry VIII
Picture, **5**-1814
Anne of Geierstein, by Scott, note on, **11**-4070
Annie Laurie, song
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Anning, Mary, found fossil of ichthyosaurus, **5**-1546, 1548
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Jackal of the Deep, **18**-6787-92
Anoa, dwarf buffalo
Picture, **4**-1267
Anode, part of electron tube, **14**-5035
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Ant-bear, another name for great ant-eater, **7**-2397-98
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Ant-eaters, account of, **7**-2397-2400
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Ant-eaters, spiny, or **echidnas,** mammals, **7**-2593-95
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Ant lion, insect, **18**-6733-34
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Ant-thrushes, name for broadbills, **9**-3288
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Antenna, for radio, **14**-5122, 5150
Anthemius of Tralles, Greek architect, **16**-5717
Anthers, parts of flowers, **2**-507-08
Pictures, **2**-506-08
Anthony, Susan Brownell. An American social reformer and a worker for woman suffrage, civil rights for women, and temperance. Born, South Adams, Mass., 1820; died, Rochester, N. Y., 1906.
Anthracene, aromatic compound, **16**-5946
Anthracite coal, *see* Coal—anthracite
Anti-aircraft guns
Picture
American, World War I, **18**-6445
Anticosti Island. An island situated in the gulf of St. Lawrence and belonging to the Province of Quebec. It has an area of over 2,500 square miles and is about four times as long as it is broad. The coast is dangerous, with only two harbors, Ellice and Fox Bays. It is guarded by several lighthouses and many of the island's few inhabitants are concerned in their maintenance. Anticosti is rich in lumber and has extensive peat deposits and important fisheries.
Antietam, Battle of, **7**-2437
Antigua. West Indian island, forming with Barbuda and Redonda a Leeward Island presidency; area, 108 square miles; capital, St. John. Discovered by Columbus, 1493; settled by British, 1632. Exports sugar, cotton, pineapples and molasses. U. S. base on island (leased, 1940).
Antilles, name for West Indies, **19**-7097
Antimony (Sb, from Latin *stibium*). Chemical element. Silvery, brittle metal. Atomic number 51; atomic weight 121.76; melting point 630°C.; boiling point 1380°C.; specific gravity 6.7. Occurs, with ores of other metals, chiefly in China and the United States. Lead hardened with antimony is used in battery plates. Antimony is also used in bearing metals and type metal; antimony compounds serve for flame-proofing textiles.
used in type metal, **5**-1636
Antinous, friend of Emperor Hadrian, **12**-4470
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Antioch, Syria, siege of, in Crusades, **7**-2584
Antioch College, Ohio
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Carrel-Dakin solution, **15**-5491
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Antofagasta, Chile, **19**-7039, 7041
Antonello da Messina, Italian painter, **3**-1104
introduced oil painting in Venice, **4**-1460
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Antoninus Pius (Titus Aurelius Fulvus) (86-161 A.D.), Emperor of Rome from 138 to 161 A.D.
reign, **4**-1247
Antony, Mark (Marcus Antonius), Roman statesman
* life, **5**-1861-62
relations with Augustus, **4**-1200
subject of play by Shakespeare, **3**-839
Poem about
Antony's speech from Shakespeare's Julius Caesar, **10**-3480
Antrim. Most populous county of Northern Ireland, with an important linen industry. The chief towns are: Belfast, the capital; Larne, Lisburn and Carrickfergus; on the north coast is the Giant's Causeway, and in the west Lough Neagh. Area, 1,175 square miles.
Ants
* account of, **17**-6349-58
driver ants, **2**-472-73
Pictures, **17**-6351-57; (in color), facing **18**-6721
Antwerp. City in Belgium and capital of the province of the same name. Located on the right bank of the Scheldt River, it is the main port of Belgium as well as one of the greatest ports of Europe. In the 16th century it was the wealthiest and most splendid of cities. Today it is noted for its works of art, famous cathedrals, and for sugar-refining, lace-making, brewing, shipbuilding and diamond-cutting. Founded before the eighth century. The name means "on the wharf." Population, 259,600.
cathedral, **17**-6161
Pictures
cathedral, **17**-6155; (gravure), **17**-6167
harbor scene, **15**-5501
port scene, **15**-5498
Anubis, a god of ancient Egypt, **3**-811-12
Aosta. Old city of Piedmont, Italy, in a beautiful valley below the Alps. It has well preserved Roman walls and remains of baths and an amphitheatre; its cathedral dates from the 14th century, and the church of Sant' Orso from the 5th century.
Aoudads, or Barbary sheep, **4**-1375
Pictures, **4**-1373; **16**-5839; **19**-7131
Apennines. Mountain range which traverses practically the whole length of Italy, being connected in the north with the Maritime Alps. Its highest peak in the peninsula is Monte Corno, 9,560 feet; but the range reappears in Sicily, where the huge Etna volcano rises to 10,870 feet. Vesuvius, 4,200 feet, is close to Naples.
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Apollo Belvedere, statue. *Picture,* **12**-4464
Apostles. Apostle means literally, "one who is sent away on a mission." Christ used the word to designate twelve of his disciples sent forth to preach the gospel to the world. Afterward the word described other followers of Christ, for instance, Paul and Barnabas. In later days the word has been used to denote a person undertaking a special mission.
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Appert, François, discovered method of preserving food, **6**-2171
Appian Way (Via Appia). The most famous of the ancient Roman roads. It ran from Rome to Brundusium (modern Brindisi). It was begun in 312 B.C. by Appius Claudius Caecus, the censor. The Appian Way was not completed until 244 B.C. Long stretches of the road are still in almost perfect condition.
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orchards in bloom, **1**-106; **8**-2679
picking apples, New York state, **10**-3408
Appleseed, Johnny (1775-1847), American pioneer whose real name was John Chapman. He was born in Massachusetts, and the idea of being an "apple missionary" came to him as a youth. From about 1800 he roamed the Midwest, planting apple seeds in the wilderness. Orchards were started from western New York to Indiana. So many legends are told about him that he has become a part of American folklore. One true story relates that when Indians threatened to attack Mansfield, Ohio, in 1812, Johnny ran 60 miles through the forest to get help and warn lonely homesteaders on the way.
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Apricots, fruit, where grown, **6**-2066
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April. The fourth month of the year, containing thirty days. It was the second month of the Roman calendar. The name is supposed to come from the Latin *aperire,* to open, alluding to the season when the buds and flowers open. April was sacred to Venus, and it has been suggested that perhaps the name was originally Aphrillis, from Aphrodite, the Greek name of Venus.
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Aragon, ancient kingdom and modern district in northern Spain; area about 18,294 sq. mi. Cereal crops, olives and grapes are grown, and minerals include copper, lead, salt and sulphur. Chief city is Saragossa. *See also* **14**-4908, 4911
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Ararat. Mountain in Turkey known to the Persians as Koh-i-Nuh, or the Mountain of Noah; 17,300 feet.
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Arch of Titus, Rome
Picture (gravure), **4**-1203
Arch of Triumph, *see* Arches, Triumphal
Archangel (Arkhangelsk). City in U.S.S.R. and capital of the Russian government of the same name. Only about 100 miles from the Arctic Circle, it is the largest far-northern city in the world. Situated on the right bank of the North Dwina River near the White Sea. It is an important port, but the harbor is clogged with ice six months of the year. In winter its shortest days are a little more than three hours long, but in summer its long days are almost 22 hours. It is a lumbering center. Founded in 1584, it was Russia's only port for many years. Population, 281,000.
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Arethusas, flowering plants, **18**-6576
Argali, wild sheep, **4**-1373
Argelander, Friedrich Wilhelm August, German astronomer, **11**-3855
Argentina. Second largest South American republic; area, 1,079,965 square miles.
fingerprinting activities, **6**-1953
history and description, **19**-7033-37
population, **19**-7035
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cattle on the pampas, **18**-6780
Argon (A). Chemical element. Inert gas (*see* Inert gases). Atomic number 18; atomic weight 39.944; melting point −189.2°C.; boiling point −185.7°C. The most abundant of the inert gases, it makes up 0.9% of the air, from which it is obtained. Argon is used in some electric bulbs.
used in electric light bulb, **13**-4670
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Argonauts. A band of legendary Greek heroes, led by Jason, who soon after the Trojan War sailed in the ship Argo to Colchis in search of the Golden Fleece. Aided by Medea, a dark witch-maiden, they killed the dragon guarding the fleece. Among the heroes on that wonderful voyage were Hercules, Castor and Pollux, Butes, Peleus and Orpheus.
Argyllshire. Rugged county of western Scotland, including many of the Inner Hebrides. Campbeltown, Oban, and Inveraray, the capital, are the chief towns. Area, 3,110 square miles.
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Arica. Port of northern Chile, the terminus of a railway from La Paz, Bolivia. It exports copper, gold, silver, iron, sulfur, salt, guano and borax.
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Arid, kind of climate, **7**-2533-34
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Aristophanes, Greek writer of comedies, **16**-5752-53
Aristotle, philosopher and scientist of ancient Greece, **2**-591-92
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Lyceum, his school in Athens, **2**-590
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When will money have doubled itself at compound interest? **18**-6555
Why do we count in tens? **18**-6554-55
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Arizona. Southwestern state; area, 113,909 square miles; capital and largest city, Phoenix. Rainfall is generally slight, and there are large desert areas, but irrigation from the Colorado River has brought prosperity to large districts. Cotton, wheat, corn, etc., are thriving crops. Minerals, especially copper, gold, rock-salt and lead, abound. Here is the Grand Canyon of the Colorado. Abbreviation, Ariz. Nickname, "Baby State," "Sunset State," or "Apache State." State flower, cactus. Motto, "Ditat Deus" (God enriches). "Arizona" comes from an Indian word meaning "few springs." First settlement, Yuma, 1854.
described in Western States, * **18**-6425-36; * **19**-6841-50
* desert regions, **9**-3025-32
Hoover Dam, **7**-2550
once part of Mexico, **6**-1921

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fattening lambs, **9**-3208
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Grand Canyon of the Colorado, **7**-2288
Hoover Dam, **7**-2551
Indian ruins, Casa Grande, **18**-6435
Mission of San Xavier, Tucson, Arizona, **18**-6435
Roosevelt Dam, **7**-2551
Arkansas. Cotton state on the Mississippi's right bank; area, 53,102 square miles; capital and largest city, Little Rock. After cotton, lumber and timber products are most important with coal, petroleum, lead and manganese mining next. Abbreviation, Ark. Nickname, "Bear State." State flower, apple blossom. Motto, "Regent populus" (The people rule). Arkansas was the name of an Indian tribe living in the state. First settlement, Little Rock, 1690.
described in Southern States, **13**-4517-28; **14**-4889-4900
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General MacArthur's birthplace at Little Rock, **14**-4900
Hot Springs National Park, **13**-4520
Arkansas River. American river, rising in Rocky Mountains, Colorado. Flows into Mississippi River. Cuts through granite, making the beautiful Royal Gorge, nearly 9 miles long and 3,000 feet deep. 2,000 miles.
Arklow, Ireland
Picture
harbor, **8**-2939
Arles, ancient city of Provence, France
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Armatures, in electric motors and generators, **12**-4202
Armenia. Russian Soviet Republic in the Caucasus, under Soviet government; area, 11,945 square miles; capital, Erivan. Ancient Armenia, which comprised parts of Turkey and Persia, existed as a kingdom from at least 600 B.C.; the Armenian Church is the oldest Christian church, having been founded about A.D. 300.
Armenians as rug weavers, **2**-445-46
Arminius, German war leader
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Army worms, larvae of a fly, **17**-6417
Arne, Thomas, English music composer, **10**-3606
Arnica, plant, **8**-2913; **18**-6666
Arnold, Benedict (1741-1801). American general and traitor. He did brilliant service at Ticonderoga, Quebec and Saratoga, where he was severely wounded. After failure to betray West Point entered British army and afterwards lived in London.
Arnold, Benedict (*continued*)
attack on Quebec, 1775-76, **4**-1163
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Arnold, Matthew, English essayist, **8**-2868
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Arrowroot, plant
Picture (in color), **8**-2998
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Arsacid dynasty, Persian rulers, **9**-3146
Arsenic (As). Chemical element. Atomic number 33; atomic weight 74.91. Occurs, with ores of gold, copper or other metals, in the United States, Sweden and other countries. Arsenic oxide (white arsenic), As_2O_3, is very poisonous, and is used as an insecticide. Calcium arsenate and lead arsenate are also insecticides.
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Ashanti, account of, **9**-3058
Ashburton Treaty, 1842. The treaty which settled the vexed question of the international boundary between Maine and Canada.
Asheville. City in western North Carolina and seat of Buncombe County. Situated on the French Broad and Swannanoa rivers at the eastern entrance to the Great Smoky Mountains National Park. It is between the Blue Ridge and the Smoky Mountain ranges. Best known as a tourist resort, it manufactures wood and textile products and is the center of a farming and mining region. Founded in 1794. Population, 51,310.
Ashley, Lord, *see* Shaftesbury, 1st earl of
Ashokan reservoir
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Asia's Great Religious Leaders, * **9**-3085-98
Asia Minor. Westernmost peninsula of Asia, forming part of the Turkish Republic. Though generally mountainous a great part of the country is exceedingly fertile, producing large quantities of cereals, fruit, cotton and tobacco. Izmir (Smyrna), Bursa (Broussa), Ankara, and Konya are the chief towns.
Asiatic elephants, **6**-2141-42
Pictures, **6**-2139-40, 2142, 2145
Asmara. Capital of Eritrea in northeast Africa. It was occupied by the Italians in 1889 and was an Italian colony until World War II. It was then occupied by the Allied forces. Situated on the Hamasen Plateau, it is in the center of good farming land. There are also gold mines about six miles away. The name means "good pasture place." Population, 85,000.
Asoka, ancient ruler of India, **8**-2826-27
Asp, snake, **15**-5413
Aspar, leader of Goths, **4**-1316
Asparagus
account of, **7**-2616
Picture, **7**-2620
Aspen trees
Picture, **12**-4507
Aspersit, flower
Picture (in color), **14**-4985
Asphalt. A bituminous material used for floorings, pavements and roofs. The natural substance is asphaltum, which is widely distributed over the earth. The island of Trinidad has a lake of boiling pitch, or asphaltum.
used in road-building, **8**-2780
Asquith, Herbert, prime minister of England, **7**-2306
Assam. Northeastern Indian province; area, 53,000 square miles; capital, Shillong. The tea-gardens here have an area greater than those of all the rest of India, while the rainfall averages 100 inches annually.
Assassin
Question about
What is the origin of the word assassin? **9**-3355
Assembly line, in auto manufacture
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Assiniboine Fur Ranch, Canada, **13**-4696
Assisi, Italy, San Francesco, church, **17**-6163
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Assonance, a kind of rime in poetry, **19**-6870
Assuan Dam, Nile River, **7**-2544
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Assurbanipal, king of Assyria, **2**-657-58
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Assurnasirpal, king of Assyria, **2**-656
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See also Architecture, Assyrian; Sculpture, Assyrian
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heraldic standard, **15**-5619
interior of palace (in color), **1**-296
Astatine (At). Chemical element. Atomic number 85. Astatine has been made in a cyclotron by bombarding bismuth with alpha particles.
Asteroids, or **planetoids.** The small planets numbering more than 1,000, which lie between the orbits of the large planets Mars and Jupiter.
Asters
seaside varieties, **14**-5163
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Asters, mountain, description, **18**-6662
Astley, Philip, founder of the circus, **3**-1075
Aston, F. W., English scientist, **4**-1229
Astor, John Jacob (1763-1848). Born in Waldorf, Germany. Emigrated in 1783 to New York, where he went into the fur trade. In 1810 founded the Pacific Fur Company, which explored and occupied Oregon Territory.

Astrakhan. City in the southeast of Russia on the delta of the Volga River 60 miles from the Caspian Sea. It is noted for the fine Persian lamb coats of the same name and as a fishing center. Most of the famed Russian caviar comes from the region. It is the most important Caspian port. Captured by Ivan the Terrible in 1556, it became a Russian city and the capital of the region of the same name. Population, 254,000.
Astrology
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What is astrology? **11**-3800
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Astronomer's Wonderful Instruments,
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Astronomical unit, measurement used in astronomy, **3**-856
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* Hayden Planetarium, N. Y., **19**-7222-24
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* famous astronomers from early times to the present, **11**-3844-60
light of stars result of splitting atoms, **7**-2633
measurements used, **3**-856
See also stars, sun, moon, earth, sky
Pictures
comet's path around sun (color), facing **10**-3665
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Asturias, The, ancient kingdom and modern district in northwest Spain, officially known as Oviedo since 1838; area about 4,205 sq. mi. Minerals include iron, coal, cobalt, manganese and mercury. Chief cities are Oviedo and Santillana. *See also* **14**-4908, 4911
Asuncion. Capital and the chief port of Paraguay. Situated on the Paraguay River, it is known as one of the finest of river harbors. The official name is Nuestra Senora de la Asuncion and means "Our Lady of the Assumption." Settled before the Pilgrims came to Plymouth, it is one of the oldest cities in the New World. It trades in tea, tobacco, fruits, timber and lace. Population, 134,000.
Picture
El Oratorio, memorial to Paraguayan heroes, **19**-6984
Atahualpa, Inca ruler, **19**-6862-63
Picture
greeting Pizarro, **19**-6860
Atalanta, in Greek mythology, was the name of an Arcadian maiden. She made it a condition that she would marry only the suitor who won a race with her. Meilanion finally won her because he threw golden apples in her path which she stopped to pick up.
Athabaska Lake. Between provinces of Alberta and Saskatchewan, Canada. Area, 3,058 square miles, the fourth largest lake in Canada, exclusive of the Great Lakes.
Athabaska River, Alberta, Canada
oil reserves, **13**-4750
Picture
of falls, **1**-156
Athapascans, or **Athabaskans.** One of the important linguistic stocks of the North American Indians, occupying the west-coast country from Alaska to northern Mexico. Among the tribes of this stock are the Chippewas, Navajos, Apaches, Hupas and Lipans.
Athena (Pallas Athene), goddess, **9**-3226
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statue by Phidias, Parthenon, **12**-4220-21
See also Minerva
Pictures, **9**-3077
sculptures by Phidias, **3**-920; **12**-4219
Athens. Capital of Greece, situated on the plain of Attica between mountains and the sea. It was the capital of the ancient state of Attica, during which time it reached its greatest fame. It was the cultural center of Greece and of the known world at that time. The old part of the city is at the foot of the Acropolis, but the new part spreads around the old and is quite modern. Has attractive buildings and streets. It is not a manufacturing center, but is a busy trading and commercial city. The most famous building surviving from ancient times is the Parthenon on the Acropolis. Population, 392,800.
Golden Age in, **8**-2874
in ancient Greek history, **3**-911-13, 915, 917-25
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sculpture, *see* Sculpture, Greek
theater of Dionysus, **15**-5346
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Pictures, **14**-5039; (gravure), **15**-5349-54
ancient Theater of Dionysus, **3**-921
in Pericles' time, **8**-2874
Parthenon, **3**-909, 920
Atlanta. Capital and largest city of Georgia, and seat of Fulton County. The city was important as a supply and manufacturing center during the Civil War, and as a result was one of Sherman's main targets on his famous march to the sea. The city was left in flames when Sherman moved on. It is a trading center for cotton, tobacco, grain and horses, and has some manufacturing of textiles and soft drinks. It was founded as the last station for the Western and Atlantic Railroad in 1837, the name being the feminine form of Atlantic. Population, 302,288.
taken by Sherman, Civil War, **7**-2441
Pictures
Georgia School of Technology, **14**-4894
occupied by Union troops, **7**-2440-41
Atlantic cable, *see* Cables, Submarine
Atlantic Charter. This was a declaration of principles guiding the U. S. and Britain in World War II, drawn up by Pres. Roosevelt and Prime Minister Churchill, at a meeting aboard ship in the Atlantic Ocean in Aug. 1941. Among the 8 points listed were: the right of self-government, increase of trade, freedom from fear and want, and the abandonment of the use of force by all the nations of the world.
Atlantic City. City in New Jersey that is famous as a seaside resort. Millions of people from all over the world visit this city every year, and many organizations hold their conventions there. It is built on Absecon Island. It is well known for its boardwalk that runs along the ocean for 8 miles. It does have a little commercial industry such as fishing and the manufacturing of toothpaste. The city was started as a seaside resort and building began in 1852. Population, 64,094. *See also* **12**-4147-48
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What is the Atlantic Pact? **5**-1608-09
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Atlantides (Hesperides), in mythology, **9**-3237
Atlantis, supposed lost continent, **5**-1751-52
Atlas, giant in mythology, **9**-3237
Atlas Mts. African range extending for 1,500 miles through Morocco, Algeria and Tunis. Its chief division is the Great Atlas, which contains the peak of Tagharat, 15,000 feet.
Atmosphere
clouds, **8**-2917-18
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Atmospheric pressure, **4**-1416-20
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What is an atom-smasher? **11**-4065-68
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What is an atomic clock? **7**-2361-62
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"atom-smashers," **11**-4065-68
breaking the nucleus of the atom, **15**-5286
cyclotron, or "atom-smasher," **4**-1233
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Atonement, Day of. The "Yom Kippur" of the Jews, kept on the tenth day of the seventh month of the Jewish calendar—September-October. It is a day of humiliation before God and expiation of sins, observed with elaborate ceremony.
Atropine, drug, use of, **8**-2912
Atropos, one of the three Fates, **9**-3228
Attalus I, king of Pergamum, and sculpture of Pergamum, **12**-4460, 4467
Attar, or otto, of roses
how perfume is made, **9**-3154
Picture
factory in Bulgaria, **14**-5051
Attila (died 453). King of the Huns. In 434 his brother Bleda and he became joint rulers of the Huns; Attila became sole ruler after putting his brother to death in 444. Attila, who called himself the Scourge of God, conquered many lands, including Germany, Thrace, Macedonia and Greece. He invaded Gaul; he was defeated at Châlons in 451 and was forced to turn back. He turned to Rome, but was persuaded to spare that city by Pope Leo I. He died of a hemorrhage in 453.
Picture, **4**-1251
Attlee, Clement Richard, 18-6605-06
Picture, **18**-6606
Attucks, Crispus, American Negro patriot, **12**-4428
Auber, Harriet (1774-1862). English hymn-writer. She wrote the fine hymn, Our Blest Redeemer ere He Breathed, in 1823.
Aucassin and Nicolette, Old French tale, **18**-6561
Auckland. Capital of Auckland Province, New Zealand. Situated on the northeast coast of North Island, it has two fine harbors and one of its main industries is shipbuilding. It has been built on the site of a group of extinct volcanoes. Sugar-refining, rope-making, boiler-manufacturing and lumbering are carried on. The city was founded as the capital of New Zealand in 1840 and remained so until Wellington became capital in 1865. Population, 281,900. *See also* **7**-2574
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Municipal Auditorium, Philadelphia, **11**-3776
Audubon, John James, American ornithologist, **19**-7052-53
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painting of canvasback duck, **11**-3888
Audubon Societies, *see* National Audubon Society
August, so named from Emperor Augustus Caesar in his own honor, following the example of Julius Caesar who gave his name to the preceding month. Eighth month of the year, containing thirty-one days.
Augusta. City in Georgia and seat of Richmond County. It is at the eastern edge of the state on the Savannah River. Not only is it among the leading cotton markets of the world, it also manufactures cotton products, bricks, lumber and fertilizer. James Oglethorpe founded the city in 1735 as a fort and named it in honor of the mother of King George III, Princess Augusta. It is the second oldest city in the state. Population, 65,919.
Augusta. Capital of Maine and seat of Kennebec County. Located in southern Maine, it is in the lake region of the state and is on the Kennebec River. The river is a good source of water power for some of the industries. Shoes, cotton products, paper and lumber are manufactured there, and the city has many publishing houses. Once an Indian village, it later became a trading post and a fort. Fort Western was built there in 1754 and was the beginning of the town. Population, 19,360.
Augustan Age
Golden Age of Latin literature, **16**-5912-17
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Augustine, St., missionary to England, **5**-1568
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Augustus (Gaius Octavius), emperor of Rome
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Auld Lang Syne, song
writing of, **10**-3604
Aurangzeb, Mogul ruler of India, **8**-2827
Aurelian (Lucius Domitius Aurelianus) died 275 A.D.). Emperor of Rome from 270 to 275 A.D.
reign, **4**-1251
Auricle, chamber of heart, **4**-1211
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Auricula, outer part of ear, **9**-3307, 3309
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Ausable Chasm, Adirondacks
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Austen, Jane, English novelist
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illustration for Northanger Abbey, **6**-2257
Auster (Notus), south wind, in mythology, **9**-3234
Austerlitz, Battle of
Picture, **6**-2205
Austin, Stephen Fuller (1793-1836). An American pioneer and politician, known as the founder of the State of Texas.
Austin. Capital of Texas and seat of Travis County. Situated in the center of the state on the Colorado River. Center for a large farming area, it has considerable shipping of agricultural products, dairy products and livestock. It also has meat-packing, and manufactures brick, tile and furniture. The University of Texas is there. First settled in 1838 it was called Waterloo, but was later named for Stephen Fuller Austin, for the man who founded it. In 1839 it was made the national capital of the Republic of Texas. Population, 87,930.
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October, by John Murray Gibbon, **18**-6653
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Why do leaves change color in the autumn? **8**-2872
Auvergne. Old province of central France, remarkable for its volcanic mountain plateau.
Avalanche. A mass of snow or ice sliding down from a mountain slope. As a rule, avalanches are not dangerous to human life because they occur above the snow line; but there have been terrible disasters caused by part of a mountain's breaking off, joining the snow or ice avalanche to form a "rocky avalanche" and burying an entire village.
Avalon Peninsula, Newfoundland, **9**-3267-68
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Avila. City of Spain, in the hills of Old Castile, 53 miles northwest of Madrid.
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Azaleas, flowering shrubs, **13**-4776
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Azerbaijan. Soviet Socialist Republic in the Caucasus; area, 33,640 square miles; capital Baku. The country has vast oil resources.
Azimuthal equidistant projection, kind of map, **12**-4354-55
Azores. Group of volcanic islands in the North Atlantic, forming part of Portugal. Terceira, St. Michael's and Pico are the largest islands, and Angra, Horta and Ponta Delgada, the chief towns. Oranges, pineapples and bananas are exported. Area, 920 square miles.
Azov, Sea of. Gulf of the Black Sea, with which it communicates by the Strait of Yenikale. 14,500 square miles in extent, it contains the Russian ports of Mariupol, Berdiansk, Taganrog and Rostov.
Aztecs, Indians of Mexico
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Temple of Bacchus (gravure), **15**-5356
Bab el Mandeb. This is the strait dividing Africa and Arabia and connecting the Red Sea and the Indian Ocean. About 20 miles broad, it is divided into two channels by the island of Perim. The Arab words mean "Gate of Tears."
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Bacillus subtilis, microbe, sets fire to hay, **6**-2187
Back crawl stroke, in swimming, **19**-6958
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Bacon, Roger, English philosopher, **2**-596
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Bacon's Rebellion. A revolt organized in 1676 by Nathaniel Bacon, a young planter, against Governor William Berkeley of Virginia. The revolt was successful at first, but collapsed when Bacon died of malaria.
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Bagdad. Capital and largest city of Iraq. It is in the center of the country and is on the Tigris River. In olden times the city was one of the main trading centers between India and Europe, and it still has considerable exporting, primarily
Bagdad (*continued*)
of wool, dates, grain, horses and gum. It manufactures copper products and cloth. The city was founded in 762 and is known throughout the world as the setting of the Arabian Nights Tales. Population, 1,009,100. *See also* **18**-6674
center of scientific learning under Haroun-al-Rashid, **2**-595
Pictures
scenes in, **18**-6739, 6742-43
Baggesen, Jens, Danish poet, **19**-7011
Bagpipes. A musical instrument that has come down from very early times. It was known in the Orient and in Europe wherever the Celtic race was found, but nowadays it has come to be known as the national instrument of Scotland. The great Highland bagpipe has a mouthpiece, a leather bag which holds a reserve of air blown into it from the mouth, a chanter with a double reed and eight note-holes, and three drones each with a single reed. The Irish bagpipe is on another pattern.
Bahama Islands, West Indies, **19**-7102
Picture
sponge factory, **15**-5334
Bahia (Sao Salvador da Bahia). The third largest city in Brazil and capital of the state of Bahia. Until 1763 it was also the capital of Brazil. Situated on the Bay of All Saints, it has one of the best and safest harbors anywhere. Much of the town is built on high hills. It is a shipping center and has some manufacturing. In the past it was the center of the diamond trade. Founded in 1549, it is the oldest city in Brazil. Population, 363,700.
early history, **19**-7044
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river boats at Una, **18**-6777
Bahrein Islands
pearl-diving, **13**-4676-77
Baikal, Lake. Sixth largest lake in the world, in east Siberia. 13,200 square miles in extent, it is 385 miles long and from 9 to 50 miles broad, and over 300 streams flow into it. It is frozen from the beginning of January to the end of May, but abounds in fish, notably sturgeon and herring. Seals are found in it.
Bail. Security put up to obtain the release of a person from arrest or from custody until the final decision in his case is given by the court. If the person "bailed out" appears in court, the bail is returned; if he does not appear, the bail is forfeited, that is, kept by the state, and an order for his arrest is made out. A person held for a crime punishable by death is not allowed bail.
Bailey, Carolyn Sherwin
Stories by
Little Rabbit Who Wanted Red Wings, **7**-2637-39
Story of Li'l' Hannibal, **12**-4192-95
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Baird, or **Beard, Thomas,** American shoemaker, **10**-3568
Baird's tapir, mammal, **5**-1827
Bakelite, coal-tar product, explanation of, **11**-4002
Baker, Sir Samuel, African explorer
Picture, **14**-5203
Bakeries, how bread is made, * **1**-369-75
Baker's dozen means thirteen. Bakers once were fined for giving short weight; and to be on the safe side, they gave an extra loaf to every dozen.
Baku. City in Russia and capital of the Socialist Soviet Republic of Azerbaijan. It is built on a rocky peninsula on the Caspian Sea. There are springs of oil, naphtha and inflammable gas in the region around the city, and so it is known as the Field of Fire. For this reason it was also the sacred city of the fire-worshipers in the past. Naturally it is a great oil and naphtha center. It also exports grain and salt. The city is old and has been in Persian hands at times. Population, 809,350. *See also* **16**-5857
petroleum, ancient times, **13**-4740, 4742
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oil-fields, **13**-4743
Balaclava, Battle of
Poem about
Charge of the Light Brigade, by Tennyson, **5**-1885
Balakirev, Mily, Russian composer, **19**-6922

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of cat, **8**-2716; **9**-3307
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Why does everything spin round when we are dizzy? **5**-1638
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high-wire circus performers, **9**-3308
Balance of power
Question about
What is meant by balance of power? **12**-4278
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Balas ruby, gem stone, **19**-7230
Balata, latex product, **9**-3151-52
Balboa, Vasco Nuñez de, discovered Pacific Ocean
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Why do some people lose their hair? **5**-1810
Baldwin I, made king of Jerusalem, **7**-2585
Baldwin, Robert, Canadian political leader, **3**-946
Baldwin, Stanley, prime minister of England, **7**-2308-09; **18**-6603-04
Balearic Islands. Spanish island group in the Mediterranean, including Majorca, Minorca and Iviza.
Balfe, Michael, Irish composer, **19**-6920
Balfour, Arthur James, Earl of (1848-1930). English statesman. Entered politics as a Conservative. Distinguished himself as secretary for Ireland (1887-91). Premier from 1902 to 1906. Was minister of foreign affairs under Lloyd George in World War I. Balfour was an author of considerable distinction.
Balfour Declaration, of 1917, **18**-6675
Bali, Netherlands East Indies
Picture
rice field, **5**-1855
Balistides, group of fishes, **16**-5900
Balkan Mts. Bulgarian range, rising to 7,800 feet. It is traversed from north to south by the famous Shipka Pass.
Balkan Wars, 1912, **14**-5049
Ball, Thomas, American sculptor, **14**-4934
Ball-and-socket joints, in body, **5**-1563
Picture, **5**-1559
Ball games
See Baseball, Football, Basketball, etc.
Ball-point pens, 10-3553
Ballad stanza, verse pattern, **19**-6985
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characteristics of early English ballads, **1**-303-04
early English ballads, **2**-721-23
See also Poetry Index under Ballads and titles
Picture
woodcut illustrating early ballad, **2**-723
Ballantyne, James, and Sir Walter Scott, **7**-2352
Ballast plants, 14-4977-78
Ballet, a form of dance for the theater, usually performed by a group, to music. It may tell a story, express ideas or feelings. Its history goes back to the time of the Renaissance, and during the 17th and 18th centuries Italy and France led in its development. In the 1800's ballet became more identified with Russia, and the steps followed rigid rules. This is what is usually thought of as classical ballet, with the women dancers on their toes. In recent years, however, ballet has become much more free, using or discarding the traditional forms and inventing new ones, according to whatever will best express the story or the feeling the dancers are to portray. With this new freedom, ballet has become very popular.
Picture
scene from Swan Lake ballet, **16**-5852
Balloons
* ships that sail the sky, **1**-344-51
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use in World War I, **18**-6447
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What is a balloon barrage? **3**-874
Balloons (*continued*)
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balloon barrage, **3**-874
German balloon of World War I, **18**-6445
of Salomon Andrée's balloon, **12**-4231
magnetized rubber balloons, **10**-3690
Navy blimp being filled with helium, **1**-311
Ballot
used in school city election, **8**-3018, 3019
Balls
toy, that answers questions, **2**-624
Questions about
What do the three balls over a pawnbroker's shop mean? **10**-3733
Why does a ball bounce? **6**-2008
See also ball games as Baseball, Basketball, Football, etc.
Balmaceda, José Manuel, president of Chile, **19**-7039
Balsa. A South American tree, *Ochroma lagopus.* The wood is very light and on that account is much used by boys in the construction of model airplanes.
Picture
floating balsa logs in Ecuador, **18**-6783
Balsam, or **jewel-weed,** plant
Picture, **15**-5607
Balsam-root, flower, **18**-6660
Baltic Sea. Great inland sea lying between Sweden, Finland, Russia (U. S. S. R.), Germany and Denmark. 166,397 square miles in extent, it contains the gulfs of Finland and Bothnia.
Baltimore, Lords of, and Maryland, **2**-549-50
See also Calvert, George
Baltimore. The largest city in Maryland and one of the main seaports on the Atlantic coast. It is situated on the Patapsco River about fourteen miles from Chesapeake Bay. The harbor is excellent. Manufacturing of many kinds goes on there, some of the products being aircraft parts, canned goods, insulated wire, clothing, motor-vehicle parts and shipbuilding. The first settlement in the area was in 1661, and a town was founded in 1729. It was named for Lord Baltimore, the founder of the Maryland colony. Population, 1,046,700.
as a port, **12**-4147
Pictures, **11**-3779
Baltimore oriole, *see* Orioles
Balto, famous dog, story of, **16**-5735
Baluchistan. Indian northwest frontier province; area, 134,638 square miles. Chief towns, Kalat, Las Bela and Quetta.
Baluchitherium, prehistoric animal, **5**-1784
Balzac, Honoré de, French author, **18**-6716-17
Bamboos, account of, **10**-3519-20
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Bananas, cultivation and uses of, **6**-2060, 2062
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banana farm near Santos, Brazil, **19**-7050
gathering fruit, **6**-2067
in Mexico and Central America, **11**-3820
plant, flower and fruit (in color), **8**-3000
Banbury. English market town famous for its oat cakes and for the nursery rime which centers around its cross. Banbury Cross, demolished in 1610, has been replaced by a new one.
Bancroft, George, American statesman and scholar, **13**-4728
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Bandaging, directions for, **12**-4377
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Banded rattlesnakes, 15-5415
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red bandfish (in color), **16**-5783
Bandicoot, marsupial animal, **7**-2504
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Banding, of birds, **6**-1954-55
Picture, **6**-1956
Baneberry, plant, description, **17**-6279
Banff, Alberta
Picture
ski jump, **10**-3697
Bangkok. Capital and main city of Siam. It is built at the mouth of the Nenam River on an island. A second part of the city is made up of houses built on rafts. These surround the island and are moored to the bank. At some places there

Bangkok (*continued*)
are eight or more rows of these houses out from the shore. The palace of the king is built on another island. In the city are dozens of canals and islands. The city is famous for its beautiful gardens and temples and for the palace. It is the trading center of Siam, dealing in rice, sugar, pepper, hides, fine woods, ivory and feathers. Before 1769 the city was just a village but at that time it was chosen as capital and became important. Population, about 700,000. *See also* **2**-440
Bank of Canada, 16-5684
Bank of England. The most important bank in the world and the central figure in the banking system of England. It was founded by William Paterson in 1694 as a joint-stock association. For lending its entire capital to the Government it was given the right to issue bank notes and a monopoly of a certain kind of banking in England. This monopoly lasted until the nineteenth century. On March 1, 1946, the bank passed into government ownership. The Bank of England Building is in Threadneedle Street, London, and the bank has been nicknamed the "Old Lady of Threadneedle Street."
Bank of the United States. The first Bank of the United States was chartered February 25, 1791, as one of the first acts of the new Congress. Soon it dominated the entire banking system of the country and acted as a restraining influence upon the state banks. Its charter expired in 1811, and, through the opposition of the state banks, was not renewed. The disordered condition of bank-note circulation during the next five years brought about a demand for a new charter for the Federal bank in 1816. The second charter lasted only until 1836. President Jackson vetoed its renewal in 1832.
Banks and Banking, * **16**-5679-84
Pictures, **6**-2024
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Banneker, Benjamin, American Negro scientist, **12**-4428
Bannerman, Helen
Story by
Little Black Sambo, **2**-756-58
Bannockburn, Battle of, 5-1680; **15**-5648-49
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Robert Bruce to His Men at Bannockburn, by Robert Burns, **5**-1887
Bantam chickens, breed of fowls, **12**-4494
Banting, Sir Frederick Grant, life and medical discoveries, **15**-5493
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Banting, or **banteng,** Javan ox, **4**-1261
Picture (gravure), **4**-1268
Bantu. Name applied to a group of Negroes of central and southern Africa who do not form a single racial group but who speak some form of the Bantu language. Bantu is spoken by over 50,000,000 natives of Africa. *See also* **2**-474
Banyan tree, account of, **9**-3261-62
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Baptisteries, architectural history, **16**-5716
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Barb, fish, *see* Barbus
Barbados, island in West Indies, **19**-7103
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Barbarossa, *see* Frederick I, Barbarossa
Barbary ape (a monkey), **1**-207
Barbary red deer, 4-1507
Barbary sheep, or **aoudads, 4**-1375
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Barbary States, in history of North Africa, **18**-6804
war with United States, **17**-6327-28
Barber shop, style of singing, **18**-6515
Barberries, shrubs, **13**-4778
and wheat rust, **5**-1758
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Barbers
Question about
Why is a red-and-white pole before a barber shop? **12**-4276
Barbets, birds, account of, **9**-3370
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Barbizon, France
Picture, **10**-3433
Barbizon school of painting, 7-2370
Barbus (barb), species of tropical fish
Picture, **5**-1767
Barcelona, the second largest city in Spain, manufacturing center of the country, capital of the province of Barcelona, port on the Mediterranean Sea, between the Besos and Llobregat rivers. Cloth, machinery, paper, glass, and chemicals are made and there is considerable commerce in citrus fruits and olive oil. It is thought that the city was founded about 300 B.C. by the Carthaginians. They named it Barcino after their leader, Hamilcar Barca. Population, 1,133,350. *See also* **14**-4930
Picture, boulevard, **14**-4929
Bardstown, Kentucky
Picture
Stephen Foster's home, **14**-4900
Barents (or **Barentz), Willem,** Arctic explorer, **8**-2982; **12**-4230-31
Pictures, **8**-2979, 2981
Bari. City in southern Italy and capital of the province of Bari delle Puglie, on the Adriatic Sea. Cotton goods, linen goods, pianos, organs, soap, and glass are made; and wine, grain and almonds are exported. Even 400 years before Christ the city was important. It has been destroyed and rebuilt three times. In ancient times it was known as Barium. Population, 252,500.
Baring-Gould, Sabine (1834-1924) English clergyman, novelist and hymn-writer. Two of his popular hymns are Onward, Christian Soldiers, and the lullaby Now the Day Is Over.
See also Poetry Index
Barium (Ba). Chemical element. Silvery, reactive metal; atomic number 56; atomic weight 137.36; melting point 850°C.; boiling point 1140°C; specific gravity 3.74. It occurs as barite (barium sulfate, $BaSO_4$), which is used in white paints. Although other barium salts are poisonous, barium sulfate can be taken internally to make the digestive tract opaque to X rays.
Bark, of trees
as food, **12**-4515
Question about
Why do trees have coats of tough bark? **8**-2872
Bark, sailing vessel, rig of, **11**-4086
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Barkentine, sailing vessel, rig of, **11**-4086
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Barker, machine used to strip bark from logs
Picture, **7**-2447
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Barley, Wall, grass
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Barnard, George Grey, American sculptor, **14**-4938-39
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Barnard, Henry, American educator, **14**-5253
Barnum, P. T.
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Barometers
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measure height of mountains, **2**-685
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Baron Munchausen, Adventures of: extracts and note, **4**-1421-27
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Barrage, Balloon
Question about
What is a balloon barrage? with picture, **3**-874

Barren Lands, Canada, description, **7**-2558-62
Barrie, Sir James Matthew, British writer, **11**-3896-97
* life-story of, **17**-6293-95
Stories by
Peter Pan (in part), **13**-4658-62
Sentimental Tommy (in part), **9**-3239-44
Pictures, **17**-6295
home in Kirriemuir, Scotland, **17**-6293
Barry, John. Born at Tacumshane, County Wexford, Ireland, 1745; died at Philadelphia, Sept. 13, 1803. He came to America and settled in Philadelphia about 1760. He was given command of the Lexington in 1776, at the outbreak of the war, and captured the Edward, the first ship ever taken by a commissioned officer of the U. S. Navy. He was later on a ship which was captured by the British, but escaped. He was appointed commodore in 1794.
Barry, famous St. Bernard dog, story of, **16**-5737
Barrymore, Ethel, American actress, **14**-5271
Barter, system of exchange of goods
limitations of, **15**-5589; **17**-6084-85
Barthé, Richmond, American Negro sculptor
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Bartholdi, Auguste, French sculptor
designed Statue of Liberty, **17**-6174
Picture
Statue of Liberty, **10**-3397
Bartholomé, Paul Albert, French sculptor, **13**-4706
Picture
Tomb of Death, **13**-4705
Bartlett, Paul Wayland, American sculptor, **14**-4938
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The Bear-Tamer, **14**-4935
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Bartolo, or **Bartoli, Taddeo,** Italian painter, **2**-697
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Bartolommeo, Fra, Florentine artist, **5**-1739
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Barton, Clara, founder of American Red Cross, **14**-5269
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Bartsia, plant
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Barye, Antoine Louis, French sculptor, **13**-4706
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Casey at the Bat, by Ernest Lawrence Thayer, **7**-2526-27
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Basil I, Byzantine emperor, **4**-1319
Basil, flower. *Picture* (in color), **14**-4994
Basile, Giambattista, Italian writer of fairy tales, **6**-2273-74
Basilicas, Roman, **15**-5348
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May basket, from paper strips, **2**-750-51
rattan, **6**-2044-45
reed, **3**-897-98
Basque Provinces consist of Alava, Viscaya (Biscay) and Guipúzcoa in northeastern Spain; total area about 2,739 sq. mi. The region is very fertile and shut off from the rest of Spain by mountains; the people have their own language and
Basque Provinces (*continued*)
are famous for their independence. Agriculture is the chief occupation, though some iron is mined. *See also* **14**-4908, 4911
Basra (Bassora or **Basrah).** City and port in Iraq on the Shat-el-Arab, as the Tigris and Euphrates rivers are called after they have joined. The city is surrounded by a thick wall and the old part is not on the river. Dates, camels, horses and carpets are exported. Many of the adventures of the fictional hero Sindbad the Sailor took place in this city. It was founded by the Arabs in 635 A.D. Population, about 50,000.
Bass, fish, **15**-5630-31
striped, description, **16**-5774-75
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Bass-viol, *see* Double bass violins
Bassano, Alberta, dam at, **7**-2548
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Bassaricyon, animal, **3**-872-73
Basse-Terre, capital of Guadeloupe, on the southern end of the island. The harbor is unprotected and so is not too satisfactory. Trade in cocoa, coffee and sugar. Sir Francis Drake once harbored there for Christmas. Population, 10,086.
Bassoon, musical instrument, **4**-1291
Bast, or **Sekhet,** Egyptian goddess
Picture, sculpture, **1**-290
Bastien-Lepage, Jules, French painter, **7**-2480
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Joan of Arc, **7**-2479
Old Beggar-Man, **7**-2479
Basutoland. South African native territory, under British administration; area, 11,700 square miles; capital Maseru. *See* **9**-3052
Bataille, Henri, French dramatist, **18**-6720
Batavia. Capital and main city and port of the East Indies. It is a modern city, on the northwest coast of the island of Java. Extensive trade in spices, oils, rice, tea, bamboo, rubber and diamonds. The Dutch founded the city in 1619. Population, over 500,000.
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Batavians, early German tribe who settled in the Netherlands, **15**-5556
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Bates, Edward, attorney general in Lincoln's Cabinet
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Bates, Harry, British sculptor, **13**-4856
Bates, Katharine Lee, American poet, **18**-6510
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Batholith, rocky formation in earth's crust, **2**-630
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Bathurst, New Brunswick, Canada
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pulp mill, **7**-2448
Bathysphere, for deep-sea descents, **15**-5465
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Baton Rouge, capital of Louisiana and seat of East Baton Rouge Parish, on the Mississippi River about 85 miles above New Orleans. Home of the state university. The city is in a rich farming region. Oil refineries, lumber mills and chemical factories are among the major industries. The city was founded around 1720 and was one of the earliest French settlements in the Louisiana territory. The name means "red stick." Population, 34,719.
Bats
* account of, **1**-315-18
in Mammoth Cave and Carlsbad Caverns, **4**-1301, 1303
migration, **6**-1959
Question about
Why do bats hide themselves when the sun shines? **7**-2610
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Battles
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What were the "fifteen decisive battles"? 7-2610
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Baudry, Paul, French painter, **7-2482**
Baumgartner, Stephen
Picture
portrait, as St. George, by Albrecht Dürer, **4-1347**
Bauxite, source of aluminum, **1-137-38; 13-4525**
Pictures
extracting aluminum, **1-137**
loading bauxite at Georgetown, British Guiana, **19-6974**
Bavaria. German state in southeastern Germany; covers an area of 30,000 sq. mi. During World War II its capital, Munich, and the important industrial center, Nuremberg, were bombed extensively; but reconstruction is well under way. Besides its industrial activity, Bavaria boasts of rich mineral deposits, fertile farm lands and heavy forests.
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Bayle, Pierre, French writer, **18-6714**
Bayly, Thomas Haynes, song-writer, **10-3605**
Bayonne, France, cathedral, **17-6160**
Bayonne. City in New Jersey on a peninsula between New York and Newark bays. It borders Jersey City and is 6 miles from New York City. With nine miles of waterfront, the city has extensive docking facilities. It is one of the world's leading oil-refining and exporting centers, and has considerable manufacturing—steam boilers, motorboats, automatic doors and chemicals. It was settled in 1646 and has had various names. It became Bayonne in 1869. Population, 79,198.
Bayonne Bridge, **1-33**
Picture
Bayonne Bridge, **1-37**
Bayreuth. Bavarian town famous for its associations with Wagner and its splendid opera house.
Beach grass
Picture, with note, **10-3654**
Beach plums, 14-5165
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Beacons, of lighthouses, **10-3580**
Beaconsfield, Earl of, *see* Disraeli, Benajmin
Beadle and Company, publishers of dime novels, **14-4959**
Beads
* doll's jewelry, how to make, **4-1395-96**
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Beagles, dogs
Picture, **2-715**
Beaked lizard, name for tuatara, **14-5228**
Beaked whales, sea mammals, **7-2346**
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Bear grass, plant, description, **19-6928**
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Bearberry, shrub, **11-4020; 14-5164**
Pictures, **14-5164**
flower of (in color), **15-5609**
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Beard, Thomas, *see* Baird
Bearded pig, of East Indies, **5-1720**
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Alaska brown bear, **18-6618**
American black bears, **1-157**
bear cub, **2-729**
in Rainier National Park, **7-2285**
polar bears in zoo, **19-7132**
Bears and Bulls. In the language of the Stock Exchange a Bear is a person who sells stock he does not possess, intending to make delivery with stock he buys at a lower price. A Bear is always hoping for prices of stock to fall. A Bull is one who buys stock hoping it will increase in price so that he can sell it at a profit.
Bearweed, name given skunk cabbage, **17-6274**
Beaters, machines used in making paper, **7-2451**
Pictures, **7-2449**
Beatrice, beloved of Dante, **17-6151**
Picture, **17-6149**
Beau Brummel, George Bryan (1778-1840). The son of Lord North's private secretary who gained his reputation as an exquisite at Eton and Oxford. At the court of George IV he was long regarded as an oracle on matters of dress and behavior. He came to a sad end, dying destitute in Caen, France.
Beaubien, Mark, of Chicago, **19-7107**
Beaufort Scale, for measuring speed of wind, **16-6032**
Beauchemin, Nérée, French-Canadian poet, **14-5117**
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Beaumarchais, Pierre Augustin de, French writer, **18-6715**
Beaumont, Francis, English playwright, **3-1125**
Picture, **3-1125**
Beaumont, William, U. S. Army surgeon, **15-5481, 5483**
Picture
with patient Alexis St. Martin, **15-5481**
Beaumont, Texas, seat of Jefferson County. On the Neches River, it can be reached by ocean-going vessels even though it is 50 miles from the Gulf of Mexico. Until 1901 the main industries were trapping, lumbering and growing rice, but in that year oil was discovered and it is now the oil-refining center of east Texas. Founded in 1836, it may have been named for the brother-in-law of one of the founders or for a hill near by—in French the word means "beautiful hill." Population, 59,061.
Beauregard, Pierre Gustave Toutant, Southern general in Civil War, **7-2434**
Beauty, in art, qualities, **1-62-63**
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Beauty Trees, * 12-4381-96
Beauvais, France, cathedral, **17-6158**
Beaux, Cecilia, American painter, **14-5271; 10-3455**
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Girl in White, **10-3461**
Beavers, animals, account of, **3-1129-31**
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building a dam, **1-157**
Bechuanaland. British South African protectorate; area, 275,000 square miles; capital, Mafeking, Cape Province. Here is much of the Kalahari Desert. *See also* **9-3052**
Beck, Joseph, Polish statesman, **13-4684**
Becker, fish
Picture (in color), **16-5781**
Becket, Thomas à, *see* Thomas à Becket, St.
Becky Sharp, Thackeray character, **8-2738**
Becquerel, Antoine Henri, French physicist
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Beddoes, Thomas Lovell, *see* Poetry Index
Bede, The Venerable, Anglo-Saxon scholar
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Picture, **1-300**
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Chippendale bedposts, **17-6261**
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Beechdrops, flowering plants, 18-6580
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Why does a bee sting? 17-6233
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diagram of hind leg, 2-508
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Begonia, plant, note and picture, 1-331
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frilled flower (gravure), 19-7178
Behring, Emil von, physician, medical discoveries, 15-5491
Behring, Vitus, *see* Bering
Beilstein, German town
Picture, 12-4170
Beira, an antelope, 4-1441
Beirut (Beyrouth), capital and main seaport of Lebanon. It is on the Mediterranean and is an important trading center. It exports olive oil, cereals, tobacco, sesame, silk, and gold and silver articles. It has been in the hands of many nations during its long history. It was known to exist 15 centuries before the birth of Christ. Population, 233,970.
Beisa, an antelope, 4-1444
Belem (Belem do Para), capital of the state of Para in Brazil, situated at the point where the Guama and the Para rivers flow into the Amazon, at the head of the Amazon Valley. It is 85 miles from the Atlantic Ocean, but large steamers can reach the port. It is a little south of the equator and is continually hot. It is important for trade rather than for manufacturing. It was founded in 1615 and the name means "Bethlehem." Population, 293,000.
Belemnites, prehistoric mollusks, 4-1402
Belfast, capital of Northern Ireland, and largest and most important city of that region. Being on Belfast Lough at the mouth of the River Lagan, it is also the main seaport of Northern Ireland. The Irish linen industry is centered there; and ships, machinery and aircraft are manufactured. It was supposedly started as a castle in 1177, and
Belfast (*continued*)
in the 16th century it was just a fishing village. Now it is a modern city. Population, 438,100.
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Parliament buildings and statue of Lord Edward Carson, 8-2944
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writing of national anthem, 10-3608
Poem about
In Flanders Fields, by John McCrae, 10-3739
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Belgrade (Beograd), capital and largest city in Yugoslavia. Located on the Danube, it is a commercial center. It is also on the Save River and at the foot of the Rudnik Mountains. It has had a turbulent history, having been in Roman, Turkish and Russian hands at various times. The city as it is known today dates from 1866. The name means "White Castle." Population, 266,850.
Poem about
The Siege of Belgrade, by Alaric Alexander Watts, 19-6873
Belgrano, Manuel, Argentine general, 19-7033
Belisarius (died 565 A.D.). General of the Byzantine Empire; served under the emperor Justinian.
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Bellamy, Edward, American socialist writer, 13-4794
Bellay, Joachim Du, French poet, 18-6566
Belle Isle Lake, Louisiana
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banding birds at Rainey Wild-life Refuge, 8-2817
Belleau Wood. The first important operation of the Second Division of the United States Army during World War I was the capture of Belleau Wood on the Marne by the Marine Brigade in June, 1918.
Bellflower Family, in botany, 13-4874
Bellflowers
Pictures (in color), 13-4877; 14-4988, 4991, 4996; 16-5881
Bellingshausen, Fabian von, Antarctic explorer, 15-5378
Bellini, Gentile, Italian painter, 3-1103-04; 4-1460-61
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Bellini, Giovanni, Italian painter, 3-1103-04; 4-1460-61
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Bellini, Jacopo, Italian painter, 3-1103; 4-1459-60
Bellini, Vincenzo, Italian opera composer, 19-6920
Belloc, Hilaire, English writer, 8-2869; 12-4207, 4210

Bellows, George, American painter, **10**-3454
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Bells
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Bells, by Edgar Allan Poe, **19**-6874-75
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Belt, of crepe paper, how to make, **15**-5599
Belted kingfishers, birds, **14**-5145
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Beluga (white whale), **7**-2348
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Ben-Hur, by Wallace, * summary and quotations, **10**-3745-52
Ben Nevis. Highest mountain in the British Isles, in the Grampians. 4,406 feet.
Picture (gravure), **7**-2302
Benares (Kasi), city in India, the holy city of the Hindus, on the Ganges River. The Hindus make pilgrimages to bathe in the waters there. Its bazaars (street markets) are famous for fine shawls, gold embroidery, saris, gold and silver jewelry, and hand-hammered brassware. Sacred cows wander in the streets. There are about 1,500 temples. It is thought that the city was founded about 12 centuries before Christ. Population, 263,100. *See also* **8**-2821
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mosque of Aurungzebe, **8**-2835
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Benedict, St.
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Benedictus, Edouard, French chemist, **11**-4000
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Benjamin, Judah P., U. S. Senator
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Bennett, Floyd M.
flight to North Pole, **12**-4239
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Bennett, Henry Holcomb, *see* Poetry Index
Bennett, James Gordon (1841-1918), American newspaper editor; sent Stanley to Africa to find Livingstone; established international trophies in yacht, automobile and airplane racing.
Bennett, Richard Bedford, premier of Canada, **4**-1491
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Monument commemorating battle, **12**-4153
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Benzoate of soda, used in preserving food, **6**-2173
Benzoin, a gum resin
Picture
plant producing (in color), **8**-2997
Benzol, *see* Benzene
Beowulf, Danish epic hero, **1**-217
Beowulf, The Story of, 1-55-60
Berchtesgaden. Town on the Aachen or Alm River in Bavaria, Germany, about 12 miles south of Salzburg. Lies on a mountain slope, surrounded by trees and meadows. Here Hitler of Germany built a hilltop retreat. Important conferences with statesmen of many lands were held in this famous place.
Berg, Alban, Viennese composer, **19**-6923, 7153
Bergen, Norway, **15**-5303
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Bergius hydrogenation method, of converting coal into fuel oil, **3**-801
Bergson, Henri (1859-1941). Great French philosopher. His most important works are Time and Free Will, Matter and Memory and Creative Evolution. *See also* **18**-6720.
Bergylt, fish
Picture (in color), **16**-5782
Beriberi, disease, **7**-2423
Bering, Vitus, Arctic explorer, **8**-2984
discovered Steller sea cows **7**-2342
explored Alaskan coast, **16**-5789
Bering Sea. Part of the Pacific lying between Siberia, Alaska and the Aleutian Islands. It connects with the Arctic by Bering Strait.
map, **16**-5793
Bering Sea Question. The original dispute of many years' standing between the United States and Canada over the sealing rights in Bering Sea was settled by arbitration. The arbitrators met in Paris in 1893, and the decision was in favor of Canada. Friction continued, however, and two conferences on the question were held in 1897, one between the United States and Canada, the other between the United States, Russia and Japan. Trouble continued, and it seemed as if the seal herd might be exterminated through seal-poachers of the different nations. In 1911 a convention was held between the United States, Great Britain, Russia and Japan prohibiting open pelagic sealing. The kill is made by the United States Government sealers.
Coast Guard patrol, **9**-3105
Bering Strait
discovery, **8**-2984
Berkeley, George, *see* Poetry Index
Berkeley, Sir William, royal governor of Virginia, **2**-556
Picture
refusing aid to settlers, **2**-555
Berkeley, city in California on the eastern shore of San Francisco Bay. It joins Oakland and is 11 miles by highway from San Francisco. Industries include printing, lumbering, canning and soapmaking, but it is more of a distributing center for manufacturers. The site was chosen for the College of California in 1858 and the city was laid out in 1864. The school is now the University of California. The city was named for Bishop George Berkeley, English philosopher. Population, 100,024.
Berkshire, breed of pig, **5**-1717
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Berlin, Irving, American song-writer, **18**-6511, 6515-16
Picture, **5**-1616
Berlin, capital of all Germany. When Germany was occupied after World War II, however, Berlin was in the Soviet zone, though the city itself was divided into sectors, occupied by Britain, France, the Soviet Union and the United States. (In 1949 Bonn became the capital of Western Germany.) Berlin is first mentioned in history in 1237 and by the 1400's it had become an important town. For centuries it has been the cultural center of Germany, a leading city on the Continent and a center of manufacture and trade. It became the capital of the German Empire in 1871. Population, 3,199,938. *See also* **12**-4155
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Berlin Conference, 1884, set up rules for African colonies, **18**-6805-06
Berlin Congress, 1878. Settled Balkan affairs after the Russo-Turkish War.
Berlioz, Hector, French musical composer, **19**-6917
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Bermuda, British islands in Atlantic, **9**-3191
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Bern, Switzerland, **16**-6007
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University of, **16**-6003
Bernadotte, J. B. J., *see* Charles XIV, king of Norway and Sweden.
Bernard, Claude, French physiologist, **3**-978-79
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conducting experiment, **3**-977
Bernard of Clairvaux, St., and Second Crusade, **7**-2585
life of, **13**-4861
Berne (Bern), capital of the confederation of Switzerland and of the canton of Berne. It is situated on a peninsula with the Aar River on three sides. Bridges, a castle, old buildings and fountains make it a picturesque city. It is known for its watchmaking, toys and cloth. It was founded in 1191 as a fort. The name of the city means "bears," and the bear is the emblem of the city. Population, 130,300.
Berners, Lady Juliana, early English writer, **2**-723
Picture, **2**-724
Bernese Oberland. Division of the Swiss Alps containing the Finsteraarhorn, 14,000 feet, Aletschhorn, Wetterhorn and Jungfrau. It is the most popular winter-sports ground in the world, and contains the resorts of Interlaken, Mürren, Adelboden, Grindelwald, Château d'Oex and many others. The Gemmi Pass through the Bernese Alps connects northern Switzerland with the Rhone valley.
Bernini, Giovanni Lorenzo, Italian sculptor, **13**-4608
and St. Peter's, Rome, **17**-6310
Bernkastel, town in Germany
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Bernoulli's Principle, law in physics, **4**-1419
Bernstein, Henri, French dramatist, **18**-6720
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plant-breeding of, **4**-1388
salmon berry, description, **19**-6934, 6936
Berry, Martha McChesney, American educator, **14**-5271
Berthollet, Claude Louis, French scientist, **2**-703
Bertillon system. Named for Alphonse Bertillon, chief of the department of identification in the Prefecture of Police of the Seine. He devised a means of identifying criminals by means of measurements which included notes of markings, deformities, color, impression of thumb lines, etc.
Beryl, mineral (emeralds and aquamarines), **19**-7230
Picture (in color), facing **19**-7225
Beryllium (Be). Chemical element. Silvery, light metal. Atomic number 4; atomic weight 9.02; melting point 1284°C.; boiling point 2780°C.; specific gravity 1.8. Occurs in beryl, which when pure is a semi-precious stone. The pure metal is too expensive to be much used, but it forms important alloys with copper. *See also* **5**-1636
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Berzelius, Jöns Jakob, Swedish scientist, **2**-706
Besant, Sir Walter, British writer, **11**-3899-3900
Beskow, Elsa
Story by
Pelle's New Suit, **2**-755-56
Bessarabia. District of Russia (U. S. S. R.) lying between the Pruth and Dniester. Originally a Russian district, it became Rumanian in 1920. It was taken over by Russia in 1940.
Bessel, Friedrich Wilhelm, German astronomer, **11**-3854-55
Bessemer, Henry, English inventor, **19**-7205-06
Bessemer process, of making steel, **9**-3349; **19**-7205-06
Picture, **9**-3348
Best, C. H., and cure for diabetes, **15**-5493
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portrait, **15**-5492
Best Friend, early locomotive, **2**-411
Beta rays, result of radioactivity, **13**-4550, 4552; **16**-5800, 5802, 5804-05
Betel. An Asiatic palm which bears an orange-colored drupe with an outer husk. The nut, used as a masticatory, stains the teeth black.
Betelgeuse, star, **11**-3787
Bethe, H. A., American astronomer, **11**-3860
Bethlehem
Poem about
O Little Town of Bethlehem, by Phillips Brooks, **17**-6099
Bethlehem, city in the Lehigh Valley in eastern Pennsylvania, on the Lehigh River and the old Lehigh Canal. It ranks as one of the leading steel-making centers in the United States, and it is also noted for its silk industry. The city was founded by the Moravians—a religious group—in 1741. These people had been exiled from Bohemia and Moravia and had come to America in search of freedom. They named their town after the birthplace of Christ. The city is still the major community of this group in America. Population, 58,490.
Betonys, flower, description, **18**-6664
Betrothed, The, by Scott, note on, **11**-4069
Bettes, John, British painter
Picture
portrait of Edmund Butts, **6**-2003
Bharal, or blue sheep, **4**-1375
Bhutan, country in central Asia, **18**-6591
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Bible
* greatest book in English, **2**-475-76
* Old Testament story of David's youth, **4**-1255-57
first copy printed in America, **6**-2086
music for singing of Psalms, **18**-6508-09
poetry of, **19**-6988
printed by Gutenberg, **9**-3385-86
translations
Eliot's translation for Indians, **6**-2086
St. Jerome's, **13**-4859
Tyndale's, **2**-476
Wyclif's translation, **1**-304; **2**-476
Poems
Psalm 137, **19**-6988
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How did the Breeches Bible get its name? **18**-6556-57
Pictures
Bible of Charles I of England, **9**-3392
illustration for, **2**-475
illustrations from medieval Bibles, **2**-480
Biceps, muscle of upper arm, **5**-1673, 1675
Pictures, **5**-1676
Bichat, M. F. X., French biologist, **3**-977
Biela's Comet, **10**-3670
Bielids, shower of meteors, **10**-3671
Bierce, Ambrose, American writer, **13**-4786
Big Ball We Live On, * **1**-17-25
Big Ben. Name of the great 13½-ton bell that rings the hours in the Westminster clock tower in London. It was named for Sir Benjamin Hall, who was First Commissioner of Works when the first bell was cast for the clock tower in 1852. This bell cracked while it was being tested. It was replaced by the present bell in 1858; this also cracked, but proved serviceable nevertheless. The name Big Ben is often applied to the clock in the clock tower as well as to the bell.
Big Bend National Park, Texas, **7**-2290
Big Bertha, long-range German gun used in World War I, **18**-6447
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Bighorns, or Rocky Mountain sheep, **4**-1373, 1375
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head, **4**-1374
Bilbao, Spain, **14**-4929
Bilberry, shrub, **11**-4020; **15**-5608
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Bilge of a ship, **13**-4847
Bill
Question about
How does a bill become a law? **12**-4280-81
Bill of Rights. The first ten amendments to the United States Constitution, passed by the Congress in its first session. They provide, among other things, for freedom of worship, of speech and of the press, and for the right to trial by jury. They forbid cruel and unusual punishment and seizure of persons or property without due process of law. They define the rights of the states under the Constitution. For the full text, see **20**-7600-02
Bill of Rights, in English history, **6**-2102

Billings, William, American hymn-writer, **18**-6508-09
Billion, explanation of, **2**-688
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Bingham, Nancy Willing, leader of American fashions after the Revolution, **9**-3167-68
Bingham, Utah
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open-pit copper mine at, **9**-3212
Binghamton, New York, seat of Broome County, in the south-central part of the state on the Susquehanna and Chenango rivers. Photographic supplies, shoes, furniture, and machinery are manufactured. The site was originally an Indian village, and it became a white settlement in 1787. The land at that time belonged to William Bingham of Philadelphia, and the city was later named for him although it was first called Chenango Point. Population, 78,309.
Binturong, animal
Picture (gravure), **2**-499
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* chemical cycles in nature, **17**-6202-05
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Biology. The science of life. It treats of organisms including the origin, development, structure, functions and distribution of plants and animals.
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Bird houses, directions for making, **1**-342-43
Bird-lice, **13**-6800
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Bird of Paradise, account of, **8**-2894, 2896
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* cuckoos, **10**-3497-3502
* day birds of prey, **10**-3753-60
* ducks, geese and other water birds, **11**-3881-88
* herons, storks and cranes, **11**-4004-12
* larks and their friends, **9**-3133-40
* parrots and owls, **10**-3613-24
* peckers, humming-birds and hornbills, **9**-3365-74
* pheasants and their allies, **12**-4362-68
* pigeons and doves, **12**-4282-88
* poultry, domestic, **12**-4492-94
* sea birds and their inland kin, **11**-4121-30
* starlings, finches and buntings, **8**-2967-76
* warblers, babblers and chatterers, **9**-3277-88
bird exhibits, American Museum of Natural History, New York, **18**-6616-17
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* southern part, **14**-5026-32
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Owl and the Pussy-Cat, by Edward Lear, **9**-3117
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Spring Song of the Birds, by James I of Scotland, **13**-4535
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How does a bird know how to build its nest? **2**-586
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Why must we cut the claws of caged birds? **2**-586
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Bird's eye maple, wood, **12**-4508
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Bird's nest, flower
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Birds That Can Not Fly, * **13**-4655-57
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Birmingham. Largest English city after London, covering 68 square miles. The center of the Midland iron, steel and coal trades, it has a great variety of manufactures, especially of hardware; the machinery, rubber, motor, chocolate, glass and jewelry industries are all important.
Birmingham, the largest city in Alabama and the seat of Jefferson County. It is called by numerous nicknames, one of the best known being "The Industrial City Beautiful." It is also called "The Pittsburgh of the South" because of the coal and iron fields around it and because it is one of the leading steel-and-iron-manufacturing centers in the United States. The surrounding country is mountainous. The first white settlement at this site was made in 1813, and the city was named for the well known iron-and-steel city in England. Population, 267,583.
Birney, Earle, Canadian poet, **14**-5114-15
Birs Nimrud, mound near Babylon, **2**-660
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What does birthright mean? **16**-5846
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portrait by von Lenbach (gravure), **8**-2863

Bismarck, capital of North Dakota and seat of Burleigh County, on the Missouri River, about 170 miles from Canada. Cattle, poultry, butter, flour and other farm products are shipped, and coal is mined in the surrounding territory. The city was founded as a military post in 1872, and it was named Bismarck the following year in honor of Chancellor Otto von Bismarck of Germany. Population, 15,496.
Picture
State Building, **16**-5660
Bismarck Archipelago, in South Pacific, **9**-3299
Bismuth (Bi). Chemical element. Pink, silvery metal. Atomic number 83; atomic weight 209; melting point 271°C.; boiling point 1440°C.; specific gravity 9.8. Occurs with ores of other metals, such as lead, copper and tin. Compounds of bismuth are used extensively in medicine. Low-melting alloys of bismuth with tin, lead and cadmium are used in automatic fire sprinklers and for making castings.
Bison, European, or **aurochs**
Picture (gravure), **4**-1266-67
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Bissell, George H., pioneer in American petroleum industry, **13**-4744
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Black rhinoceros, of Africa, **5**-1829-30
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Black Robe and White Heart, * **10**-3465-67
Black saltwort, 14-5162
Black Sea. Inland sea between Russia, Turkey, Bulgaria and Rumania, occupying 150,000 square miles. Communicating with the Sea of Marmora by the Bosporus, it is fed by the Danube, Dnieper, Don, Dniester and Bug, its waters being brackish and abounding with fish. Odessa, Kherson, Nikolaiev, Sebastopol, Batum, Trebizond, Sinope, Varna and Constantza are the most important ports.
Black snakeroot, 16-5728
Black snakes, 15-5412
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Black swallower, deep-sea fish, **15**-5466
Black swans
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Black-tailed pythons, 15-5411
Black vultures, birds, **14**-5029
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Blaine, James Gillespie (1830-93). A brilliant and popular American politician; Republican candidate for the presidency, 1884; Secretary of State, 1881 and 1889-92.
Blair, Montgomery, Postmaster General in Lincoln's Cabinet
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Blue grass. The genus *Poa* with bluish green culms. Kentucky is called the "Blue-Grass State" from its blue-grass region, where fine horses are bred.
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Bogotá, capital of Colombia, on the San Francisco and San Agustin rivers. It is near the equator, over 8,000 ft. above sea level, with a mild climate. On a fertile plateau, it is surrounded by the peaks of the Andes. The region is noted as a coffee-raising center, but within the city chocolate, cigarettes, shoes and blankets are manufactured. It was founded in 1538 and was the capital of the Spanish province called New Granada. Population, 482,500.
Bohemia. A territory in middle Europe, bounded by Germany to the north and west and by Austria to the south. The people are mostly Czechs and speak the Czech language. In its early history, dating from the sixth century, Bohemia was an independent kingdom. During the seventeenth century it became a province in the Austrian Empire. Following World War I it became the chief political division of Czechoslovakia. From 1938 until the end of World War II it fell under the control of nazi Germany. Now, it is again incorporated in the Czechoslovak Republic. A tableland girdled by mountain ranges, it has immense agricultural and mineral resources and valuable industries. Important towns are Prague,

Bohmemia (*continued*)
Pilsen, Budweis, Reichenberg, Carlsbad and Teplitz. *See also* Czechoslovakia
Bohemund I of Tarentum, in First Crusade, **7**-2583-84
Bohm, Max, American painter
Picture, Evening Meal (gravure), **10**-3464
Bohr, Niels, Danish scientist, **4**-1228, 1230
Boiardo, Matteo, Italian writer, **17**-6154
Boileau, Nicolas, French literary critic, **18**-6712
Boiling
Questions about
Can anything boil when it is cold? **10**-3732-33
What makes the kettle boil? **9**-3099
Why does boiling make an egg hard? **12**-4491
Why does boiling milk flow over the top of the saucepan? **7**-2321
Why does glass not break if put into cold water and boiled? **15**-5618
Boise, capital of Idaho and seat of Ada County, in the west-central part of the state on the Boise River. It is also on the old Oregon Trail. It is an agricultural, lumbering and mining region, and has foundries, meat- and fruit-packing plants, and flour-milling. Homes are heated by water from the hot springs. It was started as a military post in 1863. Population, 26,130.
Picture, State Capitol, **19**-6849
Bok, Edward W., American writer, **14**-5018
and Singing Tower, **2**-584
Bokhara, *see* Bukhara
Boleslav I (the Brave), king of Poland, **13**-4679
Boleyn, Anne, wife of Henry VIII
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Bolivar, Simón, South American patriot, **13**-4586
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Bolivia, South America
* history and description, **19**-6978-79
war with Chile, **19**-7039
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Aymara Indian woman, **19**-6979
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tin mine at Llallagua, **18**-6782
Boll-weevil, *see* Cotton boll-weevil
Bologna, Giovanni da, Italian sculptor, **13**-4608
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statue of Aeolus, **13**-4614
statue of Mercury (gravure), **13**-4609
Bologna, Italy, capital of the province of the same name, between the Reno and Savena rivers at the foot of the Apennine Mountains in the northern part of the country. Bologna sausage is made, and glass, artificial flowers, silk goods, velvet and machinery. It was once noted as the educational center of Europe, but is now better known for its churches and famous works of art by great painters who lived there. The city was founded by the Etruscans and is older than Rome. Population, 325,800.
school of painting, **3**-1108
Bolshevists, founders of the Communist party in Russia, **16**-5847-49
Bombard, kind of cannon, **8**-2843
Bombardier beetles, 18-6624-25
Bombay, India, capital of the region of the same name. Situated on an island, also called Bombay, it is the chief seaport in the western part of the country. The city has many industries such as textile works, railway shops and tanneries. It is the center of the cotton trade in India. From 1534 to 1661 Bombay belonged to Portugal, and after that to England. The modern city was founded in 1669. The name comes from the name of the Hindu goddess, Bambai Mumba. Population, 1,489,900. *See also* **8**-2821
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Victoria Station, **8**-2822
Bombers, *see* Airplanes
Bombs, depth, use by navy, **18**-6816
Bombs, atomic, *see* Atomic bombs
Bon Homme Richard, early American naval vessel commanded by John Paul Jones, **17**-6327
Bonaparte, Charles Louis Napoleon, *see* Napoleon III
Bonaparte, Francis Joseph Charles, son of Napoleon I
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The Boy Whom France Forgot, **13**-4541-43
Bonaparte, Joseph, brother of Napoleon, **14**-4918
Picture, portrait, **14**-4918
Bonaparte, Napoleon, *see* Napoleon I
Bonaparte family, of Napoleon I, **6**-2198, 2204-05
Bonar, Horatius (1810-1892) English hymn-writer and minister; he is best remembered for his hymn, I Heard the Voice of Jesus Say.
Bonds, notes for loan of money, **15**-5365
Bone, Muirhead, British etcher, **8**-2860
"Bone paste," name applied to certain type of porcelain, **5**-1666
Bones
* of human body, **5**-1559-63; **13**-4621-22
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Bongo, an antelope, **4**-1447
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Bonheur, Rosa. French animal-painter; born Bordeaux, 1822; died, Paris, 1899. Her Horse Fair is in the Metropolitan Museum of Art, N.Y.
place in art, **7**-2370
Picture, Horse Fair, **7**-2369
Boniface, St. (Winfrid), life of, **13**-4859, 4861
Picture, cutting down sacred tree, **13**-4859
Boniface VIII, pope, **6**-1980
Picture, at Anagni, **6**-1984
Bonington, Richard, British painter, **6**-2232, 2234
Pictures
A River Scene, **6**-2232
Fishing Boats, **6**-2233
Bonitos, fishes, **16**-5775
Picture (in color), **16**-5782
Bonn, capital of the German Federal Republic—Western Germany—formed in 1949. The city is on the Rhine River, in the Rheinland (due east of Brussels, Belgium), and is most famous as the birthplace of Beethoven. There are breweries and jute mills. Bonn University was founded in 1777. Population, 101,400.
Bonnat, Léon, French painter, **8**-2856-57
Picture
Portrait of Leon Cogniet (gravure) **8**-2863
Bonnet, doll's, how to make, **12**-4496-97
Bonneville Dam
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Bonnie Prince Charlie, *see* Stuart, Charles Edward
Bonnin, Gousse, pioneer in manufacture of chinaware, **5**-1666
Bontebok, an antelope, **4**-1440-41
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* manufacture, **3**-1053-67
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How are library books arranged? **10**-3558-61
How many books are there in the world? **2**-463
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page from 14th century music book, **9**-3383
pages from old manuscripts (in color), **2**-477-80
page printed from wood blocks, **9**-3384
Books of Dickens and Thackeray, The, * **8**-2731-38
Boom on ship, explanation of, **11**-4084-85
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Why does a boomerang come back? **11**-4131-32
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* life and work, **6**-2189-95
settled in Kentucky, **6**-1907
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Boonesborough, Kentucky, settlement and siege of, **6**-2192-93
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Indian-fighting, **6**-2194
Boötes (the Bear-Driver), constellation, **11**-3926
Booth, John Wilkes, actor, assassinated Abraham Lincoln, **7**-2443
Borage, flower
Picture (in color), **14**-4989
Borage family, in botany, **13**-4875
Borchgrevink, Carsten Egebarg, Norwegian explorer
voyage to Antarctic, **15**-5380
Bordeaux, France, capital of the department of Gironde. Built around a bend of the Garonne River, it is a fine inland port. The region around is noted for its vineyards, and the city is the center of the wine-shipping industry. It also carries on trade in vinegar, carpets, glass bottles and earthenware. The city is old and was known as Burdigala by the Romans. Population, 253,750.
Borden, Sir Robert Laird, premier of Canada, **4**-1488, 1490
Border-strip flooding, *see* Flooding
Boreas, north wind, in mythology, **9**-3234
Borecole, cabbage, *see* Kale
Borglum, Gutzon, American sculptor, **14**-4939
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Horses of Diomed, statue, **8**-2703
Borgognone, Il (Ambrogio da Fossano), Italian painter, **3**-1107
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Marriage of the two St. Catherines, **3**-1105
Boris III, of Bulgaria, **14**-5051
Borneo, **9**-3297-98
British protectorates, **9**-3185-87
map, **9**-3189
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Boron (B). Chemical element; hard, black solid. Atomic number 5; atomic weight 10.82; melting point 2300°C.; specific gravity 2.3. Boron is not a common element, but minute traces of it are necessary for life, and are sometimes added to fertilizers. Borax (sodium borate) is obtained from California, and is used in making certain kinds of glass and enamel, as a preservative and in other ways.
Borrow, George (1803-81). English traveler, linguist and writer. Traveled extensively in England, France, Germany, Russia and several other countries. He made a special study of gipsy life and customs and wrote a number of famous books about the gipsies, including The Zincali and Lavengro. He also wrote The Bible in Spain.
Boru, *see* Brian Boru
Borzoi, Russian wolfhound
Picture (gravure), **2**-715
Bosboom, Johan, Dutch painter, **8**-2854
Bosnia, state of Yugoslavia, **17**-6345-47
Bossuet, Jacques-Bénigne, **18**-6713
Boston. A center of culture and education in Massachusetts, famous in the political, commercial, musical and literary history of the United States. An important manufacturing city, and financially influential. Large wool and fish trade.
as a port, **12**-4146-47
description and history (brief), **17**-6180-81
Handel and Haydn Society, **18**-6509
just before the Revolution, **3**-1040-42
Museum of Fine Arts, founding, **9**-3334
Question about
Why is Boston called the "hub of the universe"? **17**-6180-81
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Boston Light, Massachusetts, lighthouse, **10**-3581
Boston Massacre, 1770, **4**-1160
Picture, **4**-1159
Boston Port Bill. A bill passed by the British Parliament in 1774 to punish the people of Boston for their destruction of imported tea lying in their harbor. It provided for the removal of the seat of government to Salem and the removal of the port to Marblehead until certain conditions had been complied with. The bill stirred up great sympathy among the colonists and food was sent to the city.
Boston Tea Party, **4**-1161
Boswell, James, and Samuel Johnson, **5**-1868
Pictures, **5**-1871-72
Botany. The scientific study of plants. It includes a number of more particular sciences, among which are: Morphology, which treats of the structure and development of plants; Anatomy, which deals with internal plant structure and tissues; Physiology, which deals with the life of plants, as to how nutrition is absorbed, etc.; Taxonomy, which deals with the classification of plants; Ecology, which treats of the plant in relation to its surroundings; Pathology, which tells of plant diseases; Genetics, the study of plant breeding.
See also Flowers; Fruit; Grains; Plants; Seeds; Shrubs; Trees; *also* names of plants, fruits and flowers
Botany Bay, Australia, named and settled, **7**-2464
Botflies, **17**-6420
Picture, **17**-6423
Botha, Louis (1862-1919). Great Dutch South African statesman. Commander-in-chief of Boer forces in struggle against England. Later he became the first prime minister of the Union of South Africa (1910). During the first World War he led expeditionary force against rebels in Union and German South-West Africa, organized a force against German East Africa and an expeditionary unit for Europe.
Bothnia, Gulf of. Northern arm of the Baltic Sea between Sweden and Finland. Its length is 415 miles, and its breadth varies from 93 to 149 miles.
Bothwell, James Hepburn, Earl of, husband of Mary Queen of Scots, **5**-1818; **15**-5652
Böttger, Johann Friedrich, discovered kaolin clay for porcelain, **5**-1664
Botticelli, Sandro (Alessandro Filipepi), Italian painter, **2**-699
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Virgin with Jesus (gravure), **2**-695
Bottle-nosed dolphin, sea mammal, **7**-2348
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Bottle tree. *Picture*, **9**-3262
Bottlenose whale, sea mammal, **7**-2346
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Bottles, how to make crepe paper jackets for, **13**-4845
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used to make door stops, **10**-3625-26
Question about
What makes water gurgle when it comes out of a bottle? **12**-4276
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bottling milk, **7**-2326
Bottom, Shakespearean character, **3**-834-35
Boucher, François, French painter, **5**-1881
Picture
Pastoral Idyl, **5**-1875
Bougainville, Louis Antoine de (1729-1811). French soldier and navigator. He made many important scientific and geographical discoveries in the course of his voyages.
Boughton, George Henry, Anglo-American painter
Picture
Marvell shaking hands with Milton, **4**-1241

Boulder clay, caused by glaciers, **6**-1927
Boulder Dam, *see* Hoover Dam
Boulogne. French port on the English Channel, with an important passenger traffic with Folkestone and a large North Sea fishery.
Bouncing Bet, flower
Picture (in color), **13**-4879
Bourbon, *see* Réunion
Bourdelle, Emile-Antoine, French sculptor, **13**-4706
Bourdillon, F. W., *see* Poetry Index
Bourges cathedral, 17-6159
Bourget, Paul, French writer, **18**-6719
Bouts, Thierry (or **Dierick),** Flemish artist, **4**-1223
Bovary, Madame, book by Gustave Flaubert, **18**-6717
Bow River Dam, at Bassano, Alberta, **7**-2548
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Bower birds, account of, **8**-2896
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Bowfin, *see* Mudfish
Bowhead whale, sea mammal, **7**-2343
Picture, **7**-2344
Bowling
lawn bowling, in Canada, **10**-3696
Bowring, Sir John (1792-1872) English linguist and hymn-writer. In addition to translating thousands of foreign songs and poems, he wrote a number of original hymns, of which the most famous is In the Cross of Christ I Glory.
Bows, for stringed instruments, **5**-1798
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Bows and arrows
how to make a crossbow, **2**-751-52
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What makes an arrow fly? **11**-4134-35
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Box elder, a kind of maple, **12**-4248
Boxer Rebellion, China, in 1900, **2**-431
Boxers, dogs.
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Boxes
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crepe paper, **6**-2166-67
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tool-box, **1**-131
directions for nailing, **8**-3019-20
toy, whirlwind in, **4**-1400
wall cabinet from cigar boxes, **15**-5338-39
See also Cigar boxes
Boxing the compass. Nautical term for giving all the points of the compass in regular order; hence, in politics, and so on, to try all sides and end where one began.
Boy Scouts
Picture
British Scouts, **6**-2185
Boy Scouts of America, The, * **12**-4451-58
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Boy Who Never Grew Up, The, * **17**-6293-95
Boy Who Went to the North Wind, The (story), **13**-4558-60
Boy Whom France Forgot, The (story), **13**-4541-43
Boycott. To combine against any person, group or nation, withholding social or business intercourse and compelling others to do the same. From Captain Boycott, a land agent in Ireland, who was so treated in 1880.
Boyle, John J., American sculptor, **14**-4939
Boyle, Robert, Irish scientist, **2**-646
work on electricity, **11**-3981
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Boyle's law, of pressure, **2**-646; **4**-1419-20
Boyne, Battle of the, in history of Ireland, **8**-2942
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* Boy Scouts of America, **12**-4451-58
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Why does a boy's voice break and not a girl's? **6**-2009
Brabançonne, La, Belgian anthem
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Bracken, fern
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Braddock, Edward, British general
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Bradford, William, governor of Plymouth colony, **2**-547
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Braganza, Duke of, ruler in Portugal, **14**-5187
Braganza dynasty, of Portugal and Brazil, **14**-5187
Brahe, Tycho, Danish astronomer, **11**-3846-47
Picture
at work in his observatory, **11**-3846
Brahma, Hindu god
Picture, **9**-3088
Brahmanism, a religion of the East, **9**-3085
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Picture
Brahman at prayer, **9**-3088
Brahmans, Hindu caste, **8**-2824-25
Brahmaputra. Great river of Asia. It rises in the northernmost chain of the Himalayas and flows through Tibet, Assam and Bengal into the Bay of Bengal, being navigable in places in Tibet, at 13,800 feet above sea level. Its discharge in Assam is estimated at 140,000 cubic feet a second, nearly double that of the Ganges.
Brahms, Johannes, German musical composer, **19**-6919, 7151-52
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Braille, Louis
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Braille type, raised lettering for the blind
invention by Louis Braille, **19**-7208-09
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Can a brain ever get filled up? **16**-5957-58
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Bramante, sometimes called Lazzari (Donato d'Agnolo), Italian architect, **17**-6300
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stone bramble, fruit of, **11**-4028
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Brandeis, Louis D., justice of Supreme Court, U. S. A., **19**-7166
Brandes, Georg, Danish writer, **19**-7011
Picture, **19**-7011
Brandy-bottle, yellow water lily, **16**-5870
Brandywine, Battle of. Fought in Pennsylvania during the American Revolution between the British under General Howe and the Americans under General Washington. The Americans were defeated, and Howe was enabled to occupy Philadelphia.
effect of battle, **4**-1170
Brangwyn, Frank, British painter, **8**-2860
Brant, Joseph, Mohawk chief, fought with British in Revolution, **4**-1170
Brants, geese, **11**-3885
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Branwen, Gaelic heroine, story of, **1**-217
Brass. An alloy of copper and zinc used in commerce as cast, sheet, wire and tubes. The proportions of its parts vary according to its use. The method for producing brass from copper and zinc was patented by James Emmerson in 1781. Brass has a fine yellow color, takes a high polish, is harder than copper, and therefore resists wear better. It tarnishes on exposure to dampness unless protected by varnish or veneer.
Brass instruments, musical, **4**-1292; **19**-6899
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Brazilian tortoise, **14**-5232
Brazzaville, capital of French Equatorial Africa, on the Congo River. It was founded in 1880 by the French explorer, Pierre Paul François Camille Savorgnan de Brazza, for whom the town was named.
Bread
* world's bread and butter, **1**-369-78
yeast, effect of, **2**-664; **5**-1626
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How does the yeast in bread make it rise? **8**-2716
Why is old bread more digestible than new bread? **6**-2125
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Breast stroke, in swimming, **19**-6956-57
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sung by St. Patrick, **8**-2933-34
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Questions about
Do seeds breathe just as people do? **14**-5084
Does a rock breathe? **9**-3102
How do fish live in a frozen pond? **14**-5192
What happens when a person drowns? **2**-688
Why do fish die in a tank of water? **14**-5192
Why do we get out of breath when we run? **7**-2612
Why do we not see our breath on a warm day? **14**-4951
Brébeuf, Jean de, French missionary to Indians, **2**-679
Breckinridge, John C., vice-president of U. S.
Picture
portrait (gravure), **11**-3948
Breeches Bible
Question about
How did the Breeches Bible get its name? **18**-6556-57
Breeches buoy. A lifesaving device for removing passengers from ships wrecked near shore. The breeches buoy consists of a pair of canvas short-legged breeches, attached to the underpart of a belt-like life-buoy. A hawser is stretched from the wrecked ship to the shore; the breeches buoy moves along the hawser to which it is attached by means of short ropes and a block.
Brehon Laws, ancient laws of Ireland, **8**-2932
Breitinger, Johann Jakob, Swiss literary critic, **17**-6269
Bremen, Germany, second most important port in the country, on the Weser River about 46 miles from the North Sea. It is a commercial and shipping center, and manufactures cigars, rope, sails, and machinery. It is an old city, but first came to notice when Charlemagne made it the seat of a bishopric in 788. During World War II the port and leading factories were heavily bombed. Population, 390,000.
Picture
City Hall in medieval times, **12**-4178
Bremen Town Musicians, The, **8**-2763-65
Bremer, Fredrika, Finnish writer, **19**-7014
Bremerhaven, Germany
Picture
docks, **12**-4182
Brenner Pass. Lowest pass over the Alps and first to have a railway. It connects the Austrian and the Italian Tyrol, and since Roman times has been the chief highway between Germany and Italy. 4,500 feet.
Brent, Margaret, pioneer settler of Maryland, **14**-5266-67
Brescia, Italy
school of painting, **3**-1107
Brest. One of chief French naval ports, in Brittany. It has important fisheries, considerable manufactures, and one of the finest harbors in Europe.
Breton, Nicholas, *see* Poetry Index
Brett, Jacob, laid first cable from England to France, **12**-4295
Brett, John Watkins, laid first cable from England to France, **12**-4295
Bretton Woods Plan, for world economic cooperation, **17**-6094
Brewer, Ebenezer Cobham, *see* Poetry Index
Brewster, William (1560-1644), an elder of the church of the Plymouth Pilgrims. He was born at Scrooby, England, and educated at Cambridge. During the years when some of the Pilgrims found refuge in Holland, Brewster opened a school there for instruction in English, and set up a printing press. He came to New England in 1620 with the first Pilgrim settlers.
Brian Boru, early king of Ireland, **8**-2938
Briand, Aristide, French statesman, **18**-6606
Picture, **18**-6603
Bricard, Xavier, French painter
Picture
Mother and Child (gravure), **8**-2862
Bricklaying
Question about
What does the pattern in a brick wall mean? **3**-876
Brickmaking, in ancient Babylon, **2**-654
Bricks
cinder, made from ashes, **2**-638
for house-building, **9**-3122
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Why did the Egyptians use straw for their bricks? **8**-3016
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Bride of Lammermoor, by Scott, note on, **11**-4071
Bridge, of a ship, **12**-4415, 4417; **13**-4847
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Bridge of Sighs, Venice, **4**-1456
Pictures, **4**-1464; (gravure), **4**-1468
Bridgeport, Connecticut, seat of Fairfield County. Built at the mouth of the Pequonnock River on Long Island Sound, it is 60 miles northeast of New York City. It is the industrial capital of the state, and is one of the leading industrial cities of New England. Electrical supplies, sewing machines, machinery, phonographs, hardware, airplanes and knives are among the products. The Pequonnock Indians had villages at this location, and it was first settled by white people in 1639. Population, 147,121.
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concrete, how made, **7**-2318
* history and construction, **1**-27-41
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Huey P. Long Bridge, New Orleans, La., **17**-6047
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Roman bridge at Pergamum (gravure), **15**-5355
Schmitz Park Bridge, Seattle, Washington, **7**-2313
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Brier Rose or Sleeping Beauty (story), **5**-1841-43

Brieux, Eugène, French dramatist, **18**-6719
Brig, sailing vessel, rig of, **11**-4086
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Brigantine, sailing vessel, rig of, **11**-4086
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Bright, Charles Tilston, and Atlantic cables, **12**-4295
Bright Angel Trail, Colorado
Picture, **7**-2288
Brill, fish, **16**-5779
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Brisbane, Australia, capital of the state of Queensland, in the eastern part of the country near the mouth of the Brisbane River. One of Australia's most important ports, it carries on commerce in gold, wool, sugar and meat. It manufactures boots, clothing, flour and tobacco. Home of Queensland University. The site was started as a convict colony in 1826 by Sir Thomas Brisbane. Population, 402,200.
Bristol. Chief port of southwest England, and one of the most historic. Standing 7 miles from the mouth of the Avon, it has fine docks at Avonmouth accessible to the largest vessels, and its industries include manufactures of tobacco, cocoa, chocolate and soap. There is a cathedral, founded in 1142, while the Church of St. Mary, Redcliffe, is one of the finest Perpendicular buildings in England.
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cathedral (gravure), **16**-5976
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Britain, and later Europe, * **13**-4853-58
Britain's Art Begins, * **6**-1999-2005
Britannia Bridge, Wales, **1**-29, 31
British Columbia, physical geography, **1**-113
joins Dominion of Canada, **4**-1485
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Connaught Tunnel, **2**-522
gold mine, **1**-108
salmon-fishing boats, **1**-113
sheep grazing, **1**-110
totem poles, **14**-5076
British Commonwealth Air Training Plan, Allied airmen trained in Canada during World War II, **4**-1492; **10**-3528
British Commonwealth of Nations
growth after World War I, **7**-2307
Statue of Westminster, 1931, recognized equality of members, **4**-1490
See also Commonwealth of Nations
British East Africa, former name of Kenya Colony, **9**-3054
Picture
locust swarm, **18**-6725
British Empire, *see* England—colonies and dependencies
British Empire Exhibition, held at Wembley Park, near London, 1924-25, **6**-2075
British Empire in Africa, * **9**-3047-58
British Guiana, South America, **9**-3190-91
British Honduras, Central America, **9**-3191; **11**-3822-23
British Isles. The islands just off the western coast of Europe and separated from it by the English Channel, the Strait of Dover and the North Sea. The largest island consists of England and Scotland, and the second largest is Ireland. There are more than 5,000 smaller islands, however, but most of them are uninhabited. Two of the best-known separate islands are the Isle of Man in the Irish Sea and the Isle of Wight on the south of England. The rest are known mostly in groups—the Hebrides of about 500 islands, the Orkneys and Shetlands with about 190 islands between them, the Scilly Islands numbering about 140, and others. *See also* England.
British North America Act, 1867, **4**-1484-85
British Poetry in Our Time, * **12**-4204-14
Britons, early inhabitants of England
* before and during Roman period, **5**-1565-67
Pictures, **5**-1566
Brittany. Northwest peninsula of France, formerly an independent duchy. Famous for its beauty and the quaint customs of its people, mostly peasants and fisherfolk. It contains the beautiful old towns of Rennes, its old capital, Dinan, and Vannes, many small seaside resorts, and the ports of Nantes, Brest, Lorient, St. Nazaire and St. Malo.
Brittany (*continued*)
legends of, **18**-6560-61
Pictures, **10**-3418, 3438
Concarneau harbor, **3**-1021
Brittleness, cause of, **3**-879
Brno (Brunn), Czechoslovakia, capital of the province of Moravia. The city is almost encircled by the Schwarza and Zwittawa rivers. There are several attractive churches in the city. Silk and woolen goods, steel machinery and chemicals are made. Population, 272,800.
Broadbills, birds, account of, **9**-3288
Pictures, **9**-3287; (in color), **10**-3623
Broadcasting stations
Pictures
broadcasting station with transmitter towers, **14**-5119
master control room, **14**-5121
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transmitter studio, **14**-5119
Broadway, New York City, **17**-6211
Broccoli, cauliflower, **7**-2616
Picture, **7**-2619
Brock, Sir Isaac, in War of 1812, **5**-1704
Brockets, deer, **4**-1512
Brockton, in southeastern Massachusetts, seat of Plymouth County. The city is one of America's leading shoe-manufacturing centers. Rubber goods, boxes, buttons and sports equipment are also made. The land was ceded to Miles Standish and John Alden by the Indians in 1649, and the town was settled in 1700. Population, 65,202.
Broken Hill, Australia, silver mine, **7**-2471
Brome, grass. *Pictures,* **10**-3656
Picture (in color), **10**-3522
Bromine (Br). Chemical element. Reddish brown liquid with a choking smell. Atomic number 35; atomic weight 79.916; melting point —7.2°C.; boiling point 58.8°C.; specific gravity 3.1. Bromine is extracted from some salt wells, and from sea water, which contains 2 parts of bromine per 30,000. Bromides are used in photography and in medicine; other bromine compounds are used in anti-knock mixtures for gasoline.
Bronchi, breathing passages to lungs
Picture, **4**-1329
Broncho, Western horse
Poem about
The Broncho that Would Not Be Broken, by Vachel Lindsay, **3**-843-44
Picture
bucking broncho, **6**-2018
Brontë sisters (Anne, Charlotte and Emily)
life and works, **11**-3892-93
Pictures, **11**-3894
home at Haworth, **11**-3889
Brontosaurus, prehistoric reptile, **5**-1546
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Bronx, New York, origin of name, **17**-6207
Bronx Botanical Garden
Picture
school children visiting rock garden, **15**-5625
Bronx-Whitestone Bridge, New York City
Picture, **1**-32
Bronze. An alloy of copper and tin with sometimes small proportions of other elements, as zinc and phosphorus. It is harder than copper and tin and very easy to work. It has been in use for decorative purposes from the earliest times. Proof against the moisture of the air, bronze is used in bell-casting, for the mounting and supports of astronomical instruments, and for cannon. *See also* **5**-1632-33
beryllium bronze, **5**-1636
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store entrance of bronze, **5**-1634
Bronze Age, **5**-1632-33
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Bronzino, Il (Angelo Allori), Italian painter, portraits, **3**-958
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Ferdinand de Medici (gravure), **3**-963
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Brooke, Mrs. Frances, English author of first novel written in Canada, **14**-5103-04
Brooke, Rupert, British poet, **12**-4208
* life of, **17**-6393-94
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Brooklime, plant
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The Brook's Song, by Tennyson, **6**-2242
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on Pacific coast, **19**-6936
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Broun, Heywood, American writer, **14**-5017
Broussa, *see* Bursa
Brown, Audrey Alexander, Canadian poet, **14**-5114
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Brown, Charles Brockden, American author, **13**-4707
Brown, Ford Maddox, English painter, **6**-2236
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Christ washing Peter's feet (gravure), **6**-2237
Brown, Henry Kirke, American sculptor, **14**-4936
Brown, John, British writer, **11**-3899
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Brown University, Providence, R. I.
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Browne, Charles Farrar, *see* Ward, Artemus
Browne, Frances, Irish writer of fairy tales, **6**-2272
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The Cobblers and the Cuckoo, **15**-5528-36
Browne, Thomas Edward
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Brownian movements, in nuclei of cells, **3**-978; **17**-6389
Brownies, Girl Scouts, **7**-2522-23
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Browning, Elizabeth Barrett, English poet
life and work, **10**-3471-72
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Picture, **10**-3471
Browning, Robert, English poet
* life and work, **10**-3470-72
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Brownscombe, Jennie, American artist
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the first Thanksgiving, **6**-2090
Browntail moth
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What are our eyebrows for? **2**-461
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King Bruce and the Spider, by Eliza Cook, **5**-1639-40
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Brûlé, Etienne, French explorer, **2**-678
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Brunel, Sir Isambard K., English engineer and inventor
early steamboats of, **17**-6401-02
Brunelleschi, Filippo, Florentine architect, **5**-1735-37
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Bruni, Leonardo, Italian humanist, **14** ,094-95
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Brusa, *see* Bursa
Brush, George de Forest, American painter, **10**-3453-54
Picture
In the Garden (gravure), **10**-3464
Brussels (Bruxelles), capital and largest city in Belgium and of the province of Brabant. It is on the Senne River and is connected with the North Sea by canals. It is a beautiful city and has many fine churches, the University of Brussels, famous fine-arts academies, and art galleries. It is probably best known for the manufacture of lace, but it also has sugar-refineries, foundries and metal-ware factories. It was founded some time in the sixth century. Population, 915,600.
St. Gudule, church, **17**-6161
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canal dock, **15**-5498
Brussels Griffon, dog
Picture (gravure), **2**-716
Brussels sprouts, development of, **7**-2616
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Brut, or **Brutus,** mythical founder of Britons, **9**-3221
Brutus, Lucius Junius (lived about 500 B.C.). Roman patriot; his story is probably legendary. Grandnephew of Tarquin the Proud, the last king of Rome; pretended to be an idiot in order to escape the tyrant's cruelty. For this reason he was given the surname of Brutus, which means stupid in Latin. Brutus led the revolt against Tarquin in 509 B.C. He became one of the first two consuls, after the king was driven out.
Brutus, Marcus Junius (85-42 B.C.). Roman political leader. He took the part of Pompey against Caesar. After Pompey's defeat at Pharsalia, Brutus surrendered to Caesar, who freely pardoned him and later made him governor of Cisalpine Gaul. Brutus was one of the conspirators who slew Caesar in March, 44. Cassius and he were defeated at Philippi in 42 by the forces of Antony and Octavian. After the battle Brutus killed himself.
Bryan, William Jennings (1860-1925). American politician. Secretary of State in cabinet of President Wilson. Ran for president unsuccessfully three times, 1896, 1900, 1908.
Bryant, William Cullen, American poet, **13**-4711-12
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Bryce, James (Viscount), **9**-3224
Bryce Canyon National Park, Utah, **7**-2286
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rock formation, **7**-2286
Bryony, Black, plant
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Bryony, White
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Bubonic plague, how spread, **17**-6423
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Buccaneers, of West Indies, **19**-7100
Buchan, John (1875-1940). English poet and statesman; became Lord Tweedsmuir.
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Buchanan, James, president of U. S.
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Buchanan Robert. *See* Poetry Index
Bucharest (Bukarest), capital of Rumania and one of the largest cities in southeastern Europe, on the Dimbovitza River. The old part of the city has narrow, crooked streets, but there is a modern section. There is extensive trade in petroleum, cereals, hides, honey, wax and timber. For a city of its size it has few noteworthy buildings,

Bucharest (*continued*)
but it is famous for its beautiful public gardens. It was made the capital of a principality, Wallachia, in 1698 and was just a village at the time. The name means "city of joy." Population, 984,600.
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Buck bean, plant, gentian family, **11**-4020
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Buckeye, variety of horse-chestnut, **12**-4382
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Picture, with Richard III, **5**-1687
Buckle, Henry Thomas, English historian, **9**-3224
Buckthorns, sea
Pictures (in color), **11**-4024
alder buckthorn, fruit of, **11**-4025
sea buckthorn, fruit of, **11**-4023
Buckwheat, account of, **5**-1857
Budapest, capital and largest city of Hungary. Actually it is two cities, Buda and Pest on opposite banks of the Danube River. It is situated in the heart of the grain and cattle raising region of the Danube Valley and is one of the world's leading flour-milling centers. It carries on considerable commerce in grain, wine, livestock, hemp, and hides, and manufactures iron and steel products. The University of Budapest is the leading school in Hungary. It was the first city in the world to have an underground streetcar system. Buda was founded in the 2nd century A.D. by the Romans, but Pest is much younger. Population, 1,073,450.
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Agricultural Museum, **17**-6339
Parliament House, **17**-6339
St. Stephen's Monument, **17**-6338
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Buddha, or **Gautama,** founder of Buddhism, **8**-2826; **9**-3085-87
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frogbit multiplies by, instead of seeds, **4**-1277
Buelow, Bernhard von, German statesman, **12**-4166-67
Buena Vista, Battle of, **6**-1919
Buenos Aires, capital and main city and port of Argentina, the largest city south of the equator and the third largest in the Americas. It is on the La Plata River about 130 miles from the Atlantic Ocean. The city is quite modern and very beautiful. It is the shipping center for the grain and cattle-raising region of the pampas; and textiles, machinery, foodstuffs and beverages are manufactured. The first white settlement was made in 1536, but it did not survive. Permanent settlement was made in 1580. The name means "good airs." Population, 2,620,800.
Pictures, **19**-7034-37
Buffalo, the 2nd largest city in New York and the seat of Erie County. It is located at the mouth of the Niagara River at the east end of Lake Erie, and it is one of the leading lake ports. It leads the world in flour and feed milling, and is one of the largest railway centers in the United States. It manufactures metal products, lumber and automobile parts. The site was settled as a fur-trading post by the French in 1758. It is not named for the animal, for buffalo were not found that far east. It was called *belle fleuve* (beautiful flow) because of Niagara Falls near by. The Indians mispronounced the name, and the English thought it was Buffalo. Population, 575,901.
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Buffalo Bill (Wm. F. Cody), life of, **3**-876-77
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Buffon, Count George Louis Leclerc de, French Naturalist, **17**-7053-54; **18**-6715
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Bugloss, plant
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Bugs, true, **18**-6795-6801
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Bulfinch, Thomas
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Bull Run, first battle of, **7**-2433
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Bull terrier, dog, *see* Bullterrier
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Burnside, Ambrose Everett (1824-81). American soldier born in Indiana. He graduated from West Point in 1847 but soon resigned to become a manufacturer of firearms. He volunteered in 1861, and served creditably until he was, against his will, made commander of the Army of the Potomac; defeated at Fredericksburg; served to end of war; governor of Rhode Island, 1866-69; U. S. Senator, 1875-81.
Burr, Aaron (1756-1836). An American politician, vice-president of the United States, 1801-05.
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Butte, Montana, seat of Silver Bow County. It is in the Rocky Mountains near the Bitter Root range. Because of the extensive mining of copper, silver, gold, zinc, manganese and lead in the vicinity, it is known as "the richest hill on earth." It also has tile factories, iron works and machine shops. It started as a mining camp in 1864 and was named for the many buttes, or hills, of the region. Population, 37,081.
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Byzantium, later Constantinople
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C.I.O. (Congress of Industrial Organizations). A labor organization formed in November, 1938, to succeed the Committee for Industrial Organization. The C.I.O. organizes all the workers in an industry in one union instead of having separate unions for the crafts engaged in the industry.

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Cabinet. A political term, used to denote the body of ministers who direct the government of a nation or a country and act as advisers to the president or premier.
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Cadmium (Cd). Chemical element. Silvery metal. Atomic number 48; atomic weight 112.41; melting point 321°C.; boiling point 767°C.; specific gravity 8.64. Occurs in ores of zinc, to which it is chem-

Cadmium (*continued*)
ically similar. Cadmium is electroplated on steel to protect the surface from rust. Alloys of cadmium are used as bearing metals, solders and low-melting alloys. Cadmium sulfide is a yellow pigment.
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Cairo, capital of Egypt and largest city in Africa, at the head of the Nile Delta on the east bank of the river. It is a colorful city because of its mosques and its Oriental atmosphere, and the Pyramids are only five miles away. The European section of the city is modern, but the old section has narrow, twisting streets. It is a trading center for the Mediterranean area and for Africa, and it manufactures textiles, metal articles and souvenirs. The city that now stands is the fourth that has been built there. It was started in 969. The name in Arabic is El Kahira and means "victorious city." Population, 2,100,500.
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Caisson Song, The
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Caissons, in bridge construction, **1**-39-40
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Calais. Nearest port of France to England, on the Strait of Dover. It is a busy town, with large fisheries and manufactures of tulle and lace.
siege of, and Queen Philippa, **5**-1682
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siege of Calais, 1347, **6**-1976
Calamint, flower
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Calamity Jane, the nickname of Jane Burke (1852-1903) born on the plains of Mo., became an American Army scout and mail carrier between Deadwood, S. D., and Custer, Mont.; also an aide to Gen. Custer and Gen. Miles in many campaigns. As a Wild West character in a widely read dime novel of the period she constantly predicted misfortune.
Calcium (Ca). Chemical element. Silvery reactive metal. Atomic number 20; atomic weight 40.08; melting point 810°C.; boiling point 1170°C.; specific gravity 1.55. Calcium carbonate, as limestone, is a very common rock. When limestone is heated, it gives quicklime, calcium oxide, CaO, which is used in mortar and in chemical industries. Limestone is also used in making cement and glass. Gypsum and plaster of Paris are forms of calcium sulfate.
needed for strong bones, **6**-2122
Calcium carbonate, chemical substance in pearls, **13**-4675-76
Calcutta, India, capital of the province of Bengal, and the largest city in the country. It is built on the Hooghly River, which is a branch of the Ganges. The river is navigable, but it is dangerous and it can not accommodate very large ships. Beautiful temples contrast with its filthy slums. The manufacture of jute is the major industry, but cotton goods, silk goods and hemp products are also made. The city was founded by Job Charnock of the East India Co. in 1690. From 1773 until 1912 it was the capital of India. The name means "landing-place of Kali" and comes from a famous shrine to the goddess Kali. Population, 2,108,900. *See also* **8**-2821
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Caldwell, Erskine, American writer, **14**-5013
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Caledonians, ancient tribe of Scotland, **15**-5645
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How is time divided? **4**-1453
Calends, *see* **Kalends**
Calgary, city in western Canada in the province of Alberta. It is built at the junction of the Bow and Elbow rivers about fifty miles from the Canadian Rockies. The city is a tourist center and is known for its parks and gardens. The manufacture of flour, bread, automobile bodies and caskets is carried on; and it is a shipping center for coal, livestock, wheat, stone and lumber. It was first settled as a Royal Northwest Mounted Police post and was named for the post commander's ancestral town of Calgary, Scotland. Population, 100,044.
yearly stampede, **1**-111
Calhoun, John C., American statesman, **10**-3494
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California. Second largest American state, bordering the Pacific; area, 158,693 square miles; capital, Sacramento. Possessing a beautiful climate and immense mineral and agricultural resources, it has had a phenomenal rise in prosperity since settlers were first attracted there by its gold; in 1850 its population was only 93,000. Gold is still the principal mineral, but copper, iron, chromium, antimony, lead, silver, quicksilver, rock-salt and much petroleum are produced. Agricultural produce includes wheat, barley, lucerne, hops, and vast quantities of honey, nuts and fruit. San Francisco has a magnificent harbor; Los Angeles, the largest city, is the center of the moving picture business trade, and Oakland and San Diego are business centers. Abbreviation, Cal. Nickname, the "Golden State," State flower, the golden poppy. Motto, "Eureka" (I have found it). California may come from the Spanish meaning "a hot furnace." First settlement, San Diego, 1769. Population, about 7,000,000.
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Caligula (Gaius Cæsar) (12-41 A.D.). Emperor of Rome from 37 to 41 A.D.
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Calumets, Indian peace pipes, **18**-6556
Calvert, Cecil (c. 1605-75). 2d Lord Baltimore. The first proprietor of Maryland, though he never visited the colony.
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Calvert, George, 1st Lord Baltimore and Maryland, **2**-549-50
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Calvert, Leonard (c. 1606-47). First colonial governor of Maryland. In 1634 made the first permanent settlement in Maryland, at St. Mary's.
Calvin, John (Jean), sixteenth-century religious reformer
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Cambridge. Capital and market town of Cambridgeshire, England. Its famous university, the first college of which was founded in 1284, has 17 colleges and 2 hostels, while the town has several fine churches.
Picture
St. John's College, **18**-6489
Cambridge, Massachusetts, seat of Middlesex County, on the Charles River across from Boston. Harvard, the Massachusetts Institute of Technology, and Radcliffe College are located in the city, giving it the name of "the University City." The first printing-press in the United States was in Cambridge, and it still has three important book-publishing firms. It manufactures soap, candy, rubber goods, ink and electrical machinery. It was settled in 1630 by the Puritans, and the name Cambridge was adopted in 1638 in honor of the city of that name in England. Population, 111,124.
Picture
Harvard College, **12**-4309
Camden, New Jersey, seat of Camden County, on the Delaware River across from Philadelphia, a port of entry. A great many products are manufactured such as phonograph records, steel pens and ships. The poet Walt Whitman lived in Camden from 1873 until his death in 1892. Swedes first settled it around 1638, and the town was planned in 1763 by Jacob Cooper. He named it for the Earl of Camden. Population, 117,535.
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Campanile. A bell tower not attached to another building; introduced into architecture by early Christians.
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Camus, Albert, French writer, **18**-6720
Can I Not Sing But Hoy!, early English carol, **2**-723
Canada. Dominion of British Empire. Includes provinces of Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, British Columbia, Alberta and Saskatchewan; also Yukon Territory and Northwest Territories. The land area of the dominion is 3,695,189 square miles; the population is 11,975,000.
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Canberra, capital of Australia, in the southeast of New South Wales. It was selected as the site of the capital in 1909, and was planned as a model city. The Parliament met here for the first time in 1927, and it was opened by the Duke of York, who later became King George VI of England. There is no industry as the city is devoted entirely to government. Population, 16,540.
Picture, **7**-2463
Cancerroot, flowering plant, **18**-6580
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Why can we put out a candle by blowing on it? **6**-2186
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14th century cannon, **6**-1976
Cannon-ball tree, 9-3264
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The Song My Paddle Sings, by E. Pauline Johnson, **6**-2241
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early Indian canoe, **1**-253
Canon, song in parts, **10**-3601; **19**-6901-03
Canova, Antonio, Italian sculptor, **13**-4856, 4858
Cans, *see* Tin cans
Canterbury. Ecclesiastical capital of England, on the Kentish Stour. An ancient British town, it became Durovernum of the Romans, and later capital of Saxon Kent. The magnificent cathedral was founded by St. Augustine in 597, and was finally completed about 1495.

Canterbury (*continued*)
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cathedral, **16**-5965; (gravure), **16**-5973
Canterbury bells, flower
Picture (gravure), **19**-7175
Canterbury Tales, by Chaucer, account of, **1**-301-02
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* summaries of parts, **13**-4767-73
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Cantilever bridges, 1-31
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Canton (Kwang-Chow or **Quang-chow-foo),** fourth largest city in China and capital of Kwangtung Province. It is on the Pearl River and is crossed by thousands of canals. The old part of the city is densely populated, and the new city is the commercial section along the river. There are many pagodas and colorful temples in the city. The river is thick with houseboats. Many handicrafts such as carving in jade, ebony and ivory are carried on; and tea, silk, tobacco and sugar are shipped. It was the capital of a barbaric kingdom until it fell into Chinese hands in 111 B.C. Population, 870,000.
Pictures (gravure), **2**-425-26
Canton, Ohio, seat of Stark County, on the Nimishillen Creek in the northeastern part of the state. Roller bearings, steel safes and farm machinery are made, and it is a trading center for the surrounding agricultural area. It was settled in 1805 by New England pioneers. It was the home of President McKinley and he is buried in the cemetery there. Population, 110,150.
Canute, king of England, Denmark and Norway, **5**-1570
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Canvas, used to make wool rug, **7**-2378-79
Canvasback ducks, 11-3887
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painting by Audubon, **11**-3888; (in color), **12**-4369
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Picture
of plant producing (in color), **8**-2997
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Cap, percussion, 8-2849
Capacity, or volume, measurement of, **3**-849-51, 854-57
Cape Breton Island. Island of Nova Scotia, Canada; area, 3,120 square miles; capital, Sydney. Coal is mined, and there are shipbuilding, lumber and fishing industries.
Cape buffalo, of Africa
Picture (gravure), **4**-1268
Cape Cod, Massachusetts
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Highland Lighthouse, **12**-4145
Provincetown town crier, **12**-4153
Cape Colony, South Africa, history, **9**-3049-51
Cape of Good Hope, 9-3048
how name originated, **1**-83
Cape Town, seat of government of the Union of South Africa and capital of Cape of Good Hope Province. It is the second largest city in the country, and is one of the leading ports of Africa. On the Atlantic coast, it has an excellent harbor. Behind the town Table Mountain rises like a wall. Because of the sunny climate and good beach the town is a vacation spot. The Dutch founded the town in 1652. Population, 214,200.
Picture
Cecil Rhodes Memorial University, **9**-3047
Cape Verde Islands
description, **18**-6814
Cape York, Greenland
Picture, **15**-5297
Capelin, fish, **16**-5776
Capella, star, **11**-3785
Caper. A low shrub growing from the crevices of rocks and walls in the Mediterranean region, particularly in France, Italy and the Near East. The name capers is given to the flower buds and young berries of the caper; these buds and berries are pickled and are used in sauces of different kinds. Capers have a rather sharp and bitter taste.
Caper (*continued*)
wild caper, fruit of, **11**-4020
Pictures (in color), **8**-2998
fruit of caper spurge, **11**-4023
Capercaillie, European grouse, **12**-4364
Picture (in color), **9**-3281
Capes, *see* names of capes: as Horn, Cape
Capet, Hugh, *see* Hugh Capet
Capetians, line of French kings, founded by Hugh Capet, **10**-3425, 3427, 3429
Capillaries, tiny blood vessels, **4**-1210
Capillarity, an effect of surface tension in liquids, **2**-616
Capillary action
in sub-irrigation, **7**-2555
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Why does tea run up through a lump of sugar? **15**-5438
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Caporetto, battle in World War I, **12**-4413
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Caprifig, wild fig, necessary for growth of cultivated figs, **6**-2159
Capsicum, plant, yields varieties of pepper, **8**-2992
Capybara, rodent, **3**-1133
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Carabao, *see* Buffaloes
Carabus beetles, 18-6625
Caracal, animal. *Picture* (gravure), **2**-500
Caracalla (Marcus Aurelius Antoninus)
reign, **4**-1251
Caracaras, birds, **10**-3759
Picture (gravure), **10**-3761
Caracas, capital of the United States of Venezuela. It is a modern city, built 3,000 ft. above sea level six miles inland from its port of La Guaira. The artistic and political life of the country are centered there, and it is the birthplace of Simón Bolívar. It was founded by the Spanish explorer Diego de Lasada in 1567. Serious earthquakes have frequently damaged the city, the worst in 1812. Half the city was destroyed and thousands of people were killed. It is named for the Caracas Indians that used to inhabit the region. Population, 269,000.
Picture
statue of Bolívar, **13**-4585
Carack, sailing vessel, **11**-3915-16
Caractacus, British chief, **5**-1566
Carat, unit of weight, **19**-7226
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What is 24-carat gold? **13**-4594-95
Caravaggio, Michelangelo Amerigi da, Italian painter, **3**-1108
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The Lute Player, **9**-3070
Caravans
Arab caravans, **18**-6741-42
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camel caravan of Middle Ages, **17**-6084
Caravel, small sailing vessel of 15th and 16th centuries, **11**-3915-16
Picture
model in filigree, **14**-5189
Caraway seeds, 8-2996
Carbides. In chemistry these are compounds of carbon either with the metals or with certain non-metallic elements such as silicon. Iron carbide and calcium carbide are the most important carbides. Carbides are used in iron smelting and in the manufacture of acetylene gas.
Carbohydrates, chemical compounds
use as food, **8**-2122
what they are, **15**-5573; **17**-6202-03
Carbolic acid, or **phenol** (C_6H_5OH). An important organic substance used as an antiseptic or disinfectant. It is found almost exclusively in coal-tar, produced by the destructive distillation of coal or wood.
a by-product of coal tar, **2**-637
Carbon (C). Chemical element. Atomic number 6; atomic weight 12.01. Charcoal and coal consist largely of carbon; diamond is a crystalline form. All fuels contain carbon or its compounds; on

Carbon (*continued*)
combustion, carbon monoxide, CO, or carbon dioxide, CO_2, are formed. Living matter consists of complex compounds of carbon; about 18% of the human body is carbon. Carbonates are an important group of inorganic carbon compounds. Carbon is the basis of hundreds of thousands of compounds in organic chemistry, including the hydrocarbons, which are compounds of carbon and hydrogen. Petroleum consists of a large number of hydrocarbons.
* carbon compounds, **16**-5938-48
chemical properties, **16**-5666
how carbon atoms combine in molecules, **2**-526-27
means of distinction between organic and inorganic chemistry, **15**-5424
use in reducing iron ore, **9**-3341
used to make steel, **5**-1634
Carbon arc lamp, **7**-2636
Carbon dioxide
breathed from lungs, **4**-1327-28, 1330
chemical properties, **16**-5666
food of green plants, **1**-118
produced by living cells, **3**-937
Carbon monoxide (CO). A colorless, odorless and tasteless gas (in the quantities usually encountered); it is a deadly poison. It is found as a product of a coal or charcoal fire (when there is a limited supply of oxygen), in the exhaust of gasoline engines and in the burning of illuminating gas. It burns with a pale lavender flame. A furnace or stove gives off carbon monoxide if the drafts are not open sufficiently to permit enough oxygen to enter and combine with the CO to form CO_2. It is highly dangerous to remain in a room where a gasoline engine is running, unless doors and windows let in a good supply of fresh air. This should be remembered especially in garages and in the engine-rooms of motor boats, for the quantity of CO given off by a gasoline engine mounts rapidly, and is deadly in the extreme. It combines with part of the blood, and decreases the ability of that fluid to carry oxygen.
chemical properties, **16**-5666
Carbonari, Italian secret society, **12**-4411
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Carbonyl group, term in chemistry, definition, **16**-5947
Carboxyl group, term in chemistry, definition, **16**-5947
Carbuncle, garnet cut with curved surface, **19**-7231
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Carcajou, or wolverine, **2**-770
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Carcassonne, France
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Carcassonne, by John R. Thompson, **12**-4273
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Cardan, Girolamo, Italian scientist
work on electricity, **11**-3980
Cardenas, Lazaro, president of Mexico, **11**-3820
Cardiff, the largest city in Wales, capital of Glamorgan, and an important seaport on the Bristol Channel. It is on the River Taff. Near the greatest coal and iron mines in Great Britain, it is a leading shipping center for coal, and a manufacturing center of iron and steel. It was founded over half a century before the birth of Christ and was an important Roman stronghold. Population, 234,600.
Cardinal flowers, **18**-6581
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Cardinals, birds, **8**-2973; **14**-5031
Pictures, **8**-2969, 2975; (in color), **10**-3623; **14**-5026
Carding, preparation of fibres before spinning
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use in library cataloguing, **10**-3559
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sample card for library catalogue, **10**-3558
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Carex, Marsh, plant. *Picture*, **16**-5878
Carey, Henry, *See* Poetry Index
Carey Act, U. S., aided irrigation, **7**-2546
Caribbean Sea. Part of the Atlantic between South and Central America and the West Indies.
Caribou, deer, **4**-1509, 1511
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Caribs, family of American Indians, **19** 6858
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Carillon, French word for chimes, **5**-1551, 1553
Carlist Wars, in Spain, **14**-4919
Carlotta, empress of Mexico, **11**-3818
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Carlsen, Emil, American painter, **10**-3514
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* life and work, **9**-3312-14
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Carolina, royal grant, 1663, **2**-552
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Carolina doves, **14**-5028-29
Caroline Islands, part of Micronesia, **9**-3301-02
stone money of Island of Yap, **11**-4080
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stone money of Yap, **11**-4079
Carolingians, line of Frankish kings begun by Charlemagne, **10**-3425
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Carp, fish, **15**-5631-33
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Carpaccio, Vittore, Italian painter, **3**-1104; **4**-1461
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English ambassadors visiting the Moorish king, **4**-1455
Vision of St. Ursula, **4**-1460
Carpathians, mountains of central Europe, **3**-1023; **13**-4679
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Carpenter, Francis B., American artist
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Carracci, Agostino, Italian painter, 3-1108
Carranza, Venustiano, president of Mexico, 11-3819-20
Carrara. City in Italy long noted for its marble. Ancient Roman tools are often found in the quarries.
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Carrel, Alexis, French-American scientist, 4-1232; 15-5491
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Carrière, Eugène Anatole, French painter, 8-2714
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Carrion beetles, 18-6626
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Carroll, James, yellow fever experiment volunteer, 15-5489
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Carroll, Lewis (Charles Dodgson), English mathematician and writer for children, 6-2268; 11-3900
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Alice in Wonderland (in part), 3-1088-1102; 4-1178-90
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Picture
of real Alice for whom Alice in Wonderland was written, 11-3900
Carrots, vegetable, 7-2622
Pictures, 7-2621
Carrying coals to Newcastle is an expression meaning to do something unnecessary. Newcastle is a city in the coal district of England and ships coal all over the world. Therefore it would be foolish to carry coal to a place that has so much already.
Carson, Christopher (1809-68). Generally known as Kit Karson. A famous American hunter, trapper, Indian fighter and Western scout.
Carson City, capital of Nevada and seat of Ormsby County, in Eagle Valley at the eastern end of Sierra Nevada Mountains. Mining, agriculture and lumbering are carried on around the city, and the industries of Carson City are concerned with these. It started as a trading post in 1851 and was settled as a town in 1858. It was named for the famous frontier scout, "Kit" Carson. Population, 2,478.
Picture, State Supreme Court and Library building, 19-6848
Carson Sink, in Great Basin country, 19-6841
Carter, fish
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Carteret, Sir George, and colony of New Jersey, 2-551
Carthage, ancient city and state in Africa
Carthaginians in Spain, 14-4909
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Roman soldiers storming citadel, 4-1196
Cartier, Jacques, French explorer
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Jacques Cartier, by Thomas D'Arcy McGee, 18-6647
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on Gaspé shore, 2-677
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Cartouche, royal sign, 3-816
Caruso, Enrico. An Italian operatic tenor possessing a voice of extraordinary power. Born, Naples, 1873; died, August 2, 1921. Sang in practically every important city in the world.
Carver, George Washington, American scientist, 12-4433
work on by-products from peanuts, 2-640
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Carving, *see* Woodcarving
Cary, Alice, American writer for children, 14-4956
Cary, Phoebe, American writer for children, 14-4956
See also Poetry Index
Casablanca, capital and main city of French Morocco. A seaport on the Atlantic coast, the city is one of the most important ports in Northern Africa. Much of the city is modern. The city is now famous as one of the meeting-places of President Roosevelt and Prime Minister Churchill during World War II. Wool and leather are among the main products exported. An ancient town of the same name once existed on the site, but the present city was founded by the Portuguese in 1468. The French took over in 1907. Population, 550,800.
Cascade Mountains, national parks in, 7-2283-84
Cascade Tunnel, Washington. *Picture,* 2-522
Casein, substance found in milk, uses of, 2-637
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Who was Cassandra, and why is she remembered? 7-2609
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Castes, system of social division in India, 8-2824-25
Castiglione, Baldassare, Italian author, 14-5093-94
Castile, former kingdom in central Spain, divided into Old and New Castile; total area about 53,000 sq. mi. Minerals include iron, zinc, mercury, sulphate of soda, silver and salt. Chief city is the capital of Spain, Madrid. *See also* 14-4908, 4911
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Castor and Pollux, twin stars, 11-3923-24
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Cataluña, fish. *Picture* (in color), 16-5787
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chemical definition, 16-5947

Catania, Sicily. It stands at the foot of Mount Etna on a gulf of the Mediterranean. One of the chief ports of the island, it exports sulfur, citrus fruits and wine. Silk, linen and cotton products are made, as are objects made from lava, marble and Sicilian amber. The city was founded by the Greeks in 729 B.C., and has been badly damaged by earthquakes and volcanoes. Population, 277,200.
Cataract, disease of the eye, **11**-3804
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What is cataract of the eye? **11**-3842
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Cato, Marcus Porcius, the Younger (95-46 B.C.). Roman statesman and philosopher. Great-grandson of Cato the Censor. He took the side of Pompey against Caesar and held an important

Cato, Marcus Porcius, the Younger (*continued*)
command in Africa. After the battle of Thapsus in 46 B.C. had assured the final triumph of Caesar, Cato took his own life. Since he slew himself in Utica, he is sometimes called Cato Uticensis, or Cato of Utica.
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Catskill aqueduct system
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Catskill Mountains. A group of mountains in New York State, west of the Hudson River; famed for scenery. The highest is Slide Mountain (4,205 ft.).
Catt, Carrie Chapman, American educator and lawyer, **14**-5271
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Cavour, Count Camillo, Sardinian statesman, and Italian unity, **12**-4412
Cavy, animal, **3**-1133
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Cawnpore (Cawnpur), India, capital of the province of the same name. It is a modern town on the south side of the Ganges River. Cotton and leather goods are manufactured, and it is a railway center. The city is best known for the native rebellion that took place in 1857. Population, 487,300.
Caxton, William, first English printer, **2**-724; **9**-3396
printed first books in England, **5**-1687
Pictures, from books printed by Caxton, **9**-3385
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Cayenne, capital of French Guiana. It is built on an island near the mouth of the Cayenne River, and is the largest city and main port of the country. The harbor is shallow and the city is in a swampy, unhealthy region, but considerable business is carried on. The chief exports are gold, sugar, rum, spices, cocoa, and the red pepper that is named after the city. The region was in the hands of the Dutch and the French during their quarrels between 1604 and 1676, but the French made a permanent settlement early in the 1700's. Population, 11,704.
Cayenne pepper, *see* Pepper
Cayley, Sir George, English builder of gliders, **1**-167
Caymans, variety of crocodile, **14**-5226-27
Cazin, Jean Charles, French painter, **7**-2372
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Cecilia, St.
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A Song for St. Cecilia's Day, by John Dryden, **14**-5129
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Cedar bird, **9**-3139; **13**-4836
Cedar Rapids, Iowa, on the Cedar River. The surrounding territory is important for agriculture and dairying, and meat- and poultry-packing are important industries. Oatmeal, corn syrup and sorghum are the main products made, and machinery for creameries, ice-cream plants and dairy farms is manufactured. Austin N. Palmer, originator of the Palmer method of penmanship, taught in the business college: and it is also the home of Coe College. Grant Wood, famous artist, lived and painted there. The first settlement, called Rapids City, was made in 1841. Population, 62,120.
Cedars, evergreen trees, **13**-4635-36
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Celandine, plant, **17**-6280
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Celebes Island, **9**-3297
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Macassar, **9**-3297
Celery, vegetable, **7**-2616
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Celesta, musical instrument, **4**-1293
Cell, *see* Cells, Living
Cell, the Seat of Life, The, * **2**-557-59
Cell Theory, basis of modern biology, **3**-978
Cellini, Benvenuto. Italian sculptor and craftsman; born Florence, 1500; died there, 1571; wrote a famous autobiography.
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Cellulose, plant fiber
* use and manufacture, **8**-2747-55
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Censor, Roman official, **4**-1362
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Centaur. In Greek mythology, one of a race of monsters, half man and half horse.
Picture, in sculpture, by Barye, **13**-4705
Centaury, flower. *Pictures* (in color), **14**-4982, 4995
Centennial Exhibition, Philadelphia, 1876, **6**-2074
Centeter cinerea, a fly, **18**-6630
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Central Mountains, France, **10**-3416
Central Park, New York
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Central Powers, in World War I, **18**-6441-47
Centripetal force. A force in nature which makes things in motion tend to move toward the center. Opposite of centrifugal force.
Centrosphere, heavy core of the earth, **1**-283
Century of change in art, * **6**-2229-40
Century of Progress Exposition, Chicago, **19**-7117
Century plant. A popular name for the American Aloe, *Agave Americana,* which was supposed to flower only once in each hundred years.
Cephalaspis, prehistoric fish, **3**-1032
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Cephalopods, class of mollusks, **16**-5898
in Cambrian period, **3**-906
in Ordovician period, **3**-1031
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in Cambrian period, **3**-907
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Cerberus, Pluto's three-headed dog, **9**-3238
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Cerebellum, part of brain, **9**-3065
Cerebrum, part of brain, **9**-3065-67
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Ceres (Demeter), goddess, **9**-3227
Ceres, minor planet or asteroid, **11**-3854
Cerium (Ce). Chemical element. Rare-earth element. Atomic number 58; atomic weight 140.13; melting point 640°C.; boiling point 1400°C.; specific gravity 6.9. Cerium, alloyed with other metals, is used as the "flint" in cigarette lighters.
Cerium (*continued*)
Cerium compounds are used in glass manufacture, to remove the green color due to iron impurities, and in making special glasses. *See also* Rare-earth elements.
Cervantes, Miguel de, Spanish writer, author of Don Quixote, **19**-7127-28
Cesium (Cs). Chemical element. Rare, reactive metal, very similar to rubidium and potassium. Atomic number 55; atomic weight 132.91; melting point 28.4°C.; boiling point 670°C.; specific gravity 1.9.
Ceylon, island in Indian Ocean, **9**-3184
ancient bo tree, **9**-3262
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Chabas, Paul, French artist
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Chaise longue, couch
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Chaldea, ancient empire of Mesopotamia, **2**-649, 660
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Chalk Cliffs, England
formed by skeletons of micro-organisms, **2**-662
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Challoner, Bishop Richard
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Chamberlain, Joseph, Conservative party leader in England, **7**-2305-06
Chamberlain, Neville, prime minister of England, **7**-2309-10; **18**-6604
Picture
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Chamberlin, Clarence D., pioneer American flyer, **1**-173
Chambers, William, English architect, **18**-6491
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Why does the chameleon change its color? **5**-1810
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Champlain, Samuel de, French explorer
* account of, in Canada, **2**-678
and fur trade, **13**-4689-90
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Champlain and St. Lawrence Railway, early road in Canada, **4**-1483
Chancellor, Richard, Arctic explorer, **8**-2980
Chancellorsville, Battle of, **7**-2437
Chancery, Courts of, **13**-4812-13
Changchun, (Hsinking), Manchuria, a trading center. In 1932 the Japanese made it the capital of the puppet state of Manchukuo, but in 1945 the Russians occupied it. It was called Hsinking while it was under Japanese control. The Chinese Communists now control it. Population, about 420,000.
Changsha, city in south-central China and capital of the province of Hunan, located on the Siang

Changsha (*continued*)
River. Furniture is manufactured, and it is also a trading center for the region. Population, 700,000.
Channel Islands, group of islands in English Channel belonging to Great Britain, 10 to 30 mi. west of Normandy peninsula (France). Consist chiefly of Jersey, Guernsey, Alderney and Sark, with some other islets. The chief town, St. Helier, is on Jersey. The islands are very fertile, famous for special breeds of cattle, and for vegetables, fruit and flowers partly grown under glass. They were part of the Norman domain of William the Conqueror, and remained loyal to England when it lost Normandy in 1204. During World War II they were occupied by the Germans. Area, 75 sq. mi.; population, 93,000.
Chanson de Roland, *see* Song of Roland
Chansons de Geste (Songs of Exploits), in French literature, **18**-6560
Chanute, Octave, American glider-builder, **1**-168, 170
Chaparral-cock, belongs to cuckoo family, **10**-3501
Chapel Royal, choir school in London, **10**-3602
Chapman, George, English writer, **3**-1124
Chapultepec (Hill of Grasshoppers). A rocky hill on the outskirts of the city of Mexico. The Aztecs used it as a site for some kind of worship. At the end of the 18th century the Spanish viceroy built a palace on the hill. Later the Emperor Maximilian made this palace his headquarters. It is now the presidential residence. A military school and an observatory are also situated on the hill.
Characin, fish. *Pictures* (in color), **16**-5785
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Chardin, Jean Baptiste Siméon, French painter, **5**-1882
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Grace before Meat, **5**-1875
Charge of the Light Brigade. Charge of 600 Light Dragoons, Lancers and Hussars at Balaclava in the Crimean War, October 25, 1854.
See also poem about, **5**-1885
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accepting surrender of a Saxon chief, **10**-3423
map of empire, **4**-1438
Charles I, king of England
life and reign, **6**-2097-98
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portrait, with William Harvey, **8**-2727
Charles II, king of England
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landing at Dover, **6**-2102
Charles IV, emperor of Holy Roman Empire
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entering Avignon, **6**-1980
Charles I, the Great, king of France, *see* Charlemagne
Charles VIII, king of France
in Italian history, **12**-4408
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Charles III, king of Spain, **14**-4917
Charles IV, king of Spain, **14**-4917
Charles V, king of Spain and Holy Roman emperor, **14**-4915
rule in the Netherlands, **15**-5559
Charles XII, king of Sweden, **15**-5293
Picture
statue in Stockholm, **15**-5305
Charles XIV (originally J.B.J. Bernadotte), king of Norway and Sweden, **15**-5294
Charles, J. A. C., and aviation, **1**-345
Charles, Jacques, French scientist, **2**-703
Charles Albert, king of Sardinia, **12**-4411-12
Charles d'Orléans, medieval French poet, **18**-6563
Charles Martel, Frankish ruler, **4**-1434-35; **10**-3424-25
Picture
at battle of Tours, **4**-1432
Charleston, largest city in South Carolina and seat of Charleston County. It is important as an Atlantic seaport, and it is built where the Cooper and Ashley rivers meet. The city is one of historical interest, and has many buildings and monuments commemorating different aspects of its history. Trade in vegetables, seafood and lumber is carried on; and fertilizer, asphalt, turpentine and ships are manufactured. It was founded in 1670 and was named for Charles II of England. It was England's main stronghold in her fight with Spain; it was a leader in the American Revolution; and the Civil War started at Fort Sumter on its water front. Population, 71,275.
founding of, **2**-553
on eve of Revolution, **3**-1051-52
Pictures, **1**-161
harbor at time of Revolution, **3**-1038
Navy Yard, **14**-4892
Pringle House, **14**-4900
St. Philip's church (gravure), **18**-6685
Charleston, capital of West Virginia and seat of Kanawha County. The second largest city of the state, it is in the western foothills of the Allegheny Mountains at the junction of the Kanawha and Elk rivers. The glass and chemical industries and the machinery, tool and wood-products factories of the city make it the commercial center of the state. Near by are important fields of coal, oil and natural gas. The site was first settled as a fort in 1788. In 1870 it became the state capital. Population, 67,914.
Picture
Capitol, **14**-4896
Charlock, plant, **15**-5395
Charlotte, North Carolina, seat of Mecklenburg County. It is on Sugar Creek in the cotton-growing Piedmont Plateau region. Huge, modern textile mills make it a textile center, and there is also manufacture of textile machinery, cottonseed oil, fertilizer, drugs and cement. The city was settled about 1750 and was named for Queen Charlotte Sophie, wife of George II. During the American Revolution, Lord Cornwallis occupied the city and he called it a "hornet's nest." This has been taken for the city's emblem, and now represents the many activities carried on there. Population, 100,899.
Charlotte Amalie, Virgin Islands
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Charlottetown, capital of the province of Prince Edward Island, on Hillsborough Bay at the meeting point of three tidal rivers. It has a good harbor and is the commercial center of the province. Its fisheries are important, and lobsters and oysters are canned in great quantities. Packing plants and woolen mills are also important. It is a summer resort. The British founded the town around 1760 and named it for the queen of George III. Population, 14,460.
conference of 1864 on Canadian federation, **4**-1484
Picture
tablet honoring birthplace of Confederation, **4**-1485
Charon, character in mythology, **9**-3238
Charter, Great (Magna Carta), *see* Magna Carta
Charter Oak. A tree in Hartford, Connecticut, around which an American historical legend grew up. In 1687 Governor Andros demanded the surrender of the colonial charter by the colonists. Captain Wadsworth hid the document, it is said, in a hollow tree, where it remained for two years. The oak was blown over in 1856, but a monument has been erected to mark the spot.
Chartran, Théobald, French painter
Picture
portrait of Mrs. Theodore Roosevelt, **8**-2812
Chartres, France, cathedral, **17**-6158-59
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Chase, Salmon Portland, Secretary of Treasury in Lincoln's Cabinet
Picture
listening to Emancipation Proclamation, **7**-2442
Chase, William M., American painter, **9**-3336
Picture
still-life painting, **9**-3325

Chassis, of automobiles
Picture
diagram showing different parts, **19**-7027
Chat, Yellow-breasted, variety of warbler, **13**-4840
Château de Blois, *see* Blois
Château de Pierrefonds, *see* Pierrefonds
Château-Thierry. During the World War, from July 15th to 18th, 1918, American troops successfully held the German forward movement at Château-Thierry, France.
Châteaubriand, François René de. French philosophic writer, the most famous of his day; born, St. Maio, 1768; died, Paris, 1848.
influence on France, **18**-6716
Châteaux, *see* Castles
Chats, birds, **14**-5143
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Chattahoochee River. American river, rising in Habersham County, Georgia. Flows into Apalachicola River. 500 miles.
Chattanooga, city in southeastern Tennessee on the Tennessee River, the seat of Hamilton County. The city borders on Georgia. The region is mountainous and the highways enter the city through tunnels. It is a major industrial center of the South, manufacturing iron and steel products, textiles, furniture, refrigerators and stoves. There is considerable trade in cotton, grain, coal and iron. It was a key city in the Civil War and was the center of many battles. It is also in the center of the region served by TVA. The area was Indian territory, and the first white settlement was made in 1835. The name comes from near-by Lookout Mountain and means "rock pointing in the air." Population, 128,163.
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Chaucer, Geoffrey, English poet
* life and writings, **1**-301-03
* Canterbury Tales, summaries of parts, **13**-4767-73
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Chaucer, by Henry Wadsworth Longfellow, **19**-6990
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making Swiss cheese, **7**-2322
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Chefoo, port in the Shantung Province of China, on a peninsula in the Yellow Sea. Vermicelli, peanuts, bean cake, bean oil, lace and silk are among its chief exports. Fishing is also a major industry of many of its people. The port is known as Yentai. Population, about 250,000.
Chekhov, Anton, Russian writer, **19**-6911
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with Gorky, **19**-6911
Cheliabinsk, city in Russia, in the Uralsk region. Farm machinery and leather goods are manufactured, and there is a large metallurgical works. It is the seat of government for the area of the same name. It was settled in 1658. Population, 273,100.
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Chemical pulp, **7**-2447-48, 2450-51
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* inner structure of atoms, **1**-307-13
* ions and how they behave, **17**-6079-82
* language of chemistry, **15**-5423-27
* metals and non-metals, **16**-5661-78
* organic chemistry—carbon compounds, **16**-5938-48
* radio-active elements, **16**-5797-5812
* synthetic rubber, **12**-4358-61
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How did the stone get inside the cherry? **12**-4449
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Chervil, flower. *Picture* (in color), **13**-4877
Chesapeake, ship, defeat by Shannon, **5**-1703
Cheshire. Western county of England; area, 1,025 square miles; capital, Chester. Dairy-farming and cheese-making are important; much salt is mined; and there are large chemical, textile and shipbuilding industries.
Chess, how to play, **5**-1771-72
Chess apples, whitebeam's fruit, **12**-4382
Chester, Pennsylvania, thirteen miles southwest of Philadelphia, on the Delaware River. It is an important industrial city and manufactures locomotives, automobiles, steel, ships and cloth. Swedes settled it in 1645. It was the second settlement in the state, and the other early settlement did not last, so it is the oldest town. William Penn landed there in 1682 and gave the town its present name. Population, 59,285.
Chesterfield, Philip Dormer Stanhope, Earl of
Samuel Johnson's letter to, **5**-1869
Chesterton, G. K. (Gilbert Keith), English writer, **8**-2869
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Chests. *Pictures,* colonial, **18**-6768-69
Chevet, architectural term, **16**-5720

Chewing gum
Question about
What is chewing gum made of? **1**-78
Cheyenne, capital of Wyoming and seat of Laramie County. It is located in the southeastern part of the state on a plateau that is 6,060 ft. above sea level. Game hunting and winter sports are carried on in the near-by Pole Mountains and the Snowy Range of the Rockies. The city is a center for the cattle and sheep ranches of the surrounding region. It is one of the most historic towns from the days of the Old West, and it has an annual celebration of international fame. It was founded in 1867 by General Grenville Dodge. The name comes from the Indian tribe of that name. Population, 22,474. *See also* **18**-6428
Chiang Kai-shek (1886-). President of the Chinese Republic and leader of the Kuomintang, or National People's Party. *See also* **2**-432
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Chicken snake, **15**-5412-13
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Chickering, Jonas, made iron frame for grand piano, **5**-1800
Chickweed, plant. *Picture*, **15**-5394
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For Sale—Dragon's Breath, Cheap, **16**-5685-89
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rug of Ch'ien Lung period, **2**-446
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China (porcelain ware)
Story about
willow-pattern plate, **14**-5198
See also Pottery
China Sea. Part of the Pacific lying west of the chain of islands fringing eastern Asia. It includes the Yellow Sea and the Gulf of Siam; its chief ports being Nagasaki, Shanghai, Foochow, Canton, Hong-Kong, Manila and Singapore.
Chinchilla, a small ground rodent that looks somewhat like a squirrel. When it is full-grown, the chinchilla weighs only about 1½ pounds. The native home of the animals is in the Andes Mountains of South America, but they are also raised on chinchilla farms in the United States and Canada. They eat about the same food that rabbits eat, but they must be cared for more carefully than rabbits. Chinchillas are happiest in

Chinchilla (*continued*)
high, mountainous country. They are very valuable because of their bluish gray fur that makes beautiful fur coats.
Chinchona, *see* Cinchona
Chinese checkers, how to play, **3**-902
"Chinese Gordon," *see* Gordon, Charles
Chinese-Japanese War, 1894-95. Broke out over trouble between the two nations in Korea. China was defeated on land and sea, and in the Treaty of Peace signed April 16, 1895, she had to give Formosa to Japan, grant independence to Korea and pay a heavy indemnity to Japan.
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Chiru, Tibetan antelope, **4**-1443
Chisel, tool, how to use, **1**-130
Chital, or **axis deer, 4**-1508
Chivalry, system of knighthood, **6**-1937-38
* life of Bayard, **2**-402-04
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from the Faerie Queene, by Edmund Spenser, **13**-4538-39
Glove and the Lions, by Leigh Hunt, **5**-1639
Lady of Shalott, by Tennyson, **5**-1644-46
Pictures, **6**-1934-38
Chlorine (Cl). Chemical element. Reactive, poisonous, yellowish gas with a choking smell. Atomic number 17; atomic weight 35.457; melting point −101.6°C.; boiling point −34.6°C. Common salt is sodium chloride, NaCl. Chlorine is made from salt by electrolysis (*see* Electrolysis). It is used, among other things, for bleaching paper pulp and textiles, and for treating water used in swimming pools and for drinking purposes.
chemical properties, **16**-5665-66
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use to purify N. Y. water, **14**-5059
Chloroform
use as anaesthetic, **8**-2730
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in leaves of trees, **8**-2872
in seaweed, **4**-1276
necessary to make protein, **6**-2123
Chocolate
* cultivation of cocoa, and preparation, **3**-1072-74
Choctaw Indians
and origin of expression OK, **7**-2486
Chokeberries, 16-5732
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Chokecherries, 13-4777
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Chopsticks, used in China
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Choquette, Robert, French-Canadian poet, **14**-5117
Choughs, birds, **8**-2892, 2894
Picture (in color), **9**-3281
Chow Chow, dog. *Picture* (gravure), **2**-716
Chow dynasty, of China, **2**-424
Christ, *see* Jesus Christ
"Christ of the Andes," statue. *Picture,* **19**-7041
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* Christmas Carol, by Dickens, adaptation, **17**-6110-24
Santa Claus—The True Story of Father Christmas, **17**-6095-97
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Christmas Carol, by Charles Dickens, adaptation, **17**-6110-24
Christmas Island. Lonely British island in the Indian Ocean, under Straits Settlements. Its 2,000 people work its phosphate deposits.
Christmas rose, flower, **19**-7170
Christophe, Henri (Henri I), king of Haiti, **19**-7100
Chromatic scale, in music, **18**-6698
Chromatin, part of cell-nucleus, **15**-5616
Chromium (Cr). Chemical element. Gray or silvery metal. Atomic number 24; atomic weight 52.01; melting point 1615°C.; boiling point 2200°C.; specific gravity 7.1. Chromium ores occur chiefly in Southern Rhodesia, the Union of South Africa, Russia and Turkey. Chromium plate is a familiar, beautiful coating; chromium alloys, such as chromium steel, are even more important. All compounds of chromium are colored. Lead chromate is a yellow pigment.
ingredient in steel alloys, **5**-1635
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Chrysoprase, gem stone
Picture (in color) facing **19**-7225
Chuck-will's-widow, bird, **9**-3372
Chukchi, primitive tribes of northeast Siberia, **16**-5853
Chungking, China, on the Yangtze and Kialing rivers. It is the exporting center for the products of the mountainous region around it. Silk, rice, tea, wool and skins are among the main exports. There is some manufacturing of paint, medicines, leather and oils. The city is over 4,000 years old and became part of China in 220 B.C. During World War II, it was the national capital. Population, 1,062,000.
Chinese capital moved to, **2**-433
Church, Frederic E., American painter, **9**-3332-33
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St. Alexander Church near Sofia, Bulgaria, **14**-5048
St. Andrew, Church of, Cracow, Poland, **13**-4680
St. Gudule, Gothic cathedral, Brussels, Belgium, **15**-5505
Spanish, **19**-6856
stave church of Norway, **15**-5300
Thirteenth century church, Jak, Hungary, **17**-6340
Votive Church, Vienna, Austria, **17**-6194
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Cicero, Marcus Tullius, Roman orator, **16**-5911-12
* life, **5**-1862-63
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in the Senate, **5**-1863
orating to Roman populace, **16**-5911
Cicero, the largest suburb of Chicago, lying west of the city. It is an industrial center, manufacturing telephone equipment, public-address systems and the like. It was first settled around 1849, but it was not incorporated as a town until 1867. Population, 64,712.
Cid, The (Rodrigo Diaz de Bivar), Spanish hero, **14**-4912; **19**-7127
Cid, The, collection of Spanish romances and ballads, **19**-7127
Cid, The, play by Corneille, **18**-6711
Cierva, Juan de la (1896-1936), Spanish aeronautical engineer; invented the autogiro, which was first exhibited and tested in 1928.
Cigar boxes, objects made from cabinet, **15**-5338-39
Cilia, structures in breathing passages, **4**-1326
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Cincinnati, Ohio, seat of Hamilton County. Built on hills and terraces on the north bank of the Ohio River, it is sometimes called "the Queen City." Radios, shoes, soap, machinery, tools, furniture and clothing are among the products made. It is also a music-publishing center. There are over 3000 industrial plants. The first permanent settlement was made in 1788. The name came from the name of a group of Revolutionary War officers. It was given to the town by General Arthur St. Clair who was made governor of the Northwest Territory in 1790. Population, 457,835.
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Cincinnatus, Lucius Quinctius. Legendary Roman hero of the fifth century B.C. In 458 B.C. a Roman army was surrounded by the Æquians in a pass of Mount Algidus. The senate sent for Cincinnatus, who was a renowned general, to become dictator in this emergency. The messengers sent by the senate found Cincinnatus digging in the field on his farm beyond the Tiber. He won a complete victory over the Æquians and then laid down his dictatorship. He had been dictator for only sixteen days.
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Ciudad Trujillo (Santo Domingo), capital of the Dominican Republic. It is on the southern coast at the mouth of the Ozama River. It is the oldest settlement in the Americas, having been founded in 1496 by Batholomew Columbus, brother of Christopher. The city has been laid in ruins twice by hurricanes. It has a famous cathedral in which Christopher Columbus is said to have been buried. Population, 139,100.
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Clark, William (1770-1838). An American soldier and explorer. From 1804 to 1806, with Meriwether Lewis, Clark headed an expedition which crossed the continent.
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Clemenceau, Georges Benjamin Eugène (1841-1929). French editor and statesman. Studied medicine at Paris and practiced that profession for a time. Clemenceau spent four years in the United States. Upon his return to France in 1870 he became active in politics as a radical; he was also prominent in journalism. Clemenceau was Premier from 1906 to 1909 and again from 1917 to 1920. He was an important member of the Peace Conference at Paris in 1919. He was an author of note; his writings include novels and political works.
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Cleveland, Ohio, seat of Cuyahoga County, the largest city in the state and one of the largest in the nation. It is situated on the southern shore of Lake Erie at the mouth of the Cuyahoga River. It has been called "the Forest City" because of the trees and shrubs lining the streets in the residential districts. There are almost 3,000 factories in the city, producing iron and steel, machinery, motor-vehicle parts. Home of Western Reserve University, one of the oldest colleges in the Middle West. The site was founded by Moses Cleaveland in 1796, but the city did not use the same spelling of the name. Population, 867,290.
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Clyde. Important river in Scotland. It rises in the Lowther Hills and flows into the Firth of Clyde at Dumbarton, its basin being the chief industrial center in Scotland and famous for its shipbuilding trade. 106 miles long.
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Cobalt (Co). Chemical element. Gray metal. Atomic number 27; atomic weight 58.94; melting point 1480°C.; specific gravity 8.9. Occurs with ores of other metals, chiefly in Africa. Alloys of cobalt with other metals are used for many different purposes. Cobalt compounds are used to give a blue color to glass and enamel; they are added in small amounts to paint to make it dry quicker.
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Cologne, city in northwest Germany on the west bank of the Rhine River. It is an important river port and trading center, and consequently was bombed during World War II. The Cologne Cathedral is one of the finest examples of Gothic architecture existing. Machinery, metal goods, tobacco, liqueurs, velvet, soap, woolen goods and cotton goods are manufactured, as is the famous eau de Cologne. In 50 A.D. the town became a Roman colony and was named Colonia Agrippina for the wife of Emperor Claudius. It became a part of the German Empire in 870. Population, 488,100. *See also* **12**-4155-56
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Colombo, capital and largest city of Ceylon. It is near the mouth of the Kelani River on the southwest coast of the island. It has a fine harbor and is a center of the tea and coconut trade. It was founded sometime before 1345. In 1517 the Portuguese occupied the town and named it after Christopher Columbus. The Dutch took it over in 1656, and it was captured by the British in 1796. Population, 284,155. *See also* **9**-3184
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Colón. Panamanian city on the Atlantic side of the Panama Canal; capital of the province of Colón. The city of Colón is not included in the Panama Canal Zone; the United States, however, sees to it that certain public health standards are maintained. Colón is an important port. Population 44,000.
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Colorado. State in the Rocky Mountain system; area, 104,247 square miles; capital and largest city, Denver; agricultural products and stock-raising are important; silver, gold, lead, coal and petroleum are extensively produced. Abbreviation, Colo. Nickname, the "Centennial State." State flower, the columbine. Motto, "Nil sine Numine" (Nothing without God). "Colorado" comes from the Spanish word meaning "red."
described in Western States, * **18**-6425-36; * **19**-6841-50
Mesa Verde National Park, **7**-2286
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Colorado Springs, **19**-6844
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Mount of the Holy Cross, **18**-6426
service station atop Pike's Peak, **18**-6426
sheep after shearing, **15**-5578
Colorado Plateau, 19-6842
Colorado River. Longest in the United States after the Mississippi and Missouri. Rising in the Rocky Mountains, it flows 1,650 miles into the Gulf of California, draining about 225,000 square miles. Much of its basin consists of an arid plateau, but irrigation is being carried out.
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* what makes it, **8**-2791-94
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in manufacture and use of paint, **13**-4865, 4868
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Have things any color at night? **13**-4825
How do fireworks get their colors? **13**-4824
How does color get into a bud before it is opened? **3**-879
How does the seed make the color of a plant? **14**-5087
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Is there any color our eyes can not see? **11**-3841
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Why do some colors change in artificial light? **13**-4825
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Why do white things go yellow with age? **13**-4825
Why does grass turn yellow after being made into hay? **13**-4825
Why does red irritate a bull? **13**-4827-28
Why does the sun fade carpets and not flowers? **9**-3177
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Why is the sky blue? **11**-3791-92
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reconstruction (gravure), **7**-2607
Coltsfoot, flower, description, **17**-6274
Colum, Padraic, Irish writer of fairy tales, **6**-2273
See also Poetry Index
Columba, Saint (521-597). Born in Donegal, Ireland; established a famous abbey and training school for missionaries on the island of Iona, in the Hebrides, and converted the people of northern Scotland. Because he founded so many churches and monasteries in Ireland, Scotland and the isles, he is also called Columkillé (Columba of the Churches), **8**-2934
Columbanus, St., Irish missionary, **8**-2936
Columbia, capital of South Carolina and seat of Richland County. It is on the east bank of the Congaree River in the center of the state. Mattresses, textiles, fertilizer and cottonseed oil are made. The site was settled by farmers in 1700, but it was not until 1786 that a town was planned, when a central location was wanted for the state capital. The city was almost destroyed by fire when Union troops occupied it in 1865. Population, 62,396.
Columbia River, 19-6843
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Columbia River Plateau, 19-6843
Columbia University, N. Y. City
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Columbian mammoth, of North America, **6**-2144-45
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* discovery of America, **1**-84-88
first landed in Bahamas, **19**-7102-03
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Columbus, by Joaquin Miller, **5**-1884
from Prelude to Western Star, by Stephen Vincent Benét, **8**-3001
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monument in Seville, Spain, **14**-4914
ship Santa Maria, **11**-3914
Columbus, Georgia, seat of Muscogee County. It is on the Chattahoochee River and is the trading center for the farmers of the Chattahoochee Valley. Its textile industry is large, and it manufactures farm implements, bricks and tiles, engines, boilers and soft drinks. During the Civil War it was the supply center of shoes and swords for the Confederate Army. It was settled in 1828. Population, 53,280.
Columbus, capital of Ohio and seat of Franklin County. It is in the central part of the state at the junction of the Scioto and Olentangy rivers. Oil, coal and natural gas are found in the region, and the city has largest mining-machinery factory in the world. Machine-shop products, boots and shoes are also manufactured, and the city is a center for scientific research. It was first settled in 1797 and was called Franklinton. It was made the state capital in 1812, and the name was changed in 1816. Population, 323,000.
Columbus Day, 6-2089

Columns, in Egyptian architecture, **14**-5211
in Greek architecture, **15**-5343-44
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Comber, fish. *Picture* (in color), **16**-5783
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Greek writers, **16**-5752-53
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Comedy of Errors, The, play by Shakespeare
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Comenius, European educator of the late Renaissance period, **14**-5251
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* account of, **10**-3665-71
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common comfrey (in color), **16**-5883
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Commerce
* trade between nations, **17**-6083-84
between China and ancient Rome and Greece, **2**-424
growth in feudal times, **6**-1942-43
influence in development of Dominion of Canada, **4**-1483-84
See also Trade
Commines, Philippe de, French writer, **18**-6564
Commodus, Lucius Ælius Aurelius (161-192 A.D.), Emperor of Rome from 180 to 192 A.D.
reign of, **4**-1249
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Commonwealth of Nations
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* inventors of telegraph, telephone and radio, **17**-6234-48
* how we send a telegram, **17**-6049-61
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in China, **2**-433
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What is meant by communism? **8**-3015
Communist party
in Germany, **12**-4172, 4181
Como, Lake of. Beautiful lake in northern Italy, fed by the Adda. Lying due north of Milan, it is 55 square miles in extent, being about 43 miles long, and from one to two and a half miles broad.
Picture, **12**-4410
Companion of a ship, **13**-4848
Companion-ladder of a ship, **13**-4848
Companion-way of a ship, **13**-4848
Company of One Hundred Associates (also called Company of New France), **2**-679
Compasses
for airplanes, **1**-184-85
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how to use a watch as a compass, **7**-2381
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why compass needles point north-south, **11**-4089-90
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Why are some people dark and some fair? **5**-1808
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Composite Family, in botany, **13**-4874
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in Diesel engine, **4**-1353-54
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Compton, Arthur Holly, American scientist, **4**-1228
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Comstock, Anna Botsford, American naturalist, **14**-5271
Comus, masque by John Milton
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Concarneau, France
Picture
harbor, **3**-1021
Concepción. Chief port of southern Chile, the capital of the province of the same name. Founded in 1550, it is situated 6 miles from the mouth of the Biobio River. Population, 85,000.
Conches, kind of seashells
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Concord, Mass.
Minutemen, **17**-6180
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Concord Monument, **18**-6832
home of Ralph Waldo Emerson, **13**-4715
statue of minute man, **4**-1161
Concord, capital of New Hampshire and seat of Merrimack County. It is on the Merrimack River in the south-central part of the state. It has granite works, textile mills; and produces stoves, wheels, electrical instruments, sinks. It was founded as the town of Penacook in 1727 and took the name of Concord in 1765. In 1808 it became the state capital. Population, 27,171.
Concord, Battle of, 4-1162
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Concord Hymn, by Ralph Waldo Emerson, **8**-3008
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Concrete, man-made stone
* manufacture, **7**-2312-18
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Condillac, Etienne de, French philosopher, **18**-6715
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Condors, birds, **10**-3760
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Conductors, of electricity, **10**-3690-91
Conductors, Orchestra
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What does the orchestra conductor do with his stick? **10**-3770
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Cones, visual cells, **11**-3805, 3807
Conestoga wagon
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What is confectioners' sugar? **15**-5438
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Confederation, of Canada to form Dominion, **4**-1485
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Confucius, Chinese philosopher, **9**-3089-90
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state organized under Leopold II, **18**-6805-06
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Congress, Library of, *see* Library of Congress
Congress Colors, first official American flag, **19**-7182
Congress of U. S., *see* United States—Congress
Congress of Vienna, *see* Vienna, Congress of
Congressional Record, The, is a printed record of the proceedings of the U. S. Congress, published every day Congress is in session. However, it is not the official record of proceedings;

Congressional Record (*continued*)
the Senate and House Journals contain these. The Record has been published by the Government since 1873, although several series of similar reports had been published privately since 1789.
Conifers, cone-bearing trees, **1**-221-22
Conjuring, *see* Tricks
Connaught. Western province of Ireland, comprising Galway, Leitrim, Roscommon, Sligo and Mayo. Mountainous and boggy, with several large lakes, it has only two towns, Galway and Sligo, with more than 10,000 people. Area, 6,863 square miles.
Connaught Tunnel, British Columbia. *Picture,* **2**-522
Connecticut. One of the original thirteen states of the United States; area, 5,009 square miles; capital, Hartford. Manufactures of many sorts are important, at Bridgeport and New Haven. Building stones are found. Abbreviation, Conn. Nickname, the "Nutmeg State." State flower, the mountain laurel. Motto, "Qui Transtulit, Sustinet" (He Who Transplanted Still Sustains.) "Connecticut" comes from the Indian word meaning "Long River." First settlement, thought to have been at Windsor, about 1633.
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capitol at Hartford, **18**-6683
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poultry farm, **10**-3406
Yale University, **12**-4307; **18**-6687
Connecticut River. American river, rising in Connecticut Lake, New Hampshire; empties into Long Island Sound. 350 miles.
Connor, Ralph, pen name, *see* Gordon, Charles William
Conquerors of disease, * **15**-5481-93
Conquerors of the Sea, * **17**-6397-6408
Conrad, Joseph, Polish-English novelist, **11**-4103-04
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* of forests, **8**-2803-05
* irrigation, **7**-2543-55
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scientifically planted farm lands, **8**-2663, 2668
Conservation of Matter and Energy, * **4**-1358-59
Conservation of Matter and Energy, Law of, in physics, **3**-1155
Conservative party, of Canada, **4**-1485, 1487
Conservative party, of England, **7**-2305-06, 2308
Consolation, The, philosophical work by Boethius, **16**-5919
Constable, John, English painter, **7**-2328-30
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Hay Wain, **6**-2231
Constant, Benjamin, French painter
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Constanta, Rumania. *Picture,* **14**-5045
Constantine I, king of Greece, **14**-5039, 5041
Constantine V, Byzantine emperor, **4**-1319
Constantine the Great, emperor of Rome
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leading his troops in battle, **4**-1250
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capture by Turks in 1453, **13**-4799
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Constellations, of stars
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Constitutional Convention, of 1787, **5**-1697
Consulate, in France, **6**-2202
Consumers' co-operatives, 18-6599-6600
Contempt of court. The law term given to open disrespect or disobedience to the rules or orders of a court; also to an unreasonable interruption of the proceedings of a court.
Contentment
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Contest, how to conduct a tournament, **16**-5890-91
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Continent of Europe, * **3**-1021-30
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Continental Divide, Yellowstone National Park, **2**-732
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What do we mean by contraband? **9**-3355
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Cook, Capt. James. English navigator; born, Marton, Yorkshire, 1728; killed in Hawaii, 1779.
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explorations in Australia, **7**-2464
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Cook, Mount, New Zealand, **7**-2578
Cook Islands, government and population, **7**-2581
Cooke, Edmund Vance, *see* Poetry Index
Cookies, ice box
recipe for, **7**-2517
Cooking
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Why do we cook the food we eat? **6**-2125
Why does boiling make an egg hard? **12**-4491
Why is it good to boil potatoes in their jackets? **10**-3771
Coolidge, Calvin, president of U. S.
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administrations and outline of life, **11**-3954b
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Coolidge, Mrs. Grace Goodhue, wife of Calvin Coolidge, **8**-2812
Cooper, Anthony Ashley, *see* Shaftesbury, 1st earl of
Cooper, George, *see* Poetry Index
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* Last of the Mohicans, quotations and summary, **1**-267-78
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home, Cooperstown, New York, **13**-4711
Cooper, Peter (1791-1883). An American inventor, manufacturer and philanthropist, born in New York City. He founded Cooper Union between 1857 and 1859. Greenback candidate for president, 1876.
founded Cooper Union, **17**-6216, 6219

Cooper Union, New York City, **17**-6216, 6219
Co-operation, * **18**-6593-6602
Co-operative movement, **18**-6599-6602
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home of J. Fenimore Cooper, **13**-4711
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Cope, C. W., British artist
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Charles I at Nottingham, **6**-2096
Cope, John, attack on Jacobites, **8**-2788
Copenhagen (Köbenhavn), capital and largest city of Denmark. It is an important port on the east coast of the Island of Zealand. It is the center of art and literature in Denmark and in the north of Europe. More than half of the country's shipping is carried on in its harbor, and there is manufacture of porcelain, lace, silverware, clocks and pianos. Fishing is also important. The university is one of the oldest in Europe, dating from 1478. In 1043 the city was a fishing village. The name means "merchant's haven." Population, 927,400. *See also* **15**-5296
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Copenhagen, Battle of, **6**-2203
Copernicus, Nicolaus, Polish astronomer, **11**-3846
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Copley, John Singleton, American painter, **9**-3326
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Portrait of Mr. and Mrs. Ralph Izard, **9**-3324
Portrait of Lady Wentworth, **9**-3324
Copper (Cu, from Latin *cuprum*). Chemical element. Reddish metal. Atomic number 29; atomic weight 63.57; melting point 1083°C.; boiling point 2300°C.; specific gravity 8.9. Copper ores are widely distributed. Deposits in Spain were worked by the Romans and are still important today. Pure copper is used for electric conductors. Many alloys of copper are widely used, either cast or wrought; some are called brass, some bronze. Copper compounds are used as fungicides (fungus-destroyers).
by-products of, **2**-638-39
chemical composition, **16**-5675-76
feathers of birds, turacos, contain copper, **10**-3502
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use in house construction, **9**-3123
uses of, **4**-1306-07; **9**-3208-09
verdigris compound, **13**-4596
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copper mine, Butte, Montana, **18**-6646
"copper mountain," Chuquimata, Chile, **19**-7039
loading copper in Chile, **18**-6784
mining and refining, **18**-6634
open-pit mine, Bingham, Utah, **9**-3212
use in houses, **9**-3123
Copperheads, snakes, **15**-5414
Coral, marine polyp, **19**-7068-69
in Jurassic period, **5**-1545-46
in Silurian period, **3**-1032
islands made of, **9**-3294
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in Silurian period, **3**-1033
Coral root, flower. *Picture* (in color), **13**-4879
Coral Sea, U. S. aircraft carrier
Picture, **18**-6822
Coral snakes, **15**-5413
Picture, **15**-5413
Cord, extension
how to repair, **15**-5598
Cordage, *see* Rope
Cordilleras, a name from the Spanish language meaning a long, continuous mountain chain. It was first given by the Spaniards to the chains of the Andes in South America, and was afterward applied to the entire western mountain system, or backbone, of the Western Hemisphere.
of North America, **1**-153-55
of South America, **18**-6778-79
Córdoba, Argentina, capital of the province of the same name, on the Rio Primero, in the center of the country northwest of Buenos Aires. It is the oldest city in the country and has the oldest university. In size it is the third city of Argentina. The region around the city is irrigated by a dam
Córdoba (*continued*)
12 miles from the city, and it is good country for raising livestock. It was founded in 1583. Population, 287,600.
Córdoba, Spain, **14**-4931
mosque, **15**-5470
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Córdoba, Caliphate of, **14**-4911
Corduroy roads, old-time highways, **8**-?776
Coreopsis. *Picture* (gravure), **19**-7174
Coriander seeds, **8**-2996
Corinna of Thebes, Greek poet, **16**-5750
Corinth Canal, Greece, **3**-861
on map, **14**-5040
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Corinthian Order, in architecture, **15**-5342-43, 5345
Corinthian War, 395-87 B.C., **3**-924
Cork. Southernmost county of Ireland, in Munster. Agriculture and some mining are carried on; dairying is important; and Cork, the capital, Cobh, Youghal and Kinsale are prominent as ports. Area, 2,890 square miles.
Cork
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cork bark ready for export in Portugal, **14**-5188
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Cork elm trees, **12**-4246
Corkwing fish. *Picture* (in color), **16**-5781
Cormac Mac Art, ancient king of Ireland, **8**-2932-33
Cormon, Fernand, French painter
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celebrating the Greek victory of Salamis, **3**-913
Cormorants, water birds, **11**-3882
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Corn (on foot)
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Corn cockle, plant, **15**-5395
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Corn Laws, British customs duties, **4**-1484
Corn-root aphid. *Pictures,* **18**-6796
Corn salad, flower
Pictures (in color), **15**-5397-98
Corncrake, bird, **11**-4130
Cornea, part of eye, **11**-3802
Corneille, Pierre, French writer, **18**-6711
Cornel, dwarf, flowering plant, **18**-6576-77
Picture, **14**-4987
Cornelia, mother of the Gracchi, **4**-1363
Picture, **4**-1363
Cornell, Ezra (1807-74). American engineer and contractor; born, Westchester Landing, N. Y. Founder of Cornell University, Ithaca, N. Y.
submarine cable of, **12**-4293
Cornell University
founding, **12**-4316
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Pictures, **8**-2924
Cumulus clouds, **8**-2925-26
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Cunaxa, Battle of, **3**-924
Cuneiform writing, **2**-651; **10**-3547
Picture, **10**-3548
Cunning Alchemist (story), **13**-4773
Cunningham, Allan, *see* Poetry Index
Cunningham, Andrew B., Sir (1883-). Admiral of the Fleet, First Sea Lord and Chief of the Naval Staff since 1943. He was commander-in-chief of the Allied naval forces in the Mediterranean during the North African and Sicilian campaigns.
Cunningham, Andrew B. (*continued*)
Cunningham, Alexander and Tedder were the commanders, respectively, of the sea, land and air forces under the supreme command of General Eisenhower. Cunningham served through World War I and commanded the British fleet in the Mediterranean from 1939 until the collapse of Italy.
Cunningham, Glenn, American athlete, **5**-1618
Picture, **5**-1617
Cunningham-Graham, Robert, *see* Poetry Index
Cunningham's Comet, **10**-3670
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Picture
Dutch colonial, **18**-6769
Cupid (Eros), god of love, **9**-3228
Cups
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Curaçao, island, account of, **19**-7104
Curassows, birds of South America, **12**-4368
Picture, **12**-4367
Curcuma, plant, yields turmeric, **8**-2996
Curd, formed from milk, **7**-2323-24
Curie, Marie Skladovska, Polish physicist, **3**-992-93
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Picture, **3**-991
Curie, Pierre, French physicist, **3**-992-93
work in radioactivity, **16**-5798-99
Curiosity, as emotion and instinct, **12**-4442
Curium (Cm). Chemical element. Atomic number 96. Curium was discovered in 1944 by Glenn T. Seaborg at the University of California. It can be made by bombarding plutonium^{239} (plutonium of mass number 239) with alpha particles.
Curlews, birds, **11**-4009-10, 4012
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in Canada, **10**-3694-95
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red-flowered currant, flower, **19**-6935
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Current Electricity, * **11**-4033-41
Current meter, device for measuring flow of water, **7**-2554
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in Arctic regions, **12**-4236
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What makes the currents that flow through the sea? **15**-5517-18
Picture
chart of ocean currents (color), **16**-6028
Curry, native food of India, **8**-2993
Curtain fig tree of Australia. *Picture,* **9**-3260
Curtin, John (1885-1945). Australian statesman. At his death he was prime minister. He had held this office since 1941, when he also became Minister of Defense Co-ordination in his own cabinet. This was the first labor government in Australia since 1932. He was born at Creswick, Victoria, and became a trade-union journalist. From 1917 to 1928 he was editor of a labor paper, the Worker, and published a long series of pamphlets on social and political problems.
Curtis, Charles, vice-president of U. S.
Picture
portrait (gravure), **11**-3945
Curzon, Alfred de, artist
Picture
Psyche (gravure), **9**-3229
Cuscus, marsupial animal, **7**-2502
Picture (gravure), **7**-2508
Custer, George Armstrong (1839-76). American soldier born in Ohio. He graduated from West Point in 1861 and during the Civil War rose from lieutenant to major-general of volunteers; returned to regular army as lieutenant-colonel in 1866 and was constantly engaged in fighting Indians; attacked much larger force of Sioux Indians on the Little Big Horn in Montana and was killed with his whole force.
Cut glass, manufacture of, **18**-6747
Cut-water, bird, name for skimmer, **11**-4122
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* Tale of a knife and fork, **4**-1305-14
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Cutting, the editing of motion pictures, **11**-3974
Cuttlefish, account of, **16**-5898
like imaginary creature, the kraken, **1**-358
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Cuvier, Georges, French scientist, **3**-980-81
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Cuvier's beaked whale, sea mammal, **7**-2346
Picture, **7**-2346
Cuyp, Albert, Dutch painter, **5**-1592
Picture
River Scene with Cattle, **5**-1591
Cuzco. City of Peru, famous as the ancient capital of the Incas; captured by Pizarro in 1533. It has one of the finest cathedrals in South America and a university founded in 1692.
Picture, **19**-6980
Cybele, Roman goddess
Picture
in her chariot, **18**-6763
Cycads, plants, **1**-221-22; **4**-1402
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* chemical cycles in nature, **17**-6202-05
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Cyclone, windstorm, **16**-6022, 6030, 6032
Cyclonium, *see* Illinium
Cyclopedias, *see* Encyclopedias
Cyclopses, monsters in Greek mythology, **9**-3236; **12**-4337-38
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Cyclotron, or "atom-smasher," **4**-1229-30; **11**-4068
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Cygnus (the Swan), constellation, **11**-3926
Cylinder printing-press, **9**-3389-90
Cylinders, of automobiles, **19**-7029
Cymbals, musical instrument, **4**-1293
Cymbeline, play by Shakespeare
Poems from
Fear No More, **10**-3484
Hark! Hark! The Lark, **10**-3485
Cynics. A school of philosophers founded at Athens about 380 B.C. by Antisthenes, a pupil of Socrates. The Cynics believed that the only happiness possible to men consisted in limiting their ambitions and desires and giving up the refinements of civilized life.
Cypress trees, description, **12**-4250
wood of bald cypress, **10**-3771-72
Cypripedium, *see* Lady's slipper
Cyprus, Mediterranean island, **9**-3182
Pictures, **9**-3183
Cyril, Greek monk
designed Slav alphabet, **10**-3549
Cyrus, Persian prince, **3**-924
Cyrus the Great, Persian ruler, **9**-3144
Picture, **9**-3142
Cytherea, orchid, description, **19**-6928
Cytoplasm, of living cell, **2**-558-59
Czechoslovakia
* history and description, **17**-6342-45
in World War II, **18**-6450-51
led by Eduard Beneš, **13**-4591-92
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Dabchick, bird, variety of grebe, **11**-4130
Picture (in color), **9**-3283
Dabs, fishes. *Picture,* **16**-5779
Dachshunds, dogs
Pictures, **12**-4264; (gravure), **2**-715
Dacia, Roman province, **14**-5045
Dactylic metre, in poetry, **19**-6867-68
Daddy longlegs, English name for cranefly, **17**-6416-17
Picture, **17**-6419
Daedalus, builder of Labyrinth, Crete, **2**-449
Daemon (Genius), patron saint of every man, **9**-3234
Daffodils, flowers, **17**-6126
description, **19**-7172
Poem about
Daffodils, by William Wordsworth, **3**-1137
Pictures, (in color), **14**-4992; **17**-6126
Daffydowndilly, *see* Daffodils
Da Gama, Vasco, *see* Gama
Dagnan-Bouveret, Pascale Adolphe Jean, French painter, **7**-2480
Picture
Blessed Bread, **7**-2477
Dahlias
development of, **4**-1472
Pictures, **4**-1469; (gravure), **19**-7174-78
Dahomey. French West Africa colony between the Gold Coast and Nigeria. Porto Novo is the capital, and corn, palm-oil, kola nuts and dried fish are the chief exports.
Dail Eireann, Parliament of Republic of Ireland, **8**-2944
Daingerfield, Elliott, American painter, **10**-3511
Dairen (Dalny), China, a seaport on the south coast of Kwantung Peninsula. It has a good harbor, and the chief exports are coal, soya beans, bean cakes and cereals. The harbor is free from ice most of the year. The Russians leased the peninsula from China in 1898 and called the city Dalny. The Chinese name for it is Ta-lien. It received the name Dairen from the Japanese after the Russo-Japanese War. It is now a free port and Russia leases half of the harbor. Population, 600,000.
Dairying
in Northeastern U. S., **10**-3406-07
value of U. S. production, **9**-3208
See also Cheese, Milk
Pictures, **1**-376-78; **7**-2324
German dairy, **12**-4164
in Denmark, **15**-5294
in Holland, **15**-5565
Wisconsin cheese factory, **15**-5279
Daisies, flower made of tiny flowers, **13**-4874
mountain varieties, **18**-6661
Poem about
A Daisy at Christmas, by James Montgomery, **3**-1136-37
Pictures, English daisy (in color), **14**-4994
European daisy, **13**-4870
Michaelmas daisies (gravure), **19**-7179
mountain daisies, **18**-6659, 6663
white daisy (in color), **15**-5611
Daisy-asters, flowers, description, **18**-6661-62
Picture and note, **18**-6657
Dakar, capital and seaport of French West Africa, the most important city in the province of Senegal. The route between Dakar and Natal, Brazil, is the shortest across the South Atlantic. The harbor is excellent. One of the chief exports is peanuts. During World War II the city was valuable for getting supplies to the Allies in the North African campaign. Population, 40,000.
Dakin, Henry Drysdale, and Carrel-Dakin solution, **15**-5491
Daladier, Edouard, French premier, **18**-6606-07
Dalai Lama, leader of Buddhists in Tibet, **18**-6588-90
Picture
Palace of, **18**-6589
Dale, Sir Thomas, governor of Virginia, **2**-545
Dalin, Olaf von, Swedish writer, **19**-7014
Dallas, George M., vice-president of U. S.
Picture
portrait (gravure), **11**-3948
Dallas, Texas, seat of Dallas County, in the northeastern part of the state on the Trinity River. Cotton is the major crop of the district, but large amounts of corn, wheat and oats are grown. Livestock and poultry are also important. It is the leading cotton-gin-manufacturing center in the world, and also makes furniture, textiles, clothing and beverages. It is one of the major oil centers of the Southwest. The first settlement was made by John Neely Bryan in 1841. In 1846 it was named Dallas in honor of the vice-president of the United States, George Mifflin Dallas. Population, 294,734.
Picture
Main Street, **14**-4897
Dallin, Cyrus E., American sculptor, **14**-4939
Dalmatia, state of Yugoslavia, **17**-6345-48
Dalmatians, hunting dogs
Picture (gravure), **2**-716
Dalou, Jules, French sculptor, **13**-4706
Picture
Peasant Woman, **13**-4705
Dalton, John, English chemist, **2**-705-06
Damascus, capital of Syria. It is at the eastern end of the Anti-Libanus Mountains; and because

Damascus (*continued*)
of the beautiful country around it, it is called the "Pearl of the Desert." The city itself is supposed to be the oldest in the world and is not beautiful because of its narrow, crooked, dirty streets. It is important historically for the part it has played in Jewish and Christian religions. Swords of Damascus steel were once famous; and fine damask is still woven there. It is thought that the city was founded about 2200 B.C. Population, 286,300.
See also, **18**-6678
Pictures, **18**-6678
cloisters of the great mosque (gravure), **16**-5724
Dame schools, in colonial days, **3**-969
Damien, Father, missionary to lepers, * **15**-5452-53
Damon and Pythias, **13**-4577-78
Dampier, Capt. William. English navigator; born, 1652; died, 1715. Explored the west coast of Australia in 1688.
Dams
* irrigation of desert areas, **7**-2543-55
* water power of the world, **18**-6753-62
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Assuan dam, **7**-2550
Bartlett Dam, **7**-2552
Bonneville Dam, **18**-6753
Bow River dam, Canada, **7**-2543
Chickamauga Dam, **9**-3213
Croton dam, **14**-5052
Gilboa dam, **14**-5053
Grand Coulee Dam, **12**-4406
switchyard, **9**-3213
Grimsel dam, Switzerland, **16**-6004
Hoover Dam, **7**-2551
Rio das Lagas, Brazil, **18**-6757
Roosevelt dam, **7**-2551
Shasta Dam, **18**-6759
Shoshone dam and reservoir, Wyoming, **18**-6429
Wilson Dam, Muscle Shoals, **7**-2314
Damsel fish
Pictures (in color), **16**-5787-88
Damsel fly, insect, **18**-6731
Picture, **17**-6077
Dana, James Dwight, American geologist, **19**-7056
Dana, Richard Henry, Jr., American author, **13**-4710
Dancing, folk dances
Pictures
native dance in French Equatorial Africa, **18**-6810
Spanish dancers, **14**-4925
Dancing-school, in colonial times, **3**-971, 975-76
Dandelions, weeds, **15**-5392-93
Russian dandelion, kok-saghyz, source of rubber, **4**-1408
Pictures, **15**-5392
Russian dandelion, **4**-1411
Dandolo, Enrico, doge of Venice, **4**-1322
Picture
defied by Byzantine emperor, **4**-1324
Danegeld, first British tax for defense, **5**-1570
Danelaw, part of England given to Danes, **5**-1569
Danes, invasion of England, **5**-1569-70
See also Northmen and Vikings
Daniel, prophet of Israel, in Babylon, **2**-660
Daniel, Samuel, English poet, **3**-1118
Danish West Indies
bought by U. S., **19**-7102
Dannecker, Johann Heinrich von, German sculptor, **13**-4858
D'Annunzio, Gabriele, Italian writer, **17**-6154
activity in World War I, **12**-4413
Picture, **17**-6154
Dante Alighieri, Italian poet
friendship with Giotto, **5**-1733
life and works, **17**-6150-52
Pictures
Dante beholds Beatrice, **17**-6149-54
with Giotto, **5**-1734
Danton, Georges Jacques. French revolutionary, the greatest of the Jacobins; born, 1759; guillotined at Paris, 1794.
Danube. Most important river of Central Europe, and one of the finest in the world. It rises in Germany, in the Black Forest, and flows into the Black Sea through Czechoslovakia, Hungary, Yugoslavia, Bulgaria and Rumania. The Danube is 1,725 miles long, with 300 tributaries and a drainage basin of 315,000 square miles. The most important cities it passes are: Ulm and Regensburg in Germany; Linz and Vienna in Austria; Pressburg in Czechoslovakia; Budapest in Hungary; Russe (Rustchuk) in Bulgaria; Braila, Galati (Galatz), Ismail and Sulina in Rumania. Its chief tributaries are the Iser, Inn, Raab, Waag, Drava, Sava, Morava, Theiss, Sereth and Pruth. River steamers can go up it to Linz, but ocean steamers can not pass the Iron Gates. *See also* **17**-6191
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at Budapest, **3**-1026
Iron Gates, **14**-5045
Danville, Virginia
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cotton mill, **14**-4893
Daphne, Greece
Picture
church and monastery (gravure), **16**-5723
Daphne, Trailing, flower
Picture (in color), **15**-5609
Daphnis, in mythology, **9**-3237
Dardanelles. Narrow strait connecting the Aegean Sea and the Sea of Marmora, and dividing Europe from Asia Minor. 47 miles long and from three to four miles broad, it was known to the ancients as the Hellespont.
Dare, Virginia, first English child born in America, **3**-966; **17**-6336
Picture, baptism, **3**-965
Dar es Salaam, capital of Tanganyika Territory in East Africa. It is a seaport, and the major exports are rubber and ivory. It is about 40 miles from Zanzibar. Population, 63,400.
Darius I, the Great, king of Persia, **9**-3144-45
attack on Greece, **3**-916-17
Darius III, king of Persia, **3**-926-27
Darius, Palace of, Persepolis
built on platform, **14**-5209
Dark Ages, *see* Middle Ages
Dark horse is a term used in racing to describe a horse entered for a race but about which very little is known by the general public. The same term is heard in politics, applying to a candidate who is not well known.
Darkness, *see* Light
Darnel, grass
Picture (in color), **10**-3523
Darnley, Henry Stewart, Lord, husband of Mary Queen of Scots, **5**-1818; **15**-5652
Dart River, England
Picture (gravure), **7**-2303
Darters, or **snake-birds**, **11**-3882-83
Picture, **11**-3882
Dartford warbler, bird, **9**-3278
Dartmouth College
history, **12**-4313
Picture, **12**-4317
Darwin, Charles Robert, English scientist, **3**-983-85
Picture
in his study, **3**-982
Darwin, Erasmus, English doctor and scientist, **3**-983
Darwin frogs, **15**-5456
Darwinian Theory, of origin of species, **3**-984-85
Dassies, *see* Hyraxes
Dasyure, marsupial animal, **7**-2509
Picture (gravure), **7**-2507
Date Line, International
explanation, **4**-1449-50; **7**-2359-61
Dates
* account of, **6**-2155-57
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date-palms in Libya, **18**-6803
sorting and packing in Sahara oasis, **18**-6736
Dates, time
Question about
How can a person have lived from 380 B.C. to 320 B.C.? **1**-78
Daubigny, Charles François, French painter, **7**-2370
Pictures
Boats on the River Oise, **9**-3071
Sunset (gravure), **7**-2375
The Water Gate, **9**-3071
Dauchez, French painter, **8**-2856
Daudet, Alphonse, **18**-6718
Daugherty, James, American illustrator
Picture
David and Goliath, **4**-1256

Daughters of the American Revolution. A patriotic society for American Women organized in Washington, D. C., 1890. Membership is limited to women who can furnish proof that one ancestor at least aided in establishing American independence.
"Daughters of the King," brides for settlers of New France, **2**-679
Picture
landing at Quebec, **2**-680
Davenant, William, see Poetry Index
Davenport, Thomas, American scientist
work in electromagnetism, **11**-3985
Davenport, Iowa, seat of Scott County. It is on the west bank of the Mississippi River across from Rock Island and Moline, which are spoken of with Davenport as the Tri-city group. The region is known as a hog- and corn-growing center; and in the city washing machines, cereals, cigars, wheels, foundry products and men's clothing are made. The town was founded by George Davenport, a trader from Rock Island, and Antoine Le Claire, of French and Indian stock, in 1836. Population, 66,039.
David, king of Israel
* as a youth, **4**-1255-57
Picture, **4**-1256
from statues
by Donatello, **13**-4614
by Michelangelo, **1**-65, 68; **5**-1742
by Verrocchio, **13**-4614
David I, king of Scotland, **15**-5646
Picture, **15**-5647
David, Gérard, Flemish artist, **4**-1225
Picture
The Adoration of the Child, **4**-1224
David, Jacques Louis, French painter, **6**-2077-80
Pictures
Coronation of Josephine by Napoleon, **6**-2079
Madame Récamier, **6**-2078
Mlle. Charlotte du Val D'Ognes, **6**-2076
David Copperfield, novel by Dickens
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Picture
Mr. Micawber at a party, **8**-2731
Davies, Arthur B., American painter, **10**-3455, 3514-16
Picture
Unicorns, **10**-3511
Davies, W. H., British poet, **12**-4210-11
See also Poetry Index
Davis, Charles H., American painter, **10**-3511
Da Vinci, Leonardo, *see* Vinci, Leonardo da
Davis, Jefferson (1808-89). American soldier and official, born in Kentucky. He graduated from West Point; later resigned from army, but volunteered for Mexican War; later U. S. Senator and Secretary of War; president of the Confederate States, 1861-65.
becomes president of Confederacy, **7**-2430, 2443
birthday a holiday in South, **6**-2091
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Davis, John, Arctic explorer, **8**-2980
discovered Davis Strait, **2**-396
Davis, Mary
Picture, portrait, **6**-2002
Davis, Richard Harding, American writer, **13**-4791
Davits on a ship, **13**-4848
Davy, Sir Humphry, English scientist, **2**-706, 709
discovered that nitrous oxide is anæsthetic, **8**-2729
use of voltaic pile, **11**-3984
Picture, as a boy, **2**-708
Dawes, Charles G., vice-president of U. S.
Picture, portrait (gravure), **11**-3945
Dawn
Question about
Is it darkest just before dawn? **10**-3476
Dawn horse (Eohippus), **6**-2012
Picture, **6**-2011
Dawson, John William, Canadian geologist, **19**-7056
Dawson, capital of Yukon Territory. It is built at the point where the Yukon and Klondike rivers meet, and it is the trading center of the Klondike mining region. The town came into existence and grew rapidly after gold was discovered in the Klondike in 1896. At one time the population was over 10,000, but it is now hardly more than a tenth that size.
Day Birds of Prey, * **10**-3753-64
Day fly, insect, **18**-6732-33
Pictures, **18**-6733-34
Day-lily, 19-7172
Daylight Saving
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What is Daylight Saving? **2**-460-61
Days
length changed by earth's motion, **1**-24-25
why they grow short and long, **1**-236-37
Poem about
Days, by Ralph Waldo Emerson, **4**-1513
Questions about
Has the day always been divided into twenty-four equal hours? **4**-1450
How can we tell the number of days in another world's year? **4**-1450
How did the days get their names? **4**-1451
How did we get April Fool's Day? **4**-1450-51
How is the date of Easter fixed? **4**-1451-52
How is time divided? **4**-1453
What is Ground Hog Day? **4**-1452-53
What is the meaning of Hallowe'en? **4**-1453
What is meant by the Greek Kalends? **4**-1450
What is meant by St. Valentine's Day? **4**-1450
What is meant by the term red-letter day? **4**-1453
Where does the day begin? **4**-1449-50
Days We Celebrate, * **6**-2088-95
Dayton, Ohio, seat of Montgomery County. The Great Miami, Mad and Stillwater rivers and Wolf Creek meet there. The city is called the "Home of Aviation" because it was the home of the Wright brothers. At Wright Field much research in aviation is carried on. Cash registers, refrigerators, pumps, electric motors, air-conditioning equipment and ice-cream cones are manufactured. Settlers from Cincinnati founded a village in 1796, and named it for General Jonathan Dayton, one of the first settlers. Population, 215,596.
Dead-letter Office, U. S.
receives carelessly addressed mail, **8**-2656
Dead-nettles, plants, **14**-4980
Dead Sea, 1-126
Question about
Why can't fish live in the Dead Sea? **15**-5517
Picture, **15**-5517
Deadly nightshade, *see* Nightshade—deadly
Deafness
Pictures
ways of overcoming faulty hearing, **9**-3311
Dealfish. *Picture* (in color), **16**-5782
Dearborn, Michigan. The Rouge River flows through Dearborn and merges with the Detroit River near the city. Dearborn joins Detroit on the southwest. It is best known as the home of the Ford Motor Company, but it also manufactures tools, bricks and road-paving machinery. The Edison Institute of Technology and the Edison Memorial are there, as is Greenfield Village—a collection of historic buildings that form a great museum. Settlers first came after the War of 1812, and it came to be known as Dearborn after General Henry Dearborn of the Revolutionary War. Population, 63,584.
Death
story about
Men who went to kill death, by Chaucer, **13**-4770
Poems about, **10**-3735-43
An Epitaph on Salathiel Pavy, by Ben Jonson, **13**-4597
Conclusion, by Sir Walter Raleigh, **13**-4602
Cowards die many times before their deaths, by Shakespeare, **10**-3478
Death, Be Not Proud, by John Donne, **19**-6991
I Have a Rendezvous with Death, by Alan Seeger, **5**-1890
Prospice, by Robert Browning, **16**-5711
Requiescat, by Matthew Arnold, **16**-5708
Thanatopsis (in part), by William Cullen Bryant, **16**-5825
Death adder, snake, **15**-5413
Death rate, how determined, **18**-6485-86
Death tick beetles, 18-6628
Death Valley, California, description, **19**-6841
Pictures, **19**-6843
Debate, how to conduct, **8**-2876-79
De Bougainville, Louis Antoine, *see* Bougainville, Louis Antoine de
De Broglie, Louis Victor, Prince, French scientist, **4**-1229
Debussy, Claude Achille, French composer, **19**-6919, 7152
Decameron, collection of prose tales by Boccaccio account of, **17**-6153-54

Decamps, Alexandre Gabriel, French painter, 6-2082
Decatur, Stephen, early American seaman, 17-6327-28
Picture
fighting the Barbary pirates, 17-6329
Decatur, Illinois, seat of Macon County, on Lake Decatur, which was formed by damming the Sangamon River. It is an important trading center for the rich farming region around it. Manufacture of corn products and processing of soybeans are the major industries. Lincoln received his first endorsement for the presidency at a party convention in the city. The first post of the Grand Army of the Republic was established in the city in 1866. The first settlement was made in 1830. Population, 59,305.
Deccan, plateau of India, 8-2821
December. Latin for the 10th month reckoning from March, with us the 12th and last, having thirty-one days. In this month the sun touches the tropic of Capricorn at the winter solstice, its greatest distance south of the equator.
Decibel, unit of sound measurement, 10-3634
Decimal system of numbers, 19-7008
Deck of a ship, 13-4847
Declaration of Independence
and Independence Day, 6-2092
list of signers, with facsimiles of signatures, 20-7578
signing of, 1776, 4-1165
text and introductory note, 20-7579-83
Decline and Fall of the Roman Empire, The, historical work by Gibbon
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De la Roche, Mazo, Canadian novelist, 14-5112
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Delaroche, Paul (Hippolyte), French painter, 6-2082
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Last hours of Queen Elizabeth (gravure), 5-1824
Delaware. State; area, 2,057 sq. mi.; capital, Dover. Wilmington, largest city. Leather making, pulp goods, iron and steel, railroad cars, shipyards, knitting and rayon making are chief industries. Agriculture is important. Abbreviation, Del. Nickname, the "Diamond State." State flower, the peach blossom. Motto, "Liberty and Independence." Delaware was named after Lord De La Warr, Governor of Virginia. First settlement near Wilmington, 1638.
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Delaware River. American river rising in the Catskill Mountains and flowing past Philadelphia into the Atlantic. It is navigable up to Trenton, 130 miles from its mouth. 360 miles. A great shipbuilding center.
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suspension bridge at Philadelphia, 1-30
De la Warr, Lord
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Delicious apples, monument to, 12-4449-50
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De Lisle, Claude, Joseph Rouget, writer of La Marseillaise, 10-3607
Delius, Frederick, English composer, 19-7153
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Delphinium, *see* Larkspurs
Del Sarto, Andrea, *see* Sarto
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What is a delta and how is it made? 5-1607
Demand, term, as used in economics, 16-5931, 5933-37
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The Diamond Necklace, 10-3683-86
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What is the meaning of democracy? 17-6174-75
Democratic Party. One of the major political parties in the United States tracing back to Thomas Jefferson. It was called Republican at first, then Democratic-Republican, but about 1828, the second half of the name was dropped. The Democratic party has long been one of the two principal parties in the country; its policies

Democratic Party (*continued*)
have generally been described as liberal in contrast to the conservative policies of the Republican faction, the other major political party.
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Demosthenes, Greek orator, **3**-925; **5**-1611, 1614-15
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Demotic writing, of ancient Egyptians, **10**-3547
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Dentatus, Manius Curius, Roman statesman
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Denver, capital of Colorado and largest city of the state. It is called the "Mile High City," and is noted for its dry and healthful climate. It is exactly a mile above sea level. It is an educational center and has several important museums. The region around Denver is concerned with dairying, sheep- and poultry-raising and sugar-beet growing. Slaughtering, meat-packing, grain-milling and the manufacture of mining equipment are among the major industries. It is also the banking center of the Rocky Mountain region. One of the mints of the United States is there. The Pikes Peak gold rush of 1858 brought the first settlers, and it was named for James W. Denver, governor of the Kansas Territory. Population, 322,412. *See also* **18**-6430
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Broncho Buster, monument, **19**-6844
Deodars, kind of cedar trees
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Department of Justice Building, Washington, D. C.
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Department stores
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De Peyster, Johannes, Dutch colonist
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De Quincey, Thomas, English essayist, **8**-2867
Dermestidae, family of beetles, **18**-6627
Dermis, inner layer of skin, **5**-1803-06
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Dermot MacMurrough, Irish king of Leinster, **8**-2939
De Rozier, Pilâtre, first balloon passenger, **1**-345
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Derzhavin, Gabriel, Russian poet, **19**-6905
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* agriculture on deserts, **7**-2533-34
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motion-picture costumes, **11**-3959
Des Moines, capital of Iowa and seat of Polk County, in the center of the state at the junction of the Des Moines and Raccoon rivers. The surrounding country is a rich farming and coal-mining area, and in the city there is meat-packing and the manufacture of clothing, cereals and agricultural equipment. It is an insurance and publishing center of the United States, with about fifty insurance companies having their headquarters there. Drake University and other educational and cultural institutions are located in Des Moines, with a beautiful art gallery being the newest addition. Fort Des Moines was the first settlement, made in 1843. It is named for monks who had huts by the river. Population, 159,819.
Picture, State Capitol, **16**-5659
Des Moines River. American river, rising in Lake Shetek, Minnesota. Flows into the Mississippi River. 450 miles.
De Soto, Hernando, explorations, **2**-393-94
Picture, exploring in America, **2**-393
Des Rochers, Alfred, French-Canadian poet, **14**-5117
Dessalines, General, ruler in Haiti, **19**-7100
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Destroyers
of U. S. Navy, **18**-6816
Picture, torpedo-boat destroyer, **18**-6817
Detector, for radio, **14**-5122
Detroit, largest city in Michigan and seat of Wayne County. It is on the River Rouge, and on the Detroit River which connects Lake St. Clair with Lake Erie. It is connected with Windsor, Ontario, by a tunnel and by bridges. The University of Detroit and other schools make it important educationally. It is the automobile-manufacturing capital of the world, and also makes stoves, refrigerators, aircraft parts and office equipment. The first settlement was made in 1701 when Antoine de la Mothe Cadillac built a fur-trading post and fort at the site for Louis XIV of France. The name means "strait," and it is called "the City of the Straits" because the Detroit River is really a strait. Population, 1,623,452.
Ambassador Bridge, **1**-34
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Ambassador Bridge, **1**-30
Art Center, **16**-5658
Detroit-Windsor Tunnel, **2**-523
Ford plant of, **16**-5653
skyline, **16**-5658
Deuterium. This name is given to the isotope of hydrogen of mass number 2; also known as "heavy hydrogen." The symbol D is used for it. It was discovered by American Nobel Prize win-

Deuterium (*continued*)
ner H. C. Urey in 1932. Its nucleus contains one proton and one neutron. *See also* **4**-1229; **6**-2252
De Valera, Eamon, Irish statesman, **8**-2944
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De Voto, Bernard, American writer and critic, **14**-5019
De Vries, Hugo, Dutch botanist, **3**-986
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Dew, how formed, **8**-2922
Dewar, Sir James. Scottish chemist famous for his work in the liquefaction of gases; born, Kincardine, 1842; died, 1923.
Dewberry, fruit, **11**-4020
Picture, fruit (in color), **11**-4023
Dewey, George (1837-1917). Admiral of the United States Navy.
Dewey, John, American philosopher and educator
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Dewey Decimal System for libraries, **10**-3558-61
Dewing, Thomas, American painter, **10**-3454
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De Witt Clinton, early locomotive, **2**-411
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Diabetes, discovery of treatment, **15**-5493
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Are there any diamonds in the sky? **11**-3795
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Diana of Ephesus
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Diatoms, one-celled plants, **2**-661; **3**-881
Pictures, **2**-662; **4**-1275
Diatonic scale, in music, **18**-6698
Diaz, Bartholomew. Portuguese navigator; born about 1445; lost at sea, 1500.
sailed round Cape of Good Hope, **1**-82-83
Diaz, Porfirio, president of Mexico, **11**-3818-19
Diaz de la Peña, Narcisse, French painter, **7**-2370
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Dibatag, an antelope, **4**-1442
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Franco, General Francisco, of Spain, **14**-4922-23
Primo de Rivera, Miguel, of Spain, **14**-4920-21
Question about
What is a dictator? **5**-1608
Dictionaries
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page from Babylonian dictionary, **10**-3548
Diderot, Denis (1713-84). Noted French writer; one of the leaders of French liberal thought in the eighteenth century. He was the editor of the Encyclopedia, a bulky and learned work that stood for reform. Diderot was a fertile author; his works include criticism, philosophical essays, plays, novels and translations. *See also* **18**-6715.
Diedrich Knickerbocker, pen name for Washington Irving. *See* Irving, Washington
Diervilla, plant, description, **15**-5608
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Diesel engines
for ocean-going vessels, **17**-6403-04
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How does a Diesel engine work? **4**-1353-54
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Why is old bread more digestible than new bread? **6**-2125
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Di Maggio, Joseph, baseball player
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What makes a dimple? **5**-1807-08
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Picture, Bayard's Rock, **15**-5497
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Dingo, Australian dog. *Picture,* **2**-600
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Dinotherium, prehistoric animal, **5**-1784
Diocletian (Gaius Aurelius Valerius Diocletianus) (245-313 A.D.). Emperor of Rome from 284 to 305.
reign of, **4**-1251
Diode, early electron tube, **14**-5034
Diogenes. Greek Cynic philosopher who lived in a tub; born, Sinope, Asia Minor, about 412 B.C.; died, Corinth, 323.
Diomede Islands, 1-243
Dionne quintuplets
Question about
Who are the Dionne quintuplets? **13**-4642
Dionysius, tyrant of Syracuse, **13**-4577-78
Dionysus (Bacchus), Greek god, **9**-3228
Diplodocus, prehistoric reptile
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Diploprion, fish. *Picture* (in color), **16**-5786
Dippers, Big and Little, groups of stars, **11**-3921
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Dippers, birds, **14**-5145
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Dipterus, prehistoric fish. *Picture,* fossil, **4**-1177

Dipylon vases, ancient Greece, **2**-450
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Directory, French government of Napoleonic era, **6**-2199-2200
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Discordia, goddess of discord, **9**-3234
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* work of Father Damien for lepers, **15**-5452-53
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Why are not all diseases infectious? **12**-4278
Why are there some illnesses that we can not get twice? **2**-460
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Disney, Walt
creator of animated pictures, **16**-5901
Disraeli, Benjamin, Earl of Beaconsfield. English prime minister and novelist; born, London, 1804; died there, 1881.
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Dissertation upon Roast Pig, A, **17**-6317-19
Dissolve, method of showing lapse of time in motion pictures, **11**-3974
Dissonance, in modern music, **19**-7153
Distance, as measured by degrees of latitude and longitude, **1**-239
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How did the Romans measure distance? **2**-457
Distilling, of petroleum, **13**-4753-54; **16**-5942
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diagrams of distilling process, **13**-4748-50
Distribution of Wealth, The, **17**-6359-62
District of Columbia. The federal district containing the capital of the United States; area 69 square miles. Authority for establishing it was given in the Constitution and the site was selected by Congress. A tract lying on both banks of the Potomac and containing 100 square miles was ceded by Maryland and Virginia, but in 1846 the Virginia cession was returned. There is comparatively little manufacturing except for governmental purposes and most of the people depend directly or indirectly upon the government for a livelihood. Since 1874 the district has been governed by three commissioners appointed by the president. The residents have no vote though they pay taxes, but Congress pays a part of the expenses.
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Divine Comedy, The, long poem by Dante
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illustration from, Vergil guiding Dante through the Inferno, **17**-6150
Divine right of kings, a theory of government in which the king could do no wrong.
Diving
* directions for, **19**-6955-59
* for pearls, **13**-4675-77
* sea diving, account of, **12**-4185-91
for sponges, **15**-5332-33
Question about
Why do we rise to the surface when we dive? **10**-3771
Pictures.
helmet of "Monel" metal, **5**-1635
McCann Rescue Bell, **1**-200
See also starred articles above
Diving bells. Hollow air-tight bells or cylinders, open below and supplied with air from above. In these bells persons may be lowered for work in deep water.
Pictures, **1**-200
Divining rod. A forked rod, usually a branch of hazel, sometimes used for discovering water or minerals underground.
Division of labor, *see* Labor, Division of
Dix, Dorothea Lynde, American philanthropist, **13**-4579-81
Dixie
Question about
Where does the name Dixie come from? **17**-6174
Dixmude, airship, **1**-351
Dixville Notch, New Hampshire. *Picture,* **12**-4151
Dizziness
Question about
Why does everything spin round when we are dizzy? **5**-1638
Djibouti (Jibuti), capital of French Somaliland and main seaport of the country. It is built on a peninsula on the southern shore of the Gulf of Tajura. The town has no industry and depends on importing and exporting goods for southern Ethiopia and on supplying coal for passing ships. It was founded by the French in 1888. Population, 10,421.
Dniepropetrovsk (Dnepropetrovsk, formerly **Ekaterinoslav),** city in Russia on the Dnieper River. It is in the rich mining section of the Ukraine and is one of the most important industrial cities of the country. Iron-smelting and flour-milling are two of the major industries. The city was founded by Potemkin in 1786, and Catherine II laid the cornerstone of the cathedral the following year. Population, 500,700.
Dniester (Dnestr). European river, having its source in a lake in the Carpathian Mountains. It flows into the Black Sea not far from Odessa. The yearly volume of commerce on the river is very great; it consists for the most part of grain and lumber. The Dniester River is over 800 miles long.
Doberman Pinscher, dog
Picture (gravure), **2**-714
Dobson, Austin. English poet and biographer; born, Plymouth, 1840; died, Ealing, 1921.
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Dobson, William, British painter, **6**-2000
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Portrait of Endymion Porter, **6**-2003
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Dodder, weed, **1**-332; **15**-5390, 5396; **19**-6939
Dodge, Mary Mapes, American writer, **14**-4961
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Hans Brinker, or the Silver Skates (in part), **5**-1689-93
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Alice in Wonderland (in part), **3**-1088-1102; **4**-1178-90
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Domestic animals, *see* Animals—domestic
Domestic architecture, *see* Architecture, Domestic
Dominic, St., life of, **13**-4861-62
Dominica. British West Indian island, largest of the Leeward group; area, 305 square miles; capital, Roseau. It produces limes, cocoa, coconuts, oranges, spices and coffee, and has hot springs and a boiling lake.
Dominican Republic on island of Hispaniola, **19**-7101
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Domitian (Titus Flavius Domitianus Augustus) (51-96 A.D.). *See* **4**-1246
Don. River rising south of Moscow and sweeping through central Russia into the Sea of Azov. It passes Voronesh, Novo Tcherkask and Rostov, and drains 166,000 square miles, its chief branch being the Donetz. 1,125 miles.
Don Marquis, *see* Marquis, Don
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How can a donkey eat a thistle, thorns and all? **16**-5840
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Doré, Paul Gustave, French painter
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The Miser, **18**-6713
Doric Order, in architecture, **15**-5343
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Dormouse opossum, marsupial, **7**-2503
Dorr's Rebellion. In 1842 Thomas Wilson Dorr started a revolutionary movement to change the State Constitution in Rhode Island. He was sentenced to life imprisonment for high treason in 1844 but was released three years later and had his civil rights restored in 1851. Rhode Island adopted a new constitution a few months after Dorr's Rebellion.
Dorset, Thomas Sackville, Earl of, English poet, **3**-1114
Dortmund, Germany, in the Ruhr Valley. It is one of the major industrial cities, manufacturing iron, steel, heavy machinery, sewing machines and mining equipment. It is connected with the North Sea by the Dortmund-Ems Canal. During World War II it was heavily bombed. The city was founded in the 9th century. In the 13th century it joined the Hanseatic League. Population, 433,800.
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as it looked in the 16th century, **12**-4178
Dory, fish. *Picture* (in color), **16**-5783
Doryphorus, statue of Polyclitus, used as Canon, **12**-4218
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Douai-Reims Version of Bible, **2**-476
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Douglas, William, writer of Annie Laurie, **10**-3605
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Douglas spruce, wood of, **12**-4250
Douglass, Frederick, American Negro anti-slavery leader, **12**-4429-30
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Douglass, Sir James N., lighthouse-builder, **10**-3579
Douro. River of Spain and northern Portugal. Rising in the Pico de Urbion, it flows into the Atlantic below Oporto, passing Soria and Zamora in Spain and an important wine-growing district in Portugal. 485 miles long, it is navigable for 90 miles, and drains 37,500 square miles.
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Douw, Gerard, Dutch painter, **5**-1594
Picture
Young Mother, **5**-1591
Dover, capital of Delaware and seat of Kent County, on the St. Jones Creek. The area around it is a farming community, and it is the trading center for the district. Food-canning and the making of hosiery, baskets and rubber products are carried on. William Penn ordered that a town be built as the seat of Kent County in 1683, but the town apparently was not laid out until 1717. Population, 5,517.
Dover. Kentish port on the Strait of Dover, with an important passenger-steamship traffic with Calais. The Roman Dubris, and later chief of the Cinque Ports, it was very important in the Middle Ages.
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Dover Beach, by Matthew Arnold, **6**-2150
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* Pigeons and the doves, **12**-4282-88
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in coal mines, **3**-794
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accepting surrender of Spanish Armada, **5**-1812
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Drake, Joseph Rodman, American writer, **13**-4710
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On the Death of Joseph Rodman Drake, by Fitz-Greene Halleck, **10**-3740
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how to make five-pointed star, **9**-3119-20
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Fly-Away Horse, by Eugene Field, **4**-1272-73
Wynken, Blynken and Nod, by Eugene Field, **4**-1532
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Do animals have dreams as we do? **15**-5644
Why do I dream? **15**-5639-40
Dred Scott Decision, in U. S. history, **7**-2429
Dreiser, Theodore, American author, **13**-4815
Picture, **13**-4814
Dresden, Germany, capital of Saxony, on the Elbe River. The city is a center of culture, having theaters, art schools, museums, parks and gardens. The famous Dresden china is made mostly in a town about fourteen miles away, but the city does make gold and silver articles, delicate mathematical and surgical instruments, straw hats, gloves and chemicals. There was a settlement on the site in the early part of the 10th century and a town at the beginning of the 13th. The city was badly damaged in World War II. Population, 625,000.
Dress, history of costumes, * **9**-3157-69
Dressmaking, *see* Dolls, dressmaking; Sewing
Dreyfus, Alfred (1859-1935). French officer, of Jewish descent. While a member of the French general staff, he was condemned as a spy and imprisoned. Later he was acquitted of the charge and restored to the army.
Drinkwater, John. English poet and dramatist. Abraham Lincoln and Mary Stuart are two of his best plays. Born, Leytonstone, Essex, England, 1882; died 1937.
Driver, William, named U. S. flag Old Glory, **19**-7184
Dromedary, kind of camel, **5**-1597
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What happens when a person drowns? **2**-688
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Dryden, John
* life and work, **4**-1477-78
as essayist, **8**-2866
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Dryden, Pope, Bunyan and Defoe, * **4**-1477-81
Dublin, capital of the Republic of Ireland. It is a borough of the county of the same name, and the main port of trade with England. It is at the mouth of the Liffey River on Dublin Bay of the Irish Sea. The home of several famous universities, it is the cultural center of Ireland. The Easter Rebellion of 1916 in Dublin was one of the most serious outbreaks in the struggle for independence from Britain. The city was founded about 140 A.D.; and the Danes held it from the 8th to the 12th centuries. The name means "black pool." Population, 506,635.
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Du Bois, Guy Pène, American painter, **10**-3516
Du Bois, William Edward Burghardt, American Negro leader, **12**-4431

Dubuque, Iowa
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Duccio di Buoninsegna, Italian painter, **2**-691
Picture, Madonna and Child, **2**-697
Duck hawk, fastest bird, **1**-141; **10**-3754
Duckbill, or **platypus,** mammal, **7**-2590-93
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Ducks
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How can a duckling swim without being taught? **12**-4491
Why does a duck keep dry in the water? **12**-4491
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American wood duck, **12**-4370
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Gadwall duck, **9**-3284
king eider duck, **12**-4370
Mallard duck, **8**-2898
mandarin duck, **12**-4371
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tufted ducks, **9**-3129
Ducks and Geese, * **11**-3881-88
Duckweed, plant, **4**-1278
Dudevant, Madame, *see* Sand, George
Dudley, Robert, *see* Leicester, Earl of
Dudley, famous diamond, **19**-7234
Du Fay, Charles François de Cisternay, French scientist, work in electricity, **11**-3981
Duffield, George (1818-1888), American minister and hymn-writer. He is best known for the martial hymn, Stand up! Stand up for Jesus.
Dugong, sea mammal, **1**-359; **7**-2342
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Dugouts, kind of canoes, **11**-3909
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Duiker, or **duikerbok,** an antelope, **4**-1441
Picture, **4**-1442
Duisburg-Hamborn, Germany, manufacturing city in the province of Rheinland. It is built where the Ruhr River joins the Rhine and has been noted for the manufacture of chemicals and furniture. It was one of the objectives in the Allied push of World War II to take the Rhur Valley area. Originally it was three cities, Duisburg, Hamborn and Ruhrort. Population, 256,000.
Dujardin, Felix, French scientist, **3**-977
Duluth, Minnesota, at the western end of Lake Superior, the seat of St. Louis County. It is one of the two leading inland ports of the United States. It was founded as a trading post by the French explorer Daniel Greysolon, Sieur du Lhut, in 1679, and permanently settled in 1853. It was named for Sieur du Lhut. Population, 101,065.
Dumas, Alexandre, the Elder, **18**-6716
* Count of Monte Cristo, summary, **18**-6567-75
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scene from The Three Musketeers, **18**-6717
Dumas, Alexandre, the Younger, **18**-6718
Dumas, Realier, French painter
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Napoleon as a boy at school (gravure), **6**-2209
Du Maurier, Daphne, English novelist, **11**-4110
Du Maurier, George, British novelist, **11**-3899
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Dunbar, Paul Laurence, American Negro poet, **12**-4431
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Dunbar, William, early Scottish poet, **2**-721
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Duncan, early king of Scotland, **15**-5646
Dunedin, New Zealand, **7**-2574
Picture
town hall and cathedral, **7**-2577
Dunkirk (Dunkerque). French city on coast of North Sea, 28 miles northeast of Calais. Dunkirk is one of the most important seaports of France, with many miles of wharves. Its extensive manufactures include fishing nets, soap, leather and earthenware. The city has a long history, going back to the ninth century. Toward the end of May, 1940, the advancing German armies trapped hundreds of thousands of British
Dunkirk (*continued*)
and French troops at Dunkirk. Most of these troops were rescued by an English fleet made up of all types of boats.
evacuation of in World War II, **18**-6452
Poem about
Dunkirk (in part), by E. J. Pratt, **18**-6651
Picture, **18**-6451
Dunlin, bird. *Picture* (in color), **8**-2898
Dunne, Finley Peter, American writer **13**-4791
Duns Scotus, John (about 1265-1308). A great Scottish thinker and schoolman of the Middle Ages. He joined the Franciscan Order, studied at Oxford, then became a professor of theology. He removed to the Continent and won a reputation for vast learning.
Duomo, church of Santa Maria del Fiore, in Florence, Italy, **5**-1737
Dupré, Jules. French landscape-painter; born, Nantes, 1811; died, L'Isle-Adam, 1889.
method of painting, **7**-2370
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Great Oak (gravure), **7**-2374
Duprene, *see* Neoprene
Duralumin, alloy, **5**-1631-32
Duran, Carolus, French painter, **8**-2857-58
Durand, Asher B., American painter, **9**-3332
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Dürer, Albrecht, German painter and engraver, **4**-1344-45
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Nuremberg, Town-band, **19**-7071
Portrait of a Young Man, **4**-1347
Portrait of Jerome Holzschuher, **4**-1347
Stephen Baumgartner as St. George, **4**-1347
Durham, John George Lambton, Earl of
influence in Canadian history, **3**-946
Durham, North Carolina, seat of Durham County. A leading tobacco-manufacturing center, it is also noted for cotton and hosiery manufacture. It is the home of Duke University and North Carolina University for Negroes. Settled in 1850's as Prattsburg, it was later named for Dr. Bartlett Durham. Population 60,195.
cathedral, **16**-5964
Picture
cathedral, **16**-5965
Durham, breed of cattle, **4**-1260
Duroc-Jersey, breed of pig
Picture, **5**-1718
Durra, cereal, **5**-1857
Durum, variety of wheat, **5**-1758
D'Urville, Antarctic explorer, **15**-5379
Duse, Eleonora. Italian tragedienne. Born, Vigevano, Italy, 1861, died, Pittsburgh, Pa., 1924, while on tour. She was Italy's greatest actress and was the inspiration of many of Gabriele d'Annunzio's plays.
Dusseldorf, Germany, capital of the government district Dusseldorf in the Rhenish Prussia province, at the junction of the Dussel River with the Rhine. It is an important river port and is important in the manufacture of iron and steel products. There are medical, art and other universities. Population, 420,000.
Dust, in space, **10**-3665
interest to the chemist, **17**-6391-92
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Where does dust come from? **1**-284
Dust Bowl, eroded soil area in U. S., **8**-2667
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Dustin, Mrs. Hannah
escape from Indians, **3**-779-80
Dutch and the Flemings, * **5**-1585-94
Dutch East India Company, early settlement in South Africa, **9**-3048
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Dutch painting, *see* Painting, Dutch
Dutchman's breeches, plant, **17**-6275
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Dutrochet, Henri, French surgeon and scientist **3**-978
Duveneck, Frank, American painter, **9**-3336
Dvorak, Anton, Bohemian composer, **19**-6923
Dwale, *see* Nightshade—deadly
Dwarf cornel, flowering plant, **18**-6576-77

Dwellings, *see* Houses
Dyaks. Head-hunting cannibals of Borneo who belong to the Malayan division of the Oceanic Mongols. They live in huts built on piles.
Dyce, W., British artist
Picture
painting of baptism of King Ethelbert, **5**-1568
Dyck, Sir Anthony van, *see* Van Dyck, Sir Anthony
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Picture
of wool, **15**-5587
Dyer, John, poet, **6**-2028
Dyer's weed, flower
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Why do colors sometimes run? **8**-2771
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testing dyes, **15**-5372
Dying Gaul, statue, formerly called Dying Gladiator, **12**-4460, 4467
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Dynamite, explosive
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blasting a copper field, **8**-2748
Dynamometer, device for measuring power
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for measuring horsepower of auto engine, **19**-7019
Dynamos, *see* Electric generators
Dysprosium (Dy). Chemical element. Atomic number 66; atomic weight 162.46. One of the rare-earth elements *See* Rare-earth elements.

E

E Pluribus Unum. The motto of the United States, from the Latin meaning "Out of Many, One." First appeared on the design for the Great Seal recommended to the Continental Congress in 1776.

Eads, James Buchanan (1820-87), American engineer. During the Civil War he built a number of ironclads (armored naval vessels) for use by the North on the Mississippi River. His most famous achievement was the erection of an arch bridge across the Mississippi at St. Louis.
Eagle Nest Rock, Yellowstone National Park
Picture, **2**-731
Eagle-rays, name for devilfishes, **16**-5774
Eagles
* account of, **10**-3756-58
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The Eagle, by Alfred Tennyson, **3**-1006
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Where should we look for the ears of a frog? **9**-3356
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Earhart, Amelia (Mrs. George Palmer Putnam), American aviatrix, **14**-5271
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Early, Jubal Anderson (1816-94). American soldier, born in Virginia. He graduated from West Point, but resigned from the army to practice law; served in the Mexican War; entered the Confederate service, and served to end of war.
conducts campaign in West Virginia, **7**-2442
Early days of Greece, * **11**-3987-94
Early history of South America, * **19**-6856-66
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Ears and Hearing, The, * **9**-3305-11
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* changes in surface made by air and water, **2**-385-89
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East Chicago, Indiana, on the southwest shore of Lake Michigan. It is Indiana's largest harbor. It is 20 miles from the heart of Chicago, Ill., but only about two miles from Chicago's city limits. There are large steel foundries, oil refineries and cement plants. It was founded in 1889. Population, 54,637.
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East Indies. Archipelago lying between Asia and Australia, the greater part belonging to Holland. The Dutch East Indies include Sumatra, Java, Celebes, the Moluccas and parts of Borneo, Timor and New Guinea, and have altogether an area of 733,642 square miles.
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East Orange, New Jersey, a suburb of Newark, N. J., 11 mi. west of New York City. It is the largest of the four cities that make up the "Oranges," the others being Orange, West Orange and South Orange. East Orange manufactures motors, electrical equipment and waterworks supplies. It was separated from the city of Orange in 1863 and became a city itself in 1899. Population, 68,945.
East St. Louis, Illinois, on the Mississippi River opposite St. Louis, Mo., connected with St. Louis by bridges. It is a meat-packing and livestock center as well as a railroad center. It is protected from floods by strong levees. It merged with Illinoistown in 1861 and became a city in 1865. Population, 75,609.
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Edinburgh, capital and second largest city of Scotland, seat of Midlothian County, on the southern shore of Firth of Forth. Mary Queen of Scots lived in the city, and it is famous for its historical buildings and landmarks. It is noted more as a center of learning and culture than as an industrial or manufacturing city. The University of Edinburgh is one of the most famous in the world. Probably started as a camp or fort, it became known as Edinburgh in the 600's, taking its name from Edwin of Northumbria who conquered the region. Population, 487,200.
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Edmonton, capital of Alberta Province, Canada, on the North Saskatchewan River. Fort Edmonton was built by The Hudson's Bay Company in 1795, but was destroyed by Indians and rebuilt at its present location in 1807. It is named for Edmonton, near London, England. It has been important as a fur center since its beginning, and more recently has become known for its creameries. Oil, natural-gas, coal, gold and pitchblende fields are near by. Population, 113,116.
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Eisenhower, Dwight David (1890-). Chief of staff of the United States Army. He was in supreme command of the Allied invasion of Europe from the west; and after V-E Day was commanding general of the American troops occupying Germany and American representative on the Control Council in Berlin. In World War I he organized the United States tank forces. Later he organized the Philippine Army and defenses under General MacArthur. He was chief of the Plans Division under General Marshall when the United States entered World War II.
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Elba. Italian island off the coast of Tuscany; area, 90 square miles; capital, Porto Ferrajo.
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El Bassan, city in Albania
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Elbe. German river rising in Bohemia and flowing into the North Sea. Navigable for most of its course, it passes Dresden, Meissen, Magdeburg, Hamburg, Altona and Cuxhaven, and has an immense trade. The Moldau, Eger, Havel and Saale are its tributaries, and its basin covers 57,000 square miles. 725 miles.
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Electoral vote. This is the direct vote cast by the Electoral College for president and vice-president of the United States every four years. The Electoral college has the same number of electors as there are members in both houses of Congress (531 in 1943), and each state has the same number of electors as it has members in both houses. The electoral vote is by states, that is, each elector votes for the candidates whose party has received the highest popular vote in his state.
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Elizabeth, Princess of Britain. Elizabeth Alexandra Mary, elder daughter of King George VI and Queen Elizabeth, and next in line of succession to the British throne, was born on April 21, 1926. Princess Elizabeth's education has been carefully planned to fit her for the duties and responsibilities of a modern constitutional ruler. Elizabeth was invested with the Order of the Garter November 11, 1947. She married Lt. Philip Mountbatten in Westminster Abbey, London, on November 20, 1947. Lt. Mountbatten was a former prince of Greece and Denmark. A son, Charles Philip Arthur George, was born to them on November 14, 1948. He is called Prince Charles.
Picture
in family group, **7**-2309
Elizabeth, New Jersey, seat of Union County. On Newark Bay, it joins Newark and is about 12 mi. from New York City. The sewing-machine industry, oil refineries and shipbuilding yards are the chief industries. First settled in 1664, it was named Elizabethtown for the wife of Sir George Carteret, to whom the land had been granted. Population, 109,912.
Elizabethan Age
* English seamen, **14**-5255-65
* life of Sir Philip Sidney, **15**-5375-76
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in Yellowstone National Park, **2**-732
Elkington, George and Henry, invented electroplating, **4**-1307
Elleck, fish
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Elliott, Charles Loring, American painter, **9**-3330
Picture
Portrait of Mrs. James C. Griswold, **9**-3329
Elliott, Charlotte (1789-1871), English poet and hymn-writer. Just as I Am, Without One Plea, is one of her many poems set to music.
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how to make, **16**-5982
Ellis, Edward S., American writer, **14**-4959-60
Ellis Island, in New York Harbor, since 1891 U. S. Immigrant station.
Ellsworth, Lincoln, explorer
Antarctic explorations, **15**-5388
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flowers and fruit, **17**-6273-74
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English, fruit of (in color), **11**-4028
El Paso, city in extreme west of Texas on Mexican border, seat of El Paso County, on the Rio Grande River in a region of deserts and mountains. It is a smelting and trading center. Started as a mission in 1659 by the Spanish it became a city in 1873. About half the population is of Mexican origin. Population, 96,810.
El-Registan, *see* Poetry Index
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Emancipation Act, 1829 Act which freed Roman Catholics from civil and religious disabilities in the United Kingdom.
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Emin Pasha (Edward Schnitzer), African explorer, **14**-5204
Emmet, Robert (1778-1803). Irish patriot and orator, a leader of the United Irishmen who in 1803 headed an unsuccessful rising in Dublin. Escaped to the mountains, but returning to take leave of his fiancée, he was arrested, tried for treason and hanged. Just before his execution he made a noted speech.
Emmett, Daniel Decatur, American minstrel and song-writer, **18**-6512
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En passant. French phrase meaning "in passing"; by the way; also a term used in chess.
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England. Southern and largest country of Great Britain; area, 50,874 square miles; capital, London. Divided from Scotland by the Cheviot Hills, it contains in the north the Lake District, the Pennine Chain, and the Cumbrian Mountains, with Scafell Pike (3,210 feet); the center and east are generally flat, and the south largely undulating downland. The largest rivers are the Thames, Severn, Trent, Great Ouse and Yorkshire Ouse, but the Tyne, Tees, Lower Avon and Mersey are among the most important. The chief industrial areas are in the North and North Midlands, where coal is found over a large area. Northumberland and Durham are famous for their shipbuilding and chemical trades; Lancashire for cottons and engineering; Yorkshire for woolens, worsteds, iron and steel; Cheshire for salt; and the Midlands for hardware, pottery, hosiery and lace. London, however, is easily the most important commercial center, while agriculture and stock-raising flourish almost everywhere. There are valuable North Sea fisheries. The greatest industrial centers are Birmingham, Manchester, Sheffield, Leeds; and Bradford, Liverpool, Bristol, Hull, Newcastle-on-Tyne, Portsmouth, Plymouth, Southampton, Sunderland and Birkenhead are famous as ports.
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architecture, *see* Architecture, English
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* New Zealand, the beautiful dominion, **7**-2570-81
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English Channel. Narrow sea dividing England and France. 350 miles long, it is 100 miles wide at its Atlantic entrance, but narrows to 20 miles at the Strait of Dover.
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* Johnson and Goldsmith, **5**-1867-72
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* Robert Burns, **6**-2135-38
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* British essayists, **8**-2865-69
* Scott and his stories, **7**-2349-52
* poetry at turn of 18th century, **7**-2489-93
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Eohippus, ancestor of the horse, **6**-2012
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Eos (Aurora), goddess of the dawn, **9**-3233
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Epicureanism, *see* Epicurus
Epicurus (342-270 B.C.). Founder of the doctrine of Epicureanism. He taught that pleasure—a refined kind of pleasure—is the worthiest aim of man and that freedom is the highest pleasure of all. He did not deny the existence of the gods, but held that they did not concern themselves with man. Epicurus believed that the world is made up of atoms.
Epidaurus, Greece, theatre, **15**-5346
Epidermis, outer layer of skin, **5**-1804-06
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Epiglottis, part of the throat, **10**-3557
Epigonus, sculptor, **12**-4460
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Epinephrin, hormone secreted by adrenal glands, **8**-2700
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Erasmus, Desiderius, Dutch scholar, **14**-5095, 5098, 5250-51
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Eratosthenes, scientist of ancient Alexandria, **2**-592
Erbium (Er). Chemical element. Atomic number 68; atomic weight 167.2. One of the rare-earth elements. *See* Rare-earth elements.
Erebus, in mythology, account of, **9**-3238
Erech, city of ancient Sumer, **2**-652
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Ergot, disease of rye, **5**-1856
Eric the Red, founded colony in Greenland, **2**-391
Ericson, Leif, Norse adventurer
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Ericsson, John, Swedish inventor, **17**-6402
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early American iron-clad ship designed by, **17**-6403
Erie, leading lake-port city in Pennsylvania, seat of Erie County, on Lake Erie. Built on a bluff, it has the largest harbor on the lake. Besides being a shipping center, it manufactures paper and paper products, electrical equipment and railway locomotives. Started as French stockade in 1753, it became an American fort and town in 1795. Population, 116,955.
Erie, Lake. Southernmost of the Great Lakes, lying between Ontario, Canada, and the states of Ohio, New York, Pennsylvania and Michigan. 9,940 sq. mi. in extent, it is 241 miles long with an average breadth of 40 miles; it is frozen in winter between December and April, but the Welland Canal, which avoids Niagara, allows navigation between Erie and Ontario throughout the summer. Toledo, Sandusky, Cleveland, Erie, Ashtabula and Buffalo are the chief ports.
Erie, Lake, Battle of, **5**-1704
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Eros (Cupid), god of love, **9**-3228
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Erosion, of soil, **8**-2667-68
* effect of air and water on land, **2**-385-89
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Erskine, John, American writer, **14**-5015
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Esarhaddon, king of Assyria, **2**-657
Escalators, moving stairs
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What is the principle of an escalator? **10**-3731-32
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Escurial, or **Escorial,** Spanish building, **18**-6500
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Eskimo dogs, **2**-717
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Eskimos
* Eskimos of the Arctic, **7**-2563-66
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cutting up a whale, **6**-2124
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Esophagus, part of digestive tract, **6**-2128
Pictures, **6**-2127
Esperanto, language invented for universal use, **5**-1621-22
Essays
* British essayists, **8**-2865-69
by Alexander Pope, **4**-1479
Essen, Germany, in Rhenish Prussia province. It is a few miles north of the Ruhr River in a region rich in coal fields. It became an iron-and-steel-works center, and in World War II was heavily bombed. It started as a Benedictine nunnery in 852 and became a town in the 900's. Population, 521,000.
Essex, Robert Devereux, 2nd Earl of, favorite of Queen Elizabeth, **14**-5261-62
Estates, or **classes,** of society
Fourth Estate, **7**-2484
Esters, class of organic compounds, **16**-5944-45
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Esther, Hebrew queen in Bible
in history of Iran, **9**-3145
Estonia, member of the Union of Soviet Socialist Republics, **16**-5860
Picture
city hall in Tallin, **16**-5861
Estremadura, region of southwestern Spain; area 16,162 sq. mi. Northern part has large forests, and coal, copper and silver are found. Chief city is Badajoz.
Estuarine crocodiles, 14-5227
Etaoin shrdlu, explanation of, **1**-142
Etching. From a Dutch word meaning "to feed" or "to eat." In art, the process of engraving upon glass or metal by the corroding action of acid. A plate is covered with a ground (some preparation of wax or varnish) that will resist acid. The drawing is scratched into the ground with a point; the plate is bathed in an acid which eats into the metal where exposed. When the ground has been removed the plate is inked, then wiped, and impressions are taken from it upon paper.
by Brangwyn and Muirhead Bone, **8**-2860
by Rembrandt, **5**-1710-11
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"Eternal City," name for Rome, **2**-576
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Ethelred II (the Unready), king of England, **5**-1570
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Ether, sulfuric, as anaesthetic, **8**-2729-30
Ethers, class of carbon compounds, **16**-5945
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early history, **18**-6804
Italian conquest, **13**-4568
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new roads, and the capital, Addis Ababa, **18**-6808
Etiquette, *see* Manners
Etna. Volcano in the eastern part of Sicily; the largest active volcano in Europe and the highest mountain in Italy. The height of the mountain is affected by eruptions; the average height is about 10,750 feet. The circumference at the base is about ninety miles. Some of the eruptions of Etna have been very destructive; great damage has been done and many persons killed.
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Etretat, French town on English Channel
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Etruscans, tribe of Italy, **4**-1192-93
Eucalyptus oil, used as medicine, **8**-2909
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jarrah, one variety, **12**-4249
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blossom and leaves, **8**-2909
Euclid, mathematician of ancient Greece, **2**-593; **19**-7005
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Eugenie, empress of France and wife of Napoleon III
Picture, **10**-3429
Eugenol, liquid derived from oil of cloves, **8**-2994
Eulachon, fish, **16**-5776
Euphrates River, Asia, **2**-650
Eurasia, definition of, **1**-121
Eureka
Question about
What does the word "Eureka" mean? **2**-686
Euripides, Greek writer of tragedies, **16**-5752
Europe. Second smallest, but most important of the continents, having well over a hundred people to the square mile. Its area is estimated at 3,885,828 square miles. The most remarkable feature of Europe is its immense length of coast-line, measuring nearly 50,000 miles, as compared with Africa's 15,000 miles; it has many inland seas and large numbers of islands. Two-thirds of its area consists of a great plain stretching across Northern Europe from the Ural Mountains to the North Sea; but in the north are the mountains of Scandinavia and in the south the great Alpine system. The Iberian, Italian and Balkan peninsulas each have their own mountain ranges. Europe is generally well watered, and has many fine rivers, notably the Volga, Danube and Rhine, which are all important waterways. A great part of its area is under cultivation, and large crops of cereals are grown, especially in Russia. Great Britain, Belgium, Germany, Spain, Sweden and Russia (Ural Mountains) have great mineral wealth; Rumania and Russia in particular produce large quantities of petroleum. The population is fairly evenly divided between Teutonic, Latin and Slavonic peoples: the Teutons include the English, Germans, Dutch, Flemings, Danes, Norwegians and Swedes; the Latins, the French, Spanish, Portuguese, Walloons, Italians, Rumanians and Greeks; and the Slavs, the Russians, Poles, Slovenes, Slovaks, Czechs and Serbs. The population of Ireland, Wales, Brittany and the Scottish Highlands consists largely of Celts; while on the Continent there are several non-Aryan races, including Finns, Magyars, Turks, Tartars, Bulgarians and Basques. Of course great political changes have taken place in Europe as a result of World War II.
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* recent European statesmen, **18**-6603-12
* the two World Wars and the period between, **18**-6440-64
European artists of late years, * **8**-2851-64
European War (1914-18), *see* World War I
European War (1939-1945), *see* World War II
Europium (Eu). Chemical element. Atomic number 63; atomic weight 152. One of the rare-earth elements. *See* Rare-earth elements.
Eurus, southeast wind, in mythology, **9**-3234
Eurypterids, ancestors of scorpions, **3**-1032
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Evanston, Illinois. Built on Lake Michigan, it borders Chicago on the north. It grew up around Northwestern University. Radios and dairy equipment are manufactured. It is the headquarters of the W.C.T.U. and was the home of Frances E. Willard. It was founded in 1854. Population, 65,389.
Evansville, Indiana, seat of Vanderburgh County. It is on the Ohio River, and has become a leading trading and manufacturing center, known for its barge service as well as for the manufacture of agricultural implements and automobiles. It was

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founded in 1817, and was named after one of the founders, Robert Morgan Evans, an officer in the War of 1812. Population, 97,062.
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Fargo, largest city in North Dakota and seat of Cass County. On the Red River, it is on the eastern boundary of the state. It is in the heart of a wheat- and clover-raising area, and manufactures steel, wood and glass products. The settlement was started in 1871 and was named for William
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If a feather is lighter than air why does it ever settle? **12**-4399
February. The second month of the year, named for a Roman festival, *februa.* It has 28 days ordinarily, but in leap years, that is, in every fourth year, it has 29 days.
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Federal Reserve Board. A board of seven members, at Washington, acting as the directing head of the Federal Reserve system of banking established in the United States by the Federal Reserve Act of 1913. Under this act the country is divided into 12 districts, each with its Federal Reserve bank and some of these have branches. Stock in the Federal Reserve banks is owned by the banks of the district. National banks must belong to the system, and State banks may join.
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Federalist Party. The term Federalist was first used for those in favor of ratifying the Constitution but soon came to mean those in favor of a strong central government with limited suffrage. It opposed the War of 1812, and went to pieces after it ended.
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Flint, Michigan, seat of Genesee County. Located on the Flint River it is in the southeastern part of the lower Peninsula of Michigan. It is noted for being one of the world's largest automobile-manufacturing centers. It was started as a fur-trading post in 1820 and was called Grand Traverse of Flint. Population 151,543.
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Florence, Italy, capital of the province Florence, and one of the largest cities in Italy, in the center of the country on the Arno River. Florentine art and craftsmanship in working with gold, wood and glass gave Florence fame centuries ago. Today mass manufacturing of art works for the tourists has lowered the standards. It is surrounded by the rich farming lands of the Arno Valley. It is very old, having started as a settlement and having grown into a city before the time of Christ. Population, 374,000.
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Florida. Southernmost Atlantic state; area, 58,560 square miles; capital, Tallahassee. It has a lovely climate and luxuriant vegetation. In the cultivated regions cotton, sugar, tobacco, and many kinds of fruit flourish amazingly. Lumber and tobacco products are the chief manufactures. Jacksonville, the largest city, Pensacola, Tampa and Key West are the chief towns; Palm Beach and Miami are famous winter resorts. Abbreviation, Fla. Nickname, "Everglade State." State flower, orange blossom. Motto, "In God we trust." "Florida" comes from the Spanish words meaning "Feast of Flowers" (Easter Sunday). First settlement, St. Augustine, 1565.
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Florin. An English coin of silver worth 2 shillings, in use since 1849. The name, derived from the Latin *florem* (flower), was first given to a gold coin stamped with a lily issued at Florence in 1252. There was a gold florin issued in England by Edward III in 1343-44. The florin is also the monetary unit of the Netherlands (sometimes called *guilder* and *gulden*).
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Fluorine (F). Chemical element. Highly reactive poisonous gas. Atomic number 9; atomic weight 19; melting point —223°C.; boiling point —187°C. Fluorine reacts, usually violently, with nearly all other elements. It occurs as calcium fluoride, CaF_2, and cryolite, which is used in the production of aluminum. Some fluorine compounds are used as refrigerants. Very small amounts of fluorine compounds are beneficial to the teeth; somewhat larger quantities cause the teeth to become discolored.
Fluorite, or **fluor spar** (CaF_2). Consists of fluorine and calcium. It usually occurs in grains or crystals with a glassy luster, and it is generally translucent, though not transparent. In color it may be white, violet, blue, purple or yellow, and is used sometimes as an ornamental stone. But its chief value is as the source of hydrofluoric acid, hydrofluosilicic acid, as a flux and as an agent in enameling.
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Flying Dutchman. Phantom ship said to have been seen at various times by seamen, especially about the Cape of Good Hope.
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Focke, Heinrich (1890-), German aeronautical engineer; designed the first successful helicopter in 1937, and helped to develop the Focke-Wulf fighter planes used by Germany in World War II.
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Foochow, China, a large port on the Min River, capital of the Province of Fukien. Surrounding it are walls and mountainous country. In the past it has been an important port for exporting tea and camphor, but today is concerned more with manufacturing and shipping paper, soap, pottery and canned foodstuffs. It was first opened for world trade by the Treaty of Nanking in 1843. During World War II it was occupied by the Japanese. Population, 400,000.
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Why will a hammer break a stone when a piece of wood will not? **10**-3729-30

Force Bills. The United States Congress, in 1833, to meet nullification threats by certain states, passed a bill granting the President power to execute the tariff laws by force if necessary; in 1871 the Enforcement Act, or the Ku Klux Act, was passed giving the President power to suppress violations of the XIV Amendment; in 1890 an act providing for Federal supervision of elections passed the House but not the Senate.
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Formosa, or **Taiwan,** the most southern of the Japanese islands; ceded to Japan by China in 1895, and reclaimed by China at close of World War II. It lies some distance off the coast of China, almost directly east of Hong Kong and north of Luzon in the Philippines. The area is 13,890 sq. mi.; the population, more than 5,000,000. Taihoku is the chief town. Principal products are sugar, rice, bananas, tea and camphor.
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Fort-de-France, main city of Martinque, French West Indies. A seaport, it is situated on the southwestern part of the island. It is built on a deep, well-protected harbor, and is the military and naval headquarters for France in the islands known as the Antilles. It is also known as Fort Royal and is the home of the French governor. Josephine, the wife of Napoleon I, was born in this city. It exports sugar, rum, cocoa and fruit, and is the distributing center for materials to be used throughout the island. Population, 66,000.
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Fort Knox, Kentucky, gold storage, **13**-4594
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Fort Monroe. A United States military post situated at Old Point Comfort, Virginia, and commanding the entrance to Hampton Roads. Jefferson Davis was confined here.
Fort Nassau, now Albany, N. Y., founded 1615, **2**-549
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Fort Ticonderoga, *see* Ticonderoga
Fort Washington, on Hudson River, captured by Howe, **4**-1165
Fort Wayne, seat of Allen County, in northeastern Indiana, where the St. Joseph and St. Marys rivers meet to form the Maumee River. Products range from electrical and mining equipment to gloves and hosiery. The location was the site of Indian camps until General "Mad Anthony" Wayne defeated the Indians and built a stockade, which became known as Fort Wayne after him, in 1794. It was settled as a permanent town in 1815. Population, 118,410.
Fort William Henry, on Lake George
Indians massacred English, **3**-782
Fort Worth, seat of Tarrant County, in northeastern Texas, where the Clear Fork meets the West Fork of the Trinity River. The city is in the oil-well and ranch area of Texas, and is noted as an oil-refining and meat-packing center. The town was started as a fort in 1849, and it was named for a hero of the Mexican War, General William Jenkins Worth. Population, 177,662.
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Fortress of the Heavens, observatory of Tycho Brahe, **11**-3846
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Four-H Clubs are associations of boys and girls, between the ages of 10 and 21, living on farms or ranches or in small towns. The H's stand for *head*, clear thinking; *heart*, loyalty; *hands*, service; and *health*, better living. Begun in 1899, the clubs are sponsored by the Extension Service of the U. S. Dept. of Agriculture. Projects range from raising livestock or a crop to home canning or sewing; members exhibit and compete for prizes, often at county fairs. There are more than a million members, some in every state, and they rendered great service in raising food during World War II.
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What is the Fourth Estate? **7**-2484
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Fox, Charles James. English statesman; born, London, 1749; died there, 1806. Rival of William Pitt. Introduced the India Bill, 1783; supported the cause of the American Colonies in Parliament in the Revolution.
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Francis I. King of France, soldier and patron of the artists of the Renaissance; born, Cognac, 1494; died, Rambouillet, 1547; reigned from 1515.
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Francis, Edward, doctor, studied rare germ diseases, **13**-4674
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Francis Joseph (1830-1916). Emperor of Austria, king of Bohemia, and apostolic king of Hungary. He reigned 1848-1916.
Francis of Assisi, St., **6**-2006-07
Giotto's frescoes of his life, **2**-698
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Francium (Fa). Chemical element. Atomic number 87. Francium is produced in extremely small quantities by the radioactive decomposition of actinium.
Franck, César, French composer, **19**-6919, 7152
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Franco, Francisco, dictator of Spain, **14**-4922-23; **18**-6609
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Germans entering Paris, **10**-3430
Francolins, variety of partridge, **12**-4364
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Frankfort, capital of Kentucky, seat of Franklin County. Located on the Kentucky River, it is in the "blue grass" territory. Shoes and hempen products are manufactured in the city, and the region is famous for its Thoroughbred racing horses. It was founded in 1786 by General James Wilkinson. Daniel Boone is buried in Frankfort Cemetery. Population, 11,492.

Frankfurt, city in Western Germany, in the province of Hesse-Nassau, on the Main River. It was a political center when Germany was a group of many states, and since has become a banking center. It is also noted for its chemical-manufacturing industry. Many famous writers were born here and it has always been a center of culture. It is thought that the city was founded during the first century after the birth of Christ. At times during its history it has been a free city. During World War II it was the object of Allied bombings. Population, 421,400.
Franking privilege. The right to send mail matter free of charge.
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Franklin. Arctic division of the Canadian Northwest Territories. Inhabited only by Eskimos.
Franklin, State of, now Tennessee, **6**-1908
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Fraser, Simon (1776-1862). A great Canadian fur-trader and explorer. Discovered Fraser River, 1806. A partner in the Northwest Company. He refused a knighthood offered for his services as an explorer.
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What are the spots that we call freckles? **5**-1810
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Frederick I, Barbarossa, emperor of Holy Roman Empire
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Frederick II, the Great, king of Prussia, **12**-4163
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Frederick II, Hohenstauffen emperor of Germany, **12**-4159
Frederick William (1620-88). "The Great Elector," who as Elector of Brandenburg (1640-88) secured the independence of Prussia from Poland.
Picture, **12**-4174
Fredericton, capital of the Province of New Brunswick, on the St. John River. Factories in the city make shoes and other articles of footwear and lumber products. It was founded by Sir Guy Carleton in 1785. The town of Devon, located on the opposite bank of the river, was made a part of Fredericton in 1945. Population, 10,062.
Free cities. Cities or towns with government and laws of their own, forming each a state by itself. In the Middle Ages the towns of Northern Europe (Germany, etc.) in the Hanseatic League were generally free towns. Certain cities as parts of the German Empire were called imperial cities. Until 1866 Frankfort-on-Main was a free city and until 1933 Hamburg, Lübeck and Bremen also.
Free-trade. Trade without restrictions, as commerce between countries unhampered by customs-duties. In a more limited sense it is used for international trade free of all duties except such tariffs as will cover revenue and police.
British policy, **7**-2305, 2308
Free verse, verse without metre, **19**-6987-88
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Frémiet, Emanuel, sculptor, **13**-4706
Picture, statue of Joan of Arc (gravure), **16**-5813
Fremont, John Charles (1813-90). American explorer, soldier and politician born in Georgia. Between 1842 and 1853 he made five exploring expeditions into the western country, and took part in the capture of California; U. S. Senator from California, 1850-51; Republican candidate for the presidency, 1856. In 1861 he was appointed major-general but his military career was not a success. From 1878 to 1882 he was governor of Arizona Territory.
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French, Alice (Octave Thanet, pen name), American writer, **13**-4790
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Fresnel, Augustin Jean, French scientist, **3**-993; **10**-3581
Fresno, California, seat of Fresno County. It is situated in the San Joaquin Valley in the center of the state. It is known as a fruit-drying and packing center, and the surrounding region is noted for its orchards and vineyards. The town was started in 1872 by the Central Pacific Railroad. The name is Spanish for "white ash" and was named for the white-ash trees that grow in the region. Population, 63,672.
Freud, Sigmund, Viennese physician
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Fromentin, Eugène, French painter, **6**-2082
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Fruit flies, used in work on heredity, **4**-1231
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Fry, Elizabeth Gurney (1780-1845), English Quaker philanthropist. She was born in Norwich and married Joseph Fry in 1800. Though the mother of a large family, she became one of the leaders in prison reform in Europe. Her idea that prisons should be places of reform and not of punishment has spread throughout the world.
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Fukuoka, Japan, port on the island of Kyushu. Best known for silk and cotton products, it has other industries and is in a coal-mining region. At one time the city was a political center, and it is very old. During World War II it was bombed. Population, 307,000.
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Fusan, Korea, a seaport on the southeast coast of Korea, noted for having a good harbor. During World War II the Japanese improved the city and the harbor. The fishing industry of Korea is centered at Fusan. Population, 400,000.
Fuse
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Gadolinium (Gd). Chemical element. Atomic number 64; atomic weight 156.9. One of the rare-earth elements. *See* Rare-earth elements.
Gadsden flag, presented to Congress by Christopher Gadsden, **19**-7182
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Galen, Greek physician, **8**-2723-25
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Galicia, old kingdom and modern district at northwest tip of Spain; area 11,256 sq. mi. People are called Gallegos. Lead, tin, copper and iron pyrite mines are worked. Chief towns, seaports, are Vigo and Coruña.
Galilean moons, moons of Jupiter, **10**-3411
Galilee, Sea of. Lake in northern Palestine, lying 680 feet below sea-level. Sixty-four square miles in extent, it is fed by the Jordan, and abounds in fish; the ancient city of Tiberias and the ruins of Capernaum and Chorazin stand on its shores.
Galileo, Galilei, Italian scientist and astronomer
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Gallium (Ga). Chemical element. Metal. Atomic number 31; atomic weight 69.72; melting point 29.75°C.; boiling point 1600°C.; specific gravity 5.9. Gallium is an uncommon metal, with a remarkably low melting point.
Galloway, breed of cattle
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Galveston, Texas, one of the leading ports of the United States, on Galveston Island in Galveston Bay. It is the seat of Galveston County. It is best known for the exporting of cotton and wheat and for the importing of bananas. It also has tin-smelting, oil-refining and flour-milling. It has to be protected from floods by a high wall. The region was explored by the Spanish in the early 1780's, and was made a United States settlement in 1837. It is thought that the Spaniards named it for Bernardo de Galvez, governor of Louisiana. Population, 60,862.
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Galway. County of Connaught; area, 2,370 square miles; capital, Galway. In the west is Connemara, one of the wildest and most beautiful parts of Ireland.
Gama, Vasco da, Portuguese explorer
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Ganoids, prehistoric fishes
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Gansevoort, Peter (1749-1812). American soldier who fought with distinction in the Revolutionary War and took part in the invasion of Canada, 1775. In 1777 he defended Fort Schuyler gallantly against the British. In 1809 he was appointed brigadier-general of the United States army.
G. A. R., *see* Grand Army of the Republic.
Gar, fish
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Garand rifle, **8**-2849
Gard, Roger Martin du, French writer, **18**-6720
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Garden of the Gods. Name given to a park of some 500 acres at the foot of Pike's Peak near Colorado Springs, Colorado. It is strewn with grotesquely shaped, colored sandstone rocks.
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Gardiner Canyon, Yellowstone National Park
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Garfield, James Abram, president of U. S.
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Gargantua and Pantagruel, **18**-6565
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Garner, John Nance, vice-president of U. S.
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Garnet, account of, **19**-7231
Garrick, David, English actor
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Garter snakes, **15**-5412
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Gary, Elbert H. (1846-1927). American business man, head of the United States Steel Corporation. Gary, Indiana, planned as model home for steel workers, was named in his honor.
Gary, Indiana, on the southern end of Lake Michigan and on the Grand Calumet and the Little Calumet rivers. The city is famous for its steel industry, having been founded and built by the United States Steel Corp. It was started in 1905 and was named for Elbert H. Gary, a member of the corporation. Population, 111,719.
Gas
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source of artificial light, **7**-2635
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Gas, Inflammable
* natural and manufactured gas, **7**-2353-58
Gas Engines, *see* Engines
Gas masks. Masks containing substances that neutralize, and protect against injurious gases. They also sometimes contain a supply of oxygen. Although long used in mines and other places where dangerous gases occur, gas masks were first employed on a large scale during the first World War.
Picture
American gas mask, World War I, **18**-6445
Gas warfare. The use of poison gases, tear gases and others to cripple an enemy's forces. Suffocating gases were used about 431 B.C. in the war between Athens and Sparta. In the Middle Ages similar means were employed. The first gas attack in World War I was launched by the Germans at Ypres, April, 1915, and resulted in severe Allied losses. Thereafter gas was used by both sides in the war. During World War II, none of the major warring powers used gas extensively.
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Why does a light go out in water but flare up in gasoline" **6**-2188
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Gaspé, Quebec village. *Picture*, **8**-2949
Gastric glands
Picture, **6**-2129
Gates, Horatio (1728-1806). Revolutionary soldier, born in England. He served in British army under Braddock but remained in America and later joined Revolutionary army; received high command, but failed as a leader.
at Saratoga, **4**-1170
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water-power development, **18**-6758
Gatun Lake, Panama Canal, **1**-364-65
Gatun locks, Panama Canal, **1**-364
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Gauchos. Natives of the South American pampas of Spanish and Indian descent. They are noted for their superb horsemanship and are, indeed, the "cowboys" of South America.
Gauguin, Paul, French painter
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Gaul, France in early times
Cæsar in, **4**-1198
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Gaur, wild cattle of India, **4**-1261-62
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Gauss, Karl Friedrich, German mathematician
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Gautier, Théophile, French novelist, poet and critic, **18**-6717
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Gean, name for wild cherry, **12**-4383
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Canadian goose in bird hospital, **8**-2818
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Geisha, Japanese entertainers
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Geissler, Heinrich, German scientist
work in electricity, **11**-3986
Geissler's tubes. Sealed vessels so constructed as to show the effects of electricity when passed through rarefied gases. The result is a display of light varying in color and intensity.
Gelada, baboon-like animal, **1**-208
Gelatine, made from parts of animals, **2**-635
Gelsenkirchen, Germany, in the province of Westphalia on the Emscher River and the Rhine-Herne Canal. There are coal mines in the city itself, and it was also important as a steel-and-iron-manufacturing city before World War II. The city was heavily bombed, but the mines were reopened soon after the Allies took over the city. Population, 271,100.
Gemini (the Twins), constellation, **11**-3924
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Question about
Is there any way of changing genes? **15**-5617
Genet, animal. *Picture*, **2**-490
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Geneva. Historic Swiss city, capital of the canton of the same name. Stronghold of Calvin in 16th century. Standing at the exit of the Rhone from Lake Geneva, it is a well-built place with a 12th-century cathedral, a university and fine modern buildings. Watches and jewelry are manufactured.
Geneva, lake in Switzerland, **16**-5999
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Geneva Convention, 1864. International agreement to respect those who attend sick and wounded in war.
Genevieve, St. Patron saint of Paris, reputed to have saved the city from Attila by her prayers in 451.
Picture
Bishop and St. Genevieve, by Chavannes, **7**-2478
Genghis Khan, *see* Jenghiz Khan
Genius. Inborn constructive and creative ability of an exceptionally high order.
patron saint of every man, **9**-3234
Genoa, the major port of Italy and the capital of the province of Genoa, on the Bisagno and the Polcevera rivers. It extends into the foothills of the Ligurian Alps. Shipbuilding is important, and it has foundries and metal works. In the city are many famous and beautiful churches. It is also noted for being the birthplace of Christopher Columbus. The city was built several centuries before the time of Christ. Population, 649,400.
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Pine Lands gentian, **19**-7087
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common autumn gentian, **14**-4985
field gentian, **14**-4994
marsh gentian, **16**-5882
Genus. In the classification of the animal and plant kingdoms, a group which contains one or more species.
Geoffrey of Monmouth, early Welsh historian, **9**-3221
Geography
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George III, king of England
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George IV, king of England
reign, **6**-2108
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George V (1865-1936). King of Great Britain, Ireland and the British Dominions, succeeded his father, Edward VII, in 1910. Married Princess Mary of Teck. Six children: Edward Albert, Duke of Windsor, who succeeded his father as Edward VIII, but abdicated in 1936; George VI, the present King; Prince Henry, Duke of Gloucester; Prince George, Duke of Kent; Prince John, who died in 1919; and Princess Mary.
reign of, **7**-2306-09
George VI (1895-). King of Great Britain, Ireland and the British Dominions since December 11, 1936. Married Lady Elizabeth Bowes-Lyon in 1923. Two children: Princesses Elizabeth and Margaret Rose.
attended Canadian Parliament, **5**-1837
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George, Henry, American writer, **13**-4794
George, Lloyd, prime minister of England, *see* Lloyd George, David
George, Stefan, German poet, **17**-6414
George Washington Bridge, New York City, **1**-34
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Georgetown, capital and main city of British Guiana. It is built at the mouth of the Demerara River and is protected from the ocean by a sea wall and dikes. Besides being a seaport it manufactures cigars, soap and boots. The botanical gardens and exhibits add much beauty to the city. At one time it was occupied by the Dutch and known as Stabroek, but the name was changed in 1812. Population, 77,600.
Picture, loading bauxite, **19**-6974
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Georgia. Cotton state bordering the Atlantic; area, 58,876 square miles; capital and largest city, Atlanta. Besides cotton and corn, it produces much fruit, rice, wheat, sugar and tobacco. The chief manufactures are cotton, lumber, fertilizers and cottonseed products. The mineral resources are considerable. Savannah, Macon and Augusta are the chief towns. Abbreviation, Ga. Nickname, "Cracker State." State flower, Cherokee rose. Motto, "Wisdom, Justice, Moderation." "Georgia" was named after George II of England. First settlement, Savannah, 1733.
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Gérin-Lajoie, Antoine, French Canadian author, **14**-5116-18
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Gestapo (pronounced *geh-shtáh-poe*). Abbreviated form of the German words *Geheime Staatspolizei* (secret state police). This secret police force was organized by Adolph Hitler in 1933 and placed in the charge of Heinrich Himmler. It operated effectively in putting down opposition to Nazi rule until the collapse of the Nazi regime at the close of World War II in 1945.
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Gibbs, Josiah Willard (1839-1903), American mathematician and physicist. Born in New Haven and educated at Yale University, he was professor of mathematical physics there from 1871 until his death. He applied the methods of physics to the problems of chemistry, and established the basic theory for the modern science of physical chemistry.
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Gibraltar, Strait of. Strait dividing Europe from Africa and connecting the Atlantic with the Mediterranean Sea. 8-13 miles wide, it is dominated by the fortress and Rock of Gibraltar; on the Moroccan shore are the ports of Ceuta and Tangier.
Gibson, Charles Dana (1867-1944), American illustrator. He became famous for his creation of the "Gibson girl," considered the ideal type of American girl in the early 1900's. He was a master of black-and-white drawing; and his illustrations appeared in such magazines as Scribner's, Century, Harper's and the old Life.
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Girard, Stephen (1750-1831). French-born American merchant, financier and philanthropist of Philadelphia. Financed War of 1812 and both Banks of the United States. Left his wealth for the founding of Girard College.
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Gladiators. In old Roman times, men who fought to give the people entertainment. Sometimes they fought against other gladiators, sometimes against wild animals. These fights took place in arenas before large audiences.
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Gladstone, William Ewart. English statesman; born, Liverpool, 1809; died, Hawarden Castle, Flintshire, 1898; prime minister four times. The Irish Church was disestablished and two Home Rule Bills were brought before Parliament and defeated in Gladstone's terms of office.
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Glasgow, largest city in Scotland, on the River Clyde. A leading seaport, it is the world's foremost shipbuilding center. The city also has iron and textile manufacturing. Started as a church in the 6th century, it became a town in the 12th and its growth in size and importance has been rapid. The name is supposed to be of Celtic origin, meaning "dear green spot." Population, 1,106,000.
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Glendale, California. It borders Los Angeles and is at the southern end of the San Fernando Valley. Around it are the Verdugo Mountains. As an industrial center it manufactures roofing, cement and automobile parts, but during World War II it became best known for the building of airplanes. The region was originally ranch land, but the town was started in 1887. Population, 110,000.
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Gloucester. Capital of Gloucestershire, on the Severn. One of the most historic English cities, it has a splendid cathedral, largely Norman in style, a 12th-century church, and remains of ancient walls.
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Goat's-rue, flower. *Picture* (gravure), **19**-7176
Gobi. A desert in central Mongolia, covering nearly a fourth of the country. It is almost entirely without trees, but in places there is a wiry grass that grows out of the shifting yellow sands. A few areas of the desert receive a little rain but never more than a few inches a year. Howling winds stir up sandstorms frequently. Even so some parts of the desert are inhabited, and the Chinese are finding that it is possible to raise crops and livestock in some of the border regions. Roy Chapman Andrews and other scientists have found animal skeletons and relics of early men in the Gobi. The Chinese call the desert Shamo, "sand desert." *See also* **18**-6586
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Gogol, Nicholas, Russian writer, **19**-6908-09
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Gold (Au, from Latin *aurum*: gold). Chemical element. Yellow metal. Atomic number 79; atomic weight 197.2; melting point 1063°C.; boiling point 2600°C.; specific gravity 19.3. Gold usually occurs as the metal. More than half the world's production of gold comes from the Transvaal; the United States and Canada are also large producers. Gold is used in jewelry and in dentistry; and it is the standard for our currency, its price being fixed by law at $35 per ounce (troy).
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Gompers, Samuel, founder of American Federation of Labor
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Gordon, Charles William (Ralph Connor), Canadian novelist, **14**-5110
Gorgas, William Crawford (1854-1920), American army surgeon. Following discoveries that mosquitoes were the carriers of the yellow-fever germ, he freed Havana of the disease, 1898-1902. He was the chief sanitary officer of the Panama
Gorgas, William Crawford (*continued*)
Canal Commission (1904-1913), where he did notable work in suppressing yellow fever and thus making the digging of the canal possible.
Gorgons, characters in mythology, **1**-357; **9**-3236
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Gorki, Russia, capital of the region of Gorki. It was formerly known as Nijni Novgorod and is one of Russia's oldest cities. There is manufacturing of machinery and textiles, but it has been known longest as a trading center. It was founded in 1221 at the point where the Oka River meets the Volga. The name was changed to Gorki in honor of the famous Russian novelist and playwright, Maxim Gorki. Population, 644,100.
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Goshawk, American, **10**-3759; **13**-4761
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Gospels. The four stories of the life of Jesus Christ in the New Testament. The first three—of Matthew, Mark and Luke—have much in common and are often called the synoptical gospels. That of John shows differences.
Goteborg (Gottenburg or **Gothenburg),** seaport in Sweden and capital of the country of the same name. It is on the Gota River and is the second most important port of the country. Its university and the library are among the best in Sweden. A herring fishery was the main industry two centuries ago, but now there is manufacturing of sail-cloth, iron, steel, machinery and linen. The city exports wood, grain, dairy products, matches and cattle. It was founded in 1618 by Gustavus Adolphus, but has been rebuilt several times because of fires. Population, 325,600.
Gothic architecture, *see* Architecture, Gothic
Gothic Architecture in England, * **16**-5962-76
Goths. Ancient Germanic people; divided into two branches, the Ostrogoths, or East Goths, and the Visigoths, or West Goths. Their earliest known home was on the shores of the Baltic. In the third century A.D. they migrated to the regions by the Black Sea. By the middle of the fourth century they formed a great kingdom, extending from the Black Sea to the Gulf of Bothnia. This kingdom was overrun by the Huns, and the Goths obtained permission from the Roman emperor Valens to settle in Thrace, an imperial province. Later the Goths quarreled with the Emperor; they defeated and slew him in the battle of Adrianople (378). They became the allies of Rome under the emperor Theodosius, the successor of Valens. Not long afterward the Visigoths and Ostrogoths separated. The Visigoths under Alaric made many raids on Greece and Italy and at last captured Rome in 410. They then went on into Spain, where they founded a kingdom that lasted until the eighth century. The Ostrogoths conquered Italy under their leader Theodoric in 493. The Ostrogothic kingdom in Italy was overthrown in 552 by the armies of the eastern emperor Justinian.
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Goudy, Frederic W., modern type-face designer, **9**-3396
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Goulden, Richard R., British sculptor
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Goya y Lucientes, Francisco, Spanish painter, **4**-1500
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Bull Fight, **4**-1499
Donna Isabella, **9**-3074
The Parasol, **4**-1499
Goyen, Jan Josephszoon van, Dutch painter, **5**-1592
Gozzoli, Benozzo, Italian painter, **2**-698
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Lorenzo de Medici, **5**-1745
One of the Three Wise Men, **2**-696
St. Augustine at Rome, **2**-695
Gracchus, Gaius Sempronius, Roman statesman, **4**-1362-64
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leaving his family, **4**-1199
Gracchus, Tiberius Sempronius, Roman statesman, **4**-1362-64
Graces, in mythology, **9**-3228
Grackles, birds, **13**-4766; **14**-5031
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Graf Zeppelin, German airship, **1**-349
Grafly, Charles, American sculptor, **14**-4939
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What do farmers mean by grafting? **12**-4450
Graham, Sir Robert, assassin of King James I of Scotland, **15**-5650
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Grain elevator
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lost to the Moors, **14**-4915
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Moors surrender to Ferdinand and Isabella, **14**-4913
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Grand Army of the Republic. A voluntary association organized in 1866 of men who served in the Union army or navy during the Civil War in the United States. Its objects are to maintain and strengthen fraternal feelings, perpetuate the memory of those who have fallen, and assist the widows and orphans of deceased members.
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Grand Falls. One of the world's highest waterfalls (over 300 feet). On the Hamilton River, Labrador.
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What do we mean by a grand jury? **11**- 135
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Grand Rapids, second largest city in Michigan, seat of Kent County, in the western part of the state on the Grand River. Because it has long been a furniture-manufacturing city, it is known as "the furniture capital of America." Other major industries include the making of automobile parts, refrigerators, plumbing equipment and carpet sweepers. An Ottawa Indian village occupied the site in the early 1800's. In 1826 the first settlement was started when a fur trader, Louis Campau, built a trading post. Population, 164,292.
Grand Teton National Park, Wyoming, **7**-2286-87
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Grand Trunk Pacific Railway, Canadian line, **4**-1483, 1488
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Grant, Annie McVicar, British poet, **10**-3605
Grant, James Augustus, African explorer, **14**-5204
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Grant, Sir Robert (1785-1838) English hymn-writer; at one time governor of Bombay, and for years a member of Parliament. His most well-known hymn is O Worship the King.
Grant, Ulysses Simpson, president of U. S.
administrations and outline of life, **8**-2669; **11**-3950
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Grass pinks, flowering plants, **18**-6576
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Why does grass turn yellow after being made into hay? **13**-4825
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Grasshoppers, insects, * **18**-6721-34
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Grattan, Henry, Irish writer and statesman, who was presented with $250,000 by Irish people

Grattan, Henry (*continued*)
for his services to the Irish cause; born, Dublin, 1746; died, London, 1820; buried in Westminster Abbey.
Grauer, W. G., American painter
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Do things weigh heavier or lighter when hot or cold? **12**-4399
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How does a gyroscope keep things right side up? **12**-4400-01
If a feather is lighter than air why does it ever settle? **12**-4399
What keeps a shell from falling to the ground? **12**-4399
Why does gravitation not pull down bodies lighter than air? **12**-4399
Why does iron float on mercury and not on water? **9**-3354
Why doesn't the water fall out of a pail when we swing it around? **12**-4397
Why is a needle no heavier when magnetized? **10**-3732
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Gray, Elisha, inventor
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Great Bear, *see* Big Dipper
Great Bear Lake. Lake in northern Canada, occupying 14,000 square miles and discharging into the Mackenzie River through the Great Bear River.
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Great Britain
See England (used for convenience, both for England proper and for British Empire, to keep material together); *also* Northern Ireland; Scotland; Wales
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Great Divide. Popular term in America for the watershed of the Rocky Mountains.
Great Dividing Range, in Australia, **7**-2466, 2471
Great Eastern, steamship
laid Atlantic cable, **12**-4299
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Great Grass Family, * **10**-3519-26
Great Groups of Plants, The, * **1**-218-22
Great Beetle Family, The, * **18**-6623-29
Great Kanawha River. American river, rising in the Blue Ridge Mountains, North Carolina. Empties into the Ohio River. 450 miles.
Great Lake, of French Indo-China, **2**-438
Great Lakes. These five lakes are the largest group of fresh-water lakes in the world. Lake Michigan is entirely within the United States; but the other four form the eastern half of the boundary between Canada and the United States, and they are controlled jointly by the two countries. A much smaller lake, St. Clair, between Lake Huron and Lake Erie, is sometimes included in the group. Following is the area in square miles, with greatest length and breadth in miles, and depth in feet of the chief lakes. *See also* the names of the lakes.

	Length	*Breadth*	*Depth*	*Area*
Superior	412	167	1,290	31,820
Michigan	307	118	923	22,400
Huron	250	155	750	23,010
Erie	241	51	210	9,940
Ontario	185	60	774	7,540

water level lowered, **19**-7110
Great Lakes-St. Lawrence Waterway, **19**-7119
Great light shines, * **2**-575-82
Great Modern Ship, A, * **12**-4414-26
Great Motion-Picture Industry, The, * **11**-3957-66
Great Nebula, in Orion
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Great Rift Valley, **2**-470
Great Salt Lake, **19**-6841
discovered by Bonneville, **6**-1916
Mormon settlement on, **6**-1921
Great Smoky National Park, North Carolina and Tennessee, **7**-2289
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Great Stone Face. A scarred granite rock, 80 feet high, resembling a human profile, situated on Profile Mountain in the White Mountains, N. H. The subject of a literary classic by Nathaniel Hawthorne.. The stone is also known as the Old Man of the Mountain.
Great Stories and Great Story-Tellers, * **11**-3889-3900
Great Valley, California
description, **19**-6847-48
Great Wall of China, **2**-424
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Grebes, birds, **11**-4129-30
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Greco, El (Domenico Theotocopuli), Cretan painter in Spain, **4**-1495
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Cassandra, **7**-2609
Iphigenia, **9**-3361-64
lotus-eaters, **7**-2610
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Isles of Greece! by Lord Byron, **15**-5521
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What were the ancient Olympic games? **10**-3769
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Greek fire, weapon, **4**-1321
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What is meant by the Greek Kalends? **4**-1450
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Greeks
* costumes in ancient Greece, **9**-3157-58
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Greeley, Horace (1811-72). A famous American journalist and politician; in 1872 ran unsuccessfully for president.
Greely, Adolphus W., American Arctic explorer, **12**-4236
Green, John Richard, English historian, **9**-3224
Green (color) in nature, reason for, **2**-456-57
Green turtles, **14**-5232
Green-winged teals, ducks
Picture, **11**-3886
Greene, Edgar, *see* Poetry Index
Greene, Nathanael (1742-86). American Revolutionary general, born in Rhode Island.
commanded in the South, **4**-1173
widow befriended Eli Whitney, **6**-1914
Picture
portrait, **4**-1168
Greene, Robert, English writer, **3**-1120
opposition to William Shakespeare, **3**-833
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Greenfinches, birds, **8**-2972
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Greenland. Huge island of North America, lying mainly within the Arctic Circle; it is remarkable for the immense ice-cap which covers its interior, the only habitable areas being narrow strips along the coast. Its area is 827,275 square miles; the population is mainly Eskimo; the polar bear, reindeer and musk-ox are the chief land animals. Whale and seal oil, furs and eiderdown are exported, and the fisheries are important. Greenland was colonized by the Norsemen in the 10th century, but the founder of the present Danish colony was the missionary Hans Egede, who settled in Godthaab in 1721.
Greenland (*continued*)
Other settlements are: Godhavn, the capital, Sydproven, Christianshaab, Julianshaab and Upernavik.
colony from Iceland, before 1000, **2**-391
Pictures, **15**-5297
Eskimos, **7**-2416
Greenlets, birds, **9**-3139
Greenough, Horatio, American sculptor, **14**-4934
Greensboro, North Carolina, seat of Guilford County. Several colleges, including three for Negroes, are located in the city. The cotton mills produce blue denim; and tools, sheet metal, chemicals and stoves are manufactured. It was founded in 1808 and named for General Nathanael Greene, hero of the Revolutionary War. Population, 59,319.
Greenshanks, birds. *Picture* (in color), **9**-3130
Greenwich, England
Question about
What is Greenwich time? **7**-2359
Picture
old Greenwich Observatory, **7**-2359
Gregorian Calendar. The calendar now in general use, introduced by Pope Gregory XIII in 1582, replacing the Julian calendar, which counted the year as 365¼ days, though it is really a little less. By 1582 the vernal equinox was coming on March 11 instead of on March 21. Ten days were dropped, and it was provided that in the future the even centuries (1600, 1700, etc.) should not be leap years unless they could be exactly divided by 400. This calendar was not adopted in England until 1751, when it was necessary to omit eleven days, calling the day after September 2, 1752, September 14.
Gregory I, the Great, Saint, **4**-1433
Grenada. Southernmost of the British Windward Islands; area, 133 square miles; capital St. George's.
Grenfell, Wilfred Thomason, medical missionary * life and work, **7**-2494-97
Pictures, **7**-2495-97
Grenville, Sir Richard, English seaman, **14**-5259-60
Gresham, Sir Thomas. English merchant, founder of the Royal Exchange; born, London, about 1519; died there 1579.
Gresham's Law. Derives its name from Sir Thomas Gresham, founder of the royal Exchange of London. He said: "When two sorts of coin are current in the same nation, of like value by denomination but not intrinsically, that which has the least value will be current and the other as much as possible will be hoarded." That is, the bad money drives out good money—true only when the sum of the two is greater than the demand.
Gretna Green is a village in Dumfriesshire, Scotland, near the river Sark that divides England from Scotland. When hasty marriages were made more difficult in England in 1754, it became the custom for eloping couples to cross the river and marry in Scotland where a lawful marriage could be made when a couple stated before witnesses that they were man and wife. Later Gretna Green marriages between people not Scottish, were declared unlawful in England.
Greuze, Jean Baptiste, French painter, **5**-1882
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Broken Pitcher, **5**-1877
Fidelity, **5**-1879
Innocence, **5**-1880
Scene of Family Life in Old France, **5**-1879
three heads **5**-1873
Young Rogue, **5**-1878
Grew, Nehemiah, English biologist, **2**-648
Grey, Lady Jane, queen of England, **5**-1816
Greyhounds, **2**-717
Griboyedov, Alexander, Russian writer, **19**-6906
Grid, part of electron tube, **14**-5034
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Grieg, Edvard, Norwegian composer, **19**-6923
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Griffin, imaginary creature, description, **1**-356
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Griffith Observatory Planetarium, Los Angeles, Calif.
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Grijalva, Juan de, Spanish explorer; born near Segovia, 1489; died in Nicaragua, 1527; explorer of Mexico which he christened New Spain.

Grillparzer, Franz, Austrian dramatist, **17**-6411, 6413
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Grimm, Jakob Ludwig and Wilhelm Karl (brothers), German writers of fairy tales, **6**-2270; **17**-6410
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Bremen Town Musicians, **8**-2763-65
Fisherman and His Wife, **19**-6997-7000
Hansel and Grethel, **6**-1964-68
Princess Who Became a Goose Girl, **11**-3831-33
Seven at One Blow, **10**-3714-16
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Grimmelshausen, Hans Jakob von, German writer, **17**-6268-69
Grimsel dam, Switzerland
Picture, **16**-6004
Gripsholm Castle, Sweden
Picture, **15**-5306
Griselda, Chaucer's story of, **13**-4767
Grison, animal, **2**-770
Grizzly bears, **3**-867-68
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Groll, Albert, American painter, **10**-3514
Gromwell, flower
Pictures (in color), **14**-4981, 4992; **15**-5397
Groningen, city in north Holland
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Academy of Science, **15**-5567
Gros, Antoine Jean, French painter, **6**-2081
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Grosbeaks, birds
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Pictures, **8**-2975; (in color), **12**-4372; **13**-4841; facing **14**-5140
Grote, George, English historian, **9**-3224
Grotius, Hugo. Dutch jurist, statesman and poet, founder of international law; born, Delft, 1583; died, Rostock, Germany, 1645.
Ground block, part of diver's apparatus, **12**-4185-86
Ground Control of Approach (GCA), radar equipment for aviation, **14**-5151
Ground Hog Day, origin, **4**-1452-53
Ground ivy, plant, **14**-4980
Ground sloth, prehistoric mammal, **7**-2396
Ground squirrels, **3**-1128-29
Ground-tackle of a ship, **13**-4848
Ground wood, kind of pulp, **7**-2447
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Groundsel, seaside plant, **14**-5165
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Grouse Family, of birds, **12**-4363-64
Grove, Frederick Philip, Canadian writer, **14**-5111-12
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Growing
Questions about
Do we grow as much one year as another? **16**-5846
Why do animals grow up so soon? **16**-5839-40
Why do we ever stop growing? **6**-2009
Why does hair grow after the body has stopped growing? **5**-1810
Growing West, * **6**-1905-24
GR-S (Government Rubber-Styrene), synthetic rubber, **12**-4360
Grünenberg, Johann, German printer
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Grünewald, Mathias, German painter, **4**-1344
Grysbok, an antelope, **4**-1442
Guacharos, birds, account of, **9**-3374
Guadalajara. Second city of Mexico, with a magnificent cathedral. It has a large trade and many manufactures.
Guadalquivir. River of Andalusia, Spain, rising in the Sierra del Pozo and passing Cordova and Seville on its way to the Atlantic. It is navigable for ocean steamers to Seville. 350 miles.
Picture
at Córdoba, **14**-4905
Guadeloupe, West Indies, **19**-7104
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Picture, **12**-4367
Guaranis, South American Indians, **19**-6858
Guatemala, Central America, **11**-3823
Picture, **11**-3823
Guatemala City, capital and largest city of the Republic of Guatemala. It is on a plain in mountainous country of the southern part of Guatemala—a region that is subject to earthquakes. The city is the educational center of the country. Banking and the coffee trade are important; and shoes, furniture and tobacco products are manufactured. It was founded in 1776 after the previous capital, which was about twenty miles away, had been destroyed by an earthquake in 1773. Population, 176,800.
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Guayule, rubber-producing shrub, **4**-1408
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Guelder rose, flower, **11**-4020; **17**-6131
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fruit of (in color), **11**-4026
Guemal, a deer, **4**-1512
Picture, **4**-1511
Guenon (monkey), **1**-208
Picture, **1**-206
Guernsey. Second largest of the Channel Islands; area, 25 square miles; capital, St. Peter Port. Market gardening, cattle-raising and fishing are the chief industries.
Guernsey, breed of cattle, **4**-1261
Pictures (in color), facing **4**-1258
Guest, Edgar Albert (1881-). Popular American poet, born in England. Famous for the facility of his verse, which appears daily in many newspapers.
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Guiana, British, **9**-3190-91; **19**-6975
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Guilds, medieval associations of merchants and workers, **6**-1942
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Guilford Court House. Battle of the American Revolution, fought March 15, 1781, near present city of Greensboro, N. C., between Cornwallis and Greene, resulting in American defeat.
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black-guillemot (in color), **8**-2897
Guinea, Gulf of. Immense gulf in the west coast of Africa, containing the Bight of Biafra and the Bight of Benin.
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Guinea-hen flower, description, **16**-5876
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* Story of Guns, **8**-2842-50
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Why do we see the flash from a gun before we hear the noise? **10**-3658-59
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Gurnards, fishes, **16**-5776
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Gustafson, Ralph, Canadian poet, **14**-5114-15
Gustavus I, king of Sweden, **15**-5293
Gustavus II, Adolphus. Swedish soldier, king and national hero; born, Stockholm, 1594; killed, Lützen, Saxony, 1632; reigned from 1611 and saved the Protestant cause in the Thirty Years' War.
tries to found colony in America, **2**-551
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death at Lützen, **12**-4174
Gutenberg, John, printing inventor, **9**-3384-87
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examining proofs of his Bible, **9**-3381
Gutta-percha, uses of, **9**-3151
Picture (in color), **8**-2997
Guy Mannering, by Scott, note on, **11**-4071
noteworthy characters, **7**-2351
Gwalior, India
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fort and palace (gravure), **8**-2831
Jama Masjid, **15**-5478
Gwyn, Nell, actress
Picture
portrait, by Sir Peter Lely, **6**-2003
Gymnosperms, plant group, **1**-221-22
Gypsies, *see* Gipsies
Gypsum. A non-metallic light-colored mineral found in beds or granular masses. It splits easily in one direction and can be cut with a knife. When heated at high temperature gypsum falls to a powder known as plaster of Paris. It is also ground to powder and used as a fertilizer. Pure white gypsum is called alabaster. Gypsum is found all across the United States and Canada.
in Mammoth Cave, **4**-1301
provides plaster for finishing houses, **9**-3123
Question about
What is gypsum and what are its uses? **13**-4642
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stucco (gypsum) house, **9**-3121
Gypsy moth, *see* Gipsy moth
Gyro instruments, on ships, **12**-4417
Gyrocompasses, aids to navigation, **12**-4400-01
Gyroscope
Question about
How does a gyroscope keep things right side up? **12**-4400-01

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Haakon, king of Norway, **15**-5294
Haarlem. Center of the Dutch tulip trade, with one of the largest and finest churches in Holland.
Pictures
Great Church (gravure), **17**-6172
Market Square, **15**-5565
Haarlem school, Dutch painting, **5**-1590
Habeas Corpus Act, in English history, **6**-2100
Habitants in Canada, * **8**-2952-56
in colonial times, under seigneurial system, **2**-680
painted by Krieghoff, **10**-3699-3700
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Habits
Question about
Can we break ourselves of bad habits? **16**-5961
Hackling
process in manufacture of linen, explanation of, **9**-3322
Haddock, fish, **16**-5780
Pictures, **16**-5779; (in color), **16**-5783
Hadrian (Publius Ælius Hadrianus) (76-138 A.D.). Emperor of Rome from 117 to 138 A.D.
encouragement of art, **12**-4468, 4470
reign of, **4**-1247
Hadrian IV, Pope, *see* Adrian IV
Hadrian's Wall, **5**-1567
Hæmoglobin, *see* Hemoglobin
Hafiz, Persian poet, **15**-5463
Hafnium (Hf). Chemical element. Metal. Atomic number 72; atomic weight 178.6; melting point 1700°C.; specific gravity 13.3. Hafnium occurs in small quantities with zirconium, which it closely resembles.
Haggard, Sir Henry Rider, British novelist, **11**-3900
Hague, The, seat of the Netherlands court. The city is 3 mi. from the sea and is connected to the coast town of Scheveningen by streetcars and a highway. It has many attractive and interesting buildings, especially those connected with the government and the palaces of several princes. The main concern of the city is with the government, but there is some manufacturing of iron and furniture. It started as the hunting lodge of the counts of Holland in the 12th or 13th century, and became important when Count Floris V made it his permanent residence and seat of government in 1250. The name means "hedge." Population, 523,700. *See also* **15**-5567
Pictures
Deer Park, **15**-5562
Peace Palace, **15**-5562
Hahn, Emanuel, Canadian sculptor, **14**-5079
Haifa, Israel
Pictures, **19**-7161
Haifa Technicum, **19**-7163
Haig, Douglas, Earl. Scottish field-marshal; born, 1861; commanded the British army, 1915-19. During this period were fought the battles of the Somme, of Arras, the Hindenburg line, Messines, Ypres and Cambrai, and finally the great disasters and triumph of 1918. For his services he was raised to the peerage as Earl Haig of Bemersyde and given a grant of $500,000. Died in 1928.
Hail
how formed, **8**-2927
Question about
What is the difference between snow and hail? **8**-2915-16
Haile Selassie, restored to throne of Ethiopia, **13**-4570
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Why so some people lose their hair? **5**-1810
Why does hair grow after the body has stopped growing? **5**-1810
Why does hair grow gray when people are old? **2**-463
Why does it not hurt when we cut our hair? **5**-1811
Picture
glands and muscles in skin, **5**-1805
Haiti, **19**-7100-01
freed by Toussaint l'Ouverture, **13**-4584
Picture
Christophe's fortress, **19**-7101
Hake, fish, **16**-5780
Picture, **16**-5777
Hakirya. Seat of the Government of Israel. It was formerly a village of German farmers and was called Sarona. It is on the outskirts of Tel Aviv. Because of the fighting with the Arabs in Jerusalem, it has been used as the governmental headquarters, but it may not be the permanent capital. Some branches of the Government are in Jerusalem. Most of the buildings in Hakirya are temporary structures that can be moved quickly.
Halcyon, mythical bird, **9**-3374
Hale, Edward Everett, author of the story, A Man Without a Country, **13**-4727
* Man Without a Country, quotations and summary, **7**-2401-08

Hale, Nathan
* life, and execution as a spy, **11**-3995-96
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statue by MacMonnies, **11**-3996
Hale, Sarah Josepha Buell, American writer, **14**-5271-72
Haleakala, volcano, Hawaii, **7**-2291
Hales, Stephen, English scientist, **2**-709
Halevi, Yehuda, Jewish poet of Middle Ages, **19**-7158
"Half-life," term used in work on radioactive elements, **16**-5802, 5804-06
Halftones, form of illustration
how made, **3**-1063, 1066
Pictures, **3**-1060-61
Haliburton, Thomas Chandler, Canadian writer, **14**-5102
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memorial tablet at Windsor, **14**-5103
home at Windsor, **14**-5101
Halibut, fish
account of, **16**-5778-79
Pictures, **16**-5777; (in color), **16**-5782
Halicarnassus, Asia Minor, tomb of Mausolus, *see* Mausolus
Halifax, capital of the Province of Nova Scotia, the seat of Halifax County, on a peninsula on the southeast coast of the province. The city is on a hill 225 feet above the harbor. The first newspaper in Canada was published in Halifax in 1752, and the first fire-fighting group was formed in 1764. The city is important for fisheries and for shipping, but there is also manufacture of boilers, clothing, machinery and skates. The Honorable Edward Cornwallis was sent by the British Government to found a town in 1749, and he named it for Lord Halifax. Population, 70,488.
Hall, Charles Francis, American Arctic explorer, **12**-4232
Hall, Sam S. (Buckskin Sam), American writer, **14**-4960
Hall of Fame, New York University
Question about
What is the Hall of Fame? **17**-6176-77
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Hallam, Arthur, English poet, friend of Tennyson, **10**-3469-70
Halleck, Fitz-Greene, American writer, **13**-4710-11
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Halley, Edmund, English astronomer, **11**-3851
Picture, **11**-3851
Halley's Comet, 10-3667
Picture, **10**-3668
Halliburton, Richard (1900-39). American author and adventurer; author of the famous Royal Road to Romance.
Hallmarks, explanation, **4**-1306
Hallowe'en, observance, **6**-2095
Question about
What is the meaning of Hallowe'en? **4**-1453
Halogens, group of elements, **16**-5669
Hals, Frans, Dutch painter
* life and work, **5**-1588, 1590
compared with Rembrandt, **5**-1712
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Man with a Sword, **5**-1587
Portrait of a Man and his Wife, **9**-3075
Portrait of a Woman, **5**-1590
Woman and a Child (gravure), **1**-69
Hamadryads in mythology, **9**-3237
Hamadryas, sacred baboon, **1**-208
Picture, **1**-206
Hamadryas, snake, **15**-5413
Picture, **15**-5412
Hamah, Syria, water-wheel at, **7**-2547
Hamburg, Germany, capital of the state of the same name, on the Alster and Bille rivers, and on a northern branch of the Elbe. It is the leading port in Europe. It has noteworthy churches, libraries and schools. The city is connected with most sections of Germany by rivers and canals as well as by rail. Among the main exports are coffee, cotton, hosiery, machinery, tobacco and ironware. Banking is also important. It is thought that the town started as a fort built by Charlemagne in 808. It took its name from the forest around it. Population, 1,384,100.
Picture
as it looked in medieval times, **12**-4179
Hamilcar Barca (died 228 B.C.). Carthaginian general; father of Hannibal. He served with great distinction in the First Punic War against
Hamilcar Barca (*continued*)
Rome. In 238 B.C. he crushed a dangerous revolt against Carthage. Hamilcar invaded Spain in 237 and succeeded in conquering much territory. In 228 B.C. he was slain while fighting the Vettones, a Spanish people.
Hamilton, Alexander
* life and work, **10**-3488-89
tariff proposals, **5**-1700
Pictures, **8**-2806; **10**-3490
portrait by Trumbull, **9**-3328
Hamilton, capital of Bermuda, **9**-3191
Hamilton, Ontario, seat of Wentworth County, at the western end of Lake Ontario on Hamilton Bay. The city is in the heart of a fruit-growing district. It is a shipping center, and also has considerable industry such as the making of textiles, electrical appliances, iron and steel. La Salle explored the region in 1669, and the first white settlers came in 1778. In 1813 a town site was laid out. Population, 178,686.
Picture
statue of Loyalist family, **3**-945
Hamites. People of the Mediterranean type of the white race who have inhabited all Africa north of the Sudan since prehistoric times. They are divided into Eastern and Western branches—the Eastern including the Egyptians, Nubians, Abyssinians and Gallas; and the Western including the Berbers, Tibus and Fulahs.
Hamlet, play by Shakespeare
comment on, **3**-838
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Hamlet's Soliloquy, **10**-3481
Hamlin, Hannibal, vice-president of U. S.
Picture
portrait (gravure), **11**-3948
Hammer, how to use, **1**-130
Question about
Why will a hammer break a stone when a piece of wood will not? **10**-3729-30
Hammerfest. Northernmost town in the world, on an island of Norwegian Finmark. Fishing and sealing are important.
Hammerhead, bird, **11**-4008
Picture, **11**-4004
Hammerhead, shark, **16**-5894
Hammock, directions for making, **11**-4087
Hammond, Indiana, on the Grand Calumet and Little Calumet rivers and on Lake Michigan, and on the Indiana-Illinois state line. It has been noted as a slaughtering and meat-packing center, but the steel industry has become more important in recent years. Railway cars, tire chains, punch presses and surgical equipment are made. It started as a slaughter house in 1868 and was called State-Line. The name was changed in 1873 to honor one of the founders of the slaughter house, George H. Hammond. Population, 70,184.
Hammurabi, king of Babylon
laws of, **2**-654
Picture
code of laws, **2**-654
Hampshire. County of Southern England; area, 1,623 square miles; capital, Winchester. Here are the Isle of Wight and New Forest, and the ports of Southampton and Portsmouth.
Hampshire, breed of pig, **5**-1717
Picture, **5**-1717
Hampton Court, English palace
architecture of, **18**-6490
Hampton Roads. The lower part of the estuary of the James River, Virginia; an important military point, fortified by Fort Wood and Fortress Monroe.
Hamsters, animals, **3**-1132
Hamsun, Knut, Norwegian novelist, **19**-7013
Han dynasty, China, **2**-424
Hancock, John (1737-93). American patriot, born at Quincy, Mass. President of Provincial Congress; of Continental Congress; governor of Massachusetts, 1780-85, and 1787-93.
first signer of Declaration of Independence, **20**-7579
Picture
portrait, in group, **4**-1165
Hand, bones of, **5**-1563
fracture of, **13**-4850
Questions about
Why do our hands become warm after playing with snow? **8**-2915
Why have we lines on our hands? **1**-142

Hand—*Questions about (continued)*
Why is our right hand stronger than our left? **16**-5959
Hand, measurement for horses, **6**-2252
Handel, George Frederick, German-English composer, **19**-6913-14
music of, **19**-7071-72
Pictures, **19**-6912
portrait, **19**-7072
Handel and Haydn Society, musical organization in Boston, **18**-6509
Handicaps
* some who triumphed over handicaps, **5**-1610-18
Handicrafts, *see* list in The School Subject Guide
Hands, *see* Hand
Handy, William Christopher, American "blues" composer, **18**-6515
Hangchow, China, capital of the Province of Chekiang, located where the Tsien-tang River falls into the Bay of Hangchow. The city is known for its triumphal arches, monuments to great men and temples. In the 13th century it was a literary center. Marco Polo was greatly impressed with the city and called it Kinsai. Cotton-weaving, carving of ivory, and the making of silk, tapestries, fans and screens are the important industries. Many of the people live in houseboats. Population, about 400,000.
Hanging gardens of Babylon, *see* Babylon—hanging gardens
Hangnests, *see* Orioles
Hankow, China, an important river port where the Han and Yangtze rivers meet. Two other cities actually join with Hankow to form one immense city. They are Wuchang across the Yangtze and Hanyang across the Han. As in the case of many other Chinese river towns, a great many people live in boats on the rivers. There are many mills for weaving cotton, silk and wool, and soap and cement are manufactured. The first modern iron-and-steel works in China was built there. Population, about 800,000.
Hanks, Nancy, *see* Lincoln, Nancy Hanks
Hannibal (247-183? B.C.). Greatest of all Carthaginian generals. Became commander of the Carthaginian armies in Spain in 221 B.C. He played an important part in the Second Punic War, almost bringing about the downfall of Rome. After peace was declared with Rome in 201, Hannibal turned to politics and brought about many needed reforms in Carthage as the chief magistrate. In 195, at the demand of the Romans, he was exiled to Syria. Driven from this place by the Romans, he sought refuge in Bithynia. Prusias, king of Bithynia, was on the point of surrendering the great general to the Romans when Hannibal took his own life.
invasion of Rome, **4**-1195-96, 1360-61
use of elephants, **6**-2144
Hanno, Carthaginian traveler
account of Africa, **14**-5199
Hanover, Germany, capital of the province of the same name, on the Ihme and Leine rivers at their meeting-point. In the past it has been a congregating place for foreign students. The libraries and museums contained valuable manuscripts and antiques. Because it was an important industrial city manufacturing railway equipment, machinery, iron products, chemicals and bridge parts, it was heavily bombed during World War II. It also manufactured pianos, cloth, tobacco and lamps. The city is known to have existed at the middle of the 12th century. George I of England was from Hanover. Population, 355,500.
Hanover, New Hampshire
Picture
Dartmouth College, **12**-4317
Hans Brinker, or The Silver Skates (story), **5**-1689-93
Hanseatic League, medieval union of northern German cities, **6**-1944
Pictures, **12**-4178-79
Hansel and Grethel (story), **6**-1964-68
Hansel and Grethel, opera by Humperdinck
writing of, **10**-3611
Hanson, John (1721-1783), American statesman. Born in Maryland, he was active in the public affairs of that colony and was elected to the Continental Congress in 1779. He had much to do with Maryland's ratification of the Articles of Confederation. He was the first president of the Congress of the Confederation, 1781.
Hanukkah, Jewish festival, **19**-7156
Hapsburgs, family of German rulers, **12**-4160-61; **17**-6192, 6198
in Switzerland, **16**-6003
Harbin, China, in Manchuria on the Sungari River. Flour-milling, sugar-refining and lumbering are important industries in and around the city. The surrounding region carries on agriculture. The city has grown from a small village to be a large city in fifty years. Population, about 500,000.
Harbor porpoise, sea mammal, **7**-2347
Picture, **7**-2347
Hard-hack, shrub, **19**-6934
Picture, **19**-6931
"Hard paste," name applied to certain type of porcelain, **5**-1666
Hard water
Question about
Can water be hard or soft? **8**-2773
Harding, Chester, American painter, **9**-3330
Harding, Warren G., president of U. S.
administration and outline of life, **8**-2672; **11**-3954b
Picture
portrait (gravure), **11**-3947
Hardy, Thomas, British writer, **11**-3896; **12**-4207-08
Picture, **11**-3898
Harebells, flowers, **17**-6129
of mountains, description, **18**-6666
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Hares, account of, **3**-1133-34
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Hare's ear, flower
Picture (in color), **15**-5398
Hargreaves, James, English inventor, **19**-7202-03
Hark, Hark, the Lark, song
writing of music for, **10**-3606
Harlem Heights, Battle of, 4-1165
Harlem River, New York City
Picture
Henry Hudson Bridge over, **1**-38
Harmonics, in music, **18**-6700
Harmony, Musical *see* Music—harmony
Harold, king of England, **5**-1571-72
Harp
in history of Ireland, **8**-2937
in symphony orchestra, **4**-1294
Picture, **19**-6899
Harper's Ferry, West Virginia
John Brown at, **7**-2430
Harpies, monsters in mythology, **1**-357; **9**-3235
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Harpignies, Henri Joseph, French painter, **7**-2372
Harpoons
Picture
primitive harpoon-point, **6**-1928
Harpsichord, musical instrument, **5**-1800
Picture, **5**-1801
Harriers, birds, **10**-3759
Pictures, **10**-3755; (in color), **9**-3282, 3284; (gravure), **10**-3761
Harriman Interstate Park
Picture
Camp Fire Girls on Lake Cohasset, **14**-5064
Harris, Joel Chandler, American writer of children's stories, **6**-2279; **13**-4790; **14**-4962
Picture, **13**-4790
Harris, Lawren, Canadian painter, **10**-3702
Picture
Country North of Lake Superior, **10**-3700
Harrisburg, capital of Pennsylvania and seat of Dauphin County, on the east bank of the Susquehanna River. Iron and coal mines in the region make the city important as an industrial center. Steel, machinery, textiles, clothing, leather, shoes and chemicals are among the products made. John Harris, for whom the city is named, started a trading post and ferry at the site in 1712. His son began the town in 1785. Population, 83,893.
Harrison, Benjamin, president of the U. S.
administration, **8**-2670; **11**-3952-53
proclaims Columbus Day a holiday, **6**-2089
Picture
portrait (gravure), **11**-3947
Harrison, Birge, American painter, **10**-3512
Harrison, William Henry, president of U. S.
administration, **6**-1916
outline of life, **11**-3941-42
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portrait (gravure), **11**-3946

Harrodsburg, Ky.
Picture
sculptured group of pioneers, **6**-2189
Harrow, farm implement
Pictures, **5**-1756-57
Hart, George Overbury ("Pop"), American painter, **10**-3516
Hart, James, American painter, **9**-3332
Hart, William, American painter, **9**-3332
Hart, William A., American, made practical use of natural gas, **7**-2354
Harte, Francis Bret, American writer, **13**-4790-91
See also Poetry Index
Hartebeest, an antelope, **4**-1440
Picture, **4**-1441
Hartford, capital of Connecticut and seat of Hartford County, on the west bank of the Connecticut River. Many colleges are located in the city, and it is the home of several insurance companies, which make it one of the world's leading insurance centers. A great many famous writers have lived there. The city has a children's museum that gives lectures, exhibitions and motion pictures. Office machines, aircraft engines, guns and hardware are among the products manufactured. Hartford was founded in 1636 by men from the Massachusetts Bay Colony. It was first called Newtown, but the name was changed in 1637 to honor the town of Hertford, England. Population, 166,267.
founded, **2**-556
Picture
State Capitol, **18**-6683
Hartford Convention, 1814, **5**-1705-06
Hart's tongue, fern
Picture (in color), **10**-3726
Hartwell, Charles Leonard, British sculptor
Picture
of bust, Sylvia, **13**-4853
Harun-al-Rashid. Most magnificent Abbasside ruler of Bagdad, famous as the caliph of the Arabian Nights; reigned 786-809.
tomb of his wife, Zobeide, **15**-5470
Harvard, John, Puritan minister and educator, **12**-4310
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Harvard University, founded, **2**-548
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history, **12**-4310
origin of alma mater song, **18**-6514
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Harvey, William, English physiologist, **2**-645
* life and methods of study, **8**-2726-28
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portrait, with Charles I, **8**-2727
Harz Mts. Range in central Germany, culminating in the Brocken, 3,745 feet. Length, 60 miles.
Hashemite Kingdom of Jordan, *see* Jordan
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Hastings, Warren. English statesman; born Churchill, Oxfordshire, 1732; died, Daylesford, Worcestershire, 1818; first governor-general of India.
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Hausas. Compact race of Sudanese Negroes who live in central and western Sudan. They are a peaceful and industrious race of some 4,000,000 people.
Havana, capital of Cuba, on the northern coast of the island on the Bay of Havana. Its harbor is considered one of the best in the world. Unlike many cities that have a wealthy section and a slum area, it has the two mixed together for the most part. The U. S. battleship the Maine was blown up in the harbor in 1898. Shipping and the manufacture of tobacco products are the main business concerns of the city. It was founded in 1519 by Diego de Velasquez, and called "the key of the New World." Population, 673,376.
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Hay, Col. John. American statesman, author and poet; ambassador to Great Britain, 1897-98; Secretary of State, 1898-1905. Born, Salem, Ind., 1838; died, Newbury, N. Y., 1905. Advocated "open door" policy of trade with China. One of Lincoln's personal secretaries and co-author of a famous "Life" of Lincoln.
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Why does hot water crack thick glass more easily than thin? **15**-5618
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Heber, Bishop Reginald (1783-1826). *English* hymn-writer and clergyman; at the time of his death he was Bishop of Calcutta. Some of his most beautiful hymns are: From Greenland's icy mountains, Holy, Holy, Holy, and The Son of God goes forth to war.
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Hebrides. About 100 inhabited and 400 uninhabited islands off the Scottish west coast. They lie in two groups, the Outer and the Inner, the chief islands of the former being Lewis and North and South Uist, and of the latter Skye, Mull, Islay and Jura. Fishing and stock-raising are the chief industries. Total area, 3,000 square miles.
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Hedges, Cornelius, suggested creation of Yellowstone National Park, **7**-2281
Hedin, Sven Anders (1865-). Swedish geographer and explorer. He traveled over little known regions in Persia (now Iran), Mesopotamia (now Iraq), Turkestan and Tibet, and made a number of remarkable discoveries. Among other things, he discovered the sources of the Brahmaputra and Indus Rivers, as well as a great mountain range (north of the Himalaya) that now bears his name.
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Heijo, (Pingyang or **Pyeng Yang),** city in northern Korea, on the Tatong (Dadong or Daido) River. It is called the "key to Korea." The Japanese built and improved the factories, making it an industrial center. It is thought to have been built in the 11th century before Christ. Population, 286,000.
Heine, Heinrich, German author, **17**-6411
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Helena, capital of Montana and seat of Lewis and Clark County, at the eastern end of the Continental Divide in the west-central part of the state. Mt. Helena is near by. The city is a trading center for the surrounding agricultural area. Many insurance companies are located there, and the major industry is the refining of lead and zinc. It was founded as a gold-rush town in 1864. Population, 15,056.
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Heligoland. German North Sea island, about 45 miles from the mouth of the Elbe. British from 1807 to 1890, it was then ceded to Germany, who used it as a fortress up to 1919, when it was dismantled. Though rocky, it has suffered severely from erosion, and is now only three miles in circumference.
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Helios (Sol), in ancient mythology, **9**-3233
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Helium (He). Chemical element. Inert gas. Atomic number 2; atomic weight 4.003; boiling point −268.9°C. Named from Greek *helios,* the sun, because its spectrum was seen in light from the sun before the element was discovered in uranium ores. It is obtained from natural gas, almost entirely in Texas. It is used for filling airships and balloons, and also for medical and scientific purposes. *See also* Inert gases.
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Helsinki (Helsingfors), capital of Finland and the only large city of that country. It is built on a peninsula in the Gulf of Finland. It is known for its university, its scientific societies and its theaters. Ice-breakers have to keep the harbor open in winter. The main products are carpets, tobacco and beer. It has figured in wars with Russia since the early part of the 18th century. It was founded by Gustavus I, king of Sweden, in 1550 at a near-by location, and was moved to the peninsula in 1640. Population, 338,800.
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Hero and Leander. A priestess of Aphrodite and a youth of Abydos, who met secretly in the former's tower, on the Hellespont, to which Leander swam nightly. He was drowned one stormy night, and Hero cast herself into the sea to be united to her lover in death.
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Hevea Brasiliensis, tree
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Hewitt, Peter Cooper, American inventor, **19**-7210, 7212
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Heyward, Du Bose, American writer, **14**-5014
Heywood, John, early English dramatist, **2**-727
Heywood, Thomas, English playwright, **3**-1125
Hiatt, Jesse, originator of Delicious apple, **12**-4449
Hibernation, winter sleep of animals, **6**-1973
Hibiscus, a mallow, **14**-5161
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Hickory trees, 12-4248-49
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shagbark, **13**-4639
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Hickson, William Edward, *see* Poetry Index
Hiddenite, semi-precious stone
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Hieratic writing, of ancient Egyptians, **10**-3546-47
Hieroglyphics, picture-writing of ancient Egyptians, **10**-3546-47
Rosetta Stone, clue to, **3**-814
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Why are old sign writings called hieroglyphics? **7**-2487
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High-holes, birds, **13**-4763
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redshafted flicker (in color), facing **14**-5133
Highfliers, variety of pigeon, **12**-4284
Highland Park, Michigan, suburb of Detroit. The Ford Motor Company was located there, but has moved to Dearborn. The city still manufactures automobiles, and also has candy factories. It has grown from a village of 400 people to a city in half a century. Population, 50,810.
Highwater shrub, 14-5163-64
Highways, *see* Roads
Hildebrand, *see* Gregory VII
Hildebrand, The Lay of, early German poem, **17**-6265
Hill, James Jerome (1838-1916). Born near Guelph, Ontario, Canada. Became American citizen and great railway-promoter.
Hill-robins, birds, one kind of babblers, **9**-3285
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Hills
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Why do the hills look blue at a distance? **1**-288
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Hiltensperger, George, artist
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Himalaya Mts., 18-6588, 6590
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Mount Everest, **1**-122
Hind and the Panther, The, by Dryden
note on, **4**-1478
Hindenburg, Field-Marshal Paul von, German soldier and statesman, **18**-6607
Picture, **18**-6603
Hindenburg, airship, **1**-349
Pictures, **1**-350
Hindu Kush. Mountain range in Central Asia, extending some 500 miles along Northwestern India and the northern part of Afghanistan. Several of the peaks are more than 24,000 feet above sea level.
Hinduism, religion, **9**-3085
literature, **15**-5461
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Hindus, of India, **8**-2824-25, 2837-39
contributions to study of mathematics, **19**-7006
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Hindu zodiac, **11**-3799
Hindustan, Republic of, 8-2837-39
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Hipparchus, ancient astronomer, **11**-3845
Hipparion, ancestor of horse
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Hippocrates, "the father of medicine," work and influence, **8**-2722-23
Hippocratic oath, taken by physicians, **8**-2723
Hippopotamus, account of, **5**-1723-25
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Hirohito, emperor of Japan
Picture, **2**-572
Hiroshima, Japan, on Honshu Island in the Inland Sea. It is the capital of Aki Province. Before World War II it was noted as a trading center for bronze and objects of art. The first atomic bomb to be used in warfare was dropped on the city in August 1945. Over half of it was completely destroyed. Population, 343,968.
Picture, **15**-5288
Hispaniola, island in West Indies, formerly called Santo Domingo and Haiti.
See Dominican Republic and Haiti
Histeridae, family of beetles, **18**-6626
Historians
American writers of history in latter part of nineteenth century, **13**-4793-94
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Greek writers, **16**-5750-51
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History's Patchwork Quilt, * **9**-3157-69
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Hitler, Adolf, leader of nazi Germany, **12**-4172, 4181, 4183-84; **18**-6607-08
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Hittites, ancient people of Asia Minor
archeological discoveries in Hittite cities, **18**-6765
art shows Assyrian influence, **11**-3876
Hittorf, J. W., German scientist
work in electricity, **11**-3986
Hoang-ho, river in China, *see* Hwangho
Hoarseness
Question about
Why do we get hoarse when we have a cold? **3**-878
Hoatzin, primitive bird, **8**-2758; **12**-4368
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Hoban, James, architect
Picture
White House, designed by, **8**-2808
Hobart, Garret A., vice-president of U. S.
Picture
portrait (gravure), **11**-3948
Hobart, capital of Tasmania, on the Derwent River at the base of Mount Wellington. It has saw mills, flour mills, iron foundries and tanneries, and the main exports are fruit, grain, timber and wool. It has a fine harbor, and is a favorite summer resort. It was founded in 1804 and was named for Lord Hobart. Population, 72,155.
Hobbema, Meyndert, Dutch artist, **5**-1592
Picture
Avenue at Middelharnais, **5**-1587
Hobbies
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* coin collecting, **11**-4079-81
* how to care for tropical fish, **5**-1765-67
* how to develop and print films, **6**-2259-63
* how to keep a snapshot album, **10**-3627-28
* how to make a marionette show, **8**-2744-45
* learning to be a radio amateur, **14**-4997-5002
* leathercraft, **8**-2880-88
* making a model airplane, **2**-617-21
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photographic silhouettes, **10**-3503-04
* plastics, **9**-3247-51
* puppets, **9**-3375-76
stamp collecting, **15**-5507-10
Hobby, European, bird, **10**-3756
Pictures, **10**-3755; (in color), **9**-3282
Hoboken, New Jersey, on the Hudson River opposite New York City, connected with New York by the Hudson tubes—tunnels under the river.

Hoboken (*continued*)
Considerable shipping is carried on, especially to and from South America. Much food-processing and manufacture of drafting instruments, paper containers, lead pencils and furniture are carried on. The location was early known as Hobocan Hackingh, "the land of the tobacco pipe," because the Indians made pipes from the stone of the area. The town was planned in 1804. Population, 50,115.
Hoccleve (or **Occleve**), **Thomas,** early English writer, **2**-721
Hockey, field, how to play, **12**-4498-4500
Hockey, ice, game, **18**-6520-22
in Canada, **10**-3693-94
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Hodgson, Ralph, *see* Poetry Index
Hoe, Richard, printing-press inventor, **9**-3389-90
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Hoe, Robert, founder of famous printing-press company, **9**-3389-90
Hoeylaert, Belgium
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hothouses for grape-growing, **15**-5499
Hofer, Andreas, patriot of the Tyrol, **13**-4584
Picture, **13**-4583
Hoffman, Charles Fenno, *see* Poetry Index
Hofmann, Josef Casimir (1876-). Polish pianist. Was a child prodigy, appearing in concert at the age of 6. Became one of the most famous pianists of all time. From 1927 to 1938 he was director of the Curtis Institute of Music in Philadelphia.
Hog-nosed snakes, **15**-5413
Hogarth, William, English painter, **7**-2327-28
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portrait of Polly Peachum, **6**-2005
portrait of the Artist and his Dog, **6**-2005
portrait of the Artist's Sister, **6**-2005
The Artist's Servants, **9**-3072
Hogg, James, poet
See Poetry Index
Hogs, *see* Pigs; Boar, Wild
Hohenlinden, Battle of. Great victory of the French under Moreau in 1800 over the Austrians.
Hohenstaufens, family of German rulers, **12**-4159
Hohenzollerns. Family name of the royal house of Prussia. In 1871 the Hohenzollern William I became German Emperor. Frederick III followed in 1888, and William II in the same year. With the defeat of Germany in World War I, the Hohenzollerns were deposed, and the ex-Kaiser died in Doorn, Holland, in 1941.
Holbein, Hans, the Elder, German painter, **4**-1345
Picture
Death of Mary, **4**-1347
Holbein, Hans, the Younger, German painter
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portrait of Henry VIII (gravure), **5**-1822
portrait of Sir Thomas Wyatt, **3**-1113
Holberg, Baron Ludwig, Norwegian writer, **19**-7010
Hold of a ship, **13**-4847
Hold fast! Let go! game, **11**-4082
Holidays
* in the United States, **6**-2088-95
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Holland, Clifford M., tunnel engineer, **2**-519
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* history and description, **15**-5554-68
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The Leak in the Dyke, by Phoebe Cary, **12**-4472-74
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Holland, U. S. submarine tender
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Holland Tunnel, under Hudson river
Question about
Where is the Holland Tunnel? **2**-519
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Holly trees
* account of, **12**-4384-86
varieties, **11**-4020
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Pictures
fruit (in color), **11**-4026
tree, flower and leaf, **12**-4389
Hollywood Bowl, California
Picture, **19**-6846
Holmes, Oliver Wendell, American poet and humorous essayist, **13**-4724
Pictures, **13**-4726
See also Poetry Index
Holmium (Ho). Chemical element. Atomic number 67; atomic weight 164.94. One of the rare-earth elements. *See* Rare-earth elements.
Holstein (Holstein-Friesian), breed of cattle, **4**-1260-61
Pictures (in color), facing **4**-1258
Holy Grail, Quest of the (story), **19**-6944-50
Holy Roman Empire
and Italy, **12**-4408
Charlemagne made first ruler, **4**-1436
Germany, part of, **12**-4158-60
Holyoke, Massachusetts, on the Connecticut River, at the foot of Mt. Tom. The city is sometimes called "the Paper City" because fine stationery and other paper products are manufactured. Cloth, knives, and steam boilers are also made. Settlers from Ireland came there in the early part of the 1700's. Population, 53,775.
Homage, feudal custom, **6**-1936
Home
Poems about, **2**-734-38
Home Rule, in Irish history, **8**-2943-44
Home, Sweet Home, song, **2**-738
Pictures, Payne and his home, **10**-3607
Homer, Greek poet, **3**-915; **16**-5747-48
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Iliad (adapted), **9**-3076-82
Odyssey (adapted), **12**-4337-42
Homer, Louise Dilworth Beatty, American singer, **14**-5272
Homer, Winslow, American painter, **10**-3448-49, 3512
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Northeaster (gravure), **10**-3459
The Wreck (gravure), **10**-3459
Homer's Iliad, * **9**-3076-82
Homer's Odyssey, * **12**-4337-42
Homes, *see* Houses
Homes and Housing, * **9**-3121-28
Honduras, Central America, **11**-3823
Picture
collecting rubber, **4**-1404
Honduras, British. British Central American colony; area, 8,598 square miles; capital, Belize. Cedar, logwood, mahogany, bananas, sponges and tortoiseshell are exported.
Honey
use for sweetening before sugar, **17**-6221-22
Question about
When bees take honey from flowers do flowers get more? **14**-5083
Picture
bees and honeycomb, **17**-6223
Honey-eaters, birds, **9**-3138
Honey-guides, birds, **9**-3370
Honey-locust, tree, **12**-4508
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Honeycreepers, birds, **8**-2972
Honeysuckers, birds
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cardinal honeysucker (in color), **12**-4370
Honeysuckle
hillside varieties, **15**-5608
meadow honeysuckle, *see* Clover
Poem about
The Wild Honeysuckle, by Philip Freneau, **3**-1139
Pictures, **14**-5082; **15**-5605; (in color), **13**-4878; **17**-6073
fruit, **11**-4024
Hong Kong, British island colony off the southern coast of China. It is one of the leading ports in the world. Rice was the major crop grown in

Hong Kong (*continued*)
the surrounding territories before the Japanese occupation, and fishing was an important industry. Shipbuilding and the manufacture of cement, rope, and rubber-soled shoes and sandals were carried on. Other products such as sweet potatoes, sugar-cane and pineapples are becoming important, and other industries are springing up. The British took over the island and city after the Opium War in 1842. Japan occupied the city in 1941, but the British took over again in 1945. A large part of the population is Chinese. Population, about 750,000. *See also* **9**-3187
Pictures, **2**-435
Honi soit qui mal y pense. French for "Shame be to him who thinks ill of it"—the motto of the Order of the Garter. An exclamation popularly believed to have been uttered by Edward III of England when he tied about his leg a garter which the Countess of Salisbury had dropped.
Honolulu, capital of the territory of Hawaii and seat of Honolulu County. It is the main city and the main port of the Hawaiian Islands. It is on Oahu Island, 2,090 miles southwest of San Francisco, about 4,000 miles from Australia, and about 3,500 miles from Japan. Much fruit is grown in the region. The major industries are rice-milling and the manufacture of machinery. Soap, leather and jewelry are also made. It is noted as a tourist resort. It was partly damaged at the start of World War II when Japan made her surprise attack on Pearl Harbor. In 1794 the harbor at Honolulu was discovered. Population, 268,913. *See also* **15**-5447
Pictures, **10**-3587; **15**-5450-51
Hooch, Pieter de, Dutch painter, **5**-1594
Hood, Thomas
See Poetry Index
Hoofs, of animals
use in manufacturing, **2**-635
Hoogh, Pieter de, *see* Hooch, Pieter de
Hooghly River, India
Picture
Jubilee Bridge over, **1**-35
Hook of Holland. Dutch cape at the mouth of the New Waterway, an artificial channel leading to Rotterdam. The voyage from Harwich in Essex to the Hook of Holland takes seven hours.
Hooke, Robert, English mathematician, **2**-647; **3**-977
Hooker, Joseph (1814-79). American soldier born in Massachusetts. He graduated from West Point and served with credit in the Mexican War. In the Civil War he served first in the East; commanded Army of Potomac Jan.-June, 1863; was relieved after defeat at Chancellorsville, and afterward served in the West.
Hooker, Rev. Thomas, helped found Hartford, **2**-556
Hooker, Mt. One of the loftiest peaks of the Rocky Mountains on the border of Alberta and British Columbia, Canada. 10,780 feet.
Hoopoes, birds, **9**-3373
Pictures, **9**-3369; (in color), **9**-3130
Hoot owl, 13-4762
Hoover, Herbert C., president of U. S.
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administration and outline of life, **11**-3954b-3954c
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Hoover Dam, in Colorado River, **7**-2550
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Hope, Anthony (Sir Anthony Hope Hawkins), British novelist, **11**-3900
Hope diamond, account of, **19**-7234
Hopi Indians
of Arizona desert, **9**-3027, 3029-31
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Hopi Indian dolls, **18**-6614
pueblo, model of, **9**-3028
Hopkins, Esek, first commander-in-chief of American navy, **17**-6326
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Hopkins, Gerard Manley, British poet, **12**-4211
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Hopkins, John H., Jr., American minister and hymn-writer, 18-6509
Hopkinson, Francis, American poet and music composer, **18**-6509
Hopper, Edward, American painter, **10**-3516
Picture
Tables for Ladies, **10**-3515
Hopper, Edward. Nineteenth century American minister and hymn-writer. He wrote the words to Jesus Saviour, Pilot Me.
Hoppner, John, English painter, **6**-2112
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Countess of Oxford (in color), **7**-2338
George IV, king of England (gravure), **6**-2120
Mrs. Gardiner and Her Children, **6**-2112
Mrs. Jordan (gravure), **6**-2116
Sackville Children (gravure), **6**-2118
Hops
Picture (in color), **11**-4022
Horace (Quintus Horatius Flaccus), Roman poet, **16**-5915-16
helped by Maecenas, **5**-1865
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Horehound, flower
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Horizon
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How far can we see? **11**-3839-41
Pictures
explanatory drawings, **1**-22-23
Hormones, secretions of endocrine glands, **8**-2698-2702
Horn. The connective tissue of the epidermis hardened and thickened till it forms a tough fibrous material. Sometimes borne on the heads of animals, as in a stag; sometimes forms most of outer covering, as in armadillos or turtles; sometimes arms the feet or toes, as in birds, reptiles and mammals.
use in manufacturing, **2**-635
used for buttons, **12**-4506
Horn, Cape. Southernmost point of South America, on an island off Tierra del Fuego, in Chile. A bare rock 600 feet high, and notorious for its storms, it was discovered in 1616 by the Dutch navigator Schouten, who named it after Hoorn in Holland.
Hornbeam trees, 13-4638
description, **12**-4246
Pictures, **12**-4257; **13**-4640
Hornbills, birds, **9**-3373-74
Pictures, **9**-3366-67
Hornbook, colonial children's book, **14**-4952
Horned pout, fish, **15**-5631
Horned rattlesnakes, 15-5415
Horned vipers, snakes, **15**-5414
Hornets, description, **17**-6230
Picture (in color), facing **18**-6721
Horns, powder. *Pictures*, **8**-2848
Horrocks, Jeremiah, English astronomer, **11**-3849
Horsa, Jute chief, **5**-1567
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Horse-chestnut trees
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Horse flies
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Horse mackerel, *see* Tuna
Horse nettle, weed, **15**-5395
Horse-power, meaning of term, **2**-689
Horsehead nebula
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horse-hair, for violin bow, **5**-1798
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The Arab's Farewell to His Steed, by Caroline Norton, **3**-846
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The Broncho That Would Not Be Broken, by Vachel Lindsay, **3**-843-44
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Horus, a god of ancient Egypt
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Hosmer, Harriet, American sculptor, **14**-4934
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for animals, at zoo, **19**-7136
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Hospital of St. Cross, oldest almshouse in England, **18**-6490
Hospital ships, of U. S. Navy, **18**-6816
Hospitallers. Order of monastic knights (founded, 1050); same as Knights of St. John of Jerusalem, Knights of Malta, and Knights of Rhodes. The badge of the order is the well-known Maltese cross.
Hot-air furnace, explanation, **5**-1847
Hot springs
Picture
in Yellowstone Park, **1**-159
Hot springs in New Zealand, **7**-2577
Hot Springs National Park, Arkansas, **7**-2287, 2289
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Hot Things, Cold Things and Temperature, * **5**-1579-84
Hôtel Cluny, Paris, **18**-6494-95
Hôtel de ville. French for "town hall."
Hotspur, Shakespearean character, **3**-837
Hottentots. A nickname given by the first colonists to the primitive race that originally ranged all over South Africa, but to-day is confined mainly to Great and Little Namaqualand. They are gradually being merged into the Bantu and other races.
Houdan, poultry
Picture, **12**-4493
Houdon, Jean Antoine, French sculptor, **13**-4703-04
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bust of George Washington, **13**-4703
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House of Seven Gables, Salem, Massachusetts
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Eskimo snowhouse, **7**-2564
glass blocks used in construction of, **18**-6750, 6752
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insulated by fibrous glass, **18**-6752
* paint protects, **13**-4867, 4869
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Polish farm house, **13**-4687
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Housing
* homes and housing, **9**-3121-28
in canal zone, **1**-367
Houston, Sam (1793-1863). An American soldier and political leader. Defeated the Mexicans at the battle of San Jacinto in 1836.
Houston, Texas, seat of Harris County, an inland port, on White Oak Bayou and Buffalo Bayou. It is about 50 miles from the Gulf of Mexico, and is connected to the Gulf by the Houston Ship Channel. Publishing, rice-milling, meat-packing, petroleum-refining and the manufacture of oil-field equipment, textiles, chemicals and cotton products are important. Several railroads have their headquarters at Houston. It was founded in 1836 and was named for General Sam Houston. Population, 384,514.
Picture
University of Houston, **14**-4895
Houston, University of
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Science Building, **14**-4895
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Picture
John Brown's last moments, **7**-2433
Hover flies, 17-6422
Hovey, Richard, American poet, **13**-4792
How, Bishop William Walsham (1823-1897). English hymn-writer; some of his most liked hymns are: Summer Suns are Glowing, We give Thee but Thine Own, and Who Is This So Weak and Helpless?
How Africa has been divided, * **18**-6802-14
How Alcestis gave her life (story), **8**-2703
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How Cups and Saucers Are Made, * **5**-1662-72
How did the earth begin? * **1**-133-36
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How Early Peoples Were Housed, * **12**-4445-47
How electricity is measured, * **12**-4289-92
How elevators go up and down, * **4**-1214-19
How flour is made, * **8**-2795-2802
How glass is made, * **18**-6744-52
How heat works for us, * **5**-1845-49
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How Lady Godiva helped her people, * **17**-6292
How man makes stone, * **7**-2312-18
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How plants serve mankind, * **5**-1623-28
How plants work, move and feel, * **2**-744-47
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How the French Reached Moscow (story), **14**-5196-97
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How things are measured, * **3**-849-57
How to keep your dog happy, * **12**-4261-64
How to knit a child's sock, * **14**-5005-06
How to write a radio play, * **3**-1149-51
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How We Get Linen, * **9**-3317-23
How We Digest Our Food, * **6**-2127-30
How we send a telegram, * **17**-6049-61
How wealth is created, * **15**-5357-66
Howard, Edward, early watchmaker, **7**-2388-89
Howard, Katherine, wife of Henry VIII
Picture, **5**-1814
Howe, Edgar Watson, American writer, **13**-4786
Howe, Joseph, Canadian writer and political leader, **14**-5102
Howe, Julia Ward, American poet, **18**-6510
See also Poetry Index
Howe, Richard, fourth viscount and first earl (1726-99). British admiral who commanded in American waters, 1776-78.
in America, **4**-1165
Howe, Sir William (1729-1814). British soldier, who led the storming party at Quebec and the attack at Bunker Hill. In 1776 he succeeded Gage in the chief command of the land forces, while his brother, Lord Howe, commanded the fleet. Both were opposed to making war on the colonists, and both resigned in 1778.
around New York, **4**-1165
around Philadelphia, **4**-1170
delays sending aid to Burgoyne, **4**-1170
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Howells, William Dean, American writer, **13**-4783, 4785
Picture, **13**-4786
Howitt, Mary, *see* Poetry Index
Howler monkey
Picture, **1**-214
Howrah, India, on the Hooghly River opposite Calcutta. It is independent of Calcutta, but is actually a suburb of it. The cities are connected by a floating bridge. It is known as a jute-manufacturing center. Population, 379,292.
Huang-ho, river in China, *see* Hwangho
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Huber, François, Swiss naturalist, **19**-7058
Huckleberries, 6-2066, 2068; **13**-4776
Hudson, Henry, English seaman, **14**-5264-65
Arctic exploration, **8**-2982-83
claimed Hudson River for Dutch, **2**-549
discovery of Hudson River, **2**-396
Picture
exploring the Hudson River, **8**-2977

Hudson, W. H. (William Henry), English novelist, **11**-4108
Hudson Bay. Inland sea in northeast Canada covering 400,000 square miles. It is connected with the Arctic Ocean by Fury and Hecla Strait and Fox Channel, and with the Atlantic by Hudson Strait, but is open for navigation for only three months in the year. Henry Hudson explored it in 1610.
Henry Hudson's exploration of, **14**-5265
Pictures, **7**-2556
Hudson Bay Railway, pioneer line in Canada, **4**-1491
Hudson River, also called **North River.** River of New York State. It rises in the Adirondack Mountains and is 300 miles long, having, with the Mohawk, a drainage area of 13,370 square miles. Troy, Albany and New York stand on its banks, and it is tidal and navigable up to Troy. Course through beautiful scenery. On its banks stands historic West Point. Above New York are the fine Palisades.
discovered by Henry Hudson, **2**-396
George Washington Bridge over, **1**-34
Palisades, formation of, **4**-1401
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Palisades, **2**-629
Hudson River school of painting, **9**-3332, 3334; **10**-3447
Hudson River tunnels. There are five double tunnels under the Hudson River: Pennsylvania Railroad Station, New York, to Weehawken, N. J., completed in 1910; Hudson and Manhattan Railroad System, north tunnels from Jersey City to Morton St., New York, finished in 1908; south tunnels from Jersey City to Cortland, Church and Fulton Sts., New York, completed 1909; Holland tunnel, the New York-New Jersey Vehicular Tunnel from Canal St., New York, to 12th St., Jersey City; the Lincoln Tunnel, from 39th St., New York, westward to New Jersey, first opened to traffic late in 1938.
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Where is the Holland Tunnel? **2**-519
Hudson's Bay Company, fur-trading organization in Canada, **13**-4691-92
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sold land to Canadian government, **4**-1485-86
Huerta, Victoriano, president of Mexico, **11**-3819
Huey P. Long Bridge, New Orleans
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Hugh Capet, king of France, **10**-3425
Hughes, David Edward, English inventor, **19**-7203-04
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Hughes, Langston, American Negro poet, **12**-4431
Hughes, Thomas, British writer, **11**-3900
* Tom Brown's Schooldays, quotations and summary, **14**-5152-58
Hugo, Victor, French writer, **18**-6716
* Les Misérables, quotations and summary, **11**-3861-72
Pictures, **18**-6716
Huguenots
colonies in America, **2**-394
Huia bird. *Picture,* **8**-2895
Hull, A. W., American scientist, **14**-5147
Hull, Isaac, early American naval officer, **17**-6328
Hull, John, American silversmith, **4**-1306
Hull, of a ship, **13**-4847
Hulls, Jonathan, English inventor
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Hull House, social agency in Chicago, **14**-5270
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Humbert I, king of Italy, **12**-4413
Humboldt, Baron Friedrich Heinrich Alexander von, German naturalist, **19**-7053
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Humboldt River. American river, rising in Elko County, Nevada. 375 miles.
Hume, David, English philosopher and historian, **9**-3222
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Humid, type of atmosphere, **7**-2533
Humidity
air conditioning regulates, **14**-5234-36
Question about
What do we mean by humidity? **1**-289
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Mortifying Mistake, by Anna Maria Pratt, **1**-98
Parental Ode to My Son, by Thomas Hood, **1**-225
The Pelican Chorus, by Edward Lear, **5**-1782
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Humpback salmon
Picture, **6**-1958
Humpback whale, sea mammal, **7**-2344
Picture, **7**-2345
Humped cattle of India, **4**-1261
Picture, **4**-1261
Humperdinck, Engelbert, German music composer, **10**-3611
Hundred Years' War, **6**-1975
Hungary. Central European country occupying the greater part of the Great Plain of the Danube; area, 66,758 square miles; estimated population, 13,400,000. The capital is Budapest. Szeged and Debreczen are the largest towns.
* account of, **17**-6338-42
history
relations with Austria, **17**-6193-94
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fairy tales, **6**-2271
uprising led by Kossuth, **13**-4589
Pictures
cattle ranch, **3**-1030
Danube River at Budapest, **3**-1026
See also starred article above
Hunger
Question about
what makes me hungry? **6**-2125
Huns. A warlike Asiatic people, of Mongolian stock. About 200 B.C. they overran the Chinese Empire and forced the emperor to come to terms with them. Later the Huns settled on the banks of the Volga and gradually penetrated further west. In the fourth century A.D. they compelled the Eastern Roman Empire to pay them tribute. In the fifth century, under their great leader Attila, the Huns made many conquests; they became masters of Germany, Thrace, Macedonia and Greece. They invaded Gaul; they were turned back at Châlons in 451. They then turned to Rome, but were persuaded to spare that city by Pope Leo I. After the death of Attila, in 453, the power of the Huns was definitely broken. *See also* **4**-1253
invasion of Gaul, **10**-3424
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as essayist, **8**-2867-68
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Hunt, William Holman, English painter, and Pre-Raphaelites, **6**-2236
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Hireling Shepherd (gravure), **6**-2238
Hunt, William Morris, American painter, **9**-3333
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Flight of Night (gravure), **10**-3462
Hunt the Slipper, game, **11**-4082
Hunter, John, physician, **8**-2728
Hunter, William, physician, **8**-2728
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hunting and fishing stage of economic development, **14**-5243-44
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Hunting Song, by Sir Walter Scott, **15**-5419
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Eskimo throwing spear, **7**-2565
hunting with falcons or duck hawks, **1**-141
Huntington, Anna Hyatt, American sculptor, **14**-4940
Picture
Jeanne d'Arc, **14**-4935
Huntington, Daniel, American painter
Picture
portrait of Mary Todd Lincoln, **8**-2811
Huntington, West Virginia, seat of Cabell County, on the Ohio River near the meeting point of Ohio, Kentucky and West Virginia. Coal and

Huntington (*continued*)
natural gas are found in the surrounding region, and tobacco and apples are grown. Steel rails, thermos bottles, furniture, mine cars and oxygen are manufactured. It was founded in 1869 and was named for Collis P. Huntington, president of the Chesapeake and Ohio Railroad. Population, 78,836.
Hunyadi, John. Hungarian soldier and ruler; born, Hunyad, Transylvania, 1387; died, Semlin, 1456.
Huron, Lake. One of the five Great Lakes, lying between Ontario and Michigan. 23,010 square miles in extent, it is connected with Lake Erie by the St. Clair and Detroit rivers; the Sault Ste. Marie canals, which avoid a series of rapids, provide a navigable waterway to Lake Superior.
Huronia, Indian settlement in Canada, **2**-678-79
Hurons, Indian tribe
relations with French, **2**-678-79, 682
Hurricane
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What is a hurricane? **16**-6022
forecasts, **12**-4226
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Pictures
hurricane warning, **12**-4226
path of typical hurricane (color), **16**-6025
Husband Who Was to Mind the House, The (story), **11**-3830-31
Huskies, dogs used in polar regions, **2**-717
Picture
on expedition with Admiral Byrd, **2**-718
Huss, John, Bohemian religious reformer, **6**-1981; **12**-4161; **17**-6343
Hutchins, Robert Maynard, American scholar and educator
views on education, **14**-5253
Hutchinson, Anne, life, **14**-5267
Hutchison, Bruce, Canadian novelist
Picture, **14**-5115
Huts, *see* Houses
Hutton, James, Scottish physician and geologist, **3**-981
Huxley, Aldous, English writer, **11**-4109
Huxley, Thomas, English scientist, **3**-985
Picture, **3**-984
Huygens, Christian, Dutch scientist, **2**-647
theory of light, **6**-1994-95
Picture, **2**-646
Huysmans, Joris Karl, French novelist, **18**-6718-19
Hwangho, or **Yellow River.** Second river of China. Rising in the Kwen Lun, it drains 400,000 square miles in northern China, the immense quantities of yellow earth it carries down into the Gulf of Pechili having given the Yellow Sea its name. It is of little use, however, for navigation, and passes few large towns except Lanchow and Tsinan. 2,700 miles.
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Hyacinths, flowers, account of, **19**-7172
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Hyades (the Rainers), in mythology, **9**-3233
Hyatt, John Wesley, inventor of celluloid, **11**-3999-4000; **19**-7202-03
Hybridization, meaning of, in plants, **4**-1470-73
of nasturtiums, **14**-5081
Hyderabad, India, capital of the state of the same name. It is on the Musi River and is surrounded by a wall. It is the fourth largest city in India, and in it are many impressive palaces. Primarily it is a trading center, although it carries on some cotton-milling. Population, 739,159.
Hyderabad, princely state in India, **8**-2828
map, **8**-2820
Hydra, fabulous monster
Picture
Hercules slaying hydra, **1**-354
Hydrangeas, flowering shrubs, **19**-7092
Pictures, **13**-4775; **19**-7093
Hydration, process in making paper, **7**-2451
Hydraulic elevator, description, **4**-1217
Picture, **4**-1217
Hydrocarbons, class of organic compounds, **16**-5939-42
Hydroelectric stations, *see* Electricity—generated by water power
Hydrogen (H). Chemical element. Colorless, light gas, 1/14 as heavy as air. Atomic number 1; atomic weight 1.008; melting point —259°C.; boiling point —253°C. The lightest element, its atom consists of one proton and one electron. Water is the oxide of hydrogen, H_2O. Hydrogen is the basis of acids, and it forms many other compounds. Gaseous hydrogen may be used for filling airships and balloons, and it has other industrial uses.
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in "heavy" water, **6**-2251-52
structure of hydrogen atom, **1**-307
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diagram of hydrogen atom, **1**-309
Hydrogenation method, of converting coal into fuel oil, **3**-801
Hydrophobia, **15**-5484
Hydrophone, device for detecting sounds undersea, **10**-3635
Hydrophytes, class of plants, **16**-5727
Hydroponics, *see* Agriculture, soilless
Hydrosphere, earth's layer of water, **1**-280-81
Hydroxyl group, term in chemistry, definition, **16**-5948
Hydroxyl ion
chemist's definition of, **15**-5427
Hyenas, animals, **2**-502
Picture
striped hyena (gravure), **2**-498
Hygeia, goddess of health, **9**-3234
Hygiene, *see* Food, Exercises
Hygiene, Public, *see* Public health
Hymen, god of marriage, **9**-3234
Hymns
American writers of, **18**-6508-10, 6512
text of, *see* Poetry Index under Hymns
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Hyperion, father of the Sun, **9**-3233
Hypnos (Somnus), god of sleep, **9**-3234
Hypnotism, **12**-4443-44
Hypo, chemist's definition of, **15**-5127
Hypophysis cerebri, gland, **8**-2702
Pictures, **8**-2699-2700
Hyraxes, or **dassies,** mammals, **6**-2146-47
Picture, **6**-2147

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I. Q. (Intelligence Quotient)
* explanation of, **9**-3043-46
Iambe, first court god, **16**-5749
Iambic metre, in poetry, **19**-6867
Ibadan, Nigeria, capital of the Province of Oyo. A particularly interesting feature of the government of the city is that there is a woman who settles disputes regarding the women of the city. Agriculture and handicrafts are the main concerns of the people. It is a city of Negroes and is the largest such city in Africa. Population, 327,300 (including suburbs).
Ibanez, *see* Blasco-Ibanez
Iberians. The people of Mediterranean type who are believed to be some of the first immigrants to South Europe from North Africa. It is supposed they settled at the mouth of the Iberus (Ebro) River in eastern Spain. Their descendants are the Basques of the Pyrenees. The Picts of Scotland are also held to be Iberian in origin. *See also* **14**-4908
Picture
as Roman captives, **14**-4908
Iberville, Pierre le Moyne d' (1661-1706). A great naval officer of New France. In 1698 he discovered the mouth of the Mississippi and founded the colony of Louisiana.
Ibex, wild goat, **4**-1378
Picture, **4**-1377
Ibis, bird, **11**-4009
Pictures, **11**-4004; (in color), **12**-4371, 4372
Ibsen, Henrik, Norwegian dramatist, **19**-7012
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Icarus and His Waxen Wings (story), **18**-6792
Ice
* ice and machines that make cold, **2**-528-35
cause of melting, **2**-610

Ice (*continued*)
de-icing equipment for airplanes, **1**-185
Poem about
The Icicle, by Agnes Cook Gale, **15**-5329
Questions about
Do we get a pound of ice from a pound of water? **8**-2916
Why does a piece of ice make a drink colder? **8**-2916
Why does a thaw burst the water pipes? **8**-2916
Why does shallow water freeze first? **8**-2916
Why is ice slippery? **8**-2916
Ice age, *see* Glacial epoch
Ice box recipes, **7**-2517-18
Ice-hockey, *see* Hockey, Ice
Ice-Patrol, service of Coast Guard, **9**-3104-05
Ice skating
in Canada, **10**-3694
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Icebergs
danger to shipping, **9**-3104-05
Pictures, **15**-5297
Iceland, island republic, **15**-5298-99
Eddas of, **1**-216-17
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fairy tales, **6**-2271
sagas, **19**-7009-10
population, **15**-5298
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Ich (White Spots), fish disease, **5**-1767
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life history, with pictures, **17**-6069
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Ichneumons, animals, **2**-501-02
Ichthyornis, prehistoric bird, **8**-2758
Ichthyosaurus, prehistoric reptile, **1**-96; **4**-1402; **5**-1546
school-girl found skeleton, **5**-1546, 1548
Picture, **4**-1402
Iconoscope, television instrument, **14**-5179
Ictinus, architect of the Parthenon, **12**-4222
Idaho. Northwestern state; area, 83,557 square miles; capital and largest city, Boise City. Mining, lumbering and stock-raising are carried out on a large scale. Lead, zinc, gold, silver, copper and other metals are mined. Nickname, "Gem State." State flower, syringa. Motto, "Esto perpetua" (May it last forever). "Idaho" comes from the Indian words meaning "Light on the Mountains." First settlement, Pioneer City, 1862. Population 498,115.
described in Western States, **18**-6425-36; **19**-6841-50
Pictures
Cabinet Gorge, **18**-6427
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sheep ranch, **15**-5574
State Capitol building, **19**-6849
Sun Valley, **18**-6436
tribal court, Indian Reservation, **19**-7242
Idaho, U. S. battleship. *Picture,* **18**-6823
Idia fasciata, insect, **17**-6422
Idlewild, *see* New York International Airport
Idylls of the King, by Tennyson
passages from, **19**-6950-53
Igloo, Eskimo house, how built, **7**-2564
Igneous rocks, fire-formed, **2**-513-14
Iguanas, lizards, **14**-5228-29
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Iguanodon, prehistoric animal, **1**-96; **5**-1661
Iguassu Falls, South America. *Picture,* **19**-7045
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Il Penseroso, by John Milton
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Iliad, by Homer (adapted), **9**-3076-82
account of Homer, **16**-5747-48
Ile d'Orleans, Quebec
Picture
fruit farm, **8**-2951
Illinium, *see* Promethium
Illinois. Known as the Prairie State, a North Central state. It ranks first in the production of corn and cattle-, pig- and horse-rearing, while coal is extensively mined. Chicago, the largest city, has an immense meat-packing trade, and manufactures of every sort are carried on. Other towns are Springfield, the capital, Quincy and Peoria. Area, 56,400 square miles. Abbreviation, Ill. Nickname, the "Prairie State."
Illinois (*continued*)
State flower, the wood violet. Motto, "State sovereignty—national union." "Illinois" comes from an Indian word, meaning "the River of Men." First settlement thought to have been at Kaskaskia, 1695. Population 7,694,066.
* Chicago, **19**-7105-24
described in North Central States, **15**-5273-84; **16**-5653-60
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hardships of early settlers, **6**-1909, 1911
made a state, **6**-1912
manufactures, **19**-7117-18
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Illinois Waterway, **3**-858
New Salem, grave of Ann Rutledge, **5**-1650
reproduction of Abraham Lincoln's store, **5**-1652
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Illinois River. American river, formed by junction of Kankakee and Des Plaines rivers. Flows into the Mississippi. 435 miles.
Illinois Waterway, canal
Picture, **3**-858
Illness
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Why are there some illnesses we can not get twice? **2**-460
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Illusions, Optical, *see* Optical illusions
Imagination and art, **1**-62-63
Imagists, group of English and American poets, **13**-4821
Imatra Rapids, Finland
Pictures, **16**-5864
power station, **18**-6757
Imitation, faculty of the mind, **12**-4444
Imitation of Christ, book by Thomas à Kempis, influence of, **13**-4862
Immensity of the Universe, The, * **9**-3033-39
Immermann, Karl Leberecht, German author, **17**-6411
Picture
scene from novel by, **17**-6412
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Canada, **1**-113-14
between 1820 and 1850, **3**-943
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United States, **9**-3218, 3220
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foreign population in Southern states small, **13**-4518
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Inscription for the Statue of Liberty, by Emma Lazarus, **8**-3004
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Egyptian belief in, **3**-810
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Impalla, an antelope, **4**-1443
Imperial mammoth, of North America, **6**-2145
Imperial Preference, British trade policy, **7**-2306, 2308
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"In God we trust"
Question about
How did the words, "In God we trust" come on a coin? **17**-6174
In Memoriam, poems by Tennyson
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Incandescence, kind of light, **7**-2635-36; **10**-3474
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Incas, South American Indians, **19**-6859-63
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heaping treasure for the Spaniards, **19**-6862
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Inchcape Rock, Scotland, lighthouse, **10**-3577-78
Inchworm. *Picture,* **17**-6072
Inclined plane, a simple machine, **4**-1520
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Incus (anvil), bone of middle ear, **9**-3309
Pictures, **9**-3306, 3309
Indemnities, amounts paid under terms of insurance policies
See Insurance—Accident and health insurance
Indentured servants, colonial labor, **3**-1046-47
Independence Bell, *see* Liberty Bell
Independence Day, 4th of July
observance, **6**-2092
Independence Hall, Philadelphia
Pictures, **18**-6835-36
as the State House, about 1750, **3**-1038
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Index Librorum Prohibitorum. Latin for "List of forbidden books"; a list of books forbidden to Roman Catholics first issued by Pope Paul IV in 1557. The list is prepared by the Congregation of the Index, a body of cardinals and their assistants.
India
architecture, *see* Architecture, Indian
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modern reservoirs to prevent famine, **7**-2544
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The Overland Mail, by Rudyard Kipling, **16**-5709
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India—Pearl of the East, * **8**-2819-39
India rubber tree, source of rubber, **4**-1408
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Indian cucumber-root, plant, **18**-6581
Indian elephants, **6**-2141-42
Pictures, **6**-2139-40, 2142, 2145
Indian fig, or banyan tree, **9**-3261-62
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Indian fig or prickly-pear, **9**-3266
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Indian Intercourse Act, 1832, **19**-7235, 7237
Indian Mutiny, of 1857, **8**-2828
Indian National Congress, **8**-2828, 2837-39
Indian Ocean. One of the five great oceans. It lies between Asia, Africa and Australia, and contains Madagascar, Zanzibar, Mauritius, Reunion, Ceylon, Socotra, the Seychelles, the Maldives, and the Cocos islands. Occupying 27,500,000 square miles and draining 5,000,000, it has a maximum depth of 22,968 feet, and an average depth of 12,000 feet.
Indian pinks, flowering plants, **18**-6576
Indian poke, flowering plant, **18**-6580
Picture, **18**-6580
Indian pythons, **15**-5411
Indian rhinoceros, **5**-1827
Picture, **5**-1830
Indian summer, the name given to a period of mild, pleasant weather which usually occurs toward the end of autumn. The temperature is fairly high, and there is a haze or smokiness in the air. The term was first used in western Pennsylvania, toward the end of the 18th century. In time it spread throughout the United
Indian summer (*continued*)
States and Canada and to England. One explanation of the term is that some early settlers believed the smokiness was produced by Indian fires.
Indian telegraph-plant, **2**-747
Indian turnip, *see* Jack-in-the-pulpit
Indian wild boar, account of, **5**-1719-20
Indiana. A state north of the Ohio River; area 36,291 square miles; capital and largest city, Indianapolis. Agriculture, mining and manufacturing are all important. Abbreviation, Ind. Nickname, "Hoosier State." State flower, tuliptree. Indiana was named after the Indians. First settlement, Vincennes, about 1705.
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Indianapolis, capital of Indiana and seat of Marion County. It is the largest city of the state, and is on the White River in the center of the state. Several famous writers and painters have lived in the city. The Capitol building and the Soldiers and Sailors Monument are outstanding structures. It is one of the leading corn and livestock markets in the United States, and is a banking and an insurance center. Food products, automobile parts, radio parts, automatic stokers, saws, lenses and clothing are manufactured. The location was settled in 1820 and was laid out as a town in 1821. Today it is world-famous for its auto-racing Speedway. Population, 386,972.
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Indium (In). Chemical element. Silvery metal. Atomic number 49; atomic weight 114.76; melting point 155°C.; boiling point 1450°C.; specific gravity 7.3. Indium is an uncommon element, but it has some use in bearing metals and in jewelry.
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* glass—how glass is made, **18**-6744-52
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* ice and machines that make cold, **2**-528-35
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* leather and shoemaking, **10**-3562-76
* locks—how a lock is made, **6**-2021-26
* matches, **19**-6965-73
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* telephone—the wonder of, **17**-6182-89
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* watches and clocks, **7**-2382-92
* water-power development, **18**-6753-62
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Inert gases. Helium, neon, argon, krypton, xenon and radon. These chemical elements are called inert gases because of their failure to react chemically under ordinary conditions. Neon, argon, krypton and xenon were discovered by Rayleigh and Ramsay in the atmosphere. The spectrum of helium was observed in the sun's spectrum before helium was discovered on the earth. Radon is a radioactive element, produced from radium. *See* the individual inert gases.
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* grasshoppers and some other insects, **18**-6721-34
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* mosquitoes and flies, **17**-6416-23
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Interstate Commerce Act. An act passed by Congress in 1887 which attempted to regulate commerce between the states when carried on wholly or partly by rail. It made all public carriers liable to regulation, declared that all charges must be reasonable, forbade special rates, and established the Interstate Commerce Commission to enforce these provisions.
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* of telegraph, telephone and radio, **17**-6234-48
* of printing, **9**-3381-96
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Invisible ink, how to make, **3**-904
Iodine (I). Chemical element. Dark crystals or violet vapor. Atomic number 53; atomic weight 126.92; melting point 113.5°C.; boiling point 184°C.; specific gravity 4.9. It is found as sodium iodate, together with sodium nitrate, in the Chile saltpeter deposits; it also occurs as an iodide in certain California salt wells. Iodine and its compounds are used to some extent in industry, medicine and scientific laboratories.
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Iona. Island on the west coast of Scotland. Many Scottish kings were buried here.
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Ionia, Asia Minor, center of ancient Greek civilization, **3**-910, 915-16
Ionian Sea. Part of the Mediterranean lying between Italy and Greece.
Ionians, ancient Greek people
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* cloud chamber, **12**-4319-20
chemist's definition of, **15**-5427
electrically charged, **3**-990
Ions and How They Behave, * **17**-6079-82
Iowa. Prairie state; area, 56,280 square miles; capital and largest city, Des Moines. Agriculture, live stock and coal-mining are the chief industries. Food products are the chief manufactures. Nickname, "Hawkeye State." State flower, wild rose. Motto, "Our liberties we prize and our rights we will maintain." "Iowa" comes from the name of a Sioux tribe and means "Sleepy ones." First settlement, Dubuque, about 1833.
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See also starred articles above
Ireland. Island west of Great Britain; area, 32,600 sq. mi. Consisting of the provinces of Ulster, Leinster, Munster and Connacht, it is divided politically into Northern Ireland (capital, Belfast) and Eire, formerly the Irish Free State (capital, Dublin). Northern Ireland forms part of the United Kingdom but Eire, since 1937, is an independent self-governing state. The people are nearly all Celts, and mainly Roman Catholics; but in the six counties of Ulster which make up Northern Ireland Protestants predominate. The center of Ireland is generally flat, and contains the Bog of Allen and many lakes; but the coast is fringed with mountains, the highest of which are MacGillicuddy's Reeks, in Kerry. The Shannon (220 miles) is the longest river in the British Isles,

Ireland (*continued*)
and Lough Neagh (150 square miles) the largest lake. Agriculture, dairying and stock-raising are the staple industries, but Northern Ireland has also linen, woolen and shipbuilding trades. Cobh, Londonderry and Limerick are ports.
* history and description, **8**-2929-47
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* Easter Rebellion, 1916, **13**-4589-90
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Jack Cade's Rebellion, **5**-1686-87
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The Harp That Once Through Tara's Halls, by Thomas Moore, **15**-5521
The Lake Isle of Innisfree, by William Butler Yeats, **2**-736
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linen industry, **9**-3317, 3319-23
Sneem bridge, Kerry (gravure), **7**-2304
See also starred article
Irene, Byzantine empress, **4**-1319
Iridium (Ir). Chemical element. Heavy metal. Atomic number 77; atomic weight 193.1; melting point 2350°C.; boiling point above 4800°C.; specific gravity 22.4. Occurs with platinum, which it resembles. An alloy of platinum and iridium is used for fountain-pen points.
Iris, in Greek mythology, messenger of the goddesses, **9**-3228
Iris, of the eye, **11**-3802
Iris, flowering plant, **18**-6577-78
emblem of France, *see* Fleur-de-lis
produces orris root, **8**-2911
swamp iris, note and picture, **16**-5733
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Iris Family of plants, **19**-7172
Iron (Fe, from Latin *ferrum*). Chemical element. Gray metal. Atomic number 26; atomic weight 55.85; melting point 1535°C.; boiling point 3000°C.; specific gravity 7.86. All industrial nations use large amounts of iron. Reduction of iron ores with coke in the blast furnace gives pig iron, which may be converted to steel, containing controlled amounts, less than 2%, of carbon. Steel is the most important structural metal. Steel alloys with manganese, chromium, vanadium, nickel, molybdenum, tungsten or other metals have special uses.
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Is iron heavier when it rusts? **9**-3354-55
Why does iron bend when it is hot? **9**-3354
Why does iron feel colder than wood? **9**-3354
Why does iron float on mercury and not on water? **9**-3354
Why is iron roofing sometimes corrugated? **9**-3354
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iron mine, Michigan, **15**-5283
iron works in Alabama, **14**-4892
molten pig iron, **15**-5368
Iron Chink, machine for canning fish, **11**-4062
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Iron Gates. Narrow gorge where the Danube cuts its way between the Balkan Mountains and the Transylvanian Alps, on the border of Yugoslavia. Here a series of rapids stretching for two miles formerly prevented navigation, but between 1890 and 1900 a passage was made for river steamers by blasting.
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Irrigation
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canal and irrigated tract, **8**-2673
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Irritants, medical, **6**-1933
Irving, Sir Henry, English actor, **5**-1615, 1618
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Irving, Washington, American author, **13**-4707-08
Story by
Rip Van Winkle, **12**-4481-89
Pictures, **13**-4708
Irving Memorial, Seville, Spain, **13**-4709
studying in Spanish monastery library, **13**-4709
Irvington, New Jersey, just outside of Newark. It is a residential suburb of New York and Newark. Toy trains, castings, radio loudspeakers, tools, lumber, knives and chemicals are manufactured. It was founded in 1692 as Camptown It was called by its present name in 1852 in honor of Washington Irving. Population, 55,328.
Isabella, surnamed **the Catholic,** queen of Castile, **14**-4912-13, 4915
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promises aid to Columbus, **1**-87
Isabella, queen of Spain (1843), **14**-4919
Isaurians, Asiatic tribe, **4**-1316
Isfahan, or **Ispahan.** Persian city famous as a caravan center. It trades in tobacco, fruit and cotton, and makes pottery.
Picture, **9**-3149
Ishtar, Babylonian goddess, **2**-654
Isinglass, **11**-4062
Isis, a goddess of ancient Egypt, **3**-811-12
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Iskanderoun, *see* Alexandretta
Islam, *see* Mohammedanism
Island universes, isolated star systems, **9**-3034, 3038-39
Islands. Areas of the 14 largest islands:

	square miles
Australia	2,974,581
Greenland	839,700
New Guinea	330,000
Borneo	286,161
Madagascar	241,094
Baffin Land	236,000
Sumatra	163,093
Great Britain	89,041
Honshu (Japan)	87,426
Celebes	73,160
South Island (N.Z.)	58,092
Java	50,745
North Island (N.Z.)	44,281
Cuba	44,164

* in British Empire, **9**-3181-91
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Isodorous of Miletus, architect, **16**-5717
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Children of the Sea (gravure), 8-2864
Helping Mother, 8-2851
The Needlewoman (gravure), 8-2864
Istanbul (Constantinople), Turkey, the former capital of the country. It is located on the Bosporus (a strait) and the Sea of Marmora. It is on a peninsula, and is similar to Rome in that it is built on seven hills. It is the only city that is in two continents—Asia and Europe—and it has a very romantic air that has influenced writers and artists. Much of the city is actually very filthy and crowded, yet it is colorful, and different from most cities. Morocco-leather articles, tobacco pipes, perfumes and headgear are the main products. It is more important as a port than as an industrial city. It was supposedly founded in 658 B.C. Population, 845,300.
It Came Upon a Midnight Clear, Christmas carol writing of, 10-3604
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Italian language, characteristics, 13-4576
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Ithaca, New York
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Iturbide, Augustin de, Mexican revolutionist, afterward emperor, 11-3816
Ivan III, the great, Russian ruler, 16-5691
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Ivan IV, the terrible, Russian ruler, 16-5692
Ivanovo, Russia, capital of the province of the same name. Rye and oats are grown in the surrounding country, and there are cotton, linen, machinery and chemical factories in the city. Until 1861 it was two towns, Ivanovo and Voznesensk. Ivanovo was the older, having been founded in the 16th century. Population, 285,000.
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Ives, Frederick Eugene, developed color printing, 9-3394
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elephant tusks being brought to market, 9-3055
vegetable ivory button, 12-4506
Ivory-billed woodpeckers, 14-5030
Picture, 14-5027
Ivory Coast. French West African colony; area, 184,174 square miles; chief town, Abidjan. Rubber, palm-oil, cocoa, mahogany, skins and nuts are exported.
Ivy, plant
English ivy, 14-4976
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The Ivy Green, by Charles Dickens, 3-1136
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Jack and the Bean-Stalk (story), 10-3597-99
Jack Frost, *see* Frost
Jack fruit. *Picture* (in color), 8-3000
Jack-in-the-pulpit, plant, description, 17-6278
fruit of, 11-4020
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fruit of (in color), 11-4025
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Early Spring, Quebec, 10-3704
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Jackson, Andrew, president of U. S.
* life, 10-3491-92
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Jackson, Helen Hunt, *see* Poetry Index
Jackson, Thomas Jonathan (Stonewall), Confederate general in Civil War, 7-2433, 2436-37
Picture, portrait, 7-2431
Jackson, capital of Mississippi and seat of Hinds County, on the Pearl River. The city is important for trade in agricultural products, especially cotton, and it manufactures cottonseed oil, iron, fluorescent-lighting equipment and bottles. A state historical museum is at Jackson. The site was a trading post before 1822, and in that year it was laid out to be the capital. It was named for Andrew Jackson. Population, 62,107.
Picture
Capitol, 14-4896
Jackson Hole. Famous hunting and fishing grounds in the western part of Wyoming, south of the Yellowstone National Park. Named for the fur trader David E. Jackson.
Jacksonville, the largest city in Florida and seat of Duval County, on both sides of the St. Johns River in the northeastern part of the state. It is

Jacksonville (*continued*)
24 mi. from the Atlantic Ocean by river, and is an important river port. Ships en route to Central and South America and the Far East usually make their last stop in the United States at Jacksonville. It exports rosin, lumber and turpentine, and it manufactures iron and steel products. Coffee, cigars, fertilizer and canned goods are also produced. It was first settled in 1816 by Lewis G. Hogan. A creek that flows through the city bears his name. In 1822 the town was planned, and it was named for Andrew Jackson. Population, 206,422.
Jacobite rebellion, English history, **8**-2788-89
Jacobs, Joseph, Australian collector of fairy tales, **6**-2267-68
Jacquard loom
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Jacquerie, uprising of French peasants in 1358, **6**-1979
Jacques Cartier bridge, at Montreal. *Picture,* **1**-35
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Picture (in color), facing **19**-7225
Jadwiga (Hedviga), queen of Poland, **13**-4680
Jaeger, gull, **11**-4124
Picture, **11**-4123
Jaffa (Joppa), Israel. It is on the Mediterranean and has been an important port for centuries. It is known throughout the world for the exporting of oranges, and it also ships almonds, soap, honey, chocolate and wool. The chief products are soap, cement and cereals. The city has had a turbulent history, having figured in a battle as early as 1472 B.C. The name means "beauty." Population, 101,600.
Jagiello (Ladislas II), king of Poland, **13**-4680
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Jaguars, 2-493
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Banas River at Rajmahal, **8**-2829
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James II, king of England
defeat in Ireland, **8**-2942
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James I, king of Scotland, **15**-5649-50
as poet, **2**-721
prisoner in England, in youth, **5**-1684-85
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James II, king of Scotland, **15**-5650
James III, king of Scotland, **15**-5650
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as a boy, **15**-5651
James IV, king of Scotland
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James, Henry, American writer, **13**-4785
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arrival of women in 1619, **2**-545
colonial dwelling on estate of John Rolfe, **2**-542
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Jane Eyre, novel by Charlotte Brontë
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January. The first month of the year, consisting of 31 days. The name comes from Janus, an important Roman god.
Janus, king of Italy in Roman mythology, **9**-3235
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* history and description, **2**-560-72
* pearl culture industry, **13**-4678
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bridge, old-fashioned, **1**-27
costume in ancient Japan, **9**-3161
Hiroshima, **15**-5288
irrigation in, **7**-2545
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Japan Sea. Part of the Pacific lying between Siberia, Korea and Japan.
Japanese architecture, *see* Architecture, Japanese
Japanese beetle
Question about
What harm do Japanese beetles cause? **18**-6630
Pictures, **18**-6630
Japanese Current, or **Kuro-Siwo.** The Black Stream (because of the deep blue of its waters), part of the equatorial current of the Pacific, flows past eastern Formosa, thence north past Japan, where it merges into the easterly drift of the North Pacific.
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Jarrah, or Australian mahogany, tree, **12**-4249
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Mt. Edith Cavell and Lake Cavell, **1**-156
Java, Dutch colonial possession in Indian archipelago, **9**-3297; **15**-5568
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Javan rhinoceros, 5-1827-28
Jaw, bones of skull, **6**-1929
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Jay, John (1745-1829). An eminent American lawyer and statesman; first Chief Justice of the U. S. Supreme Court.
arranged treaty with England, **5**-1700
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portrait in group, **8**-2806
Jay Treaty, between U. S. and England, 1794, **5**-1700
Jays, birds
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Pictures (in color), **9**-3131; **12**-4370; **13**-4841; facing **14**-5133, 5134, 5140
Jay's Treaty. Negotiated in 1794 by John Jay of the United States and Lord Grenville of Great Britain; an attempt to settle some of the unfilled provisions of the Peace of Paris. Terms were published prematurely in the press and an outbreak of popular wrath against Jay and Washington followed.
Jazz, kind of dance music, **18**-6515
use in modern American music, **19**-7154
Jean Jacques I., Emperor of Haiti, **19**-7100
Jeanne d'Arc, *see* Joan of Arc
Jefferson, Thomas, president of U. S.
* life, **10**-3488
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portraits, **5**-1700; (gravure), **11**-3946
portrait, in group, **4**-1165
home, Monticello, **18**-6828
in group, sculptured in relief in Jefferson Memorial, **10**-3487
Jefferson City, capital of Missouri and seat of Cole County, in the central part of the state on

Jefferson City (*continued*)
the Missouri River. The Capitol building is built from marble found in the state. In the surrounding country are dairy farms and orchards, and there are also coal and zinc mines. Printing, milling and the manufacturing of shoes and clothing are important industries. The city was founded in 1822. Population, 24,268.
Jefferson Memorial, Washington, D. C.
Pictures, **5**-1540
Jefferys, Charles W., Canadian artist, **10**-3704
Pictures
brides landing at Quebec, **2**-680
Western Sunlight (gravure), **10**-3706
Jellicoe, John Rushworth, Viscount of Scapa. English admiral of the fleet; born in 1859. During his period of command was fought the battle of Jutland, 1916. In 1917 Jellicoe was succeeded by Sir David Beatty and returned to the Admiralty as First Sea Lord until the end of 1917. Jellicoe died in 1935.
Jelly, how to make, **1**-339-40
Jellyfishes, **19**-7060, 7065-66
Pictures, **19**-6889, 7067
Jenghiz Khan (Genghis Khan) (1162-1227). Mongol conqueror. His name was originally Temujin; he later adopted the title of Jenghiz Khan, which means Very Mighty Ruler. He was the son of a Mongol chieftain; he succeeded his father at the age of fourteen. After much fighting he became the leader of the United Mongol and Tartar tribes. He refused to pay tribute to the Chinese emperor. In 1209 he invaded China and overran the country in several brilliant campaigns. He also conquered great areas in Turkestan. At his death his dominions were divided among his three sons.
conquest of China, **2**-429
conquest of Iran, **9**-3149
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Jenner, Edward, discovered vaccination, **8**-2728
Jerboas, animals, **3**-1132
Pictures, **3**-1130
Jerome, St., life of, **13**-4859
Jerome, Chauncey, American clockmaker, **7**-2388
Jersey. Largest and most important of the Channel Islands; area, 45 square miles; capital, St. Helier. Market gardening and cattle-raising are important.
Jersey, breed of cattle, **4**-1261
Pictures (in color), facing **4**-1258
Jersey City, second largest city in New Jersey and the seat of Hudson County. It is on a peninsula between the Hudson River and Newark Bay. The Hackensack River forms part of its western boundary. Across the Hudson is the lower end of Manhattan Island, and it is connected with New York by tunnels. Old buildings and statues remain that recall the days of the early Dutch settlers. It is important as a shipping center and is a part of the Port of New York. Steel products, soap, cans, medicines and paints are manufactured. Settlement began in the early 1630's. Population, 301,173.
Jerusalem. City in Palestine, and formerly the capital. It is considered holy by Jews, the Christians and the Moslems; and the name in various languages means "City of Peace," and "Sacred City." The city is famous for its shrines and temples. Most of these holy places are in the old part of the city. The new city is made up of suburbs and a modern business section. The city is in rocky, hilly country, and the surrounding land has to be irrigated. The city is known to have existed 1,400 years before the birth of Christ. Population, 164,440. *See also* **18**-6676
capture by Nebuchadnezzar II, **2**-660
in Crusades, **7**-2584-86
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mosque of Omar, **15**-5476
Nathan Straus Health Center, **19**-7161
Jerusalem artichokes, **7**-2622-23
Jerusalem Delivered, epic poem of the Crusades by Torquato Tasso, **17**-6154
Jesuits (Society of Jesus), Catholic religious order
educational system of, **14**-5251
order founded by Loyola, **13**-4864
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Ballad of Trees and the Master, by Sidney Lanier, **16**-5825
Judas Iscariot, by Robert Buchanan, **10**-3645-46
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What language was usually spoken by Jesus Christ? **18**-6557-58
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one attributed to St. Luke, **2**-577
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And Pilgrims of Emmaus, by Velasquez, **4**-1497
Betrayal by Judas, by Cimabue (gravure), **2**-696
The Infant, by Murillo, **4**-1494
The Last Supper, by Leonardo, **3**-830
Washing Peter's Feet, by Ford Madox Brown (gravure), **6**-2237
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Questions about
What does gold-filled mean? What does gold-plated mean? **13**-4595
What is 24-carat gold? **13**-4594-95
What is white gold? Yellow gold? **13**-4595
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Jewett, Milo P., first president of Vassar College, **12**-4315
Jewett, Sarah Orne, American writer, **13**-4789
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* State of Israel, **18**-6674-76
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Jicarilla Apache Indians, of New Mexico, **19**-7240-41
Jidda, Arabia
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Jiggering, process in manufacture of pottery, **5**-1667
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Jimmu, legendary Japanese emperor, **2**-560
Jimson weed, thorn apple, **13**-4780-81
Jinghis Khan, *see* Jenghiz Khan
Jinnah, Mohammed Ali, Pakistan leader, **8**-2837, 2839
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Jiu-jutsu, *see* **Jujitsu**
Joan of Arc
* life of, **16**-5819-21
and French war against England, **5**-1685-86
in history of France, **10**-3429-30
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Joan of Arc, by Bastien-Lepage, **7**-2479
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Job's tears, *see* Peridot
Jodl, Gustaf, Nazi Chief of Staff
Picture
signing Germany's unconditional surrender, World War II, **18**-6460

Joe-pye weed, 14-5163
Picture, 14-5161
Joffre, Joseph Jacques Césare. Marshal of France, commander-in-chief of French armies, 1915-16; born, Rivesaltes, 1852. Stayed the German invasion at the first battle of the Marne, 1914. The failure of French offensives of 1915, and the successful German attack upon Verdun in 1916 were a great blow to his prestige. Succeeded by Nivelle at the end of 1916. Sent on a special mission to the United States in the spring of 1917. Died in Paris, January 3, 1931.
Johannesburg. Largest city in the Union of South Africa. The fame of the city is based entirely on gold. The rich fields of the Witwatersrand have made the city the business center of South Africa and have attracted people to the region by the thousands. It has been only in recent years that other industries, such as flour mills, iron foundries, furniture factories and food canneries, have grown up. Gold was discovered in 1886, and the city's history starts at that date. Population, 324,300.
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Johansen, John C., American painter
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Interior—Evening, 10-3513
John, king of England, life and reign, 5-1577
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signing Magna Carta, 5-1576
John I, king of Portugal, 14-5184
John II, king of France
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at Battle of Poitiers, 5-1681
John III (Sobieski), king of Poland, *see* Sobieski
John VI, king of Portugal
reign in Brazil, 19-7045-46
John, Augustus, British painter, 8-2859
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George Bernard Shaw (gravure), 8-2861
Portrait of Mme. Suggia (gravure), 8-2861
John Balliol, king of Scotland, 15-5648
John the Baptist, St.
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by Andrea del Sarto (gravure), 3-964
by Benedetto da Majano (gravure), 13-4613
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with Madonna, by Michelangelo (gravure), 13-4613
with Madonna, early French, 13-4701
John, Sir W. Goscombe, British sculptor, 13-4856
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of bust, Evelyn, 13-4853
John Dory, fish
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John Maynard, Pilot, 17-6137-38
John Milton and His Poems, * 4-1235-42
John of Bologna, *see* Bologna, Giovanni da
Johnny Chuck Finds the Best Thing in the World, 17-6378-80
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Johnson, Andrew, president of U. S.
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portrait (gravure), 11-3947
Johnson, E. Pauline, *see* Johnson, Pauline
Johnson, Eastman, American artist, 10-3453
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The New Bonnet (gravure), 10-3464
Johnson, Esther, *see* "Stella"
Johnson, J. Rosamond, American music composer, 18-6514
Johnson, James Weldon, American educator and poet, 18-6514
Johnson, Malvin G., American Negro artist
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Southern landscape, 12-4432
Johnson, Pauline, Canadian poet, 14-5109
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Johnson, Richard M., vice-president of U. S.
Picture
portrait (gravure), 11-3948
Johnson, Samuel, English writer
life and works, 5-1867-71
as essayist, 8-2866
Pictures, 5-1867-69, 1871-72
Johnson, Sir William (1715-74). A famous British officer and Indian-fighter who won his title by defeating the French general Dieskau at Lake George in 1755. He settled in the Mohawk Valley, New York state, and won the confidence of the Six Nations. He became noted for his understanding and control of the tribes in that locality. Johnstown, N. Y., is named for him.
and Five Nations, 3-778
Johnson grass, weed, 15-5396
Johnson-Cory, William, *see* Poetry Index
Johnston, Albert Sidney, Southern general in Civil War, 7-2434
Johnston, Joseph Eggleston, Confederate general in Civil War 7-2441
Picture, portrait, 7-2431
Johnston, Mary, American writer, 13-4787
Johnstown, Pennsylvania, on the Little Conemaugh River and Stony Creek where they join to make the Conemaugh River. The city is in the Allegheny Mountains about 75 miles south and east of Pittsburgh. Johnstown is a mining center, especially for the bituminous coal found in the region. Iron, steel, mining equipment, chemicals, glass and soap are produced. The town was founded in 1800 and was named for Joseph Jahns of Switzerland who had settled there in 1791. Population, 66,688.
Joinville, Jean de, French writer, 18-6563
Joliet, Louis, explorations, 2-395
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Joliot, Jean-Frédéric, French scientist, 4-1229
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Joliot-Curie, Irene, French scientist, 4-1229
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Jonathan, son of King Saul
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Jones, Inigo, English architect, 18-6490-91
Jones, John Paul, early American seaman, 17-6325-27
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Jonson, Ben, English dramatist, 3-1123-24
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Jonson, Cornelius, British painter
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Portrait of Sir John Coke, 6-2003
Jordaens, Jacob, Flemish painter, 5-1586
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Singing the Old Songs, 5-1591
Jordan, Mrs. (Dorothy Bland), actress
Picture
portrait by Hoppner, as Comic Muse (gravure), 6-2116
Jordan, Hashemite Kingdom of
* history and geography, 18-6676-77
map, 18-6671
Jordan. Remarkable river of Palestine, rising near Mount Hermon and flowing almost entirely below sea-level; the Dead Sea, into which it runs, is 1,290 feet below the Mediterranean, and the Sea of Galilee 680 feet. No large town has stood on its banks, and it has never been navigable. 120 miles.
Lowdermilk plan for development of valley, 18-6677
Joseph, in Egypt, 3-816
Josephine (Beauharnais), empress of France and wife of Napoleon I, 6-2199, 2206
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with Napoleon in group, 6-2203
Josselin, Château of, 18-6494
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Jouffroy, Marquis de, early French shipbuilder, 17-6399
Joule, James Prescott, English scientist, 3-994
Journalism, Defoe founded in England, 4-1481
* starting a school paper, 6-2041-44
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What is meant by a newspaper morgue? 7-2484
What is the Fourth Estate? 7-2484

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Joy, George W., British painter
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Nelson's Good-bye to his Grandmother (gravure), **6**-2209
Juan Fernandez. Largest of a group of islands lying 360 miles west of Chile; area, 36 square miles. Alexander Selkirk, hero of Defoe's Robinson Crusoe, lived alone here (1704-09).
Juarez, Benito, president of Mexico, **11**-3817-18
Jubilee Bridge, India, note and picture, **1**-35
Judaism
literature, **15**-5464
Judas Iscariot
Poem about
Judas Iscariot (last part of poem), by Robert Buchanan, **10**-3645-46
Judas Maccabaeus, patriot of ancient Palestine, **13**-4583
Judas tree, **12**-4386
Judge Who Imprisoned a Prince, The, **17**-6140
Judson, Edward Zane Carroll, American writer, **14**-4960
Jugglers, medieval entertainers, **6**-1940
Pictures, **6**-1940
Jugo-Slavia, *see* Yugoslavia
Jugurtha, King of Numidia, **4**-1366
Jujitsu (or "soft art"). The Japanese form of wrestling which makes use of opponent's strength and weight to disable or injure him. It is the application of skill and a knowledge of human anatomy opposed to brute force. Now extensively used as a form of physical culture.
Picture
G men learning jujitsu, **14**-4903
Julian (Flavius Claudius Julianus) (331-63 A.D.). Emperor of Rome from 361 to 363 A.D.
reign of, **4**-1252
Julius II, Pope
and building of St. Peter's, **17**-6309
patron of Michelangelo, **3**-831
Pictures
examining the model of a palace, **14**-5094
portrait by Raphael (gravure), **3**-962
Michelangelo's figures for his tomb; Fettered Slave; Moses (gravure), **13**-4612-13
Julius Cæsar, *see* Cæsar, Julius
July. The seventh month of the year, with 31 days. Named for Julius Cæsar.
Jumbo, famous circus elephant, **3**-1078; **6**-2144
Picture
arrival in New York, **3**-1076
Jump-peg, game, **1**-339
Jumping
Question about
Why do we jump when we get a shock? **7**-2612
Jumping bean
Question about
What is there inside the jumping bean? **2**-685
Jumping mice, **3**-1132
Juncos, birds, **13**-4835
of Pacific coast, **14**-5145
June. The sixth month of the year with 30 days. Named for the Junius, a Roman clan.
Poem about
June, by James Russell Lowell, **4**-1516
June-berry, **12**-4512
June bugs, beetles, **18**-6627
Juneau, capital of Alaska and the main port of the territory. It is on the Taku River and the Gulf of Alaska. The country around the city is mountainous, and the city has to be reached by air or by sea. It is a gold-mining center, although only one mine, the Alaska-Juneau, still remains active. The city was founded by Joe Juneau in 1880 when he discovered gold there. Population, 5,729.
Picture, **10**-3583
Jungfrau. One of the chief mountains of the Bernese Oberland, Switzerland. It has two sister peaks, the Mönch and Eiger. 13,670 feet.
Jungle comes from the Hindu word meaning waste land. In India, it applied to great tracts of uncultivated land—usually damp—covered with trees and a dense undergrowth of shrubs, vines and grass. Later the word was used to describe similar land in other warm regions. We sometimes use the word to mean any neglected tract of land grown up with vines and shrubs.
result of climate, **7**-2532-33
Picture
in Venezuela, **18**-6779
Jungle, The, novel by Upton Sinclair, **13**-4814
Jungle fowls, Indian
ancestor of domestic fowls, **12**-4366
Picture, **12**-4362
Junior Grain Clubs, in Canada, **13**-4641
Juniper trees
Pictures, **11**-4102
Junk, Chinese sailing vessel
Picture, **11**-3920
Junkers, German landowner class, **12**-4172
Juno (Hera), goddess, **9**-3226
Picture
sculptured head, **12**-4219
Juntas, revolutionary groups in Spain, **14**-4918
Junto, early American club for literary and scientific research organized by Benjamin Franklin, **13**-4632
Jupiter (Zeus), god, **9**-3226
statue of, by Phidias, **7**-2604
Pictures
on Mount Olympus, **9**-3225
statue by Phidias, reconstruction (gravure), **7**-2608
Jupiter, planet
account of, **10**-3409-14
as seen through telescope, **17**-6373
Pictures, **10**-3410
Jupiter and its satellites, **10**-3414
Jupiter Terrace, Yellowstone National Park, **2**-730
Jura Mts. Thickly wooded mountain range lying between Switzerland and France. 180 miles long, it divides the Rhone valley from that of the Rhine. 5,650 feet.
Jurassic period, *see* Geology—Jurassic period
Jury system, **13**-4813
Question about
What do we mean by a grand jury? **11**-4135
Justice, Themis, the goddess of, **9**-3228
Justinian, Byzantine emperor, **4**-1316-17
code of laws, **13**-4812
struggles with western Europe, **4**-1431
Pictures
in his palace, **4**-1315
with Belisarius, **4**-1318
Justinus, Byzantine emperor, **4**-1316
Jute
Picture (in color), **8**-2997
Jutes, where settled in England, **5**-1567
Jutland, Denmark
naval battle of 1916, **18**-6443
Jutland, Battle of. A great naval engagement that took place in 1916 off Jutland between the British and German high-seas fleets. Although the German fleet escaped, it never emerged again upon the high seas to fight.
Juvenal (Decimus Junius Juvenalis). Roman poet, **16**-5918-19
Juventas (Hebe), cupbearer of the gods, **9**-3228

K

Kaaba. Sacred shrine at Mecca. It is the point toward which all Mohammedans face during their devotions.
Kabul, capital and main city of Afghanistan, on the Kabul River in mountainous country. The city has been a trading center for centuries, on the caravan route from Iran to India. Wheat and barley are the main agricultural products of the region, and carpets are made in the city. The famous karakul wool used for fur coats is the product that has made Kabul important to the rest of the world. Much of the city is old, crowded and dirty, but efforts at modernization are being carried out. Population, 120,000. *See also* **18**-6592
Kafirs, African tribe
and the Boers, **9**-3049-50
Kagu, bird, **11**-4010
Picture, **8**-2756
Kaibab squirrel. *Picture,* **3**-1127
Kaieteur Falls, British Guiana, **18**-6781
Kaiser. A title meaning "emperor"; from 1871 to 1918 applied especially to the Hohenzollerns of Germany.
See also Wilhelm II
Kakapo, bird, **10**-3618
Picture, **10**-3613

Kakas, birds, **10**-3614
Kalahari Desert. Vast arid stretch of country in the west of South Africa, largely in Bechuanaland. It has a general elevation of from 3,000 to 4,000 feet, and stretches 600 miles from north to south.
Kalamazoo, Michigan, seat of Kalamazoo County, on the Kalamazoo River. Corn and grapes are grown in the surrounding country, and the region is also known for its fruit orchards. Paper, fishing equipment, air-conditioning machinery, heaters and furnaces are made. A trading post was set up on the location in 1823, but permanent settlement did not start until 1829. The Indian name means "boiling pot," from the gas bubbles that rise in the river water. Population, 54,097.
Kalamazoo River. American river, rising in Hillsdale County, Michigan; flows into Lake Michigan. 200 miles.
Kale, plant, curly kale, **7**-2616, 2618
Pictures
curly kale, **7**-2619
sea kale (in color), **14**-4982
Kalends, Greek
Question about
What is meant by the Greek Kalends? **4**-1450
Kalevala, collection of Finnish poems, **1**-216; **16**-5862
Kalgoorlie, Australia
Picture
prospecting for gold, **7**-2470
Kalmia, mountain laurel, **13**-4776
Kamakura, Japan
Picture
bronze Buddha, **2**-564
Kamchatka. Peninsula in northeast Siberia, containing a lofty chain of volcanic mountains. The climate is cold and damp, and the people get their living chiefly by hunting and fishing. Petropavlovsk on the Pacific coast has a splendid harbor.
Kane, Elisha Kent, American Arctic explorer, **12**-4232
Kane, Paul, Canadian artist and author, **10**-3701-02
Picture
portrait of an Indian chief, **10**-3702
Kangaroos
Pictures, **7**-2498-2501, 2505, 2507-08
Kangaroos, Opossums and Their Kin, The, * **7**-2498-2510
Kansas. Prairie state on the right bank of the Missouri; area, 82,276 square miles; capital, Topeka. It has great agricultural and stock-raising industries, the source of an important meat-packing trade at Kansas City, which is partly in Kansas and partly in Missouri. The state produces coal and petroleum, as well as zinc and lead. Nickname, "Sunflower State." State flower, sunflower. Motto, "Ad astra per aspera" (To the stars through difficulties). Kansas was the name of a Sioux tribe. First settlement is thought to have been at Leavenworth, 1854.
described in North Central States, **15**-5273-84; **16**-5653-60
made a state, **6**-1924
Pictures
flag (in color), **19**-7191
co-operative oil refinery, **18**-6599
oil refinery, **15**-5282
wheatfield, **8**-2677
Kansas City, Kansas, seat of Wyandotte County, on the Kansas and Missouri rivers, which separate it from Kansas City, Missouri. Kansas City is the largest city in Kansas and is a trading center for the surrounding agricultural area. Meat-packing is a major industry, and beds, mattresses, airplane parts, and equipment for railroads are manufactured. Lewis and Clark camped at the location in 1804, but the actual settlement was made by the Wyandotte Indians when they were moved there from Ohio in 1843. Population, 121,458.
industries of, **16**-5659-60
Picture
Union Station, Kansas City Mo., **16**-5654
Kansas City, second largest city in Missouri, at the point where the Kansas and Missouri rivers meet. Kansas City, Kansas, and Kansas City, Missouri, are joined by several bridges and make use of the same streetcar and telephone systems.
Kansas City (*continued*)
The Missouri city is one of the great railway centers of the United States, and it is also well known as a livestock shipping and meat-packing center. Fruits, vegetables, grains, dairy products and poultry products are shipped from Kansas City in great quantities. Canning, baking, and the making of clothing and livestock feeds are also important. The French started a fur-trading post on the site in 1821. The name comes from a tribe of Indians of the region. Population, 399,178.
Kansas-Nebraska Act, terms, and effect, **7**-2429
Kansas-Nebraska Bill, of 1854, in dispute over slavery, **11**-3944
Kant, Immanuel, German philosopher, **17**-6409
Pictures, **12**-4180
portrait, **17**-6410
Kaolin, clay used in pottery, **5**-1663-64
Picture, mining, **5**-1662
Kapok refers to the fibers of the silk-cotton or kapok tree which are used commercially as filling for pillows and mattresses.
Karachi, seat of the government of Pakistan and chief port. Because of the unbearable heat of the region, another location may be made the permanent capital of Pakistan. Karachi is on the Arabian Sea and is bordered on the northeast by the Sind Desert. Besides being hot the city is dirty, unhealthy, and crowded with poverty-srticken people. The city does have a modern airport built by the United States Army, and it is making a definite effort to improve all of its unsatisfactory conditions. Large amounts of jute are produced in the area, and skins and wool are among its other leading exports. Population, 359,492.
Karajich, Vuk Stefanovich, Serbian writer collected folk tales, **6**-2277
Karakul, animal
Picture
ewe and lamb, **4**-1374
Karamzin, Nicholas, Russian writer, **19**-6905-06
Karfiol, Bernard, American painter, **10**-3516
Picture, Hills, **10**-3517
Karlsefni, Snorro, first white child in America, **2**-391
Karnak, Egypt
erection of temples, **14**-5212
Pictures, **1**-290; **14**-5213, 5216
ruins of Thebes, **3**-815
Kashmir. Native state of northern India, area, about 85,000 square miles; capital, Srinagar. Much of it consists of a barren tableland between the Karakoram range and Himalayas, but in the Jhelum valley is the Vale of Kashmir, one of the most fertile spots in the world.
Kashmir goats, **4**-1377
Kassites, ancient people who overran Babylonia, **2**-655
Katmai, Mount, volcano, **16**-5794
Katmandu (Kathmandu), capital of the state of Nepal, which is on the northwest border of India. The city is at the meeting point of the Bishanmati and the Baghmati rivers. It is known for its temples, one of which is made of wood. The city takes its name from this temple, for *kath* means wood, and was founded in the early part of the 8th century. Population, 108,800.
Kattegat is an arm of the North Sea between Sweden and Denmark. It is 150 miles long and 90 miles wide at its greatest width. The name derives from the Danish word *kat* (ship) and *gata* (street or passageway).
Katydids, insects, **18**-6724
Pictures, **18**-6723
Kauai, one of Hawaiian Islands, **15**-5448
Kauffmann, Angelica, Swiss painter, **17**-6264
Kaulbach, Hermann, German painter
Picture
illustration for Browning's Pied Piper of Hamelin, **10**-3472
Kaunas, *see* Kovno (Kaunas)
Kayak, Eskimo canoe, **7**-2566
Kaye-Smith, Sheila, English writer
as novelist, **11**-4107
Kazak, type of Caucasian rug. *Picture,* **2**-445
Kazan, Russia, capital of the Tatar Autonomous Socialist Soviet Republic. Kazan is on the Kazanka River three or four miles from where that river joins the Volga. Besides being an important river port, it manufactures machinery, tobacco, textiles and soap. Population, 402,000.

Kearny, Stephen W., American general in Mexican War, **6**-1919
Keas, birds, **7**-2580; **10**-3614
Picture, **10**-3615
Keats, John
* life and writings, **7**-2493
See also Poetry Index
Pictures, **5**-1615
portrait, in group, **7**-2488
Keble, John (1792-1886). Oxford scholar, poet and hymn-writer, author of Sun of My Soul. Keble College, Oxford, is named after him.
Ked, parasitic insect, **16**-6019
Keel of a ship, **13**-4847
Keelson, part of ship, **13**-4847
Keewatin. Part of the Canadian Northwest Territories lying west of Hudson Bay and north of Manitoba.
Keitel, Wilhelm, German general
Picture, **12**-4183
Keller, Gottfried, Swiss writer, **17**-6413
Keller, Helen, life, **14**-5270
Picture, **5**-1611
Kellermann, Bernhard, German novelist, **17**-6415
Kelley, used in drilling for oil, **13**-4756
Picture, **13**-4742
Kellogg Peace Pact, 18-6449
Kells, Book of, illuminated manuscript, **2**-582
Kelvin, William Thomson, 1st lord, scientist, **19**-7206
and the Atlantic cable, **17**-6239, 6241
invention of siphon recorder, **12**-4299
Kemal Atatürk, president of Turkey, **13**-4806, 4808
Kempe, Margery, early English evangelist
autobiography of, **2**-723-24
Kempis, Thomas à, *see* Thomas à Kempis
Ken (or Kenn), Thomas (1637-1711). English hymn-writer and one of the seven bishops tried during the reign of James II. He has earned lasting fame for his fine old hymns: Awake, My Soul; Glory to Thee, My God, this Night; and the Doxology (Praise God from Whom All Blessings Flow).
Kenilworth, by Scott, note on, **11**-4070
Kennedy, Leo, Canadian poet, **14**-5113-14
Kennedy, Margaret, English novelist, **11**-4110-11
Kennels, dog, how to make, **12**-4260
Kenneth MacAlpine, ruler of ancient Scots, **15**-5645
Kensett, J. F., American painter, **9**-3332
Kent, Rockwell, American painter, **10**-3516
Kent. Southeastern English county; area, 1,555 square miles; capital, Maidstone. The most famous, historically, of the English counties, it was the way by which the Romans, the Jutes, and St. Augustine entered Britain; here are Canterbury, and several ancient Cinque Ports, notably Dover, Hythe and Sandwich. At the mouth of the Medway are Chatham, Rochester and Gillingham, forming an important industrial area. Kent is famous for its hops, fruit and sheep, while its fisheries are important. Coal is mined near Dover, and Whitstable has oyster beds.
Kentucky. Largest tobacco-producing state; noted also for its horses; produces coal and petroleum, and manufactures much tobacco; area, 40,395 square miles; capital, Frankfort. Louisville is the largest city. Abbreviation, Ky. Nickname, the "Blue Grass State." State flower, goldenrod. Motto, "United we stand, divided we fall." "Kentucky" comes from an Iroquois word meaning "Land of tomorrow" or "Dark and Bloody Ground." First settlement, Harrodsburg, 1774.
ballads, **18**-6513
described in Southern States, **13**-4517-28; **14**-4889-4900
gold storage at Fort Knox, **13**-4594
history
considered a part of Virginia, **6**-1908
explored by Daniel Boone and others, **6**-1907-08
fifteenth state, **6**-1907-08
in Civil War, **7**-2432-34
life of Boone, **6**-2189-95
Mammoth Cave in, **4**-1300-03
Poem about
My Old Kentucky Home, by Stephen Collins Foster, **2**-734
Kentucky (*continued*)
Pictures
flag (in color), **19**-7190
horses grazing, **13**-4519
Indian-fighting at Boonesborough, **6**-2194
log cabin, birthplace of Abraham Lincoln, **18**-6837
Mammoth Cave, **4**-1299-1300
sculptured group of pioneers, at Harrodsburg, **6**-2189
Stephen Foster's home in Bardstown, **14**-1900
Kentucky River. American river, rising in the Cumberland Mountains, Kentucky. Flows into the Ohio River. 250 miles.
Kenya Colony, Africa, **9**-3054
Picture
main street of Mombasa, **9**-3055
Kepler, Johannes, German astronomer, **11**-3847
Picture, **11**-3848
Kerensky, Alexander, Russian socialist leader during February Revolution, **18**-6609-10
Kerkeslin, Mt., Canada
Picture, **1**-156
Kern, Jerome, American music composer, **18**-6516
Kerosene
first manufacture, **13**-4744
made from petroleum, **2**-633
uses, **13**-4753
See also Petroleum
Kerry. Rugged western county of Munster, Ireland; area, 1,815 square miles; capital, Tralee. Here are the Lakes of Killarney, and Carrantuohill, 3,414 feet, the highest Irish mountain.
Picture, **8**-2931
Kestrel, bird, **10**-3756
Pictures (gravure), **10**-3764; (in color), **9**-3283
Ketch, sailing vessel, rig of, **11**-4085
Picture, **11**-4084
Ketones, class of organic compounds, **16**-5945
chemical definition, **16**-5948
Kettle
Question about
What makes the kettle boil? **9**-3099
Kettle drums, musical instruments, **4**-1292-93
Picture, **4**-1293
Kewalo Basin, Oahu, Hawaiian Islands
Picture, **15**-5450
Key, Ellen, Swedish writer, **19**-7014
Key, Francis Scott, author of The Star-Spangled Banner, **18**-6509-10
See also Poetry Index
Key cases, how to make of leather, **8**-2887-88
Keys. The name given to coral and other reefs off the shores of Florida, Central America and the West Indies.
Keys, *see* Locks
Kharkov (Charkov), Russia, capital of the Ukrainian S. S. R., situated at the meeting point of the Lopan and the Kharkov rivers. It is in an important iron-and-coal-producing region, and makes machinery, iron products, locomotives, bricks and farming equipment. The city was occupied by Germany during World War II, but much of the industry had been moved before the city fell. The city started as a fort in the middle of the 17th century. Population, 833,400. *See also* **16**-5857
Khartoum (Khartum), capital of Anglo-Egyptian Sudan, situated at the point where the Blue and White Nile meet. It is a modern city and has a hospital, race track, golf course and streetcars. It is chiefly concerned with government and shipping. The site was settled about 1823 and it started as a city when it was chosen as the capital in 1830. Population, 44,950.
Khayyam, Omar
See Omar Khayyam
Khorramshahr, Iran
Picture, **9**-3146
Khufu, king of Egypt
Picture
Great Pyramid, built by him, **3**-809
Khu-n-Aten, king of Egypt, *see* Amenhotep IV
Khyber Pass. Mountain highway which from the earliest times has been the road of invaders entering India. Running for about 30 miles among the wild border ranges of Afghanistan, it is traversed by the trade route from Kabul to Peshawar.
massacre at, **18**-6591
Kiang, animal of horse family, **6**-2019

Kidd, William (c. 1650-1701). A British sailor who became the notorious pirate Captain Kidd. He was hanged at Execution Dock, London, in 1701. People still search for the treasure believed to have been buried by this pirate.
Kidneys
blood supply, **4**-1212
structure and function, **7**-2460
Picture, **7**-2461
Kiel. German naval port on the Baltic, near the eastern entrance to the Kiel Canal. It has large shipbuilding yards and a busy export trade.
Kiel Canal, Europe, **3**-861
Kierkegaard, Sören, Danish philosopher and writer, **19**-7011
Kiev, Russia, in the Ukrainian S. S. R., on the Dneiper and Desna rivers, the capital of the government district of Kiev. One of Russia's oldest cities, it has figured in much of the country's history and so has come to be known as "the mother of cities" in Russia. It is known as a holy city, and before World War II, had many churches, and many museums noted for relics from Russian historical events. Many of its interesting buildings and relics were destroyed during the war. Trade in sugar-beets, farm products, and timber is carried on; and chemicals, hardware, and sugar are manufactured. Kiev was founded a few centuries after the birth of Christ. Population. 846,300. *See also* **16**-5857
Kilauea, volcano of Hawaii, **7**-2291; **10**-3585; **15**-5446
Pictures, **6**-2052
Kilkenny Castle, in Ireland
Picture, **8**-2945
Kill van Kull, stream connecting New Jersey and Staten Island
Picture
bridge over, **1**-37
Killarney, Lakes of. Three Irish lakes among beautiful wooded scenery near Killarney, County Kerry, Ireland.
Picture, **8**-2930
Killdeer, bird, variety of plover, **11**-4010
Picture, **13**-4837
Killer whale, a dolphin, **7**-2346-47
Picture, **7**-2346
Kilmer, Joyce, American poet
* life of, **17**-6394-95
See also Poetry Index
Picture, **17**-6393
Kilns, cement. *Picture*, **7**-2316
Kilns for china
Pictures, **5**-1668-69
Kimberley. South African cathedral city in Griqualand West, Cape Province. Here are the De Beers diamond mines, the most important in the world, around which the city has grown up since 1870. It underwent a severe siege by the Boers, 1899-1900.
Kinchinjunga. Second highest mountain in the Himalayas. 28,150 feet.
Kindergarten
Picture, **12**-4147
Kindling point, temperature at which substances burn, **6**-2186-87
Kindness to animals
Question about
Do animals know when they are being treated kindly? **16**-5842
Kinescope, cathode ray tube used in television, **14**-5181
Kinetic energy, term in physics, **4**-1357
Kinetic Theory of Gases, in physics, **4**-1420
King, Ernest Joseph (1878-). Commander-in-chief of the United States Fleet from December, 1941, to December, 1945. Fleet Admiral King was senior member of the Army and Navy Joint Board of Strategy and a member of the Combined Chiefs of Staff of the United States and Great Britain. A submarine expert and an aviator, he was previously chief of the Navy Board of Aeronautics. On his retirement in December, 1945, he was presented with the Navy Gold Star in lieu of a third Distinguished Service Medal for his "foresight" as Chief of Naval Operations.
King, William Lyon Mackenzie, premier of Canada, **4**-1491
King, William R., vice-president of U. S.
Picture, portrait (gravure), **11**-3948
King Arthur and His Knights (stories), 19-6941-53
King cobras, 15-5413
Picture, **15**-5412
King crab
Picture, **3**-905
King George's War, *see* French and Indian Wars
King Lear, play by Shakespeare
comment on, **3**-838
"King of Beasts," name for lion, **2**-491
King of the Golden River, The (story), **6**-2213-28
King snake, 15-5413
King William's War, *see* French and Indian Wars
Kingbird, account of, **9**-3286; **13**-4831
of South, **14**-5030
Pictures (in color), **10**-3622; **13**-4843
western kingbird, facing **14**-5133
Kingcup, name given in some districts to the marsh-marigold, **16**-5728
Kingfishers, birds, account of, **9**-3374
belted, **13**-4830
of Pacific coast, **14**-5145
Pictures, **9**-3367, 3369; **14**-5144; (in color), **9**-3131; **12**-4371, 4372
nest and eggs, **9**-3369
Kingfishes, 16-5780
See also Whitings
Kinglets, birds, account of, **13**-4839
of western North America, **14**-5137
Picture
golden-crowned (in color), **9**-3132
Kings and Queens of Scotland, * **15**-5645-52
Kings Canyon National Park, California, **7**-2285
King's Mountain, Battle of, 4-1172
Kingsley, Charles, British writer, **11**-3889-90
See also Poetry Index
Pictures, **11**-3890
illustration from Water Babies, **11**-3891
Kingston, capital of Jamaica and the main port of the island. Much of the town is modern, and it has electric lights and streetcars. It is a shipping center. Fires, earthquakes and hurricanes have damaged the city on many occasions. It was started in 1693 to replace Port Royal which had been destroyed by an earthquake. Population, 109,100.
Kinkajou, animal, **3**-872
Kinnikinnick, or bearberry, **11**-4020; **14**-5164
Picture, **14**-5164
Kinzie, John, first white man to live in Chicago, **19**-7106
Kioto, *see* Kyoto
Kipling, Rudyard, British writer, **6**-2268-69; **11**-3897-98
Picture, **11**-3899
See also Poetry Index
Kirby, William, Canadian novelist, **14**-5104-05
Kirchoff, Gustav Robert, German astronomer studies of sun's spectrum, **11**-3855-56
Kirumbos, birds, **9**-3374
Kissinger, John R., yellow fever experiment volunteer, **15**-5489
Picture, **15**-5488
Kitasato, Dr., discovered bubonic microbe, **15**-5485
"Kitchen Cabinet" was the name applied to an informal group of advisers of President Andrew Jackson. They were credited with having more influence on him than his regular Cabinet, especially from 1829 to 1831. The most important members of the "Kitchen Cabinet" were Amos Kendall, William B. Lewis and Duff Green.
Kitchens, electric
Picture, **13**-4531
Kitchener of Khartoum, Horatio Herbert, Earl. Born Ballylongford, County Kerry, Ireland, 1850; lost at sea, 1916; conquered the Sudan, 1898; as Secretary of State for War, organized the British army, 1914-15.
Kites, how to make, **3**-899-901
Question about
What power keeps a kite floating in the air? **12**-4398
Kites, birds, **14**-5029
account of, **10**-3756
Pictures, **10**-3755; (in color), **9**-3130, (gravure), **10**-3763, 3764
Kittiwake, variety of gull, **11**-4122
Picture, **11**-4123; (in color), **9**-3284
Kitty Hawk, North Carolina
airplane flights by Wright brothers, **1**-170
Picture
memorial to Wright brothers, **18**-6828

Kitwango, British Columbia
totem poles, **14**-5075
Picture
totem poles, **14**-5076
Kiwi, bird, **13**-4657
Klein, A. M., Canadian poet, **14**-5113-14
Kleist, Heinrich von, German writer, **17**-6410
Klipspringer, an antelope, **4**-1442
Klondike gold mines, discovery, **16**-5790
Klopstock, Friedrich Gottlieb, German poet, **17**-6269, 6270
Knapweed, flower
Pictures, **19**-7177; (in color), **14**-4986, 4994
Kneller, Sir Godfrey, German painter
place in British art, **6**-2000
Pictures
Portrait of Dr. John Wallis, **6**-2002
Portrait of John Gay, **6**-2003
Portrait of Marlborough, **6**-2002
Portrait of Sarah Jennings, **6**-2002
Knife-handles, **4**-1311
Knight, Charles R., artist
Picture
primitive artists engraving pictures of mammoths, **1**-191
Knight and the Ugly Old Woman, by Chaucer, **13**-4772-73
Knighthood. An institution which arose gradually throughout Europe as an adjunct of the feudal system. A knight was bound to the performance of certain duties, as the defense or recovery of the Holy Sepulchre, and observed a code of knightly etiquette. In the 16th century knighthood came to be an honor conferred on civilians for valuable services rendered, the right to bestow belonging in England to the sovereign. It carries the title of Sir.
Poems about
from the Faerie Queene, by Edmund Spenser, **13**-4538-39
Glove and the Lions, by Leigh Hunt, **5**-1639
Lady of Shalott, by Tennyson, **5**-1644-46
Pictures, **6**-1934-38
in England, **5**-1685
Knights
* life of Bayard, **2**-402-04
See also Arthur, King; Crusades
Knights Hospitallers, Order of, **7**-2585
Picture
fortress in Syria, **7**-2584
Knights of St. John, Order of
when founded, **7**-2585
Knights Templars, Order of, **7**-2585
Picture, **7**-2585
heraldic device, **15**-5619
Knitting, child's sock, **14**-5005-06
how to make twin sweaters, **15**-5510-12
Knives
* history, use and manufacture, **4**-1305-11
Pictures
primitive, **6**-1928
Knossos, Palace of, Crete
age, **14**-5212
paintings, **2**-448-49
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game board found there, **2**-449
throne room (gravure), **14**-5215
wall-paintings, **2**-452-53
Knot, bird, **11**-4012
flies from Arctic to Antarctic, **8**-2762
Picture, **11**-4011
Knot. In seamanship, a measurement of a ship's speed, so called from the knots at regular intervals on the log-line. The speed is reckoned in knots, that is nautical miles per hour.
Knot-grass, weed, **7**-2411
Knots, how to tie, **1**-340-42; **4**-1397
sailors' hitches and splices, **9**-3253-54
Question about
What was the ancient Gordian knot? **7**-2603
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Boy Scouts learning to tie knots, **12**-4452
U. S. Sailors tying, **18**-6819
Knots, in wood
Question about
What makes a knot in a piece of wood? **8**-2872-73
Knox, Henry (1750-1806). American Revolutionary soldier, born in Boston. He served with credit through the whole war, and was Secretary of War (1785-95) both under the Confederation and under the Constitution.
Knox, John, Scottish religious leader
opposition to Mary Queen of Scots, **15**-5652
Knox, Fort, Kentucky, gold storage, **13**-4594
Knoxville, Tennessee, seat of Knox County, in the eastern part of the state on the Tennessee River. Situated in the foothills of the Chilhowee Mountains, the city is near coal, copper, iron and zinc mines. Clothing, furniture, cement, and steel products are manufactured. It is in the region served by the Tennessee Valley Authorit· First settled in 1786, it was planned as a town in 1791 and was named for the Secretary of War, General Henry Knox. Population, 111,580.
Koala, Australian marsupial, **7**-2503-04
Pictures, **7**-2503; (gravure), **7**-2508
Kob, an antelope, **4**-1442
Kobe, one of Japan's leading seaports. It is situated on Osaka Bay and has a good harbor which has been improved during the last few decades. Shipbuilding was one of the major industries before World War II. The city was bombed during the war. It was a modern city, with electricity and a subway. It grew up from a group of fishing villages. Population, 967,234.
Koch, Robert, German scientist, **15**-5485
Picture
in his laboratory, **15**-5486
Kodiak bear, **3**-867
Koehl, Hermann, German aviator, **1**-173, 175
Koenig, Frederick, German printing-press designer, **9**-3389
Koh-i-nur, famous diamond, **19**-7233
Kohl-rabi, developed from cabbage, **7**-2616
Picture, **7**-2619
Kok-saghyz, Russian dandelion, source of rubber, **4**-1408
Picture, **4**-1411
Koltsov, Alexis, Russian poet, **19**-6907
Kom Ombo, Egypt
Picture, temple ruins, **3**-818
Komodo dragon, lizard, **1**-143
Kona, fertile region of Hawaii, **15**-5447
Kookaburra, Australian bird, **7**-2473
Koran, scriptures of Mohammedanism, **9**-3091-92; **15**-5459-61, 5464
Korea
* history and geography, **2**-573-74
early printing, **9**-3385
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Korrigum, an antelope, **4**-1440
Kosciusko, Thaddeus, Polish patriot, **13**-4681
Pictures, **13**-4682
portrait, **4**-1166
Kossuth, Louis, Hungarian patriot, **13**-4589; **17**-6340
Picture, **13**-4587
Kovno (Kaunas). Famous city in Lithuanian Soviet Socialist Republic. Formerly capital of Lithuania. Population, about 108,000.
Kowloon, mainland part of Hong Kong colony, **9**-3187
Krafft, Adam, stone-carver, **13**-4699-4700
Krait, snake, **15**-5413
Krak, Prince, legendary founder of Cracow, Poland, **13**-4679
Krakatoa, volcanic island near Java
eruption of 1883, **6**-2053; **17**-6392
Picture, **6**-2056
Kraken, imaginary monster, description, **1**-358
Kranach, Lucas, *see* Cranach, Lucas
Kreisler, Fritz (1875-). Austrian violinist and composer, born in Vienna. He showed unusual talent as a child, and studied in Vienna and Paris. His first American appearance was made in 1888; and he remains enormously popular in both America and Europe. As a composer he is chiefly known for his transcriptions of melodies by other composers and for his light violin pieces, among them Caprice Viennois and Schön Rosmarin.
Kremlin, seat of Russian government, in Moscow, **16**-5856
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Kress, Samuel H., art collection in National Gallery of Art, Washington, **5**-1543
Krieghoff, Cornelius, Canadian painter, **10**-3699-3701
Picture
The Settler's Log Cabin, **10**-3699

Kroll, Leon, American painter, **10**-3516
Kruger, Paul, president of the Transvaal in Boer War, **9**-3050
Kruger National Park, South Africa
Picture, **9**-3053
Krylov, Ivan, Russian writer, **19**-6906
Krypton (Kr). Chemical element. Inert gas (*see* Inert gases). Atomic number 36; atomic weight 83.7; melting point −157°C.; boiling point −152.9°C. There is one part of krypton in a million parts of air.
Kshatriyas, Hindu caste, **8**-2824-25
Ku Klux Klan, after Civil War, **7**-2444
Kuala Lumpur, capital of the Federated Malay States and of the state of Selangor, on the Klang River. Much research on tropical diseases has been carried on. It is the railway center and educational center of the country. Important tin fields are found near by. Population, 141,650.
Kublai Khan, Mongol ruler of China, **2**-429
and Marco Polo, **1**-81-82
Poem about
Kubla Khan, by Samuel Taylor Coleridge, **12**-4271
Picture
going forth to battle, **2**-430
Kudu, an antelope, **4**-1445, 1447
Picture, **4**-1447
Kuhn, Walt, American painter, **10**-3518
Kuibyshev (Samara), Russia, on the Volga River, one of the leading river ports. It is an educational center. Important oil fields are found in the region. Much of the land has to be irrigated. Machinery, farming equipment, and leather are manufactured. During World War II the city served as the capital when Moscow was in danger. It was founded in 1586 and was known as Samara until 1935. Population, 390,000.
Picture, **16**-5858
Kumasi, tribe of the Ashanti, **9**-3058
Kumquats, variety of orange, **6**-2059
Kunzite, semi-precious stone
Picture (in color), facing **19**-7225
Kuomintang, nationalist party, China, **2**-432
Kurile Islands. Volcanic island chain stretching from Japan to Kamchatka.
Kuyp, Albert, *see* Cuyp, Albert
Kyd, Thomas, English dramatist, **3**-1122-23
Kyoto (Kioto), capital of Japan until 1868, on Honshu Island. The city is known as a center of religion and has about a thousand shrines, most of them being Buddhist temples. It makes bronze products and fans. The city was founded in 794, and the name means "capital." Population, 1,089,700.
Kysylchoto (Krasny) capital of Tannu-Tuva, **18**-6588

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Labiate Family, *see* Mint Family
Labine, Gilbert, discoverer of Canadian pitchblende, **5**-1556; **7**-2559-60
Labor, element in economic production
adds value to raw material, **9**-3214
as factor in creation of wealth, **15**-5358-60, 5366
classification of, **17**-6360
co-operation in labor relations, **18**-6597-98
relation to price, **16**-5934-35
supply of labor governs wages, **17**-6362
See also Labor, Division of; Laboring classes; Wages
Labor, Department of, U. S., **5**-1792
Labor, Division of
affects trade relations, **17**-6083-84
explanation of, **14**-5245-47
Labor Day, observance of, **6**-2094
Laboring classes in England, 19th century, **7**-2295-96
Labour party, of England, **7**-2305, 2308
Labrador, account of, **9**-3275-76
* Dr. Grenfell's mission, **7**-2494-97
population, **9**-3275-76
Pictures, **9**-3276
Labrador Current. A cold current moving southward from arctic regions following the western side of Davis Strait. Off the southeast part of Newfoundland it comes into contact with the Gulf Stream and sets up an eastward drift, the Gulf Stream drift. Causes fogs.
Labrador Current (*continued*)
Labrador Peninsula, or **Ungava,** description, **7**-2557-58
Labrador tea, shrub
description, **19**-6938
Labrosse, Paul, French-Canadian wood-carver
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Madonna and Child, **14**-5078
Laburnum trees, account, **12**-4386
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tree, flower and leaf, **12**-4390
Labyrinth, in ancient Crete, **2**-448-49
Labyrinth, inner ear
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diagram, **9**-3307
Labyrinthodont, amphibian of Carboniferous period
Picture
skull, **4**-1297
Lac, from insect, used to make shellac, **11**-4000-01
Laccolith, rocky formation in earth's crust, **2**-630
Picture
diagram, **2**-631
Lacemaking
Pictures, **15**-5499
making Irish lace, **8**-2941
Lacewing, insect, **18**-6734
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Lachesis, one of the three Fates, **9**-3228
Lacombe, Albert, French-Canadian missionary to the Indians, **10**-3465-67
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La Condamine, Charles Marie de, French scientist investigated South-American rubber, **4**-1414
Laconia, part of ancient Greece, **3**-913-14
Lacrimal (tear) glands, of eyes, **7**-2461
Lacrosse, game
in Canada, **10**-3695-96
Lacteals, lymphatic vessels, **6**-2129-30
Lactic acid, in milk, **7**-2321
Ladies' tresses, *see* Lady's tresses
Ladislas II (Jagiello), king of Poland, **13**-4680
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statue, **13**-4679
Ladon, a Greek river, and Syrinx and Pan, **9**-3236
Ladrone, *see* Mariana Islands
Lady Godiva, story of, **17**-6292
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Lady-smocks, flowers, **17**-6127-28
Lady with the Lamp, * **16**-5704-06
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Lady's fingers, flower
Picture (in color), **14**-4993
Lady's slipper, flower
account of, **17**-6282
Pictures
pink lady's slipper, **15**-5606; **17**-6282
showy cypripedium, **17**-6272
Lady's tresses, plant, **16**-5732-33
Pictures, **16**-5733
autumn (in color), **14**-4986
La Farge, John, American painter, **9**-3334, 3336
Pictures
Muse of Painting (gravure), **10**-3462
Lafayette, Marie Jean Paul Yves Roch Gilbert du Motier, Marquis de (1757-1834). French nobleman who, at the age of 20, came to America to serve in the War of Independence. He was attached to the staff of General Washington and fought gallantly throughout the war. On his return to France he took part in the revolution, but was too moderate for the extremists. His visit to the United States in 1824 was a triumphal tour.
in America, **4**-1170
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visiting Washington at Mt. Vernon, **3**-971
Lafayette National Park
See Acadia National Park
Lafayette Square, Washington, D. C.
Picture, **5**-1538

La Fontaine, Jean de. Most famous French writer of fables; born, Château-Thierry, 1621; died, Paris, 1695.
writings, **18**-6712
Picture
scene from fable by, **18**-6713
Lafontaine, Louis H., Canadian political leader, **3**-946
Lagerlöf, Selma, Swedish writer, **19**-7014
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Story by
The School Examination, **13**-4663-64
Picture, **19**-7014
Lagoon. A sound, channel or lake near to or communicating with the sea.
Lagos, capital of the British colony Nigeria, built on Lagos Island, an important port. It is the trading and shipping center of the country. Bananas, cocoa, mahogany, and palm oil are exported. The British took charge of the city and the surrounding territory in 1861. Population, 174,200.
LaGuardia Field, New York
Picture, **1**-174
La Guayra. Port of Carácas, capital of Venezuela, trading in cotton, sugar, hides, coffee, cocoa and indigo.
Lahore, Pakistan, capital of the Punjab. The city is near the Ravi River which has gradually changed its course until it is about a mile from the city. Many famous and beautiful mosques stand in the city, and at one time it was noted for its gold and silver work and its cloth. Now it is more industrial, making soap, leather, clothing and bricks. Rudyard Kipling lived and wrote in Lahore, and his well known hero Kim was of that city. It is a very old city. Population, 671,650.
Picture
bazaar, **8**-2830
Lake Bowdoin, Montana
Picture
bird hospital, **8**-2818
Lake-dwellers, early settlers in Switzerland, **16**-5999-6000
Lake lawyer, name for hake, **16**-5780
Lake Washington Bridge, Seattle, **1**-33; **7**-2318
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Lakes
in Devonian period, **4**-1176
of Africa, **2**-468
of North America, **1**-155
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The Unnamed Lake, by Frederick George Scott, **6**-2243
Question about
What are the largest fresh-water lakes in the world? **7**-2486
Lakes-to-Gulf Waterway. Chicago to Gulf of Mexico, **19**-7108, 7110
Lakewood, Ohio, on Lake Erie, a suburb of Cleveland. Although there is a little manufacturing in Lakewood, it is primarily a residential district. It has established an excellent record for fire prevention. Population, 68,485.
Lalemant, Charles, French missionary to Indians, **2**-679
Laliberté, Alfred, Canadian sculptor, **14**-5079
Picture
statue, La Travailleuse Canadienne, **14**-5078
L'Allegro, by John Milton
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Lamaism, form of Buddhism, **18**-6588-90
Lamarck, Jean Baptiste de Monet, French scientist, **3**-980-81
Picture, **3**-981
Lamartine, Alphonse de, French poet, **18**-6716
Lamb, Charles, English writer, **8**-2866-67
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Dissertation upon Roast Pig, **17**-6317-19
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Taming of the Shrew, from Shakespeare's play, **16**-5755-62
See also Poetry Index
Picture, **8**-2867
Lamb, Mary, English writer, **8**-2866-67
Stories by
Romeo and Juliet, **8**-2688-97
Taming of the Shrew, from Shakespeare's play, **16**-5755-62
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Lambikin, The (story), **1**-323-24
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The Lamb, by William Blake, **3**-845
Picture
lamb with its mother, **4**-1373
Lambton, John George, *see* Durham, Earl of
Lamellicorn beetles, **18**-6627
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Lammergeier, bird, **10**-3759
Picture (gravure), **10**-3761
Lamp shells, *see* Brachiopods
Lampman, Archibald, Canadian poet, **14**-5105-07
See also Poetry Index
Lamprey. An eel-like order of aquatic vertebrates widely distributed in temperate regions in both fresh and salt water. They have large mouths with small teeth, a single nostril and seven gill-pouches on each side. Some are edible. The larger kind attach themselves to fish and tear off their flesh with their teeth.
Lamps, source of artificial light, **7**-2634-36
of lighthouses, **10**-3581
Lancaster, Pennsylvania, seat of Lancaster County, on the Conestoga River and Lincoln Highway. The surrounding country is a leading agricultural district of the United States, producing corn, wheat and tobacco. Dairy and poultry farming are also important. The city itself has extensive stockyards, and it manufactures candy, coffee, linoleum, jewelry and watches. It was first settled in 1717 and was known as Hickory Town until 1730. Population, 61,345.
Lancaster, House of
in War of Roses, **5**-1686
united to House of York by marriage, **5**-1688
Land, as factor in creation of wealth, **15**-5358
United States government land and settlers, **9**-3218
Land birds of the Northern province,
* **13**-4759-66, 4829-44
Lander, John, brother of Richard Lander, **14**-5201
Lander, Richard, African explorer
found mouth of Niger River, **14**-5201
Landing Ship-Tanks (LST)
Picture
American LST, World War II, **18**-6456
Landlocked salmon, *see* Sebago
Landolphia, rubber-producing vine, **4**-1408
Landor, Walter Savage
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Landowski, Paul, French sculptor
Picture
St. Francis and St. Clare, **6**-2007
Landrails, birds. *Picture* (in color), **9**-3281
Land's End. Westernmost point of Great Britain, lying nine miles from Penzance, in Cornwall. From here to John o' Groats is usually considered the extreme length of the island.
Landseer, Sir Edwin, English artist
paintings of, **6**-2235
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Wild Cattle, **4**-1258
Landseer, Thomas, engravings of brother's pictures, **6**-2235
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Langland, William, early English writer, **1**-304
Langley, Samuel P., pioneer American airplane-builder, **1**-171
Langmuir, Irving, American scientist
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Langobards, *see* Lombards
Langshan, poultry
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* man's attempt to make one, **5**-1619-22
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Questions about
How did men learn to talk? **16**-5961
How many words has the English language? **18**-6555-56
What is the longest word? **1**-75-76
What language was usually spoken by Jesus Christ? **18**-6557-58
Langur, leaf monkey, **1**-208
Lanier, Sidney, American poet, **13**-4791
See also Poetry Index
Picture, **13**-4791
Lansing, capital of Michigan, seat of Ingham County, on the Grand, Red Cedar and Sycamore rivers in the southern part of the state. Lansing is important as a trading center for the surrounding agricultural communities, and it manufactures farm machinery, automobiles, engines and pumps. The first settlers came in 1837, and in 1847 the site was selected as the capital because it was more centrally located than Detroit. Population, 78,753.
Picture
sculptured figure on waterworks building, **7**-2312
Lanthanum (La). Chemical element. Metal. Atomic number 57; atomic weight 138.92; melting point 826°C.; specific gravity 6.2. Lanthanum compounds occur with compounds of the rare-earth elements (*see* Rare-earth elements).
Laocoön, critical work by Lessing, **17**-6269
Laocoön, sculptural group, **12**-4460
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Laon. Historic city of northern France, having been the capital of the West Franks.
Picture
cathedral of Notre Dame (gravure), **17**-6167
Laos, state of French Indo-China, **2**-438-39
Lao-tse, Chinese philosopher, **9**-3088-89
Picture, **9**-3090
Lap (fleece), layer of cotton fibre
Picture, **14**-5171
La Paz, major city of Bolivia in size and importance, the seat of government though the official capital is Sucre. Situated on the La Paz River in the Andes Mountains, La Paz is a modern city. However, it is an old city in the Western Hemisphere and is noted for its old churches. It is a trading center, and has some manufacture of such products as cigarettes, glass and textiles. It was founded in 1548 at the site of an Indian settlement. Population, 302,000
Lapis-lazuli, description, **19**-7232
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Laplace, Pierre Simon de, French astronomer, **11**-3854
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Lapland
inhabitants, **15**-5304, 5306
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La Plata. Wide South American estuary on which Buenos Aires and Montevideo stand. It forms part of the boundary between Uruguay and Argentina. 145 miles broad at its mouth, it receives the Paraná and Uruguay rivers and drains 1,400,000 square miles. 200 miles.
La Plata, Viceroyalty of, **19**-7033-34
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Larder beetles. *Picture,* **18**-6624
Lardner, Ring, American humorous writer, **13**-4821
Lares and Penates, gods of the hearth, **9**-3234
Large intestine
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Hark! Hark! The Lark, by Shakespeare, **10**-3485
Larkspurs (delphiniums), **18**-6662
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La Rochefoucauld, François, French author, **18**-6712
Larynx, description, **10**-3557
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Why do we get hoarse when we have a cold? **3**-878
La Salle, Robert Cavelier, Sieur de
explorations, **2**-395
Lassell, William, English astronomer, **11**-3858
Lassen, Peter
Picture
of peak named for him, **7**-2282
Lassen Peak, **7**-2284
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Lassen Volcanic National Park, **7**-2284
Last of the Mohicans, by Cooper, quotations and summary, * **1**-267-78
Last Supper, by Leonardo da Vinci, **3**-828
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Latakia, district of Syria, **18**-6678
Latent heat, term in physics, **5**-1583
Later Middle Ages, The, * **6**-1974-87
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Latex, juice of rubber tree, **4**-1404-05
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Lathes, industrial machines
invention by Thomas Blanchard, **19**-7213
Latin America. Term applied to the nations south of the United States, because these nations were colonized chiefly by men of Latin stock, and the Monroe Doctrine, **9**-3107-08
Latin Empire, of Crusaders, **4**-1322-23; **7**-2585-86
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La Tour, Quentin de, French artist, **5**-1881-82
Latvia, member of the Union of Soviet Socialist Republics, **16**-5860
Picture
Town Hall Square, Riga, **16**-5861
Laughing jackass, kind of kingfisher, **9**-3374
Laughter
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Why do I laugh and cry? **1**-73
Why do we not laugh when we tickle ourselves? **16**-5958
Laura, beloved of Petrarch, **17**-6152
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Laurens, Jean Paul, French painter, **8**-2858
Laurentic, torpedoed steamer
treasure recovered by divers, **12**-4188, 4191
Laurier, Sir Wilfrid, premier of Canada, **4**-1487-88
Lausanne. Swiss city near Lake Geneva, capital of the canton of Vaud; famous as an educational centre. It has a university and a fine Gothic cathedral.
Lava. Fluid rock which flows from a crack in the earth's surface or from a volcano. It is mineral matter dissolved in mineral matter, solution taking place at a high temperature. If it cools rapidly, it produces glass, as obsidian; if slowly, a crystalline rock.
Laval, Pierre, leader in French Vichy government, **18**-6606-07
Laval-Montmorency, François de, bishop in New France, **2**-679-80
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Lawrence, Massachusetts, seat of Essex County, in the northeastern part of the state on the Merrimack River. Lawrence is noted for the manufacture of textiles; and paper, shoes and rubber products are made. Until 1845 it was part of the cities of Methuen and Andover, but businessmen from Boston bought the location because the river would be an excellent source of power for textile mills. It was named for one of these men, Abbott Lawrence. Population, 85,603.
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Lead (Pb, from Latin *plumbum*). Chemical element. Gray, heavy metal. Atomic number 82; atomic weight 207.21; melting point 327°C.; boiling point 1613°C.; specific gravity 11.3. Occurs as the sulfide, PbS, galena. Lead is used in storage-battery plates, in cable sheathing, for low-melting alloys and for making shot and bullets. "White lead," a valuable pigment, is a compound of lead; tetraethyl lead is used in anti-knock gasoline.
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Leavenworth, Kansas. Important railway centre, 26 miles northwest of Kansas City; also a trade centre for a farming and mining region. Fort Leavenworth, to the north, has a permanent garrison and is the seat of a federal prison.
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Portrait of Comte d'Espagne (gravure), **5**-1878
Lechwe, an antelope, **4**-1442
Ledwidge, Francis, Irish poet, **12**-4206
Lee, Charles (1731-82). British-American soldier. He served in British army, but came to America in 1773, and was later appointed major-general by Congress. After service in the South he was in command under Washington, and was captured by the British. Long afterward it was discovered that he was willing to betray his adopted country.
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Leicester, Robert Dudley, Earl of
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Leinster House, home of Eire Parliament in Dublin, **8**-2944
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Leipzig. Commercial city in Saxony, Germany, famous for its great printing and book trades, its industrial fairs, its university, and its pianoforte, paper and chemical manufactures.
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booksellers at 18th century fair, **6**-2069
Leipzig, Battle of. Fought between Napoleon and the allied Russians, Austrians, Prussians and Swedes in 1813, and known as the Battle of the Nations. Blücher with 60,000, Schwarzenberg with 240,000 and Bernadotte with 135,000 men, pressed Napoleon so hard that his Saxon allies went over to the enemy, and he brought back only a part of his 300,000 men.
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Le May, Leon-Pamphile, French-Canadian poet, **14**-5116
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Lenin, Nikolai, Russian communist leader, **18**-6610
Leningrad, Russia, formerly the capital. Until 1914 it was known as St. Petersburg, and from then until 1924 it was known as Petrograd. Located in the northwestern part of the country, it is built on the Neva River delta on the Gulf of Finland. It was an attractive city as well as a manufacturing center before the war. Machinery, delicate instruments, electrical equipment and chemicals were made. During World War II the city was badly damaged, but it is now recovering. It was founded by Peter the Great in 1703 and was named for him. It is now named for Nikolai Lenin who founded the Soviet Union. Population, 3,191,300. *See also* **18**-5856-57
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busy street corner, **16**-5859
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Griboyedov Canal, **16**-5853
Lens, French town in northwestern department of Pas-de-Calais, about 50 mi. southwest of Dunkirk, on the Déûle and Lens Canal. It is a coal-mining center; and there are iron, steel and engineering works. It was the scene of severe fighting in both the first and second World Wars.
Lens, of the eye, **11**-3804-05
Lenses
in cameras, **5**-1655; **8**-2961-63
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Lent is the period of 40 weekdays preceding Easter, in memory of Christ's fast in the wilderness. It begins with Ash Wednesday and is set aside in many Christian churches as a period of prayer and self-sacrifice.
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Leo III, Byzantine emperor, **4**-1318-19
Leo (the Lion), constellation, **11**-3925-26
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position in the sky, **11**-4043, 4045
León, northwestern province of Spain, part of old kingdom of León; area 5,936 sq. mi. Coal is mined. The city of León is famous as the burial place of the ancient rulers and for its great Gothic cathedral. *See also* **14**-4908, 4911
Leonardo and Michelangelo, * **3**-822-31
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Leonidas, king of Sparta
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Leonids, shower of meteors, **10**-3671
Leopardi, Alessandro, Venetian sculptor, **4**-1458-59
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pedestal of Colleoni monument, **4**-1468
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Leopold, archduke of Austria
in Third Crusade, **7**-2586
Leopold II, king of Belgium
and Congo Free State, **18**-6805-06
Léopoldville, capital of the Belgian Congo, on the Congo River. It is important as a shipping and trading center. Although it is about 300 miles inland from the west coast of Africa, it has electricity and other modern conveniences. It was founded by the explorer Henry M. Stanley in 1882. It took its present name in 1923 in honor of King Leopold II of Belgium.
Picture, **18**-6813
Lepanto, Battle of, A.D. 1571. A decisive naval battle in which Venetian, Spanish and Papal galleys, under Don John of Austria, vanquished the Turkish fleet. Cervantes, the author of Don Quixote, took part in this battle.
Lepers, *see* Leprosy
Lepidodendrons, ancient plants, **4**-1296
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Lesseps, Viscount Ferdinand de. French diplomat and engineer; built the Suez Canal; born, Versailles, 1805; died, near Paris, 1894.
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Leutze, Emanuel, American painter, **9**-3333
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Mrs. Catharine VanRensselaer Schuyler, **4**-1163
Washington Crossing the Delaware, **4**-1167
Leven, Loch. Scottish lake containing several beautiful islands. On one of these, Castle Island, are the ruins of the castle in which Mary Queen of Scots was imprisoned.
Lever, Charles James, Irish writer, **11**-3899
Lever, Haley, American painter, **10**-3514
Lever, a simple machine, **4**-1521, 1523-24
Leverrier, Urbain Jean Joseph, French astronomer, **11**-3857-58
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For Sale—Dragon's Breath, Cheap, **16**-5685-89
Lewis, Meriwether, *see* Lewis and Clark expedition
Lewis, Sinclair, American novelist, **14**-5007-08
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Lewis and Clark expedition, **5**-1701-02; **18**-6426
Lexington, Kentucky, seat of Fayette County, widely known as a blue-grass and tobacco center. It is known throughout the world for the Thoroughbred horses that are raised in the region. Furniture, clothing, leather goods, and feeds are made. The homes of Henry Clay and Mary Todd Lincoln are in Lexington and also the University of Kentucky. Settlers came to the region in 1775. Population, 49,304.
Lexington, Mass.
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Lexington Common, **18**-6832
Lexington, Battle of, **4**-1161-62
Leyden. Beautiful old Dutch city, famous for its defense against the Spaniards, 1573-74. It has a celebrated university and a fine picture gallery, and manufactures textiles.
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Leyden jar, for storing electricity
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Lhasa, capital of Tibet. It is in the Himalayan Mountains and is not easily reached. Foreigners have not been allowed into the city until recent years, and even yet the natives do not trust or welcome them. Cars and airplanes are also feared. Caravan routes pass through the city and have made it a trading center. The ancient city is known to be over a thousand years old, and it does not have modern facilities. It is a holy city, and the name means "place of God." Population, about 50,000. *See also* **18**-6590
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Lhermitte, Léon Augustin, French painter, **7**-2372
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How are library books arranged? **10**-3558-61
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protect building stone against decay, **8**-2720
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Lichfield. Ancient city of Staffordshire, with a splendid three-spired cathedral. Dr. Johnson was born here.
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"Licks," origin of name, **6**-2190
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Liddell, Alice, for whom Alice in Wonderland was written
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Lie, Jonas, American painter, **10**-3512
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Lie, Trygve, Secretary General of United Nations
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Lieb, Michael, *see* Munkácsy
Liebig, Justus von, Baron, German chemist
Pictures, **3**-988; **12**-4180
Liechtenstein. Principality on the Upper Rhine, between Switzerland and Austrian Vorarlberg; area, 65 square miles. Only three sovereign states in Europe are smaller: Andorra, Monaco and San Marino.
Liége. Belgian city on the Meuse, in a great coal-mining district. Besides woolens and leather, it has a great manufacture of iron and steel, the locomotive works at Seraing near by being especially important.
Picture
street scene, **15**-5506
Lieurance, Thurlow (1878-). American composer, born in Iowa. Spent years of musical research among American Indians. He wrote the well known song, "By the Waters of Minne'onka."
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Why do white things go yellow with age? **13**-4825
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Liliuokalani, Lydia Kamekeha (1838-1917). Ruler of Hawaii. She became queen in 1891, but was deposed by her subjects in 1893. She lived in California for many years. *See also* **10**-3585-86
Lille. Centre of the French textile industries, near the Belgian frontier. There are linen, cotton, thread, damask, cloth and tulle manufactures, besides others of tobacco, paper, sugar and machinery.
Lilliput, satirical name for England, **3**-947
Lily Maid of Astolat, The (story), **4**-1341-42
Lily-of-the-valley, **19**-7172
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Lima, capital of Peru and of the Department of Lima, on the Rimac River near the Pacific coast. The lima bean was first grown there and takes its name from the city. The area is subject to earthquakes. Cotton and woolen goods, pottery, sugar, and copper products are made. The city was founded in 1535 by Francisco Pizarro, Spanish explorer, and it is becoming modernized slowly. The name comes from the Rimac River, but has been slightly changed. Population, 522,800.
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Lime, fruit, use on ships, **6**-2059-60
Limelight, old-fashioned theater light, **7**-2635
Limerick. Capital of County Limerick, Munster; it is the third largest city in Eire (Ireland).
Limes, fortified line built by ancient Romans, **12**-4157-58
Limestone
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Limoges. Old capital of the former French province of Limousin, with a famous porcelain industry. Its Gothic cathedral, begun in the 13th century, was completed in 1851.
Linacre, Thomas, founded college for physicians in England, **8**-2725
Lincoln, Abraham, president of U. S.
* life, **5**-1649-52
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giving Gettysburg address, **5**-1651
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reproduction of store in New Salem, **5**-1652
statue by Saint Gaudens, **14**-4932
Lincoln, Mrs. Mary Todd, wife of Abraham Lincoln, **8**-2810-11
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Lincoln, Nancy Hanks, mother of Abraham, **5**-1649
Lincoln, capital of Nebraska, seat of Lancaster County, on Salt Creek in the southeastern part of the state, the second largest city in Nebraska. Lincoln is the home of the University of Nebraska. The region is important for agricultural products, and the city is a trading center. Grain elevators, creameries, metal works, and machine shops are among the major industrial concerns. It is also the home of a number of insurance companies. Settlers came to the territory in the 1840's, but the town was very small until it was

Lincoln (*continued*)
chosen to be the capital in 1867. It was named for Abraham Lincoln. Population, 81,984.
Picture, Capitol (gravure), **18**-6687
Lincoln, England, cathedral, **16**-5970
Lincoln Memorial, Washington, D. C., **5**-1542
Picture, **5**-1540
Lind, Jenny. Swedish singer; born, Stockholm, 1820; died, near Malvern, England, 1887. Made famous tour of America under management of P. T. Barnum.
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Lindbergh, Charles A., pioneer transatlantic aviator, **1**-173
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with Spirit of St. Louis, **1**-170
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What is linoleum? **7**-2609
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* pressure of, **4**-1415-20
movement of molecules in liquids, **2**-609-14, 616
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Can anything boil when it is cold? **10**-3732-33
Lira da braccio, musical instrument
Picture, **5**-1797
Lisbon, Portugal, capital and main city of the country and of the Province of Estremadura. It is officially known in Portugal as Lisboa. Located on the Tagus River a few miles from the ocean, it is the leading port of the country and one of the best ports of Europe. Wine, fish, fruit and livestock are exported; and ships, textiles, glass, paper and fire arms are manufactured. The modern sections and the old sections of the city are quite different, one being clean and orderly, the other being crowded and dirty. It is a very old city, having been built several centuries before it became the capital in 1260. Population, 709,179.
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Lister, Joseph, Lord, English surgeon, **15**-5484-85
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Liszt, Franz, Hungarian pianist and composer, **19**-6917, 7150-51
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Lithium (Li). Chemical element. Silvery, reactive metal. Atomic number 3; atomic weight 6.94; melting point 186°C.; boiling point 1336°C.; specific gravity 0.534. Lithium is used in small amounts in alloys with aluminum, magnesium, lead and zinc. Lithium hydride is used as a source of hydrogen for balloons in air-sea rescue work.
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Little Dipper, group of stars, **11**-3921
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Little Many-Legs, * **16**-6010-20
Little One Eye, Two Eyes and Three Eyes (story), **14**-5069-72
Little People, fairies of Ireland, **8**-2931
Little Princes in the Tower (story), **13**-4540-41
Little Rabbit Who Wanted Red Wings (story), **7**-2637-39
Little red elephant, flower, description, **18**-6664
Little Red Riding-Hood (story), **18**-6473-75
Little Rock, Arkansas, capital of the state, seat of Pulaski County. It is the largest city of the state and the trading center. It is on the Arkansas River. The city is sometimes called "the city of roses" because of the abundance of flowers grown there, and it is noted for having beautiful residential districts. Branches of the University of Arkansas are located in Little Rock even though the main part of the school is at Fayetteville. Cottonseed oil, lumber products and ice are made in the city. The town was started in 1820 after the site had been chosen for the capital. The site was named by a French explorer, Sieur Bernard de la Harpe, in 1722, to distinguish it from a larger rocky formation farther up the river. Population, 88,039.
Picture
birthplace of General MacArthur, **14**-4900
Little Women, book by Louisa May Alcott
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Live oaks, trees, **12**-4244-46; **13**-4637
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action in digestion, **6**-2129
structure and function, **7**-2459-60
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Livermore, Mary, life, **14**-5269
Liverpool, England, borough of Lancashire County. It is the third largest city in England and the second largest seaport, being surpassed only by London. It is on the Mersey River, but it does not have a natural harbor. The harbor

Liverpool (*continued*)
has been built by man, and the river has to be dredged frequently. Raw cotton is one of the principal imports, and the products of Lancashire factories are exported. The city itself does not carry on a great deal of manufacturing. A castle was built on the site in 1207 and a town was chartered 20 years later. During the 18th century the port became important because of trade with Africa and the American colonies, and so the city grew rapidly. Population, 769,200.
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forage crops for livestock, **7**-2541-42
Livingstone, David, African explorer
* life and explorations, **14**-5201-03
Livingston, Robert, American patriot
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Livius Andronicus, Roman writer, **16**-5908
Livy (Titus Livius), Roman writer, **16**-5917
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Monitor lizard, **2**-473
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Lizard's tail, plant, **19**-7088
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Llamas, animals, **5**-1600
Pictures, **18**-6785; (gravure), **5**-1604
Lloyd George, David (1863-1945). English statesman; native of Wales. He studied law, and became a noted lawyer. He entered politics as a liberal. In 1908 he was appointed Chancellor of the Exchequer. He played an important part in World War I, becoming Minister of Munitions in 1915 and Prime Minister in 1916; and he was prominent in the Peace Conference in Paris. In 1922 his ministry fell. Lloyd George continued in public life as a member of the House of Commons. His War Memoirs, in six volumes, appeared in 1933-36.
Lloyd's of London, insurance organization, account of, **1**-144
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Lobsters, account of, **16**-5954-55
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Why do lobsters turn red in boiling? **13**-4828
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fishing in Canada, **11**-4057
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Locarno peace treaties, 1925, **18**-6449
Lochner, Stephen, German painter, **4**-1343-44
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Adoration of the Wise Men, **4**-1343
Locke, John. Most famous English philosopher of his day; born, Wrington, Somerset, 1632; died, High Laver, Essex, 1704.
Lockheed Constellation, airplane
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Lockheed P-80 Shooting Star, jet airplane
Picture, **1**-180
Lockheed Saturn 75, airplane
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Erie Canal at, **13**-4888
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* history and construction, **6**-2021-**26**
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Erie Canal, **13**-4888
Panama Canal, **1**-364-66
Pictures
locks of Erie Canal, **13**-4882, 4884, 4886-88
locks of Panama Canal, **1**-362, 364, 367
of Holland, **15**-5557
Lockyer, Sir Norman. English astronomer; born, Rugby, 1836; died, Sidmouth, 1920.
Loco Weeds
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Locofoco matches, **19**-6969
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for trains, **2**-405-09, 411-13
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Locusts, insects, **18**-6724-26
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migratory locust (in color), facing **18**-6720
Lodestones, metallic ore with magnetic properties, **11**-4088
Lodge, Sir Oliver. English scientist, a pioneer of electricity and wireless telegraphy; born Penkhull, Staffordshire, 1851.
Lodore Falls, England
Poem about
The Cataract of Lodore, by Robert Southey, **6**-2245-46
Lodz, Poland, capital of the district of the same name. It is the largest city in the country, and it is second only to Warsaw in importance. It is a modern city, and is a manufacturing center. The making of textiles has at one time been the leading industry, and bricks, boilers, and machines are also made. Lodz suffered considerable damage during both world wars, and it was the site of terrible Jewish massacres in World War II. Population, 496,900.
Lofoten Islands. Norwegian island group with a famous cod fishery. Between two of them is the strong current known as the Maelström.
Log, record of a voyage, **12**-4418; **17**-6404-05
Log cabins, homes of American pioneers, **12**-4447
Logan Sea, prehistoric, in America, **5**-1545
Loganberries
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Logarithms, means of mathematical calculation, **19**-7008
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Logwood. *Picture* (in color), **8**-2998
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Lollards, followers of John Wyclif, **6**-1981
Lombardi, family of Venetian sculptors, **4**-1458; **17**-6311
Lombards, Teutonic people
invasion of Italy, **4**-1432-33, 1435
settled in Italy, **12**-4407
Lombardy poplars, *see* Poplar trees
Lomé, French Togo, capital and major seaport of the country. It is on the western coast of Africa. It is important as a trading center, and exports palm oil, cocoa and cotton. Population, 27,900.
Lomond, Loch. Largest and one of the most beautiful Scottish lakes, lying between Dumbartonshire and Stirlingshire. 27 square miles in extent, it is 23 miles long and 5 miles broad, and is dominated by Ben Lomond, 3,200 feet.
Lomonosov, Michael, Russian scientist and writer, **19**-6905
London, Jack, American author, **13**-4817-18
Picture, **13**-4816
London, Ontario, Canada. It is situated on the Thames River in western Ontario, and it is the home of the University of Western Ontario. It used to be an oil center, but is now important for the manufacture of machinery, farming implements, furniture, hosiery and stoves. It was settled in 1826 and was named for the capital of England. At one time it was considered for the capital site of Upper Canada. Population, 80,342.
London, the capital of the United Kingdom and of the Commonwealth of Nations. It is situated on the Thames River in southeastern England. Greater London has an area of 693 sq. mi. The historic center of London is the old City, with an area of one sq. mi., which was once surrounded by walls. London was severely damaged in World War II; the houses of Parliament, St. Paul's Cathedral and other famous buildings were bombed. Many formerly overcrowded areas that were bombed out are being rebuilt. Population, 8,244,370.
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In Honor of the City of London, by William Dunbar, **13**-4536-37
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"Change Alley" in 1720, **10**-3733
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fire of 1666, **6**-2103
Globe Theater of Shakespeare's day, **3**-837
King George and Royal Albert Docks, **17**-6094
old Fortune Theatre, **3**-1119
old Red Bull Theatre, **3**-1123
Temple church, **16**-5976
Tower Bridge, **1**-36
London Company, to colonize America, **2**-544, 547
London Pride, plant, note and picture, **15**-5603
London Times, newspaper, back files on microfilm, **16**-5702
encouraged printing-press improvements, **9**-3389
Londonderry. Second largest city of Northern Ireland, capital of County Londonderry. Standing on the Foyle, it is surrounded by walls, and is famous for its resistance to James II in 1689. Agricultural produce is exported and linen manufactured.
Picture, **8**-2943
Long, Crawford W., and early use of anæsthetics, **8**-2729
Long Beach, California, on San Pedro Bay of the Pacific Ocean. It is best known as a tourist resort, but it is also important as a seaport. The manufacture of airplanes is one of the most important industries, and oil refining, shipbuilding and canning are also carried on. The site was settled in 1840, but was not founded as a town until 1888. It took its name from the eight miles of beach along which it lies. Population, 241,109.
Long Island. An island forming the southeastern section of New York state. Area, 1,682 square miles; length, 118 miles; width, 15 to 23 miles. On it are Brooklyn and Queens, two boroughs of New York City. Many popular summer resorts are situated on Long Island. The many market gardens have caused Long Island to be nicknamed "New York's vegetable garden."
Picture
lens of Montauk Point lighthouse, **10**-3581
Long Island, Battle of. Battle of Revolution fought on present city of Brooklyn, Aug. 27, 1776. American army was badly defeated, and barely escaped capture.
American army escapes, **4**-1165
Long Parliament, in English history, **6**-2098
Picture
being dissolved by Cromwell, **6**-2101
Longfellow, Henry Wadsworth, **13**-4721, 4723
story of Evangeline, with part of poem, **5**-1895-97
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Longicorn beetles, **18**-6628-29
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Longitude, a term used in geography and astronomy, **1**-239
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diagram of degrees of longitude marked off on the earth, **1**-239
Long's Peak, mountain, **7**-2286
Lönnrot, Elias, Finnish writer, **19**-7014
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Loosestrife, flower
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Lope de Vega, *see* Vega, Lope de
Lopez, Carlos Antonio, ruler of Paraguay, **19**-6984
Lopez de Cardenas, discovered the Grand Canyon, **7**-2285
Loran, long-range navigation device, **14**-5148-49
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lost power to throw out bills brought in by House of Commons, **7**-2306
Lorentz, Hendrik Antoon, Dutch scientist
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Lorentz-Fitzgerald Contraction, law of motion, **19**-6853
Lorenzetti, Pietro, Italian painter, **2**-697
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St. Francis and St. John with the Madonna, **2**-691
Lorenzo, Fiorenzo di, Italian painter, **3**-959
Lories, birds, **10**-3614
Lorikeets, birds, **10**-3614
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Swainson's lorikeet (in color), **10**-3622
Loring, Frances, Canadian sculptress, **14**-5080
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head of Sir Frederick Banting, **14**-5079
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Lorna Doone, novel by Richard D. Blackmore
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Lorrain, Claude, French painter, **5**-1876
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David at the Cave of Adullam, **5**-1883
Landing of Cleopatra, **5**-1875
Lorraine
Picture
iron-and-steel plant, **10**-3420
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Lorris, Guillaume de, early French writer, **18**-6561
Lory, bird. *Picture* (in color), **10**-3622
Los Angeles, California, seat of Los Angeles County, on the Pacific Ocean. It is the largest city in California, and leads the state as a commercial and industrial center. The University of Southern California, the University of California at Los Angeles and other important schools are located there. The movie industry is centered in the adjoining city of Hollywood. Besides being a leading amusement center, it is a manufacturing center for such products as airplanes, furniture, clothing, drugs and rubber products. Los Angeles was founded in 1781, and the name means "city of the angels." Population, 1,825,687.
description, **19**-6849-50
water supply system, **14**-5055-56
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Coliseum, **7**-2314
Griffith Observatory Planetarium, **11**-3857
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Los Angeles, airship, **1**-349
"Lost Battalion," World War I, and Cher Ami, pigeon, **7**-2319
Lost Colony of Roanoke, * **17**-6333-37
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What is the lost continent? **5**-1751-52
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The Lotos-Eaters, by Tennyson, **12**-4275
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What is the legend of the lotus-eaters? **7**-2610
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Louis I (The Pious), successor of Charlemagne, **4**-1438
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Louis IX (St. Louis), king of France
* life of, **16**-5817-19
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Louis XV, king of France, **10**-3434
Louis XVI, king of France, **10**-3434-35
Louisbourg, Nova Scotia
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capture by Pepperell, 1745, **3**-780
Pictures
capture by Pepperell, **3**-777
capture in 1758, **2**-683
Louisiade Archipelago, 9-3299
Louisiana. State containing the mouth of the Mississippi; area, 48,523 square miles; capital, Baton Rouge. It produces much cotton, sugar, rice, corn and fruit, and has forests of pine, cypress, oak, cotton-wood and magnolia; leads in production of sulphur, and also has much petroleum. Here is the great port of New Orleans, the largest city in the state. Abbreviation, La. Nickname, "Pelican State" or "Creole State." State flower, magnolia. Motto, "Union, Justice and Confidence." Louisiana was named for Louis XIV of France by Robert de la Salle in 1682. First settlement, below New Orleans, 1700.
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De Soto's expedition, **2**-393
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French cede to Spain, **3**-784
French sell to U. S., **5**-1701
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Evangeline statue in St. Martinsville, **14**-4899
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Jackson Square, New Orleans, **17**-6047
New Orleans balconies, **14**-4899
Paul J. Rainey Wildlife Refuge, **8**-2814, 2817
skyline, New Orleans, **17**-6048
sugar cane refinery, **13**-4522
Louisiana Purchase, 5-1701; **11**-3938; **18**-6426
Louisville, Kentucky, seat of Jefferson County. It is on the Ohio River, and it is known as "Falls City" because of the rapids in the river. The city is probably best known throughout the world for the famous Kentucky Derby that is held at Churchill Downs. The manufacture of liquors, tobacco, machinery, lumber and paints make it an important industrial city. Plans for settling the site were made by the owner of the land in 1773, but Indian uprisings scared people away. Actual settlement began in 1778 after George Rogers Clark had conquered the Indians. The city was first called Falls of the Ohio, but was later named for Louis XVI of France. Population, 319,077.
Lourdes. French pilgrimage town at the foot of the Pyrenees, with a famous shrine in a grotto. It is estimated that 600,000 pilgrims visit yearly the shrine of Our Lady of Lourdes.
Picture
entrance to shrine, **10**-3434
Louse, *see* Lice
Louse-wort, parasitic plant, **1**-332
Louvain. Belgian university city, a famous ancient seat of learning. The cathedral and university library were destroyed by the Germans in 1914, but the splendid town hall remains.
L'Ouverture, Toussaint, *see* Toussaint l'Ouverture
Louvre, palace, now an art gallery, Paris
architecture, **18**-6495-96
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Abou Ben Adhem, by Leigh Hunt, **5**-1646
Annabel Lee, by Edgar Allan Poe, **12**-4346
Believe Me, If All Those Endearing Young Charms, by Thomas Moore, **12**-4343
Birthday, by Christina Rossetti, **12**-4351
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Low Countries. This name is given to a low-lying area on the North Sea. Formerly the name of the Netherlands was applied to the entire area. At present it is divided up into the kingdoms of the Netherlands and Belgium and the grand duchy of Luxemburg.
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Lowell, Percival, American astronomer, **11**-3859
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Lowell, Massachusetts, situated at the meeting point of the Merrimack and Concord rivers. The famous American artist James McNeill Whistler was born in Lowell. The city owes its growth and success largely to its textile mills, though it is now important for the manufacture of electrical equipment, beverages, shoes and machinery as well. Francis Cabot Lowell recognized the location as desirable for textile mills because of the water power that could be supplied by the falls in the rivers. A settlement was founded in 1822, and it became a town in 1826. Population, 101,229.
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Lucas, Eliza, life, **14**-5267
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Lion of Lucerne, **3**-889
Lucerne, Lake of. One of the most beautiful Swiss lakes, covering 44 square miles. It is

Lucerne, Lake of (*continued*)
dominated by the mountain peaks of Rigi and Pilatus, famous for the splendid views from their summits; at its west end is Lucerne.
Lucerne, or **alfalfa,** fodder-plant, **7**-2413
Lucian, ancient Greek writer, **11**-3975-76
Lucifer, in ancient mythology, was Venus, the morning star, **9**-3233
Lucifer (Satan)
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Lucifer in Starlight, by George Meredith, **19**-6991
Lucifer matches, **19**-6966
Luciferin, chemical substance, **1**-142
Lucite, trade name of plastic, **11**-4002-03
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brush with back made of, **11**-3999
Lucius Junius Brutus, *see* Brutus, Lucius Junius
Lucknow, India, on the Gumti River in the north-central part of the country. It was formerly the capital of the kingdom of Oudh, and is still a divisional capital. It has been called the "city of parks" because of its open areas, but it has its crowded, dirty sections. It has some beautiful Oriental buildings. Mangoes and cantaloupes are grown in the region, and embroidery, brass and copper work, pottery-making and wood-carving are done in the city. It first became important in the 18th century. Population, 387,200.
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salt wells, **15**-5402
Ludwig, Emil, German biographer, **17**-6415
Ludwig, Otto, German dramatist, **17**-6413
Lugano, lake in Italy and Switzerland
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Luini, Bernardino, Italian painter, **3**-1107
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The Spielers, **10**-3513
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Lullaby, by Alfred Tennyson, **1**-223
Lullaby of an Infant Chief, by Sir Walter Scott, **1**-228
Norse Lullaby, by Eugene Field, **1**-228
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* in United States, **16**-5985-91
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logging in Oregon, **8**-2678
pine planks for matches, **19**-6966-67
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What is the secret of luminous paint? **9**-3102
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Lungs, organs of breathing
* structure and function, **4**-1325-31
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Lupines, plants, **18**-6664
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Luray Caverns, Virginia, **4**-1300
Picture, **4**-1302
Lusaka, capital of Northern Rhodesia, in the southern part of the country. It is the trading center for the mining and agricultural regions around it. It was made the capital in 1935. Population, 2,700.
Lusiads, The, epic poem by Camoëns, **19**-7130
Lusitania, British passenger liner
sunk in World War I, **18**-6443
Lutetium (Lu). Chemical element. Atomic number 71; atomic weight 174.99. One of the rare-earth elements. *See* Rare-earth elements.
Luther, Martin, leader in Protestant Reformation, **12**-4161
as writer of hymns, **10**-3601
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Wartburg house, **12**-4162
Lutyens, Sir Edwin, English architect, **18**-6492
Luvini, Bernardino, *see* Luini, Bernardino
Luxemburg, capital of the Grand Duchy of Luxemburg, on the Alsette River. Because of the Ardennes Mountains it has always been a strong city, and further fortifications were built by the Prussians between 1839 and 1866. The Treaty of London of 1867 made the duchy a free region, and the fortifications were destroyed. Iron and steel works, brewing, and leather-working are important industries. The name means "little town." Population, 59,000.
Luxembourg Palace, Paris, **18**-6494
built by Marie de' Médici, **5**-1874
Luxor. Upper Egyptian winter resort famous for its remains of ancient Thebes. Among these are the Luxor temple and court of Rameses, while near by is the Valley of the Kings, burial-place of Tutankhamen and other pharaohs.
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Lycopodium powder, from club-mosses, **10**-3724
Lycurgus, Spartan law giver, **3**-914
Lydgate, John, early English writer, **2**-721
Lyell, Sir Charles, Scottish geologist, **3**-982
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Lyly, John, English dramatist, **3**-1120
Lyme Regis, England, fossils found in quarries, **5**-1546
Lymph, body fluid, **7**-2461
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Lyndsay, Sir David, early Scottish poet, **2**-721
Lynmouth, England
Picture (gravure), **7**-2304
Lynn, Massachusetts, on Massachusetts Bay. The city has been noted for the making of shoes for over three centuries. Important plants of the General Electric Company are now among its leading industries. It was settled in 1629, and in 1637 it was named after the town of King's Lynn, England. Population, 105,153.
Lynx. *Pictures,* **2**-490
Lyon, Mary, American educator, **14**-5268
Lyons, France, in the southeastern part of the country, at the meeting point of the Rhone and Saône rivers. It is the capital of the Department of Rhône, and is the third largest city in France. In the past the city was important as a fortress, and it is still considered as one of the strong cities of Europe, but it fell to the Germans during World II. The silk industry has made it internationally famous; and iron products, automobiles, electrical equipment and hardware are also manufactured. It is thought that the city was founded by the Greeks six centuries before Christ. During the days of the Roman Empire it was known as Lugdunum. Population, 460,750.
Lyons, New York
Pictures
locks and power-house of Erie Canal, **13**-4886-87

Lyra, Cretan, musical instrument
Picture, **5**-1799
Lyra (the lyre of Orpheus), constellation, **11**-3926
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use by ancient Greeks, **19**-6900
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Lyre birds, **9**-3288
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Lyrids, shower of meteors, **10**-3671
Lysicrates, winner in the dramatic contest of the Dionysiac games at Athens, about 334 B.C.
Lysippus, Greek sculptor, **12**-4332
Picture
Apoxyomenus, statue (gravure), **12**-4335
Lyte, Henry Francis (1793-1847). English clergyman and hymn-writer. His famous hymn, Abide With Me, sung at the close of church services all over the world, was written the night that he preached his last sermon.
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Mabinogion, Celtic epic, **1**-217
Mabuse (Jan Gossaert), Flemish artist, **4**-1225
Macadam, kind of road, **8**-2776-77, 2780
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Macaque (monkey), **1**-207-08
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Macaroni. A wheat product containing a large percentage of gluten. It is made in the form of tubes of different diameters. Formerly a product peculiar to Italy, now made in China, France, the United States, etc. After the wheat is ground and the bran removed, it is worked into a dough with hot water and squeezed through a cylinder perforated at the bottom with holes of the size required. The strips, usually 3 feet long, are hung up to dry.
MacArthur, Douglas (1880-). Commanding general of the United States forces occupying Japan and, under Allied authority, in charge of the reconstruction of the Japanese government, industry and so on. Under him Japan is being disarmed and various political reforms have been instituted. In command in the Philippines in December, 1941, he was ordered to leave by President Roosevelt in March, 1942. Thereafter he halted the Japanese attempt to invade Australia; and became supreme commander of all the Allied forces in the southwest Pacific. He served in the first World War, and spent many years in the Philippines. He has the five-star rank of General of the Army.
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birthplace at Little Rock, Arkansas, **14**-4900
signs Japanese surrender papers, World War II, **18**-6460
Macassar, seaport on Celebes
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Macaulay, Rose, English novelist, **11**-4107
Macaulay, Thomas Babington, English historian, **9**-3223
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Tomorrow, and tomorrow, and tomorrow, **10**-3482
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Maccari, Cesare, Italian artist
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MacCarthy, Hamilton P., Canadian sculptor, **14**-5079
McClellan, George B., Union general in Civil War, **7**-2433, 2436-37
McClintic, Thomas B., doctor famous for experiments with spotted fever, **13**-4673
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McCormick, Cyrus Hall, American inventor, **19**-7207
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McCormick reaper, **5**-1758
McCoy, George W., director National Institute of Health, **13**-4674
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Macdonald, Sir John Alexander, premier of Canada, **4**-1484-87
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MacDonald, James Ramsay, prime minister of England, **7**-2308; **18**-6603
Macdonald, Margaret
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memorial to her, Lincoln's Inn Fields, **13**-4858
Macdonough, Thomas, early American seamen, **17**-6332
Picture
in battle on Lake Champlain, **17**-6332
Macdougall, William, and Riel rebellion, **4**-1486
MacDowell, Edward, American music composer, **18**-6512; **19**-6923, 7154
McDowell, Ephraim, pioneer American doctor, **15**-5483
McDowell, Franklin Davey, Canadian writer
Picture, **14**-5115
MacDowell Colony, New Hampshire, **18**-6512
Mace, spice, **8**-2993-94
Macedonia. Native kingdom of Alexander the Great, but now belonging chiefly to Yugoslavia and Greece. It is peopled by a great mixture of races including Bulgars, Serbs, Jews, Greeks, Turks and Vlachs.
history, to Roman conquest, **3**-925-29
Macedonian dynasty, of Byzantine Empire, **4**-1319-21
McEwen, Walter, paintings in Library of Congress, **5**-1537
McFee, Henry Lee, American painter, **10**-3518
Picture
Still Life, **10**-3515
McGee, Thomas D'Arcy, *see* Poetry Index
Machiavelli, Niccolò (1469-1527). Italian historian and statesman. From 1498 to 1512 he was secretary to an important political body of Florence. Though he wrote poetry, historical works and comedies, Machiavelli is best known for his political treatise, The Prince. In this work he maintains that a ruler is justified in adopting any means to attain his ends.
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portrait, **14**-5091
Machine gun, account of, **8**-2850
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* simple machines, **4**-1519-24
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in automobile manufacture, **19**-7018-22
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Machu Picchu, ancient Inca city. *Picture,* **19**-6982
MacInnes, Tom, Canadian poet, **14**-5110
McIntire, Samuel, builder, **18**-6771
Macintosh, Charles, made waterproof coats, **4**-1414
Mackay, Charles, *see* Poetry Index
McKay, Claude, American poet and novelist, **14**-5014
McKay sewing machine, for shoe manufacture, **10**-3570
McKeesport, Pennsylvania, situated where the Monongahela and Youghiogheny rivers meet in the southwestern part of the state. Coal and natural gas are found in the surrounding hills. Iron, steel and candy are made. The site was settled in 1795 by John McKee. Population, 55,355.
McKenna, Stephen, English novelist, **11**-4108
Mackennal, Sir Bertram, British sculptor
Picture
model for bronze group, **13**-4857
Mackenzie, Alexander, premier of Canada, **4**-1486-87

Mackenzie, Alexander, Scottish explorer
explored for fur trade, **5**-1555
Picture
reaching the Pacific, **3**-943
Mackenzie, Compton, English novelist, **11**-4107
McKenzie, R. Tait, Canadian sculptor, **14**-5079
Picture
sculptured frieze, relay runners, **14**-5075
Mackenzie, William Lyon, Canadian leader, **3**-946
MacKenzie, district of Canada, **5**-1555-58
Mackenzie. Great Canadian river, rising in the Rockies and flowing into the Arctic. It is navigable for many miles in summer. Including the Peace River, it is 2,350 miles long.
valley of, **7**-2560
Mackerel, fish, **16**-5775
Pictures, **16**-5777; (in color), **16**-5783, 5788
McKim, Mead and White, American architectural firm, **18**-6684
Mackinac. Name of a strait between the north and south peninsulas of Michigan, connecting Lakes Michigan and Huron. It is about 4 miles wide and in it lies Mackinac Island, rocky and wooded, nine miles in circumference, which became an important trading post and later a favorite resort. The island was made a Michigan state park in 1895.
McKinley, William, president of U. S., **8**-2670-71
administration and outline of life, **11**-3953
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McKinley, Mt.
highest mountain in North America, **7**-2290
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MacLeish, Archibald, American writer, **14**-5017
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MacLennan, Hugh, Canadian novelist
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McLennan, William, *see* Poetry Index
Macleod, Fiona (William Sharp), Scottish writer, **11**-3900
McManus, Seumas, Irish writer of fairy tales, **6**-2273
MacMillan, Donald B., American Arctic explorer
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MacMonnies, Frederick, American sculptor, **14**-4938
statue of Nathan Hale, **11**-3996
Picture
statue of Nathan Hale, **11**-3996
MacNeil, Hermon Atkins, American sculptor, **14**-4939
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The Sun Vow, **14**-4935
Macon, Georgia, seat of Bibb County, on the Ocmulgee River. It is in the center of the state, and serves as the trading point for the dairy and agricultural farms in the region. Much of Georgia's famous peach crop comes from the country around Macon. The poet Sidney Lanier was born there. Cotton goods, machinery and brick are manufactured. The city was settled in 1822. Population, 57,865.
Macon, giant dirigible, wreck of, **1**-351
Macoun, John, Canadian explorer and naturalist, **19**-7056
Macpherson, James, and poems of Ossian, **6**-2027-28
McPherson, Kansas
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Madagascar, area and location, **2**-466
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Madame Bovary, novel by Gustave Flaubert, **18**-6717
Madariaga, Salvador de, Spanish diplomat and writer, **19**-7129
Madden Dam, Panama Canal, **1**-365
Madden Lake, Panama Canal, **1**-365
Madder, plant
Pictures, **15**-5400; (in color), **8**-2998
Madder Family of plants, **8**-2909
Madeira Islands, **18**-6814
doll's Maderia costume, **18**-6553
Madeira River. Chief tributary of the Amazon, almost rivaling it in size. It drains 425,000 square miles and is about two miles wide at its mouth. 2,200 miles.
Madison, Mrs. Dorothy Payne (Dolly Madison), **8**-2809
Picture
portrait by Gilbert Stuart, **8**-2807
Madison, James, president of U. S.
administrations and outline of life, **5**-1703-07; **11**-3938-39
notes in Constitution, **20**-7584
Pictures, **5**-1703; (gravure), **11**-3947
Madison, Wisconsin, capital of the state, seat of Dane County. It lies in the state's lake region, being between lakes Mendota and Monona. The University of Wisconsin is located there. Among the products manufactured are machinery, tools, hospital equipment, tin cans, and batteries. Important mines in the surrounding regions produce iron, lead and zinc. Settlers built a trading post on the site early in the 19th century, and the location was chosen as territorial capital in 1836. It was named for President James Madison. Population, 67,447.
Madonna, in art
first pictures in catacombs, **2**-578
in Italian painting. **3**-958
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Bellini, Giovanni (gravure), **3**-1110; **4**-1459
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Correggio, **3**-1105; (gravure) **3**-1111
Crivelli, **4**-1461
Della Robbia, scultpure (gravure), **13**-4612
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Fra Angelico, **2**-694
Gerard David, **4**-1224
Ghirlandaio, **2**-693
Giotto, **2**-694
Hans Holbein, **4**-1347; (gravure) **4**-1352
In early French Sculpture, **13**-4701
Labrosse, Paul, wood-carving, **14**-5078
Leonardo, **3**-825
Lochner, **4**-1343
Massys, **4**-1226
Memling, **4**-1224
Michelangelo, **3**-827; sculpture (gravure), **13**-4613
mosaic in Church of St. Gregory, **2**-579
Murillo, **4**-1497
Raphael (gravure), **3**-961-64
Ribera, **4**-1494
Van der Goes, **4**-1226
Van der Weyden, **4**-1220, 1226
Madras, India, on the east coast, the capital of the governmental division of the same name. It is the third largest city in India and one of the most important seaports, though the harbor is unsafe during storms. Cotton, rice and hides are exported, and the weaving of cotton and the tanning of hides are among the main industries. The city was founded as a trading post of the East India Company in 1639. Population, 777,481. *See also* **8**-2821
Picture
harbor, **8**-2830
Madrid, capital of Spain and of the province of Madrid. It is on the Manzanares River, on a high plateau over 2,000 ft. above sea level, subject to extreme and sudden weather and temperature changes. Much of the city is modern and attractive, but the old sections are dirty and crowded. Fans, tobacco, glass, carpets, guitars and jewelry are made in Madrid. The city is known to have existed in the 10th century, but it became important when it became the capital of Philip II in 1561. The city suffered considerable damage during the Spanish Civil War, 1936-39. Population, 1,187,150. *See also* **14**-4929
Pictures
Plaza of Castelar, **14**-4929
Royal Palace, **14**-4919
Senate Building, **14**-4921
Madrigals, part songs of Elizabethan times, **10**-3602
Madura. City of southern India, makes brass vessels and cottons.
Pictures
corridor in the great temple (gravure), **8**-2833
Maecenas, Gaius Cilnius, Roman patron of arts, **5**-1864-65
Picture
with Virgil, Horace and Varius, **5**-1865
Maes, Nicolaes, Dutch painter, pupil of Rembrandt
Picture
Young Girl Peeling Apples, **5**-1593

Maeterlinck, Maurice, Belgian writer, **18**-6719
Mafeking. Administrative centre for British Bechuanaland, South Africa. It is famous for its defense by Sir Robert Baden-Powell in the Boer War, October 12, 1899, to May 17, 1900.
Magazines, indexing of, **10**-3559
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Magdalena River, of South America, **18**-6781
Magellan, Ferdinand
sailed around globe, **1**-89; **2**-392
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Magellanic Clouds, two galaxies near the Milky Way, **17**-6199
Maggiore, lake in Switzerland
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Magi (magicians or soothsayers). The priestly order of ancient Media, or Persia. Their religion was similar to that of the Parsees, and included belief in the advent of a Savior. The Gospel of St. Matthew tells of the coming of the wise men, or magi, from the East to worship Christ.
Magic of Paint, The, * **13**-4865-69
Magic Square, problem of, **6**-2165
Magical Electron Tube, The, * **14**-5033-38
Magna Carta (Great Charter)
granted by King John, **5**-1577
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King John signing, **5**-1576
Magnesium (Mg). Chemical element. Light, silvery metal. Atomic number 12; atomic weight 24.32; melting point 651°C.; boiling point 1110°C.; specific gravity 1.74. Magnesium compounds occur in many rocks and minerals. From some salt wells and from sea water, magnesium chloride, $MgCl_2$, is obtained, and from this magnesium metal is obtained by electrolysis. Magnesium is important in airplane construction. Some magnesium compounds are used in medicine.
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Magnetic recorders, wire or tape, **1**-265
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* electricity and magnetism, **11**-4088-92
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magnetic recorders, **1**-265
used to produce lowest temperature, **5**-1581
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Why is a needle no heavier when magnetized? **10**-3732
Magnetron oscillator, electron tube, **14**-5147-48
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How does the speedometer of a motor car work? **1**-77
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Magnifying glasses
how they work, **2**-458; **8**-2683-84
Magnitogorsk, Russia, in the southern Urals. It is one of the youngest cities in the world, and has grown to importance because of the mining and the milling in the Ural district. It became especially important during World War II because of its distance from the invading forces. It was started in 1929. Population, 145,900. *See also* **16**-5857
Magnolia trees, **12**-4386
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Magog, Canada
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power plant, **18**-6758
Magpies, birds
account of, **8**-2892; **14**-5139-40
Pictures, **12**-4370; (in color), **9**-3131
Magyars, people of Hungary, **17**-6193, 6338, 6340
Mahan, Alfred Thayer. Eminent American naval historian; born, West Point, New York, 1840; died, Washington, 1914. His book, The Influence of Sea Power upon History, 1660-1783, exercised a great effect upon the policy of nations.
Mahan, U. S. destroyer. *Picture,* **18**-6817
Mahogany tree
Australian, name for jarrah tree, **12**-4249
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Mahonia, shrub, **13**-4781
Maidenhair, fern
Picture (in color), **10**-3726-27
Mail-order service, **19**-7118
Mail service, *see* Postal service
Maimonides, (Moses ben Maimon), **19**-7158
Main. Chief German tributary of the Rhine, passing Bamberg, Wurzburg, Frankfurt and Mainz. 300 miles.
Picture, **12**-4169
Maine. Northeasternmost state; area, 33,215 square miles; capital, Augusta. Portland is the largest city, and Bangor is an important town. Agriculture, lumbering, manufacturing, quarrying and shipbuilding are the principal industries. Abbreviation, Me. Nickname, "Pine Tree State." State flower, pine cone and tassel. Motto, "Dirigo" (I direct). The state was named for Maine, an ancient province of France possessed by Queen Henrietta, wife of Charles I of Great Britain. The first settlement was in Saco, in 1622. Population 847,226.
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potatoes, **10**-3407
Mainliner, passenger plane
Picture
instrument panels, **1**-183
Mainz, or **Mayence.** Ancient German city at the junction of the Rhine and Main. It has a fine cathedral and a museum of Roman remains.
Mair, Charles, Canadian poet, **14**-5104
Maize, *see* Corn
Majano, Benedetto da, Italian sculptor and architect, **13**-4606; **17**-6298
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John the Baptist, statue (gravure), **13**-4613
Madonna and child (gravure), **5**-1745
Major, Charles, American writer, **13**-4787
Majorca. Largest of the Spanish Balearic Islands; area, 1,325 square miles; capital, Palma.
Majordomus, medieval master of the palace, **4**-1431, 1434
Make-up, in motion-picture photography, **11**-3964
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Makers of Telegraphs, Telephones and Radio, * **17**-6234-48
Makers of Venice, The, * **4**-1454-64
Making a model airplane, * **2**-617-21
Making Iron and Steel, * **9**-3341-53
Making the desert blossom, * **7**-2543-55
Malabou squirrel. *Picture,* **3**-1126
Malacca, British settlement in Malaya, **9**-3185
Malachite, semi-precious stone, **19**-7232
Picture (in color), facing **19**-7225
Málaga, Spain, capital of the province of the same name, on the Mediterranean at the mouth of the Guadalmedina River. The harbor is good; and wine, olive oil, almonds, palmetto hats and raisins are exported. Among the major industries are the making of pottery, chocolate, chemicals, linen and lithographed work. It is thought that the city was founded by the Phoenicians a century or more before the birth of Christ. Population, 277,582. *See also* **14**-4930-31
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Malaria
* discovery of causes, **15**-5487-88
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cold and fever in, **7**-2486
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Malay Peninsula
British possessions in, **9**-3184-85
Siam part of, **2**-440
Pictures
natives of Perak, **9**-3187
Singapore, **9**-3188
street scene in Singapore, **1**-121
Malay tapir, mammal, **5**-1825-26
Picture, **5**-1827

Malays. People who live in the Malay Peninsula, Tidor, Ternate, Borneo coastlands, and parts of the Sulu archipelago. They are more recent than the primitive Malayans, whom they have dominated, and in many places supplanted. They originated from a tribe in Sumatra in the 13th century, and, becoming Mohammedans, spread their culture and language throughout the peninsula and archipelago.
Malbone, Edward, American painter, **9**-3330
Malcolm, early king of Scotland, **15**-5646
Malcolm IV, king of Scotland, **15**-5646-47
Malden, Massachusetts, on the Malden River, a suburb of Boston, lying about 5 mi. north of that city. Footwear, paint, fire hose, tin cans and candy are made. Malden was founded in 1640. Population, 59,567.
Malemutes, Alaskan dogs, **16**-5793-94
Malherbe, François de, French poet, **18**-6711
Mallard ducks, 11-3886
Pictures (in color), **8**-2898; **11**-3886
Mallarmé, Stéphane, French poet, **18**-6719
Malleus (hammer), bone of middle ear, **9**-3309
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Mallows, plants, marsh mallows, **14**-5161
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Malope. *Picture,* flower (gravure), **19**-7175
Malory, Sir Thomas, early English writer
brought together the stories of King Arthur, **2**-724-25
Malpighi, Marcello, Italian scientist, **2**-648
Malta, Mediterranean island, **9**-3182
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Malta fever, disease, **13**-4673-74
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Malthus, Thomas, English economist, **3**-984
Maluinas, *see* Falkland Islands
Maltose, in making beer, **5**-1855
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first ones in Triassic period, **4**-1402
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origin and development of, **1**-259
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Pictures, see names of mammals; as Cattle
Mammals That Lay Eggs, * **7**-2590-95
Mammoth Cave, Kentucky, **4**-1300-03
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Mammoth Hot Springs, Yellowstone Park, **3**-729
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Mammoths, ancient relatives of elephants, **6**-2144-45
found in ice in Siberia, **1**-93-94
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Is a fly stronger than a man, in proportion to its size? **17**-6424
Poem about
Seven Ages of Mankind, by Shakespeare, **10**-3479
Picture
skeleton compared with that of an elephant, **8**-2719
Man, Isle of. It is in the Irish Sea about 27 miles from the coast of England and about the same distance from Scotland. Noted for the Manx cat that has a bob tail or no tail at all. The Isle of Man is a part of the United Kingdom, but the island's constitution and government are separate. It is 33 mi. long, 12 mi. wide, and has an area of 200 sq. mi. Like Ireland, it is free from snakes and toads.
Man, Prehistoric and primitive
* cave-men and their pictures, **1**-189-96
* how early peoples were housed, **12**-4445-47
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Cro-Magnons, in France, **10**-3422
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early surgery, **8**-2721
first appearance, Pliocene epoch, **6**-1925, 1928
in England, **5**-1565-66
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in Pleistocene epoch, **6**-1927-28
pins of thorn and bone, **9**-3041
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Is there a man in the moon? **10**-3533-34
Man o' War, famous thoroughbred horse
Picture, **6**-2017
Man-of-war birds, 11-3884
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Man Who Gave Away Millions, A, 17-6138
Man without a country, by E. E. Hale
* summary and quotations, **7**-2401-08
Manager, or **enterpriser**
as factor in creation of wealth, **15**-5361-62
Managua, capital of Nicaragua, on the southern shore of Lake Managua. Most of the residents are Indians. Around it are volcanic cones. It is a modern city, having been rebuilt after an earthquake in 1931. Population, 137,000.
Manakins, birds, **9**-3286, 3288
Pictures, **9**-3287; (in color), **10**-3621; **12**-4371
Manamah, capital of the state of Bahrein—a group of islands in the Persian Gulf. The city is situated at the northern end of the island of Bahrein, which is the largest of the islands. Manamah is the commercial center of the state. Pearl-fishing is one of the main industries of the islands, though they have become important for oil since 1932. Boat-building and fishing are also carried on. Population, 30,000.
Manatee, sea mammal, **1**-359; **7**-2342
Picture, **7**-2341
Manchester. Commercial capital and centre of the cotton trade of Lancashire, England. Covering over 20,000 acres, it is the greatest purely commercial city in England, and is closely surrounded by a network of industrial towns. In addition to its great textile trade, it is important as an engineering and railway centre, while there are many manufactures. The Manchester Ship Canal makes it a port. It has a cathedral, built in 1421, and a university. Population 736,500.
Manchester, New Hampshire, one of the seats of Hillsboro County, on the Merrimac and Piscataquog rivers, the largest and most important city of the state. It grew to importance as a cotton-milling town, but today many other products such as shoes, cigars, woolen goods and boxes are manufactured. It was settled in 1722 as Harrytown and was later called Derryfield until it took its present name in 1810. Population, 77,685.
Manchester Ship Canal, England, **3**-861, 863
Manchu dynasty, China, **2**-429-30
Manchukuo, former puppet state in Asia, **2**-432-33
See also Manchuria
Manchuria. A large northern province of China. In 1932 it became the Japanese puppet state of Manchukuo. By the end of World War II it was under Chinese Communist control. The country is rich in minerals and timber; the chief crop is soy beans. Mukden, Harbin, Kirin and Changchun are the chief cities. Area, 503,013 square miles. Population, 39,454,026.
Japanese influence, **2**-564-65
Mandalay. Capital of Upper Burma, India, on the Irrawaddy. Here is a temple with several hundred pagodas.
Mandarin. A Chinese public officer, one of the nine orders entitled to wear a button on the hat. Called by the Chinese *Kwan.*
Mandarin ducks
Picture, **11**-3881
Mandeville, Sir John, reputed writer of travels, **1**-304
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Mandrill, a baboon, **1**-208
Picture (gravure), **1**-212
Maned wolf, wild dog, **2**-604
Manes, spirits of the dead, **9**-3234
Manet, Edouard, French painter, **7**-2476
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The Balcony, **7**-2474
Boy with a Sword, **7**-2479
Firing Party, **7**-2477
Manetho, Egyptian writer, **3**-821
Mangabey (monkey), **1**-208
Mangan, James Clarence
See Poetry Index

Manganese (Mn). Chemical element. Gray metal. Atomic number 25; atomic weight 54.93; melting point 1260°C.; boiling point 1900°C.; specific gravity 7.2. Manganese ores are mined chiefly in Russia, India, South Africa and Brazil. Manganese is very important in making steel, nearly all of which contains small amounts of manganese. Alloys with larger amounts of manganese are useful for special purposes. *See also* **5**-1634-35
world distribution, industrial uses, **18**-6644
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mining the ore in Brazil, **18**-6638
Mangel, as fodder plant, **7**-2413
Mango
Picture, fruit (in color), **8**-3000
Mangrove, account of, **9**-3264
Manhattan, borough of New York City, **17**-6207, 6219
Manhattan Island, purchase by Dutch, 1626, **2**-549
Manihot tree, source of rubber, **4**-1408
Manila, capital of the Philippine Republic, chief port of the islands. It is located on the west coast of Luzon at the point where the Pasig River flows into Manila Bay. Abaca, from which rope is made, is one of the major exports; and tobacco products, footwear, machinery and sugar are manufactured. The region is subject to earthquakes, and the city has had several serious fires. During World War II it was occupied by the Japanese, and was greatly damaged. The Spanish founded the city in 1571. Population, 684,800.
Picture, **9**-3298
Manila "hemp," fiber for rope, **14**-5220, 5222, 5224
Pictures, **14**-5218-19
Manioc, root-plant, furnishes tapioca
Picture (in color), **8**-2997
Manitoba. Canadian prairie province; area, 246,512 square miles; capital, Winnipeg. Wheat, oats, barley and flax are grown, and horses, cattle and swine reared. Winnipeg is the grain market of the eastern prairie region. Population 729,744.
became province of Dominion, **4**-1486
Picture
Dominion Rust Laboratory, Manitoba Agricultural College, **5**-1763
Manitoba Lake. In the province of Manitoba, Canada. Area, 1,817 square miles.
Manitoba Project, muskrat farm sponsored by Canadian Government, **13**-4697-98
Mann, Heinrich, German novelist, **17**-6415
Mann, Horace, American educator, **14**-5252-53
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Mann, Thomas, German novelist, **17**-6415
Manna grass
Picture (in color), **10**-3523
Manners
* good manners, **13**-4617-20
Washington's rules for good conduct, **13**-4620
Manning, Henry Edward, Cardinal. English divine; born, Totteridge, 1808; died, 1892; succeeded Cardinal Wiseman as Roman Catholic archbishop of Westminster.
Picture
portrait by G. F. Watts (gravure), **6**-2237
Mannyng of Brunne, Robert, *see* Poetry Index
Manon Lescaut, novel by Abbé Prévost, **18**-6715
Manor house of England, description, **18**-6489
Picture
interior, **6**-2106
Manors, feudal estates, **6**-1940-41
Manship, Paul, American sculptor, **14**-4940
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Dancer and Gazelles, **14**-4935
Mantegna, Andrea, Italian painter, **3**-1103
Picture
St. George (gravure), **3**-1112
Mantis, insect, **18**-6728-29
Picture
praying mantis, **18**-6730
Mantua. Fortress of northern Italy, on two islands formed by the Mincio. The birthplace of Virgil, it was important in the Middle Ages; its buildings include the old ducal palace, the cathedral, and the beautiful church of San Andrea, containing the tomb of Mantegna. Weaving, tanning and saltpetre industries.
church of Sant' Andrea, **17**-6299
Manual Training, *see* list in The School Subject Guide
Manufactures
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Manure
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Why does manure make a plant grow faster? **14**-5082
Manuscripts, Illuminated, **2**-582; **10**-3548-49
in Ireland, **8**-2936
in Ireland and England, **2**-582; **6**-1999
Pictures
Irish books, **8**-2935
of manuscripts, **6**-2001; (in color), **2**-477-80
page from 14th century music book, **9**-3383
Persian, **9**-3144
Manutius, Aldus, Italian printer, **9**-3396
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Manx cats
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Manzanitas, shrubs, **13**-4781
Maoris, natives of New Zealand, **7**-2576
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Maple leaf, emblem of Canada, **12**-4507; **17**-6177
Question about
Why is the maple leaf Canada's emblem? **13**-4642
Maple Leaf Forever, The, song
writing of, **10**-3609
Maple sugar
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Maple syrup, how made, **15**-5437
Maple trees, blossoms, **17**-6273
moosewood maple, **13**-4777-78
production of sugar, **15**-5437
sycamore maple
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varieties, **12**-4248, 4507-08
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Norway—maple seeds, **11**-4095
Maps
* "air-age" maps, **12**-4352-57
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location of North American Indian tribes, **1**-242
of oil areas of world, **13**-4745
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Marabou, variety of stork, **11**-4008
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Maracaibo, Lake, Venezuela, **18**-6781
Picture, oil derricks, **13**-4743
Maral, a deer, **4**-1507
Marathon, Battle of, **3**-917; **7**-2610
Pheidippides brought news of, **3**-890
Marble
Carrara, **13**-4575
Vermont production, **11**-3774
Picture
quarry in Tennessee, **13**-4526
Marbles, game
how to play, **15**-5513-14
March. The third month of the year in the Julian and Gregorian calendars, containing 31 days. Named for Mars, the Roman god of war.
Poem about
Written in March, by William Wordsworth, **4**-1515
March of the Ten Thousand (story), **7**-2567-69
Marco Polo, *see* Polo, Marco
Marconi, Guglielmo, Italian scientist, **17**-6245-46
first radio amateur, **14**-4997
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Marcus Aurelius (Antoninus), Roman emperor, **5**-1865-66
reign, **4**-1247-48
Picture, portrait relief (gravure), **1**-68
Mardonius, Persian General, **3**-918
Mare Imbrium (Sea of Showers), region of moon
Picture, **10**-3539
Mare's nest is an expression used when a person believes he has made an interesting discovery and it turns out to be nothing at all. The name comes from Mara, a sort of demon that was once thought to have a nest full of wonderful treasures.
Margaret, early queen of England
Picture, **15**-5647
Margaret, early queen of Scotland, **15**-5646
Margaret (the Maid of Norway), queen of Scotland, **15**-5647-48
Margaret Rose, Princess, of England
Picture
in family group, **7**-2309

Margarine, a spread used like butter, made of refined, edible vegetable oil or meat fat, or a combination of both, and cultured skim milk blended together. Margarine is generally fortified with at least 9,000 U.S.P. units per pound of vitamin A, which is the amount of this vitamin in an average pound of butter.
Margay, an animal
Picture, **2**-493
Maria de Medici, *see* Marie de Medicis
Maria Louisa, *see* Marie Louise
Maria Theresa, empress of Austria, **17**-6339
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receiving Hungarian nobles, **17**-6192
Mariana, queen of Austria
Picture
portrait by Velasquez (gravure), **4**-1504
Marianas Islands, **9**-3301
Marie Antoinette, queen of France, **10**-3434-35
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Marie de' Médici, wife of Henry IV of France
built Luxembourg Palace, **5**-1874
Marie Louise, of Austria, second wife of Napoleon I, **6**-2206
Marietta, first settlement in Ohio, **6**-1909
Marigold, flower
Pictures (in color), **15**-5397; (gravure), **19**-7176, 7180
Marigold, Marsh, *see* Marsh marigold
Marin, John, American painter, **10**-3516
Marine Parkway Bridge, New York City
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Marines, United States, **18**-6818
Marines' Hymn
origin of, **18**-6511
Marion, Francis, in American Revolution, **4**-1171-72
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Marionettes, how to make a marionette show, * **8**-2744-45
Romeo and Juliet—puppets, **9**-3375-76
Mariposa lilies, description, **18**-6662
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Maris, Jacob, Dutch painter, **8**-2853
Maris, Matthew, Dutch painter, **8**-2853
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Outskirts of a Town (gravure), **8**-2864
Maris, William, Dutch painter, **8**-2853
Maritime climates, near ocean, **7**-2420
Maritime Provinces, of Canada, **1**-105
Marius, Gaius, Roman general, **4**-1364-66
in civil war in Rome, **4**-1198
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driven out by Sulla, **4**-1366
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Marjoram, flower
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Picture, in mosaic, **13**-4564
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Mark Twain, *see* Twain, Mark
Markham, Sir Clements, obtained cinchona plants from South America, **8**-2910
Markham, Edwin
See Poetry Index
Markhor, wild goat, **4**-1378
Picture, **4**-1377
Marks, Henry Stacy, artist
Picture, Meeting of Parrots, **10**-3619
Marlborough, John Churchill, Duke of. English statesman and general; born, near Musbury, England, 1650; died, near Windsor, 1722.
Pictures
portrait, by Sir Godfrey Kneller, **6**-2002
Marlborough, Sarah Jennings, Duchess of
Picture
portrait, by Sir Godfrey Kneller, **6**-2002
Marline-spike, definition, **13**-4849
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Marlowe, Christopher, English dramatist, **3**-1120-22
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Marlowe, Julia (Mrs. E. H. Sothern), American actress, **14**-5272
Marmette, Napoleon, French-Canadian novelist, **14**-5118
Marmora, Sea of. Small inland sea lying between European and Asiatic Turkey. It connects with the Black Sea by the Bosporus and with the Mediterranean by the Dardanelles.
Marmoset, monkey-like animal, **1**-213
Picture, **1**-214
Marmots, animals, **3**-1129
Picture, **3**-1128
Marne. Chief tributary of the French Seine. Rising in the Langres plateau, it flows past Châlons and Epernay in Champagne to join the main stream at Charenton. On the Marne the German invasion of France was checked in 1914. 320 miles.
Marne, First Battle of, **18**-6442
Marne, Second Battle of, **18**-6446
Marot, Clément, French poet, **18**-6565
Marquand, John P., American writer, **14**-5014-15
Marquesas Islands, in South Seas, **9**-3303
Marquette, Jacques, missionary
* life and work, **6**-2083-85
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visited site of Chicago, **19**-7105
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Marquis, Don, American writer and humorist, **13**-4820-21
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Marquis, variety of wheat, **5**-1757
Marriage
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Why do married women wear wedding rings? **7**-2609
Marrow, of bones
manufactures red blood cells, **3**-932-33
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Marrows, plants. *Picture,* **7**-2620
Marryat, Frederick, British writer, **11**-3899
Mars (Ares), god, **9**-3227
Mars, planet, **9**-3292-93
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icecap at pole, **9**-3293
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Marsden, Samuel
missionary to New Zealand, **7**-2575
Marseillaise, La, French anthem
writing of, **10**-3607
Picture, first singing, **10**-3604
Marseilles, France, capital of the department of Bouchesdu-Rhône. It is the second largest city of the country and the leading seaport, and it is also the major port of the Mediterranean. It is a modern city in spite of its ancient origin. Back of the city are mountains. Wines and machinery are among the principal exports; and coffee, raw sugar, cocoa and grain are imported. Manufacturing includes silk, soap, chemicals, bricks and ships. It was settled about 600 B.C. by the Greeks. Population, 636,300.
Picture, harbor, **10**-3419
Marsh, Othniel C., studied prehistoric birds, **8**-2758
Marsh, Reginald, American painter, **10**-3516
Marsh carex, *see* Carex, Marsh
Marsh cinquefoil, *see* Cinquefoil, Marsh
Marsh deer, **4**-1512
Marsh elder, **14**-5163-64
Marsh gas, *see* Methane
Marsh-locks, Purple, plant, **19**-6934
Marsh marigold, plant, **16**-5728; **17**-6276, 6278
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Marsh pennywort, *see* Pennywort, Marsh
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Marsh red-rattle, *see* Red-rattle, Marsh
Marsh trefoil, *see* Buck-bean
Marsh-violet, plant, **16**-5728
Picture and note, **16**-5729
Marsh woundwort, *see* Woundwort—marsh
Marshall, George Catlett (1880-). American army officer. From September, 1939, until November, 1945, he was chief of staff and the highest ranking general of the United States Army. On his retirement, President Truman appointed Marshall his special envoy to China, with the rank of ambassador. In 1947 he was appointed Secretary of State by the President. In the war he was responsible for the development of military plans and for carrying out strategic plans in conjunction with the Naval Staff and Allied Staffs. He has had a long career in the Army, beginning with 1901; and his genius for strategy was shown in World War I, when General Pershing assigned him the task of planning and carrying out the campaigns of Saint Mihiel and the Argonne.

Marshall, John *(1755-1835). American statesman and jurist. Served in the Virginia legislature and in the U. S. Congress. Became Secretary of State in 1800. From 1801 to 1835 he was chief justice of the U. S. Supreme Court.*
laid down foundations of Indian law, **19**-7237
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Marvell, Andrew, English poet
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portrait (in group), **4**-1241
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Marvelous Reptile Family, * **14**-5225-32
Marx, Karl (1818-83). Eminent economist and founder of modern Socialistic movement, as defined in his program The Communist Manifesto. Led a wandering life because of revolutionary activities and died in London. The title of his most important work is Das Kapital, an analysis of modern industrial society.
communism based on writings, **8**-3015
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Mary II, queen of William III of England, **6**-2101-02
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Mary, queen of Hungary
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life and reign, **5**-1818; **15**-5650, 5652
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with Queen Elizabeth, **5**-1818
Maryland. Atlantic state; area, 10,577 square miles; capital, Annapolis. Agriculture, coal-mining and varied manufacturing are the important industries. A fertile fruit-growing district, it contains the great port of Baltimore, the largest city in the state. Abbreviation, Md. Nickname, "Old Line State" or "Cockade State." State flower, black-eyed Susan. Motto, "Fatti maschii parole femine" (Manly deeds and womanly words). Named in honor of Queen Henrietta Marie, wife of Charles I of England. First settlement, St. Mary's, 1634. Population 2,091,720.
described in Northeastern States, **10**-3403-08; **11**-3773-82; **12**-4145-54
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Masefield, John, British poet, **12**-4207-08
See also Poetry Index
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Mason, James M., and Trent affair, **7**-2434
Mason, Lowell, American hymn writer, **18**-6512
Mason and Dixon's line, 7-2428
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stone marker, **12**-4153
Masonite hardboard, from cellulose, **8**-2754
Masonry, *see* Concrete
Mass, term in physics
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Mass number. The weight of a given isotope of a chemical element, based on a system in which we give the weight of oxygen as 16 (*see* Isotope). Thus, when we say that the mass number of a certain isotope of iodine is 128, we mean that it is 128/16 times as heavy as oxygen: that is, 8 times as heavy. We indicate the mass number of a given isotope by means of a small number set at the upper right of the symbol. For example, iodine of mass number 128 is I^{128}; uranium of mass number 235 is U^{235}. The mass number of the isotope of a certain element is not the same thing as the atomic weight of that element. The atomic weight in question is the average weight of all the isotopes.
Mass production, effect on price, **16**-5934
Massachusetts. One of the smallest but most important states; area, 8,257 square miles; capital and largest city, Boston. Settled in 1620 by the Pilgrim Fathers, it is now a great manufacturing state, containing Worcester, Springfield, New Bedford, Fall River, Lowell, Cambridge and many other busy towns. Fishing and quarrying are important. Abbreviation, Mass. Nickname, "Bay State" or "Old Colony State." Flower, mayflower. Motto, "Ense petit placidam sub libertate quietem" (With the sword she seeks quiet peace under liberty). Massachusetts comes from an Algonquian name meaning "big-hill-small-place." First settlement, Plymouth, 1620. Population 4,255,204.
Boston Light, **10**-3581
described in Northeastern States, **10**-3403-08; **11**-3773-82; **12**-4145-54
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Massenet, Jules, French composer, **19**-6920
Massinger, Philip, English playwright, **3**-1125
Massys, Quentin, Flemish artist, **4**-1225
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Mastodons, ancient relatives of elephants, **6**-2144
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Mather, Cotton, early New England divine, **13**-4625
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Mauchly, J. W., American engineer, **19**-7213-14
Maugham, W. Somerset, English writer, **11**-4105-06
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Maui, one of Hawaiian Islands, **15**-5447
Mauna Loa, volcano, Hawaii, **7**-2291
Maupassant, Guy de, 18-6717-18
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Mauretania. In ancient geography, the northwestern part of Africa, corresponding roughly to modern Morocco. It became a Roman province in the first century, A.D.
Mauritius, island in Indian Ocean, **9**-3183-84
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Maurois, André, French writer, **18**-6720
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Mawson, Sir Douglas, explorer
Antarctic explorations, **15**-5382-83
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Maximian I (Marcus Aurelius Valerius) (died 310 A.D.). Emperor of Rome from 286 to 305 and from 306 to 308 A.D.
Maximilian, emperor of Mexico, **11**-3817-18
Maximilian I. German king and Holy Roman Emperor; born, Vienna, 1459; died, Wels, Upper Austria, 1519; reigned from 1493.
Maxwell, James Clerk, *see* Clerk-Maxwell, James
May. The fifth month of the year, named for the goddess Maïa; containing 31 days.
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May in the Greenwood, **13**-4533
Why It Was Cold in May, by Henrietta Robins Eliot, **4**-1515
May, poetic name for English hawthorn, **12**-4393
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May fly, insect, **18**-6732-33
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May-pinks, or arbutus, **17**-6274
Mayagüez, Puerto Rico
Picture, **10**-3589
Mayaguez, Puerto Rico, capital of the department of Mayaguez, on the river of the same name, important as a port. Coffee and oranges are exported. It is a modern city even though it was founded in 1752. Population, 59,500.
Mayas, early Indian inhabitants of Mexico and Central America, **11**-3813
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Mayo, William James, American doctor
* life and work, **11**-3811-12
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Mazama, Mt., volcano in Oregon, **7**-2283-84
Mazarin, Cardinal, Italian-born statesman of France, **10**-3432
Mazzini, Giuseppe, Italian patriot, **13**-4587-88
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Meade, George Gordon (1815-72). American soldier, born in Spain. He graduated from West Point, served in Mexican War and during whole of Civil War. After June, 1863, he commanded Army of Potomac.
Meadow grass, leaves of, **10**-3526
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Meadow honeysuckle, *see* Clover
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* of energy, **18**-6437-39
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Measuring, of flowing water, **7**-2554
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shipping frozen meat from New Zealand, **7**-2580
Union Stock Yards, Chicago, **19**-7119
Meat-packing
in North Central states, **16**-5658
Mecca (Mekka), one of the capitals of Saudi Arabia. It is surrounded by hills. It is known the world over as the center of the Moslem religion, having been the birthplace of the founder of the faith, Mohammed. Non-Moslems are not supposed to visit the city. Every Moslem is supposed to visit the city at least once during his life, and so at a certain time according to the Mohammedan calendar, Moslems make pilgrimages to Mecca. They go by the thousands. It is an ancient city and not many efforts to introduce modern ways have been made. Population, 120,000.
See also **18**-6670
Picture, **18**-6669
Mechanical pulp, *see* Ground wood
Mechanics
* simple machines, **4**-1519-24
Mecklenburg County, N. C., **4**-1162-63
Medford, Massachusetts, on the Mystic River, a suburb of Boston, about 5 mi. northwest of that city. The famous circus owner, P. T. Barnum, built an important museum of natural history there. It was important as a trading center during colonial days, and now manufactures beds, boxes and wax products. It was founded in 1630. Population, 67,071.
Medical Centre, East Side, New York. *Picture,* **15**-5490
Medici, De, Italian Renaissance family
influence on architecture of Florence, **5**-1732, 1737-40
palaces of, **17**-6298
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Medici, Cosimo de', Italian patron of learning, **14**-5091
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bust by Benvenuto Cellini, **14**-5089
Medici, Lorenzo de, the Magnificent (1449-92). One of the most famous members of the celebrated Florentine family; patron of artists.
Medicine, history of
* conquerors of disease, **15**-5481-93
* Mayo Clinic, **11**-3811-12
* some great doctors of the past, **8**-2721-30
how different from surgery, **8**-2722
hypnotism as medical practice, **12**-4444
Question about
What do we mean by the word "allergy"? **2**-685
Medicine Man. Among the Indians a man who professes to cure sickness, drive away evil spirits, and control the weather by the use of "medicine," that is to say, magical power.
Medicine plants, * **8**-2909-13
Medicines, from plants, * **8**-2909-13; **5**-1626-27
by-products of meat-packing industry, **2**-635
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Medieval times, *see* Middle Ages
Medina. Burial-place of Mohammed, and terminus of the Hejaz Railway, Arabia. After Mecca it is the holiest Moslem city.
Mediterranean Sea. Largest and most important inland sea, the cradle of European civilization. It contains the Tyrrhenian, Ionian, Adriatic and Ægean seas, and is roughly divided into three basins, the eastern of which is known as the Levant. The Nile is the only great river that flows into it, but there are many large and important islands, notably Corsica, Sardinia, Majorca, Sicily, Corfu, Crete, Cyprus Rhodes, Malta, the Cyclades and Sporades. Among the greatest ports are Valencia, Barcelona, Marseilles, Toulon, Genoa, Leghorn, Naples, Palermo, Catania, Messina, Venice, Trieste, Piræus, Salonica, Smyrna, Beirut, Alexandria, Tunis and Algiers. The Mediterranean connects with the Atlantic by the Strait of Gibraltar; with the Sea of Marmora by the Dardanelles; and with the Red Sea by the Suez Canal.
Medlars, trees
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Medwall, Henry, early English dramatist, **2**-726
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diagram showing its use, **9**-3200
Megaspelion monasteries, in Greece
Picture, **14**-5043
Mei-ling, *see* Soong Mei-ling
Meissen. Home of the Dresden china industry, on the Elbe, in Saxony. An important place in the Middle Ages, it has one of the loveliest Gothic cathedrals in Germany.
Meissonier, Jean Louis Ernest, French painter, **6**-2082
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Napoleon at the head of his troops (gravure), **6**-2212
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Meitner, Lise, German scientist, **4**-1230
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Melanesia, islands of South Seas, * **9**-3299-3301
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Melanin, coloring matter of skin, **5**-1804
Melbourne, Australia, capital of the state of Victoria, on Port Philip Bay at the mouth of the Yarra River. It is a well-planned city and has a good climate. It is known for its attractive theaters, gardens, parks and churches. It is a shipping center; and clothing, pottery, soap and boots are made. The site was settled by white people in 1835 and the town was planned and started in 1837. It was named for Lord Melbourne. Population, 1,226,923. *See also* **7**-2467
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Melchers, Gari, American painter, **10**-3455
Picture
Mother and Child (gravure), **10**-3464
Melic, grass. *Picture,* **10**-3525
Mellon, Andrew W., art collection in National Gallery of Art, Washington, **5**-1543
Melons, fruit, **6**-2062, 2064
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Memling, Hans, Flemish artist, **4**-1223, 1225
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Memmi, Simone Martini, Italian painter, **2**-697
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What is meant by amnesia? **16**-5958-59
Why do we forget some things and remember others? **8**-2718

Memphis, Tennessee, seat of Shelby County and the largest city of the state, on the Mississippi River, and important as a shipping and trading center. Horses and livestock are raised in the vicinity. The chief products are paper, harnesses, engines, drugs and paint. The Mississippi River was discovered by De Soto at about the site of the city, but actual settlement was not made until 200 years later when the French built a fort in 1739. Permanent settlement started in 1819, but because of repeated epidemics of yellow fever the city was at times practically a ghost town. The modern city dates from 1893. Population, 292,942.
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Men of the Crusades, * **7**-2582-89
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Men of the Northern Sea-Gates, * **8**-2977-89
Men Who Discovered Electricity, * **11**-3980-86
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Mendel, Gregor, Austrian monk and scientist, **3**-985-86
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Mendeleef, Dimitri Ivanovitch, Russian scientist, **3**-989
Mendelssohn-Bartholdy, Felix, German composer
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Mendoza, Diego Hurtado de, Spanish statesman and writer, 16th century, **19**-7127
Menelaus, husband of Helen of Troy, **9**-3076, 3078
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Menendez de Aviles, Pedro
Spanish explorer in Florida, **2**-394
Menes, king of Egypt, **3**-808-09
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Menhaden, fish, **16**-5776
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fishermen, **11**-4060
Meningitis, disease, **13**-4673
Mennonites. A small denomination of evangelical Christians called after Menno Simons (1492-1559) of Friesland. Their creed contains the usual evangelical doctrines. They reject infant baptism, accept only offices connected with the management of schools, intermarry only with members of the faith, and do not resist violence.
Mental disease, *see* Insanity
Menzel, Adolph Friedrich Erdmann von, German painter, **8**-2852
Mercator, Gerardus (1512-94). Flemish geographer who did much work for the Emperor Charles V during his campaigns. Famous for his projection, used in nautical maps, in which the meridians are represented by parallel lines and the parallels of latitude cut the meridians at right angles.
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Merchant of Venice, The, play by Shakespeare
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The Quality of Mercy, **10**-3482
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Sir Henry Irving as Shylock, **5**-1613
Mercury (Hermes), god, **9**-3227
Pictures
with Pegasus, **9**-3227
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Mercury (Hg, from Latin *hydrargyrum*: liquid silver). Chemical element. Liquid metal. Atomic number 80; atomic weight 200.61; melting point −38.9°C.; boiling point 356.9°C.; specific gravity 13.6. Mercury occurs chiefly as the sulfide, cinnabar, HgS, a red mineral. Mercury is extremely useful for scientific instruments. It is also used in mercury-vapor lamps and in alloys with other metals in dentistry. Mercury compounds are used in medicine. *See also* **16**-5671
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Why does iron float on mercury and not on water? **9**-3354
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Mercury, planet, **9**-3290-91
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Mergenthaler, Ottmar, inventor of linotype typesetting machine, **3**-1055-57; **9**-3391-92
Mérida. Capital of Yucatan, Mexico, 24 miles from the port of Progreso. Founded in 1542, it has a 16th-century cathedral, while near by are remarkable ruins of the Maya civilization.
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Mérimée, Prosper. French novelist, essayist, historian and literary critic; born, Paris, 1803; died, Cannes, 1870.
Merino sheep, **4**-1371; **15**-5576
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Merrimac, ironclad ship in Civil War, **7**-2435-36
Picture
battle with Monitor, **7**-2435
Merry Wives of Windsor, The, play by Shakespeare
comment on, **3**-836
Mersey. River of Lancashire and Cheshire on which stand Liverpool and Birkenhead, besides Stockport, Warrington, Widnes, Runcorn, Wallasey, Bootle and New Brighton. Flows from the Peak of Derbyshire into the Irish Sea.
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Mersey Vehicular Tunnel, **2**-523
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Cliff Palace, **7**-2287
Mesdag, Hendrik Willem, Dutch painter and collector, **8**-2854
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Beaching Dutch Boats (gravure), **8**-2864
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Mesopotamia (Iraq)
* history, **2**-649-60
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See also Assyria; Babylonia
Mesozoic age, geological era, **4**-1401
Mesquite. A low-growing tufted grass occurring upon the ranges in the West and Southwest of the United States. It makes excellent fodder.
Messiah, oratorio by Handel, **19**-6913-14, 7072
Messiah, The, epic by Klopstock, **17**-6269
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Metaphor. A figure of speech whereby a word or phrase denoting one kind of idea is applied to another by way of suggesting a likeness between them: a *shower* of blessings; the message *winged* its way.
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Metsys, Quentin, *see* Massys, Quentin
Metternich, Clemens Wenzel Nepomuk Lothar, Prince (1773-1859). An eminent Austrian statesman who guided the fortunes of his country during the Napoleonic Wars, and after the Congress of Vienna became the leading statesman of Europe. He stood for all that was reactionary in the period that followed until the revolutions of 1848 forced him from power.
Meung, Jean de, early French writer, **18**-6561
Meunier, Constantin, Belgian sculptor, **13**-4858
Meuse. River of France, Belgium and Holland draining nearly 13,000 square miles. It rises in the Langres plateau and passes Verdun, Sedan, Dinant, Namur and Liége, joining the Rhine at Gorcum. The region through which the Meuse runs was a noted battle-ground during the first World War. 560 miles.
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Paricutin volcano, **6**-2054
Popocatepetl volcano, **1**-156
Mexico, Gulf of
sponge-fishing, **15**-5332
Mexico and Central America, * **11**-3813-24
Mexico City, capital of the Republic of Mexico and one of the oldest cities of the New World. It is built in the Valley of Mexico, surrounded by high mountains, in the southern part of the country. It is a mile and a half above sea level, and the climate is healthful. Cigarettes, textiles, footwear, chocolate, pianos and glass are among the main products. Earthquakes shake the city, but they are not serious, and volcanoes can be seen in the distance. The city is supposed to have been started by the Aztecs in the early part of the 14th century, and by the time of the Spanish conquerors it had grown to be of fair size. The Spanish practically destroyed it in conquering it, and the present city dates from 1522. Population, 1,448,422.
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Meyerbeer, Giacomo, German composer, **19**-6918
Meynell, Alice, *see* Poetry Index
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Picture, fruit (in color), **11**-4022
Miami, Florida, seat of Dade County, at the mouth of the Miami River on Biscayne Bay. Even though it is an important port, it is better known as a vacation spot. It is a shipping center for the islands of the Caribbean and for South America. It is also important for the shipping of the oranges and other fruits grown in the state. Prefabricated houses, airplanes, boats, preserved fruits and marmalades are made in Miami. It is sometimes called the "Magic City" because of its rapid growth during the 1920's and since. It was started in 1895. Population, 192,122.
Mica. An important rock-forming mineral found in thin sheets or flakes. In large sheets it is valuable for use in place of glass as, in thin layers, it is transparent. Ground mica is used as a lubricant and in making fireproof paint. Mica is used in quantity as an insulator in electrical work. White mica is called muscovite; light brown mica is called phlogopite, and dark brown or black mica is called biotite. India contributes most of the world's high-grade mica, with Madagascar the second source.
industrial uses, world distribution, **18**-6645-46
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mine in North Carolina, **13**-4526
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To a Mouse, by Robert Burns, **3**-848
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Michael, Russian tsar, founder of Romanoff dynasty, **16**-5692
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Michaelmas Day. Feast of St. Michael and All Angels, September 29.
Michelangelo Buonarroti, Italian artist
* life and work, **3**-830-31; **13**-4607-08
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Lorenzo de Medici, statue (gravure), **13**-4615
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Michelangelo Buonarroti—*Pictures* (*continued*)
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Victory, statue of (gravure), **1**-71
Michelson, Albert A., American physicist
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experiments with speed of light, **10**-3473-74
Picture, **19**-7166
Michigan. State bordering the Great Lakes; area, 58,216 square miles; capital, Lansing; largest city, Detroit. Iron, copper and coal are its chief mineral products; agriculture, lumbering and grazing are important. Automobile manufacturing is the most important industry, but there are many others. Abbreviation, Mich. Nickname, "Wolverine State" or "Auto State." Flower, apple blossom. Motto, "Si quereris peninsulam amœnam circumspice" (If thou seekest a beautiful peninsula, behold it here). The name Michigan is an Indian word meaning "big lake." First settlement, Sault Ste. Marie, 1668. Population 5,422,373.
described in North Central States, **15**-5273-84; **16**-5653-60
history, included in Northwest Territory, **6**-1909, 1911
Isle Royale National Park, **7**-2290
made a state, **6**-1916
Pictures
flag (in color), **19**-7190
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Michigan, Lake. One of the Great Lakes, the only one lying entirely within the United States. 307 miles long and 118 miles broad, it covers 22,400 square miles, its northern half being covered with ice in winter. A huge shipping trade is done in summer by the cities of Chicago and Milwaukee on its western shore.
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Are microbes necessary to produce cream? **2**-458
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Microwave magnetron, electron tube, **14**-5147-48
Midas and the Golden Touch (story), **10**-3443-44
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* Later Middle Ages, 1300-1500, **6**-1974-87
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Midsummer Night's Dream, A, play by Shakespeare
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Where the Wild Thyme Blows, **10**-3485
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Mighty Insect, The, * **17**-6062-78
Mignard, Pierre, French painter, **5**-1876
Mignonette, flower
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Migration
* of animals, **6**-1954-60
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Mikhailkov, Sergei, *see* Poetry Index
Milan, Italy, capital of the province of the same name, on the Olona River in the northern part of the country. It is the second largest city in Italy, and a railway and banking center. The surrounding region is important for farming. Great works of sculpture and art can be found in Milan, but it is a more modern city than many other Italian cities. Silk, machinery, dynamos, cars and metal bridges are made. The city is known to have existed during the 3rd century A.D. During World War II it was bombed frequently. Population, 1,267,550.
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Mildew. A term used to cover a number of plant diseases caused by fungus parasites, as well as spots or discolorations caused by microscopic fungi on manufactured articles like leather, paper, cloth. In America mildews have been divided into two classes: true or powdery mildews (of which there are 150 species), such as rose mildew, apple mildew, bean mildew, etc.; and downy mildews, such as potato rot, limabean mildew, etc. Spraying with Bordeaux mixture or some other reliable fungicide is the great preventive.
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* Nature's wonderful food, **7**-2323-26
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Why does boiling milk flow over the top of the saucepan? **7**-2321
Why does milk turn sour? **7**-2321
Why does milk turn sour in a thunderstorm? **7**-2321-22
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Mill on the Floss, The, novel by George Eliot
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Millais, Sir John Everett, English painter, and Pre-Raphaelites, 6-2236
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Lorenzo and Isabella (gravure), 6-2238
Millay, Edna St. Vincent, American poet, 13-4822
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Millennium. A period of 1,000 years. The term, which comes from the Latin, has special reference to the idea of Christ's reign on earth, but is also used in the sense of a long period.
Miller, Joaquin, American poet, 13-4792
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Miller, Richard, American painter, 10-3455
Millet, Francis D., American painter, and decorations at World's Columbian Fair, Chicago, 10-3452
Millet, Jean François, French painter
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Millikan, Robert Andrews, American physicist, 4-1228
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Millipedes, account of, 16-6020
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Mills, Clarke, American sculptor, 14-4936
Mills, *see* names of objects manufactured
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Milne, A. A. (Alan Alexander) (1882-). British author, most famous for his verses, stories and plays for children, among them When We Were Very Young and Winnie-the-Pooh, which are delightfully fantastic and humorous. From 1906-14, Milne was assistant editor of Punch, the English comic weekly. Among his successful dramatic works are Mr. Pym Passes By and The Dover Road.
Miltiades, Greek leader
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Milton, John, English poet
* John Milton and his poems, 4-1235-42
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Milton, Mary Powell, wife of John Milton, 4-1238
Mi-lu, a deer, 4-1508
Milwaukee, Wisconsin, seat of Milwaukee County, on the Milwaukee, Menominee and Kinnikinnick rivers and the western shore of Lake Michigan. Its harbor is considered the best and the most attractive on Lake Michigan, and it is one of the leading shipping centers of America. It is known for having comparatively few accidents, and is sometimes called the safest city of the nation. It trades in coal, lumber and grain, and manufactures iron, steel, machinery, malt products, motorcycles and clothing. The site was originally an Indian village, and permanent white settlement was made in 1795. Population, 587,472.
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Can we break ourselves of bad habits? 16-5961
Can we think without words? 16-5961
How did men learn to talk? 16-5961
What is meant by amnesia? 16-5958-59
Where am I in my sleep? 15-5642-43
Where does a thought come from? 16-5960-61
Why do I dream? 15-5639-40
Why do we worry? 16-5961
Why does my face turn white when I am frightened? 16-5958
Why is yawning infectious? 16-5958
Mind-reading trick, 16-5892
Mind-reading arithmetical trick, 8-3022
Mindszenty, Joseph, Cardinal (1892-), Roman Catholic primate of Hungary. During World War II he resisted the Nazis, and afterward opposed many measures of the communist government set up in Hungary, particularly a decree abolishing religious schools. In 1949, he was charged with treason against the government and finally sentenced to life imprisonment. His trial and sentence aroused the indignation of the whole democratic world.
Miner, Jack, Canadian naturalist
* work with birds, 11-3809-11
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Mineral wool. A fibrous wool-like material, not unlike spun glass, which is made by blowing a powerful jet of air or steam through melted slag; used as a packing for steam pipes, as it is a poor conductor of heat.
Minerals
* mineral wealth of the world, 18-6631-46
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Cromwell, by Richter (gravure), **1**-67
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short-billed minivet (in color), **12**-4369
Mink, animal, **2**-769
mink-farming in Canada, **13**-4696-97
Picture, **2**-769
Minneapolis, Minnesota, seat of Hennepin County and largest city of the state, on the Mississippi River. Within the city there are many lakes. With St. Paul it forms the "twin cities." Minneapolis is known as a vacation city because thousands of people pass through it every summer on their way to the beautiful lake region of northern Minnesota. Flour-milling is one of the leading industries, and sportswear, farm equipment, bread, linseed oil, artificial limbs and furniture are made. The city was started in 1847. The name is a combination of an Indian word with a Greek word and means "water city." Population, 492,370. *See also* **15**-5277-78
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Minnesingers, singing poets of Middle Ages, **10**-3601; **17**-6265; **19**-6901
Minnesota. American North Central state containing the sources of the Mississippi; area, 84,068 square miles; capital, St. Paul; largest city, Minneapolis. It is a great grain, dairy and lumber state. St. Paul on the Mississippi and Duluth on Lake Superior are great shipping centres. Iron-mining, flour-milling and meat-packing are important industries. Abbreviation, Minn. Nickname, "Gopher State." Flower, moccasin flower. Motto, "Etoile du Nord" (Star of the North). The name of the state comes from a Sioux word meaning "sky-blue water." Population 2,577,363. First settlement, Fort Snelling, 1819.
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Minneapolis flour mills, **8**-2802
St. Anthony Falls, Minneapolis, **17**-6041
state capitol (gravure), **18**-6688
University of Minnesota, **12**-4313
Minnesota River. American river, rising in Big Stone Lake, South Dakota. Flows into the Mississippi River. 475 miles.
Minnows, fishes, **15**-5633
Minos, judge of the dead, **9**-3238
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Minos, legendary hound of Hell
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Mint. A place where money is coined by public authority. The term is derived from Moneta, a surname of Juno, in whose temple at Rome money was coined.
See also United States Mint
Mint, plant
Pictures, **16**-5879; (in color), **15**-5398 **16**-5881, 5883, 5884
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Labrador, **7**-2494-97
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Missions, Californian; *see* California—missions
Mississippi. Fertile American Southern state, producing much cotton, lumber, fruit and grain; cotton-seed products are important; area, 47,716 square miles; capital and largest city, Jackson. Abbreviation, Miss. Nickname, "Bayou State." Flower, magnolia. Motto, "Virtute et armis" (By valor and arms). The state's name is derived from two Indian words, *maesi,* fish, and *sipu,* river. First settlement, Biloxi, 1699. Population 2,231,401.
described in Southern States, **13**-4517-28; **14**-4889-4900
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Huey P. Long Bridge at New Orleans, **1**-35

Mississippi Scheme or **Bubble** (1716-20). Financial scheme proposed by John Law, which included sole trading rights on the banks of the Mississippi. Its object was to restore French credit, but it almost brought France to ruin.
Missouri. Rich Central state; area, 69,674 square miles; capital, Jefferson City; largest city, St. Louis. Coal-fields cover many thousand square miles; lead, copper and zinc mines are important, while great quantities of grain and fruit are produced and cattle and mule breeding are important. Manufactures are large and varied. Abbreviation, Mo. Nicknames, "Ozark State," "Iron Mountain State" or "Show Me State." Flower, hawthorn. Motto, "Salus populi suprema lex esto" (Welfare of the people be the supreme law). The word Missouri was taken from a Sioux tribe of that name. First settlement, Fort Orleans, 1719. Population, 3,749,819.
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stock farm, Jackson County, Missouri, **15**-5276
Missouri Compromise, in U. S. history, **6**-1914; **7**-2429
Missouri River. Greatest tributary of the Mississippi, which it joins near St. Louis. Omaha, St. Joseph, Kansas City and Jefferson City stand on it. 2,475 miles.
Mist
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What makes the white mist at night in hot weather? **8**-2948
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Is mistletoe harmful to the trees on which it grows, **8**-2871
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Mitchell, S. Weir, American writer, **13**-4789
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Mites, insects, **16**-6018-20
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Mitford, Mary Russell, British writer, **11**-3899
Mithras, religion of, **9**-3234
Mithridates VI (Mithridates the Great) (died 63 B.C.). King of Pontus, in Asia Minor. In his reign Pontus became a great power and was brought into conflict with the Romans. Though Mithridates won many victories over Rome, he was finally conquered by Pompey and driven into exile. He was planning a new campaign when his troops revolted. Mithridates then had one of his Celtic soldiers run him through with a sword.
See also **4**-1366-67
Mitre, Bartolomé, Argentine statesman, **19**-7035
Mixers, Concrete, **7**-2315, 2317
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Miyajima, Japanese island
Picture
gateway to Shinto shrine, **2**-564
Mnemosyne, goddess of memory, **9**-3234
Moat House, Kent, England
Picture, hall, **5**-1688
Mobile, Alabama, seat of Mobile County and the second largest city of the state, on Mobile Bay at the mouth of the Mobile River, the only port in Alabama. The Azalia Trail—17 miles of flower-lined streets—attracts thousands of visitors every spring. Lumber, cotton, cereals and steel are exported. Varnish, alum, paper and dyestuffs are manufactured. Large quantities of shrimp and oysters are caught in the bay. The city was founded in 1711 by the French, and at later periods was under the rule of Spain, England and the Confederacy as well as the United States. Population, 78,720.
captured by Farragut, **7**-2439
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Bienville Square, **14**-4898
loading cotton for export, **14**-5170
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Moby Dick, novel by Herman Melville
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Moccasin-flower, name for pink lady's slipper, **15**-5606
Mockingbirds, **9**-3139; **14**-5032
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Modena. Ancient city of northern Italy, with a university and a splendid Romanesque cathedral. The Este Palace contains a fine library and art collection.
Modern Symphony Orchestra, The, * **4**-1287-94
Moe, Jorgen, Norwegian collector of fairy tales, **6**-2275
Moerike, Eduard, German poet, **17**-6410
Moffat Tunnel, Colorado
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Mogadiscio, capital of former Italian Somaliland, on the east coast of Africa, important as a port. Agriculture and cattle-raising are carried on in the surrounding country. Almost nine-tenths of the people are African natives. Population, 55,000.
Moguls, Mohammedan emperors of India, **8**-2827
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Mohair, the Goat's-hair Cloth, * **8**-2782-84
Mohammed, founder of Mohammedanism, **9**-3091-92, 3097
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Moirae, or **Fates,** in Greek mythology, **9**-3228
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Mola, name for deep-sea sunfish, **16**-5900
Molasses. A dark-colored liquid produced in the process of sugar manufacture. Most molasses is cooked over and over again at the sugar mill until the crystallizable sugar has been extracted. Some molasses, however, is sold as table molasses; it is also used in considerable quantities by confectioners and others.
Pictures
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Molasses Candy, recipe for, **2**-752-53
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for casting buttons, **12**-4504-05
for casting dishes, how to make, **8**-2741-42
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scene from his play, The Miser, **18**-6712
with Louis XIV, **18**-6711
Mollienisia (Mollies), species of tropical fish
Picture, **5**-1765

Mollison, Amy Johnson (1903-1941), British aviatrix. A pioneer in flying, she made a solo flight from England to Australia in 1930; a round-trip flight from London to Tokyo in 1931; and, with her husband, Captain James Mollison, across the Atlantic in 1933. Early in World War II, she volunteered to ferry planes from factory to airports. She lost her life on such a mission when she was forced to bail out of her plane and was drowned in the Thames River.
Mollusks
* account of, **19**-6883-92
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How does a mussel build its shell? **19**-6882
What has happened to the snails from all the empty shells? **19**-6882
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Molochs, spiny lizards of Australia, **14**-5228
Molokai, one of Hawaiian Islands, **15**-5447
leper colony, **15**-5452-53
Molotoff, Viacheslav M., Russian statesman, **18**-6611
Moltke, Helmuth von (1848-1916). Chief of the German general military staff at the beginning of World War I, and responsible for the general conduct of German operations in the invasion of Belgium and the advance upon Paris. In October, 1914, he became ill and was superseded at the front by General von Falkenhayn.
Picture, **12**-4177
Moluccas. Dutch East Indian archipelago, including Amboyna and Ternate islands. Occupied by the Dutch in 1613, they have ever since been a great centre of the clove and nutmeg trade. Area, 195,650 square miles.
Molybdenum (Mo). Chemical element. Hard silvery metal. Atomic number 42; atomic weight 95.95; melting point 2620°C.; boiling point 3700°C.; specific gravity 10.2. Molybdenum is used for electric contact points, and supports for filaments in radio tubes. Molybdenum steels are very tough and are used for special purposes.
Picture
mine at Climax, Colorado, **18**-6433
Mombasa, Kenya Colony
Picture, **9**-3055
Mona Lisa (La Gioconda), painting by Leonardo da Vinci, **3**-828
description of costume, **9**-3161
Picture, **3**-829
Monaco. Riviera principality under French protection. Area, 8 square miles. It consists of the towns of Monaco, Monte Carlo and La Condamine.
Monal, pheasant, description, **12**-4365
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Monarch butterfly
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Monarch Geyser, Yellowstone National Park, **2**-731
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Monel metal, alloy, trade mark, * **5**-1635-36
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What is the origin of the dollar sign? **17**-6174
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Moneywort, plant. *Picture* (in color), **16**-5884
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Mongols, rule in China, **2**-429
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Mongooses, **2**-501-02
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Monitor, ironclad ship in Civil War, **7**-2435-36
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Monkshood, plant, description, **18**-6662
Monochord, musical instrument, **5**-1800; **10**-3771
Monocotyledons, plants, **1**-221-22; **3**-885
Monocytes, white blood cells, **3**-936
Picture, **3**-936
Monongahela River. American river, formed by West Fork and Tygart's Valley rivers, West Virginia. Joins the Allegheny River at Pittsburgh to form Ohio River. 300 miles.
Picture, **11**-3777
Monoplanes, *see* Airplanes
Monotype machine, note and picture, **3**-1058
Monroe, Harriet, poetry editor, **13**-4821
Monroe, James, president of U. S.
administrations and outline of life, **6**-1913-15; **11**-3939-40
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portrait (gravure), **11**-3947
Monroe Doctrine, foreign policy of U. S., **9**-3107-08; **11**-3940
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Monrovia, capital of Liberia, on the western coast of Africa at the mouth of the Saint Paul River. The climate is hot, and most of the inhabitants are natives. The port trades in palm nuts, rubber, ivory and dyewoods. Population, 10,000.
Mons. Belgian manufacturing and coal-mining centre, famous for its lovely Gothic church of St. Waudru. A center of fighting during World War I. On November 11, 1918, the Canadian troops entered the city of Mons in triumph.
Monsoon, movement of air, **16**-6031
Mont Blanc. Highest mountain in Alps, on the border of Italy and France. Though the limit of the snow line is 8,600 feet, ascents are now made practically every day during the summer, the first having been achieved in 1786. Beneath it is the Mer-de-Glace glacier. 15,780 feet.

Mont Cenis Pass. Highway between France and Italy over the Graian Alps. Beneath the Col de Préjus a tunnel has been driven, carrying an electric railway between Modane and Bardonecchia. 6,900 feet.
Mont Saint Michel, France
Picture, **10**-3426
Montaigne, Michel de, French essayist, **8**-2866; **18**-6566
Montana. Large American Northwestern state, area, 147,138 square miles; capital, Helena; largest city, Butte. Containing much of the Rocky Mountain system and part of the Bad Lands, it used to be generally too dry for cultivation, but since irrigation has been carried out agriculture has become important, but stock-raising and mining are the leading industries. Copper, coal, silver and other minerals are abundant. Abbreviation, Mont. Nickname, "Stub-Toe State," or "Bonanza State." Flower, bitter root. Motto, "Oro y plata" (Gold and silver). The name comes from a Spanish word meaning "mountainous." First settlement thought to have been at Helena about 1861. Population 484,281.
described in Western States, **18**-6425-36; **19**-6841-50
Glacier National Park, **7**-2281
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bird hospital at Lake Bowdoin, **8**-2818
Brule Formation, **2**-389
flag (in color), **19**-7191
sheep-herding, **18**-6425
Montauban. French cathedral city on the Tarn, famous as a Huguenot stronghold in the 16th and 17th centuries.
Montauk Point, Long Island, lighthouse
Picture, lens, **10**-3581
Montcalm, Louis Joseph, Marquis de
death of, **3**-783-84
in Canada, in war against English, **2**-683
Monteflore, Moses, Jewish philanthropist
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Montenard, Frédéric, French painter, **8**-2856
Picture
Pastoral Scene, **8**-2857
Montenegro, state of Yugoslavia, **17**-6345-48
Monterrey, Battle of. An engagement between the United States forces under General Taylor and the Mexicans under General Ampudia in 1846. After suffering three days' attack upon their city, the Mexicans sued for peace and were allowed to evacuate, and an eight weeks' armistice followed.
Poem about
Monterey, by Charles Fenno Hoffman, **8**-3005
Montesquieu, Baron Charles de. French critical writer; born near Bordeaux, 1689; died, Paris, 1755. *See also* **18**-6714
Montessori, Maria, Italian educator, **14**-5254
Monteverde, Claudio
and symphony orchestra, **4**-1288
as musical composer, **19**-6903
Montevideo City, capital and major port of Uruguay, the largest city of the country, on the Rio de la Plata. It is a beautiful, modern city. Important as a trading center, it exports the agricultural and animal products from the near-by farming regions. The Spanish founded the city in 1726 as a fort during their struggle with Portugal. The name means "I see a mountain," but the region is not actually mountainous. Population, 770,000.
Pictures, **19**-6975, 6983
Montezuma II, Aztec ruler, **2**-393
Montford, Simon de. English statesman, patriot and general; born about 1208; killed at the battle of Evesham, 1265; called first model parliament in England.
struggle with Henry III, **5**-1578
Montgolfier, Jacques-Etienne and **Joseph-Michel,** French balloonists, **1**-167
Picture
early fire balloon, **1**-344
Montgomery, Sir Bernard (1887-). Commanding general of the British forces occupying Germany. He led the famous British Eighth Army which, in 1943, drove the German forces under Rommel from El Alamein in Egypt to Tunis and bore the brunt of the Tunisian and Sicilian campaigns. In December, 1943, he was made head of all the British armies taking part in the Allied invasion from the west. He was born in Ireland and served in World War I.
Montgomery, James, hymn-writer
See Poetry Index
Montgomery, Lucy Maud, Canadian writer, **14**-5110
Montgomery, Richard
attacks on Montreal and Quebec, **4**-1163
Montgomery, capital of Alabama and seat of the county of the same name, near the center of the state on the Alabama River. During the Civil War it was the capital of the Confederacy. It is a trading center for the surrounding agricultural region, and it manufactures textiles, syrup, pickles, barrels, tiles and chemicals. It was at one time an Indian village, and in 1817 it was settled by white men as New Philadelphia. In 1819 the name was changed in honor of General Richard Montgomery of the Revolutionary War. Population, 78,084.
Months
Poems about
April, by Sir William Watson, **16**-5713
June, by James Russell Lowell, **4**-1516
November in England, by Thomas Hood, **4**-1517
Why It Was Cold in May, by Henrietta Robins Eliot, **4**-1515
Written in March, by William Wordsworth, **4**-1515
Monticello, home of Thomas Jefferson
Picture, **18**-6828
Montignac, France, prehistoric art in caves of, **1**-189
Montmorency Falls. Waterfalls in the province of Quebec, Canada; 265 feet high.
Montpelier, capital of Vermont and seat of Washington County, near the center of the state on the Winooski River. Admiral George Dewey lived there. Much of the industry of the city centers around the famous Vermont granite that is quarried and worked in the vicinity. There are also sawmills and clothes-pin factories. The site was settled in 1787. Population, 8,006.
Montreal, Quebec, the largest city of Canada. It is built on an island in the St. Lawrence River. French is the main language spoken, although a great many English-speaking people live in the city. Greater Montreal occupies several miles along the north bank of the river as well as Montreal Island. The city is noted for its churches and for its French atmosphere. Shawinigan Falls is an excellent source of water power, and so the city has grown to be a leading industrial center. Electrical equipment, railway equipment, footwear, ships, flour and bakery products are made. Jacques Cartier discovered an Indian village on the island in 1535, and white settlement was made in 1642. The name comes from the high hill overlooking the city—Mount Royal. Population, 1,139,921.
Pictures, **8**-2948
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airport, **4**-1491; **10**-3532
Jacques Cartier bridge **1**-35
Monts d' Auvergne, mountains in central France, **10**-3416
Monts, Pierre du Guast, Sieur de, settlement in Acadia, **2**-678
Montserrat. British West Indian island in the Leeward group; area, 32 square miles; capital, Plymouth. It exports cotton and limes.
Moody, Dwight Lyman (1837-1899). American evangelist; he preached throughout America, England and Australia. The famous Moody and Sankey hymn-book was prepared for his use.
Moody, Mrs. Susanna, Canadian writer, **14**-5103
Moody, William Vaughn, *see* Poetry Index
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* description, origin, theories about, **10**-3535-44
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causes eclipse of sun, **9**-3169-71, 3174-75
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Could we ever travel to the moon? **11**-3975-79
Does the moon pull the sea? **10**-3534
Is there a man in the moon? **10**-3533-34
Why does the moon grow brighter as the sun sets? **10**-3534
Will the world become like the moon? **10**-3534
Would the earth seem to be up in the sky if we were on the moon? **10**-3534

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Moonwort, fern. *Picture* (in color), **10**-3727
Moore, Albert, British painter, **6**-2236
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Moore, Anne Carroll, American librarian
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Moore, Clement C., *see* Poetry Index
Moore, Sir John, British general
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The Burial of Sir John Moore, by Charles Wolfe, **10**-3740
Moore, Thomas, Irish poet, **10**-3605
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Moore's Creek, Battle of, 1776, **4**-1164
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Moorings of a ship, **13**-4848
Moorish idol, fish
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Moorland, vegetation of, **4**-1280
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Moose tick, 16-6020
Moosewood maples, shrubs, **12**-4507; **13**-4777-78
Moraines, deposits carried by glaciers, **3**-774
Morales, Luis de, Spanish painter
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Moran, John J., yellow fever experiment
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Moreto, Agustin, Spanish writer, **19**-7129
Moretto da Brescia, Italian painter, **3**-1107
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A Nobleman (gravure), **3**-1112
Morgan, Daniel (1736-1802). American Revolutionary general, born in New Jersey but a resident of Virginia. He served at Quebec and Saratoga and in the South.
escapes from Lord Cornwallis, **4**-1173
Picture, **4**-1168
Morgan, John Pierpont (1837-1913). American financier, international banker, art-collector and philanthropist.
Morgan, Lillian V., American scientist, **4**-1231
Morgan, Thomas Hunt, American scientist, **4**-1231
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Morganite, account of, **19**-7230
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Morgarten, Switzerland
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Moriscos, Moors converted to Christianity, **14**-4917
Morland, George, English painter, **6**-2230; **7**-2334-35
Morley, E. W.
experiments, **16**-5866-67
Morley, John (Viscount) (1838-1923). English author and statesman. Morley was active in journalism as a young man. In 1883 he was elected to Parliament and had a long and brilliant political career. Morley was an eminent man of letters; his biographies of Burke, Voltaire, Cromwell and Gladstone are considered models of their kind.
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Morton, Levi P., vice-president of U. S.
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Morton, William Thomas Greene
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use in early Christian churches, **16**-5716
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St. Mark, **13**-4564
Mosasaurus, prehistoric lizard, **5**-1661
Moscow, capital of the U.S.S.R. and the main city of the country. It is Russia's political center, and as such is of interest to the entire world. It is located in the middle of European Russia on the Moscow River. By a series of canals and rivers it is connected to the Baltic, Caspian and White seas and to the Atlantic and Arctic oceans. From 1714 to 1918 it was not the capital of the country, but it was always a commercial center. Automobiles, tools, locomotives and steel are manufactured. The city was attacked and bombed during World War II, but it was never taken. The known history of the city dates from the 12th century. Population, 4,137,000. *See also* **16**-5856
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Moseley, Henry G. J., English scientist, **4**-1228
Moselle River
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Was there a real Mother Goose? **7**-2609
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Motherwort, flower
Picture (in color), **13**-4879
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* Butterflies and moths, **18**-6523-47
eggs, **18**-6523-24
larvae in jumping beans, **2**-685
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How do moth balls keep moths from destroying our furs and woolens? **18**-6532
Why is the tongue of a moth so long? **5**-1606-07
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* force, work, power, energy, **4**-1355-57
* laws of motion as applied to machines, **4**-1519-24
* laws of motion, in physics, **3**-1152-56
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What does "streamlined" mean? **11**-4133-34
What makes an arrow fly? **11**-4134-35
When I walk in a moving train do I move faster than the train? **11**-4134
Why are we thrown forward when the train stops suddenly? **11**-4132
Why does a boomerang come back? **11**-4131-32
Why does a falling object turn round? **11**-4132
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* how animated films are made, **16**-5901-06
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Motor nerves, of muscles, **5**-1676
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How did the words "In God We Trust" come on coins? **17**-6174
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Question about
Who were the people known as mound-builders? **2**-687
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Mount. For mountains, *see* word following Mount; as Etna, Mount
Mount Desert Island, Maine
Acadia National Park, **7**-2290
Mount Holyoke College
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Mount McKinley National Park, Alaska, **7**-2290-91
Mount Moriah, Newfoundland
Picture, **9**-3274
Mount of the Holy Cross, Colorado
Picture, **18**-6426
Mount Rainier National Park, **7**-2283
Picture, **9**-3206
Mount Rushmore Memorial, in the Black Hills of South Dakota, is an immense carving on a cliff of Mount Rushmore. On the memorial are the heads of George Washington, Thomas Jefferson, Abraham Lincoln and Theodore Roosevelt. The memorial was designed by Gutzon Borglum in honor of Theodore Roosevelt. It would have taken a man over 450 feet tall to have had a head the size of those of the memorial.
Mount Stephen, George Stephen, 1st Baron (1829-1921). Born in Scotland; noted Canadian financier and railway man; first president of the Canadian Pacific Railway.
Mt. Vernon, New York, on the Bronx and Hutchinson rivers. It is a suburb of New York City and is about 13 mi. north of the heart of Manhattan. Vitamin tablets, freight cars, stoves and dresses are made there. The region was settled in the 17th century, but the town was not incorporated until 1853. Population, 67,362.
Mount Vernon, home of Washington, on the south shore of the Potomac.
description, **5**-1544
Pictures, **11**-3947; **18**-6825
tomb of Washington, **5**-1648
Mount Wilson Observatory, Pasadena, California, **17**-6367
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Mountain beaver, *see* Sewellel
Mountain bluebirds, **14**-5137
Mountain climbing
Picture, **16**-6005
Mountain laurel, flower-bearing shrub, **13**-4776
Mountain-lion, *see* Puma
Mountain robins, thrushes, **14**-5136
Mountains, some of the world's highest, compared with famous North American:

	Feet
Everest, Himalayas	29,002
Godwin-Austen (K-2 or Dapsang), Himalayas	28,250
Kanchenjunga, Himalayas	28,146
Makulut, Himalayas	27,790
Dhaulagiri, Himalayas	26,795
Nanga-Parbat, Himalayas	26,660
Gasherbrum, Himalayas	26,470
Distaghil, Himalayas	25,868
Nanda Devi, Himalayas	25,645
Rakaposhi, Himalayas	25,460
Kamet, Himalayas	25,447
Namcha Barwa, Himalayas	25,445
Gurla Mandhata, Tibet	25,355
Ulugh Mustagh, Tibet	25,340
Tirich Mir, India	25,263
Mustagh, Sinkiang	23,890
Kaufmann, Russia	23,386

Mountains (*continued*)

	Feet
Aconcagua, Argentina-Chile	23,080
Huascaran, Peru	22,180
Mercedario, Argentina-Chile	21,870
McKinley, Alaska	20,300
Logan, Yukon-Canada	19,850
Whitney, California	14,501
Pike's Peak, Colorado	14,110
Harney Peak, South Dakota	7,242
Washington, New Hampshire	6,288

* flowers of, with pictures, **15**-5601-08
* worn down by air and water, **2**-385-89
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in Africa, **2**-468-69
of France, **10**-3416
of Iran, **9**-3141-42
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of North America, **1**-153-56
of Norway and Sweden, **15**-5299-5300
Questions about
How do we know the height of a mountain? **2**-685
Why do mountains get no higher though snow falls on them? **8**-2914-15
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diagrams of how mountains are formed (color), facing, **2**-631
height measured with barometer, **4**-1417
Mt. Everest, **1**-122
of the moon, **10**-3537
skiing, Sudetic Mountains, Europe, **17**-6344

Mountbatten, Louis, Viscount (1900-). British admiral and supreme Allied commander of land, sea and air forces in southeast Asia from August, 1943. Early in 1947 he was appointed Viceroy of India to wind up the affairs of the British government there. Lord Mountbatten began his career in the Royal Navy in 1913 and made a brilliant record in World War II. In 1942 he was chief of Combined Operations (the Commandos).

Mourning doves, **14**-5028-29
See also Turtle doves

Mouse, *see* Mice

Mouse and the Sausage (story), **11**-4113

Mouse-hares (pikas), **3**-1133

Mouse tail, flower
Picture (in color), **15**-5400

Mousse, recipes for, **7**-2517

Moussorgsky, Modest, Russian composer, **19**-6922

Mouth and the Teeth, The, * **6**-1929-32

Moveable bridges, **1**-31

Movement, *see* Motion

Movie making in school, * **10**-3765-68

Moving pictures, *see* Motion pictures

Mozambique, (Portuguese East Africa), **18**-6813

Mozart, Wolfgang Amadeus, Austrian composer, **19**-6915
music of, **19**-7073
Picture, **19**-7074
playing for Maria Theresa, **19**-6916

Much Ado about Nothing, play by Shakespeare
comment on, **3**-835

Mucous membrane
of breathing passages, **4**-1326
of digestive tract, **6**-2127-28
of mouth, **6**-1931
of nose, **10**-3554-56

Mud, how to remove mud stain, **9**-3119

Mudfish, lives out of water, **15**-5541

Muir, Alexander, *see* Poetry Index

Muir, John, Scotch-American naturalist, **19**-7056-57

Mukden, China, capital of Liaoning Province and formerly the capital of Manchuria, on the Liao River. The Manchu dynasty reigned at Mukden, and the tombs of the emperors are near the city. Machinery, airplanes and tools are made. The Russians occupied the city early in the 20th century, and the Japanese invaded it in 1931. The city dates from the Middle Ages. Population, 863,500.

Mulberry, tree
bark used by Chinese for paper, **3**-1054
Picture
fruit, **11**-4095

Mule deer, **4**-1511-12
migration, **6**-1957, 1959
Pictures, **4**-1512; **6**-1960

Mules, account of, **6**-2020
Picture
army mules, **6**-2020

Mullein, plant
Picture
of flower (in color), **13**-4879

Mullets, fishes, **16**-5775
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Mullins, Rosanna (Mrs. Leprohon), Canadian novelist, **14**-5104

Mulock, Dinah Maria (Mrs. Craik), British writer, **11**-3899

Multiplex system, in telegraphy, **17**-6056

Multiplication, an odd method, **17**-6148

Mumford, (or Mulford), Hannah, wife of John Eliot, **6**-2086-87

Mumford, Lewis, American historian, sociologist and writer, **14**-5019

Mummers, in early English plays, **2**-727
Pictures, **2**-727

Mummies, Egyptian, **3**-812
Pictures
mummy-cases, **2**-452; (gravure), **1**-66

Muncaczy, *see* Munkácsy

Munchausen, Baron
* Adventures of Baron Munchausen, book, extracts and note, **4**-1421-27

Munich, Germany, capital of Bavaria, the third largest city of Germany, on the Isar River. Before the forming of the Nazi party, the city was known for its beauty—attractive gardens, well-planned streets, and valuable art collections. In 1919 the Nazi party was formed in Munich, and in 1923 Hitler first tried to gain control of the government in his famous Munich Beer Hall Putsch. The Munich Pact of 1938 yielded to German demands in regard to Czechoslovakia. Brewing and the making of stained-glass church windows made the city internationally famous. The city was founded in 1158, and the name means "the place of the monks." Population, 760,900.

Munich Pact, **7**-2309; **12**-4183; **18**-6450
Picture
Chamberlain signing pact, **18**-6604

Municipal Government. The self-government of a town, city or village. It includes all the activities of the municipality: the public utilities, including ways of transportation and communication, supplying of light and water; disposal of waste matter; protection of property, health, life; education; recreation; charities and correction; and municipal housing. There are in America four varieties of municipal executives; in some cities the mayor is given complete charge of all administrative work, the council being ousted from any share in it, as in Boston and New York. In other cities the mayor is given a limited range of power, the council retaining a hold upon him, as in Chicago, Philadelphia and Los Angeles. Third, there is the Commission plan of government wherein the administrative functions are divided among five commissioners, as in Buffalo and St. Paul. Lastly, there is the arrangement by which the supervision of the city's administrative work is given to a manager whom the council appoints and to whom he is responsible. This is called the city-manager plan.

Municipal Stadium, Chicago
Picture, **7**-2314

Munkácsy (Michael Lieb), Hungarian painter
Picture
Milton and His Daughters, **4**-1240

Munnings, A. J., British painter, **8**-2860
Picture
Mares and their Foals (gravure), **8**-2863

Munster. Southwestern Irish province, comprising Cork, Clare, Kerry, Waterford, Limerick and Tipperary; area, 9,320 square miles.

Muntjac, or **barking deer**, **4**-1509

Muntz, Laura, Canadian painter
Picture
Madonna with Angels (gravure), **10**-3708

Mural painting
Question about
What do we mean by a mural? **6**-2251
Picture
historical mural by Edvard Buk Ulreich, **6**-2251

Murcia, ancient kingdom and modern province in southeastern Spain; area 4,453 sq. mi. Zinc, lead and sulfur are mined. Products include silk,

Murcia (*continued*)
soap, leather, pottery and flour. Chief city and capital is also named Murcia. *See also* **14**-4908, 4911
Murdock, William, Englishman, first to make practical use of manufactured gas, **7**-2354
Murex. *Pictures* (color), **19**-6896
Murfree, Mary Noailles (Charles Egbert Craddock, pen name), American writer, **13**-4790
Muriatic acid, or **hydrochloric acid** (HCl). A gaseous compound of hydrogen and chlorine whose aqueous solution is used extensively in dyeing, in making coal-tar colors, and in preparing the chloride of different metals. Colorless, with a pungent odor and taste, and soluble in water, it is one of the strongest acids known.
Murillo, Bartolomé Estéban, Spanish painter, **4**-1500
Pictures
A Spanish Flower-girl, **9**-3070
Infant Jesus and the Infant St. John, **4**-1494
Infant St. John, **4**-1494
Madonna and Angels, **4**-1497
Madonna and Child, **4**-1497
Murmansk. Port on the Arctic coast of Soviet Russia, near the Finnish boundary. Is free from ice the year round and is linked with Leningrad by railway.
Murphy, Francis, American painter, **10**-3456
Murray River. Largest Australian river, draining 250,000 square miles. Rising in the Australian Alps, it flows into the Great Australian Bight, in South Australia, forming the boundary between New South Wales and Victoria for most of its course.
Murre, bird. *Picture* (in color), **9**-3132
Muscat (Musqat), capital of Muscat and Oman, in southeastern Arabia on the Persian Gulf. It is the chief port of the Sultanate, and exports pearls, dates and the famous Arabian horses. The coast was once known as the Pirate Coast because Arab pirates raided the ships that passed through the gulf. Population, 3,500.
Muscle Shoals, Alabama, **13**-4521; **14**-4889-90
Picture
Wilson Dam, **7**-2314
Muscles
* structure and function, **5**-1673-77
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of the eye, **11**-3806
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Muses, nine sisters, list of, **9**-3228
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* American Museum of Natural History, **18**-6613-22
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See also American Museum of Natural History, N. Y.; Metropolitan Museum, N. Y.
Pictures
Museum of Fine Arts, Santiago, Chile, **19**-7042
Pennsylvania Museum of Art, Philadelphia, **11**-3776
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* account of, **11**-3905-08
edible varieties, **10**-3723
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* American song-writers, **18**-6508-16
* composers of great music, **19**-6912-26
* harmony and discord, **18**-6695-6700
* writers of famous songs, **10**-3600-12
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* beginnings and growth of music, **19**-6897-6903
* classic composers and their works, **19**-7070-76
* modern symphony orchestra, **4**-1287-94
* romantic composers and music of to-day, **19**-7148-54
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Poems about
Musical Instrument, by Elizabeth Barrett Browning, **16**-5707
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Pied Piper of Hamelin, by Robert Browning, **12**-4475-80
Song for St. Cecilia's Day, by John Dryden, **14**-5129
Questions about
What does the orchestra conductor do with his stick? **10**-3770
What is a folk song? **16**-5739-46
Pictures
page from 14th century music book, **9**-3383
summer concert in Boston, **12**-4149
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Musical instruments
* violin and the piano, **5**-1794-1802
* in a symphony orchestra, **4**-1288-94
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classification as string, wind or percussion, **10**-3632-33
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What was the first stringed instrument? **10**-3770-71
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playing French horns and flutes, **9**-3305
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Musk deer, **4**-1512
Musk kangaroos, marsupials, **7**-2501
Musk-ox, animal, **4**-1378
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Musk plant, *see* Monkey flowers
Muskellunge, fish, **15**-5634
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Muskrats, **3**-1132
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Musquash, *see* Muskrats
Musschenbroek, Pieter van, Dutch scientist and invention of Leyden jar, **11**-3981
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How does a mussel build its shell? **19**-6882
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Musset, Alfred de, French poet, **18**-6716
Mussolini, Benito, "duce" and dictator of Italy, **13**-4565-66, 4568, 4570; **18**-6608-09
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Mustard, plant, **8**-2996; **15**-5389-90, 5395
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Why does mustard burn our tongue? **6**-1933
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Mutation, meaning of, in plants, **4**-1470
Mute swans, **11**-3884
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Mutiny of the Bounty, 1789. Mutiny of the crew of H.M.S. Bounty, who cast adrift their officers. The Pitcairn Islanders are descendants of the mutineers.
Muybridge, Edward, pioneer in motion-picture photography, **11**-3956
My American Notes, book by Dickens
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Mycenae, early Greek state, **3**-909-10
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Mynas, birds, **8**-2968
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Picture (gravure), **19**-7180
Myristica, plant, yields nutmeg and mace, **8**-2993
Myron, Greek sculptor, **12**-4220
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Marsyas, sometimes called Dancing Faun, made after Myron (gravure), **12**-4334
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Myrrh, account of, **8**-2913

Myrtle, or **periwinkle**
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Myrtleberries, *see* Whortleberries
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Nabeul, Tunisia
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Nablus. Ancient capital of Samaria, Palestine.
Nabopolassar, king of Chaldea, **2**-659
Nacre, substance manufactured by molluscs, **14**-4675-76; **19**-6887, 6892
Naevius, Gnaeus, Latin writer, **16**-5908
Nagana, disease of animals, **17**-6422
Nagoya, Japan, capital of Owari Province on Honshu Island, just north of the bay of Ise. Before World War II Nagoya was important for the manufacture of fabrics, pottery, clocks, fans and threads. It also had machine shops that made it a military target, and during the war it was heavily bombed. Population, 1,328,084.
Nagpur, India, capital of the Central Provinces, in the middle of the country near the Wardha and Wainganga rivers. The surrounding country is a cotton-growing region, and the city manufactures cotton cloth. Important colleges are located there. The name means "town of serpents." Population, 301,957.
Naiads in mythology, **9**-3236
Nails,
suggestions for nailing boxes, **8**-3019-20
Nails (in body)
grow from skin, **5**-1806
Question about
Why do human beings have fingernails and toenails? **5**-1810
Nairne, Lady Caroline, *see* Poetry Index
Nairobi, capital of Kenya Colony, in Africa, which belongs to Great Britain and is in the eastern part of the continent. The Kikuyu Hills rise above the city, and near by are the Limoru highlands. In the first half of the 20th century it has grown from an obscure village to a good-sized city. Population, about 90,000.
Naismith, James, inventor of basketball, **15**-5593
Names, children's, in American colonies, **3**-966
Irish names, **8**-2938-40
Namur. Historic Belgian cathedral city at the junction of the Sambre and Meuse. It is an important industrial centre, with iron and brass foundries, and the manufacture of cutlery. It was captured by the Germans in August, 1914.
Picture
scene along the Meuse River, **15**-5497
Nanaimo. Port on Vancouver Island, Canada, with lumber and fish-curing industries; also a coal-mining centre.
Nancy. Beautiful French city on the Meurthe, with a famous embroidery industry. Its many fine buildings include a cathedral and the old ducal palace of Lorraine. Nancy has a university and a noted school of forestry.
Nandid, fish
Picture (in color), **16**-5786
Nanking, capital of Kiangsu Province and former capital of China. Nanking is on the Yangtze River and is an important river port. The main part of the city is surrounded by a wall and is away from the river a mile or two. The wall was not sufficient to prevent the Japanese from taking the city in 1937, and considerable damage was done. The famous Nankeen cloth is made there, taking its name from the name of the city, and other cloths and Indian ink are also made. The city was built about 600 years before the birth of Christ. The name means "southern capital." Population, 1,750,000.
Picture, tomb of Sun Yat-sen, **2**-436
Nanking, Treaty of, 1842, **2**-430
Nansen, Fridtjof, Norwegian Arctic explorer, **12**-4236-37
as writer, **19**-7013
Picture, **12**-4229
Nantes. One of the most important ports of France, on the Loire. A fine modern city, it has many ancient buildings, including the cathedral and old ducal castle of Brittany; in the cathedral is Colombe's splendid monument to the last duke and duchess. There is a large government steam-engine works.
Naphtha. One of the products obtained from petroleum, is a volatile, colorless liquid, holding a place between gasoline and benzine. It may also be obtained in the distillation of wood and coal-tar. Industrially naphtha is used in the manufacture of cleaning compounds, paints and varnishes, rubber goods, etc.
Naphthalene, by-product of coal tar, **2**-637; **16**-5946
Napier, John, Scotch mathematician, **19**-7008
Naples, Italy, capital of the province of the same name, on the Bay of Naples not far from Mount Vesuvius. The city's location is internationally famous for its beauty, but the city itself has its unattractive sections. The old castles in the city, the relics from Pompeii, and valuable art collections help make the city interesting. It is one of the most important ports and manufacturing centers of Italy. Ships, locomotives, glass, gloves, perfumes and wines are made. The city was founded over 2,500 years ago by Greek settlers and was then called Parthenopé. Population, 977,950.
the modern city, **13**-4576
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Napoleon I, emperor of France
* life and wars, **6**-2198-2208
and Italian unity, **12**-4410-11
and Louisiana Purchase, **5**-1701
and production of beet sugar, **15**-5430
conflict with German states, **12**-4164
created Legion of Honor, **12**-4277
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in Spain, **14**-4917-18
rule in Netherlands, **15**-5564
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Incident of the French Camp, by Robert Browning, **5**-1884
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at the head of his troops, by Meissonier, **6**-2212
bestowing Legion of Honor badges, **12**-4277
crowning Josephine, **10**-3428
Evening of Waterloo, **6**-2211
statuette by Gérôme, **1**-71
Napoleon III, emperor of France, **10**-3437
and Italy, **12**-4412
made Maximilian emperor of Mexico, **11**-3817
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with Bismarck at Sedan, **12**-4175
Napoleonic Wars
in Spain, **14**-4917-18
relation to War of 1812, **5**-1702-03
See also Napoleon I
Narbada. River of the Indian Deccan, rising in the Satpura Mountains and flowing into the Gulf of Cambay. It is one of the most sacred rivers of India. 800 miles.
Narcissus, character in mythology, **9**-3237
Narcissus, flower, **17**-6126-27; **19**-7172
Pictures, **17**-6125; **19**-7174
Nares, George Strong, British Arctic explorer, **12**-4234
antarctic explorations, **15**-5379

Narwhal, a dolphin, **7**-2348
Picture, **7**-2348
Nascopie, ship. *Picture,* **16**-5837
Nashville, capital of Tennessee and seat of Davidson County, in the north-central part of the state on the Cumberland River. Near the city is Andrew Jackson's home, the Hermitage, and within the city are many homes and buildings dating from early times. A large number of colleges are located in Nashville. Agriculture and dairying are important in the surrounding country, and cellophane, footwear, stoves, clothing and candy are made in the city. The site was settled in 1779. Population, 167,402.
Picture
Capitol, **14**-4896
Nashville, Battle of, **7**-2442
Nasopharynx, *see* throat
Nassau. Capital of the British Bahama Islands, on New Providence Island.
Picture
sponge factory, **15**-5334
Nast, Thomas, artist
Picture
Portrait of General Grant, **7**-2432
Nasturtium. The name, coming from the Latin *nasus,* nose, and *tortus,* twisted, refers to the acrid odor and pungent taste. Botanically, a synonym for Rorippa, the Cress Family. Horticulturally it signifies a plant of the genus Tropæolum, familiar in gardens. The latter species bear conspicuous flowers of varying shades of yellow and red.
breeding hybrids, **14**-5081
Natal. South African eastern province, including Zululand; area, 35,000 square miles; capital, Pietermaritzburg. The soil is very fertile, sugar and other tropical produce being grown near the coast, and fruit and cereals on the uplands. Sheep and cattle are reared, and coal is mined. Durban is the largest port on the east coast of Africa.
joined Union of South Africa, **9**-3050
named by Vasco da Gama, **1**-83
Natali, for raising water, **7**-2544
Natchez, Mississippi
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Eliot's mission to Indians, **6**-2086-87
National Academy of Design, founding, **9**-3330
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National Airport, Washington, D. C.
Picture, **5**-1544
National Archives building, Washington, D. C.
Picture, **5**-1542
National Association of Audubon Societies, **8**-2814-15
National Flowers, **17**-6177
National Forests of United States, **8**-2804-05
National Gallery of Art, Washington, D. C., **5**-1543
Picture, **5**-1544
National Guard. This term, in the United States, refers to the militia of the various states. The National Guard is part of the Army of the United States; in case of war its members are subject to service in the field at the call of the President, who is the commander-in-chief of the Army.
National League, in baseball, **17**-6141
National Parks of U. S., * **7**-2281-91
* Wonderful Caverns, **4**-1298-1304
* Yellowstone National Park, **2**-728-33
Colonial National Historical Park, Va., **18**-6826
and bird sanctuaries, **8**-2814
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Hot Springs, Arkansas, **13**-4520
Yellowstone, **1**-158-59
National Transcontinental Railway, Canadian line, **4**-1488
Natural Bridge, Virginia
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Natural gas, **7**-2353-55; **13**-4742
Picture
diagram of rocky layers in which gas is found, **2**-516
Natural History, by Pliny the Elder, **16**-5918
Natural History of a Nut, The, * **12**-4434-40
Natural selection, as explanation of rise of new species of plants and animals, **3**-984; **4**-1388
Naturalism, in French literature, **18**-6718
in French painting, **7**-2475-80
Naturalists
* famous naturalists, **19**-7051-58
Naturalization. "The act of investing an alien (one born in another country) with the rights and privileges of a native-born citizen or subject." Most countries now grant naturalization after a term of residence in the country. In the British Empire the general law demands residence under the British flag or service under the British Government for five years out of the eight preceding the application. The last year must be spent in the place where the application is made. Married women take the nationality of their husbands. In the United States the term is continuous residence for at least five years, and the last year must be spent where the application is made. A "declaration of intention" must be filed at least two years before citizenship is granted. A married woman does not take the nationality of her husband. Only white aliens or those of African descent may be naturalized.
Nature
in English poetry, 18th century, **6**-2027-30
Wordsworth and his friends, **7**-2489-91
in French painting, **7**-2369-72
Question about
Why is so much of nature green? **2**-456-57
Nature Artists of France, * **7**-2369-76
Nature's Excavators, * **2**-385-89
Nature's wonderful family, * **1**-91-97
Nature's wonderful food, * **7**-2323-26
Nauru, island of Melanesia, **9**-3300
Nausicaä, princess of ancient Greece, **12**-4340, 4342
Nautical almanac, navigation aid, **17**-6406
Question about
What is the book called the Nautical Almanac? **2**-460
Nautilids, mollusks, **19**-6885, 6887
Poem about
The Chambered Nautilus, by Oliver Wendell Holmes, **9**-3337
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shells (in color), **19**-6896
Navajo Indians, **9**-3027
Pictures, **9**-3029; **19**-7239
Navajo Indian exhibit, American Museum of Natural History, **18**-6614
Naval Academy, U. S., *see* Annapolis
Naval Heroes of Young America, * **17**-6325-32
Naval Reserve. An organization which can be called into active service in time of war to reinforce the regular navy. The Reserve includes volunteers organized and trained for service, some seamen of the merchant marine and some mercantile vessels.
Naval stores, from pine trees, **8**-2873
Navarre, old kingdom and modern province in northern Spain; area 4,055 sq. mi. Cereal crops are grown; and minerals include iron, copper and rock salt. Chief town and capital is Pamplona.
Navel orange, **6**-2058-59
Navigation, of a ship, **12**-4417-18
* lighthouses, **10**-3577-81
* radar, **14**-5146-51
U. S. Coast Guard aids, **9**-3106
Navigation instruments, for airplanes, **1**-182-85
Navy of U. S., *see* United States—navy
Nazareth. Ancient town in Galilee, Palestine, the home of Jesus. In ancient times it was insignificant, but under its modern name, En Nasira, it had over 7,000 population in 1922, more than half Christians.
Nazi (National Socialist) party, of Germany, **12**-4172, 4181, 4183-84
Picture
Nazis on trial at Nuremberg, **12**-4184
Neagh, Lough. Largest lake in the British Isles, in Ulster, Ireland. 150 square miles.
Neagle, John, American painter, **9**-3330
Neale, John Mason (1818-1866), Church of England minister, poet and hymn-writer.
See also Poetry Index
Near East, territory in Western Asia
Picture
unleavened bread from, **1**-375
Nearsightedness, **11**-3805
Nebraska. One of the North Central states; area, 77,237 square miles; capital, Lincoln. Omaha is the largest city. Agriculture, stock-raising, meat-packing are the chief industries. Abbrevi-

Nebraska (*continued*)
ation, Nebr. Nickname, "Tree-planter State." State flower, goldenrod. Motto, "Equality before the Law." Nebraska is an Indian word meaning "wide river." First settlement, near Omaha, 1847. Population 1,228,218.
described in North Central States, **15**-5273-84; **16**-5653-60
Kansas-Nebraska Bill, **7**-2429
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Nebulae, masses of extremely thin gas, **9**-3038
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Great nebula, in Orion, **11**-3783
Horsehead nebula, in Orion, **11**-3786
Owl nebula, **11**-3789
Nebular Hypothesis, of origin of solar system, **1**-133, 135
Neckar. German river, one of the chief tributaries of the Rhine, which passes Heidelberg and joins the Rhine at Mannheim. 247 miles.
Necklaces
doll's, of beads, directions for making, **4**-1395
sealing wax, how to make, **8**-2875-76
Nectar, of flowers, **14**-5083
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nectar glands, **2**-508
Nectarine, kind of peach, **6**-2066
Needles
* history and manufacture, **9**-3040-42
how to float in water, **2**-623
how to thread, **1**-337
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Why is a needle no heavier when magnetized? **10**-3732
Needle-whin, flower
Picture (in color), **14**-4984
Nefertiti, queen of Egypt
Picture, **3**-816
Negritos. The name applied to the dwarf Negroes of Africa, the Oceanic Negroes of Malaysia, and certain of the Philippine Islands. The Andaman Islanders, the Samangs, and the Aetas are characteristic races outside Africa, while the Batwa pigmies south of the Congo are typical members of the African group.
tribe in Philippines, homes of, **12**-4445
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* outstanding American Negroes, **12**-4427-33
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Why is the skin of the Negro race black? **5**-1809
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Joshua Fit De Battle of Jericho, **16**-5743
Swing Low Sweet Chariot, **16**-5741
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Georgia school, **14**-4894
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Negros Island, Philippines
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Nehru, Jawaharlal, **8**-2837
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Neilsen, Kay
Story by
The Giant Who Had No Heart in His Body, **4**-1525-27
The Husband Who Was to Mind the House, **11**-3830-31
Nelson, Horatio, English admiral
* in wars against Napoleon I, **6**-2200-04
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at Battle of St. Vincent, **6**-2201
Nelson's good-bye to his Grandmother, by G. W. Joy (gravure), **6**-2209
on his flagship (gravure), **6**-2210
Nemesia, flower. *Picture* (gravure), **19**-7176
Nemesis, in mythology, **9**-3238
Nemophila
Picture, flower (gravure), **19**-7178
Neodymium (Nd). Chemical element. Atomic number 60; atomic weight 144.27. One of the rare-earth elements. *See* Rare-earth elements.
Neon (Ne). Chemical element. Inert gas (*see* Inert gases). Atomic number 10; atomic weight 20.183; melting point −248.7°C.; boiling point −245.9°C. The air contains only one part in 50,000 of neon. Neon is used in electric signs because of the brilliant orange-red color produced when an electric discharge passes through it.
neon signs, **1**-312
use in lamps, **7**-2636
Neoprene, synthetic rubber, **11**-4002; **12**-4359
NEP (New Economic Policy), of Russia, **16**-5848-49
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Neptune (Poseidon), god of the sea, **9**-3235
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Neptune, planet
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discovery, **11**-3857-58
Neptune's cup, variety of sponge, **19**-7060
Neptunium (Np). Chemical element. Atomic number 93. Neptunium can be made by bombarding uranium with neutrons or deuterons. It is radioactive and changes into plutonium, emitting electrons.
Nereids, in mythology, **9**-3235
Nero (Nero Claudius Cæsar Drusus Germanicus) (37-68 A.D.). Emperor of Rome from 54 to 68 A.D.
reign of, **4**-1245-46
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Nerves
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habit affects sensations, **8**-2718
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What happens when my foot goes to sleep? **15**-5643-44
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Nests of birds, **8**-2760
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How does a bird know how to build its nest? **2**-586
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Question about
What is it that makes a nettle sting? **1**-76
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stinging nettle, **14**-4980
Neurons, nerve cells, **9**-3059
Picture, **9**-3060
Nevada. Western state; area, 110,540 square miles; capital, Carson City. Largest city, Reno. It is mostly arid and barren, but has valuable silver, gold, copper, lead and other mines. Abbreviation, Nev. Nickname, "Sagebrush State." State flower, sagebrush. Motto, "All for our country." Nevada is a Spanish word meaning "snow-clad." First settlement, Genoa, 1850. Population 143,318.
described in Western States, **18**-6425-36; **19**-6841-50
Hoover Dam, **7**-2550
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Nevada (*continued*)
Pictures
flag (in color), **19**-7191
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Virginia City, **19**-6848
Nevins, Allan, American historian and writer, **14**-5018-19
New Aberdeen, Nova Scotia
Picture
coal mine, **3**-787
New Amsterdam, *see* New York (colony)
New Bedford, Massachusetts, seat of Bristol County, on Buzzards Bay at the mouth of the Acushnet River. In the past the city has been famous as a whaling port, but now it manufactures silverware, machinery, cut glass, silk and foundry products. It was settled in 1652 and was named in honor of the Duke of Bedford. Population, 110,308.
New Britain, island in South Pacific, **9**-3299
New Brunswick. Canadian eastern province; area, 28,000 square miles; capital, Fredericton. It has farming, fishing and lumber industries. St. John is a great port. Population 457,401.
history, separated from Nova Scotia, **3**-942-43
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fishing ship at Campbellton, **1**-109
pulp mill, Bathurst, **7**-2448
New Caledonia, island in South Pacific, **9**-3300
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native boy spearing fish, **9**-3300
New Deal, policy of Franklin D. Roosevelt Administration, **11**-3954c-3954d
New Delhi, capital of the Republic of India, in the northern part of the country. New Delhi is a modern city, having grown up since 1930. The old city of Delhi was so crowded that the new location was selected for the capital. The two cities are about five miles apart. Delhi is on the Jumna River and is noted for its ancient, beautiful temples. Trade in grain and fruits is important, and hand-made jewelry, gold and silver work and silk shawls are produced. New Delhi is primarily concerned with the affairs of the government. Population of Delhi, including New Delhi and suburbs, 521,850, of which about 100,000 live in New Delhi. *See also* **8**-2821
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pleasure resorts, commercial value, **12**-4149
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New England Confederation. A union of the colonies of Massachusetts Bay, Plymouth, Connecticut and New Haven effected in 1643 for the sake of defense against the Dutch and the Indians and lasting until 1684.
New England Council
successor to Plymouth Company, **2**-547
New England Primer, early New England school text, **14**-4952-53
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New English Art Club, influence of, **8**-2858
New France. Name given to the French possession in North America, otherwise known as Canada and Acadia.
* history, to year 1763, **2**-676-83
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New Granada, part of Peru
united with Colombia, **19**-6975
New Guinea, 9-3299
British territory in, **9**-3187
map, **9**-3190
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natives, **9**-3190
New Hampshire. New England state; area, 9,304 square miles; capital, Concord; largest city Manchester. Textile-manufacturing, boot- and shoe-making, wood-pulp and quarrying are the leading industries. Abbreviation, N. H. Nickname, "Granite State." State flower, purple lilac. New Hampshire was named after Hampshire, England. First settlement thought to have been made at Dover, about 1623. Population 460,851.
described in Northeastern States, **10**-3403-08; **11**-3773-82; **12**-4145-54
early history, **2**-556
on the eve of the Revolution, **3**-1042-43
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flag (in color), **19**-7190
Dartmouth College, **12**-4317
Dixville Notch, **12**-4151
Mount Washington, **10**-3404
New Haven. Second largest city and port of Connecticut, with hardware and cutlery industries.
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Pictures, **18**-6687-88
Yale University, **12**-4307
New Hebrides Islands, 9-3300-01
New Ireland, in South Pacific, **9**-3299
New Jersey. Eastern state; area, 7,836 square miles; capital, Trenton. Textiles, particularly silk, automobiles, machinery, phonographs, etc., are manufactured, the chief industrial centres being Jersey City and Newark; the latter is the largest city. Fruits and vegetables are extensively grown. Abbreviation, N. J. Nickname, "Jersey Blue." State flower, violet. Motto, "Liberty and prosperity." New Jersey was named after the island of Jersey. First settlement, Bergen, 1617. Population 4,234,463.
described in Northeastern States, **10**-3403-08; **11**-3773-82; **12**-4145-54
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New Jersey plan for Constitution, **20**-7585
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Atlantic City beach, **12**-4150
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Grover Cleveland's home, **19**-7195
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Princeton University, **12**-4318; **18**-6687
Trenton, airview of, **11**-3779
New London, Connecticut
Picture
Coast Guard Academy, **9**-3106
New Mexico. Mountainous Southwestern state; area, 121,666 square miles; capital, Santa Fé. Largest city, Albuquerque. Mining and stock-raising are carried on. Dry-farming is important. Abbreviation, N. Mex. Nickname, "Sunshine State" or "Spanish State." State flower, yucca. Motto, "Crescit Eundo" (It grows as it goes.) Mexico is an Aztec word which is the title of the Aztec national god. First settlement, Santa Fé, 1598. Population 533,982.
Carlsbad Caverns, **4**-1303-04
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adobe house, Santa Fé, **18**-6435
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Indian farmer, Pueblo ranch, **19**-7238
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Palace of the Governors, Santa Fé, **18**-6435
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New Netherland, Dutch colony
early history, **2**-549, 551
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New Orleans. Famous cotton port of Louisiana. Standing about 100 miles from the mouth of the Mississippi, it was founded in 1717 by the French, and still retains some of its French characteristics. Population 494,537.

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capture by Farragut in 1862, **7**-2436
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New South Wales. Oldest Australian state, colonized in 1788; area, 309,432 square miles; capital, Sydney. Population 2,600,847.
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New York (city). Commercial capital of America, and after London the greatest city and port in the world. Founded as New Amsterdam by the Dutch in 1621. The original city stood on Manhattan Island, between the Hudson and East rivers; but it also includes The Bronx, Staten Island, and the west end of Long Island. The Brooklyn suspension bridge and other bridges connect this part of the city with Manhattan. As a commercial and shipping centre New York is unrivaled in the western hemisphere; its huge skyscraper buildings and fine parks are famous. The population is very cosmopolitan, and includes more Jews and Irish than any other city in the world. Population 7,677,000.
* what one may see in New York, **17**-6206-19
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Bronx-Whitestone Bridge, **1**-32
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Cathedral of St. John the Divine (gravure), **18**-6686
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Chrysler Building, **17**-6214
City Hall, **17**-6207; **18**-6683
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Waldorf-Astoria Hotel, **8**-3011
Washington Arch, **17**-6211
Woolworth Building (gravure), **18**-6688
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New York (state). Middle Atlantic state; one of the original 13 states; area, 49,576 square miles. Largest city, New York; capital, Albany. The most populous state in the Union, it has extensive agricultural and mining industries, but manufacturing is easily the greatest. The Hudson and Mohawk rivers and the Erie Canal form a waterway between the Atlantic and the Great Lakes, and among the largest cities are Buffalo, Rochester and Syracuse. Abbreviation, N.Y. Nickname, "Empire State." State flower, rose. Motto, "Excelsior." Named for the Duke of York. First settlement, New York, 1613 or 1614, or else near Albany about the same date. Population 12,858,203.
described in Northeastern States, **10**-3403-08; **11**-3773-82; **12**-4145-54
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Vassar College, **12**-4308
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New York International Airport, known as Idlewild and located within Greater New York, is the largest airport in the world. It covers 4,900 acres, equal to about half of Manhattan Island. The Port of N. Y. Authority operates this airport, begun in 1942. First commercial flights began July 1, 1948.
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merino sheep, **15**-5574

New Zealand Alps, 7-2578
New Zealand flax, *see* Phormium
Newark, Canada, *see* Niagara, Canada
Newark. Largest city of New Jersey, manufacturing chemicals, jewelry, cutlery, leather, hardware, clothing and glass. Population 429,760.
Newbery Medal, yearly prize for American book
for children, **14**-4964
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Newbolt, Sir Henry, *see* Poetry Index
Newcastle-upon-Tyne. Coal-mining, industrial and shipbuilding centre and port, in Northumberland, England. The chief coal-market of the world, it has been an important place since the Middle Ages; there are a cathedral and remains of a Norman castle and walls.
Newfoundland
* account of, **9**-3267-75
claimed for England by Sir Humphrey Gilbert, **14**-5257
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Grenfell hospital at St. Anthony, **7**-2497
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Newlands, J. A. R., and grouping of elements, **12**-4291
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Old Stone Mill, **12**-4153
Newport News. Seaport of Virginia, on Hampton Roads. It has a fine harbor and one of the largest shipyards in the world.
Newport News, U. S. cruiser
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Newspapers
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experimenting with a prism, **2**-648
model of telescope made by, **17**-6364
Newts, lizard-like animals, **15**-5457
Picture, **15**-5458
Ney, Marshal Michel (1768-1815), French soldier; famous for his victories, under Napoleon, in Austria, Spain and Russia. After Waterloo, where he led the last charge of the Old Guard, he was tried and sentenced to death. There is a tale, never proved, that he escaped and found his way to North Carolina.
Ngami, Lake, Africa
discovered by Livingstone, **14**-5202
Ngauruhoe, Mount, volcano in New Zealand, **7**-2577
Niagara Falls. Stupendous falls of the Niagara River, which divides Ontario, Canada, from New York. The cataract over which 12 million cubic feet of water flow in a minute, is divided into two by Goat Island: the Horseshoe Falls on the Canadian side are 158 feet high, 2,550 feet across, and the American Falls are 167 feet high and 1,060 feet across. The force of the water wears away the edge of the Horseshoe Falls at the rate of 2½ to 4 feet a year. Electrical power is generated.
Picture, **1**-160
Niagara River
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Peace Bridge over, **1**-38
Nibelungenlied, or **The Song of the Nibelungs,** **1**-217
place in German literature, **17**-6266
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scene from, **17**-6266
Nicaragua. Republic of Central America; area, 51,700 square miles; capital, Managua. The most prosperous parts lie toward the Pacific, the Mosquito Coast on the east being marshy and unhealthy, though the jungles yield cedar, gums and medicinal plants. Population 1,013,946. *See* **11**-3824
Picture
cathedral in Managua, **11**-3821
Nice. One of the largest French Riviera towns, founded by the Greeks as Nicæa. The old town has narrow and picturesque streets; the new town has splendid boulevards.
won for France under Napoleon III, **12**-4412
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Nicephorus, Byzantine emperor
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Nicholas I, Russian tsar, **16**-5695-96
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Nicholas, St.
Story about
Santa Claus—The True Story of Father Christmas, **17**-6095-97
Nichols, Dale, American artist
Picture
The Christmas Tree, **6**-2095
Nicholson, William, British painter, **8**-2859
Nicholson, William, English printing-press designer, **9**-3388-89
Nickel (Ni). Chemical element. Gray metal. Atomic number 28; atomic weight 58.69; melting point 1455°C.; specific gravity 8.9. Nickel is obtained chiefly from Ontario, Canada, and forms many alloys useful for protection from rust, as well as for armor plate, burglar-proof safes and other purposes. Powdered nickel is a catalyst (*see* Catalysts) for converting raw oils into oleomargarine and fats used in soap-making.
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How did cobalt and nickel get their names? **13**-4596
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Nicol, Pegi, Canadian painter, **10**-3700-01
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Niger, African river
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traced to mouth by Lander brothers, **14**-5201
Nigeria, account of, **9**-3058
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Day Is Done, by Henry Wadsworth Longfellow, **4**-1274
Night, by William Blake, **4**-1269
Night-Piece, by Robert Herrick, **4**-1271
To the Night, by Percy Bysshe Shelley, **4**-1270-71
Winter Night, by John Greenleaf Whittier, **16**-5826
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Have things any color at night? **13**-4825
Is it darkest just before dawn? **10**-3476
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Nightingales, birds, account of, **9**-3140
Virginia nightingale, name for cardinal, **8**-2973

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Nightingale and Glow-Worm, by William Cowper, **14**-5241
Ode to a Nightingale, by John Keats, **3**-1007-09
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Nightjars, whippoorwills, **14**-5030
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Nightshade, plant, **15**-5395; **17**-6130
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Nightshade Family, in botany, **13**-4875
Nihau, one of Hawaiian Islands, **15**-5448
Nijni-Novgorod (Gorki). Russian commercial city on the Volga, famous for its fairs.
annual fair at, **6**-2070-71
Nike, Greek goddess of victory, **9**-3234
See also Victory, Statues of
Nile. Longest African river, draining 1,100,000 square miles. Rising in Lake Victoria Nyanza, it flows through the Sudan and Egypt into the Mediterranean, which it enters through a wide delta. Its value to Egypt is immense, for its summer flood annually fertilizes a vast area of land. Surplus water is conserved for irrigation by the Assuan Dam, and a still larger dam is being built on the Blue Nile at Sennar in the Sudan. When the Nile is high, it is navigable up to Gondokoro, 2,900 miles from its mouth, but otherwise six cataracts prevent navigation between Assuan and Khartoum. The Bahr el Ghazal, Blue Nile and Atbara are its chief tributaries; Khartoum, Omdurman, Wadi Halfa, Assuan, Assiout, Cairo, Damietta and Rosetta stand on its banks. 4,000 miles.
course and area drained, **2**-469
source discovered by Speke and Grant, **14**-5204
source of Blue Nile found by Bruce, **14**-5201
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Nile, Battle of the, **6**-2202
Nile crocodile, **14**-5227
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Nile Valley, Egypt, agriculture, **3**-808
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Nilgai, Indian antelope, **4**-1445
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Nîmes. Ancient cathedral city of Languedoc, France, famous for its Roman remains. Its chief ancient monuments are a mausoleum, baths, two gateways and an amphitheatre to seat 20,000 spectators; close by is the Pont du Gard, the most perfect existing Roman aqueduct. Nîmes manufactures silk and cotton goods, boots, carpets and shawls.
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Maison Carrée (gravure) **15**-5351
Pont du Gard, Roman aqueduct (gravure) **15**-5351
Nîmes, Temple of
Picture, **8**-3010
Nimitz, Chester William (1885-). Chief of Naval Operations, the highest ranking admiral in the Navy. He was promoted to this rank in December, 1945. For the four previous years he was commander-in-chief of the United States Pacific Fleet, with headquarters in Hawaii, and thus had direction of all naval action against the Japanese. He and Admiral Halsey both deserve credit for the terrific naval bombardment of the coast of Japan that immediately preceded the end of the war.
Niña, Columbus' ship
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Ninebark, note and picture, **15**-5607
Nineveh, city of Assyria
architecture, **14**-5209
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libraries of clay books, **2**-658
Picture
Palace of Sennacherib, **14**-5207
Ningpo. Great port of central China, on the Yung. Famous for its temples, pagodas, stone bridges, library and gold and silver work.
Niobe, statues of, **12**-4330
Picture
Niobe shielding her youngest daughter (gravure), **12**-4336
Niobium (Nb), formerly called columbium. Chemical element. Gray metal. Atomic number 41; atomic weight 92.91; melting point 1950°C.; boiling point 2900°C.; specific gravity 8.4. Discovered in 1801 in England in a mineral that had been sent over from America. Niobium is added to stainless steel to give added protection from rust.
Nipigon, Lake. In the province of Ontario, Canada. 1,730 square miles in area.
Nipple-wort, flower
Picture (in color), **14**-4996
Nirvana, in Buddhist religion, **9**-3086-87
Nitidulidae, family of beetles, **18**-6626-27
Nitrates. The salts of nitric acid. Some nitrates are used for medicinal purposes. Some are used in the manufacture of indelible ink, some in fireworks and some in photography. Nitrate of soda (sodium nitrate) is valuable as a fertilizer, restoring nitrogen to the soil.
Chilean deposits, **19**-7041
table showing world production, **18**-6635
Pictures
being loaded into railroad cars, **18**-6635
nitrate plant, **17**-6205
storage tanks in Chile, **18**-6784
Nitric acid (HNO_3). An acid obtained by the distillation of sulphuric acid and sodium nitrate mixed together. In a pure state it is a colorless liquid with a strong and unpleasant smell and a corrosive effect on animal and vegetable matter. It is a powerful oxidizing agent. In nature it is found in combination with potash, soda, lime and magnesia. In the arts it is known as aqua fortis, and is used for etching on copper and steel. Industrially it is used in making coal-tar dyes, explosives, etc.
Nitrocellulose, form of cellulose, **8**-2752
Nitrogen (N). Chemical element. Colorless gas, forming ⅘ of the air. Atomic number 7; atomic weight 14.008; melting point −210°C.; boiling point −196°C. It is essential for life; the human body is 3% nitrogen. Nitrogen forms nitric acid HNO_3, and ammonia, NH_3, and these and other nitrogen compounds are used as fertilizers and explosives, and for many other industrial purposes.
chemical properties, **16**-5664
in chemical cycle in nature, **17**-6204-05
nitrogen-fixing bacteria, **2**-663
plants that give it to soil, **5**-1627
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Nitroglycerine; more properly, **glyceryl trinitrate** ($C_3H_5(NO_3)_3$). A liquid, heavy, oily and highly explosive, in a pure state colorless; produced by the action of a mixture of nitric and sulfuric acids upon glycerine. Though in the open it burns quietly, under percussion or when heated in a closed vessel it explodes, setting free gas of about 10,000 times its own volume. Combined with a clay it makes dynamite for blasting; poured upon cotton, guncotton for ammunition, etc.
Nitrous oxide (N_2O). A gas, colorless, transparent, slightly sweet of taste and odor. It is more generally known as laughing gas, a name formerly given because of its effect upon behavior and facial expression when inhaled in small quantities. Larger quantities cause unconsciousness and insensibility to pain.
as anæsthetic, **8**-2729
Niven, Frederick, Canadian novelist
Picture, **14**-5113
Noah. A patriarch of Bible times, whose life story is told in Genesis v-ix. In the great Deluge he saved his family and many animals (two of each kind) in the ark which he had built at the direction of God.
Picture, Noah's Ark, **11**-3913
Nobel, Alfred, Swedish inventor, **19**-7212-13
Picture, **19**-7213
Nobel Prizes. Annual awards (withheld during World War II) made to persons who work for the benefit of humanity in physics, chemistry, medicine, literature and peace; established by the will of Alfred Nobel, Swedish inventor of dynamite, who died in 1896.
list of some Nobel Prize winners in science, **3**-995-96; **4**-1234

Nobile, Umberto. Italian navigator, airship constructor and flier. Born, Italy, 1885. Built the Norge and was one of the leaders in the Amundsen-Ellsworth-Nobile successful trans-Polar flight, May, 1926. *See* Norge.
Noble gases, chemical elements, **1**-150-51; **15**-5372
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Noguchi, Hideyo, physician, studies in yellow fever, **15**-5489-90
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in his laboratory, **15**-5489
Noises, comparative intensity of common noises, **10**-3633-35
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Nolan, Philip, character in The Man without a Country, **7**-2401-08
Nom de plume. French for pen name; assumed name or pseudonym.
Nombre de Dios, early Spanish port on Isthmus of Panama.
Sir Francis Drake's attack on, **14**-5258
Nome, Alaska
gold mines, discovery, **16**-5790-91
Non-intercourse Act. Passed by the U. S. Congress in 1809, this act prohibited French and British merchant vessels from entering U. S. ports, and goods produced in the two countries from being imported. It was one of several acts passed in an effort to make the French and British stop interfering with American shipping and to keep the U. S. out of the war in Europe. Nevertheless, the problem was settled only by the War of 1812.
Nonpareils (painted buntings), birds, **14**-5032
Non-partisan League. A league formed among the farmers of North Dakota in 1915, and now recognized as a strong political influence in that state, South Dakota, Minnesota and other Northwestern states. The measures it advocates include state ownership of banks, mills, etc.
Nonius, Roman senator, famous opal of, **19**-7233
Nordenskjöld, Nils Adolf Erik, Baron, arctic explorer, **8**-2989
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Nordhoff, Charles, American writer, **14**-5011-12
Norfolk. Port of Virginia, on an arm of Chesapeake Bay. Lumber, fruit, grain and cotton are the principal exports.
Norfolk Island. British Pacific island, about 400 miles from New Zealand. The descendants of the Bounty mutineers were brought here from Pitcairn Island in 1856, but some of them returned.
Norge, airship
Picture
at Spitzbergen (gravure), **13**-frontis.
Norman architecture, *see* Architecture, Norman
Norman Conquest of England, *see* England—history
Normandy. One of the most important of the old French provinces, bordering the English Channel. At the beginning of the 10th century it was seized by the Northmen under Duke Rollo; their descendants invaded England with William the Conqueror, Normandy being united with England up to 1204. It was twice reconquered during the Hundred Years' War, the French finally regaining it in 1450. Among its towns are: the old capital city of Rouen; the important ports of Havre, Cherbourg and Dieppe; and the watering-places of Trouville, Etretat and Deauville. It contains also the beautiful old towns of Lisieux, Caen, Bayeux, Falaise, the birthplace of William the Conqueror, and Mont St. Michel.
invasion of, World War II, **18**-6457
Normans in southern Italy, **12**-4408
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Norris, Kathleen, American novelist, **13**-4818
Norris Geyser Basin, Yellowstone National Park
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* of eastern part, **17**-6272-82; **18**-6576-81
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North America Before White Men, * **1**-240-54
North America nebula, 11-3785
North Atlantic Pact, *see* Atlantic Pact
North Borneo, 9-3186-87
North Cape. Headland on the island of Magerö, in the extreme north of Norway. It is frequently visited by tourists in the summertime to see the midnight sun.
North Carolina. South Atlantic state, partially explored by Raleigh's expedition in 1584; area, 52,712 square miles; capital, Raleigh. Largest city, Winston-Salem. Corn, cotton, tobacco, wheat, sweet potatoes and oats are extensively produced; first state in manufacture of tobacco, and second in cotton. Lumbering and furniture-manufacturing are important. Wilmington, the chief port. Abbreviation, N. C. Nickname, "Old North State" or "Turpentine State." Flower, goldenrod. Motto, "Esse quam videri" (To be, rather than to seem). The Carolinas may have been named for Charles IX of France by Jean Ribault in 1562, or they may have been named in honor of King Charles I of England. First settlement thought to have been made on Albemarle Sound, 1653. The population of the state is 3,637,975.
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state of Franklin, **6**-1908
signers of Constitution, **20**-7600
slow to ratify Constitution, **20**-7586
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Capitol at Raleigh, **14**-4896
chapel on Roanoke Island, **2**-542
farm in coastal region, **13**-4518
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picking cotton, **13**-4522
raising peanuts, **13**-4523
stalactites in Linville Caverns, **13**-4528
tobacco factory, **14**-4889
North Carolina, U. S. battleship
Picture, **18**-6824
North Carolina, University of
Picture, **14**-4895
North Central States: Part I, * **15**-5273-84
North Central States: Part II, * **16**-5653-60
North Channel. Channel dividing Ireland from Scotland and connecting the Irish Sea with the Atlantic.
North Dakota. Northern prairie state; area, 70,665 square miles; capital Bismarck. Largest city, Fargo. Wheat-growing and stock-raising are carried on; and grain and dairy products are manufactured. Abbreviation, N. Dak. Nick-

North Dakota (*continued*)
name, "Flickertail State" or "Sioux State." Flower, wild prairie rose. Motto, "Liberty and Union, one and inseparable, now and forever." Dakota, a Sioux word, means "alliance of friends." First settlement, Pembina, 1812. Population 542,652.
described in North Central States, **15**-5273-84; **16**-5653-60
Pictures
flag (in color), **19**-7191
Lower Souris Refuge, **8**-2817
North Island, New Zealand, *see* New Zealand
North Pole
* search for, **12**-4227-44
first attempt to reach by air, **1**-346
See also Arctic regions
Picture (gravure), **13**-frontis.
North Pole Men, The, * **12**-4227-44
North Sea. Branch of the Atlantic lying between Great Britain and the Continent. Its average depth is only 120 feet in the south and 350 feet in the north; it contains the Dogger, Jutland and Great Fisher banks, on all of which vast numbers of cod and herring are caught. Commercially it is of immense importance, its great ports including Aberdeen, Dundee, Leith, Newcastle, Sunderland, Hull, Grimsby, London, Antwerp, Rotterdam, Amsterdam, Bremen, Hamburg, Göteborg, Oslo and Bergen.
North Sea Canal, Holland, **15**-5564
North Star
position in the sky, **11**-3921, 4043-45
North West Company, early fur-trading organization in Canada, **3**-941; **13**-4690-91
Northampton, Massachusetts
Picture
Smith College, **12**-4316
Northeastern New Guinea, United Nations Trusteeship, **9**-3189
Northeastern States: * **10**-3403-08; **11**-3773-82; **12**-4145-54
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harpers' meeting in Belfast, **8**-2937
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flax drying, **8**-2940
Londonderry, **8**-2943
Parliament buildings, Belfast, **8**-2944
pulling flax, **9**-3317
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origin of, **7**-2634
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as shown at Hayden Planetarium, **19**-7222
Northern Pacific Railway
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railroad building in the west, **6**-1922
Northmen, **15**-5290-91
Arctic explorations of, **12**-4230
in England
invasion of England, **5**-1569-70
in Ireland, **8**-2937-38
in North America, before Columbus, **1**-244; **2**-391, 676; **9**-3268
in Russia, **16**-5691
ships, **11**-3913, 3915
Picture
landing in North America, **2**-391
See also Vikings; Danes
Northwest Passage, **8**-2977-89; **12**-4232, 4234
Frobisher's search for, **14**-5256
Northwest Territories, Canada
became part of Dominion, **4**-1485
description, **7**-2558-61
government, **7**-2559
work of mounted police, **16**-5831-38
Pictures
airplane dock at Aklavik, **10**-3532
camp of tents at time of gold rush, 1898, **16**-5833
Northwest Territory, U. S. history, **6**-1909, 1911
Northwestern University, Evanston, Illinois
Picture, **19**-7124
Norton, Mrs. Caroline Sheridan, *see* Poetry Index
Norway. Kingdom of northern Europe; area, 125,000 square miles; capital, Oslo (formerly Christiania). It consists largely of mountain tablelands, and only three per cent of its area is fit for cultivation, oats, barley, rye and potatoes being the chief crops. Fishing is the chief occupation, the cod, smelt and sprat fisheries being very important; but the dairy-farming, timber, iron-ore, paper and pottery industries are increasing. The greater part of the population lives along the coast or on the fiords, the large towns of Bergen, Stavanger, Trondhjem and Drammen all being ports. Norway formed part of Denmark from 1397 to 1814, when it was united with Sweden. Became a separate state in 1905. Conquered by Germany in April-May, 1940; liberated 1945.
* description, **15**-5299-5303
* history, **15**-5290-94
in World War II, **18**-6452-61
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literature, *see* Scandinavian literature
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population, **15**-5300
Pictures
Geiranger Fiord, **3**-1028
See also starred articles above
Norway maples
Picture
seeds, **11**-4095
Norway spruce, *see* Spruce trees
Norwich school of painters, **6**-2230
Nose, structure of, **4**-1325-26; **10**-3554-56
sense of smell, **6**-2249
sneezing, **2**-687
Notary public. In law, a public officer with legal authority to put into writing deeds, contracts, etc., and to authenticate them or certify their accuracy, usually under an official seal; also to take affidavits and administer oaths.
Notre Dame, cathedral, Paris, **17**-6158
Pictures, **1**-72; **10**-3432; **12**-4469; **17**-6168
Nottingham. Capital of Nottinghamshire, England. Famous especially for its lace industry, it also has considerable tobacco, engineering and leather trades, a historic castle and a Roman Catholic cathedral. Here Charles Stuart set up his standard in 1642.
Notus (Auster), south wind, in mythology, **9**-3234
Noun. In grammar, a word that gives the name of anything. It is a part of speech used as the subject or the object of a verb, or governed by a preposition.
Nova Scotia. Canadian eastern maritime province; area, 21,500 square miles; capital, Halifax. Much fruit is grown, the Valley of Annapolis alone exporting millions of barrels of apples a year; dairying is important and the wool clip exceeds a million pounds weight. Around Sydney, Cape Breton Island, there are important coal mines, while Halifax is a great port for transatlantic liners. Population 577,962.
history
settled partly by Loyalists, **3**-942
Pictures
capture of Louisbourg in 1758, **2**-683
coal mine, **3**-787
tuna-fishing, **11**-4055
Novæ. Stars which suddenly increase greatly in brilliance and then gradually fade out again.
Novelists, *see* Fiction, *also* names of novelists
November. The eleventh month in our year, consisting of 30 days. In the old Roman year it was the ninth month, the name coming from Latin *novem,* nine.
Poem about
November in England, by Thomas Hood, **4**-1517
Novgorod. *See* Nijni-Novgorod (Gorki)
Novial, an artificial language, **5**-1622
Novikov, Nicholas, Russian writer, **19**-6905
Novocain, anesthetic, first produced in 1905, **16**-5939
Noyes, Alfred, British poet, **12**-4208
Noyon. Ancient French city on the Oise, with a fine 12th-century cathedral. It was a residence of Charlemagne and the birthplace of Calvin.
Picture
cathedral (gravure), **17**-6171-72
Nuclear energy, *see* Atoms
Nucleus
of atoms, **1**-307, 309-10
chromosomes, **15**-5616-17
Nullification and states' rights
Calhoun's belief about, **10**-3494

Numbers
in flag-wagging, **11**-4013-14
trick with numbers, **2**-750
Questions about
How much is a billion? **2**-688
Why do we count in tens? **18**-6554-55
See also Arithmetic
Numbers and cities, game, **19**-7084
Numidia. Ancient kingdom of northern Africa, corresponding roughly to modern Algeria. It was originally divided among various tribes, but these were united after the Second Punic War under Masinissa. Several of Numidia's rulers, particularly Masinissa and Jugurtha, were famous figures in Roman history. Numidia became a Roman province in 46 B.C.
Numismatics, study of coins, *see* Coins
Nuño, Jaime D., Spanish music composer, **10**-3608
Nuremberg. Second largest Bavarian city, famous for its manufacture of toys. Despite its commercial importance, it is extremely picturesque, and has medieval houses, churches and walls. No other large city in Germany possesses so picturesque an aspect.
Frauenkirche, and its clock, **17**-6161
Pictures
medieval houses, **6**-1979
trial of nazi leaders, **12**-4184
"Nuremberg egg," earliest type of watch, **7**-2387
Nurse, first scientific, Florence Nightingale, **16**-5704-06
Nursery rimes, *see* Poetry Index for first lines and titles
Nut, *see* Nuts
Nutcrackers, birds, account of, **8**-2891-92
Clark's, account of, **14**-5140
Picture
Clark's nutcracker, **14**-5136
Nutgalls, develop on oak trees, **9**-3151
Nuthatches, birds, **9**-3136, 3138; **13**-4764; **14**-5138
Pictures, **13**-4837; (in color), **9**-3131
Nutmegs, **8**-2993-94
Pictures, **8**-2992; (in color), **8**-2998
Nutria (coypu rat), **3**-1133
Picture, **3**-1132
Nuts
* account of, **12**-4434-40
food value of, **5**-1625
regions where grown, **7**-2541
trick with, **12**-4380
Pictures, see starred article
Nuuanu Pali, cliff in Hawaii
Picture, **10**-3587
Nux vomica, tree, **8**-2912
Picture
flower and fruit (in color), **8**-2999
Nyala, an antelope, **4**-1415
Nyasa, Lake. Southernmost and third largest of the great lakes of Central Africa, lying between Nyasaland, Portuguese East Africa and Tanganyika Territory. 11,000 square miles in extent, it is 350 miles long, its greatest breadth being 45 miles.
discovered by Livingstone, **14**-5202
Nyasaland, **9**-3053
Nylon, synthetic fiber
chemical make-up and uses, **15**-5572
Pictures
brush bristles of nylon, **11**-3999
in process of manufacture, **15**-5572
stockings made of nylon, **11**-4003

OK, origin of expression, **7**-2486
O Canada, national anthem
writing of, **10**-3608-09
***O.* Henry (William Sydney Porter),** American short-story writer, **13**-4819-20
Picture, **13**-4814
Oahu, one of Hawaiian Islands, **15**-5447-48
Oak Ridge, Tennessee
Picture
atomic-bomb plant, **16**-5811
Oak trees
account of cork oak, **9**-3152
* description and varieties, **12**-4245-46
galls produced by wasps, **17**-6232
Oak trees (*continued*)
how nutgalls develop on, **9**-3151
live oaks, **13**-4637
pin oak, **12**-4510, 4512
white oak, **13**-4640
wood of, how to identify, **15**-5336
used for furniture, **18**-6774
Pictures, **4**-1282; **12**-4247, 4253, 4509
leaves of black oak, **12**-4246
live oaks, **1**-161
sprouting acorn, **2**-504
Turkey or moss-cupped, fruit of (in color), **11**-4028
white-oak acorns, **11**-4093
Oakeley, Canon Frederick, *see* Poetry Index
Oakland. City 6 miles across the bay from San Francisco, California. Beautifully situated, with a fine climate, Oakland has also a large commerce as a railroad terminus and as a shipping center. Its chief industries are shipbuilding, marble working, smelting, planing, fruit-canning and windmill factories.
bridge, **1**-37, 39
Oakland Bridge, *see* San Francisco-Oakland Bridge
Oakley, Annie (1860-1926) born in Ohio. Noted for her marksmanship, she was a dead shot from a very early age. She became a feature in vaudeville acts, later joined Buffalo Bill's Wild West Show and became a favorite performer in England and the continent of Europe.
Oarfish, **16**-5899
Picture (in color), **16**-5787
Oases
Pictures, **18**-6736, 6738, 6740
in Algeria, **2**-467
in Libya, **18**-6803
Oat-grass, fodder-grass, **7**-2410
Pictures, with note, **10**-3655; (in color), **10**-3522
Oats, account of, **5**-1851, 1853
U. S. crop of, **8**-2679
Pictures, **5**-1850, 1853
Obelisks, in Egypt, **3**-816; **14**-5212
in London (Cleopatra's needle), **14**-5212
Pictures, **3**-815
in Central Park, New York city, **17**-6216
Oberammergau, Germany
Passion Play, **18**-6557
Picture, **12**-4155
Obi. Great Siberian river, rising in the Altai Mountains and flowing into the Arctic Ocean. With the Irtish, it drains 1,125,000 square miles, and measures 2,500 miles.
Oboe, musical instrument, **4**-1291
Obregón, Alvaro, president of Mexico, **11**-3820
Observatories
* description of astronomy observatory, **17**-6370-73
Pictures, **17**-6370-73
Occleve, Thomas, early English writer, **2**-721
Occupations
* choosing a vocation in the U. S., **16**-5992-96
Ocean
depth of, **1**-281; **3**-875-76
wears away land, **2**-388
Poems about, **6**-2148-54
Questions about
How many oceans are there? **15**-5518
What is it like under the sea? **15**-5465-67
See also Sea
Picture
chart of ocean currents (color), **16**-6028
Ocean currents, *see* Sea—currents
Ocean spray, shrub, description, **19**-6934
Ocean Weather Stations, U. S. Coast Guard service, **9**-3105
Oceania
* islands of the South Seas, **9**-3294-3304
islands, list of, with area and population, **9**-3303-04
list of famous volcanoes, **6**-2056
map, **9**-3296
See also Australia; Micronesia; New Zealand; Polynesia; South Seas
Pictures
island life, **9**-3294-3302
Oceanus, in mythology, **9**-3235
Ocelot, animal. *Picture,* **2**-490
Ochre. A natural earth in which iron is mixed with earthy material. It is commonly red, reddish brown or yellow, and is used as a pigment in making paints.

Ochs, Adolph S., American publisher
Picture, **19**-7166
Ochtmann, Leonard, American painter, **10**-3512
O'Connell, Daniel, Irish patriot, **8**-2943
Octane rating, of gasoline, **13**-4753
Octave, in music, **19**-6898
Octavius, Gaius, *see* Augustus (Gaius Octavius)
October. The tenth month in our year, consisting of 31 days. It was the eighth month in the old Roman year, from Latin *octo*, eight.
Poem about
October, by John Murray Gibbon, **18**-6653
Octopods, mollusks, **19**-6885, 6887
Picture, **19**-6888
Octopus, account of, **16**-5898
luminous, **15**-5540
Pictures, **1**-48; **16**-5895
Ode, verse form, **19**-6986
Ode on the Morning of Christ's Nativity, by John Milton
note on, **4**-1236
Odes, The, poems by Horace, **16**-5916
Odessa, city in Russia, **16**-5857
Odoacer, Teutonic conqueror of Rome, **4**-1253
submission to Byzantine Empire, **4**-1316
O'Donnell, Hugh, sixteenth-century Irish patriot, **8**-2941
Odysseus, *see* Ulysses
Odyssey, story by Homer
adaptation, **12**-4337-42
account of Homer, **16**-5747-48
Oersted, Hans Christian. Danish electrician and physicist, discoverer of electromagnetism; born, Rudkjöbing, 1777; died, 1851.
work in electricity, **11**-3984, 4090; **12**-4199; **17**-6236
Picture, **17**-6235
Of Human Bondage, novel by Maugham
comment on, **11**-4106
Offenbach, Jacques, French composer, **19**-6920
O'Flaherty, Liam
Story by
The Wild Goat's Kid, **1**-201-03
Oglethorpe, James Edward. English general and colonizer; born, London, 1696; died, Cranham Hall, Essex, England, 1785.
founded Georgia, **2**-554
Picture
with Indians, **2**-554
Oh Little Town of Bethlehem, Christmas Carol written by Phillips Brooks, **10**-3603-04
O'Hara, John, American writer, **14**-5015
O'Higgins, Bernardo, South American patriot, **13**-4586-87; **19**-7037
Picture
portrait in group, **19**-7038
Ohio. State bordering on Lake Erie; area, 41,222 square miles; capital, Columbus. Largest city, Cleveland. One of the richest states in the Union; agriculture is important, but it has 12,000 square miles of coal-fields, much oil, and large iron, glass, pottery and textile industries. Among other important cities are Cincinnati, Toledo, Akron, Dayton and Youngstown. Nickname, "Buckeye State." State flower, scarlet carnation. Motto, "Imperium in imperio" (An empire within an empire). Ohio is an Iroquois word meaning "great." First settlement, Marietta, 1788. Population 6,886,316.
described in North Central States, **15**-5273-84; **16**-5653-60
early history (arranged chronologically)
claimed by France, **3**-780
Ohio Company formed, **3**-780
first settlements, **6**-1909
hardships of early settlers, **6**-1909, 1911
made a state, **6**-1911
Pictures
Antioch College, **18**-6601
Camp Fire Girls, **14**-5061
Cincinnati and Cleveland, **16**-5655
coal miners, **3**-792
early travel on Ohio River, **6**-1909
flag (in color), **19**-7190
Ohio River. Chief left-bank tributary of the Mississippi, formed by junction of the Allegheny and Monongahela. Its basin is one of the chief American industrial areas, and it passes Pittsburgh, Cincinnati, Louisville, Evansville and Cairo. 975 miles.
Picture
early travel on Ohio River, **6**-1909
Ohio Valley, claimed by French and English, **3**-780
Öhlenschläger, Adam, Scandinavian poet, **19**-7011
Oil
* petroleum (mineral oil), **13**-4739-58
as fuel for ocean-going vessels, **17**-6403
by-products from petroleum, **2**-638
Picture, **2**-634
drying oils from plants, **9**-3154-55
eucalyptus, *see* Eucalyptus oil
from cottonseed, **2**-640
from plants, **9**-3154
in paint manufacture, **13**-4867
linseed, *see* Linseed oil
lubricating, from petroleum, **13**-4753
non-drying oils from plants, **9**-3155
volatile oils in flowers, **10**-3734
See also Petroleum
Questions about
How does oil make a rough sea calm? **2**-463
What is the difference between fat and oil? **19**-7248
Why does oil not mix with water? **2**-685-86
Why does oil burn more easily than some other things? **6**-2186
Why does oil float on the surface of water? **2**-686
Picture
oil refinery, Kansas, **15**-5282
Oil-birds, **9**-3374
Oil of cloves, **8**-2994
Oil of pimento, **8**-2993
Oil painting
first use in Venice, **4**-1460-61
method of early Venetian painters, **3**-1104
Oil-palm, *see* Palms
Okapi, animal, **4**-1447-48
Picture, **4**-1448
O'Keeffe, Georgia, American painter, **10**-3518
Picture
Cow's Skull and Roses, **10**-3518
Oklahoma. South-central state; area, 69,919 sq. mi.; capital and largest city, Oklahoma City. Formerly called Indian Territory, but Indians now compose only about one-twentieth of the population. Much oil and zinc are produced. Agriculture and stock-raising are important. Abbreviation, Okla. Nickname, "Sooner State." State flower, mistletoe. Motto, "Labor omnia vincit" (Labor conquers all things). Oklahoma is a Choctaw word for "red people." Population 2,168,066.
described in Southern States, **13**-4517-28; **14**-4889-4900
Platt National Park, **7**-2287
Pictures
Camp Fire Girls at Ardmore, **14**-5065
oil derricks, **13**-4527
Oklahoma City. Capital of the state of Oklahoma, and also the largest city, situated on the north fork of the Canadian River. The city is the center of an oil-producing, farming and stock-raising region. It has meat packing plants, flour and grist mills, oil refineries, cottonseed oil mill, poultry and egg packing plants, machine shops, soap and cracker factories, printing and publicity houses. Population 204,424.
Pictures, **14**-4898
Olaf, St., king of Norway, **15**-5293
Olaf of Orchard Farm (story), **12**-4301-05
Old and New Turkey, * **13**-4797-4810
Old Curiosity Shop, The, novel by Dickens
Picture
Little Nell and her grandfather, **8**-2735
Old empires and new Europe, * **12**-4459-70
Old Faithful, geyser, **2**-732
Picture, **2**-728
Old-field-larks, *see* Meadowlarks
Old Folks at Home, song
Picture
illustration for, **18**-6511
Old Glory, name for U. S. flag, **19**-7184
Old Ironsides (Constitution), early American naval vessel, **5**-1703; **17**-6328
Pictures, **17**-6325
battle with Guerriere, **5**-1704
Old Mortality, by Walter Scott, note on, **11**-4071
Old North Church (Christ Church), Boston, Mass., dating from 1723, is the oldest ecclesiastical building in the city. Its tower is famous as the place where the signal appeared on the night of Paul Revere's historic ride.
Picture, interior, **18**-6685

Old Oaken Bucket, The, song
origin of, **18**-6512
Old Pretender, *see* Stuart, James Francis
Old red sandstone, name for Devonian rocks, **4**-1175
Old Time Spelling Bee, An (story), **14**-5193-96
"Old Tom Peabody," sparrow, national bird of Canada, **13**-4835
Oldfield, plant, **14**-4978
Olefins, series of hydrocarbons
chemical definition, **16**-5948
composition and structure, **16**-5942-43
Oleomargarine, substitute for butter, **7**-2324
Olfactory bulb, special organ of smell, **10**-3556
Oligocene epoch, *see* Geology—Oligocene epoch
Oliphant, M. L. E., British scientist, **14**-5147
Oliphant, Margaret Oliphant, Scottish novelist, **11**-3899
Olive Oil. Oil obtained by pressing ripe olives. It is non-drying and is of a yellowish or yellowish green color. In countries where the olive grows the oil is much used for cooking. Some other uses are for making salad-dressing, lubricating, lighting, making toilet soap, etc.
Oliver, Isaac, British painter, **6**-2000
Picture
Portrait of Earl of Essex, **6**-2003
Olives, grown in California, **6**-2066
Picture
olive grove near Sparta, Greece, **14**-5041
Olivine, *see* Peridot
Olm, salamander
description, **15**-5458
Olympia. Capital of the state of Washington on the southernmost inlet of Puget Sound, it is the port for a great area, rich in timber, agricultural and mineral resources. The oyster industry is extensive. Much fruit is grown in the district.
Olympians, twelve principal gods
list of, **9**-3226
Olympic games
influence on sculpture, **12**-4216
Questions about
What are the modern Olympic games? **10**-3769-70
What were the ancient Olympic games? **10**-3769
Pictures, **10**-3769-70
Olympic National Park, Washington, **7**-2283
Olympus, Mt., regarded by Greeks as home of gods, **9**-3226
Omaha. Largest city of Nebraska, with meat-packing, smelting, railway and engineering industries.
industries of, **16**-5659-60
Oman, map, **18**-6671
Omar Khayyám, Persian poet and scientist, **15**-5463
as astronomer, **11**-3845
Omega Centauri, globular cluster of stars
Picture, **11**-3785
Omiak, Eskimo canoe, *see* Umiak
Omphalodes
Picture
flower, **19**-7175
Onager, wild ass, **6**-2019
Picture, **6**-2019
One Hundred Associates, Company of, 2-679
One Nation, Indivisible, * **8**-2669-80; (Part II), **9**-3206-20
O'Neill, Hugh, sixteenth-century Irish patriot, **8**-2941
Onions
account of, **7**-2624
Question about
Why does an onion make our eyes water? **11**-3841
Pictures, **7**-2621
field of, **13**-4734
onion-seller in Bucharest, **14**-5047
Ontario. Most populous Canadian province; area, 412,582 square miles; capital, Toronto. It has immense agricultural resources, producing about half the milk, butter and cheese of the Dominion and more than half the fruit, while forests cover 170,000 square miles. Gold, silver, nickel, iron and copper provide great mineral wealth; and manufactures, at Hamilton especially, are important. Here are Ottawa, the Federal capital, London, Brantford, Windsor and other flourishing cities. Population 3,787,655.
French population of, **8**-2949-50
Ontario (*continued*)
history
settled by Loyalists, **3**-942
as Upper Canada, 1791-1840; **3**-943-46
development as part of the Dominion, **4**-1488
Pictures
apple orchard in bloom, **1**-106
French River, **10**-3698
nickel mine in Sudbury district, **1**-109
Ontario, Lake. Smallest and easternmost of the five Great Lakes; area, 7,540 square miles. Forms a part of the boundary between the United States and the Dominion of Canada. Lake Ontario has many good harbors. It is subject to violent storms and heavy swells.
Ontario Society of Artists, The, 10-3703
Opah, fish
Picture (in color), **16**-5781
Opal
account of, **19**-7230-31
Nonius' opal, **19**-7233
Picture (in color), facing **19**-7225
Open-hearth furnace, for making steel, **9**-3349, 3352
Picture, **9**-3346
Open-pit mining, 3-790-91
Picture, **3**-787
Opera. Drama set to music; one of the principal forms of the art of music. The vocal parts, in choruses, recitatives, arias, duets, trios, etc., have orchestral accompaniment and setting. Scenery, costume, action and dancing are important in the production of an opera.
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Orange Free State. South African pastoral and agricultural state, member of the Union of South Africa; area, 50,000 square miles; capital, Bloemfontein. Population 772,060. *See also* **9**-3049
joined Union of South Africa, **9**-3051
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Orange River. Largest South African river, rising in the Drakensberg and flowing into the Atlantic. Great falls in its lower course impede navigation, and much of the country it flows through is sandy and desolate. The Vaal is its tributary. 1,300 miles.
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Oregon. Middle Pacific state; area, 96,981 square miles; capital, Salem. It has great mining, agricultural and pastoral resources. Largest city and commercial centre, Portland. Abbreviation, Ore. Nickname, "Beaver State" or "Webfoot State." State flower, Oregon grape. Motto, "Alis Volat Propriis" ("She Flies With Her Own Wings"). The meaning of the name Oregon is uncertain. First settlement, Astoria, 1811. Population 1,235,482.
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Orlando, Vittorio Emanuele, Italian statesman
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Orleans. Historic French city on the Loire, famous for its relief in 1429 by Joan of Arc. It suffered severely in the Huguenot wars, when its cathedral was destroyed, and is now mainly modern in appearance.
Orleans, Battle of
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Alexander Wilson and John Audubon, **19**-7051-53
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Orozco, José Clemente (1883-1949). Mexican painter, best known for his murals. His early training in architecture and mathematics shows in his monumental work, full of vitality, which can be seen in New York City, Pomona, Cal., and other places as well as in Mexico City.
Orpen, Sir William, British painter, **8**-2859
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Mrs. Gibbs, **8**-2861
Orpheus. A mythical Greek who by the sound of his lyre could move rocks and trees and charm wild beasts. Heart-broken over the death of his wife, Eurydice, he went to Hades to seek her. Pluto, after hearing his music, allowed Eurydice to follow her husband back to earth, but only on condition that he should not look back before reaching the upper world. The strain was too great: he looked, and Eurydice was lost again. After his death his lyre was placed among the stars by Zeus.
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Oryx, an antelope, **4**-1444
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Osaka. Second largest Japanese city, with over 700 factories. It does an immense trade in cotton, refined sugar, iron and metal goods, leather, glass and confectionery. Population 2,989,874.
Osceola, Seminole Indian chief, **19**-7237
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Oslo, capital of Norway, **15**-5303
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medieval wooden church, **15**-5301
Osmium (Os). Chemical element. Very heavy metal. Atomic number 76; atomic weight 190.2; melting point 2700°C.; boiling point above 5300°C.; specific gravity 22.58. Osmium is an uncommon element; it occurs with platinum, which it resembles.
Osmosis, passage of fluid through a membrane, **2**-616
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Ossa, Mt. Peak in Thessaly, Greece, now known as Mt. Kissovo. 6,400 feet.

Ossian, poems of
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Ossicles, bones of middle ear, **9**-3309
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Ossoli, Marchioness, *see* Fuller, Margaret
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Osteopathy. A system of treating disease by the manipulation of different parts of the body. It is based on the theory that diseases are due to some derangement of the mechanism of the skeleton, nerves, blood-vessels or other tissues.
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Ottava rima, verse pattern, **19**-6985
Ottawa. Capital of the Dominion of Canada, on the Ottawa River, Ontario. A well-built, modern city, it contains two cathedrals, a university, and the splendid Dominion parliament house; there are machinery, paper, flour, and especially lumber, industries. Population 154,951.
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Ottawa River. Canadian river rising in Ontario and emptying into St. Lawrence River, 685 miles.
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Otto I (912-73). Emperor of the Holy Roman Empire from 962 until his death. He had succeeded his father as king of Germany in 936. In the year 955 he had a victory over the Magyars.
Ottoman, from coffee cans, how to make, **8**-2740-41
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Ox-tongue, flower
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Oxalic acid ($(COOH)_2$). An acid which exists in various plants, particularly wood sorrel, or oxalis. It forms white crystals, will dissolve in water and alcohol, has an exceedingly acid taste and is a strong poison. To produce it in large amounts the action of fused caustic soda or potash on sawdust is employed. Some of its uses are: removing inkstains, printing calico, bleaching straw and flax, dyeing, etc.
Oxalis, flowering plant, **18**-6579
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Oxenham, John, pen name of W. A. Dunkerley, English writer of prose and verse, who died in 1941. Oxenham was born and educated in England, but lived a number of years in the United States.
Oxeye daisy, weed, **15**-5394
Oxford. Cathedral city and capital of Oxfordshire, on the Thames, here called the Isis. Famous for its university, dating from about 1100, it is one of the finest English cities.
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Oxlip, flower
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Oxygen (O). Chemical element. Colorless gas. Atomic number 8; atomic weight 16; melting point −218.4°C.; boiling point −183°C. By far the most abundant element in the earth's crust; it comprises ½ of the air. It is essential for life and for combustion (burning). Nearly all the other elements form important compounds with oxygen. Gaseous oxygen, mixed with air, is used in certain cases of illness. It is also used in oxyacetylene welding and for other industrial purposes.
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Pacific Ocean. Largest of the oceans, having an area greater than all the land in the world. One and three-quarter times as big as the Atlantic, it contains the greatest known ocean depths. Few large rivers flow into it, but it is remarkable for its immense number of islands, among them New Zealand, the Philippines, the East Indies, Japan, the Aleutian Islands, and the Melanesian, Micronesian and Polynesian groups. Its splendid harbors include Vancouver, San Francisco, Valparaiso, Auckland, Sydney, Singapore, Shanghai and Yokohama.
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Paderewski, Ignace Jan, Polish pianist and statesman
as premier of Poland, **18**-6611
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Padua. City of Venetia, Italy, with a famous university, the most important in Europe during the later Middle Ages. Still surrounded by walls, Padua has nearly fifty churches, the finest of which are the Cathedral and St. Antonio; the Chapel of the Annunciation has frescoes by Giotto.
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pageant of lost colony of Roanoke Island, **17**-6337
Paget, Sidney, British painter
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Lancelot and Elaine, **19**-6946
Pago Pago is a harbor in the Samoan Islands, on the southern coast of the main island, Tutuila. It is one of the best harbors in the Pacific. It was ceded to the United States in 1872, and it has since been an important naval base.
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* history, early times to Holbein, **4**-1343-48
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* Early Florentine school, **2**-697-99
* Later Renaissance masters, **3**-822-31, 957-60
* Sienese school, **2**-691-92, 697
* Venetian, **4**-1459-64
* Venetian and other schools, **3**-1103-08
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influence on Velasquez, **4**-1498
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Venetian influence on Dürer, **4**-1344
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* history, to Goya, **4**-1495-1500
recent artists, **8**-2854
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Painting, Swiss, 8-2852
Pajou, Augustin, French sculptor, **13**-4703
Pakenham, Sir Edward, in battle of New Orleans, **5**-1706
Pakistan, Dominion of, 8-2837-39
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Pictures
Italian, **17**-6296-97; (gravure), **4**-1465, 1467-68; **5**-1744, 1746; **17**-6302-08
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What is a fossil? **6**-2247-49
See also Geology; Animals—history
Paleozoic age, geological era, **4**-1401
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Paleolithic age, in history of cave-man, **1**-190
Palermo. Capital and largest seaport of Sicily, with a large export trade. The ancient Panormus, the stronghold of the Carthaginians in Sicily, it was successively conquered by Pyrrhus, the Romans, the Vandals, Belisarius, the Saracens, the Pisans and the Normans, and it still has many historic buildings. Population 411,879.
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campanile, **13**-4573
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Pales, goddess of Roman shepherds, **9**-3235
Palestine
* crusades to, **7**-2582-89
Maccabees, in early history, **13**-4583
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water-wheel for irrigation, **7**-2546
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Palestrina, Giovanni Pierluigi da, Italian composer of church music, **19**-6903, 6912-13
Picture, **19**-6913
Pali Pass, Oahu, Hawaiian Islands
Picture, **15**-5450
Palimpsests, manuscripts, **2**-582
Palisades of the Hudson
formation, **2**-630
time of formation, **4**-1401
Picture, **2**-629
Palissy, Bernard, French artist and scientist, **2**-643
Palladio, Andrea, Italian architect, **4**-1458; **17**-6311
Palladium (Pd). Chemical element. Silvery metal. Atomic number 46; atomic weight 106.7; melting point 1553°C.; boiling point 2200°C.; specific gravity 12.2. Palladium occurs with platinum, which it resembles. It is used in jewelry, in electric industries and in dentistry.
Pallas Athene (Minerva), goddess, **9**-3226
Palma, Jacopo or Giacomo (called Palma Vecchio), Italian painter, **3**-1106
Pictures
Meeting of Jacob and Rachel (gravure), **3**-1111
Three Sisters, **3**-1105
Palmer, Alice Freeman, American educator, **14**-5270
Palmer, Walter L., American painter, **10**-3512
Palmettos, palm trees of South, **13**-4637
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Palms, of hands
Question about
Why do we have lines on our hands? **1**-142
Palms, trees, account of, **9**-3154
California fan-palm, **13**-4637
date-palm
description and uses, **6**-2155-57
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avenue of palms in Savannah, Ga., **14**-4898
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coconut-palm, **5**-1624; **12**-4440
growing in Ireland, **8**-2931
oil palm, ripe fruits, **18**-6809
palmettos, **13**-4639
Palmyra. Ancient city of Syria, now in ruins; situated in an oasis on the northern edge of the Arabian Desert. It was a famous centre of trade and commerce. In the third century A.D. it became the centre of an important kingdom, also known as Palmyra. Under Queen Zenobia this kingdom won great power in the East; it was overthrown by the Roman emperor Aurelian in the year 272 A.D.
Palo Alto, California
Picture
Stanford University, **12**-4306
Palomar Mountain telescope, California, **17**-6367
Pictures, **17**-6366-69
Paludan-Müller, Frederik, Danish poet, **19**-7011
Pamela, novel by Samuel Richardson
notes on, **6**-2254
Pamir Plateau, in Asia, **1**-123
Pampas, Argentina
Pictures, **18**-6780; **19**-7033
Pampas deer, **4**-1512
Pan, god of shepherds, **9**-3237
and reed flute and Syrinx, **9**-3236
Pan-American Highway, **8**-2781
Pan-American Union, **18**-6599; **19**-7049-50
building, note and picture, **5**-1541
creation of, **11**-3952
Panama. Capital of the Republic of Panama, at the southern end of the Canal. A cathedral and university city, it was founded in 1671. The city of Panama is not in the Canal Zone. Population 176,021.
Picture
ruins of old Panama, **11**-3824
Panama, Republic of, Central America, **11**-3824
and Canal Zone, **1**-363
Panama Canal
* digging the Panama Canal, **1**-360-68
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Panama Canal Zone, **10**-3586-87
purchase by U. S., from Panama, **1**-363
Pictures, **10**-3595-96
Panchromatic, kind of film used in photography, **6**-2259-60
Pancreas
as gland of internal secretion, **8**-2701-02
action in digestion, **6**-2129
structure and function, **7**-2460
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Panda, animal, **3**-873
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Giant Panda, **18**-6616
Pandanus, tropical plant
Pictures, **9**-3260; (in color), **8**-3000
Pandora, story of, in mythology, **9**-3233
Pandora's Box (story), **10**-3141-42
Pangan Falls, Canada
Picture
water-power development, **18**-6758
Pangolin, scaly ant-eater, **7**-2398-2400
Picture, **7**-2399
Pansies, flowers, **19**-7171
Pictures (in color), **15**-5610; (gravure), **19**-7179
Panthéon, Paris, **18**-6498
wall decoration, **7**-2482
Picture (gravure), **11**-3827
Pantheon, Rome, **15**-5348
Picture (gravure), **4**-1206
Panther, animal
toy, how to make, **6**-2163-64
Paoli, Pasquale de, Corsican hero
Picture, **5**-1872
Papal Line of Demarcation, **2**-393; **19**-6864, 7043
Papal States, territory governed by Popes, **12**-4325
founding, **4**-1485-86
Papanin, Ivan, Russian scientist and Arctic explorer, **12**-4240
Picture, **12**-4239
Papaw, or **pawpaw.** Name of several different kinds of trees and the fruits of these trees. The papaw of the tropics (*Carica papaya*) is a small palm-like tree. It has yellow fruits from 8 to 10 inches in length; these are eaten raw, cooked or pickled. Other papaws are members of the *Asimina* group. The best known is *Asimina triloba,* a small tree growing in various central and southern regions of the United States. Its pulpy and fragrant fruit is from 2 to 6 inches long; this fruit is considered a great delicacy.
Papeete, capital of Society Islands, **9**-3303
Paper
articles made of crepe paper, **1**-231-33; **6**-2166-67; **13**-4845
cut-out designs, how to make, **8**-2739
early development, **10**-3550
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manufacture, **3**-1059; * **7**-2445-53
in Newfoundland, **9**-3271-72
May baskets made with strips of, **2**-750-51
production in U. S., **9**-3216
toys, how to make, **4**-1396-97
Questions about
How are the marks put into writing paper? **18**-6558
Why does heat make paper curl up? **9**-3356
Pictures
Chinese books, **10**-3550
paper-mill in Newfoundland, **9**-3272
papyrus plant, **5**-1623
Paper birch trees, **12**-4247
Picture, **12**-4245
Paper-knife, directions for making, **1**-132
Papier-mâché. From French *papier,* paper, and *mâché,* chewed. A material made of paper reduced to pulp of a doughy consistency, with such substances as size, glue, resin or clay added. It can be shaped or molded into a variety of articles, and dries into a hard, strong substance.
Papineau, Louis Joseph, Canadian leader, **3**-946
Papua, East Indies, **9**-3189
Papuans, natives of Melanesia, **9**-3299
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natives in outrigger canoe, **9**-3299
Papyri, old Egyptian books, **3**-814
Papyrus, from plants
use as writing paper, **3**-1053; **10**-3549-50
Pictures, with note, **5**-1623
Pará. Cathedral city and port of Brazil, near the mouth of the Amazon. Once famous for its great export of rubber, it trades also in nuts, hides and cacao.
Parabola. A curve which is commonly considered as being formed by the intersection of a cone with a plane that is parallel with the side of the cone.
Paracelsus, Swiss chemist and physician, **2**-643
Picture, **2**-643
Parachute
toy parachute, how to make, **4**-1396
Question about
What is a parachute and how does it work? **12**-4400
Pictures, **12**-4400
Paradise, origin of word, **9**-3144
Paradise Lost, by Milton, account of, **4**-1240-42
Picture
the creation of the world, by Gustave Doré, **4**-1237
Paradise Regained, by John Milton
note on, **4**-1242
Paraffins, series of hydrocarbons, **13**-4753; **16**-5939-40
chemical definition, **16**-5948
Paraguay. Inland republic of South America; area, 61,000 square miles; capital, Asuncion. Most of it consists of dense jungles or grassy uplands, the chief exports being hides, timber, tobacco, meat, quebracho and Paraguay tea. Paraguay gained 60,000-100,000 sq. mi. of territory in 1936 by treaty with Bolivia. Population 1,040,420. *See also* **19**-6984
Picture
Asuncion, **19**-6984
Paraguay River, **18**-6781
Paralysis tick, **16**-6019
Paramaribo, capital of Dutch Guiana
Picture, **19**-6974

Paramecia, one-celled animals, **2**-662-63
Paraná River, **18**-6780-81
Parasites, insects
mites, ticks, chiggers, **16**-6018-20
Parasites, plant, **1**-332
wheat rust, **5**-1757-58
See also Mistletoe
Parathyroid glands, **8**-2699-2700
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Paratroopers. *Picture,* **18**-6456
Parchment
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Paré, Ambroise, French surgeon, **8**-2725
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Parental instinct, **12**-4442-43
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Question about
Why are we like our parents? **15**-5613-17
Paricutin, volcano in Mexico
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Paris, prince of ancient Troy, **9**-3076, 3078-80
Pictures, **9**-3077, 3079
statue of, **12**-4459
Paris, France, **10**-3422
French International Exhibition of 1889, **6**-2074
improvements in, under Napoleon III, **19**-7112
World's Fair (1937), **6**-2075
Pictures
Notre Dame Cathedral, **1**-72; **10**-3432; **17**-6168
Place de la Concorde, **10**-3415
Sainte Chapelle, **17**-6170
* various scenes, **11**-3825-28
Paris, Treaty of, 1763
Canada made a British colony, **2**-683
effect in North America, **3**-940
provisions in America, **3**-784
Park, Mungo, 1771-1806, African explorer, **14**-5201
Parker, Dorothy, American writer, **14**-5015
Parker, Sir Gilbert, Canadian novelist, **14**-5110
Parkhurst, Helen, American educator, **14**-5254
Parkman, Francis, American writer and historian, **13**-4728, 4730
Picture, **5**-1616
Parks, N. Y. City, service to children, **15**-5624
Parks of United States, National, * **7**-2281-91
See also National Parks, Yellowstone, etc.
Parley, Peter, *see* Goodrich, Samuel Griswold
Parliament, meaning of word, **5**-1578
Parliament, British, *see* England—Parliament
Parliament, Irish, *see* Ireland—Parliament
Parliamentary law. The rules which govern the procedure of deliberative assemblies. It is a distinct branch of the law and covers the duties of officers and the order for all motions.
Parnassus, in mythology, **9**-3237
Parnell, Charles Stewart, Irish statesman, **8**-2943-44
Parody. Among the Greeks a comic imitation of a serious poem. Later applied to comic imitation of any variety of prose. Parody is found in the literature of very early peoples, but the Greeks first gave it form, and Aristophanes, the great comic poet, parodied whole passages of Euripides. Don Quixote is a parody of medieval romance.
Parr, Catharine, wife of Henry VIII
Picture, **5**-1814
Parrakeets, or Paroquets, birds, **10**-3616
Pictures, **10**-3615; (in color), **10**-3621, 3622, 3624
Parrington, Vernon Louis, American scholar and writer, **14**-5018
Parrot fever, disease
experimentation with, **13**-4674
Parrot fish
Pictures (in color), **16**-5785-86, 5788
Parrots, **10**-3613-18
Question about
How can a parrot be made to talk? **2**-586
Pictures, **10**-3615
Parrots and the Owls, * **10**-3613-24
Parry, William Edward, Arctic explorer, **8**-2986-88; **12**-4231
Picture, **8**-2983
Parsees, modern Zoroastrians, **9**-3091
Parsley, **7**-2618; **13**-4874
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Parsnips, **7**-2622
Parsnips, Water
Picture (in color), **16**-5884
Parson bird, **9**-3138
Picture, **9**-3135
Parthenon, Athens
description of, **8**-3009; **15**-5342-43
sculptures and architecture, **12**-4221-22
See also Athens
Pictures, **3**-909, 920
as it stands today (gravure), **15**-5349
sculptured figures of, **12**-4215, 4217
Parthian dynasty, Persian rulers, **9**-3146
Participle. In grammar, a verbal adjective. It is formed from a verb and modifies a noun or pronoun. In English there are two participles: the present, for example, *giving,* and the past, for example, *given.*
Parties, circus, **1**-231-32
games for, *see* Games—for parties
Partnership, **15**-5363-64
Partridgeberries, **18**-6579
Picture, **18**-6578
Partridges, birds, **12**-4364-65; **14**-5135
name given to grouse, **13**-4760
Pictures
European partridge (in color), **8**-2898
French partridge (in color), **8**-2900
nest and eggs, **8**-2757
Parts of speech. Eight in number: noun, adjective, pronoun, verb, adverb, preposition, conjunction, interjection. A noun is the name of a person, place or thing; an adjective qualifies a noun; a pronoun is used instead of a noun; a verb expresses action or being; an adverb modifies a verb, adjective or other adverb; a preposition shows the relation between one noun and another; a conjunction connects words and clauses; an interjection expresses an emotion of the mind. Some grammarians add a part of speech called the article, as *a, an,* and *the.*
Pasadena, California
Picture
Rose Bowl, **12**-4317
Pascal, Blaise, French philosopher and scientist, **2**-646; **18**-6712
Picture, **2**-645
Pascal's Principle, law in physics, **4**-1416
Pasha, Emin, *see* Emin Pasha
Pasque flower, **18**-6658
Picture (in color), **14**-4996
Passion Play
development in Germany, **17**-6267
Question about
What is a Passion Play? **18**-6557
Passover. A double festival combining the feast of unleavened bread and a festival in which the chief rite was the sacrifice of a lamb within the family circle and the sprinkling of its blood on the door-posts. The first was probably the old Canaanitish harvest festival, when the people busy with field labors were accustomed to eat unleavened bread; the second probably a spring full-moon festival also observed by the Canaanites. The Hebrews adopted both festivals and made the sprinkling of the blood symbolic of the protection received when pestilence struck Egyptian households, and the unleavened bread symbolic of the haste with which their departure from Egypt was attended. Passover (or *Pesach,* as it is called in Hebrew) is perhaps the most popular of all Jewish religious festivals.
Passport. A document issued by a government for the identification and protection of its citizens traveling abroad. First, it is a certificate of the citizenship of the bearer and, second, a formal permit authorizing him to leave the state. This, presented to the foreign government, obtains permission to pass through by the act of an officer in putting a visé upon it.
Pasteur, Louis, French scientist
* life and work, **15**-5483-84
checked disease of silk-moths, **18**-6529
Picture, **15**-5482
Pasteurizing
to preserve milk, **6**-2173
Picture, **7**-2325
Paston Letters, record of 15th century English life, **2**-724
Patagonia. Territory in the extreme south of South America, in Argentina and Chile. It consists mainly of high pastoral plateaus, with large areas of stony desert, there being little or no rainfall east of the Andes during eight months of the year.
Patagonians, **19**-6858
Picture, **19**-6859

Pâté de foie gras, paste of goose liver, **11**-3885-86
Patents, explanation of, **9**-3102
Pater, Walter Horatio (1839-94). English essayist. His most famous work is Marius the Epicurean; the hero is a Roman youth living in the second century A.D.
Paterson. City of New Jersey, with an important manufacture of silk. Founded primarily as an industrial centre through the activities of Alexander Hamilton, who organized here the first great industrial corporation in America.
Pathans, people of India
Pictures, **8**-2824
Pathology. The study of diseases, including their nature, causes, progress and symptoms.
Patience of Griselda (story), **13**-4767
Patmore, Coventry, English poet
See Poetry Index
Patriarch comes from two Greek words meaning "father" and "rule," and thus means the male head of a family. It is especially applied to the Hebrew leaders in the Old Testament, Abraham, Isaac and Jacob. The early Christians borrowed the term and applied it to the bishops of Rome, Constantinople, Alexandria, Antioch and Jerusalem. The title is still used by the Greek and Russian Catholics and some smaller sects.
Patricians, nobility of Rome, rule of, **4**-1192-93
Patrick, St., missionary to Ireland, **8**-2933-34
Pictures
shrine of St. Patrick's Bell, **8**-2935
shrine of St. Patrick's Tooth, **8**-2935
Patriotism
* patriots of many lands, **13**-4582-92
* young citizen and his flag, **19**-7185-86
Poems about, **7**-2363-68
See also Poetry Index under Patriotism
Patriots' Day, holiday, **6**-2095
Patriots in Many Lands, * **13**-4582-92
Patroclus, Greek hero
in the Iliad, **9**-3079-80
Patrol boats, 18-6816
Patten, George W. (Gilbert), American writer, **14**-4961
Pattern, for doll's princess slip, **8**-3020-22
Patterns in Verse, * **19**-6985-88
Patton, George Smith, Jr. (1885-1945). American general in command of the Third Army, which spearheaded the great drive across western Europe in the last year of World War II. He had won victories previously in North Africa and Sicily. He was an audacious, forceful leader with a swashbuckling, colorful personality. Death came as the result of an automobile accident; and he was buried in the Third Army cemetery at Hamm, Luxemburg.
Paul I, Russian ruler, **16**-5694
Paul Bunyan of the Woods (story), **7**-2599-2602
Paul J. Rainey Wildlife Refuge, Louisiana, **8**-2815
Pictures, **8**-2814
Pausanias, Greek author
value of his descriptions, **12**-4215
Pavia. Ancient city of Lombardy, Italy, still partly surrounded by walls. It has a famous university, a cathedral and a medieval castle.
Certosa, architecture of, **17**-6299
Pictures
Certosa (gravure), **17**-6303, 6306
Pavlov, Ivan, Russian physiologist, **3**-987
Picture
Pavlov apparatus, **3**-987
Pawnbrokers
Question about
What do the three balls over a pawnbroker's shop mean? **10**-3733
Paxton, William M., American painter, **10**-3455
Payne, John Howard, wrote Home, Sweet Home, **10**-3605-06
See also Poetry Index
Pictures, **10**-3607
Pea Family, in botany, **13**-4873-74
discoveries made by Mendel, **15**-5613, 5615
fruit of, **7**-2613
trees belonging to, **12**-4386
Pictures, **7**-2620
beach pea, flower (in color), **14**-4981
narrow-leaved everlasting pea, flower (in color), **14**-4987
Peace
See peace treaties, as Versailles, Treaty of
Peace Bridge, connecting Buffalo and Fort Erie, Ontario
Picture, **1**-38
Peace pipes
Question about
What is the Indian's pipe of peace? **18**-6556
Peace River. Canadian river rising in the Rocky Mountains in northern British Columbia. It flows through Alberta into the Great Sla e River near Lake Athabaska. 1,065 miles.
farming district, **1**-111
Peace Tower, Ottawa. *Picture,* **5**-1832
Peaches, 6-2066
Pictures, **6**-2064
orchard being sprayed, **17**-6062
Peacock, Thomas Love, *see* Poetry Index
Peacock, bird, **12**-4366
Pictures, **8**-2756; **12**-4367; (in color), **12**-4369
Peale, Charles Willson, American painter, **9**-3327
Pictures
portrait by Benjamin West, **9**-3329
portrait of himself, **9**-3326
Peale, Rembrandt, American painter, **9**-3327
Peanuts
account of, **7**-2614
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toy dolls made from, **2**-628
Pictures, **7**-2624
raising peanuts in North Carolina, **13**-4523
Pear, Prickly, *see* Prickly-pear
Pear trees, *see* Pears
Pearce, Charles Sprague, paintings in Library of Congress, **5**-1537
Pearkes, George R. (1888-). Canadian army officer who was in command of Canada's Pacific Coast Defense. He acted in conjunction with the United States forces in the recapture of the Aleutian Islands from the Japanese late in 1943. In France with the Canadian Expeditionary Force in World War I, he won the Victoria Cross. For a time he was a member of the Canadian Northwest Mounted Police.
Pearl Harbor, Hawaiian Islands
attack on, **15**-5451
Pearl River. American river, rising in Winston County, Miss. Flows into the Gulf of Mexico. 350 miles.
Pearls
* account of, **13**-4675-78
Australian industry, **7**-2469
Picture
making cultured pearls, **2**-568
Pearly everlasting, herb, **19**-6940
Pears
account of, **6**-2065-66
trees, wild, **12**-4383
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wild (in color), **11**-4025
Pearse, Padraic, Irish patriot, **13**-4589-90
as poet, **12**-4210
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Peary, Robert Edwin, American Arctic explorer, **12**-4238-39
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equipment used in explorations, **12**-4233
with his wife, **12**-4232
Peasants' Revolt, in England, 1381, **6**-1979
Picture
burning of St. John's Monastery, **6**-1982
Peat, fuel, **3**-786; **4**-1295; **16**-5727
Picture
field in Germany, **12**-4170
Pecan, nut-bearing tree, **12**-4436
variety of hickory, **12**-4248-49
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Peccary, wild pig of America, **5**-1722-23
Picture, **5**-1722
Peckers, Humming-Birds and Hornbills, * **9**-3365-74
Pecos River. American river, rising in the Rocky Mountains, New Mexico; flows into the Rio Grande. 800 miles.
Pectin, gum in flax, **9**-3320
Pedalfer, kind of soil, **8**-2666
Pedocal, kind of soil, **8**-2666
Pedro I, emperor of Brazil, **19**-7046
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Pedro II, emperor of Brazil, **19**-7046
Pedro Miguel Locks, of Panama Canal, **1**-366
Peel, Sir Robert, English statesman
Picture
portrait by Sir Thomas Lawrence, **7**-2294

Peele, George, English playwright, **3**-1120
Pegasus, winged horse in mythology
Picture
with Mercury, **9**-3227
Pegasus, Great Square of, constellation, **11**-3922
Peiping (formerly Peking or Pekin), China
description, **2**-433
made capital city by Kublai Khan, **2**-429
Pictures (gravure), **2**-425-28, 436
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Peking, China. In 1949 the Communists made Peiping their capital, and restored the old name of Peking, which means "northern capital." *See also* Peiping
Peking ducks
Picture, **11**-3886
Pekingese, dog. *Picture,* **2**-717
Pelargonium, name for geranium, **19**-7170
Pelicans, water birds, **11**-3883-84
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Pellagra, disease caused by vitamin deficiency, **7**-2425
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Peloponnesus, part of Greece, **3**-909
Pelton wheel
use in water-power development, **18**-6755
Peludo, hairy armadillo, **7**-2395
Pelvis, part of skeleton
bones of, **5**-1563
Pemmican, preserved meat, **1**-248; **6**-2169
Penang, British settlement in Malaya, **9**-3185
Pencils
Question about
Why will a slate pencil write on slate but not on paper? **3**-877-78
Pendennis, novel by Thackeray
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Foucault's, how to make a model of, **8**-2713
Penelope, wife of Ulysses, **12**-4339-40, 4342
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Penguins, birds
* account of, **11**-4128-29
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Penicillin
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Peninsular War, Spain, **14**-4917-18
Penn, William
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house in Philadelphia, **18**-6835
Pennell, Joseph, American graphic artist, illustrator and author. Born, 1860; died, 1926. One of the foremost American etchers and lithographers. Moved to London, England, in 1884 and was strongly influenced by Whistler. He wrote and illustrated many books and also illustrated books by other authors.
Pennsylvania. Great coal- and oil-producing state; area, 45,333 square miles; capital, Harrisburg. Anthracite is found over an area of 472 square miles, and there are great iron, steel and other manufactures. Farming is also important. Here are Philadelphia, the largest city, Pittsburgh, Scranton and Reading. Abbreviation, Pa. Nickname, "Keystone State," "Steel State" or "Coal State." Motto, "Virtue, Liberty and Independence." The name came from Penn, in honor of William Penn, and sylvania, woods. First settlement, Philadelphia, 1683. Population 9,465,765.
described in Northeastern States, **10**-3403-08; **11**-3773-82; **12**-4145-54
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gets control of Delaware, **2**-552
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Battle of Gettysburg, **7**-2437-38
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petroleum found, **13**-4744-45
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Pennsylvania (*continued*)
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See also Philadelphia: Petroleum
Pennsylvania, U. S. battleship
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Pennsylvania Academy of the Fine Arts
founding of, **9**-3330
Pennsylvania Turnpike, Pennsylvania
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Penny post, England, **7**-2296-97
Pennyroyal, flower
Picture (in color), **16**-5882
Pennywort, Marsh, **16**-5734
Picture, **16**-5731
Penobscot River. American river, rising in Somerset County, Maine, and flowing into Penobscot Bay, 350 miles.
Pens, for writing
* history of development, **10**-3550-53
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What is the hole in the nib of a pen for? **2**-689
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golden-lined pentapus (in color), **16**-5787
Pentatonic scale, in music, **18**-6697-98
Pentstemon, flower. *Picture* (gravure), **19**-7178
Peony, plant, description, **19**-7171
Peoples of the Desert, * **18**-6735-43
Pepin the Short, Frankish king, **4**-1435-36
defeated Lombards, **12**-4407
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plant, and drying berries, **8**-2990
Pepper-root, name of toothwort, **17**-6279-80
Peppergrass, weed, **15**-5395
Pepperell, Sir William, **3**-780
Picture
capture of Louisbourg, **3**-777
Peppermint, plant, **8**-2996
Peppermint creams, recipe for, **2**-753
Pepperrell, Sir William, *see* Pepperell, Sir Wm.
Pepsin, secreted by stomach, **6**-2129
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Picture
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Père David's deer, **4**-1508
Peregrine falcon, **1**-141; **10**-3754
Pérez de Ayala, Ramón, Spanish writer, **19**-7129
Pérez-Galdós, Benito, Spanish writer, **19**-7129
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made from by-products of coal, **2**-637
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making attar of roses in Bulgaria, **14**-5051
Pergamum, Greek sculpture of, **12**-4460, 4467
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Peridot, precious stone, **19**-7231
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Periodic Table, of chemical elements, in part, **1**-149-51
Periscope, eye of submarine, **1**-198-99
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Periwinkle, or **myrtle**
Pictures
flower (gravure), **19**-7180; (in color), **14**-4988
Periwinkles, mollusks, **19**-6885
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Permalloy, type of cable, **17**-6057
Permanent Court of International Justice, *see* World Court
Permian period, in geology, **4**-1296
Pernambuco, or **Recife.** Brazilian port, exporting sugar, cotton, coffee, cocoa, hides, dyewoods and rubber. Founded in 1526.
Perneb, Lord Chamberlain, ancient Egypt
tomb of, **3**-810
Peroxide of hydrogen (H_2O_2). Discovered in 1818 by a French chemist, Thénard, it is the colorless compound of hydrogen and oxygen containing twice as much oxygen as is contained in water. Minute quantities of it occur in the air, in rain water and in snow. A powerful bleaching agent, it is used for bleaching ostrich feathers, silk, ivory, wood, etc. In medicine and surgery it is used as an antiseptic. It may be prepared by action of acids on peroxide of sodium.
Perpetual frost, a division of climate, **7**-2534
Perpignan. City of southern France; population, 72,000. It was founded in the tenth century, in 1197 it was given a charter by Peter II of Aragon, who included it among his possessions. Perpignan's university and cathedral go back to the fourteenth century.
Perrault, Charles, French writer of fairy tales, **6**-2269
Perry, Matthew Calbraith, Commodore
opened Japan to foreigners, **2**-563
Perry, Oliver Hazard, early American seaman, **17**-6330-32
Pictures
aboard his flagship, the Lawrence, **17**-6331
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in War of 1812, **5**-1704
Perseids, shower of meteors, **10**-3671
Persepolis, Persia
architecture of, **14**-5209-10
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ruins of Grand Portal, **9**-3145
Perseus, constellation, **11**-3922-23
Pershing, John Joseph (1860-1948). American general, graduated from U. S. Military Academy in 1886. Served in the Spanish-American War, and with distinction in the Philippines, for which service he was promoted from captain to brigadier-general. While absent on duty on the Mexican border his wife and three young daughters were lost in a fire, but his son was rescued. When the United States entered the World War he was chosen to command the A. E. F. and was made general, U. S. A. Insisted upon integrity of American army, and as Commander-in-Chief, planned the American operations at the Marne in 1918, at St. Mihiel and in the Meuse-Argonne. He was appointed permanent general, and in 1921 Chief-of-Staff. He was retired in 1924.
Picture
reviewing detachment of French sailors, World War I, **18**-6444
Persia (Iran)
* history and geography, **9**-3141-50
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Pictures
costumes in ancient Persia, **9**-3160
Persian rugs, **2**-442, 444
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Persian cats, 2-495
Pictures, **2**-491, 494
Persian Gulf, pearl-diving, **13**-4676-77
climate, **9**-3142
Persian wheel, *see* Sakya (Persian wheel)
Persians. The name given to the inhabitants of Persia. Strictly there is no race of this name. One of the races inhabiting this region is called Iranians from their language. As a nation the Persians have had a great history and an interesting literature.
Persicaria, flower
Pictures
climbing (in color), **15**-5400
pink (in color), **15**-5399
Persimmon, fruit, **6**-2068
Perspective
in Persian art, **2**-575-76
inverted, in early Christian art, **2**-575
Question about
Why do two sides of a road seem to meet in the distance? **11**-3839
Perth, capital of Western Australia, **7**-2469
Perth. Cathedral city and capital of Perthshire, Scotland, on the Tay. Finely situated among wooded hills, it is noted especially for its dyeing industry. It contains a 13th-century church in which John Knox preached.
Peru. Western maritime republic of South America; area, 482,258 square miles; capital, Lima. The centre and greater part is a lofty Andean plateau, sinking in the east to the forests of the Amazon, while the fertile coastal belt is the chief centre of population. The largest towns are Callao, the port of Lima, Arequipa, Mollendo, Ayacucho, Payta and Cuzco; copper, silver, petroleum, sugar, cotton, coffee, alpaca wool and guano are the chief exports. Population 7,271,654.
* history and description, **19**-6859-64, 6981-82
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llama, use in ancient Peru, **5**-1600
Tacna and Arica, claim on, **19**-7039
Pictures, **19**-6980, 6982
Bay of Pisco, Peru, **18**-6613
Indian of, **19**-6865
Perugia. Picturesque city of central Italy, the former centre of the Umbrian school of art. It has a richly decorated Gothic cathedral, while the Church of St. Peter has pictures and pillars by Raphael, Parmigiano and Perugino.
in the history of painting, **3**-959-60
Perugino (Pietro Vannucci), Italian painter, **3**-959
Picture
Virgin and Child (gravure), **3**-964
Peruvian bark
Picture
plant producing, cinchona (in color), **8**-2999
Peseta. The unit of currency in Spain, divided into 100 centimos. It is worth about 12 cents. Also the name for a former Spanish silver coin worth about 25 cents.
Peshkov, Alexei, *see* Gorky, Maxim
Pestalozzi, Johann, Swiss educator, **14**-5252; **16**-6005
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Pétain, Henri, 10-3439-40; **18**-6607
Picture, **18**-6609
Petals, of flowers, **2**-507; **3**-1013
Peter II (1923-). Exiled Yugoslavian king; mounted the throne in 1934; fled to England when the Axis conquered Yugoslavia.
Peter and the Wolf, musical composition by Prokofieff
writing of, **10**-3612
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Peter Pan, fictional character, created by James Barrie, **17**-6295
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statue in Kensington Gardens, London, **17**-6294
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Peter the Great, Russian ruler, **16**-5692-94
sent expedition to Alaska, **16**-5789
Pictures, **16**-5693
Peter the Hermit, and First Crusade, **7**-2582-83
Picture, **7**-2583
Peterborough, England, cathedral, **16**-5970
Picture
cathedral (gravure), **16**-5975
Petersburg, Va., siege of, **7**-2441
Petition of Right, in English Constitution, **6**-2098
Petrarch (Francesco Petrarca), Italian poet and scholar, **14**-5089-90; **17**-6152-53

Petrarch (*continued*)
influence on English poetry, **3**-1113
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watching the artist, Simon Memmi, at work, **14**-5088
Petrarchan sonnet, verse form, **19**-6986
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Petrified forests, in Arizona, **9**-3026, 3027
in Yellowstone Park, **2**-733
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Petrified Forest National Monument, Arizona
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sandstone formations, **9**-3026
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Petroleum
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well farthest north, Fort Norman, **7**-2559
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derricks in Oklahoma, **13**-4527
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oil wells in Rumania, **14**-5046
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Pettie, John, British painter
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account of, **13**-4831-32; **14**-5140-41
Picture
wood pewee, **14**-5027
Pewter, alloy, **5**-1636
Phaeton, tried to drive Sun's chariot, **9**-3233
Phalanger, marsupial animal, **7**-2501-04
Picture, **7**-2500
Phalanx. Ancient Greek name for the heavy infantry in battle line. Usual depth seems to have been eight men. It was closely packed with shields touching. The lances were about 20 feet long and the first 5 ranks projected in front. The others held their spears over their comrades' shoulders and dropped them if it became necessary to manœuvre.
Phalaropes, birds, **11**-4012
Pictures, **11**-4011; (in color), **9**-3282
Phanerogams, flowering plants
meaning of word, **10**-3721
Phantom Ship. Lava island in Crater National Park, Oregon. It looks like a ship under sail.
Picture, **19**-6842
Pharaohs, kings of Egypt, *see* Egypt, Ancient; *also* names of kings
Pharisees. A Jewish religious party who insisted upon the strict observance of the law, both written and oral; believed in the restoration of a Kingdom of Israel when their punishment of foreign domination was ended; kept themselves apart from the mass of the people.
Pharos, or lighthouse
of Alexandria, *see* Alexandria
Pharsalia, The, long epic poem by Lucan, **16**-5918
Pharynx. The pharynx is a funnel-shaped, pouch-like passage, connecting the cavities of the mouth and nose with the œsophagus (leading to the stomach) and the larynx (at the upper part of the windpipe).
Pheasants, birds, account of, * **12**-4365-66
ring-necked, on Pacific coast, **14**-5145
name given to grouse, **13**-4760
Pictures, **12**-4362, 4367; (in color), **8**-2899; **12**-4371
Pheasants and Their Allies, * **12**-4362-72
Pheasant's eye, flower. *Picture* (in color), **15**-5400
Pheidias, *see* Phidias
Pheidippides, Greek runner, **3**-890
Phenicians, *see* Phœnicians
Phenol, ingredient of certain plastics, **11**-4002
Phenomenal berry, cross between bramble and raspberry, **4**-1388
Phi Beta Kappa, honorary fraternity, **12**-4309
Phidias, Greek sculptor
* work and characteristics, **12**-4220-22
expressed spiritual ideal of the gods, **12**-4327
made friezes of Parthenon, **8**-3009
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Athene, in Parthenon (statue), **3**-920
head of Athene, **12**-4219
Jupiter, statue of, Olympia (gravure), **7**-2608
See also Parthenon—*Pictures*
Phigalia, temple of Apollo, frieze of, **12**-4222
Philadelphia. Chief city of Pennsylvania, on the confluence of the Schuylkill and Delaware rivers. Founded by William Penn, the Quaker City has grown rapidly, its suburban territory especially being very beautiful. Fine parks, buildings and monuments are numerous. In historical interest the city is rich. It has communication with the productive Middle West. Oil is one of its largest shipments; in the manufacture of steam locomotives, street-railway cars, knit goods, carpets and rugs Philadelphia leads. Shipbuilding is very important. Population 1,931,334.
as a port, **12**-4147
Centennial Exposition, 1876, **6**-2074; **8**-2669
influence of exposition on American art, **9**-3334; **14**-4936; **18**-6682
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State House about 1750, **3**-1038
suspension bridge over Delaware, **1**-30
Philæ, temple of Isis, **14**-5212
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Philately
See Postage stamps
Philip, King (c. 1639-76). A famous Indian chief called King Philip by the English, though his Indian name was Metacomet. He united the Indians of New England in a general war upon the whites. The death of King Philip in 1676 put an end to "King Philip's War."
Philip II, king of France, **10**-3427
in Third Crusade, **7**-2585-86
Philip IV, king of France
opposition to papacy, **6**-1980
Philip II, king of Macedon
becomes ruler of Greece, **3**-925
Philip V, king of Macedon, **3**-929
Philip II, king of Spain, **14**-4915-17
becomes king of Portugal, **14**-5187
rule in the Netherlands, **15**-5559-5560
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in procession, **14**-4916
Philip III, king of Spain, **14**-4917
Philip IV, king of Spain
Pictures
portraits by Velasquez (gravure), **4**-1501, 1503
Philip V, king of Spain, **14**-4917
Philippa, queen of Edward III of England
Pictures, **5**-1679-80
Philippi, Battle of. Famous as the battle in the last act of Shakespeare's play of Julius Cæsar. Two battles were fought in 42 B.C. between the forces of Brutus and Cassius, the murderers of Cæsar, and Mark Anthony and Octavius, Cæsar's heir. The defeat and deaths of Cassius and Brutus made Anthony and Octavius masters of the Roman world.
Philippine Islands
* history and geography, **9**-3298-99
map, **9**-3296
production of rope fibers, **14**-5220
Pictures, **9**-3298-99
Phillips, Wendell (1811-84). American orator and reformer, born and died in Boston. Became an anti-slavery leader, and the orator of the movement; wrote for the Liberator and the Anti-slavery Standard; published a number of pamphlets.
Philosophy. The term means, most simply, a love of wisdom which leads to a search for the general principles of all knowledge, for the law

Philosophy (*continued*)
that furnishes a reasonable explanation of anything. A philosopher seeks to know "why." Philosophy may also mean systematic study in a special field, for which universities confer the degree of Doctor of Philosophy.
See also Greek philosophy
Phipps, J. C., British Arctic explorer, **12**-4231
Phira, city on Ægean island of Santorin
Picture, **14**-5043
Phlogiston theory, **2**-647, 701
Phlox, flowers, varieties, **18**-6666
Pictures, **18**-6659; (gravure), **19**-7176
Phobos, moon of Mars, **9**-3292
Phoebe, name for Diana as goddess of the moon, **9**-3227
Phoebes, birds, account of, **13**-4831
of Pacific coast, **14**-5140
Picture, nest, **13**-4765
Phoebus Apollo, Greek sun-god
Picture, **4**-1449
Phoenicia. The Greek and Roman name for the territory along the Mediterranean coast of Syria. Bounded on the east by the Lebanon Mountains, the country was some 200 miles long and from 5 to 15 miles broad. The origin of the name is unknown. The different settlements were never welded together into a powerful kingdom and never played an important political part.
Phoenicians
African explorations, **14**-5199
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as shipbuilders, **11**-3911-12
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introduced flax-growing into Ireland, **9**-3317
Pictures
alphabet, **10**-3548
Phoenician boat with two banks of oars, **1**-79
ship, **11**-3912
Phœnix. Capital of the state of Arizona. Centre of the Salt River Valley, the richest agricultural district in the state.
Phœnix, imaginary bird, **1**-356
may be Chinese golden pheasant, **12**-4366
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Phonograph
* account of, **1**-260-65
invented by Edison, **5**-1894
Picture
combination radio and phonograph, **14**-5120
Phosphorescence, kind of light, **10**-3474
in midges, **17**-6417
Phosphoros, in ancient mythology
was Venus, the morning star, **9**-3233
Phosphors, paints for fluorescent lamps, **7**-2636
Phosphorus (P). Chemical element. White, inflammable, poisonous solid. Atomic number 15; atomic weight 30.98; melting point 44°C.; boiling point 280°C.; specific gravity 1.8. Occurs as phosphates, such as apatite, from which superphosphate is obtained. Superphosphate is a well-known fertilizer. Phosphorus is used in incendiary bombs and in rat poison.
in matches, **19**-6962, 6966, 6969
Photo-electric cells
used in sending pictures, **14**-5124-25
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* camera fun, **5**-1654-58
* films, how to develop and print, **6**-2259-63
* how a camera takes pictures, **8**-2960-66
* microfilm, **16**-5699-5703
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Photogravure, printing process, **9**-3394-95
Photomechanical engraving, used in printing, **9**-3394
Photostatic method, for making copies, **16**-5700
Photosynthesis, work of green leaves by power of light, **1**-117-18; **2**-745; **6**-1972-73; **11**-4093, 4095; **17**-6203
Phototube, electronic device used in television, **14**-5036
Picture, **14**-5036
Phyfe, Duncan, American furniture-maker, **18**-6771-72
Picture
furniture designed by, **18**-6772
Phyllopods, crustaceans
Picture
in Cambrian period, **3**-907
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Physical exercises, *see* Exercises, Physical
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Plata River system, **18**-6780-81
Plataea, Battle of, **3**-918
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Platelets, particles in the blood, **3**-936
Picture, **3**-937
Platen-Hallermund, August von, German poet, **17**-6413
Plateresque, decoration, definition, **18**-6502
Platinum (Pt). Chemical element. Heavy metal. Atomic number 78; atomic weight 195.23; melting point 1773.5°C.; boiling point 4300°C.; specific gravity 21.4. Platinum, mixed with other metals that resemble it, is found in Russia, Alaska and South Africa, and to a less extent in Canada and the United States. Platinum, sometimes alloyed with other metals, is used for electrical contacts, in pen points, in jewelry, as a catalyst and for scientific apparatus. *See also* **16**-5669
Plato, Greek philosopher
life and writings, **16**-5753
founded the Academy, **14**-5249
Plato, crater of the moon
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Platt National Park, Oklahoma, **7**-2287
Platte River. An American river rising in the Sweetwater River, Wyoming, and flowing into the Missouri River, 1,000 miles.
Platypus, or **duckbill,** mammal, **7**-2590-93
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Plautius, Roman invader of Britain, **5**-1566
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Plautus, Titus Maccius, Roman dramatist, **16**-5908-09
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When were playing cards first used? **10**-3772
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* how to write a radio play, **3**-1149-51
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Plebeians, lower class of Rome
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Pledge
Question about
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fossil remains, **4**-1403
Pleistocene Epoch, period of continental glaciers, **3**-774-75
Pliny the Elder, ancient Roman writer, **2**-595; **16**-5918
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Pliny the Younger (Gaius Plinius Caecilius Secundus), ancient Roman writer, **16**-5918
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Plovdiv (Philippopolis), Bulgaria
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Plover Family, birds, **11**-4010
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migration of golden plovers, **6**-1955
Pictures, **11**-4011; (in color), **8**-2898; **9**-3130, 3283; **13**-4841
Plows
Picture
horse plow, **5**-1756
Plows, Cable. *Pictures,* **12**-4296
Plumb line
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Does a plumb line always hang straight? **2**-455
Plums
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Burbank's stoneless, **4**-1388
developed from sloes, **12**-4383
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flowers of beach plum, **14**-5163
Plutarch. Greek historian; born, Chæronea, Bœotia, about A.D. 46; died there about A.D. 120; author of the Lives, a famous collection of biographies of famous personages of antiquity.
Pluto, god of the lower regions, **9**-3238
Pluto, planet, **9**-3293
discovery of, **11**-3859
Plutonium (Pu). Chemical element. Atomic number 94. Plutonium^{238} (of mass number 238) is formed from neptunium^{238}. Plutonium^{239} was manufactured during World War II at Hanford, Washington, in an atomic-energy pile, by the action of neutrons on uranium^{238}. It is fissionable material, and can be used for an atomic bomb.
used in developing atomic energy, **15**-5288-89
Plymouth. Port, naval station and fishing center in Devonshire, England, at the mouth of the Plym. Plymouth Sound is a splendid anchorage, and it was from here that the Black Prince, Drake, Hawkins, Cook and the Mayflower sailed on their voyages, Drake having been mayor in 1585. Devonport is now part of Plymouth. Many trans-Atlantic liners land at Plymouth.
Plymouth, Mass., landing of Pilgrims, **2**-547
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Governor Bradford's house, Leyden street, in colonial times, **13**-4627
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Plymouth Company, to colonize America, **2**-544, 547
Plymouth Rocks, breed of poultry, **12**-4494
Picture (in color), facing **12**-4492
Plywood. *Picture,* **16**-5990
Po River (ancient names, Padus or Eridanus), the largest river of Italy. It is 418 mi. long from its source in the southwestern Alps of the Piedmont to where it empties into the Adriatic Sea not far south of Venice. Its course is generally eastward and its drainage basin covers the larger part of northern Italy.
Pocahontas (1595-1617). Daughter of the Indian chief Powhatan, said to have saved the life of Captain John Smith. She was kidnaped by an English captain, and while a prisoner married John Rolfe. She went to England with her husband and died there.
Pochard, duck
Picture (in color), **9**-3132
Pocitos Beach, Uruguay. *Picture,* **19**-6983
Pocket gophers, rodents, **3**-1131
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Purloined Letter, **17**-6320-24
Gold Bug, summary and quotations, **5**-1899-1904
See also Poetry Index
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memorial to Poe, **5**-1898
Poelcilogale, animal, **2**-769-70
Poet laureate, in Great Britain, the title given to the poet appointed a member of the royal household, to compose verses for court and national occasions. The name comes from the ancient Greek practice of crowning poets with a laurel wreath; and the appointment is a great honor. The English poets laureate, with dates of office, are as follows: Ben Jonson, 1619-37; Sir William Davenant, 1660-68; John Dryden, 1670-88; Thomas Shadwell, 1688-92; Nahum Tate, 1692-

Poet laureate (*continued*)
1715; Nicholas Rowe, 1715-18; Laurence Eusden, 1718-30; Colley Cibber, 1730-57; William Whitehead, 1757-85; Thomas Warton, 1785-90; Henry James Pye, 1790-1813; Robert Southey, 1813-43; William Wordsworth, 1843-50; Alfred Tennyson, 1850-92; Alfred Austin, 1896-1913; Robert Bridges, 1913-30; John Masefield, 1930-
Poetry
* patterns in verse, **19**-6985-88
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Poetry Goes Back to the Country, * **6**-2027-30
Poets
See American literature, English poetry; also names of poets. For poems, *see* Poetry Index
Pogonias, sweet, flowering plants, **18**-6576
Poi, Hawaiian food, **15**-5448
Poincaré, Raymond (1860-1934). French statesman. A highly successful lawyer, he became premier in 1912. He served as president from 1913 to 1920. Poincaré was premier again from 1922 to 1924 and from 1926 to 1929.
Poinsettia. A shrub belonging to the family of the *Euphorbiaceæ.* A native of tropical and subtropical Central America and Mexico, the poinsettia has been grown successfully in other lands. It grows from three to six feet high; its small greenish-yellow flowers are surrounded by leaves of bright red, pink or white. In the north the poinsettia is a greenhouse plant; it is much used for Christmas decorations.
Point, measurement used in printing, **3**-854
Point Bonita Light, California
Picture, **10**-3579
Point de Sable, Jean Baptiste, first permanent settler at Chicago, **19**-7106
Pointelin, Auguste Emmanuel, French painter, **7**-2372
Pointers, hunting dogs
Picture (gravure), **2**-715
Poison
not harmful to animal producing it, **3**-878
of caterpillars, **18**-6528-29
of snakes, **15**-5410-11, 5416
Poison gas, in World War I, **18**-6443, 6447
Poison ivy, 13-4779
Poison toads, of South Africa
Picture, **15**-5456
Poison weed, *see* Larkspurs
Poisonous plants. Plants which contain poisonous substances in sufficient amounts to make them harmful to the taste or touch of men or animals. Of those poisonous to the touch the poison sumac and ivy are notable; bittersweet, henbane and poke have poisonous seeds; wild cherry and larkspur have poisonous foliage.
Poitiers, France
Picture
tower of St. Porchaire church (gravure), **16**-5722
Poitiers, Battle of, 1356
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Pola, Italy
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amphitheatre (gravure), **15**-5356
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colonized by Teutonic Knights, **12**-4160
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Polaris, North Star, location, **11**-3921
Polarization, of light, **6**-1996; **8**-2686-87
Picture
diagram, **6**-1997
Polaroids, light filters, **7**-2636; **8**-2686-87
Poldhu. The wireless station in Cornwall, England, from which the first wireless message was sent across the Atlantic on December 12, 1901. The message was simply the letter S, and was received by Marconi in Newfoundland.
Polecats, 2-769
Polenz, Wilhelm von, German author, **17**-6414
Poles
Question about
What are the little cups on the telegraph poles? **19**-7245
See also North Pole; South Pole
Police. That part of the administration which has to do with the preservation of peace and the prevention of crime. The first modern police force was the London Constabulary appointed in 1828. The system of organization differs in different cities, but the supreme authority is generally in a superintendent or a board.
* Royal Canadian Mounted Police, **16**-5831-38
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Polk, James Knox, president of U. S.
administration, **6**-1918
administration and outline of life, **11**-3942
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Pollack, fish, **16**-5780
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Pollen, of flowers, **2**-507-08; **3**-1013-14
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pollen grains, **2**-507
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Polls
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What are public-opinion polls and how are they made? **19**-7245-47
Polo, Marco, Italian traveler, **1**-81-82
described petroleum, **13**-4740, 4742
influence of his travels, **6**-1983
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Polo, Nicolo, father of Marco, travels, **1**-80-81
Polonium (Po). Chemical element. Atomic number 84. In 1898 Pierre and Marie Curie discovered in uranium ores minute quantities of a new element, which they named polonium from Mme. Curie's native land, Poland. Polonium is radioactive, and changes into lead. *See also* Radium
discovery of, **16**-5798-99
Polotsky, Simeon, Russian writer, **19**-6905
Poltava. Town of the Russian Ukraine, manufacturing leather and tobacco. Here in 1709 Peter the Great defeated Charles XII of Sweden.
Polyanthus, flower, description, **19**-7171
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Polyclitus, Greek Sculptor
* work and characteristics, **12**-4215, 4218
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statues modeled after (gravure), **12**-4334
Polygala, fringed, flowering plant, **18**-6578-79
Polygamy and Mormonism, **6**-1921
Polymerization, chemical process, **12**-4358-59; **15**-5427, 5572; **16**-5948
Polynesia, islands of South Seas, * **9**-3302-03
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Pomegranate, fruit, **6**-2068
Picture, **6**-2064
Pomelo, name for grapefruit, **6**-2059
Pomerania. Prussian province on the south shore of the Baltic. The ports of Stettin and Stralsund are its most important towns.
Pomeranian dogs. *Picture* (gravure), **2**-716
Pomeroy, F. W., British sculptor
Picture
of statue, The Potter, **13**-4853
Pomona, in Roman mythology, **9**-3235
Pompano, fish, **16**-5780
Pompeii, Italy
destruction in 79 A.D., **4**-1246; **6**-2051
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Courtyard of the House of the Vettii (gravure), **15**-5356
Temple of Jupiter, reconstruction, **15**-5340
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Pompey the Great, Roman general
* life, **4**-1367-68
and Cæsar, **4**-1198-99
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Ponce de Leon, in Puerto Rico and Florida, **2**-393
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Pondichérry, India
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Pondweeds, description, **4**-1278
Ponies, Shetland, *see* Shetland ponies
Pont Neuf, bridge in Paris
built by Henry IV, **5**-1873
Ponte Vecchio (Old Bridge), famous bridge of Florence, Italy, **1**-28
Pontiac, Indian chief
fight against English, **3**-784
Pontoon. In military language, a flat-bottomed boat or other float used in building bridges quickly for the passage of troops.
in bridge construction, **1**-33; **7**-2318
Picture
bridge with concrete pontoons, **1**-39
Pontus. Ancient kingdom of Asia Minor, on the Black Sea. It rose to great power under Mithridates VI, called the Great, who mounted the throne in 124 B.C. Mithridates soon came into conflict with Rome and proved to be one of the most dangerous foes the Republic ever had. It was not till the King was conquered by Pompey, 63 B.C., that Pontus ceased to be a threat to Rome. It became a Roman province in the first century A.D.
Poodle, dog. *Picture* (gravure), **2**-716
Poona. Military and industrial centre in the Bombay Presidency, India.
Poop of a ship, **13**-4848
Popcorn, reason for exploding, **5**-1851
Pope, head of Catholic church
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Pope, Alexander, life and work, **4**-1478-79
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Why does a popgun go **pop? 10**-3660
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* spread and growth of, **18**-6479-87
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natives of South Seas, **9**-3303-04
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religious population of the world, **9**-3098
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Is the population of the world still growing? **5**-1606
Which is the biggest nation? **5**-1605-06
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Populist Party, or **People's Party.** Organized at Cincinnati in 1891 by a national convention made up of representatives of the agricultural and industrial classes. It nominated candidates for the presidency of the United States, carried several state legislatures, and elected many members of Congress; declined after 1900.
in Cleveland's administration, **8**-2670
Porbandar, India
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wharf, **8**-2823
Porcelain, *see* Pottery
Porcupines, **3**-1133
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Porgy and Bess, folk opera
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Porgy Family, fish, **16**-5780
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Porphyry, rock, how formed, **2**-514-15
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Porpoises, sea mammals, **7**-2347-48
Picture, **7**-2347
Port, meaning of term for side of ship, **13**-4849
Port au Prince. Capital and seaport of Haiti, with a cathedral, a fine harbor, and exports of hides, coffee and logwood.
Port Royal, Nova Scotia, founded, **2**-673
named Annapolis Royal, **3**-780
Port Said. Egyptian port and coaling station at the north entrance to the Suez Canal. It was founded in 1859. On the western breakwater is a statue of de Lesseps, builder of the canal.
Port Sudan. Sudanese import and export center, being the Red Sea terminus of the railway from Atbara Junction.
Porter, David Dixon (1813-1891). American naval officer. He played a prominent part in naval operations in the Civil War.
Porter, William Sydney, *see* O. Henry
Portia, Shakespearean character
Picture
in scene from The Merchant of Venice, **3**-839
Portland. The chief port of the state of Maine; it has a large tourist traffic as well as extensive freight tonnage by rail and water. Population 76,643.
Portland. Largest city and port of Oregon, with lumber-mills, foundries and canneries. Built on slopes rising into tree-clad mountainsides, with ranges in the distance. The region round is rich in timber, fruit and minerals. Population 305,394.
as a harbor, **19**-6844-45
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Interstate Bridge over Columbia River, **1**-33
lumber mill, **8**-2678
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Why do some faces in pictures seem to follow us? **8**-2720
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by British artists, **6**-2002-03, 2005, 2112; (gravure), **6**-2113-20; (in color), **7**-2337-40
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by Velasquez (gravure), **4**-1501-04
Great figures in Tudor days (gravure), **5**-1821-24
See also articles on painting grouped by national adjectives as Painting, American; Painting, British, etc.
Portsmouth. Chief British naval station, with a naval dockyard covering 300 acres. Standing on a land-locked harbor, in Hampshire, it has been important since the 16th century, and has a large trade.
Portsmouth, seaport of New Hampshire
at time of Revolution, **3**-1042
Portsmouth, Treaty of. Treaty ending Russo-Japanese War, signed 1905, Portsmouth, N. H. signing of, **2**-564
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* history and description, **14**-5183-90
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* collecting, **15**-5507-10
how cancelled, **8**-2654
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Why has a postage stamp a perforated edge? **6**-2251
Pictures, see starred article above
Postal money orders, **8**-2659
Postal savings banks. Banks established by various governments through the Post Office Department. First introduced into England in 1861, they have been established in every country. Besides receiving deposits upon which they pay interest they provide annuities and write life insurance, and serve as agents in purchasing government securities. *See also* **8**-2661; **16**-5683
Postal service
* how our letters come to us, **8**-2653-61
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international co-operation, **18**-6598-99
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The Overland Mail, by Rudyard Kipling, **16**-5709
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Pot-holders
how to make from carpet warp, **4**-1285
Potaro River, of South America, **18**-6781
Potash, mineral
uses, world production, **18**-6646
Potassium (K, from Latin *kalium*). Chemical element. Silvery, reactive metal. Atomic number 19; atomic weight 39.096; melting point 63.6°C.; boiling point 774°C.; specific gravity 0.86. Potassium compounds are widespread in nature; there are a few commercial sources, the best known being at Stassfurt, Germany, and in California and New Mexico. Potassium salts are an important constituent of fertilizers. *See also* **16**-5672
structure of potassium atom, **1**-309-10
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diagram of potassium atom, **1**-309
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Why does a potato not rot under the earth while it is growing? **14**-5086
Why is it good to boil potatoes in their jackets? **10**-3771
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Potatoes, Sweet, **7**-2622
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Potential energy, term in physics, **4**-1357
"Potlatch," Indian custom, **1**-247
Potomac. American river rising in West Virginia and flowing past Washington into Chesapeake Bay. 400 miles.
Potosi. Cathedral city of Bolivia, standing more than 14,000 feet above sea-level, near famous silver and tin mines. It is the highest town in the world.
Potsdam Conference, 1945
Picture, **12**-4183
Potter, Beatrix
Story by
The Tale of Peter Rabbit, **16**-5923-24
Potter, Edward C., American sculptor, **14**-4938
Potter, Paul, Dutch painter, **5**-1592
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* how china cups and saucers are made, **5**-1662-72
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Does a hen know that chickens will come out of her eggs? **12**-4490
Is the white of the egg part of the chicken? **12**-4490-91
Why does a bad egg float and a good egg sink? **12**-4491
Why does boiling make an egg hard? **12**-4491
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skeleton of a chicken, **1**-258
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Pound, Ezra, American poet, **13**-4821
Pound (or **weir**), for catching fish, **11**-4055, 4057
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Powder River. American river, rising in the Big Horn Mountains, Wyoming; flows into the Yellowstone River. 400 miles.
Powell, John Wesley, explored Colorado River, **7**-2285
Power
harnessing the wind, **10**-3730-31
* meaning in physics, **2**-689; **4**-1355-57
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See also Water power
Power of attorney. A legal instrument authorizing the person named to act as the attorney for the person signing it. A *general* power of attorney gives authority to act without limitation. A *special* power limits it to the acts specified.
Powers, Hiram, American sculptor, **14**-4934
Poznan (Posen), city in Poland
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Praetorian Guard, of ancient Rome, **4**-1244, 1246, 1249
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Praetorius, Michael, German music composer, **10**-3603
Prague. The capital of Czechoslovakia; rises in terraces from the banks of the Moldau. Ancient and picturesque, it contains many medieval buildings, and has a university and an unfinished 14th-century cathedral. Manufactures include machinery, chemicals, linen and cotton. Population 848,823.
Pictures, **17**-6343
Prairie, *see* Prairies
Prairie chicken, variety of grouse, **12**-4364
Picture (in color), **10**-3621
Prairie dog, **3**-1128-29
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Prairie hen, variety of grouse, **12**-4364
Prairie Provinces, of Canada, **1**-111
Prairie rattlesnakes, **15**-5415
Prairie smoke, *see* Pasque flower
Prairie wolves, *see* Coyotes
Prairies
plant growth, **7**-2533
Praseodymium (Pr). Chemical element. Atomic number 59; atomic weight 140.92. One of the rare-earth elements. *See* Rare-earth elements

Pratincoles, birds, **11**-4010
Pratt, Anna Maria, *see* Poetry Index
Pratt, Bela L., decorations in Library of Congress, **5**-1539
Pratt, E. J., Canadian poet, **14**-5111
Picture, **14**-5110
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Pratt, Matthew, American painter, **9**-3327
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Praxiteles, Greek sculptor, **12**-4328-30
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Grace for a Child, by Robert Herrick, **1**-100
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Mohammedans at prayer, painting by Gérôme, **2**-441
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Pictures, **17**-6072; **18**-6730
Precedent, in law, **13**-4811-12
Precession of the equinoxes
explanation, **1**-25
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diagram, **1**-21
Precious stones
* history and description, **19**-7225-34
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Precipitate, chemical substance
definition of, **15**-5427
Precipitron method, for cleaning air, **17**-6392
Prefabrication
of houses, **9**-3127
Pictures
erection of prefabricated house, **9**-3125
Prehistoric animals, *see* Animals—history
Prehistoric man, *see* Man, Prehistoric and primitive
Prendergast, Maurice, American painter, **10**-3512
Pre-Raphaelite Brotherhood, ideals and influence, **6**-2235-36
Prescott, William Hickling, American writer and historian, **13**-4727-28
Presidents of the U. S., * **11**-3937-54d
See also United States—Presidents; also, names of Presidents
Presidential Succession Act, 20-7605
Press. The printing press; hence those who are engaged in printing and publishing, and particularly applied to newspapers and magazines.
See also Printing, Newspapers
Pressure, at great sea depths, **15**-5465
Pressure of Liquids and Gases, The, * **4**-1415-20
Pretender, the Old, *see* Stuart, James Francis
Pretender, the Young, *see* Stuart, Charles Edward
Pretoria. Capital of Transvaal and of the Union of South Africa. It is finely built, and has a cathedral. Diamonds are mined near by.
Prévost, Abbé, French novelist, **18**-6715
Priam, king of Troy
in the Iliad, **9**-3076, 3080
Priapus, in mythology, **9**-3237
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Picture
fur seals, **6**-1959
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Prickly-pear, account of, **9**-3266; **18**-6660
Pictures, **9**-3265
Priestley, J. B. (John Boynton), English novelist, **11**-4110
Priestley, Joseph, English scientist, **2**-701
discovered use of rubber as an eraser, **4**-1414
work in electricity, **11**-3982
Pictures, **2**-704
Primary Election. Elections held either to choose delegates to nominating conventions, or else to choose a candidate directly. Generally only party members are entitled to vote in the primaries, though in some states the non-partisan primary is in use and the whole electorate may take part in selecting candidates. Primary elections have been regulated by law only since about 1900. By 1915 the direct primary had come to be almost universal in selecting either state or local nominees, or both, throughout the United States.
Primates, *see* Apes; Monkeys; Lemurs
Primitive man, *see* Man, Prehistoric and primitive
Primitives (early type of Renaissance painting)
in Italy, **2**-690-99
Primo de Rivera, Miguel, Spanish dictator, **14**-4920-21
Primroses, flowers, **17**-6127
bird's-eye, or mealy, **16**-5731-32, 5734
evening primrose, **18**-6656
experiments on, by De Vries, **4**-1390
Pictures, **4**-1389; **13**-4880; **16**-5731; **17**-6126; **18**-6654
Primrose Family, in botany, **13**-4875
Primus berry, how developed, **4**-1388
Prince Edward Island. Island province of eastern Canada; area, 2,184 square miles; capital, Charlottetown. Silver fox breeding is important, there being more than 300 fur farms. Population 95,047.
Picture, fox farm, **1**-108
Prince of Wales, *see* Wales, Prince of
Prince Who Was Poor, The, 15-5537-38
Prince's Five Servants, The (story), **18**-6506-07
Princess, Strange Adventures of, by Chaucer, **13**-4769
Princess Who Became a Goose Girl, The (story), **11**-3831-33
Princeton, Battle of, 4-1167
Princeton University
history, **12**-4312
Pictures (gravure), **18**-6687
Nassau Hall, **12**-4318
Principe, Portuguese possession, in Gulf of Guinea, **18**-6814
Prinsep, Valentine Cameron, British painter
Picture
At the Golden Gate (gravure), **6**-2240
Printing
* inventors of printing, **9**-3381-96
description, **3**-1059, 1067
introduced into England, **2**-724
of pictures, **3**-1059-61, 1063, 1066-67
one cause of Renaissance, **17**-6297
proofreader's marks, explanation and table, **7**-2484-85
school paper, how to print, **6**-2041-44
Pictures, **3**-1055-58, 1060-67
hand press, **6**-2043
hand press of Bernardo Cennini, **14**-5095
printing press, American colonial times, **13**-4628
plate for printing, **16**-5677
shop in a cave in China, **2**-437
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Printing. Block
* with linoleum blocks, **4**-1391-94
See also Wood-block printing
Printing-press
Pictures, **3**-1055-58
See also Type
Prionodura, bird, arranges bower, **8**-2896
Prior, Matthew, *see* Poetry Index
Priscilla, heroine in Longfellow's poem, **The** Courtship of Miles Standish
Picture, **13**-4722
Prisms, effect on light, **8**-2791-92
Picture, **8**-2791
Prisoners of war, members of military, naval and air forces, of a warring country, captured by the enemy. In olden days they were considered the property of the captors and might be killed, tortured or made slaves. However, since the last quarter of the 19th century, there have been several international agreements for the treatment of prisoners of war. The most important is the Geneva Convention of 1929, which was signed by 47 nations, not including Japan and the Soviet Union. By this treaty prisoners of war must be removed as quickly as possible from war zones; have the right to send and receive mail, food and clothing; have "livable" quarters; have the same food as that which the enemy provides for its own troops; and must be treated with humanity. These provisions are carried out by the International Red Cross; and representatives of neutral countries visit the prisoner-of-war camps.
Prisons. Originally looked upon as houses of detention only, such as the Tower of London, the Bastille in Paris, but since the early 17th century used as places for the punishment of crime. At first conditions were very bad, but the reform movement led by John Howard brought about many improvements as regards the housing of prisoners, etc., and prisons began

Prisons (*continued*)
to be looked upon as a possible means of reformation. Prisons include lock-ups, jails and prisons proper, as well as reformatories for younger delinquents.
Privateers
in American Civil War, **7**-2439-40
in American Revolution, **4**-1171
Privet, bush, **11**-4019
Picture
fruit (in color), **11**-4021
Problems, arithmetical and miscellaneous, **4**-1285-86; **6**-2165; **7**-2380
How did the farmer enlarge the fold? **16**-5771
How did the father divide his garden? **7**-2380
traveler's dinner, **13**-4624
See also Puzzles
Proboscis monkey
Picture, **1**-208
Proctor, Alexander Phimister, Canadian sculptor, **14**-5079
Producer, in economics
definition of, **17**-6086, 6088
Producers' co-operatives, 18-6601
Profits, in economics, **17**-6361-62
Progressive party, U. S., in 1912, **8**-2671; **19**-7198
Projectiles, 8-2843-50
Prokofieff, Sergei, Russian music composer, **10**-3612; **19**-6926, 7153
Proletariat. The term applied to wage-earners who have no capital but who depend on daily wages for a livelihood. Proletariat comes from the Latin word, *proletarii.* This name was given to the lower classes in ancient Rome. They were considered valuable to the state only because they brought up children (*proles* means child in Latin).
Prometheus, the Titan who stole fire from Olympus for man, **9**-3228, 3233
Promethium (Pm), formerly called Illinium. Chemical element. Atomic number 61. One of the rare-earth elements. It is doubtful if it occurs in nature, but it has been synthesized in a cyclotron and in an atomic-energy pile. *See* Rare-earth elements
Prong-horned antelope, of North America, **4**-1448
Picture, **4**-1448
Pronoun. A word which stands instead of a noun. There are personal pronouns, as *I, we, he;* reflex pronouns, as *ourselves, himself;* demonstrative, as *this, that;* interrogative, as *who? which? what?;* relative, as *who, which, what.*
Proofreading
* proofreaders' marks, explanation and table, **7**-2484-85
Picture, **3**-1063
Proportion. In mathematics, the equality of ratios. The ratio of 12 to 3 is equal to the ratio of 8 to 2, so that 12:3=8:2 is a proportion. If one quantity varies directly as another, the two are *directly* proportional. If one quantity varies inversely as another, the two are *inversely* proportional.
in architecture, **15**-5341-42
Proportional representation. A system of voting designed to secure that the various political opinions of the electorate shall be fairly represented in the body of persons elected. The basis of the system is the transferable vote, each elector being allowed to vote for more than one candidate in order of preference, surplus votes being divided.
Proprietorship, form of business, **15**-5362-63
Proserpina, in mythology, **9**-3238
Poem about
The Garden of Proserpine, by Algernon Charles Swinburne, **16**-5712-13
Protactinium (Pa). Chemical element. Atomic number 91; atomic weight 231. Protactinium is radioactive, and changes into actinium or uranium.
Protection, British trade policy, **7**-2305
Protective coloration, *see* Adaptation to environment
Proteins, chemical compounds
albumen, white of egg, **12**-4490-91
chemical composition, **17**-6202-03, 6205
in allergy, **2**-685
in plants, **1**-118
serum proteins in blood, **3**-936-37
use as foods, **6**-2123-24
use in plastics, **11**-4003
Proterozoic Era, early period in earth's history, **3**-775
Proteus, a salamander, **15**-5458
Proteus, a sea god, **9**-3235
Protons, parts of atoms, **1**-307, 309-10
Protoplasm, living matter, **1**-50; **2**-557-58
* chemical cycles, **17**-6202-05
Protozoa, one-celled animals, **2**-661-62
amebas, **15**-5540
Picture, **2**-662
Proust, Joseph Louis, French chemist, **2**-705
Proust, Marcel, French writer, **18**-6720
Provence. Beautiful old French province bordering the Mediterranean. The Greeks early established a settlement at Massilia, the modern Marseilles, and later Provence was for centuries under Roman rule, there being splendid Roman remains at Arles, Orange and Fréjus.
early literature of, **17**-6150
Provençal language, **18**-6559
Proverbs, games, **15**-5598
Providence. Capital of Rhode Island, making jewelry, textiles and machinery.
founding of, **2**-549
Province of Newfoundland, The, * **9**-3267-76
Provincetown, Mass.
Picture
town crier, **12**-4153
Proxima Centauri, nearest star to sun, **9**-3035; **11**-3784
Proximity fuse, 14-5126
Prudhon, Pierre Paul, French painter, **6**-2080
Prunes
account of, **6**-2066
Prussia. Largest state of Germany, occupying nearly the whole of the north of the country. Originally consisting only of East Prussia and Brandenburg, its dominions grew rapidly, and it soon included the great provinces of Silesia, Pomerania, Schleswig-Holstein, Rhenish Prussia, Hanover and Westphalia, with part of Saxony. Its capital is Berlin. Area, 113,575 square miles at its greatest extent.
in Napoleonic Wars, **6**-2204, 2207-08
influence on history of Germany, **12**-4162-63, 4165
Przevalski's horse, 6-2014
Picture, **6**-2011
Psalms
music for singing of, **18**-6508-09
Psyche
Picture, **9**-3229
Psychoanalysis, for diagnosis and treatment of mental disease, **12**-4444
Psychology, *see* Mind
Ptarmigan, bird
account of, **12**-4363-64
Picture (in color), **9**-3234
Pteranodon, prehistoric flying reptile
Picture, **5**-1659
Pterichthys, fish of Devonian period, **4**-1175
Pteridophytes, plant group, **1**-221-22; **10**-3724
Pterodactyl, prehistoric animal, **5**-1546
Pictures, **1**-97; **5**-1659
fossil remains, **5**-1547
Ptolemies, Egyptian kings, **3**-821
Ptolemy, Greek astronomer, **11**-3845
wrote account of Africa, **14**-5199
Picture, **11**-3844
Public Health
and milk inspection, **7**-2325
Public-opinion polls
Question about
What are public-opinion polls and how are they made? **19**-7245-47
Public schools
of New York and other large cities, **15**-5622-23
Public utilities
Question about
What are public utilities? **9**-3355-56
Puccini, Giacomo, Italian opera composer, **19**-6921
Pucelle, La. Old French name for Joan of Arc, meaning "the Maid." In Shakespeare's Henry VI, Part I, she is called Joan la Pucelle.
Puddling furnace, for making pig iron into wrought iron, **9**-3348
Pueblo Indians, of Southwest, U. S., **19**-7238, 7240
of Arizona, **9**-3031
Pictures, **19**-7239, 7241

Puerto Rico. Fertile West Indian island under U. S. administration; area, 3,435 sq. mi.; capital, San Juan. Sugar, coffee, rice, corn, tobacco and bananas are produced. Population 1,869,255.
account of, **19**-7101-02
area, **8**-2674
as American territory, **10**-3587
Pictures, **10**-3588-91
San Juan, **19**-7103
Puff adder, snake, **15**-5414
Puffballs, edible mushrooms, **10**-3723; **11**-3908
Puffbirds, **9**-3365
Picture (in color), **10**-3624
Puffin, bird, **11**-4126
Pictures, **8**-2759; **11**-4125; (in color), **8**-2900
Puget, Pierre, French sculptor, **13**-4702
Puku, an antelope, **4**-1442
Pul, *see* Tiglath Pileser III
Pulaski, Casimir, Count (1748-79). Polish-American soldier. After taking part in an insurrection he escaped from Poland and entered the American army in 1777; killed in attack on Savannah, 1779.
Pulaski Skyway, New Jersey, **1**-37
Pull of the earth
See Gravitation
Pulley, a simple machine, **4**-1523
Pullman, George, inventor of sleeping cars, **2**-414
contractor in Chicago, **19**-7110
Pulp, for paper
* manufacture of, **7**-2445-53
See also Lumber and lumbering; Wood
Pulp-grinder, machine used in making pulp
Picture, **7**-2448
Pulse, waves of blood through arteries, **4**-1209-10
Puma, animal, **2**-493
Picture (gravure), **2**-500
Pumice stone
Question about
Where does pumice stone come from? **9**-3101
Pump
in water supply systems, **14**-5056-57
water, for irrigation, **7**-2550, 2552
worked by atmospheric pressure, **4**-1418
Question about
What is a heat pump? **14**-4949-50
Picture
diagram of water pump, **4**-1418
Pumpkin-seed, sunfish, **15**-5630
Pumpkins, **7**-2616
Punctuation marks
fun with punctuation marks, **19**-7084
Punic Wars, between Carthage and Rome, **4**-1195-96
Pictures, **4**-1196-97
Punjab. Indian northern province in the plain of the Indus; area, 100,000 square miles; capital, Lahore. The rainfall is scanty, but by means of irrigation canals vast crops of cereals, cotton, oil-seeds and sugar are produced, while rock-salt is a great source of wealth. More than half the people are Moslems, and more than a third Hindus, the Sikhs numbering about 3,000,000. Amritsar, Ambala, Simla and Multan are among the towns. Population 28,410,000.
Picture
school, **8**-2822
Pupil, of the eye, **11**-3802
Question about
What makes the pupil of the eye grow larger and smaller? **11**-3841
Pupin, Michael, American scientist, **14**-5018; **17**-6244
Picture, **17**-6245
Puppets, *see* Marionettes
Purbeck marble
use in sculpture, **13**-4853
Purcell, Henry, English music composer, **10**-3602
Pure-Food Laws. Laws passed by the Congress of the U. S. in June, 1906, prohibiting adulteration, misrepresentation, and the misuse of preservatives in the preparation of foodstuffs and drugs. The law is administered by the U. S. Department of Agriculture, aided by the Treasury Department and the departments of Commerce and Labor.
Puritans
forbade celebration of Christmas, **6**-2095
in American colonies, **2**-547-48, 550
in England, **2**-546
John Milton's relation to, **4**-1236, 1238-39
Puritans (*continued*)
singing of Psalms, **18**-6508
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Pictures
costumes of, **9**-3164
Purloined Letter, The, **17**-6320-24
Purple finches, birds
of Pacific coast, **14**-5143
Purple martins, birds, **14**-5144
Purslane, flower
Pictures (in color), **14**-4981; **15**-5391
Pushkin, Alexander, Russian writer, **19**-6907
folk-tale collection, **6**-2277
Picture, **19**-6906
Puss in Boots (story), **14**-4941-43
Puss in the corner, game, **11**-4082
Pussy toes, flower
Picture (in color), **15**-5610
Pussy willow, description, **17**-6273
Putnam, Israel (1718–90). American soldier, born in Massachusetts, but a resident of Connecticut. He served in French and Indian War, Pontiac's War, and in Revolution.
Picture
portrait and note, **4**-1168
Putty. A kind of cement, usually of whiting and boiled linseed oil, beaten to the consistency of dough, and used in fastening glass in sashes, for stopping crevices and so on.
Puvis de Chavannes, Pierre, French painter
work and characteristics, **7**-2482
Pictures
Bishop and St. Genevieve, **7**-2478
panels in Boston Public Library, **7**-2481
portion of wall-painting, **7**-2475
Shepherd's Song, **7**-2478
Puzzle of Space, * **16**-5865-69
Puzzle-pictures
about a steamer, **12**-4268
Puzzles
arranging matches or toothpicks, **2**-625
building a word, **10**-3626-27
How did the farmer enlarge the fold? **16**-5771
How did the farmer make his bridge? **15**-5336
king's guard, **16**-5891-92
magic square, **6**-2165
puzzling cards, **7**-2651
trees in the park, **13**-4623
What are these plants? **10**-3505
What can it be? **10**-3507-08
What is wrong? **2**-748
Who am I? **9**-3251-52
with paper and scissors, **15**-5337
wordy game, **10**-3506
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Pycnogonida, spider-like creatures, **16**-6014-15
Pyle, Howard, American author and illustrator, **14**-4961
Story by
The Fruit of Happiness, **7**-2625-32
Pylons, in Egyptian architecture, **14**-5212
Pictures (gravure), **14**-5213, 5215-16
Pyramids
Picture
Pyramid of the Sun, Mexico, **11**-3815
Pyramids of Egypt
account of, **7**-2604; **14**-5211
* description, and account of building, **3**-808-10
Pictures, **3**-809
building the Great Pyramid, **2**-589
2nd pyramid, Gizeh; step pyramid, Sakkâra, (gravure), **14**-5214
pyramid of Cheops (gravure), **7**-2606
Pyrenees Mts., **14**-4905, 4907
Pictures, **14**-4907
Pyrethrum
Picture
flower (gravure), **19**-7175
Pyrite (FeS_2). An iron disulphide that crystallizes in the isometric system. It is of a brass-yellow color with a metallic lustre, and occurs in rocks of every age and kind. Pyrite is used chiefly in the making of sulphuric acid and green vitriol.
Pyrola, plant, note and picture, **16**-5879
Pyrotechnics, making of fireworks, **13**-4824
Pyroxylin (cellulose nitrate), basic material of many plastics, **11**-4000
Pyrrhus, king of Epirus
war with Rome, **4**-1194
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Pythagoras, scientist of ancient Greece, **2**-589-90
Pictures, **2**-588; **19**-7004

Pythagorean theory, in astronomy, **11**-3846
Pytheas, early Greek navigator, **12**-4227
Pythias
Story about
Damon and Pythias, **13**-4577-78
Pythius, architect of Mausoleum at Halicarnassus, **12**-4332
Pythons, snakes, **15**-5411-12
Picture, **15**-5410

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Quagga, horse-like animal, **6**-2018
Quail, bird
account of, **12**-4365; **13**-4760; **14**-5135
Pictures, **14**-5133; (in color), **9**-3132; **10**-3621; **12**-4371; **13**-4841
Quakers, account of, **2**-551
Quaking grass
Pictures, **10**-3652; (in color), **10**-3522
Quantum Theory, of light, **6**-1997
Quarries
Picture
granite quarry, Vermont, **11**-3774
Quarter-deck of a ship, **13**-4848
Quartz, a form of silica (silicon dioxide, SiO_2), the most common of all minerals, forming 12% of the earth's crust. It is hard enough to scratch glass, and may be colorless, milky, smoky, yellow, amethyst, rose, green, etc., with a glassy luster. Quartz is found in all granites; and quartz veins may contain rich gold deposits. It is used in the manufacture of glass, in ornaments, as prisms in optical work. Quartz crystals are particularly important in making radio receivers, to control the frequency of vibrations so that stations may be tuned in and out.
as a gem stone, **19**-7232
Quassia, drug from bitterwood tree, **8**-2911
Quebec (city)
bridge at, **1**-33
history (arranged chronologically)
founded by Champlain, **2**-678
attacked by Arnold, 1775-76, **4**-1163
captured by Wolfe, **3**-783
Laval University, *see* Laval
Pictures, **8**-2948
altar in Church of the Guardian Angel, **14**-5077
Golden Dog plaque on Bourgeois Philibert house, **14**-5105
ice-skating rink, **10**-3697
painting of General Wolfe's death, **3**-776
Quebec Bridge, **1**-35
toboggan slide in front of Chateau Frontenac, **10**-3696
Quebec. Largest Canadian province on both sides of the St. Lawrence; area, 594,434 square miles; capital, Quebec. It was first visited by Cartier in 1535, Quebec City being founded by Champlain in 1608, and existed as a French colony up to 1763; five-sixths of the people are of French descent, speaking French. The chief industries are dairying, lumbering, mining, manufacturing and paper-making, the forest resources being enormous; 175,000 square miles are said to be still untouched. The world's largest supply of asbestos is produced here, while Montreal is the largest city and export centre in Canada. Population 3,331,882.
French language, use of, **8**-2950
habitants, life of, **8**-2952-56
* history, 1759-1850, **3**-940-46
as Lower Canada, 1791-1840, **3**-944-46
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Pictures
among the habitants, **8**-2953, 2955
brides for settlers of New France, **2**-680
Church of the Holy Family on island of Orleans, **14**-5077
country scene near Cap Noir, **1**-105
Father Point lighthouse, **10**-3581
Ile d'Orleans fruit farm, **8**-2951
Montreal airport, **10**-3532
Ste. Anne de Beaupré, **8**-2956
two scenes, **8**-2948
village of Gaspé, **8**-2949
water-power developments, **18**-6758
winter scene, **7**-2415
Quebec Act, Canada, 1774, provisions, **3**-941
Quebec Bridge, Quebec, Canada, **1**-33
Picture, **1**-35
Quechuan, stock of South American Indians, **19**-6859
Queen Anne's lace (wild carrot), plant, **15**-5394
Picture, **15**-5389
Queen Anne's War, *see* French and Indian Wars
Queen Mary, ship
description, **12**-4414-15, 4419, 4422-24
Pictures, **12**-4414-15, 4423, 4425
Queensborough Bridge, New York City, **1**-33
Queensland, Australia, account of, **7**-2467-68
Picture, Brisbane the capital, **7**-2462
Queenston Heights, Battle of. In the War of 1812. Canadian troops numbering about 2,000 defeated an American force of 6,000.
Queer and lowly creatures, * **19**-7059-69
Queer plants, * **9**-3260-66
Quentin Durward, by Scott, note on, **11**-4070
Quercia, Jacopo della, Italian sculptor, **13**-4606
Quest of the Golden Fleece, The (story), **10**-3444-45
Quetzalcoatl, Toltec god, **11**-3813
Quezal, bird, **9**-3370-71
Picture
Mexican quezal (in color), **10**-3623
Quiberon Bay, Battle of. Naval engagement between the British under Hawke and the French, in 1759, during the Seven Years' War. Risking his ships among uncharted rocks while a gale was blowing, Hawke chased and attacked the French and utterly destroyed their fleet, thus preventing an invasion of England and giving England the command of the sea. Quiberon Bay is a small arm of the Bay of Biscay.
"Quick-frozen" foods, **6**-2171
Quicksand, explanation, **9**-3101
Quicksilver or **mercury** (Hg). The only metal that is liquid at ordinary temperatures. It is a heavy tinny-white metal with a tendency to separate into globules. It amalgamates easily with other metals. Although mercury sometimes is found uncombined, the main supply for commerce comes from cinnabar (sulphide of mercury), a cochineal-red mineral. Spain, Austria and the United States have been the big producers, so far, of this metal.
production in U. S., **9**-3210
Questions about
Why does iron float on mercury and not on water? **9**-3354
Why does quicksilver roll up into little balls? **2**-688
Quills, from birds' wings
use as pens, **10**-3550
Picture
quill pen, **10**-3551
Quinine, medicine, **8**-2909-10
Quinsywort, flower
Picture (in color), **14**-4985
Quintilian, Roman orator and teacher, **14**-5249
Quintuplets, Dionne, *see* Dionne Quintuplets
Quintus Ennius, Latin poet, **16**-5908
Quipus, knotted cords of Incas, **19**-6861
Quisling. Name applied to a traitor who helps a foreign invader. This name comes from Major Vidkun Quisling, who aided the Germans to invade his native Norway in April, 1940. Later he worked with the German occupying force to crush all opposition to Nazi rule. In 1945 he was tried in the Norwegian courts for treason, convicted and executed by a firing squad.
Quito. Capital of Ecuador, standing over 9,000 feet above sea-level among lofty volcanic mountains. It has a cathedral and a university, and manufactures textiles, leather goods and jewelry. Population, 150,374.
Qum, town in Iran
Picture
Fatemeh-el Masumeh Mosque, **15**-5468

R

R-34, British dirigible, **1**-349
Picture, **1**-348
R-101, airship, **1**-351
Ra (or **Re**), Egyptian sun-god, **3**-811

Rabbi. The Hebrew for "my great one." An honorary title applied to Jewish teachers of the law. In the time of Christ the title was used merely as a term of respect, but later it was restricted to those authorized to decide ritualistic and legal questions.
Rabbit-foot clover, plant, **14**-4978
Rabbits, account of, **3**-1134
Story about
The Tale of Peter Rabbit, **16**-5923-24
Pictures, **3**-1134
Rabelais, François, French author
life and writings, **18**-6565
Rabies, disease, cure discovered by Pasteur, **15**-5484
Raccoon, animal, **3**-870-72
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Raccoon dog, 2-601
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Races of mankind
* North American Indians, **1**-240-54
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Rachmaninoff, Sergei, Russian pianist and composer, **19**-6924-25
Racine, Jean, French dramatist, **18**-6712
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* development and uses, **14**-5146-51
use in aviation, **1**-185
Radar, Master Detective, * **14**-5146-51
Radcliffe, Mrs. Ann, writings of, **6**-2256
Radiation of heat and light
experiment to show, **2**-623
heat transmission, **5**-1582, 1847-48
measurement of by Geiger counter, **14**-4947-49
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* how to write a radio play, **3**-1149-51
* learning to be a radio amateur, **14**-4997-5002
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See also radar
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use with telephone, **17**-6188
Radio direction finder (RDF)
use on ships, **12**-4417-18
Radio plays
* writing a radio play, **3**-1149-51
Pictures
rehearsal of radio play, **14**-5121
sound effects for radio play, **14**-5121
Radio telegraph
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exchange board of central office, **14**-5125
Radio telephone
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* radioactive elements, **16**-5797-5812
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measurement of by Geiger counter, **14**-4947-49
Radiolocation, British name for radar, **14**-5146
Radiosondes, weather-recording instruments, **12**-4225
Picture, **12**-4225
Radishes
Pictures, **7**-2621; (in color), **14**-4981; **15**-5611
Radisson, Pierre Esprit (1636-1710?). French adventurer and explorer who explored North America as far west as the Mississippi and as far north as James Bay. Offered his service to the English and led an expedition into Hudson Bay—the start of the Hudson's Bay Company.
Radistchev, Alexander, Russian writer, **19**-6905
Radium (Ra). Chemical element. Atomic number 88; atomic weight 226.05; melting point
Radium (*continued*)
960°C.; boiling point 1140°C.; specific gravity 5. Discovered in 1898 by Pierre and Marie Curie, shortly after their discovery of polonium (*see* Polonium). The discovery of these radioactive elements opened the door to our knowledge of atomic structure and eventually to the whole field of nuclear physics. Radium changes into radon by radioactive transformation. Radium is used in medicine, and in small quantities for making luminous paints. *See also* **16**-5676, 5806-08
discovery by the Curies, **3**-990, **992-93**
discovery of, **16**-5798-99
in paint, **9**-3102
where found, **5**-1556-57
Pictures
preparation for use, **16**-5801-03
radium salt, **16**-5800
Radon (Rn). Chemical element. Inert gas (*see* Inert gases). Atomic number 86; atomic weight 222; melting point −110°C.; boiling point −62°C. Radon is inert chemically, but is very radioactive. It is formed from radium and changes into polonium.
Rae, Henrietta, British painter
Picture
Apollo and Daphne (gravure), **9**-3231
Raeburn, Henry, Scottish painter, **6**-2112; **7**-2330-31
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Raffia, baskets, how to make, **6**-2044-45
Rafflesia Arnoldi, largest flower, **1**-332; **9**-3264
Rafinesque, Constantine Samuel, naturalist, **19**-7058
Ragusa, or **Dubrovnik.** Ancient port of Dalmatia. In the past it has been Greek, Roman and an independent republic. It has a cathedral and many medieval buildings. Population 18,767.
Picture, **17**-6345
Ragweed, 15-5394
Pictures, **15**-5391
Ragwort, weed
Pictures, **16**-5882; (in color), **14**-4996
Rahere, court jester, **16**-5964
Raid of Prince Igor, twelfth century Russian chronicle
account of, **19**-6904-05
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in Australia, **7**-2470
in Canada, **1**-116
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Poem about
Workin' on the Railroad, **16**-5745
Questions about
Does the smoke of a train go the opposite way to the train? **2**-459
When I walk in a moving train do I move faster than the train? **11**-4134
Why are we thrown forward when the train stops suddenly? **11**-4132
Why does the whistle change as the train comes nearer? **10**-3659
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aerial railway in Switzerland, **16**-6005
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Railroads—*Pictures* (*continued*)
railroad building in the west, **6**-1922
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streamlined train, **5**-1636; **9**-3352-53; **11**-4133
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resemble penguins, **11**-4130
Pictures (in color), **9**-3283; **12**-4371
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The Rainy Day, by Longfellow, **9**-3339
Questions about
How far does rain sink into the earth? **8**-2920
Is it harmful to us to drink rain water? **8**-2919
What is the shape of a raindrop? **8**-2919
Where does the rain go? **8**-2920
Why is salt damp when it is going to rain? **8**-2919
Why is the rain sometimes heavy and sometimes fine? **8**-2919
Rain forests, of tropics, **7**-2532-33
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How does the sun make a rainbow? **13**-4826-27
How many colors has the rainbow? **7**-2487
When we are looking at a rainbow can people see the other side? **6**-2252
Why do we sometimes see two rainbows? **1**-75
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Rainfall
source of spring water, **9**-3102
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Rainier, Mt., description, **7**-2283
Picture, **9**-3206
Raisins, from California
Picture
drying grapes, **6**-2060
Rajmahal, India
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heights overlooking Banas River (gravure), **8**-2829
Raleigh, Sir Walter, * **14**-5260-64
and lost colony of Roanoke, **17**-6333-37
and potatoes, **7**-2618
as historian, **9**-3222
as poet, **3**-1116
attempted settlement in America, **2**-543
See also Poetry Index
Pictures, **5**-1821
in group, **3**-1113
spreading cloak for Queen Elizabeth, **14**-5261
Raleigh. Capital of the State of North Carolina. It is a large cotton and tobacco market. Among its manufactures are cotton goods, yarn, hosiery, underwear, structural iron, agricultural implements, cotton oil, fertilizers and woodenware. Population 46,897.
Picture
Capitol building, **14**-4896
Rambouillet, breed of sheep, **15**-5577
Rameses II, Pharaoh of Egypt, **3**-817
treatment of Jews, **19**-7155
Pictures
statue of (gravure), **11**-3878
statues in Temple of Luxor, **3**-819
Ramie. This shrub, which is a member of the nettle family, produces in the bark of its stalk one of the strongest vegetable fibres. Ramie is used extensively as a textile in China and has been used to a much lesser extent in Europe and America, under the name of Chinese grass. The chief objection to its use is that it is difficult to clean the fibre, which is surrounded by a resistant gum. The fibre is weakened if this gum is removed by acids or alkalis.
Rampion, flower
Pictures (in color), **14**-4990, 4995
Ramsay, Allan, Scottish painter, **6**-2112
Pictures
A Lady, **6**-2109
portrait of his wife (gravure), **6**-2115
Ramsay, Allan, poet, **6**-2028
Ramson, flower
Picture (in color), **14**-4988
Rand, the, mining district in Transvaal, South Africa, **9**-3051; **13**-4594
Picture, **9**-3051
Randall, James Ryder, American journalist and song-writer, **18**-6510
Randolph, John, of Roanoke (1773–1833). An American statesman, descendant of Pocahontas. Fought duel with Henry Clay.
Rands, William Brighty, *see* Poetry Index
Ranger, Henry W., American painter, **10**-3511
Rangoon. Capital of Burma and largest port. The export centre for the Irrawaddy valley, it has an immense trade in rice, teak, cotton, hides, and especially oil. Population 400,415.
Rankin, Jeanette, first woman member of Congress, **14**-5272
Ransom, John Crowe, *see* Poetry Index
Rape, as fodder plant, **7**-2413
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great broom rape (in color), **14**-4989
Raphael, Italian painter
* life and work, **3**-959-60
as architect, **17**-6300
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as a boy, statue, **14**-5097
at work in a courtyard, **14**-5096
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Balthasar Castiglione (gravure), **3**-964
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Pope Julius II (gravure), **3**-962
St. John in the Desert (gravure), **3**-964
Raphael, Mary F., artist
Picture
Guinevere in the Nunnery Garden (gravure), **19**-6948
Raphael and His Time, * **3**-957-64
Rapunzel's Golden Ladder (story), **11**-3829-30
Rare-earth elements. These are the elements from cerium, atomic number 58, to lutetium, 71. (The term "earth" was formerly used for the oxide of a metal.) Phosphates of all these elements occur in monazite sand in India and Brazil. They are extremely similar to one another in properties. Cerium, sometimes mixed with other rare-earth elements, has some industrial uses. *See* Cerium
Rare-earth metals, 16-5676
Rasbora, species of tropical fish
Picture, **5**-1766
Raspberry
flowering, account of, **15**-5608
wild, **11**-4020
Pictures, **6**-2063; **15**-5604; (in color), **11**-4023
Raspe, Rudolf Erich, German scholar
* Adventures of Baron Munchausen, extracts, **4**-1421-27
Rat kangaroos, marsupials, **7**-2501
Picture, **7**-2500
Ratel, animal, **2**-770
Picture, **2**-770
Rats
* account of, **3**-1131-33
cats check spread of rats, **2**-501
spread bubonic plague, **17**-6423
Poem about
The Pied Piper of Hamelin, by Robert Browning, **12**-4475-80
Pictures, **3**-1130, 1132-33
Rattan. A genus of East Indian and tropical African palms with reed-like pointed stems sometimes several hundred feet long. Used for making bridges, plaited work, and chair-bottoms in native countries, and exported under the name of cane.
making a basket from, **6**-2044-45
Rattle, Yellow, flower
Pictures (in color), **14**-4993; **15**-5399
Rattlesnake flags, in American Revolution, **19**-7182-83
Rattlesnake plantain, description, **19**-6928

Rattlesnakes, varieties, and account of, **15**-5415
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Ravel, Maurice, French composer, **19**-6919, 7153
Ravenna, Italy
and early Christian art, **16**-5716
Corsini Canal, with picture, **13**-4573
Pictures, Mosaics in San Vitale church, **2**-577, 581; (gravure), **1**-70
Ravens, account of, **8**-2889-90
northern, **14**-5139
of North America, account of, **13**-4766
Poem about
The Raven, by Edgar Allan Poe, **19**-6871-73
Pictures, **8**-2895; (in color), **9**-3282
Raw materials, meaning of term, **9**-3211, 3213
Rawlings, Marjorie Kinnan, American writer, **14**-5013
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Ray, John, English naturalist, **2**-709
Rayon, fabric from cellulose, **8**-2753-54
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Rays, fishes, **16**-5774
Pictures (in color), **16**-5781, 5782
Rays, ultraviolet, importance to our health, **6**-2121-22
Rays That Fill Our Universe, The, * **13**-4545-52
Razor-bills, auks, **11**-4126
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Razor-shells, mollusks
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Re (or Ra), Egyptian sun-god, **3**-811
Reaction
* chemical behavior, **15**-5367-74
Read-aloud poems, *see* Nursery Rimes in Poetry Index
Reade, Charles, British novelist, **11**-3900
Readers' Guide to Periodical Literature, 10-3559
Reading. Iron- and steel-manufacturing city in Pennsylvania in an important coal-field. Population 110,568.
Real Princess, The (story), **7**-2458
Reaping, invention of machinery for
Picture, of reaper, **5**-1758
Rebab, crude musical instrument
Picture, **5**-1797
Rebec, ancestor of violin, **5**-1795
Pictures, **5**-1799
Récamier, Madame
Picture, portrait, by David, **6**-2078
Receiver, for radio, **14**-5122-23
Recent European Statesmen, * **18**-6603-12
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Reciprocal Trade Plan, for reduction of tariffs, **17**-6093
Reciprocity Treaty, United States and Canada, 1854-66, **4**-1484
Reclamation Act, U. S., aided irrigation, **7**-2546
Reconstruction, after American Civil War, **7**-2443-44
Records, phonograph, how made, **1**-264-65
Recreation, vacation areas in northeastern states, **12**-4147-49
* sports in Canada, **10**-3693-98
Rectifier, special electron tube, **14**-5036
Red Book of Hergest, Welsh folk-tales, **1**-217
Red blood cells, 3-932-34
Pictures, **3**-932-34
Red cedar, or **savin.** A tree native to North America. It grows in sandy or rocky places from Lake Champlain to the Gulf of Mexico. Conical in form, it has horizontal branches, very small leaves and small bright blue berries. Used for lead pencils, fence-posts, etc.
Red Cross
American Red Cross founded by Clara Barton, **14**-5269
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How did the Red Cross Society gets its emblem? **18**-6558
Red deer, or **stag, 4**-1506-07
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Red-flowered currant, *see* Currants—red-flowered
Red geese, *see* Flamingoes
Red-hot-poker, flower, **19**-7172
Picture, (gravure), **19**-7175
Red Indian paint, *see* Bloodroot
Red Indian paint brushes, *see* Painted cups
Red-letter day. Saint's day or festival of the Church marked with red in the calendar; also any day happily memorable in one's life.
meaning of, **4**-1453
Red may, variety of hawthorn, **12**-4384
Red Platy, fish
description, **5**-1766
Red-rattle, Marsh
Picture (in color), **16**-5882
Red River. An American river rising in the Staked Plain, Texas, and flowing into the Mississippi River. 1,200 miles.
Red River. A navigable river rising in Lake Traverse, Minnesota. It crosses the international boundary between the United States and Canada, flows through Manitoba and empties into Lake Winnipeg. Its length, from its American source to its Canadian mouth, is 706 miles.
first settlement, **3**-941
Riel rebellion of 1869-70, **4**-1486
Red river hog, 5-1721
Red Sea. Arm of the Indian Ocean stretching 1,500 miles from Suez to the Strait of Bab-el-Mandeb. Its shores are arid and infertile, but since the opening of the Suez Canal it has become the chief route from Europe to the East. Suez, Port Sudan, Suakin, and Jiddah, the pilgrimage port of Mecca, are its chief ports.
cause of color, **15**-5540
Red-shafted flickers, birds, **14**-5134-35
Red Square, Moscow
Pictures, **16**-5858-59
Red squirrels, 3-1127-28
Red-tails, birds, *see* Redstarts
Redbirds, 14-5031
Redbud, tree, description, **12**-4386
Redfield, Edward W., American painter, **10**-3512
Redgauntlet by Scott, note on, **11**-4071
Redi, Francesco, Italian scientist, **2**-709
Redpolls, birds, **8**-2973; **13**-4832
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Redshanks, birds
Picture (in color), **9**-3130
Redstarts, birds, account of, **9**-3140; **13**-4840
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a warbler, not a thrush, **9**-3140
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Redwinged blackbird, 13-4766
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Redwings, birds, **9**-3140
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Picture, in group, **15**-5488
Reed-bird, name for bobolink, **8**-2970
Reed grass
Pictures, **10**-3653; (in color), **10**-3523-24
Reedbuck, an antelope, **4**-1442
Picture, **4**-1444
Reedlings, Bearded, birds
Picture (in color), **8**-2900
Reference books, cataloguing of, **10**-3559
Refineries
oil, **13**-4753-54
sugar, **15**-5434, 5437
Pictures
cracking plants, **13**-4755
diagrams of refining process, **13**-4748-50
sugar refineries, **15**-5437
Reflection
of light, **6**-1990-91
of sound, **9**-3200
Question about
Why do we see reflections in transparent glass? **10**-3474-75
Pictures
diagrams of reflection of light, **6**-1991-93
Reflex action, 7-2612; **9**-3061
Pavlov's experiments, **3**-987-88
tickling causes, **16**-5958
Reform Acts, of 1832. By these acts, the voting population of the United Kingdom became more fairly represented in the House of Commons in Parliament. Cities, towns, counties and boroughs were redivided so that the number of representatives each sent to Commons would be in just proportion to their populations. The acts also permitted a greater number of people to vote. The most important effect of the act was to shift the political balance of power from the House of Lords to the House of Commons.
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under the Tudors, **5**-1814-17
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Reformers, political party in Canadian history, **3**-945-46
Reforms, Social, *see* Social reforms
Refraction
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of light, **6**-1991-92
of sound-waves, **9**-3200-01
shown by appearance of objects in water, **2**-622, 688-89
Pictures, diagrams of refraction of light, **6**-1993
Refrigeration
* ice and machines that make cold, **2**-528-35
by means of heat, **5**-1848-49
to preserve food, **6**-2169-71
Pictures, **6**-2170-71
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Refrigerators, 2-528-35
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Pictures, **2**-528
Refuges for birds, **8**-2815, 2818
Regal pythons, 15-5411
Picture, **15**-5410
Regensburg, Germany
Picture
cathedral, **17**-6170
Regent, famous diamond, **19**-7233
Regent. One who is given authority in the absence, minority or disability of the king; in the old universities a doctor who takes part in instruction or government; in the state of New York a member of the body known as the University of the State of New York.
Regiment. The largest permanent association of soldiers, consisting of any number of battalions according to the country and the arm of the service. It is the third subdivision of an army corps, several regiments forming a brigade, and several brigades a division.
Regina. Capital and commercial center of the Canadian wheat-growing province of Saskatchewan. Population 58,245.
Picture, airport, **10**-3532
Régnier, Mathurin, French author, **18**-6711
Regulus, Marcus Atilius (died 250? B.C.). Roman general in the First Punic War. In 256 he invaded Africa and at first defeated the Carthaginians. In 255 his army was routed by Xantippus and he himself was taken prisoner. According to Roman tradition he was sent by the Carthaginians to Rome in order to ask the Romans for peace with Carthage; he promised to return to captivity after he had delivered his message. Regulus urged the senate not to accept the Carthaginian offer. Then, in accordance with his promise, he returned to Carthage, where he was put to death.
Reichstadt, Duke of, *see* Bonaparte, Francis J. C.
Reign of Terror, in France
See France—history—Revolution
Reign of Wooden Ships, The, * **11**-3909-20
Reims, *see* Rheims
Reindeer, account of, **4**-1509, 1511
in Canada, **7**-2561
introduced into Alaska, **16**-5792
Picture, **7**-2416
Reindeer-hunters, Prehistoric, *see* Man, Prehistoric and primitive
Reindeer period, in history of cave-man, **1**-190
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Réunion (Bourbon), French possession, 18-6811
Reval, or **Tallinn.** Capital of Estonian Soviet Socialist Republic. Exports flax and cereals. Population 137,792.
Revenge, English ship in which Sir Francis Drake and Sir Richard Grenville fought the Spanish, 14-5259-60
Revenue Cutter Service
early name of U. S. Coast Guard, 9-3104
Revere, Paul (1735-1818), American patriot and silversmith. He is best known for his ride, on the night of April 18, 1775, to warn Lexington and Concord that the British were coming, which Longfellow made famous in his poem. It is less well known that, two days before, Revere rode to warn the patriots to move their military stores from Concord, a ride which was equally important. He was keenly interested in the cause of independence, and was one of the men who donned warpaint and feathers for the Boston Tea Party. Although Revere held several commands with the Massachusetts Militia, he did not serve in the Continental Army. He had little formal education, but learned the trade of silversmith under his father. The younger Revere became a master craftsman, whose surviving work is treasured today. He also had considerable talent as an engraver.
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Paul Revere's Ride, by Longfellow, 8-3006-07
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Rhadamanthus, judge of the dead, 9-3238
Rhamphorhynchus, prehistoric flying lizard
Picture
fossil remains, 5-1547
Rheas, birds, 13-4656
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Rhebok, an antelope, 4-1442
Rheims, or **Reims.** A city of Champagne, France, with a great trade in wine and an extensive textile industry. Its Gothic cathedral was irreparably damaged by the German bombardments, 1914-18, but the main structure is still standing. Population 116,687.
cathedral, 17-6159
Pictures
cathedral (gravure), 17-6166
Rhenium (Re). Chemical element. Metal. Atomic number 75; atomic weight 186.31; melting point 3000°C.; specific gravity 20.5. Rhenium is scarce and expensive. It can be used as a catalyst.
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Rhode Island. The smallest state in the Union; area, 1,214 square miles; capital and largest city, Providence. Textile-manufacturing is the leading industry, and jewelry is important. Abbreviation, R. I. Nickname, "Little Rhody" or "Plantation State." Flower, violet. Motto, "Hope." First settlement, Providence, 1636. Population 713,346.
described in Northeastern States, 10-3403-08; 11-3773-82; 12-4145-54
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Rhode Island Reds, breed of poultry, 12-4494
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Rhodes, Cecil
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Rhodes, James Ford, American historian, 13-4793
Rhodes. Mediterranean island famous as the headquarters of the Knights Hospitallers in the Middle Ages. It was ceded to Italy in 1920. Area 545 sq. mi. Population 61,886.
Rhodes, Colossus of, *see* Colossus of Rhodes
Rhodes scholars
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What are Rhodes scholars? 1-74
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Rhodium (Rh). Chemical element. Silvery metal. Atomic number 45; atomic weight 102.91; melting point 1985°C.; specific gravity 12.5. Occurs with platinum, which it resembles. Rhodium is used with platinum in thermocouples (*see* Thermocouples) for measuring temperature, and as a catalyst.
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Turkey rhubarb, **8**-2910
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Turkey rhubarb (in color), **8**-2999
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Ribs, bones of the body, **5**-1559
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Richard II, king of England
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Richard III, king of England
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Richardson, Henry Hobson, American architect, influence, **18**-6682, 6684
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Richardson, John, Canadian writer, **14**-5102-03
Richardson, Samuel, English novelist
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Richelieu, Cardinal, French statesman, **10**-3431-32
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being received, as a young man, by Henry IV, **10**-3427
Richier, Ligier, French sculptor, **13**-4700
Richmond, Sir W. B., British artist
Picture
Venus and Anchises (gravure), **9**-3232
Richmond. Capital of Virginia, trading largely in tobacco; varied industries. The capital of the Confederacy in the Civil War, it has many fine buildings and monuments and a splendid cathedral. Population 193,042.
in colonial times, **3**-1050
Pictures
Capitol, **14**-4896
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Richter, Christian, artist
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Rickets, vitamin deficiency disease, **7**-2426
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Riel, Louis, and Riel rebellions, **4**-1486
Rifle birds, **8**-2894
Rifling, in gun, **8**-2844, 2849
Rift Valley, *see* Great Rift Valley
Riga. Capital of Latvian Soviet Socialist Republic; on the Dwina. A commercial center and port, it manufactures cottons, tobacco, hardware, glass, paper and jute. Population 393,211.
Rigaud, Hyacinthe, French artist, **5**-1876
Riggs, Mrs. K. D. Wiggin, *see* Wiggin
Right-handedness
Question about
Why is our right hand stronger than our left? **16**-5959
Right Whales, sea mammals, **7**-2343-44
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Riley, James Whitcomb, American writer, **13**-4792
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"The Old Swimmin' Hole," Riley Memorial Park, Greenfield, Ind., **13**-4782
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Rimsky-Korsakov, Nicolas, Russian composer, **19**-6922
Rinehart, Mary Roberts, American novelist, **13**-4818
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Ring (cyclic) compounds, term in chemistry
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Ringhals, an African cobra, **15**-5413
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Why do married women wear wedding rings? **7**-2609
Rio de Janeiro, Brazil
origin of name, **1**-88
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Rio de Oro, Spanish colony in Africa, **18**-6814
Rio Grande, a river in the southern part of North America. Rising in southwestern Colorado, it flows south across New Mexico, then southeast to the Gulf of Mexico, forming the boundary between Texas and Mexico. Near its mouth are Brownsville, Texas, and Matamoras, Mexico. Much of its water is drawn off for irrigation in New Mexico. The river is 1800 miles long and can be navigated by small boats for about 450 miles from the mouth.
irrigation in valley of, **7**-2544
Rip Van Winkle (story), **12**-4481-89
Riparian rights. The rights under the law of owners of land containing a watercourse or bounded by one, to its banks, bed and waters. In common law the rights of an owner adjacent to water extend to the middle of the stream; those of an owner whose land contains a stream are absolute unless they inflict injury on other riparian owners.
Rise and Fall of Japan, The, * **2**-560-72
Rise of French Art, * **5**-1873-83
Risso's dolphin, **7**-2347
Picture, **7**-2347
Rivadavia, Bernardino, Argentine statesman, **19**-7034-35
Rivera, Diego, Mexican painter, born in 1886. He began the study of painting in Mexico City at the age of six, completing his education in Europe. He is known chiefly for his murals, namely those in the Ministry of Education Buildings, the National Agricultural Academy and the Palace of Cortez in Mexico. The most important in the United States are the murals in the California School of Fine Arts, San Francisco.
Rivera, Primo de, *see* Primo de Rivera, Miguel
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* Mississippi, **17**-6037-48
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What is a delta and how is it made? **5**-1607
Why does a river curve and twist rather than run straight? **6**-2010
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Pictures
tunnels beneath rivers **2**-523
Riverside Drive, New York City, **17**-6212, 6214
Riviera. French and Italian coast of the Mediterranean; sometimes called the Côte d'Azure. Chief towns, Nice, Monte Carlo, Mentone, Cannes, Rapello.
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Rivière, Briton, British painter
Picture
Apollo (gravure), **9**-3230
Rivoire, Apollos, father of Paul Revere, **4**-1306
Rivulus, fish
Picture (in color), **16**-5785
Rizzio, David, adviser to Mary Queen of Scots, **15**-5652
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* story of lost colony of, **17**-6333-37
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Rob Roy, novel by Sir Walter Scott
note on, **7**-2351; **11**-4071
Robber crabs, climb trees for food, **16**-5954
Robbers, The, drama by Schiller, **17**-6271
Robbia, Andrea della. Florentine sculptor, nephew and pupil of Luca della Robbia; born, 1437; died about 1528; father of four sculptor sons.
Pictures
of sculpture (gravure), **13**-4612
Robbia, Giovanni della, Italian sculptor
Picture
of sculpture (gravure), **13**-4612
Robbia, Luca della, Italian sculptor
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angels (gravure), **13**-4615
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Robert I (Robert Bruce), king of Scotland
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King Bruce and the Spider, by Eliza Cook, **5**-1639-40
Robert Bruce to His Men at Bannockburn, by Robert Burns, **5**-1887
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Robert II, duke of Normandy
and First Crusade, **7**-2585
Robert III, king of Scotland, **15**-5649
Robert (High Steward of Scotland), first Stewart, or Stuart, king, **15**-5649
Robert, Hubert, French painter, **5**-1882
Roberts, Charles G. D., Canadian poet, **14**-5105-06
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Roberts, Elizabeth Madox, American writer, **14**-5010
Roberts, Frederick Sleigh, Earl. British field-marshal; born, Cawnpore, India, 1832; died, St. Omer, France, 1914.
march from Kabul to Kandahar, **18**-6591
Roberts, Kenneth, American author, **14**-5010
Robertson, James, pioneer
* life and work, **6**-2195-97
settled in Tennessee, **6**-1908
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Robeson, Paul, American Negro singer and actor, **12**-4432
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Robinson, Theodore, American painter, **10**-3512
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use in World War II, **18**-6459
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Rochambeau, Jean Baptiste Donatien de Vimeur, Count de, French general
first celebrates Washington's birthday as holiday, **6**-2089-90
Picture
portrait, **4**-1166
Rochdale principles, of co-operative movement, **18**-6601
Rochester. The third largest city in New York State, 7 miles from Lake Ontario, on the Genesee River. The city is well laid out, with many parks and fine buildings. Its chief manufactures are photographic apparatus, optical instruments, boots and shoes, ivory buttons, carbon paper and typewriter ribbons. Population 324,975.
Rochester, England
Picture
cathedral (gravure), **16**-5974
Rock
soil formed from, **8**-2663-64
Rock cook, fish
Picture (in color), **16**-5782
Rock elm trees, 12-4246
Rock hyraxes, mammals, **6**-2146-47
Rockefeller, John Davison, Sr. (1839-1937). American capitalist and founder of the Rockefeller Institute for Medical Research, the Rockefeller Foundation, etc.
Rockefeller Center is a planned group of 14 buildings in New York City. The chief structure, the RCA building, home of the National Broadcasting Company's studios, is 70 stories high, set off by a large sunken plaza with a fountain. Other structures are the Radio City Music Hall, the largest theatre in the world, the Center Theatre, the British Empire Building, La Maison Francaise, the International Building and the Time, Life and Fortune Building.
Pictures, **17**-6215
Rocket, flower
Pictures (in color), **14**-4981
Rocket, early train, **2**-408-09
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from earth to moon, **11**-3975-79
rocket power for airplanes, **1**-179
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U. S. Navy Viking rocket, **11**-3979
Rockfish, *see* Bass—striped
Rockling, fish
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Rockrose, flower
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* formation of layers, **2**-513-18
* in earth's crust, **2**-629-32
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Does a rock breathe? **9**-3102
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Rocky Mountain goat, 4-1378
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Rocky Mountain National Park, Colorado
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tunnels through, **2**-521-22
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* account of, **3**-1126-34
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Rodin, Auguste, French sculptor, **13**-4706
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Age of Bronze, **13**-4705
Burghers of Calais, **13**-4704
Creation of Man, **13**-4705
Rods, visual cells, **11**-3805, 3807
Roebuck, a deer, **4**-1511
Roebuck berry, or stone bramble
Picture (in color), **11**-4028
Roemer, Olaus, Danish scientist, **2**-647
measured speed of light, **10**-3473
Roentgen, *see* Röntgen
Rogers, John, American sculptor, **14**-4934
Rogers, Randolph, American sculptor, **14**-4934
designed doors of U. S. Capitol, **5**-1533
Rogers, Will (1879-1935). American humorist; star of stage and screen. Killed, with Wiley Post, aviator, in plane crash in Alaska.
Rohde, Ruth Bryan (Mrs. Borge Rohde); born 1885, Jacksonville, Ill., the daughter of William Jennings Bryan, she was a member of Congress, 1929-33, and U. S. Minister to Denmark, 1933-36; the first woman to be appointed to the U. S. Diplomatic Corps.
Roland, French hero of Middle Ages
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Rolland, Romain, French writer, **18**-6720
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Romulus. Legendary founder and first king of Rome; reigned from 753 to 716 B.C. After his death he was worshiped as a god under the name of Quirinus. *See also* **4**-1191-92
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Rosebay, flower
Picture (in color), **14**-4987
Rosecrans, William Starke (1819–98). American general, born in Ohio. He graduated from West Point in 1842, resigned from army in 1854, but fought in the West during the Civil War; defeated at Chickamauga and transferred; held several political offices after close of war.
Rosenthal, Toby Edward, American painter
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Rothenburg, German town
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Rotogravure, process of printing pictures, **3**-1066
Rotorua, New Zealand resort, **7**-2577
Rotten boroughs. In Great Britain certain municipalities which had had the right of sending a member to Parliament lost their population, or fell under control of members of the nobility and acted in elections only according to the wishes of the nobility. These were disfranchised by the Reform Bill of 1832.
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Roving, giving first twist to thread
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Rowley, Mass., first woolen mill in America, **15**-5578
Royal Academy, society of English artists
founding, **7**-2328, 2333
Royal Canadian Academy, of artists, **10**-3703
Royal Canadian Air Force, **10**-3527-32
Royal Canadian Mounted Police, * **16**-5831-38
Royal Gorge, or **Grand Canyon, of the Arkansas River,** is one of the best known of the great river canyons of Colorado. It is in the centre of the southern half of the state, on the eastern slope of the Continental Divide. Zebulon M. Pike discovered it in 1806. *See also* **18**-6430
Royal Observatory, Greenwich, England, **11**-3851
Royal Society. Organized in London in 1660, one of the oldest scientific societies in Europe. Its present home is Burlington House. It awards

Royal Society (*continued*)
four medals every year, one Copley for philosophical research, two Royal for the two most important contributions to science within the British dominions, and the Davy for the most important discovery in chemistry in Europe or British America.
Royal William, early Canadian steamboat, **17**-6401
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Roybet, Ferdinand, French painter, **8**-2858
Royce, Josiah (1855-1916). American philosopher, born at Grass Valley, Cal. Graduated from University of California, and after further study taught at Harvard. He published many books, and was a member of many learned societies.
Ruapehu, mountain in New Zealand, **7**-2577
Rubber
* account of, **4**-1404-14
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How does rubber rub out ink? **18**-6558
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Rubens, Peter Paul, Flemish painter, **5**-1585-86
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Garland of Fruit, **5**-1589
Mother and Child, **5**-1589
Painter's Sons, **5**-1589
Rubicon River
crossed by Cæsar, **4**-1198-99
Rubidium (Rb). Chemical element. Rare, reactive metal, very similar to potassium. Atomic number 37; atomic weight 85.48; melting point 39°C.; boiling point 696°C.; specific gravity 1.53.
Rubinstein, Anton, Russian composer, **19**-6922
Ruble. Russian silver coin of the value of 100 kopecks, the unit of Russian coinage.
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Rumford, Count (Sir Benjamin Thompson), English scientist, **2**-704-05
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Rum-pel-stilt-skin, 3-1141-43
Run-on couplet, verse pattern, **19**-6986-87
Runeberg, Ludvig, Swedish poet, **19**-7014
Runes, from the Old Norse and Icelandic for letter, writing, secret, mystery. The alphabets used among the ancient Scandinavian peoples. The name is especially applied to letters carved on weapons or on stones which are found in Scotland and Ireland and in other maritime regions of Europe as well as Scandinavia. It also is used for a short sentence of mystic meaning which holds some of the wisdom of old philosophers of the Northlands.
Running
Question about
Why do we get out of breath when we run? **7**-2612
Rupee. A silver coin of India divided into 16 annas of 12 pies and worth about 34 cents.
Rural Free Delivery. *Pictures,* **8**-2659
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Rusa deer, 4-1508
Rush, William, American sculptor, **14**-4933
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The Nymph of the Schuylkill, **14**-4935
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Rushlight, used to tell time
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Ruskin, John, English writer
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The King of the Golden River, **6**-2213-28
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digging iron ore, Ural Mountains, **18**-6632
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Russia and the Baltic States, * **16**-5847-64
Russian dandelion, kok-saghyz, source of rubber, **4**-1408
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Russian Literature
* account of, **19**-6904-11
Russian wolfhound (Borzoi), dog
Picture (gravure), **2**-715
Russo-Japanese War, 16-5698
Russo-Turkish War. The war in 1877-78 in which Russia tried to extend her dominions toward the Mediterranean. Russia was successful, and the Treaty of San Stefano was signed March 3, 1878. But the European powers were unwilling to allow Russia the additional territory gained, and a congress was called at Berlin for a new settlement.
Rust
preventing and removing on tools, **2**-625
use of paint to prevent, **13**-4867
Question about
Is iron heavier when it rusts? **9**-3354-55

Rust, fungi destructive to plants, **5**-1757-58
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effect on barberry and wheat, **5**-1764
Ruthenium (Ru). Chemical element. Silvery metal. Atomic number 44; atomic weight 101.7; melting point 2450°C.; specific gravity 12.2. An uncommon element; occurs with platinum, which it resembles.
Rutherford, Sir Ernest, New Zealand scientist, **4**-1227-28
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Rutledge, Ann
Poem about
Ann Rutledge, by Edgar Lee Masters, **17**-6254
Picture
of grave, **5**-1650
Ruwenzori Mts., Africa, **2**-469
Ruyter, Michael de. The greatest Dutch admiral; born, Flushing, 1607; died, Syracuse, Sicily, 1676.
Ryan, Abram, American poet, **13**-4791-92
Ryder, Albert, American painter, **10**-3455
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Rye grass
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Sabbath, *see* Sunday
Sabbatias, plants, **14**-5162
Picture, **14**-5159
Sabin, Florence Rena, American scientist, **14**-5272
Sabines. An ancient people of central Italy; they dwelt in the mountains northeast of Rome. The kidnapping of the Sabine women is a famous incident of Roman legend. It is said that Romulus, finding it hard to provide wives for his men, determined to use trickery. He invited the Sabines to a series of games at Rome. The Roman youth took this occasion to carry off a number of Sabine girls, who became their wives. The Sabines were conquered by the Romans in the third century B.C.
Picture, **4**-1193
Sable, animal, **2**-768
Sable antelope, **4**-1444
Sable Island. An island off the coast of Nova Scotia. Often called the "Graveyard of the Atlantic" because of the ships wrecked on its shore.
Sabotage, explanation of, **12**-4279
Sac-fish, **16**-5900
Sacajawea (1790-1844). A squaw of the Shoshone tribe who rendered great service for the Lewis and Clark Expedition across the continent. A peak in the Bridger range is named for her.
Picture
statue in Portland, Oregon, **19**-6847
Saccharin
Question about
Is saccharin a sort of sugar? **15**-5438
Sachs, Hans, meistersinger of Nuremberg, **10**-3601; **17**-6268
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statue of, **17**-6268
Sacramento. Beautiful capital of California, in the center of a fruit-growing district. Population 105,958.
Sacramento River. American river, rising near Sisson, California; flows into Suisun Bay. 600 miles.
Picture
Shasta Dam, **18**-6759
Sacrifice of Iphigenia, The, **9**-3361-64
Safavid (Sufi) dynasty, of Persian rulers, **9**-3150
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Safety devices, on elevators, **4**-1219
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Safety glass, invention of, **11**-4000
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Safety in industry, * **16**-6034-36
Safety matches, **19**-6962
Safety pins, history of, **9**-3042
Saffron, flower
Picture
meadow saffron (in color), **15**-5612
Sagadahoc, Maine, attempted settlement, **2**-544
Sagas, Scandinavian epic poetry, **1**-216; **19**-7009-10
Sage-brush. A dry, shrubby and bushy plant (botanical family, *Artemisia*), found on the dry and alkaline areas of the western United States. Some species grow as high as twelve feet. Though in appearance sage-brush resembles sage, it is not connected with that family of plants.
Saggers, in pottery-making, **5**-1669
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Sagittarius (the Archer), constellation, **11**-3926
Sahara, desert, **2**-466-67
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Saiga, an antelope, **4**-1443
Sailfish. *Picture* (in color), **16**-5786
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Sailors
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Columbus, by Joaquin Miller, **5**-1884
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Jacques Cartier, by Thomas D'Arcy McGee, **18**-6647
Life on the Ocean Wave, by Epes Sargent, **6**-2153
Rime of the Ancient Mariner, by Samuel Taylor Coleridge, **11**-3927-36
Song for All Seas, All Ships, by Walt Whitman, **6**-2150
Spanish Waters, by John Masefield, **12**-4274-75
Yarn of the Nancy Bell, by William S. Gilbert, **11**-4029-30
Ye Mariners of England, by Thomas Campbell, **7**-2364
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Saint (or **St.**), *see* name of saint
St. Anthony, Newfoundland
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Ponce de Leon Hotel, **14**-4899
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St. Bartholomew the Great, church in London, **16**-5964
St. Benin's Chapel, Ireland
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St. Bernard dogs, **2**-717
Pictures, **2**-714; **16**-6002
St. Calixtus, catacomb of, **2**-576, 578
St. Catharines. Town of Ontario, Canada, in the fruit-growing district around Niagara Falls.
St. Cecilia
Poem about
A Song for St. Cecilia's Day, by John Dryden, **14**-5129
St. Christopher, island in West Indies
See St. Kitts
St. Clair, Arthur (1734-1818). American soldier; born in Scotland. Took part in the capture of Louisburg (1758) and Quebec (1759). Became a major-general in the Continental Army in the Revolutionary War. St. Clair was court-martialed for having evacuated Fort Ticonderoga at the approach of the British, but was acquitted of all charges. He became president of the Continental Congress in 1787; he was named the first governor of the Northwest Territory in 1789. In 1791 he commanded the forces battling the Indians.
St. Clairsville, Ohio
Picture, coal miners, **3**-792
St. Clare, founder of order of Poor Clares
Picture, **6**-2007

St. Croix, island, bought by U. S. from Denmark, **8**-2672
See also Virgin Islands
Picture, **10**-3592
Saint-Cyr (Saint-Cyr-l'Ecole), France. Village near Paris, west of Versailles. Famous for its military school, corresponding to the United States Military Academy at West Point.
St. Denis. Northern suburb of Paris, with flour and cotton mills, chemical and dye works, and manufactures of machinery. Here is a magnificent abbey, the burial place of most of the kings of France.
abbey, **17**-6156
St. Elias, Mt., discovery by Bering, **16**-5789
Saint-Etienne, France. Manufacturing town, 32 miles southwest of Lyons. Located amid some of the richest coal fields of France. Among its manufactures are steel, heavy iron goods, hardware and ribbons. Population 190,236.
Saint-Exupéry, Antoine de, French writer, **18**-6720
St. Francis of Assisi, *see* Francis of Assisi, St.
St. Francis River. American river, rising in St. Francis County, Missouri; flows into the Mississippi. 460 miles.
Saint Gaudens, Augustus, American sculptor, **14**-4936-37
Picture, statue of Lincoln, **14**-4932
Saint George and the Dragon (story), **1**-53-54
St. George's Channel. Passage separating Wales from Ireland and connecting the Irish Sea with the Atlantic.
St. Gotthard Pass. Highway through the Lepontine Alps between Switzerland and Italy. The railway from Lucerne to Milan is carried beneath it by a series of tunnels with a length of 9¼ miles. 6,935 feet.
St. Gotthard Tunnel. *Picture,* **2**-520
Saint Helena, island in South Atlantic Ocean, **9**-3190
Napoleon sent there, **6**-2208
St. Helier. Capital and port of Jersey, with steamship communication with Southampton.
St. James's Palace, England. A royal palace in London, between St. James and Green Parks. Built originally as a hospital; reconstructed by Henry VIII and enlarged by Charles I. Was the London residence of the sovereigns from 1697 up to the time of Queen Victoria. Since 1837 Buckingham Palace has been the royal home.
St. Jerome
made Latin translation of Bible, **2**-476
St. Joan, *see* Joan of Arc
Saint John. Winter terminus of the Canadian Pacific Railroad, at the north of the St. John River, New Brunswick. A flourishing port, it has a fine harbor and docks, besides textile, leather and fishing industries. Population 51,741.
St. John, island
bought by U. S. from Denmark, **8**-2672
See also Virgin Islands
St. John River. American river, rising in Brevard and Osceola counties, Florida; flows into the Atlantic Ocean. 400 miles.
St. John's, capital of Newfoundland, **9**-3269
Pictures, **9**-3269
St. John's-wort, flower
Pictures (in color), **13**-4879; **14**-4991
St. John's-wort Family, in botany, **13**-4873
St. Kitts. British West Indian island forming with Nevis and Anguilla a Leeward Island presidency; area, 65 square miles; capital, Basse-Terre. Cacao, coffee, tobacco, coconuts and limes are produced, though the interior is hilly.
St. Lawrence River. It is the largest river of Canada and one of the largest in the world. The river proper begins at the outlet of Lake Ontario and flows northeast for about 750 mi. until it enters the Gulf of the St. Lawrence. The source of the river system, which drains an area of more than 500,000 sq. mi., is the St. Louis River, which rises in northeast Minnesota and enters Lake Superior at its most western end. Between Lake Ontario and Montreal there are about 30 mi. of rapids in the St. Lawrence. The river is one of the great waterways of the world as well as a source of tremendous hydroelectric power.
Quebec Bridge over, **1**-33
Thousand Islands International Bridge over, **1**-39
Poem about
Canadian Boat-Song, by Thomas Moore, **6**-2244
St. Lawrence River (*continued*)
Pictures
bridge at Montreal, **1**-35
Quebec Bridge at Quebec, **1**-35
St. Lawrence Valley, Canada, **1**-105-06
St. Lawrence Waterway project, 3-863
St. Louis, *see* Louis IX, king of France
St. Louis and St. Joan, * **16**-5817-21
St. Louis. One of the greatest commercial centers in the U. S. 20 miles below the junction of the Missouri with the Mississippi, in Missouri. The river is crossed here by a bridge 2,225 feet long, connecting the city with East St. Louis. Finely built, the city has three cathedrals and two universities, but is famous chiefly for its great manufacture of tobacco, over 80,000,000 pounds of which are annually produced. Other industries include smelting, meat-packing, publishing, flour milling, foundries, and leather and clothing manufactures. Population 816,048.
industries of, **16**-5654, 5659; **17**-6046
Pictures
airview, business and shopping district, **17**-6041
old river front, **15**-5273
St. Malo. Picturesque seaport of Brittany, France, surrounded by ancient towered ramparts. It has a considerable traffic with the Channel Islands and Southampton.
St. Mark's, Campanile of, Venice, **4**-1457
Pictures (gravure), **4**-1465, 1466
St. Mark's Church, Venice
description, **16**-5718-19
building of, **4**-1455-56
Pictures
in painting by Gentile Bellini, **4**-1454
mosaics, **2**-577, 579
views of the building (gravure), **4**-1466-68; **16**-5721-22
St. Martinsville, Louisiana
Picture
Evangeline statue, **14**-4899
St. Maurice River. Canadian river in the province of Quebec; a tributary of the St. Lawrence. 350 miles long.
Saint-Mihiel, France. This town gave its name to a salient held by the Germans in World War I from 1914 to 1918. In September, 1918, it was recaptured by the Americans.
St. Paul. Capital of Minnesota, on the Mississippi. Standing opposite Minneapolis, it is an important centre of the cattle and meat-packing trades, while its horse market is the largest in the United States. Population 287,736.
account of, **15**-5277-78
Pictures
Capitol, **18**-6688
skyline, **16**-5657
St. Paul's Cathedral, London, built by Sir Christopher Wren, **18**-6491
Picture, **8**-3011
St. Peter's church, Rome, **17**-6309-10
Pictures, **8**-3011; **12**-4324; (gravure), **17**-6305, 6308
St. Petersburg, Florida
Picture
recreation pier, **14**-4897
St. Petersburg, *see* Leningrad
St. Pierre. French island off Newfoundland forming part of the colony of St. Pierre and Miquelon. The cod fishery is important.
Saint-Quentin, France. On Somme River, 95 miles northeast of Paris; scene of much heavy fighting during World War I. There are important foundries, machine works and tile yards. Manufactures include cotton and woolen goods, embroideries and lace.
Saint-Saëns, Camille, French composer, **19**-6919
St. Sophia, church and mosque, Constantinople
* history and description, **16**-5717-18
Pictures, **13**-4803; **16**-5714
St. Stephen, king of Hungary, **17**-6193, 6339
St. Sulpice, church in Paris, **18**-6498
St Thomas, Virgin Islands, **19**-7102
bought by U. S. from Denmark in 1917, **8**-2672
Pictures, **10**-3592-94
St. Valentine's Day, origin, **4**-1450
St. Vincent, West Indies
Picture, **19**-7104
St. Vincent, Battle of, 1797. Engagement off Cape St. Vincent, Portugal, between the British under Jervis and a Spanish fleet which had left Cadiz

St. Vincent, Battle of (*continued*)
to join the French at Brest. The British victory broke up the French plan of invasion.
Nelson at, **6**-2202
Picture, **6**-2201
Ste. Anne de Beaupré, Canada
Pictures, **8**-2956
Sainte-Beuve, Charles Augustin, French literary critic, **18**-6717
Sainte Marie, Indian mission station in Canada, **2**-678-79
Saints
* Some famous monks, **13**-4859-64
See also names of saints
Saintsbury, George Edward Bateman (1845-1933). Educated at Oxford. From 1875 to 1895 Saintsbury engaged in journalism and in literary work in London. In 1895 he became professor of English literature in Edinburgh University. Saintsbury was an eminent literary critic. He wrote many works on literature; his masterpiece is his renowned History of Criticism, in three volumes.
Sairey Gamp, Dickens' character
Picture, **8**-2734
Sakhalin, or **Saghalien.** Siberian island north of Japan, to whom the southern half was ceded by Russia in 1905. Fishing is the chief industry.
Sakkâra, Egypt, tomb of Thi, **14**-5211
Picture, step pyramid (gravure), **14**-5214
Sakya (Persian wheel), for raising water, **7**-2544
Saladin, sultan of Egypt and Syria
and the Crusades, **7**-2585-86
Picture, **7**-2586
Salal, shrub, **19**-6939
Picture, with note, **19**-6935
Salamanca, University of, 14-4926
Salamanders, account of, **15**-5456-58
superstitions about, **1**-356-57
Pictures, **15**-5457
Salamis, Battle of
description, **3**-918
Picture
celebrating the victory, **3**-913
Salangane, bird, nests are edible, **9**-3372
Salary, origin of word, **15**-5401
Salazar, Antonio de Oliveira (1889-), prime minister of Portugal. Formerly a professor of economics, he became minister of finance in 1928, and prime minister in 1932. Under him, Portugal's affairs were put on a sounder basis, its credit restored. However, improvement was made at the cost of making the country practically a fascist state, with Salazar as dictator.
Salem, Peter, American Negro patriot, **12**-4428
Picture
at Battle of Bunker Hill, **12**-4428
Salem. Capital of Oregon on the Willamette River. It is the seat of Willamette University. Region around has fruit, hop and wheat interests. Population 30,908.
Salem, Mass., first settlement, **2**-548
Pictures
House of the Seven Gables, **13**-4718
old doorway, **12**-4153
Salerno. Ancient seaport city of southern Italy, at the head of the Gulf of Salerno. It has a beautiful 11th-century cathedral built by the Normans.
medical school in Middle Ages, **8**-2725
Salic dynasty, of German rulers, **12**-4159
Salic Law. Law of succession disallowing females the right to occupy the throne. The law is said to be based on the passage in the code of the Salic Franks of the 5th century.
Salicylic acid. A compound of carbon, hydrogen and oxygen found in many plants, especially in wintergreen and the sweet birch. This acid has a sweetish-sourish taste, is odorless, slightly soluble in water and very soluble in alcohol. It is used as an antiseptic, as a food-preservative and in the manufacture of dye-stuffs.
Salisbury, Robert Cecil, first Earl of, adviser to Queen Elizabeth
Picture, **5**-1614
Salisbury, England. Cathedral town and busy trade center on the Avon River, about 80 miles southwest of London.
Salisbury, North Carolina. County seat of Rowan County. Centre of an agricultural and mining region. Contains tobacco factories, iron foundries, machine shops, tanneries and cotton and woolen mills.
Salisbury Cathedral, England, **16**-5969
Picture (gravure), **1**-72; **16**-5976
Salisbury Plain. An elevated plain lying north of Salisbury, Wiltshire, England, now used chiefly for military purposes.
Saliva, secretion of mouth, **6**-1931-32
action in digestion, **6**-2128
Sallowthorn, 14-5161
Sallust, Roman historian, **16**-5912
Picture, **16**-5914
Salmon
Atlantic, **15**-5634-36
catching of
how caught, **11**-4057
contest with eagle, story, **10**-3757
eggs, number of, **15**-5542
Pacific, **15**-5634, 5636
rock salmon, *see* Dogfish
Pictures, **15**-5630, 5636-37
Canadian cannery, **11**-4063
catching on Pacific coast, **11**-4056
drying nets, **11**-4056
fishing boats, in British Columbia, **1**-113
humpback salmon, **6**-1958
Salmon berry, shrub, **19**-6934, 6936
Picture, **19**-6931
Salmon River Mountains. Mountain range in Idaho. The highest mountain is Hyndman Peak, which is 12,078 feet in height.
Salonika, or **Salonica,** now officially Thessalonike. A port and commercial centre of Greek Macedonia, exporting cereals, cotton, wool, tobacco and skins.
Salt
* how obtained, **15**-5401-08
in blood, **3**-937
in Dead Sea, **15**-5517
obtained from the sea, **12**-4402
production in Michigan, **16**-5654, 5656
used in preserving food, **6**-2174
structure of salt molecule, **2**-526
See also salts
Questions about
How does salt melt snow? **8**-2914
What makes the sea taste of salt? **1**-74
Why do our tears taste of salt? **2**-688
Why does salt make us thirsty? **10**-3772
Why is salt damp when it is going to rain? **8**-2919
Pictures
diagrams of formation of salt molecule, **2**-526
salt crystals, **16**-5671
surface deposit, **12**-4403
See also starred article
Salt Lake, *see* Great Salt Lake
Salt Lake City. Capital of Utah, with smelting, leather and tobacco industries. Noted for being the headquarters of the Mormons, it has a university and a cathedral. Population 149,934.
description, **18**-6436
monument to sea-gulls, **2**-586
Picture
Mormon Temple, **19**-6849
Salt River Project, Arizona
Picture
Roosevelt Dam, **7**-2551
Salts
* in chemistry, **17**-6283-91
ionization of, **17**-6080-82
needed in our bodies, **6**-2122
Saltwort, plant, **14**-5159-60
Salute to the Flag, 19-7184
Salvador, Central America, **11**-3823-24
Salvarsan, discovered by Paul Ehrlich, **15**-5487
Salvation Army
Question about
What is the Salvation Army? **3**-878
Salwin (Salween) River. The most important river in Burma. Rises in Tanla mountains in Tibet and flows into Bay of Bengal.
Salzburg. Ancient and beautiful Austrian city, on the Salzach. It has a cathedral modeled after St. Peter's at Rome and a Romanesque abbey church. This city was the birthplace of Mozart. Population 40,000.
Pictures, **17**-6196
Samara, re-named Kuibishev, U. S. S. R. (Russia). Port at junction of Samara River and the Volga, 550 miles southeast of Moscow. Great trade center for corn, hides, meat, fish and salt. Population 390,000.

Samarium (Sm). Chemical element. Atomic number 62; atomic weight 150.43. One of the rare-earth elements. *See* Rare-earth elements.
Samarkand, city in Russia, **16**-5857; **18**-6584
Picture, tomb of Tamerlane, **16**-5859
Sambar deer, 4-1508
Picture, **4**-1507
Samnites. Ancient Latin people inhabiting Samnium, Southern Italy. After stubborn resistance, they yielded to the Romans, 290 B.C.
Samoa, Islands of Polynesia, **7**-2581; **9**-3302; **10**-3586
Pictures, **10**-3586
home of Robert Louis Stevenson, **11**-3898
Samothrace, Victory of, statue, **12**-4332
Picture (gravure), **12**-4336
Samoyede, dog
Picture (gravure), **2**-714
Sampans. Houseboats, used on Chinese rivers, in the Straits Settlements and elsewhere. Serve also to transport merchandise.
Picture, **2**-427
Samphire, plant, **14**-5160
Pictures, (in color), **14**-4981
Sampler, colonial needlework
Picture, **3**-969
Samson. One of the judges over Israel; celebrated for his strength. Performed many feats of arms against the Philistines. When the Philistine woman, Delilah, cut off his hair, his strength left him. He was captured, blinded and enslaved by the Philistines. As his hair grew back, his strength returned. He took vengeance on the Philistines by pulling down over their heads and his own the building in which they had gathered.
Samson Agonistes, by John Milton
note on, **4**-1242
Samuel. Hebrew judge and prophet. Last of the judges; was succeeded by Saul, the first of a long line of Hebrew kings.
Samuel Johnson and Oliver Goldsmith, ∗**5**-1867-72
San Angelo, Texas. County seat of Tom Green County; about 180 miles northwest of Austin. Center of a prosperous stock-raising and wool-growing region.
San Antonio. Third largest city of Texas, a military post of the United States, and a fine resort for pulmonary patients. Market for live stock, cotton, wool and mohair. Population 253,854.
Alamo, **18**-6833
Picture, Alamo, **18**-6839
San Bernardino, California. County seat of San Bernardino County, about 55 miles east of Los Angeles. Among industrial establishments are the Santa Fé railroad shops, lumber mills, grain elevators and crate factories.
San Francisco. Commercial center and port of the Pacific states, on a magnificent land-locked harbor in California. Approached by the Golden Gate, it is noted for its fine scenery. It has regular steam communication with China, Japan, Australia, Central America, etc. It exports silver, gold, quicksilver, wheat, flour, wool, etc., and has manufactures of boots and shoes, cigars, flour, iron and wooden articles. In the suburbs are the California and Stanford universities. San Francisco was much damaged by an earthquake and fire in 1906. Population 634,536.
bridges, **1**-34, 37, 39
description, **19**-6849
Golden Gate International Exposition, **6**-2075
Pictures
Golden Gate Bridge, **1**-32
Golden Gate International Exposition, **6**-2074-75
San Francisco-Oakland Bridge, **1**-32
view from Nob Hill, **19**-6846
San Francisco-Oakland Bridge, 1-37, 39
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San Francisco Peace Conference, 17-6134-35
San Joaquin River. American river, rising in the Sierra Nevada Mountains, California; flows into Sacramento River. 350 miles.
San Joaquin Valley, California
irrigation canals, **3**-864
San José. Capital of Costa Rica. It has a cathedral and is in a rich agricultural region. Population 229,504.
San Juan. Capital and chief port of Puerto Rico, with a cathedral and a university. Sugar and coffee are exported. Population 169,247.
Pictures, **10**-3588-89; **19**-7103
San Juan Hill. Near Santiago, Cuba. The capture of this hill by the American troops led to the surrender of the city of Santiago, in the Spanish-American War.
San Luis Potosí. Inland state of Mexico. Lies for the most part within the great plateau of Mexico. Gold, copper, lead, silver, iron, zinc, mercury and petroleum are found there in considerable quantities. Population 668,863.
San Marco, Venice, *see* St. Mark's Cathedral
San Marino, Calif.
Picture
Huntington Library and Art Museum, **19**-6846
San Marino. Miniature Italian republic in the Apennines; area, 38 square miles; capital, San Marino. It has kept its independence since 1631. Population 14,545.
San Martín, José de, South American patriot, **13**-4586; **19**-7033, 7037
Picture, **13**-4586
San Rocco School, Venice, ceiling by Tintoretto, **4**-1463-64
San Salvador. Capital and largest city of the republic of Salvador. Owing to frequent earthquakes the cathedral and most of the buildings are built of wood. Population 105,193.
Sanctuaries, Bird
∗ Bird sanctuaries, **8**-2813-18
Singing Tower, **2**-584
Picture
Singing Tower, **2**-584
Sanctuaries, Wildlife
Yellowstone National Park, **2**-729
Sand, George (1804-76). Famous French authoress. "George Sand" is the pen name used by Lucile-Amandine-Aurore Dupin. She married Baron Casimir Dudevant in 1822, but the marriage proved unhappy and resulted in a separation. George Sand is the greatest woman novelist of France. Among her best works are Indiana, Valentine, The Devil's Pool and Little Fadette. *See also* **18**-6717.
Sand, use in glass-making, **18**-6746
use in making concrete, **7**-2313, 2315
Question about
How did the sand get on the seashore? **15**-5515
Sand boas, snakes, **15**-5112
Sand-hoppers, account of, **16**-5956
Sand lilies, flowers, **18**-6658
Sandalwood trees, in Hawaiian Islands, **15**-5448
Sandburg, Carl, American poet, **13**-4822
See also Poetry Index
Picture, **13**-4820
Sanderling, bird, **11**-4012
Picture, **11**-4011
Sandpike, *see* Pike—sand
Sandpipers, birds, **11**-4012
Poem about
The Sandpiper, by Celia Thaxter, **3**-1006
Pictures, **11**-4011; (in color), **9**-3281
Sandri, India
Picture, tope, **15**-5478
Sandstone
in Carboniferous period, **4**-1295
Picture
sandstone formations in Painted Desert, **9**-3026
Sandusky, Ohio
Picture
Camp Fire Girls, **14**-5061
Sandwich, Ontario, Ambassador Bridge, **1**-34
Picture
Ambassador Bridge, **1**-30
Sandwich Islands, *see* Hawaiian Islands
Sandwiches, directions for making, **11**-4016
Sangallo, Antonio da, the Younger, Italian architect
and the Farnese Palace, **17**-6300
and St. Peter's, Rome, **17**-6309-10
Sangallo, Giuliano da, Italian architect
plans for St. Peter's, Rome, **17**-6309
Sanger, fish, *see* Pike—sand
Sangster, Charles, Canadian poet, **14**-5103
Sankey, Ira D. (1840-1908). American preacher, singer and musician. He is known through his long association with Dwight L. Moody and through the Moody and Sankey hymn-book, which he prepared for Moody's use.
Sanmichele, Michele, Italian architect, **4**-1457
Sans-culotte, derivation of term, **9**-3163, 3165
Sanskrit, ancient language, **15**-5461-62; **18**-6466
Sansovino, Andrea, Italian sculptor, **13**-4607

Sansovino, Jacopo Tatti, Italian architect and sculptor, **4**-1457-58; **13**-4607; **17**-6311
Santa Anna, Antonio Lopez de, Mexican leader, **6**-1919; **11**-3816
Santa Barbara. Pacific coast resort in southern California, possessing a fine bathing beach.
mission, note and picture, **6**-1924
Picture
Carmelite convent (gravure), **18**-6686
Santa Claus
Poem about
A Visit from St. Nicholas, by Clement Clarke Moore, **17**-6106-07
Santa Claus—The True Story of Father Christmas, 17-6095-97
See also Christmas
Santa Cruz de Tenerife. Capital and commercial port of the Canary Isands, on the northeast coast of the island of Tenerife (or Teneriffe). The harbor has a fine mole, constructed within recent times.
Santa Fé, Argentina. Capital of the province of the same name, near the juncture of the Salada and Paraná Rivers, about 300 miles northwest of Buenos Aires. The principal industries are cloth and soap factories, flour mills, tanneries and chemical plants. Population 154,173.
Santa Fé. Capital of New Mexico and an old Spanish city, much changed since the American occupation. Nearby are interesting remains of the Pueblo Indians, and also of old mission churches. Stock raising, mining, and the manufacture of Indian blankets are chief industries. Population 20,325.
founded, 1605, **2**-394
Pictures
adobe house, **18**-6435
Palace of the Governors, **18**-6435
Santa Maria, Columbus' ship
Pictures, **1**-85; **11**-3914
Santa Maria del Fiore (the Duomo), cathedral in Florence, **17**-6162
Picture
Brunelleschi's dome (gravure), **5**-1746-47
Santa Maria Maggiore, church, Rome, **16**-5716
mosaic, design of, **2**-580
Santa Monica, California. City in Los Angeles County, 15 miles west of the city of Los Angeles, on the Pacific Ocean. A very popular summer resort.
Santayana, George, American philosopher and writer
life and writings, **14**-5014
Picture, **14**-5017
Santiago de Chile. Capital and largest city of Chile, 68 miles from its port of Valparaiso. One of the finest cities in South America, it has a historic cathedral and great commercial activity. Population 639,546.
Pictures, **19**-7042-43
Santiago de Cuba. Port on southern or Caribbean coast of Cuba. Is centre of the mining district and has large foreign trade. Population 107,125.
Santo Domingo. Capital of the Republic of Santo Domingo, with a 16th-century cathedral and a large sugar and coffee export trade. It is now called Ciudad Trujillo.
Santo Domingo, former name of Hispaniola.
See Dominican Republic and Haiti
Santos. Brazilian coffee port, the chief outlet of the state of São Paulo.
Santos-Dumont, Alberto, Brazilian flier, **1**-347
São Paulo. Second largest city of Brazil, capital of the state of São Paulo. A great commercial and manufacturing centre, it has a cathedral and many fine buildings. Population 1,120,405.
Picture, **19**-7049
São Salvador, *see* Bahia
São Tomé, Portuguese possession, **18**-6814
Sap, in plants
circulation, **2**-506
of sugar maple, **15**-5437
Picture
tapping sugar-maple trees, **15**-5436
Sapajou monkey
Picture, **1**-213
Sapphire, account of, **19**-7229-30
famous sapphires, **19**-7234
Picture (in color), facing **19**-7225
Sappho, Greek poet, **16**-5749-50
Saprophytes, plants, **1**-332
Sapsuckers, birds, **13**-4763-64; **14**-5135
Picture
yellow-bellied sapsucker (in color), **13**-4841
Saracen Empire and the Crusades, **7**-2582-89
Saracens
architecture, *see* Architecture, Saracenic
See also Mohammedans
Saragossa, Spain, **14**-4930
Sarajevo. Capital of Bosnia, Yugoslavia, with two cathedrals and 100 mosques. It manufactures tobacco and fancy wares. On June 28, 1914, Archduke Francis Ferdinand was assasinated here. Population 78,173.
Picture, **17**-6347
Saranac Lake, New York
Picture
Sanatorium, **1**-229
Sarasate, Pablo de (1844-1908). Famous Spanish violinist and composer. Some of his works rank among the greatest compositions for the violin.
Saratoga, Battle of, 4-1170
Sarawak, British colony in Borneo, **9**-3187, 3298
Sard, semi-precious stone
Picture (in color), facing **19**-7225
Sardines, account of, **16**-5776
Pictures, **16**-5779; (in color), **16**-5782
Sardinia, Italy. Island in Mediterranean, south of Corsica, from which it is separated by the Strait of Bonifacio. Cagliari is the capital. Sardinia has great mineral and agricultural wealth, not yet fully exploited. Area 9,301 sq. mi. Population 1,034,206.
Sardis. Capital of ancient Lydia, in Asia Minor. Was once a wealthy mart, the capital of the fabulously rich king Crœsus. To-day only a village and some mounds remain. Sardis has been the scene of important excavations, which have revealed Lydian civilization.
Sardonyx
Picture (in color), facing **19**-7225
Sarett, Lew, *see* Poetry Index
Sargasso Sea
Question about
Where and what is the Sargasso Sea? **15**-5520
Sargasso weed, in Atlantic Ocean, **4**-1276, 1278
Sargent, Epes, *see* Poetry Index
Sargent, John Singer, American painter, **10**-3451-52
Pictures
Henry G. Marquand (gravure), **10**-3460
La Carmencita (gravure), **10**-3460
Mrs. Wertheimer (gravure), **10**-3460
Lord Ribblesdale (gravure), **10**-3460
Sargon, Akkadian ruler, **2**-653
Sargon II, king of Assyria, **2**-656-57
palace of, **14**-5209
Sarsaparilla, drug, **8**-2911
Sarsaparilla, wild, flowering plant, **18**-6579
Pictures, **18**-6579; (in color), **8**-2999
Sartain, William, American painter, **10**-3455
Picture
Chapter from the Koran, **15**-5459
Sarto, Andrea del, Italian painter, **3**-958
Picture
St. John the Baptist, **3**-964
Sartor Resartis, book by Carlyle
comment on, **9**-3313
Sartre, Jean-Paul, French writer, **18**-6720
Saskatchewan. Canadian central prairie province; area, 252,000 square miles; capital, Regina. Besides rearing live-stock, it is the greatest wheat-growing province in the Dominion, and its development has been enormously rapid. Saskatoon is an educational center. Population 895,992.
became province of Dominion of Canada, **4**-1488
Riel rebellion of 1885, **4**-1486
Picture
Regina airport, **10**-3532
Saskatchewan River. Canadian river rising in the Rocky Mountains. It flows eastward through Alberta, Saskatchewan and Manitoba and empties into Lake Winnipeg. 1,265 miles.
Saskatoon. Agricultural and educational center in Saskatchewan, Canada, on the South Saskatchewan River.
Sassafras trees, 8-2911; **13**-4639
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Sault Ste. Marie. County seat of Chippewa, Michigan, on the St. Mary's River. The canal here is the largest ship canal in the world. The International Bridge spans the rapids of the river, connecting the city with its Canadian namesake.
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Sault Ste. Marie. Manufacturing town of Ontario, Canada, on the ship canal connecting Lakes Huron and Superior. Often called "Soo."
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Savannah. Cotton port in Georgia exporting also lumber, cottonseed oil and resin. Historically one of the most interesting cities of the South. Population, 95,996.
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Savannah River. American river formed by the Tugaloo and Kiowee rivers, South Carolina; flows into the Atlantic Ocean. 450 miles.
Save River. One of the chief tributaries of the Danube River. Rises in the Julian Alps; joins the Danube at Belgrade.
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Sax, Antoine Joseph, known as **Adolphe** (1814-94). Belgian maker of musical instruments. Sax was the inventor of the saxhorn and the saxophone. *See* **4**-1292
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Saxony. Important German state, lying between Prussia and Czechoslovakia. It is a mining and manufacturing country, with important textile, paper, engineering, chemical, pottery, glass and porcelain industries; coal, lead, zinc, iron and cobalt are mined. Dresden, the capital, Leipzig and Chemnitz are the largest cities. Population 5,206,861.
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Scandium (Sc). Chemical element. Metal. Atomic number 21; atomic weight 45.1. The existence of scandium was predicted by the Russian chemist Mendeleef on the basis of the Periodic Table. *See* Periodic Table.
Scapa Flow. Sea basin in the Orkney Islands, the chief British naval base during World War I. The Germans scuttled their ships here in 1919, rather than deliver them to the Allies.
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Scheldt. River of France and Belgium draining practically all Flanders. Rising near Le Câtelet, it passes Cambrai, Valenciennes, Tournai, Ghent, Antwerp and Flushing, flowing into the North Sea through several wide channels in Holland. Navigable by a skillful arrangement of locks for 210 miles, it forms with its tributaries and innumerable canals an immense system of waterways. 267 miles.
Schick test. A test for determining whether or not a person is susceptible to (that is, liable to an attack of) diphtheria. The diphtheria toxin (*see* Toxins) is injected under the skin of the subject. If there is a reaction, it shows that the subject is susceptible. He is then protected by injections of antitoxin. The Schick test was discovered in 1913 by Bela Schick, a Hungarian scientist.
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Schumann, Clara Josephine Wieck (1819-96). German pianist and composer. She married Robert Schumann in 1840 and shared his artistic work until his death in 1856.
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Schuyler, Philip (1733-1804). American soldier and statesman. Served in French and Indian War, in Continental Congress and in Revolution; twice U. S. Senator from New York. His daughter Elizabeth married Alexander Hamilton.
delayed march of Burgoyne, **4**-1170
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Schwab, Charles Michael (1862-1939). American industrialist. In 1897 he became president of the Carnegie Steel Company. In 1901, when the Company was combined with the Morgan interests to form the United States Steel Corporation, Schwab was made president of the new company. In 1918, the last year of World War I, he was director general of shipbuilding for the Emergency Fleet Corporation of the United States Shipping Board.
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Scilly Islands. Group of 36 islands and about 100 islets lying about 25 miles from Land's End, Cornwall, England. The climate is mild and equable, large quantities of fruit, flowers and vegetables being grown for the English market.
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Scipio Africanus the Younger (Publius Cornelius Scipio Æmilianus) (died 129 B.C.). Roman general; grandson by adoption of Scipio Africanus the Elder. Captured Carthage in 146 and Numantia, in Spain, in 133. He was the head of the aristocratic opposition to the reforms of Tiberius Gracchus.
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Scotland. Northern country of Great Britain; area, 29,796 square miles; capital, Edinburgh. It comprises the Orkney, Shetland and Hebridean Islands, and has three distinct physical divisions —the Southern Uplands, Central Lowlands and Northern Highlands, which contain the Gram-

Scotland (*continued*)
plans and Ben Nevis (4,406 feet). The principal river is the Clyde, in the basin of which is one of the world's greatest industrial regions, with its center in Glasgow. The Tay and Spey, however, are the longest rivers, while Edinburgh stands on the Forth, and the Tweed has a famous woolen industry. Of the many lakes Loch Lomond is the largest in Great Britain. Scotland has important coal, iron, fishing, shipbuilding, textile, jute and distilling industries, but the Lowlands are the only thickly populated part. Among the largest towns are Dundee, Aberdeen, Paisley and Greenock. There are 33 counties. Population 5,030,000.
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Scotland Yard. Headquarters of the London Metropolitan police, on the Victoria Embankment. The original site was Great Scotland Yard, where once stood a palace used by the kings of Scotland when visiting London.
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Scott, Winfield (1786-1866). American soldier, born in Virginia. He entered the army in 1808 and distinguished himself in the War of 1812; became commander-in-chief in 1841; invaded Mexico; Whig candidate for president, 1852; retired from army, 1861.
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on battleships, **18**-6823
Sears, Edmund Hamilton (1810-76). American clergyman and hymn-writer. He wrote the poetic words of It Came Upon the Midnight Clear.
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Seashells
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Why can we hear a noise like waves in a sea-shell? **10**-3659-60
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Why do we wear light things in summer and dark in winter? **10**-3476
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Seattle. Pacific seaport in the state of Washington. Lumber, wheat, fish and gold are among its exports, and it is the chief centre of trade with Alaska. Shipbuilding is important. It is the gateway to a rich, agricultural district. Population 368,302.
Lake Washington Bridge, **7**-2318
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Seaweeds, account of, **10**-3721-22
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How does seaweed tell us what the weather is going to be? **8**-2717
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Sebaceous glands, of skin, **7**-2461
Sebago, salmon, **15**-5636
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Sebastopol, *see* **Sevastopol**
Secession. In American history, the withdrawal of a state from the Union. Actually there has never been a real secession, as the action of the Southern states in 1860 was unsuccessful.
Secretary-bird, 10-3760
Picture (gravure), **10**-3762
Sedalia, Missouri. County-seat of Pettis County; 96 miles east of Kansas City. Has many car shops and railway repair shops; also important meat-packing plants.
Sedges, 10-3526; **19**-7088
Picture, **19**-7087
Sedgwick, John (1813-64). American military leader. Served in the American army from 1837 until his death. Sedgwick was one of the leading Union generals in the American Civil War. He played a distinguished part in the battles of Antietam and Gettysburg. In 1864 he was killed at Spottsylvania.
Sedimentary rock, how formed, **2**-515-17
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Do seeds breathe just as people do? **14**-5084
How does the seed make the color of a plant? **14**-5087
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showing ways of scattering, **3**-1083-87
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catching mackerel, **11**-4053
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how used to locate oil, **13**-4755
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Seismology, study of earthquakes, **6**-2050
Sekhet, or **Bast,** Egyptian goddess
Picture, sculpture, **1**-290
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Selection, method of breeding plants, **4**-1469-70
Selene (Luna), name for Diana as goddess of the moon, **9**-3227
moon, in ancient mythology, **9**-3233
Selenium (Se). Chemical element. Atomic number 34; atomic weight 78.96; melting point 220°C.; boiling point 688°C.; specific gravity 4.8. Selenium occurs in small quantities in some minerals containing sulfur, which it resembles. Selenium can be used in photo-electric cells; it is also employed in small quantities in the manufacture of glass and enamel. In some parts of the West traces of selenium in the soil may poison livestock.
Self-heal, flower
Picture (in color), **15**-5612
Selfish Giant, The (story), **4**-1338-40
Seljugs (Seljuks), dynasty of Persian rulers, **9**-3149
conquest of Byzantine Empire, **13**-4797-99
Selkirk, Alexander, original of Robinson Crusoe, **2**-665
Semi-arid, kind of climate, **7**-2533
Semi-vitreous, term describing certain kind of pottery, **5**-1663
Semicircular canals, control sense of body's position in space, **9**-3307
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Seminole Indians
wars with the United States, **19**-7237
Picture
hewing a canoe, **19**-7236
Semites. The family of Mediterranean type in which are included the Arabs, the Himyarites of Abyssinia, the ancient Assyrians, Aramæans, Amorites, Philistines, Phœnicians and Carthaginians and the still-surviving Jews. The inscriptions found in the countries inhabited by these groups are all in the Semitic languages.
of Africa, **2**-473-74
Semmes, Raphael (1809-77). Confederate naval officer. Commander of the famous raiders Sumter and Alabama, which took a great toll of Union shipping in the Civil War.
Semper Paratus, Coast Guard song
origin of, **18**-6511
Senate, Washington, D. C., **5**-1788-90
Picture, **5**-1788
Seneca, Roman philosopher and writer, **16**-5917-18
Picture, **16**-5917
Seneca Indians. A North American Indian tribe belonging to the Iroquois family. Their territory formerly extended from Lake Seneca to the Genesee River; they also established colonies westward toward Lake Erie and along the Allegheny River. The Senecas were British allies in the American Revolution. Today they number only a few thousand. Most of them live in New York State.
Senefelder, Aloys, inventor of lithography, **9**-3392
Senegal. Oldest French West African possession; area, 77,730 square miles; capital, St. Louis. Corn, millet, nuts and gum are produced, and Dakar is a rising port. Population 1,723,068.
Senior Girl Scouts, activities, **7**-2521-22
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The Destruction of Sennacherib, by Lord Byron, **19**-6874
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of earthworms, **19**-7144
of insects, *see* Insects—senses of
Question about
Why do we lose the sense of smell when we have a cold? **6**-2249
See also Hearing; Sight; Smell; Taste; Touch
Sensible heat, term in physics, **5**-1583
Sensitive plants, movement of, **2**-747
Sentence. In grammar, a combination of subject and predicate, simple or complex; a complete thought expressed in words.
Sentimental Tommy (in part), by Sir James M. Barrie, **9**-3239-44
Sepals, parts of flowers, **2**-507; **3**-1013

Separatists, in England, **2**-546-47
See also Pilgrims
Separators of cream, **1**-374, 377
Pictures, **1**-376-77
Sepia, fluid from squids, **16**-5898
September. In our calendar the ninth month of the year, consisting of 30 days. In the old Roman year it was the seventh month, the name coming from Latin *septem,* seven.
Septuagint, first translation of Old Testament into Greek, **2**-476
Sequoia National Park, California, **7**-2285
Sequoia trees
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varieties and use of wood, **12**-4250
Pictures, **11**-4098
cross section, sequoia trunk, **18**-6620
logs, **16**-5988
Sequoya. Cherokee Indian scholar who gave written language to his people; born near Tuskegee, Alabama, 1760; died, 1843.
Serbia, state of Yugoslavia, **17**-6345-46
in World War I, **18**-6441
fairy tales, **6**-2277
Serfs
beginnings of freedom toward end of Middle Ages, **6**-1975-76
Sergeant. A non-commissioned officer in the army or in the marines, next higher in rank to the corporal.
Sergeant Casey, war dog, **16**-5738
Seriemas, birds of South America, **11**-4010
Serpentine. This mineral (hydrous magnesium silicate) is abundant and widely distributed. Serpentine rocks occur in masses, often of great size; these are of various colors—green, brown, yellow, red or mottled. Serpentine is a highly prized building material, particularly when found mixed with magnesite or white calcite. It is found in the British Isles, Sweden and the United States (especially in Pennsylvania, Maryland, New Mexico, California and Washington).
Serpents, *see* Snakes
Serra, Junípero (1713-1784), Spanish missionary in America of the Franciscan order. Sent to California in 1767, he founded missions at San Francisco, Santa Barbara and San Diego. San Diego (founded July 16, 1769) was the first European settlement in upper California.
founded California missions, **6**-1923
Serum, method of preventing disease, **2**-460
Serum proteins, in blood, **3**-936-37
Serval, animal. *Picture* (gravure), **2**-500
Servia, *see* Yugoslavia
Service, Robert W., English poet who wrote of Canada, **14**-5109-10
Service-berry, or **shadbush,** **12**-4512
Service tree, wild, **12**-4382-83
Picture and note, **12**-4391; (in color), **11**-4027
Sesame. An annual plant about two feet high. Cultivated in India and other regions of the East. Its seeds are much used for food by Oriental peoples. They also yield an oil that is employed instead of olive oil in cooking, in medicine, in soap-making and so on. The cake left after the oil has been pressed out forms a food for the lower classes and also for cattle.
Set, Egyptian god, **3**-811-12
Seth Jones, early dime novel
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Seton, Ernest Thompson
Story by
Coaly-bay, the Outlaw Horse, **7**-2596-99
Setter dogs
Pictures, **1**-256; **12**-4261; (gravure), **2**-715
Setubal, Portugal. Seaport, about 20 miles southeast of Lisbon. Exports include cork, wine and fruit.
Sevastopol, city in Russia, **16**-5857
siege of, in Crimean War, **7**-2299
Picture
siege of Crimean War, **7**-2298
Seven at One Blow (story), **10**-3714-16
Seven Days' Battles. A series of battles in the American Civil War, extending from June 25, 1862, through July 1. These battles include Mechanicsville, Oak Grove, Gaines' Mill, Savage Station, Glendale and Malvern Hill. At the beginning of the Seven Days the Union Army under McClellan was within striking distance of Richmond; at the end of this period the Union army had withdrawn and Richmond was no longer in danger.
Seven Days' Battles (*continued*)
Seven Seas. This name is applied figuratively to all the oceans of the world. The seven seas referred to are the North and South Atlantic, the North and South Pacific, the Arctic, the Antarctic and the Indian Oceans.
Seven Wonders of the World
* account of, **7**-2604-08
Colossus of Rhodes, **12**-4467
Hanging Gardens of Babylon, **2**-660
lighthouse, Alexandria, **3**-821
Mausoleum, Halicarnassus, **12**-4331-32
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statue of Zeus, Olympia, **12**-4220
temple of Diana, Ephesus, **15**-5344-45
Pictures, see starred article
Seven Years' War. Third and longest (1756-63) of the contests between Frederick the Great and his enemies for the possession of Silesia.
England's part, **6**-2104
in Canada, **2**-683
Seventeen-year locust, *see* Cicadas
Severn. Second largest river of England and Wales, rising in Plynlimmon and flowing into the Bristol Channel. It passes Shrewsbury, Worcester, Tewkesbury and Gloucester, and its chief tributaries are the Teme and Upper Avon. Draining 4,350 square miles, it is generally too swift for navigation, and has a tidal bore. 210 miles.
plan for harnessing tides, **15**-5516
Severus, Lucius Septimius (146-211). Roman emperor. After the murder of the Emperor Pertinax, in 193, Severus was declared emperor by his troops. He established his position by defeating several rivals for the throne. The reign of Severus was marked by constant warfare; the enemies of Rome were held at bay. Severus rebuilt the wall of Hadrian in Britain.
reign, **4**-1251
Sevier, John, pioneer
life, **6**-2197
Picture, statue, **6**-2197
Sévigné, Marie de Rabutin-Chantal, Marquise de (1626-96). French writer. The letters she wrote to her daughter, the Countess de Grignan, are considered models of literary style; they also give a vivid picture of seventeenth century French society. These letters fill fourteen large volumes.
Seville, Spain, **14**-4931
cathedral, **17**-6164
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Alcazar, **15**-5473, 5475, 5477
cathedral (gravure), **17**-6172
courtyard in Pilate's house, **15**-5476
monument to Columbus, **14**-4914
patio of Irving Memorial, **13**-4709
Sèvres. French town between Versailles and Paris, with a famous porcelain industry and school of ceramics.
Sewage disposal. In small communities, sewage (refuse matter or liquid) is generally disposed of in the soil; care is taken not to pollute (make unclean) the water supply provided by wells or flowing streams. In larger places, sewage is sent through a system of big underground pipes. In some cities sewage runs through these pipes to deep water in flowing streams, lakes or the ocean. This method often results in the pollution of the water supply or of bathing beaches. A more satisfactory way of disposing of sewage is by incineration or burning. In certain cities the sewage is treated chemically in such a way as to kill living matter in it; the solid matter (called sludge) may be used as fertilizer. In other places the sewage is made to flow over the fields. The sewage serves as fertilizer; large crops may be planted on the land. This method is in common use in China.
Seward, William Henry, Secretary of State in Lincoln's Cabinet, **10**-3496
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listening to Emancipation Proclamation, **7**-2442
Sewellel ("mountain beaver"), **3**-1131
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Sewing
* how to make rag dolls and foreign costumes for them, **18**-6549-53
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See also Dolls, dressmaking

Sewing machine
Pictures
early Singer sewing machine, **19**-7214
electronic sewing machine, **14**-5037
Sex in plants, *see* Flowers—fertilization; Reproduction—plants
Sextant. An instrument of navigation and surveying, for measuring the angular distance of stars or other objects, or the altitude of a star above the horizon. Newton was the first inventor, but his description was not published until after his death. Before the publication, about 1730, Thomas Godfrey of Philadelphia had made a sextant. *See also* **17**-6406
Sexton beetle, **18**-6626
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Seychelles Islands, in Indian Ocean, **9**-3183
Seymour, Jane, wife of Henry VIII
Picture, **5**-1814
Seymouria, reptile of Permian period, **4**-1296
Shackleton, Sir Ernest Henry
expeditions to South Pole, **15**-5381-86
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Shad, fish, **16**-5776
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Shaddock, variety of grapefruit, **6**-2059
Shadoof, use in irrigation, **3**-808; **7**-2543-44
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telling time by, **7**-2383
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Shaggy-manes, mushrooms, **11**-3908
Shah Jehan, Mogul emperor
as architect, **15**-5472
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apartment in palace (gravure), **15**-5477
Taj Mahal, **15**-5477
Shakespeare, William, English dramatist and poet
* life and works, **3**-832-42
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Romeo and Juliet, **8**-2688-97
Taming of the Shrew, **16**-5755-62
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Sir Henry Irving as Shylock, **5**-1613
See also starred article
Shakespeare Cliff, in Chalk Cliffs of England
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Shakespeare's Fellows, * **3**-1113-25
Shakespearean sonnet, verse form, **19**-6986
Shale
source of petroleum, **13**-4758
in Carboniferous period, **4**-1295
Shama, bird. *Picture,* **9**-3135
Shamrock
emblem of Ireland, **17**-6177
Shanghai. Greatest Chinese port, near the mouth of the Yang-tse-kiang. Exporting chiefly silk, tea, sugar, cotton, hides, wool and beans, it does about two-fifths of the whole foreign trade of China, and has a large foreign quarter. Population 3,489,998. *See also* **2**-433
Pictures (gravure), **2**-425, 427
the Bund, **2**-435
Shanley, Charles Dawson, *see* Poetry Index
Shannon. Largest river of Ireland and the British Isles, draining 4,550 square miles. Rising in County Cavan, it flows into the Atlantic by an estuary at Limerick. 250 miles.
Shannon, ship
victory over Chesapeake, **5**-1703
Sharks, **16**-5893-94
accompanied by pilot fish, **15**-5541
in Devonian period, **4**-1175
use of skin from, **11**-4062
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Sharp, William, *see* Macleod, Fiona
Shasta Dam, California
Picture, **18**-6759
Shaw, George Bernard. British dramatist and critic; born, Dublin, 1856. He is an excellent speaker and is renowned for wit and satire.
Picture
portrait, by Augustus John, **8**-2861
Shaw, R. Norman, English architect, **18**-6492
Shays' Rebellion. An insurrection in western Massachusetts in 1786-87, under Daniel Shays. The uprising was unsuccessful. Shays escaped.
Shearing, of sheep
Pictures, **15**-5577
Shears, *see* Scissors
Shearwaters, birds, **11**-4126, 4128
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Manx (in color), **9**-3281
Sheave, elevator pulley, **4**-1218
Sheba (Saba), Arabia. Ancient Arabian city. The inhabitants of Sheba carried on an extensive trade in frankincense, gold, ivory, ebony and spices. Their wealth was famous in the Orient. The scriptures (I Kings, X) tell of the visit of the Queen of Sheba to King Solomon. She brought him many rich gifts.
Sheboygan, Wisconsin. County-seat of Sheboygan County, situated on Lake Michigan at the mouth of the Sheboygan River. Industrial establishments include machine shops, chain and motor factories and brick works. Water power is derived from the falls of the Sheboygan River.
Sheeler, Charles, American painter, **10**-3518
Sheep
* sheep and goats, **4**-1369-78
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grease obtained from wool, **2**-635
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mountain sheep of Carpathians, **3**-1022
New Zealand flock, **7**-2578
on the pampas, Argentina, **19**-7033
ranch in British Columbia, **1**-110
sheep-herding in Montana, **18**-6425
sheep market, Bagdad, Iraq, **18**-6739
Sheep botflies, **17**-6420
Sheep breeding, **4**-1369-70
Sheepdog, service to man, **2**-717
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Sheepdog, Old English
Picture (gravure), **2**-714
Sheepheads, fish, **16**-5780
Sheffield, England, manufactures cutlery, **4**-1307
Sheffield plate, **4**-1307
Shekel. A weight and a coin of the ancient Assyrians, Jews, Phœnicians and other peoples. It came to be the chief silver coin of the Jews about 140 B.C. and was worth about 60 cents. Nowadays the word is used as a slang expression for money.
Sheldrakes, ducks
Picture (in color), **9**-3282
Shellac, as base for plastics, **11**-4000-01
from scale insect, **18**-6797
Shelley, Percy Bysshe
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Shellfish, *see* Crustaceans; Mollusks
Shells
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How does a mussel build its shell? **19**-6882
What has happened to the snails from all the empty shells? **19**-6882
Pictures (in color), **19**-6893-96
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Shells, Explosive, **8**-2846, 2849
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What keeps a shell from falling to the ground? **12**-4399
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Shelter
* homes and housing, **9**-3121-28
* in early times, **12**-4445-47
Shelterbelts of trees, to prevent erosion, **1**-382
Pictures, **1**-380
Shenandoah, airship, **1**-349, 351
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Shenandoah National Park, Virginia, **7**-2289-90

Shenandoah Valley, Virginia. A beautiful and fertile valley lying between the Shenandoah Mountains on the west and the Blue Ridge Mountains on the east. The apple orchards around Winchester are famous. The Shenandoah Valley was the scene of much hard fighting during the Civil War; few districts suffered as much from the terrible effects of the war.
Picture, **13**-4518
Shepherd-Maid and the Sweep, The (story), **11**-3903-04
Shepherds' Calendar, The, poem by Edmund Spenser
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Sheraton, Thomas, furniture-maker, **17**-6262
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examples of furniture, **17**-6261-64
Sheridan, Philip Henry (1831-88). American soldier born in Albany, N. Y. He graduated from West Point, and during the Civil War became distinguished as a cavalry officer.
See also **7**-2442-43
Sherlock Holmes, character created by Sir Arthur Conan Doyle, **11**-3894
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Sherman, James S., vice-president of U. S.
Picture
portrait (gravure), **11**-3948
Sherman, Roger, American patriot
Pictures
portrait in group, **4**-1165
in group, signing Declaration of Independence, **10**-3487
Sherman, Stuart P., American writer and critic, **14**-5019
Sherman, William Tecumseh (1820-91). American soldier, born in Ohio. He graduated from West Point, and served in Mexican War, but resigned from the army to engage in banking and then in teaching; returned to army in 1861 and fought in many of the most important battles of the war; succeeded Grant as commander of peace army in 1869.
See also **7**-2439, 2441-42
Sherwood Forest. One of the ancient English forests, extending from Nottingham northward to Worksop, and covering nearly 200 square miles. Famous as the retreat of Robin Hood.
Shetland Islands. Scottish group of 30 islands and 70 uninhabited islets in the North Atlantic. They cover 550 square miles and form a Scottish county, Lerwick on Mainland being the capital. Sheep, cattle and Shetland ponies are bred, but the main industry is fishing.
Shetland ponies, origin of, **6**-2017
Picture, **6**-2017
Shibaak, Arab window, **18**-6742
Shilling. A coin or paper money varying in value, used mostly by the Anglo-Saxon peoples, with the exception of those in North America, where the decimal system has replaced the old monetary system. The first shilling was issued in the reign of Henry VII. The par value of the present-day English shilling is 24 cents.
Shin leaf, plant
note and picture, **16**-5879
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Ship beneath the Waters, * **1**-197-200
Ships and shipbuilding
* advances in shipbuilding since 1800, **17**-6397-6408
* history of wooden ships, **11**-3909-20
* inventors of, **17**-6397-6408
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How do ships sail against the wind? **16**-6022-23
How is time told on shipboard? **7**-2362
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Allied war ship, World War I, **18**-6447
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Phoenician bireme, **1**-79
prefabricated steel bow, **9**-3353
Spanish treasure ships of the 16th century, **14**-5260
U. S. shipyard, **11**-3782
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Venetian warship, **4**-1324
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Ships and Sailors of Our Navy, * **18**-6815-24
Ships that sail the sky, * **1**-344-51
Shipton, Mother. Famous English legendary prophetess of the 16th century. Her prophecies, published by Baker in 1797, included the coming death of Cardinal Wolsey, the Lord Percy, and others. W. Lilly, the astrologer, declared that 16 of her 18 predictions had been fulfilled.
Shirley, James, English playright, **3**-1125
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* manufacture from leather, **10**-3562-76
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Arab shoemaker, **18**-6741
making shoes by hand, **14**-5246
making wooden shoes in Switzerland, **16**-6000
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Shoguns, rulers of Japan, **2**-563
Sholes, Christopher L., American inventor, **19**-7213
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Shooting star, plant, **19**-6939
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Shooting-stars, *see* Meteors and Meteorites
Short-legged weasel family, * **2**-767-72
Short-waves, in radio
how to build a short-wave receiving set, **14**-4997-5002
Shorthand. A method of writing by means of quickly noted signs or characters so that the hand can keep pace with the speech. The ancient Greeks and Romans had a system but it was lost. In the 16th century the art was revived, but Pitman in 1837 devised the successful system still used with modifications. There are other systems of shorthand such as the Gregg.
Shorthorn, breed of cattle, **4**-1260
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Shostakovitch, Dimitri, Russian composer, **19**-6925-26
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Shotgun, account of, **8**-2849
Shoulder blade, in body, **5**-1562-63
Shovelers, ducks
Picture (in color), **9**-3130
Show Boat, musical play
music written by Jerome Kern, **18**-6516
Picture
scene from, **18**-6515
Shows, *see* Fairs
Shrapnel. A form of shell for use in field guns, invented by General Henry Shrapnel of the British army, who died, 1842. A powder-charge bursts the casing of the shell, which is filled with bullets, at a point before the objective is reached, and the released bits of metal fly onward in a spread-out shower. The distance of explosion is gauged on a time fuse set in the nose of the shell. During World War I shrapnel shells inflicted enormous losses.
See also Guns

Shrews, insect-eating mammals, **1**-318-19
Pictures, **1**-317, 320
Shrewsbury. Capital of Shropshire, England, on the Severn. An ancient place with many picturesque houses, it has a Norman castle and abbey church and a Roman Catholic cathedral.
Shrikes, birds, **9**-3138; **13**-4836
Pictures, **9**-3133
African shrike (in color), **10**-3622
loggerhead shrike (in color), **13**-4842
nest and eggs, **8**-2757
red-backed (in color), **9**-3282
Shrimps, description, **16**-5956
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Shrines
* historic places in U. S., **18**-6825-39
Shrinking, of cloth
Question about
Why do things shrink? **8**-2771-72
Shrubs
* of North America, **13**-4774-81
Shub-ad, queen of Ur
Picture
golden headdress, **2**-655
Shutters, of a camera, **8**-2963
Shylock, Shakespearean character
Picture
Sir Henry Irving as Shylock, **5**-1613
Siam, country in southeast Asia, **2**-440
map, **1**-125
Siamese cat. *Picture,* **2**-495
Sibelius, Jean, Finnish composer, **19**-6923, 7153
Siberia. Name formerly applied to the northern Asiatic part of Russia east of the Ural Mountains and the Caspian Sea and extending to the Pacific Ocean. In the days of the Tsars Siberia was divided into four governments and six provinces. After the revolution a number of republics and territories were carved out of Siberia. At present the name Siberia—more exactly Siberian Region—is limited to the central area of what was formerly Siberia; it corresponds roughly to the former Yeniseisk, Tomsk and Irkutsk Governments of Imperial Russia. The Siberian Region has an area of 1,730,000 square miles. It is bounded on the north by the Arctic Ocean, on the south by Mongolia and the Kazak S. S. R. (Soviet Socialist Republic), on the east by the Yakutsk A. R. (Autonomous Republic) and the Buriat-Mongol A. R., on the west by the Ural Region. The Siberian Region is very rich in minerals, which include iron ore, gold, silver, platinum, asbestos, mica, antimony, coal and salt. The chief crops are wheat, rye, barley, potatoes, flax, hemp, beans, grasses and sunflower seed. The administrative centre is Novo-Sibirsk; other cities include Irkutsk, Omsk, Tomsk and Krasnoyarsk.
Siberian lynx. *Picture,* **2**-490
Sicily. Largest island of Italy and the Mediterranean; area, 9,926 square miles; capital, Palermo. The chief industries are fruit-growing and the sardine and tuna fisheries, though Mount Etna is the chief source of the world's sulphur supply. Palermo, Messina, Catania, Trapani and Marsala are important ports; Syracuse and Girgenti abound in antiquities. Occupied in turn by Greeks, Carthaginians, Romans, Franks, Goths, Byzantines, Saracens, Normans, Angevins and Aragonese, Sicily has had the most eventful history of all Europe. Population 4,000,078.
in Italian history, **12**-4108, 4410-12
Pictures, **13**-4575
townspeople, **13**-4571
Sicklebills, birds, **9**-3288
Picture, **9**-3287
Sickles, Daniel Edgar (1825-1914). American soldier. Was a successful lawyer and politician at the outbreak of the Civil War (1861). Sickles raised a regiment of volunteers, and soon won recognition as a gallant and skillful officer. He rose to the rank of major general, and distinguished himself in the battles of Chancellorsville and Gettysburg. He lost a leg in the latter encounter. Upon recovering from his wound, he remained in active service until 1869. Sickles was active in politics after that time.
Sickness
Question about
Should we have plants in a sick-room? **14**-5084
Siddons, Mrs. Sarah Kemble
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portrait by Reynolds as Tragic Muse (gravure), **6**-2113
Side stroke, in swimming, **19**-6957
Sidewinder, rattlesnake, **15**-5415
Sidney, Sir Philip, English poet and soldier, **3**-1116
* life, **15**-5375-76
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Pictures, **15**-5375-76
Sidon, Sarcophagus of the Weepers, **12**-4459-60
Picture, **12**-4466
Siegfried, hero in German literature, **17**-6266
Picture, murder of, **17**-6266
Siena. Famous city of Tuscany, one of the earliest centres of Italian Renaissance art. It is situated on three hills, the streets being winding and picturesque. Noted for straw-plaiting and trade in oil and wine. The 13th-century Pointed cathedral contains Donatello's statue in bronze of John the Baptist. Population 48,664.
cathedral, **17**-6163-64
early painters, **2**-691-92, 697
Happy Fountain, **13**-4606
Pictures
cathedral, **17**-6170
incident of siege of, **14**-5098
Sienkiewicz, Henryk (1846-1916). Polish novelist. Was the author of a number of fine historical novels, of which the most famous, Quo Vadis? (Whither Goest Thou), has been translated into nearly every modern language. Sienkiewicz won the Nobel prize for literature in 1905.
Sierra Leone, account of, **9**-3058
Picture, street in Freetown, **9**-3058
Sierra Madre. Mountain range in Mexico. Sometimes applied to Rocky Mountain system in New Mexico.
Sierra Nevada. Californian mountain range containing Mount Whitney, the highest peak in the United States (not counting Alaska), 14,502 feet. Famous for its grand scenery.
Picture
settlers crossing, **6**-1917
Sierra Nevada, mountains in Spain, **14**-4907
Sight
* eyes and seeing, **11**-3801-08
in deep-sea creatures, **15**-5466
magnifying glass, explanation, **2**-458
See also Light
Questions about
Are all animals blind at birth? **16**-5842
Are pictures of the things we see printed on the eye? **11**-3842-43
Can a fish see and hear us? **2**-684
Can a fly see in all directions at the same time? **17**-6424
Do we see a thing as soon as we look at it? **11**-3842
How can we see with our eyes shut? **11**-3843
How far can we see? **11**-3839-41
Is there any color our eyes can not see? **11**-3841
What is cataract of the eye? **11**-3842
What is the use of having two eyes? **11**-3842
What makes the pupil of the eye grow larger and smaller? **11**-3841
Why can't I see in the dark? **11**-3838-39
Why can't we see the spokes of a wheel when it goes very fast? **11**-3841
Why do dark things look smaller than light things? **11**-3841-42
Why do two sides of a road seem to meet in the distance? **11**-3839
Why do we see lights when we get a blow on the eye? **11**-3843
Why does an onion make our eyes water? **11**-3841
Why does heat make things seem to quiver? **11**-3842
Why, if we look at red, do we afterward see green? **11**-3843
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Sigillaria, fossil tree
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Signac, Paul, French painter, **8**-2709
Signaling
flag-wagging; directions, with pictures, **11**-4013-14

Signaling (*continued*)
railroad signaling devices, **2**-417, 419
with a heliograph, **16**-5885-87
Signature, meaning of term, in book-making, **3**-1067
Signorelli, Luca di Egidio di Venture de', Italian painter, **2**-699
Signory, government of Renaissance Florence, **5**-1731-32
Sika deer, 4-1508
Picture, **4**-1507
Si Kiang, river in China, **2**-422-23
Silage, fodder in silo, **7**-2413
Picture, of silo, **7**-2410
Silas Marner, novel by George Eliot
comment on, **11**-3891
Picture
illustration from, **11**-3893
Silent Night, Christmas carol
written by Joseph Mohr, **10**-3603
Silesia. An important district of eastern Europe in the border areas of Poland, Germany, and Czechoslovakia. In the southeast is a very valuable coal-mining district; zinc and lead are also found in considerable quantities. Breslau, the chief city, is a flourishing manufacturing center. Silesia also has rich agricultural areas and forests.
Silhouettes. Profile drawings in solid color against a light background. Derived from the name of the economy-minded French minister of finance, Etienne de Silhouette.
made with camera, **10**-3503-04
making stippled silhouettes, **2**-749
Silica, use in glass-making, **18**-6746
Silicon (Si). Chemical element. Atomic number 14; atomic weight 28.06; melting point 1420°C.; boiling point 2600°C.; specific gravity 2.4. Silicon is the next most abundant element in the earth's crust after oxygen. Silicon dioxide, silica, SiO_2, forms quartz, and this and other silicon compounds are abundant in rocks. Glass, cement and clay are silicates. Silicon-iron is an acid-resisting alloy. Silicones are silicon compounds that have recently come into use particularly as high-temperature lubricants and as ingredients in heat-resisting paints. They have other industrial uses.
ingredient in steel alloys, **5**-1635
Silk
* account of silkworm and silk manufacture, **15**-5307-21
French industry, **10**-3420
how to test purity, **5**-1768
industry in Europe, **18**-6529
See also Silkworm
Pictures
old Chinese silk farm, **2**-423
See also starred article above
Silk grass, *see* Yucca
Silk rubber tree, source of rubber, **4**-1408
Silkworm
* and silk manufacture, **15**-5307-21
Silliman, Benjamin (1779-1864), American chemist and geologist; born at North Stratford (now Trumbull), Conn. He was professor of chemistry at Yale (1802-53) and founded and edited the American Journal of Science and the Arts, usually called Silliman's Journal. Among his many achievements, he obtained for the first time in the United States the metals sodium and potassium and discovered the fusion of the carbons in the voltaic arc. He was also active in the organization of the Yale medical school.
Silliman, Benjamin (1816-1885), American chemist, son of above, born at New Haven, Conn. He became his father's assistant and later succeeded him at Yale, also as editor of the American Journal of Science. Frequently called on in chemical and mining problems, he helped to lay the foundations for the modern petroleum industry in his report on oil from Venango County, Pa., where the first oil well was later drilled in that state. He showed that petroleum is mostly a mixture of hydrocarbons and outlined uses and methods of preparing it followed today. With John P. Norton he established at Yale what later became the Sheffield Scientific School. From 1849-54 he taught at the University of Louisville, Ky. Both father and son were original members of the National Academy of Sciences.
petroleum experiments, **13**-4744
Silo, building for storing silage, **7**-2413
Picture, **7**-2410
Siloam Inscription, 7-2483-84
Silurian period, geology, *see* Geology—Silurian period
Silver (Ag, from Latin *argentum*). Chemical element. Lustrous white metal. Atomic number 47; atomic weight 107.88; melting point 960°C.; boiling point 1950°C.; specific gravity 10.5. Silver occurs in nature as the metal, as ores of silver and with ores of lead and copper; Mexico, the United States and Canada are the leading producers. Silver is used in coinage and in jewelry silver salts are employed in photography.
Australian mines, **7**-2471
production in U. S., **9**-3209
use in photography, **8**-2963
used as money, **15**-5590
used for making cutlery, **4**-1305-06
Questions about
Why does silver tarnish in the air while gold does not? **1**-287
Why is a silver spoon blackened by egg? **12**-4491
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silver cutlery, manufacture of, **4**-1307-11
Silver chloride, 16-5669, 5671
Silver foxes
farmed in Canada, **13**-4694-96
Silver-plating, explanation of, **4**-1307, 1309
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Silver sulfide, 16-5669, 5671
Silverfish, insects. *Picture,* **17**-6067
Silversword, plant which grows in crater of Haleakala
Picture, **7**-2291
Silverweed. *Picture* (in color), **13**-4878
Silvester II, pope of Roman Catholic church encouraged study of mathematics, **19**-7007
Simcoe, John Graves, first governor of Upper Canada, **3**-944
Simeon Stylites, St. Monk of Sisan, Syria, who, when his fame spread among the Arabs, retired up a high pillar near Antioch, on which he lived for 30 years. He made many converts, and also influenced state matters up to his death, in about 459.
Simla. Hot-weather capital of India, in the Punjab. It stands 7,000 feet above sea-level in the Himalayan foothills.
Picture, **8**-2830
Simmons, Edward E., American painter, **10**-3453
Simmons College
founding, **12**-4316
Simms, William Gilmore, American author, **13**-4710
Simon, Lucien, French painter
Picture
The Procession (gravure), **8**-2862
Simon de Montfort, *see* Montfort, Simon de
Simonides, Greek poet, **16**-5749
Simoon, desert storm
how Arabs protect themselves from, **18**-6742
Simple cell, *see* Electric batteries
Simplon Pass. Alpine pass leading from the Swiss Valais to Domo d'Ossola, Italy. The railway to Milan is carried beneath it by a tunnel 12 miles long. 6,600 feet.
Simpson, Sir George, early head of Hudson's Bay Company, **13**-4691-92
Simpson, James, discovered use of chloroform as anæsthetic, **8**-2730
Sims, Admiral William S. Born, Port Hope, Canada, in 1858. Became American citizen. Commanded American naval forces in European waters after the United States entered World War I. He died in 1936.
Sinai, Mt. Historic summit in the Sinai peninsula of Egypt. 8,550 feet.
Sinanthropus pekinensis, primitive man, **6**-1925
Sinclair, Upton Beale, American author, **13**-4814-4815
Sindbad the Sailor (story), **5**-1843-44
Sinews, of human body, *see* Tendons
Sing Sing. New York Sate prison at Ossining, Westchester County, New York.
Singapore. There are really three Singapores—the island of Singapore at the southern tip of the Malay Peninsula, the city of Singapore in the southeastern part of the island and the naval base in the north. The island of Singapore, with

Singapore (*continued*)
an area of 220 square miles, was formerly included in the British Crown Colony of the Straits Settlements. The city of Singapore (population, 727,000) was one of the most important trade centers of the world, receiving merchandise from every land in exchange for cargoes of rubber and tin. The great naval base at Singapore served the English battle fleets operating in the Far East. On February 8, 1942, the Japanese, who had just conquered the Malay Peninsula, invaded the island of Singapore. All resistance to the Japanese ended on February 15. On September 12, 1945, at Singapore, there took place the formal surrender of all of Japan's southeastern armies, including 85,000 troops in the Singapore area. *See also* **9**-3185
Pictures, **9**-3188
street scene, **1**-121
port, **17**-6094
Singing
part-singing introduced, 10th century, **19**-6901
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Singing Tower, Florida, **2**-584
Picture, **2**-584
Sinhalese, natives of Ceylon, *see* Ceylon
Sinkiang (Turkestan), **18**-6584
Sinn Fein, political movement in Ireland, **8**-2944
Siouans. One of the largest linguistic stocks of North American Indians. In former times they ranged far and wide, especially from the Saskatchewan southward to Arkansas and from the Mississippi to Wyoming. They include the Dakotas, Omahas, Iowas, Crows, Assiniboins, Osages, Winnebagos and many others.
Picture, **18**-6556
Siphon, experiment showing working, **2**-622
Picture
use in water supply, **14**-5059
Siphon recorder, cable instrument, invented by Kelvin, **12**-4299
Siqueiros, David Alfaro (1898-) Mexican painter, famous for his murals in which he portrays social conditions in bold, vigorous style. His work may be seen in Mexico, New York City, Los Angeles and Buenos Aires.
Sir Philip Sidney, * **15**-5375-76
Sir Walter Scott and His Stories, * **7**-2349-52
Sirens, sea nymphs, **1**-357
in mythology, **9**-3236; **12**-4339
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Sirius, star, **11**-3785, 3923
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spectrum of (color), facing **11**-3920
Sirocco, a wind, **16**-6021
Sisal, plant
fiber for rope, **14**-5222, 5224
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Siskins, birds, **8**-2973
pine siskins, **13**-4832
Pictures, **8**-2899
red siskin (in color), **12**-4371
Sisley, Alfred, French painter, **8**-2714
Picture
Road to Mount Valerien, **8**-2713
Sistine Chapel, Vatican, Rome
Michelangelo's paintings, **3**-831
Pictures
Michelangelo's paintings, **3**-822, 823, 826-27
Sistine Madonna, by Raphael
Picture (gravure), **3**-962
Sitka, Alaska
Pictures, **10**-3583; **16**-5795
Sitting Bull (Tatanka Yotanka) (1837-90). A Sioux chief who led many Indian risings in the Western states of the United States. After the killing of General Custer on the Little Big Horn in 1876 Sitting Bull escaped to Canada. He returned to the United States in 1881. He was arrested when an Indian uprising threatened in 1890 and was killed near Fort Yates, North Dakota, during an attempt at rescue.
Situtunga, an antelope, **4**-1445
Siva, Hindu god
Picture, **9**-3088
Six Nations, Indian confederacy, **1**-250-52; **2**-554
See also Five Nations; Iroquois Indians
Size Weeder, modern farm machine, **19**-7208
Picture, **19**-7209
Skagerrak is a broad channel connecting the North Sea with the Kattegat and separating Norway from Jutland, Denmark. The Skagerrak is about 150 miles long and from 100 to 125 miles wide. Its name derives from skaw (*skagen* in Danish), a sandbank off Jutland, and *rack* (meaning extension).
Skates, fishes, **16**-5774
Pictures, **16**-5779; (in color), **16**-5783
Skating, ice
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* Animals with backbones, **1**-255-59
* human skeleton, **5**-1559-63
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Pictures
man and elephant compared, **8**-2719
of human body, **13**-4621
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Skelton, John, early English poet, **2**-726
Skiing
in Canada, **10**-3694
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in Alps, **16**-6005
in Norway, **15**-5303
on Sudetic Mountains, Czechoslovakia, **17**-6344
Skimmers, birds, **11**-4122
black skimmer, **14**-5026
Skin
* structure and functions, including hair and nails, **5**-1803-06
of elephants, **8**-2719-20
sweat glands and sebaceous glands, **7**-2461
Questions about
If our skin is waterproof, how does moisture penetrate it? **5**-1808
What are the spots that we call freckles? **5**-1810
What happens to our skin when we blush? **2**-457
What is an albino? **5**-1809
What is it that makes wrinkles in old people's faces? **5**-1809
What makes a dimple? **5**-1807-08
Why are some people dark and some fair? **5**-1808
Why does my face turn white when I am frightened? **16**-5958
Why does the chameleon change its color? **5**-1810
Why is skin of the Negro race black? **5**-1809
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Skinks, lizards, **14**-5231
Skins of animals
made into leather, **10**-3562, 3564-65
medium of exchange in fur trading, **13**-4693
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mother and chick, **8**-2761
Skull, human, **5**-1560, 1562
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jaws, **6**-1929
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diagram of passage for ear, **9**-3306
Skullcap, plant, **16**-5880
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greater skullcap (in color), **16**-5883
Skulpin, fish
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yellow skulpin (in color), **16**-5784
Skunk cabbage, plant, **17**-6274
on Pacific coast, **19**-6928
Pictures, **17**-6272; **19**-6929
Skunks, animals, **2**-771-72
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Skunkweed, *see* Rocky Mountain bee plant
Sky
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Are there any diamonds in the sky? **11**-3795
Could the sky fall down? **11**-3792
Do we know how far the sky goes? **11**-3792-93
How many stars are there in the sky? **11**-3793
Is a falling star one of the stars we see in the sky? **11**-3795
Where are the clouds when the sky is clear? **8**-2917
Why is the sky blue? **11**-3791-92
Why is the sky so blue in tropical countries? **11**-3792

Skye. Largest of the Inner Hebrides; area, 643 square miles. Wild and rugged, it has six mountains over 3,000 feet high, stock-raising and fishing being the only industries.
and Prince Charlie, **8**-2789-90
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Missouri, name for American pipit, **9**-3136
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Skylark, by James Hogg, **3**-1007
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Skyros, Grecian island
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Skyscrapers
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What is the meaning of skyscraper? **8**-3013
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Slashers, machines used in manufacture of cotton
Picture, **14**-5176
Slate
formed from Cambrian rocks, **3**-905-06
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Smith, Alfred Emanuel (1873-1944), four times governor of New York (elected 1918, 1922, 1924 and 1926) and Democratic candidate for president in 1928. He was born and grew up in New York City. His administrative ability was widely recognized, and he worked for improvement in government and in labor, health and agricultural laws. A friendly, witty man, he was one of the most popular figures ever to appear on the American political scene.
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Smithsonian Institution, The. An institution in Washington, D. C., devoted to the "increase and diffusion of knowledge among men." It was founded in 1846 as a result of a legacy for that purpose bequeathed to the United States by James Smithson, an English chemist and mineralogist. It has been the parent of several scientific bodies which later became government departments. The Institution carries on original research work in science and publishes pamphlets and memoirs on scientific subjects.
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Why does smoke sometimes rise and sometimes fall? **1**-78
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Smokeless powder. A form of gunpowder that burns or explodes without developing much smoke. It is used largely in modern warfare for rifle and gun ammunition and also in ammunition for sporting rifles.
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Smuts, Jan Christian (1870–). South African general and statesman. In the South African War he commanded the Boer forces in Cape Colony. After that war he became a loyal supporter of British rule in South Africa. He held many important political positions in the Government and was Prime Minister of the Union of South Africa from 1919 to 1924.
Smyrna (Izmir). Port of Asia Minor and terminus of two railways. Founded by the Greeks about 1000 B.C., it has been important practically ever since, and has a great export of carpets, beans, barley, fruit, cotton and tobacco.
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What is the difference between snow and hail? **8**-2915-16
Why do mountains get no higher though snow falls on them? **8**-2914-15
Why do our hands become warm after playing with snow? **8**-2915
Why is the now white? **8**-2914
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Snowdon. Highest mountain in England and Wales, in Carnarvonshire. 3,590 feet.
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Socialism. As the word is now used it means a possible state of society in which all forms of industry will be carried on by the state for the benefit of society as a whole. While the objects of Socialism and Communism are much the same, Socialists generally advocate only peaceful methods of attaining their ends.
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Sodium (Na, from Latin *natrium*). Chemical element. Silvery, reactive metal; atomic number 11; atomic weight 22.997; melting point 97.7°C.; boiling point 892°C.; specific gravity 0.97. Sodium chloride, NaCl, is common table salt, and occurs in sea water. Many other sodium compounds occur in rocks, and sodium carbonate, Na_2CO_3, and sodium hydroxide, NaOH, are very important industrially; metallic sodium is also used in industry. Washing soda is a hydrate of sodium carbonate, $Na_2CO_3.10H_2O$, and baking soda is sodium hydrogen carbonate, $NaHCO_3$. *See also* **16**-5672.
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Soissons. Ancient French city on the Aisne, 65 miles north of Paris. The beautiful 12th-century cathedral was ruined during World War I.
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Solan geese, 11-3883
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Solar engines, using energy from sun, **6**-1969-70
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Solar plexus. A network of nerves behind the stomach from which nerve filaments extend throughout the abdomen. In boxing, a blow on the pit of the stomach causes temporary collapse by paralyzing the nerves.
Solar system
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Solution. The state of being dissolved; the changing of matter from a solid or gaseous state to the liquid state by means of a liquid.
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Somme. River of Picardy, France, flowing past St. Quentin and Abbeville to enter the English Channel. During World War I four important battles were fought in this area. 150 miles.
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Soochow. Chinese silk-manufacturing center on the Imperial Canal, 55 miles from Shanghai.
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Sorbonne. One of the colleges of the University of Paris. It was founded about 1250 by Robert de Sorbon (or Sorbonne), Chaplain of Louis IX, and was originally a theological college. The Faculty of Theology disappeared after the French Revolution. New buildings were erected in 1889, called the New Sorbonne.
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Is it true that sound goes on forever? **10**-3662
What makes an echo? **10**-3657
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What makes water gurgle when it comes out of a bottle? **12**-4276
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Why can we hear a noise like waves in a sea-shell? **10**-3659-60
Why do our voices sound hollow in an empty hall? **10**-3660
Why do the telegraph wires vibrate or hum? **10**-3661
Why do we hear better on water than on land? **10**-3658
Why do we see the flash from a gun before we hear the noise? **10**-3658-59
Why does a bee make a humming sound? **10**-3664
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Why does a violin string change its tone when held down? **10**-3662
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Why does milk turn sour in a thunderstorm? **7**-2321-22
Sousa, John Philip (1854-1932), composer and bandleader, called the "March King" because of the many stirring marches he composed. Born in Washington, D. C., he was a violin soloist at the age of 11. Later he conducted various orchestras and was appointed leader of the Marine Corps band in 1880. In 1892 he started his own band, which became world-famous. He wrote books, many songs and light operas. The Stars and Stripes Forever, High School Cadets, Liberty Bell, Semper Fidelis and Washington Post are among his most famous marches.
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South Carolina. One of the South Atlantic states; area, 31,055 square miles; capital, Columbia. Besides cotton, much phosphate rock is exported; third state in cotton-manufacturing. Charleston is the largest city and the chief port. Abbreviation, S. C. Nickname, "Palmetto State." State flower, the yellow jessamine. Motto, "Dum spiro, spero" (While I breathe, I hope). Named in honor of Charles IX of France, or Charles I of England. First settlement is thought to have been made at Old Charleston in 1670. Population 1,899,804.
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South Dakota. One of the North Central states; area, 77,047 square miles; capital, Pierre. Here are several Indian reservations. Farming, stock-raising and mining for gold, silver and lead are carried on. Abbreviation, S. Dak. Nickname, the "Coyote State" or "Sunshine State." State flower, the Pasque flower. Motto, "Under God the people rule." Dakota is an Indian word meaning "alliance of friends." First settlement is thought to have been made at Yankton about 1859. Population 642,961.

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Spartacus (died 71 B.C.). Leader of revolt against the Romans; native of Thrace. He was captured by the Romans, sold as a slave and trained as a gladiator. In 73 B.C. he escaped with a number of his comrades. The slaves of southern Italy joined him in great numbers; Spartacus was soon strong enough to hold off the trained armies of Rome. In the battle of the Silarus River in 71 the army of Spartacus was crushed and he himself was slain.
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Spinoza, Baruch or **Benedict** (1632-77), a Dutch-Jewish philosopher, banished from the Jewish community because of his beliefs. In his works, which include the Theological-Political Treatise, he holds that there is unity in all things; also, that God is the source of everything and is found in everything too.
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Spoils system. In politics, the practice of a victorious party to eject from public offices members of the defeated party, and to reward, with the vacated offices, its own supporters. The name was given in 1832, when Mr. Marcy remarked of New York politicians, "They see nothing wrong in the rule that to the victor belong the spoils of the enemy."
Spokane, lumbering, mining, fruit-growing and manufacturing centre in state of Washington. Population 122,001.
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Springfield. Capital of Illinois. Famous for its association with Abraham Lincoln, who practiced law here, and whose monument and mausoleum are only a mile from the heart of the city. Springfield is the centre of a rich farming and coal-mining district; it also has horse-breeding interests. Population 75,503.
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Spyglass
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Squadron. A military, naval and air force term denoting, in each case, a unit of a certain size. The military term refers to the subdivision of a cavalry regiment.
Squarcione, Francesco, and painters of Padua, **3**-1103
Square measure. The method of measuring the area of a plane surface having length and breadth. A unit of square measure is a unit of rectilinear measure multiplied by itself; for example, 1 foot multiplied by one foot equals 1 square foot. That is, a square foot is 1 foot long and 1 foot wide.
Squash. The fruit of a plant of the Gourd Family. The pumpkin and the Hubbard squash are the two most familiar squashes, with vegetable marrow a good third. In North America squashes are used as vegetable food and for pies.
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Hubbard squash, **7**-2623
Squatter sovereignty, or **popular sovereignty.** American historical expressions referring to the right of the inhabitants of a territory to regulate their internal affairs in their own way without the intervention of Congress. "Squatter" sovereignty applied to unorganized territory inhabited by squatters, and "popular" sovereignty to an organized territory.
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Stadium. Originally a horseshoe-shaped or semicircular grand-stand nearly surrounding an ancient Greek sports field, and having the seats arranged in sloping tiers. Olympia and Athens had the most celebrated stadia. Nowadays many colleges have erected notable stadia where football games and other sports are held.
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Stage coach
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Stained glass. The expression used to describe windows made of colored glass. As early as the 5th century A.D. mention is made of stained-glass windows in European churches. Figures of the saints and conventional designs were the most common subjects for this kind of art. Later private houses often had stained-glass windows of a non-religious character. Nowadays colleges, libraries and other public institutions have notable windows of this kind. There are various methods of giving color to the glass, many pieces of which go to form the window, and these pieces are held together by being set in ribbons of lead.
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Standish, Miles (or **Myles).** Born, Lancashire, England, 1584; died, Duxbury, Mass., 1656. He was one of the colonists on the Mayflower. The Pilgrim Fathers appointed him captain, and he led many expeditions against the Indians. About this man Longfellow wrote his poem The Courtship of Miles Standish.
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Sulfates. In chemistry, salts of sulfuric acids. Gypsum is a calcium sulfate; barytes is a barium sulfate; Epsom salts is a magnesium sulfate, etc.
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Sulfur (S). Chemical element. Yellow solid. Atomic number 16; atomic weight 32.066; melting point 112.8°C.; boiling point 444.6°C.; specific gravity 2.07. Free sulfur deposits are found in Louisiana and Texas, which produce more than ½ of the world's supply, and in Sicily. Sulfur also occurs as sulfates and sulfides. Sulfuric acid, H_2SO_4, is extremely important industrially. Sulfur dioxide, SO_2, is used in treating wood pulp for paper; and sulfur and sulfur compounds are used in rubber.
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Superior, Lake. It is the farthest to the northwest and the highest above sea level of the Great Lakes, and is the largest body of fresh water in the world. Greatest length, 412 mi.; greatest width, 167 mi.; greatest depth, 1,290 ft.; total area, 31,820 sq. mi. About 200 rivers empty into the lake. The largest of the many islands are Isle Royale (a part of Michigan), and Saint Ignace and Michipicoten which are a part of Canada.
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Why do we rise to the surface when we dive? **10**-3771
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Swiss Guards in French Revolution, **3**-889
Swiss Guards Who Did Their Duty (story), **3**-889
Swiss painting, *see* Painting, Swiss
Swithin, or **Swithun, St.** Wessex monk who was Bishop of Winchester, and had great influence over church and state matters of the time. His remains were moved into Winchester Cathedral in 971, and miracles are said to have been performed at his shrine. According to a popular superstition, it will rain forty days if it rains on St. Swithin's Day, July 15.
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Lötschberg and St. Gotthard tunnels, **2**-520
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Swordfish, 16-5896, 5898
Sycamore maple trees, 12-4248
Sycamore trees, 13-4637-38
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development of leaf, **2**-505
Sydney. Largest city and seaport of Australia, capital of New South Wales. The great Pacific shipping centre of the Commonwealth, it stands on the natural harbor of Port Jackson, one of the finest in the world; it is well laid out, and has two cathedrals and a university, and a number of public parks. There are clothing, leather, pottery, glass, furniture, tobacco and engineering industries. Famous for its splendid climate, Sydney is the oldest Australian city, having been founded in 1788. Population 1,384,380.
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Picture, harbor bridge, **7**-2462
Sydney. Centre of the coal, iron and steel industries of Cape Breton Island, Nova Scotia. It has a fine harbor and an active shipbuilding trade. Population 28,305.
Symbolism, in ancient Cretan painting, **2**-448
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Haydn's symphonies, **19**-7073
* development of symphony orchestra, **4**-1287-94
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Symphony Orchestra
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Synagogue. A congregation of Jews meeting for religious instruction and worship; also the building in which such a congregation holds public worship.
Temple Emanu-El, New York, **17**-6215
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Synapse, connection between nerve cells, **9**-3060
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Synthesis, term in chemistry, definition, **16**-5948
Synthetic Rubber, * **12**-4358-61
Syr Darya, river in Asia, **18**-6583
Syracuse, Sicily
Athenian expedition against Syracuse, **3**-923
Syria. A former province of Turkey in Asia. After the first World War, France was given a mandate for the territory. It includes the Syrian Republic, the Lebanese Republic, Latakia and the Jebel Druze. The Sanjak of Alexandretta (later the Hatay Republic), in northern Syria, became Turkish in 1939. Population 3,918,156. Area 57,900 sq. mi.
* history and geography, **18**-6677-78
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Szent-Gyorgyi, Albert von, Hungarian scientist, **7**-2425
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Tabard Inn, Southwark, England
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Tabb, John Banister, American poet, **13**-4791-92
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Table Mt. Flat-topped mountain rising above Cape Town, South Africa. 3,580 feet.
Tablecloth, directions for making
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Linen table-cloth, **9**-3323
Tables
directions for making
of sticks, **1**-129
toy tables, **5**-1773
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designed by Chippendale and Adam brothers, **17**-6263
Tabriz. Trade centre of northwest Persia, exporting raisins, cotton and carpets. Population 214,000.
Tacitus, Cornelius, Roman writer and historian, **16**-5919
Tacking, sailing against wind, **11**-3915; **16**-6022-23
Tacna and Arica, negotiations and settlement as to nationality, **19**-7039
Tacoma, Washington
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Tacoma, Mt., *see* Rainier, Mt.
Tadpoles
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Where does the tadpole's tail go? **1**-74
Taegu (Taikyu), Korea, capital of the district of North Keisho. The city is in the south-central part of the country and has been a walled city, but the walls have fallen into ruins. Trade in fruits and cereals is important to the city. Population, 269,113.
Taft, Lorado, American sculptor, **14**-4940
Taft, William Howard, president of U. S.
administration, **8**-2671
outline of life, **11**-3954
Picture
portrait (gravure), **11**-3947
Tagalos, or **Tagalogs.** A race who dwell in the Philippine Islands of Luzon, Mindoro, Lubang and Marinduque. They are of Malayan origin.
Tagging, of birds, **11**-3810

Tagus. River of Spain and Portugal, rising in eastern Spain and flowing into the Atlantic. It passes Aranjuez, Toledo, Talavera and Alcantara in Spain, and Abrantes, Santarem and Lisbon in Portugal. 565 miles.
Tahiti, largest of Society Islands, **9**-3303
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Taiga, vegetation belt, **7**-2534
Tailrot (Fungus), fish disease, **5**-1767
Taiping Rebellion, China, **2**-431
Taiwan, *see* Formosa
Taj Mahal, India, description, **15**-5472
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Takkakaw Falls. Waterfalls 1,200 feet high in British Columbia, Canada.
Talbot, William Henry Fox, developed use of photography in printing, **9**-3394
Tale of a knife and fork, * **4**-1305-14
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Talisman, The, by Scott, note on, **11**-4070
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Questions about
How can a parrot be made to talk? **2**-586
How did men learn to talk? **16**-5961
Talking Machine and Its Records, 1-260-65
Tallahassee, capital of Florida, seat of Leon County. The city is in the north-central part of the state in a rich agricultural district. The State College for Women is located in Tallahassee, as are other important schools. Lumber, wooden boxes for fruit, machinery and pecan candies are made. The site was settled in 1818, but did not become the capital until 1823. The name is Indian, and it means "Hill Sacred to the Sun." Population, 18,105.
Picture
Capitol, **14**-4896
Talleyrand-Périgord, Charles Maurice de (1754-1838). French diplomatist and statesman under Napoleon and in the period following. Was Louis XVIII's minister of foreign affairs, and, for a short time, prime minister. Involved in the Revolution of 1830, and helped to organize the Quadruple Alliance of 1834.
Tallinn, *see* Reval
Tallis, Thomas, English composer, **19**-6913
Talmud, collection of Jewish religious writings, **19**-7157
Talon, Jean Baptiste (1625-91). A French official, intendant of justice, police and finance in New France from 1663 to 1668 and from 1670 to 1672. He built ships, started trade with the West Indies, sent out exploring parties and did many other things for the good of the colony. His report to the king of France, written in 1667, is a valuable historical document. *See also* **2**-679.
Tamandua, an ant-eater, **7**-2398
Tamaraos, buffaloes of Philippines, **4**-1264
Tamarisks, shrubs, **14**-5161
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common tamarisk flower (in color), **14**-4981
Tamburlaine, play by Marlowe
note on, **3**-1121
Taming of the Shrew, The, the story of Shakespeare's play, **16**-5755-62
Tampa, Florida, seat of Hillsborough County. The city is on the western coast of Florida at the point where the Hillsborough River flows into Tampa Bay. The city is noted as a winter resort and has a mild climate. The Havana cigars that are made in Tampa have also brought fame to the city. The city is a grapefruit-canning center, and manufactures chemicals, crates and cement. The region was first explored by the Spaniards in the 16th century, but a town was not started until 1823. Population, 124,476.
Tampere, Finland
Picture, **16**-5863
Tampico. Most important oil port of Mexico, near the mouth of the Panuco River, in center of east coast. It is an old Aztec city, surrounded by lagoons and marshes. Population, about 80,000.
Tamworth, breed of pig
Picture, **5**-1719
Tanagers, birds, account of, **8**-2972
of Pacific coast, **14**-5141
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scarlet, **13**-4835
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Tananarive, capital of Madagascar, near the center of the island. Although the island belongs to France, only a few thousand of the inhabitants of the city are French. Most of them are natives. The French have set up schools, a radio station and an airport. Population, 163,100.
T'ang dynasty, China, **2**-429
Picture
porcelain figure, **2**-431
Tanganyika, Lake. Second largest African lake, on the borders of Tanganyika Territory, northern Rhodesia, and the Belgian Congo. 12,700 square miles in extent, it is the longest lake in the world, measuring 400 miles; from 30 to 45 miles broad, it is over 1,000 feet deep. Burton and Speke discovered it in 1858.
Tanganyika Territory. Formerly German East Africa, British mandatory state; area, 365,000 square miles; capital, Dar-es-Salaam. It is still largely undeveloped, but the Central and Usambara Railways have made great areas available for coffee, coconut, caoutchouc, sugar and cotton planting, while there are many sheep and cattle and valuable mineral deposits. Population 5,417,594.
United Nations Trusteeship, **9**-3053
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swarm of locusts, **18**-6725
Tangelo, fruit, how produced, **4**-1472
Tangers, birds
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Tangier, part of Morocco, **18**-6814
Tangrams, 12-4267
Tanks, Fish, 5-1765-66
Tanner, Henry O., American Negro painter
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The Banjo Lesson, **12**-4430
Tannic acid, use in tanning leather, **10**-3564
Tannin, from trees, **9**-3151
Tanning, of leather, **10**-3562, 3564-65
Pictures, **10**-3564-67
Tannu-Tuva, *see* Tuvinian Autonomous Region
Tansy, weed
Picture
of flower (in color), **13**-4877
Tantalum (Ta). Chemical element. Metal. Atomic number 73; atomic weight 180.88; melting point 2850°C.; boiling point above 4100°C.; specific gravity 16.6. Tantalum is used for filaments in electric lamps that must resist vibration. Plates of tantalum are employed in surgery to replace bone.
Taoism, religion, **9**-3088-89
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Taos, New Mexico, **10**-3514; **18**-6434
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Tapirs
* account of, **5**-1825-27
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Tapirs and the Rhinoceroses, The, * **5**-1825-31
Tappan, Eva March
Story by
Robin Hood (in part), **2**-397-401
Tar. A thick, blackish, sticky material obtained by destructive distillation of organic and bituminous substances such as coal, wood, peat and shale. Coal-tar is obtained largely in the manufacture of gas from coal. Wood-tar is obtained by burning wood without flame, for instance, under a covering of turf.
how to remove tar stain, **9**-3119
Tara. Village in Meath, Ireland, which was for centuries capital of the early Irish kings. On the Hill of Tara stood the royal palace, and there are remains of earthworks and monuments.
early festivals, **8**-2932
Tarantulas, spiders, **16**-6018
Tarapacá, source of nitrates
taken from Peru by Chile, **19**-7039, 7041
Tarbell, Edmund C., American painter, **10**-3455
Tardigrada, or **water bear**
can live without food, **2**-460
Target set, how to make, **9**-3378-80
Tariff, explanation, **5**-1700; **13**-4555
high tariffs one cause of depression, **17**-6093
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Tarim River, Asia, **1**-123; **18**-6586

Tarkington, Booth, American author, **13**-4815
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Tarleton, Banastre (1754-1833). British soldier in American Revolution.
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combat with Colonel Washington, **4**-1172
Tarnovo, Bulgaria. *Pictures,* **14**-5050
Tarpon Springs, Florida
Picture
sponge market, **15**-5334
Tarquinius Superbus, Lucius (Tarquin the Proud). Last of the legendary kings of Rome; reigned from 534 to 509 B.C. *See also* **4**-1192-93.
Tarragona. Spanish Mediterranean port, with a 12th century cathedral and many Roman remains. These include an amphitheatre, an aqueduct and the Tower of the Scipios. Population, 335,407.
Tarsier, animal, **1**-213
Tartars, Mongolian people
in Russia, **16**-5853
invasion of Poland, **13**-4679
invasion of Russia, **16**-5691
Tartarus, in mythology, **9**-3237
Tashkent, Russia, capital of the Uzbek Soviet Socialist Republic. The city is on the Chirchik River in Asiatic Russia, and it is the center of a cotton-growing region. The country requires irrigation. Tashkent lies on trade routes between Iran and India. Because of its distance from the war front, the city was filled with refugees when Germany invaded Russia. Textile and clothing mills are among the major industrial concerns. The city is known to date from the 7th century. Population in normal times, around 600,000. *See also* **18**-6584
Tasman, Abel Jansen
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Tasmania, account of, **7**-2463, 2470
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Tasso, Torquato, Italian writer
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Taste, sense of, **6**-1932
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Why is sugar sweet? **15**-5438
Taste-buds, of tongue, **6**-1932
Tatars, *see* Tartars
Tate, Nahum (1652-1715). English poet and hymn-writer. He is best known for his immortal hymn "While shepherds watched their flocks by night," and for a version of the Psalms written with a partner, Nicholas Brady. *See also* Poetry Index.
Tatler, The, papers by Addison and Steele, **8**-2866
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Taxco, Mexican town. *Picture,* **11**-3816
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Taylor, A. H., American scientist, **14**-5147
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Taylor, Benjamin Franklin, *see* Poetry Index
Taylor, Jane
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The Discontented Pendulum, **5**-1777-78
Taylor, Zachary, president of U. S.
administration and outline of life, **11**-3943
in Mexican War, **6**-1919
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Why does tea run through a lump of sugar? **15**-5438
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Teak, tree found in Siam, **2**-440; **12**-4249
Teals, ducks, **11**-3886
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Questions about
Why do our tears taste of salt? **2**-688
Why do I laugh and cry? **1**-73
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Teasel, plant
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Technetium (Tc). Chemical element. Atomic number 43. It is doubtful if technetium occurs in nature; it has been synthesized in a cyclotron.
Tecumseh, Indian chief
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Teeth
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mammals with peculiar teeth or none, **7**-2393
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Questions about
What makes our teeth chatter when we are cold or frightened? **6**-1933
Why can not human beings grow a third tooth? **6**-1933
Pictures, **6**-1929-31
Tegner, Esaias, Swedish writer, **19**-7014
Tegucigalpa, capital of Honduras and of the department of the same name. Tegucigalpa is an ancient Aztec city, and is on the Choluteca River, surrounded by mountains. The city is the trading and commercial center for the surrounding farm communities and mining districts. Gold and silver are mined in the vicinity. Population, 55,715.
Teheran (Tehran), capital of Iran. The city is near the Elburz Mountains about 65 miles south of the Caspian Sea. The city was of little importance until it was chosen as the capital of Persia in 1788. The city was occupied in 1941 by troops of Great Britain and Russia; and in November 1943, leaders of the United States, Great Britain and Russia held an important war conference in Teheran. Factories of the city make cigarettes, carpets, glass and cement. The city dates from the 12th century. Population, 699,110.
Pictures, **9**-3141, 3149
Teju lizards, 14-5230
Picture, **14**-5230
Tekke, Turkoman tribe of Central Asia
Picture, Tekke rug, **2**-445
Tel-Aviv, Israel, on the Mediterranean Sea. Although it is one of the youngest cities in the world, it has grown rapidly. It is the second largest city in Palestine, the chief city of the State of Israel and one of the most important ports of the country. The city was founded in 1909 by Jewish families from Jaffa, and later many Jewish immigrants, especially from Europe, helped to swell the population. Tel-Aviv is the trading center for the surrounding agricultural districts. The name means "Hill of Spring." Population, 300,000. *See also* **18**-6676
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Telegraph
development in Newfoundland, **9**-3267-68
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What are the little cups on the telegraph poles? **19**-7245
Why do the telegraph wires hum? **10**-3661
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Telegraph, Submarine, *see* Cables, Submarine
Telegraph, Wireless, *see* Radio telegraph
Telegraphy
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Telemachus, son of Ulysses, **12**-4340
Telemobile, traveling telephone unit
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toy, how to make, **17**-6183
Telephone, Wireless, *see* Radio telephone
Teleprinters, for telegraphic communication
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Telescopes, **17**-6364-69
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* in astronomy observatory, **17**-6370-73
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* explanation of, **14**-5177-82
Tell, William
drama about, by Schiller, **17**-6271
story of, **3**-887-89
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Tellurium (Te). Chemical element. Atomic number 52; atomic weight 127.61; melting point 452°C.; boiling point 1390°C.; specific gravity 6.2. Tellurium is found as the element, and in compounds with gold and other metals. Small quantities of tellurium added to lead increase its strength, toughness and resistance to corrosion.
Temesvar, or **Temisoara.** Capital of the Rumanian Banat. The centre of a great grain, tobacco and leather trade, it has two cathedrals. Population 89,872.
Temiskaming and Northern Ontario Railway, pioneer line in Canada, **4**-1490-91
Temperate zones, of earth, **7**-2417
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affects colors of stars, **11**-3800
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boiling and freezing points of water, how regulated, **17**-6079-80
* chemistry and temperature, **17**-6313-16
effect on stiffness or bending, **3**-879
* hot things, cold things and temperature, **5**-1579-84
of earth's surface, **7**-2415, 2417-20, 2422
Questions about
Does hot water take more room or less room than cold? **14**-4950
Is our blood cold when we feel cold? **7**-2486
What is a heat pump? **14**-4949-50
What is a thermostat? **14**-4950-51
Where does the warmth of our bodies come from? **14**-4951
Why do we not see our breath on a warm day? **14**-4951
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Centigrade and Fahrenheit scales, **5**-1580
Tempest, The, play by Shakespeare
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Tempestas, in mythology, **9**-3234
Templars. Secret society of monastic knights to defend the Holy Sepulchre and pilgrims to Jerusalem; founded, 1118; dissolved, 1312.
Temple Church, London, **16**-5966
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of Vesta, Rome, **4**-1205
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Parthenon, Athens, **3**-909, 920
Templeton, Alec, pianist
Picture, **5**-1618
"Ten Thousand," Greek soldiers with Xenophon, retreat of, **3**-924
Tenant
Question about
What is a tenant? **9**-3355
Tendons, ropes of muscle, **5**-1673
Teneriffe. Largest of the Canary Islands, covering 780 square miles. Of volcanic origin, it rises to over 12,000 feet in its famous Peak, and is extremely beautiful and fertile; Santa Cruz, the capital, exports much fruit. Population 66,429.
Teniers, David, the Younger, Flemish painter
life and work, **5**-1586, 1588
Pictures
Players at Tric-trac, **5**-1593
Prodigal Son, **5**-1591
Tennessee. Southern state on the Mississippi's left bank; area, 42,246 square miles; capital, Nashville. There are iron, coal, lumbering and varied agricultural industries. Cotton and lumber are the chief manufactures and the state is second in the production of marble. Memphis, the largest city, is a busy river port. Abbreviation, Tenn. Nickname, "Big Bend State," "Volunteer State" or "Hog and Hominy State." Flower, the iris. Motto, Agriculture, Commerce. The name comes from an Indian word meaning "curved spoon." First settlement, Watauga, about 1769. Population 2,915,841.
described in Southern States, **13**-4517-28; **14**-4889-4900
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atomic-bomb plant at Oak Ridge, **16**-5811
Capitol at Nashville, **14**-4896
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marble quarry, **13**-4526
Moccasin Bend, **13**-4519
Reelfoot Lake, **17**-6045
water front, Memphis, **17**-6044
Tennessee River. American river formed by the Clinch and Holston rivers, Tennessee. It flows into the Ohio River. 1,200 miles.
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Moccasin Bend, **13**-4519
Tennessee Valley Authority (TVA), power project, **14**-4889-90
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Chickamauga Dam, **9**-3213
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Tennyson, Alfred, Lord, English poet
* life and works, **10**-3468-70
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Tennyson and the Brownings, * **10**-3468-72
Tense. In grammar, one of the forms or set of forms which a verb takes in order to indicate time of action.
Tension, physical force, **4**-1355
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Tents, how to make, **7**-2381
of Arabs, **18**-6737, 6739
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Arab tent, **18**-6740
Terbium (Tb). Chemical element. Atomic number 65; atomic weight 159.2. One of the rare-earth elements. *See* Rare-earth elements.
Terborch, Gerard, Dutch painter, **5**-1594
Picture
Lady Reading a Letter, **5**-1587
Terence, Roman author, **16**-5909
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Terminus, deity of boundaries, **9**-3235
Termites, insects, **18**-6793-95
food for ant-eaters, **7**-2397-98
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Terns, birds
* account of, **11**-4121-22
fly from Arctic to Antarctic, **8**-2762
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Terpander, Greek poet, **16**-5749
Terra, the earth, regarded by Greeks as mother of all, **9**-3226

Terra-cotta. A hard, unglazed pottery, harder baked than brick but of finer quality, used as a building material or for statuettes and rougher vessels and ornaments. The color varies according to the earth used. Sometimes the surface is enameled.
used by the Della Robbias, **5**-1739
Pictures
ancient Greek figures, **3**-910, 915
Terrain-clearance altimeter, airplane instrument, **1**-184
Terrapins, water turtles, **14**-5232
Picture, **14**-5231
Terre Haute, Indiana, seat of Vigo County. The city is in the west-central part of the state on the Wabash River, and is situated in a region of good farm land and soft-coal mines. The factories of Terre Haute produce bottles, brick, clothing, paint and boilers. An Indian village first occupied the site, and the French later had a fur-trading post there. In 1816 Terre Haute was founded. The name is French and means "high land." Population, 62,693.
Terrestrial Planets, The, * **9**-3289-93
Terriers, dogs, **2**-717
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Terry, Eli, first American clockmaker, **7**-2387
Terza rima, verse pattern, **19**-6985
Tests, aptitude, **2**-459; **16**-5993, 5996
* intelligence, **9**-3043-46
Tethys, in mythology, **9**-3235
Teutoberg, Battle of. Annihilation of three Roman legions under Varus by the German hero Arminius, or Hermann, in A.D. 9. Arminius ambushed the legions on the march in difficult forest country, and hardly a Roman escaped. "Varus, give me back my legions!" exclaimed Cæsar Augustus, on hearing of the disaster.
Teutones, Teutonic tribe, **4**-1365
Teutonic Knights, medieval organization, **12**-4160
Teutonic peoples
conquest of present-day Europe, **3**-1029
conquest of Western Roman Empire, **4**-1429-30
Tetuan, seat of government of Spanish Morocco. The city is on the Mediterranean Sea on the northern coast of Africa, southeast of the Strait of Gibraltar. The surrounding country is important for its rich orchards and vineyards, and the city is a trading center, dealing in fruits, cloth and leather. Population, 73,115.
Tewkesbury, England
Picture
Abbey (gravure), **16**-5975
Texas. Largest state in the Union; area, 267,339 square miles; capital, Austin. Part of the state consists of arid plains, but in the fertile sections cotton, corn, rice and other cereals, sugar and tobacco are abundantly produced; stock-raising and the coal and petroleum production are important; lumbering, petroleum refining, meat-packing and cottonseed products are also important. Houston is the largest city. Dallas, San Antonio, Fort Worth and Galveston are the chief cities. Abbreviation, Tex. Nickname, "Lone Star State" or "Beef State." Flower, bluebonnet. Texas is an Indian word meaning "friends" or "allies." First settlement thought to have been made at San Antonio, about 1692. Population 6,414,824.
Alamo, San Antonio, **18**-6833
Big Bend National Park, **7**-2290
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Camp Fire Girls, **14**-5062
canal and irrigated tract, **8**-2673
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scene in cotton field, **14**-5167
skyscrapers in Dallas, **14**-4897
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Texas Agricultural and Mechanical College
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Texas fever in cattle, transmitted by a tick, **16**-6019
Textiles
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* silk and silk-manufacture, **15**-5307-21
tests for textiles, **5**-1768
use of air conditioning in industry, **14**-5235-36
See also Cotton; Linen; Rayon; Silk; Wool
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French loom, **10**-3420
rayon fabrics, **8**-2751
thread and fabric made of casein, **2**-638
Thackeray, William Makepeace, novelist
* life and writings, **8**-2737-38
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portrait, **8**-2736
Thailand, *see* Siam
Thales, Greek philosopher
astronomical discoveries of, **11**-3844-45
Picture, **19**-7002
Thallium (Tl). Chemical element. Metal. Atomic number 81; atomic weight 204.39; melting point 303.5°C.; boiling point 1650°C.; specific gravity 11.85. Thallium has little industrial importance, but its salts are used as poisons for rodents and ants.
Thallophytes, plant group, **1**-218-20; **10**-3721
Thames. Longest and most important English river, draining 5,900 square miles. Rising in the Cotswolds, in Gloucestershire, it flows through a wide estuary into the North Sea, being six miles broad at its mouth. Oxford, Abingdon, Henley, Reading, Maidenhead, Windsor, Kingston, Richmond, London, Tilbury, Sheerness and Southend are the chief places it passes. Below London the Thames forms the greatest port in the world. 215 miles.
Tower Bridge over, at London, **1**-31
Picture, Tower Bridge at London, **1**-36
Thamin, a deer, **4**-1508
Thanatos, or **Death,** in mythology, **9**-3238
Thanksgiving Day
first celebration and later ones, **6**-2091
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Thanksgiving Day, by Lydia Maria Child, **1**-99
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Thatch, roofing material
Picture
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Thaw
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Why does a thaw burst the water pipes? **8**-2916
Thaxter, Celia, American poet, **13**-4792
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Thayer, Abbott, American painter, **10**-3453-54
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Thayer, Colonel Sylvanus, superintendent of West Point, **18**-6701, 6703
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Theocritus, Greek poet, **16**-5753
Theodora, Byzantine empress, **4**-1317
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Theodoric the Great
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Theodosius I (Theodosius the Great)
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Theophrastus, scientist of ancient Greece, **2**-592
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Theotocopuli, Domenico, *see* Greco, El
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Thermit process, for welding, **17**-6315
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diagrams of Fahrenheit and Centigrade scales, **5**-1580
Thermopylæ, Battle of, **3**-918
Thermos bottle, explanation, **14**-4951
Thermostat
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What is a thermostat? **14**-4950-51
Theseum, Athens, **15**-5343
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Thessalonike, *see* Salonika
Thetis, a Greek sea-goddess
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Thibault, Jacques Anatole, *see* France, Anatole
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Can we think without words? **16**-5961
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Why does salt make us thirsty? **10**-3772
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Thirty Years' War
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This great world of ours, ∗ **1**-43-47
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Thomas, Edith M., *see* Poetry Index
Thomas, George Henry (1816-70). American soldier, born in Virginia. He graduated from West Point, served in Mexican War, and refused to resign from Union army when Virginia seceded. Fought chiefly in the West.
Thomas, Martha Carey, American educator, **14**-5272
Thomas, Seth, early American clockmaker, **7**-2388
Thomas, Theodore, founded Chicago Symphony Orchestra, **19**-7122
Thomas à Becket, St., death of, **5**-1575
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Thomas à Kempis, St., life of, **13**-4862
Thomas Carlyle and John Ruskin, ∗ **9**-3312-16
Thompson, Sir Benjamin (Count Rumford), English scientist, **2**-704-05
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Thompson, David (1770-1857). Canadian explorer who explored the Columbia and Kootenay rivers from their rising to their outlet between 1807 and 1811.
Thompson, Francis, British poet, **12**-4205, 4209
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Thompson, John R., *see* Poetry Index
Thompson, Maurice, American writer, **13**-4789
Thompson-Seton, Ernest, *see* Seton
Thomson, James, English poet
life and influence, **6**-2028-29
Thomson, Sir Joseph J., English scientist, **4**-1227
Thomson, Tom, Canadian painter, **10**-3699-3700
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The West Wind, **10**-3700
Thomson, Virgil, American music critic and composer, **19**-6924
Thomson, William (Lord Kelvin), British scholar and scientist, **3**-993-94; **19**-7206
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Thorax (chest), bones of, **13**-4621
Thoreau, Henry David, American author, **13**-4713, 4715
as naturalist, **19**-7055
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Thorgilsson, Ari, early Norwegian historian, **19**-7010
Thorium (Th). Chemical element. Gray metal. Atomic number 90; atomic weight 232.12; melting point 1845°C.; specific gravity 11.85. Thorium occurs with the rare-earth elements in monazite. Thorium oxide is used in incandescent gas mantles; and thorium sometimes serves as a coating on the tungsten filament of electric bulbs. Thorium is radioactive, and changes into radium or protactinium.
Thorn apples, plants, **13**-4780-81
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Thornycroft, Sir Hamo, English sculptor, **13**-4856
Thoroughbred horses
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Thoroughwort, plant, **16**-5728
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Thorwaldsen, Bertel, Danish sculptor, **13**-4858
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Thoth, a god of ancient Egypt, **3**-812
Thothmes III, king of Egypt, **3**-816-17
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Thought-reading by cards, **2**-753-54; **6**-2046-48
Thousand Islands. This group lies in a 40-mi. stretch of the St. Lawrence River where it is 4 to 7 mi. wide as it leaves Lake Ontario. There are actually many more than a thousand of these islands, but some are mere points of rock. They are noted for their lovely scenery and are popular summer resorts with both Canadians and visitors from the States.
Thousand Islands International Bridge, between Canada and United States, **1**-39
Thousand Nights and One Night, **15**-5464
Thousand-legged worms, *see* Millipedes
Thrashers, birds, account of, **13**-4838
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Three Musketeers, The
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Thrift, or **sea-pink**
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Why does a lump rise in my throat when I cry? **1**-78
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Overflow, by John Banister Tabb, **3**-1011
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Thucydides, Greek historian, **16**-5751
Thulium (Tm). Chemical element. Atomic number 69; atomic weight 169.4. One of the rare-earth elements. *See* Rare-earth elements.
Thunder, cause of, **8**-2917, 2928
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Why does milk turn sour in a thunderstorm? **7**-2321-22
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Thyme, herb, **17**-6130
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Thyme, water (Philotria canadensis), plant, **16**-5872
Thymus gland, 8-2700
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Thyroid gland, 8-2698-99
produces metamorphosis in amphibians, **15**-5458
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Thyroxine, hormone of thyroid gland, **8**-2699
Tian Shan, *see* Tien Shan
Tiang, an antelope, **4**-1440
Tiber. Italian river which flows past Rome on its way from the Apennines to the Tyrrhenian Sea. 240 miles.
Tiberius (Tiberius Claudius Nero Cæsar) (42 B.C.-37 A.D.). Emperor of Rome from 14 A.D. to 37 A.D.
reign of, **4**-1244
Tibet, description, **18**-6588-90
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statue of Buddha at Shigatse, **18**-6582
Tibullus, Roman author, **16**-5917
Tic polonga, snake, **15**-5414
Tick birds, of Africa, **5**-1831
Tickling, cause of laughter, **1**-73
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Why do we not laugh when we tickle ourselves? **16**-5958
Ticknor, Francis Orrery, *see* Poetry Index
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Ticonderoga, N. Y.
Pictures, **18**-6834
Ticonderoga, Fort, captured by Americans, **4**-1162
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capture of, **3**-1906
Tidal bore, a tidal current which rushes roaring upstream in certain rivers with such force as to produce one or more high, abrupt wave-fronts, very dangerous to shipping. Bores are particularly high in the Amazon River of Brazil and certain rivers of India and China.
Tidal waves
Question about
What is a tidal wave? **15**-5517
Tides
explained by attraction of moon, **10**-3536
tidal currents, **16**-6033
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The Tide River, by Charles Kingsley, **6**-2241
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Can we make the tides work for us? **15**-5516
Where does the water go at low tide? **2**-685
Tieck, Johann Ludwig, German novelist, **17**-6409
Tien Shan. Mountain range in Central Asia, extending through Russian and Chinese Turkestan. Several peaks of the Tien Shan are over 20,000 feet high and many others are over 10,000 feet. The name Tien Shan means Celestial Mountains.
Tientsin, China, on the Hai River and the Grand Canal, near the Gulf of Chihli, southeast of Peiping. The city did not amount to much until it was opened for foreign trade in 1861 and until nine foreign countries were given land there. Since that time the city has grown to be one of the leading trading centers of North China. Cotton, hides and beans are exported. The foreign section of the city has modern buildings and electricity. Tientsin was the scene of heavy fighting in 1937 and was damaged considerably. It was held by Japan until 1945. The name means "ford of heaven." Population, 1,718,000.
Tiepolo, Giovanni Battista, Italian painter, **3**-1107
Tierra del Fuego, archipelago at tip of South America, **18**-6777-78
Tiflis (officially, in Georgian, Tbilisi), Russia, capital of the Georgian Soviet Socialist Republic and formerly of the Transcaucasian Federation. The city is on the Kura River, and is divided into the old section and the new. The old is Oriental in appearance, but the new section is modern. Cotton and leather goods are produced in Tiflis. The official name—Tbilisi—means "Warm Springs." Population, 519,200.
Tiger beetles
Picture, **18**-6624
Tiger cat. *Picture,* **2**-493
Tigers, description, **2**-492-93
toy, how to make, **5**-1775-76
Poem about
The Tiger, by William Blake, **3**-845
Question about
Why is a tiger striped? **16**-5841
Pictures, **2**-497, 500; **16**-5841
circus tigers, **3**-1080
saber-toothed, of Pleistocene epoch, **6**-1926
Tiglath Pileser I (1117-1080 B.C.). King of Assyria. He was a famous conqueror and hunter; he won great victories against the Hittites, Arameans and other peoples, and killed many lions and elephants with his own hand. Among the buildings he restored was a temple in the ancient city of Assur.
Tiglath Pileser III, king of Assyria, **2**-656
Tiglon, animal, **2**-493
Tigris River, Asia, **2**-650
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Tiles, how to make from clay, **13**-4624
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use in Persian architecture, **9**-3141, 3148-49
Tillamook Rock, Oregon, lighthouse, **10**-3577
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Tiller, part of steering apparatus, **13**-4847-48
Tilton, Theodore, *see* Poetry Index
Timber, *see* Forests and forestry; Lumber and lumbering; Trees
Timber rattlesnakes, 15-5415
Picture, **15**-5415
Timbuctoo. A town in the French Sudan. It is notable for its commerce and is the center of the caravan trade in West-Central Africa.
Time
* history of devices for telling, **7**-2383-91
as factor in theories of relativity, **19**-6851-55
electric master clock, **13**-4530
how to tell by clock, **7**-2392
measurement of, **3**-850
watches aboard ship, **12**-4415, 4417
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The Isle of Long Ago, by Benjamin Franklin Taylor, **6**-2244
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How is time divided? **4**-1453
How is time told on shipboard? **7**-2362
What is an atomic clock? **7**-2361-62
What is Daylight Saving? **2**-460-61
What is Greenwich time? **7**-2359
What is meant by a time zone? **7**-2359-61
What is 22 o'clock? **7**-2362
Where does the day begin? **4**-1449-50
Why are all electric clocks on alternating current? **7**-2362
Picture
diagram of time zones, **7**-2360
Time lock, explanation of, **6**-2022
Times Square, New York City, **17**-6211
Timiskaming, Lake, Canada
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Timocharis, Greek astronomer, **11**-3845
Timothy-grass, fodder-grass
name and history, **7**-2410
Pictures, **10**-3653; (in color), **10**-3523
Timur the Lame, *see* Tamerlane
Tin (Sn, from Latin *stannum*). Chemical element. Silvery metal. Atomic number 50; atomic weight 118.70; melting point 231.9°C.; boiling point 2260°C.; specific gravity 5.75. Tin ores are found chiefly in the Malay States, Bolivia and the East Indies. Sheet steel plated by dipping in molten tin is used for making tin cans. Tin also serves for collapsible tubes, type metal, bronzes (alloys with copper) and bearing metals.
world distribution, industrial uses, **18**-6638, 6640
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young tinamous, **8**-2761
Tindale, William, *see* Tyndale
Tinderboxes, description, **19**-6966
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Tines, prongs of fork
Picture
how formed, **4**-1309
Tiniest Living Things, The, * **2**-661-64

Tintoretto (Jacopo Robusti), Italian painter, **3**-1106-07
in Venice, **4**-1462-64
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A Doge in Prayer before the Redeemer, **4**-1456
Marriage of St. Catherine (gravure), **3**-1112
Venetian Senator, **4**-1462
Tiphia popillivora, a wasp, **18**-6630
Picture, **18**-6630
Tipperary. County of Munster, Ireland; area, 1,662 square miles; capitals, Clonmel and Nenagh. Population 136,939.
Tippoo, sultan of Mysore
defeated by British, **6**-2205
Tirana, capital of Albania. The city is near the center of the country, and because of its nearness to Greece, Yugoslavia and Italy, Tirana is important in the political affairs of the world. Seventy-five percent of the people are Moslems. Population, 30,806.
Tired feeling
Question about
What happens when we get tired? **15**-5643
Tires, rubber
Pictures
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on modern milk wagon, **7**-2326
testing synthetic rubber tires, **15**-5573
Tirnovo, or **Trnovo,** city in Bulgaria, situated on a promontory high above a gorge in the Yantra River. It is believed to have been a Roman fortress, and was the capital of Bulgaria 1186-1394. Population, about 15,000.
Tissue, as name for living material, **3**-977
Titanic was the name of the giant steamship of the White Star Line which struck an iceberg on her maiden voyage from England to N. Y. in April 1912. She was then the largest ship in the world and supposed to be unsinkable. She sank in 3 hours; and of the 2,223 persons aboard, 1,517 were lost, many prominent people among them. 706 were rescued by wireless S.O.S. (a new invention then) which was picked up by the Carpathia.
Titanium (Ti). Chemical element. Metal. Atomic number 22; atomic weight 47.90; melting point 1800°C.; specific gravity 4.5. Titanium compounds occur in small quantities in many rocks. The metal is used in some steel alloys; and titanium dioxide, TiO_2, is a white pigment.
Titanotheres, prehistoric animals, **5**-1784
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Titian (Tiziano Vecelli), Italian painter, **3**-1104, 1106; **4**-1460-63
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Alfonso d'Este (gravure), **3**-1109
Ariosto, **3**-1105
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Empress Isabella (gravure), **3**-1110
Flora (gravure), **3**-1111
Holy Family (gravure), **3**-1111
Three Members of Farnese Family, **4**-1462
Titicaca, Lake, in Andes, **18**-6781
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Titmouse, bird
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Tito, Marshal, premier of Yugoslavia, **17**-6348; **18**-6612
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Titus Andronicus, play by Shakespeare
comment on, **3**-837
Titus Aurelius Antoninus, *see* Antoninus Pius
Titus (Titus Flavius Sabinus Vespasianus) (died 81 A.D.). Emperor of Rome from 79 to 81 A.D.
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Titusville, Pennsylvania
Drake oil well, **13**-4744
Tivoli, Italy
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Toad-flax, plant, **13**-4876; **15**-5394-95
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ivy-leaved toad-flax, flower (in color), **13**-4879
pale blue toad-flax, flower (in color), **14**-4996
Toads, life history of, **15**-5455-56
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Tobacco, account of, **9**-3155-56
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a field in Virginia, **1**-164
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tobacco field in Virginia, **13**-4523
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San Domingo (in color), **10**-3623
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Question about
Why do human beings have fingernails and toenails? **5**-1810
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Toga, ancient Roman costume, **9**-3158
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Togoland. British West African colony under Gold Coast administration; area, 12,600 square miles. The former German colony has been shared between Britain and France, the greater part becoming French. Population 293,671.
Tokyo, capital and largest city of Japan. The city is built on the southeastern coast of Honshu Island where the Sumida River flows into Tokyo Bay. In 1923 Tokyo was practically destroyed by earthquake and fire, and when it was rebuilt, many precautions were taken to guard the city from these dangers. In World War II the city was heavily bombed and almost destroyed again. It is in the process of being rebuilt. Harbor improvements are increasing Tokyo's importance as a shipping center, and consequently more and more factories are being built in the city. Tokyo was founded in the 16th century, and the name means "eastern capital." Population, 6,778,804.
description, **2**-572
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bridge, old-fashioned, **1**-27
Toledo, Ohio, seat of Lucas County. The city is in the northern part of the state on Lake Erie and is important as a port. The Maumee River flows through Toledo into Maumee Bay. Coal is shipped from Toledo in great quantities, and the making of glass, automobiles, scales and oil well equipment is carried on. A fort was founded on the site in 1794, and the town of Toledo was founded in 1833. The city took its name from the city of the same name in Spain. Population, 278,165.
industries of, **16**-5658
Toledo, Spain, **14**-4929
Toll. A tax paid or duty imposed for some use or privilege or other reasonable consideration. *Toll thorough* is the charge paid for the use of a bridge or highway by those who use it as a thoroughfare for personal travel or conveying goods. A gate across the bridge or road prevents passage of those who do not pay the charge.
Tolstoy, Leo, Russian writer, **19**-6910
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Pyramid of the Sun, Mexico, **11**-3815
Tom Brown's Schooldays, book by Thomas Hughes
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Tom Sawyer, in part, by Mark Twain, **6**-2131-34
Tom Thumb, famous circus dwarf, **3**-1076
Tom Thumb, early locomotive, **2**-411
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Tomahawk. The war hatchet used by the North American Indians. Before the white man came the heads were made of flint, jasper or other hard stone, but afterward iron was used.
Tomatoes, **7**-2616
use of juice in diet, **2**-633
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Tomatoes—*Pictures* (*continued*)
effect of light on tomato plants, **4**-1471
grown without soil, **4**-1473
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Tombigbee River. American river, rising in Prentiss County, Miss.; flows into Mobile River. 475 miles.
Tombs
early Christian Catacombs, **2**-576, 578
Egyptian, **1**-292, 297; **3**-810-11; **14**-5211
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Ming tombs, China, **15**-5479
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of Cecelia Metella, Appian Way, **4**-1205
of Death, Paris, **13**-4705
of Hadrian (castle of St. Angelo), Rome, **4**-1205
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Tompkins, Daniel D., vice-president of the U. S.
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Tompot, fish. *Picture* (in color), **16**-5783
Tone, Wolfe, Irish patriot, **8**-2943
Tonga, or **Friendly Islands,** part of Polynesia, **9**-3302
Tongres, Belgium
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church and statue of Ambiorix, **15**-5503
Tongue
structure and uses, **6**-1932
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Why does mustard burn our tongue? **6**-1933
Why is the tongue of a moth so long? **5**-1606-07
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Tonkin, state in French Indo-China, **2**-438-39
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Toothwort, flower, description, **17**-6279-80
Topaz, account of, **19**-7231
Picture (in color), facing **19**-7225
Tope, fish. *Picture*, **16**-5897
Topeka, capital of Kansas, seat of Shawnee County. The city stands on the Kansas River in the northeastern part of the state. The Menninger Foundation of Topeka is noted for its psychiatric research, and the United States Veterans' Bureau has set up a psychiatric hospital. The headquarters of the Atchison, Topeka & Santa Fe Railroad are in Topeka. Flour mills, packing plants and foundries are located in the city. Men who opposed slavery founded the town in 1854. Population, 67,833.
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high school, **16**-5656
swimming pool, **16**-5656
Topes, mounds, for relics, **15**-5470
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Sanchi Tope, **15**-5478
Topham, F. W., artist
Picture
Savonarola preaching, **13**-4860
Topi, an antelope, **4**-1440
Toplady, Augustus Montague (1740-78), English clergyman and hymn writer. Among his famous hymns is "Rock of Ages." *See also* Poetry Index.
Topsides, meaning of term, **13**-4847
Tories in American Revolution, *see* Loyalists
Tormentil, flower. *Picture* (in color), **14**-4983
Tornado, wind storm, **16**-6032
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Toronto, capital of Ontario, second largest city in Canada. The city is on the Humber and Don rivers and the north shore of Lake Ontario. The Canadian National Exhibition is held at Toronto every year, and this is one of the largest annual fairs in the world. Toronto and the islands along the shore attract thousands of tourists every summer. Toronto is a banking center, a meat-packing center, and the main publishing city of Canada. Rubber products, clothing, medicines and paints are among the principal products manufactured. The site was an Indian village, a French mission, and a fur-trading post during the 17th century, and the present city was founded in 1794. Population, 696,555.
scene of annual exhibition, **6**-2075
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Canadian National Exhibition, **6**-2072
Toronto University, Toronto, Canada. Chartered in 1827 as King's College. Later the college was secularized and received its present name.
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Torpedo boat destroyers, of U. S. navy, **18**-6816
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Torpedo boats, **18**-6816
Torres, early explorer, Australia, **7**-2463
Torres Strait. Wide channel between Australia and New Guinea, with a famous pearl fishery.
Torricelli, Evangelista, Italian scientist, **2**-645
Torrid Zone, of earth, **7**-2417
Tortoise-shell cats, **2**-495
Tortoises, **14**-5231-32
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Toscanelli, Paolo, Italian geographer
world map, **1**-42
Toscanini, Arturo (1867-). Italian orchestra conductor. He conducted opera in Italy and at the Metropolitan in New York. In 1928 he became the conductor, and later the Musical Director, of the New York Philharmonic-Symphony Orchestra, resigning in 1936 to organize and conduct the National Broadcasting Company Symphony Orchestra.
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Tottel's Miscellany, collection of 16th century poems
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Toucans, birds, account of, **9**-3370
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Toulon, French seaport
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Toulouse, France
churches, **17**-6160
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church of St. Sernin, **16**-5724
Touraine. Old French province in the valley of the Loire. Tours, the capital, Amboise and Chinon are the most famous towns. It corresponds today to the present department of Indre-et-Loire. Population 343,276.
Tourmaline, gem, account of, **19**-7231
Picture (in color), facing **19**-7225
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how to conduct tennis tournaments, **16**-5890-91
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medieval tournaments, **6**-1936, 1938
in medieval England, **5**-1685
Tourniquet, how to make, **14**-5004
Tours. Old capital of Touraine, France, on the Loire. An important railway centre, it has iron, steel, leather and engineering industries; there are a noble Gothic cathedral and remains of a Roman amphitheatre. Population 83,753.
Tours, Battle of, **4**-1435
Tourte, François, bow-maker, **5**-1798
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Paris, France, **11**-3827
Verona, Italy, **17**-6306
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growth in feudal times, **6**-1941-44
growth in later Middle Ages, **6**-1977-78
Toxins. Specific poisonous substances resulting from secretion products of vegetable and animal organisms; or, as we may say, poisons given off by certain bacteria or germs when they have entered into chemical combination with animal cells. Antitoxins are substances which neutralize or render harmless such toxins. *See also* **2**-460
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making rocking-horses in Munich, Germany, **12**-4166
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Tozeur, Tunisia
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Tracer chemistry, use of artificially radioactive elements, **16**-5810-11
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* use of money, **15**-5589-92
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What is balance of trade? **12**-4277
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Trade mark. A distinguishing design or mark adopted by a manufacturer and stamped upon his products to indicate the maker. In most countries trade marks may be registered and protected by law. Trade marks came into use to protect a manufacturer against those who would imitate his goods and sell them pretending them to be the original product.
Trade winds
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What do we mean by the trade winds? **16**-6022
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Trailing arbutus, flowering shrub, **13**-4775
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Trajan (Marcus Ulpius Trajanus) (died 117 A.D.). Emperor of Rome from 98 to 117 A.D.
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Transylvania. Mountainous plateau formerly belonging to Rumania. In 1940 Hungary obtained a considerable portion of this territory. It has many great forests. The soil is generally fertile, and about half the country consists of either cultivated or pastoral lands. Salt, gold, silver, copper, quicksilver, iron and lead are found, and mineral springs abound. Sibiu (Hermannstadt), Cluj (Kolozsvar) and Brasso (Kronstadt) are the chief towns. Area 22,312 sq. mi. Population 3,217,149.
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Trent. Old Italian town on the Adige, with a Romanesque cathedral and many handsome buildings. It manufactures silk, pottery and sugar, and has a brisk transit trade. Population 56,017.
Trent, Council of, 1545 to 1563. The nineteenth general council of the Roman Catholic Church; of great importance. It defined teachings and ordered reforms. It organized the Catholic or Counter Reformation.
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Trenton, capital of New Jersey, and seat of Mercer County. The city is on the Delaware River in the western part of the state between Philadelphia and New York City. Trenton is famous as a historical spot because of Washington's surprise attack in the Revolutionary War. Wire rope and cables, hardware, pottery and parachutes are made in Trenton. Settlement of the site was made in 1676, and the town was later named for William Trent, chief justice of the colony. Population, 124,697.
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Trenton, Battle of, December 26, 1776. Washington with about 2,500 men crossed the Delaware and defeated the Hessians (about 1,500), during the Revolutionary War.
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Trieste, Free Territory of, an important port at the northern end of the Adriatic Sea. The city has belonged now to Austria and then to Italy, but was made free by the United Nations after World War II. The old part of the city is built on a steep hill—Castle Hill—and the streets are narrow and crooked. Along the sea there is a modern section that has wide streets and attractive houses. Shipbuilding, oil refining and the making of musical instruments have long been important industries of the city. Population, 355,561.
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Trinity River. American river, rising in northern Texas; flows into Galveston Bay; 530 miles.
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Triolet, verse pattern, **19**-6987
Tripoli (Tripolitania). Part of Italian North African province of Libya; area, 350,000 square miles. Coastal regions are fertile and produce dates, olives, figs, cereals and esparto grass, but except for oases the interior is arid and barren. Italy won control in 1912. Population 717,663.
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Tristan da Cunha, islands in South Atlantic Ocean, **9**-3190
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Triumph, Arch of. When people speak of the Arc de Triomphe (Arch of Triumph) they are almost always referring to the Arc de Triomphe de l'Étoile (triumphal arch of the star) in Paris, France. Although there are other arches, this one is the best known today. The arch stands in the Place de l'Étoile at the head of one of the most famous avenues in Paris, the Champs Élysées. Napoleon started to build the arch in 1806 to commemorate his victories, and the structure was completed in 1836 by Louis Philippe. On the inner walls are the names of Napoleon's generals, and also a listing of 96 of Napoleon's victories. On the outer walls are four great sculptures, one of which represents and honors the volunteers of the Revolution of 1792. This sculpture was designed by the famous François Rude. The arch is huge, standing 162 ft. high, 147 ft. wide and 73 ft. deep. After World War I, the grave of France's Unknown Soldier was placed in the Arc de Triomphe, and a flame in honor of the Unknown Soldier burns constantly over the grave.
Triumvirate. In Roman history the government of the country by three equally powerful men. There were two periods of three-man government in Rome; the first that of Pompey, Crassus and Cæsar; the second, Octavius, Antonius and Lepidus.
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* siege of, **9**-3076-82
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wooden horse of legend, **16**-5747
Troy, New York, seat of Rensselaer County. The city is on the Hudson River and the State Barge Canal. The detachable shirt collar was first made at Troy, and so it became known as the "Collar City." The city still produces a large part of the collars made in the United States, and surveying instruments, bells, brushes and clothing are made. Settlement was made in 1659. Population, 70,304.
Troy weight. In the 14th century the pound (12 ounces) of the city of Troyes, France, was adopted in England. Later the Troy measurement, as the name Troyes came to be spelled and called, was confined to the weighing of gold and silver and other valuable commodities.
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Tsingtao, in northeast China, in Shantung Province on Kiaochow Bay, an arm of the Yellow Sea. The city is important as a port and as a manufacturing center. Near the city are coal mines, and within the city are textile mills. Tsingtao was founded by the Germans in 1897. The Japanese took over the city at the start of World War I and controlled it until 1922. In 1938 the Japanese again captured the city and held it until the end of World War II. At that time it was again returned to China. Population, 756,000.
Tsin-Shi Hwang-ti, Chinese emperor, **2**-424

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Tufted vetch, plant, **14**-4978
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Tui, bird, **9**-3138
Tuileries, palace in Paris, **18**-6495
Tula, Russia, capital of the region of the same name. The city is built on the Upa River about 120 miles south of Moscow, and it is famous for metallic wares. Firearms, soap and leather goods are also made. Population, 272,000.
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Tulsa, Oklahoma, seat of Tulsa County. The city is the second largest in the state, and is built on the Arkansas River. Tulsa is world famous as an oil center, and several hundred oil and gas companies have their headquarters in the city. It is often called "The Oil Capital of the World." The city is also a livestock shipping and trading center. Airplanes, munitions and textiles are manufactured. The city was planned in 1887, and before that had been a small trading post. Until the discovery of oil in 1901 the city's growth was slow. Population, 180,250.
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Tunis, capital of Tunisia. The city is in the northeast part of the country on the Gulf of Tunis. Since 1881 the city has belonged to the French, and it is divided into two distinct sections—the old Arab city and the newer European part. Near by are the ruins of ancient Carthage. Axis forces occupied Tunis during World War II until the Allies captured the city in 1943. Population, 219,578.
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Turgenev, Ivan, Russian novelist, **19**-6909-10
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Turin (Torino), Italy, capital of Turin Province. The city is built on the Po River, and even though it is quite old, the plan of the city gives it a modern appearance. The streets are straight and cross each other at right angles. Turin is considered one of the beauty spots of northern Italy. Silks, automobiles, ribbons and iron products are produced in Turin. The city is known to have existed at the time of Christ, and at one time it was the capital of the Kingdom of Italy. Many of the factories became munitions plants during World War II, and so the city was heavily bombed. Population, 712,980.
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Turks. The western section of the Northern Mongolic people. They include the Yakuts, Kirghiz, Uzbegs, Turkomans, Anatolians, Tartars and Osmanli. Their contact with the Caucasic type has modified the typical Mongol features in these races.
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Tuscany. Former Italian grand-duchy, containing Florence, Pisa, Leghorn, Siena, Pistola and Lucca. In the fourteenth century Dante, Giotto, Petrarch and Boccaccio made Tuscany foremost in the revival of arts and letters. The Tuscan dialect became the literary language of Italy. Because of dissensions in Florence the Medici obtained supreme power, and were in alliance with Spain. For nearly 200 years Tuscany was under Spanish influence. After several changes, the people voted for union with Italy. Area, 8,861 sq. mi.; population, 2,974,439.
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Tweed, William Marcy (1823-78). A Democratic politician and a notorious Tammany boss in New York. At the head of a group of politicians called the Tweed Ring, he robbed the city of millions of dollars. He was caught, tried, and sentenced to jail; he escaped and fled to Spain, but was returned to New York, where he died in jail.
Tweed. River forming part of the boundary between England and Scotland. Rising in Clyde Law, it flows into the North Sea near Berwick, and has a famous woolen industry.
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Tyrol. Alpine region divided between Italy and Germany; the Austrian Tyrol lies in the valley of the Inn, north of the Brenner Pass; the Italian Tyrol is in the basin of the Adige and the Brenta, and south of the Brenner. Celebrated for its beauty, the Tyrol contains the Dolomites and Ortler Alps, with Ortler Spitz, 12,875 feet. Innsbruck in Germany and Trent, Bolzano and Merano in Italy are its chief towns. Population 351,888.
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Ukrainia, or **The Ukraine.** South Russian soviet republic of the Soviet Union, famous for the rich black soil of its wheat-growing districts. Chief cities: Kharkov, Kiev and Odessa. Population 30,960,221.
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Ulan Bator Hoto (Urga), capital of Outer Mongolia. The city is a trading center, dealing in wool, hides and furs. The name was changed from Urga to Ulan Bator Hoto (or Khoto) in 1924, and the new name means "Town of the Red Heroes." Population, about 100,000. *See also* **18**-6586, 6588
Ulm. Old German city on the Danube. Its famous cathedral has a spire 530 feet high, the tallest in the world. Population 62,472.
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Ulpian, Roman lawyer, definition of justice, **13**-4812
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Ulster. Irish northern province, comprising six counties in Northern Ireand adhering to England and three in Eire (Ireland). The area is 8,613 square miles. Population 5,331,979.
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Union City, New Jersey, across the Hudson River from New York City, and connected to New York by the Lincoln Tunnel. Union City borders Jersey City on the north. Union City is a residential district, but also has manufacturing of textiles. The city was formed in 1925 by combining two towns, Union Hill and West Hoboken. Population, 56,173.
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Union Station, Washington, D. C. *Picture,* **5**-1533
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United Empire Loyalists, **3**-942
United Kingdom of Great Britain is made up of the four countries, England, Wales, Scotland and Northern Ireland, represented in the British Parliament. The United Kingdom was formed by the Act of Union, which went into effect on January 1, 1801. Even though southern Ireland is now the completely independent Republic of Ireland, Northern Ireland sends representatives to Westminster.
United Nations, The, * **17**-6132-36
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United Provinces. Indian provinces of Agra and Oudh; area, 107,000 square miles; capital, Allahabad. Vast crops are grown in the rich plain of the Ganges, and here are many of the greatest Indian cities. Population 55,020,617.
United States. Most important republic in the world, covering over 3,000,000 square miles in North America. With Alaska it is almost as big as Europe. Between the Appalachians in the east and the Rocky Mountains in the west is the huge plain of the Mississippi, the richest agricultural district in the world, occupying more than half the country; and here enormous crops of grain are grown and vast numbers of cattle pastured. In the southeast, from Texas to Virginia, is the great cotton belt, producing three-fifths of the world's supply of cotton, besides tobacco, sweet potatoes, rice and corn. California and other states have an immense production of fruit. Of the minerals the most important are coal and iron, which are found in many states. Gold, silver, copper, lead and zinc are mined in many parts of the west, while the petroleum production of the South Central and Western States is enormous. Manufacturing, however, is by far the most valuable industry. The iron, steel, leather, motor-car, canning and textile industries are all very important. Commerce is served by about 250,000 miles of railways. Politically the United States consists of a union of 48 states, with the territories of Alaska and Hawaii. Other dependencies or possessions are the Canal Zone, Puerto Rico, Guam, Virgin Islands, etc. Washington, the capital, stands in the Federal District of Columbia. The commercial metropolis and by far the largest city is New York; next come Chicago, Philadelphia, Detroit and Los Angeles. In the next group, Cleveland, Baltimore, St. Louis, Boston, Pittsburgh, Washington, D. C., San Francisco, Milwaukee and Buffalo, all have over half a million inhabitants, and more than 25 other cities have between 500,000 and 200,000. The chief ports are Boston, New York, Baltimore, Norfolk, Newport News, Charleston, Savannah, New Orleans, Galveston, San Francisco and Seattle. The population in 1820 was under 10,000,000; in 1946 it was more than 140,000,000.
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Why is the United States often called Uncle Sam? **17**-6175
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United States Mint. A mint is a place where money is coined by government authority. The United States Mint was established in 1792 and was set up in Philadelphia. Coining of silver began in 1794, and coining of gold in 1795. The mint remained a separate part of the national government until 1873 when, by act of Congress, it was placed under the Treasury Department as the Bureau of the Mint. Besides making the coined money of the country, the United States Mint also makes metallic money for foreign countries, and supplies fine gold and silver bars for use in industry. Mints for the actual coining are in San Francisco and Denver, as well as Philadelphia.

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Unknown Soldier. An unidentified soldier of the World War whose dead body is taken as a symbol for a nation's homage to its fallen. England in 1920 buried her Unknown Soldier in Westminster Abbey. On Armistice Day, 1921, the United States buried her Unknown in Arlington Cemetery. France's Unknown lies beneath the Arc de Triomphe in Paris. Other nations have their Unknown Soldiers.
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Upper Darby, Pennsylvania, a residential suburb of Philadelphia. Upper Darby lies about ten miles west of the main business district of Philadelphia, and has industries of its own, including factories for the making of towels and chemicals. Population, 56,883.
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Ural Mountains. A long mountain range forming the boundary between Europe and Asia; it extends from the Arctic Ocean to the Caspian Sea, a distance of about 1,600 miles. The average height of the range is from 1,000 to 1,500 feet, but several peaks are more than 5,000 feet high. *See also* 1-123; 16-5852
Ural River. Russian river rising in the Ural Mountains and flowing into the Caspian. Orenburg is the only city it passes, it being generally too shallow for navigation. 1,400 miles.
Uranium (U). Chemical element. Atomic number 92; atomic weight 238.07; specific gravity 18.7. Uranium is rather widely distributed in small quantities. Workable deposits are known in Canada, the United States, Russia, Czechoslovakia and the Belgian Congo. Uranium has been known since 1789; its radioactivity was discovered by Becquerel in 1896. Ordinary uranium contains 0.7% of U^{235}; during the war this was separated at Oak Ridge, Tennessee, and used for atomic bombs. Uranium is also the starting point for making the 4 trans-uranium elements (elements with atomic numbers higher than that of uranium)—neptunium, plutonium, americium and curium.
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Utah. Western state; area, 84,916 square miles; capital and largest city, Salt Lake City. Sheep-raising, farming and mining are the leading occupations; smelting of copper and lead are the leading industries. Nickname, "Beehive State" or "Mormon State." Flower, Sego lily. Motto, "Industry." The state was named after the Utes, an Indian tribe. First settlement, Salt Lake City, 1847. Population 550,310.
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Utica, New York, seat of Oneida County. The city is built on the Mohawk River and the State Barge Canal. It is well known as a textile center, specializing in the making of knitted underwear. Red linen, machine guns and metal products are also made. A fort was built on the site about the middle of the 18th century, and the village of Utica was settled in 1786. The name was taken from a Greek town. Population, 100,518.
Utopia, by Sir Thomas More
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Utrecht. Ancient Dutch city on the Old Rhine, with two cathedrals, one of the 8th century, and a university. Textiles and tobacco are manufactured. Population 163,559.
Utrecht, Peace of, 1713, terms, as to America, 2-683
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Valence, combining power of chemical elements, **1**-150-51; **3**-989; **15**-5423; **16**-5948
Valencia, old kingdom and modern province of eastern Spain; area, 4,239 sq. mi. Coal is mined, and products include silk, tobacco, soap, textiles, leather, wine and oranges. The chief city, also the capital and a seaport, is Valencia. Population 1,341,700.
Valencia, Spain, capital of the province of the same name. The city is on the Guadalaviar River, 3 miles from the Mediterranean, on the east coast. With its port town of El Grao, the city is of importance as a shipping center. Excellent cloth goods, leather goods and colored tiles are produced in Valencia. The city is known to have existed a few centuries before the time of Christ. At one time it was the capital of an independent Moorish kingdom, and much of the architecture is notable for the Moorish influences that are apparent. Population, 562,967. *See also* **14**-4930
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Valéry, Paul, French poet, **18**-6720
Valladolid. Historic cathedral and university city of central Spain, having once been capital of Castile and Leon. It manufactures textiles, but is famous chiefly for its beautiful old buildings. Christopher Columbus died here, and Cervantes wrote part of Don Quixote in Valladolid. Population 126,278.
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Valona, city in Albania. *Picture,* **17**-6348
Valparaiso, Chile, capital of the province of the same name. The city is the second in size in Chile, and it is the country's most important port. It is built on the hills overlooking the Bay of Valparaiso. Cotton goods, tobacco, sugar and machinery are produced in Valparaiso. The city was founded in 1536, and the name means "Vale of Paradise." Population, 215,614.
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Vanadium (V). Chemical element. Gray metal. Atomic number 23; atomic weight 50.95; melting point 1710°C.; specific gravity 6.0. Vanadium is not very common, but it is used in some steel alloys to increase toughness, elasticity and tensile strength.
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Vancouver, George (1758-98). Captain in the British navy. Explored Vancouver Island, and Columbia River, between 1792 and 1794.
Vancouver, Canada, the trading center of British Columbia. It is situated on the Gulf of Georgia, just north of the Canadian-United States border. Behind the city rise beautiful mountains. Fish-canning is one of the most important industries of the city, and shipping, shipbuilding and flour milling are important. Captain George Vancouver discovered and explored the site in 1792. A village was founded in 1874, and it took the name of Vancouver in 1886. The present city has been built mostly since 1886, for in that year the old city was badly damaged by fire. Population, 409,975.
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Vancouver Island. Beautiful island of British Columbia, Canada, covering about 12,408 square miles. The first part of the province to be settled, it has fruit-growing, fishing and coal-mining industries, Victoria being the chief port. Population 121,933. *See also* **1**-113.
Vandals. An ancient Germanic people. Their earliest known home was in northeastern Germany. In the fourth and fifth centuries A.D. they overran Gaul, Spain and northern Africa. In 455 they captured Rome and thoroughly plundered it. In 429 the Vandals set up a kingdom in northern Africa. It lasted for over a hundred years; it was finally overthrown in 534 by Belisarius, the general of the Eastern emperor Justinian. The Vandals were a cruel and barbarous people, delighting in destruction for its own sake. The word Vandal has been used as a term of reproach since their day. It means one who willfully destroys anything beautiful, such as a work of art.
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Van Dyck, Sir Anthony, Flemish painter
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* some portraits by Velasquez (gravure), **4**-1501-04
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What is veneered furniture? **1**-144
Vener, Lake. Largest Scandinavian lake, in southwest Sweden. 2,149 square miles in extent, it forms part of the canal and lake waterway connecting Göteborg and Stockholm.
Venezuela
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Who used the famous words, "Veni, vidi, vici"? **7**-2486
Venice, Italy, capital of the province of Venice. The city is built on small islands at the northern end of the Adriatic Sea, and the buildings are made firm by piles driven deep into the mud. Canals form the streets of the city, and people get around in gondolas. There are narrow lanes along the canals, and hundreds of bridges connect these lanes. The city is also noted for the great number of old, richly decorated palaces that are built along the canals. Venice is important as a port and as a tourist center. Dainty glassware, lace, tapestries, jewelry and works of art are produced in Venice. When Italy was invaded from the north, people escaped to the mud islands, and the city was founded in 452. Population, 303,262.
* painting, sculpture and architecture, **4**-1454-64
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Venus's girdle, a jellyfish, **19**-7060
Picture, **19**-7067
Vera Cruz. Port of Mexico, 265 miles by railway from Mexico City. It was founded by Cortez in 1519 on a slightly different site. It exports coffee, tobacco, sugar, rubber and mineral ore. Population 70,958.
Verb. A part of speech that expresses action or being.
Verbena
Picture, flowers (gravure), **19**-7174
Verde River, Arizona
Picture
Bartlett Dam, across Verde River, **7**-2552
Verdi, Giuseppe, Italian opera composer, **19**-6921, 7150
Verdigris
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What is verdigris? **13**-4596
Verdun. Ancient French fortress on the Meuse, famous for its defense against the Germans in 1916, when the cathedral and town were badly damaged. Population 13,552.
siege in World War I, **18**-6443
Verdun, Quebec, a suburb of Montreal. Verdun is located on the Island of Montreal and is primarily important as a residential district. During World War II, however, an important war plant was built in Verdun. Population, 67,349.
Verdun, Treaty of (843), **4**-1438
Vereshchagin, Vasili, Russian painter, **8**-2851-52
Vergil, *see* Virgil
Verhaeren, Emile, Belgian poet, **18**-6719
Verlaine, Paul, French poet, **18**-6719
Vermeer, Jan (Johannes), Dutch painter, **5**-1594
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The Cook, **9**-3074
The Pearl Necklace, **9**-3075
Young Woman with a Water Jug, **5**-1593
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Vermont. New England state; area, 9,609 square miles; capital, Montpelier. Largest city, Burlington. Farming and dairying are carried on, and the state leads in granite and marble quarrying and maple-sugar industries. The leading industries are woolen goods and preparing stone. Abbreviation, Vt. Nickname, "Green Mountain State." Flower, red clover. Motto, "Freedom and Unity." The name comes from two French words: *verd,* green, and *mont,* mountain. First settlement, Fort Dummer, 1724. Population 359,231.
described in Northeastern States, **10**-3403-08; **11**-3773-82; **12**-4145-54
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Vernet, Joseph, French painter, **5**-1882
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Mediterranean scene, **5**-1875
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Verona. One of the most beautiful Italian cities, containing a famous Roman amphitheatre, a 12th-century cathedral, the ancient castle of Theodoric, many fine palaces, and a splendid art collection of the Veronese, Paduan and Venetian schools. It lies at the foot of the Alps, and has furniture and textile manufactures. Population 153,708.
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Veronese, Paolo (Paolo Cagliari), Italian painter, **3**-1107
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Magdalen (gravure), **3**-1112
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Verrazano, Giovanni da
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David, statue (gravure), **13**-4614
Versailles, Palace of, architecture, **18**-6496
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Versailles, Treaty of
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* patterns, **19**-6985-88
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Vespasian (Titus Flavius Sabinus Vespasianus) (9-79 A.D.). Emperor of Rome from 69 to 79 A.D. reign of, **4**-1246
Vesper, in ancient mythology, was Venus, the evening star, **9**-3233
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Vesta (Hestia), goddess of fire, **9**-3226
Vestal Virgins, in ancient Rome, **9**-3226
Vesuvius. Volcanic mountain, ten miles southeast of Naples, in Italy. The height of the mountain is affected by eruptions; the average height is about 4,000 feet. The circumference at the base is about thirty miles. There have been many eruptions in ancient and modern times, some of them causing great loss of life. The most famous eruption, perhaps, was that of 79 A. D., when Pompeii and Herculaneum were buried under a shower of pumice stone and volcanic ash.
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Veterinarian is a doctor for animals. He is required to have a license in order to practice this specialized medicine and surgery. His trained work is of vital importance to the livestock industry.
Veto
liberum veto, in Polish diet, **13**-4682
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Victor Emmanuel III, king of Italy, **13**-4566
Victoria, queen of England
* reign, **7**-2292-2300
Victoria, capital of British Columbia, on Vancouver Island. The Gulf of Georgia separates Victoria from the mainland of Canada, and the Strait of Juan de Fuca separates the city from the United States. Victoria is an important Canadian port and is the Pacific Ocean base for the Royal Canadian Navy. The city is the trading center and railway center for Vancouver Island, and furniture, footwear, soap and chemicals are manufactured. The Hudson's Bay Company founded Victoria, and it was a fur-trading post for twelve years. In 1858, however, it became the capital of Vancouver Island, and in the same year gold was discovered near by. The city was named for Queen Victoria. Population, 87,400.
Victoria, capital of Hong Kong, **9**-3187
Victoria, state of Australia, **7**-2466-67
Picture
Melbourne, the capital, **7**-2462
Victoria, Lake (Victoria Nyanza), **2**-468; **9**-3054
Victoria Cross. The highest decoration for valor conferred on members of the British naval and military services. This decoration is in the form of a Maltese cross.
Victoria Falls, on the Zambezi, **2**-469
discovered by Livingstone, **14**-5202
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first Winged Victory, Nike of Delos, **11**-3991
Victory of Samothrace (gravure), **12**-4336
Vicuña, llama, **5**-1600
Picture (gravure), **5**-1604
Vienna, capital of Austria, on the Danube River. Vienna has long been a center of culture, and is noted for being the home of such musical forms as the waltz. Symphonies, operas and operettas have been written and performed in Vienna. Famous authors and scientists have also lived in the city. Vienna is known for its beautiful and historic buildings, museums, cathedrals and palaces. Before World War I, Vienna rivaled Paris as a fashion center, and the city was important for its manufactured goods and as a trading

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center. But two world wars have gravely altered the once gay city. Population, 1,548,150. *See also* **17**-6198
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Vignola, Barozzi da, Italian architect, **17**-6309
Vigny, Alfred Victor, Count de (1797-1863), French writer. He was one of the leaders of the Romantic school of poetry. He also wrote a fine historical novel, Cinq-Mars, a collection of short stories, called Military Servitude and Grandeur, and a tearful play, Chatterton.
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Villon, François, French poet, **18**-6563
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Why does a violin string change its tone when held down? **10**-3662
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Virchow, Rudolf, German scientist, **3**-978
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Virgil (also Vergil), Roman poet, **16**-5912-15
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Virginia. Historic state, the first permanent English colony having been founded at Jamestown in 1607; area, 40,815 square miles; capital and largest city, Richmond. Essentially agricultural, it produces much grain, fruit and vegetables, but easily its most important product is tobacco; manufactures cotton, tobacco and lumber. Produces coal and other minerals. Norfolk and Newport News are busy ports Abbreviation, Va. Nickname, "Old Dominion." Flower, American dogwood. Motto, "Sic semper tyrannis" (Thus always to tyrants). The name was given by Sir Walter Raleigh in honor of Queen Elizabeth, the Virgin Queen. Population 2,677,773.
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Washington. Mountainous Pacific state; area, 68,192 square miles; rainiest part of the United States, it is generally thickly wooded, and lumbering, coal-mining, fishing, stock-raising and
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agriculture are the chief occupations. Lumber and food products are the leading industries. The capital is Olympia, the largest town is Seattle. Spokane is also important. Nickname, "Evergreen State" or "Chinook State." Flower, rhododendron. Motto, "Al-ki" (by and by). First settlement, Tumwater, 1845. Population 1,736,191.
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Tugela, Natal	1,800
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Gavarnie, France	1,385
Takkakaw, British Columbia	1,200
Vettis, Norway	850
Multnomah, Oregon	850
Rjukan, Norway	780
Kaieteur, British Guiana	741
Cascate delle Marmore, Italy	650
Terni, Italy	650
Middle Yosemite, California	626
Voringfos, Norway	535
Skjaeggedalsfos, Norway	530
Stirling, New Zealand	500
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Snoqualmie, Washington	268
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Waterloo, Iowa, seat of Black Hawk County. It is on the Cedar River in the northeastern part of the state. The region is known as one of the best farming districts of the country. Meat-packing and the manufacture of farm and creamery equipment, engines and wringers are among the leading industries. The site was settled in 1845 and was called Prairie Rapids, but in 1851 the name was changed to the present name. Population, 51,743.
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Waves of sea
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What is a tidal wave? 15-5517
Wax. Ordinarily a sticky substance secreted by bees and used to build honeycombs. It is thick dull yellow with a smell of honey. When purified it is white and plastic. It is lighter in weight than water. It is used in medicine, as modeling material, and for candles, etc.
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Webster, Noah (1758-1843). The maker of the well-known American dictionary bearing his name.
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Weinman, Adolph A., American sculptor
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Weir, J. Alden, American painter, **10**-3455
Weir, Robert Stanley, *see* Poetry Index
Weismann, August, German scientist, **3**-985
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Welby, Amelia, *see* Poetry Index
Welfare state. This phrase means a nation in which the government provides for medical care, old age, unemployment and social security in general—"from the cradle to the grave"—for its citizens. Such a program is usually paid for by taxation. Under the measures passed by the Labour Government, Great Britain frequently is called a welfare state.
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Welland Ship Canal, Canada, **3**-863
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Welles, Gideon, Secretary of Navy in Lincoln's Cabinet
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in Napoleonic Wars, **6**-2200, 2205-08
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Wellington, capital of New Zealand, on North Island. It is situated on Port Nicholson Harbor on the southern coast of the island, and is important as a shipping center and as a manufacturing city. It is known as a garden spot of great beauty. Candles, soap, footwear, woolen cloth and biscuits are produced. The city was founded in 1840 and was the earliest settlement of the country. Population, 183,100. *See also* **7**-2574
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Wells, England. *Pictures,* cathedral, **16**-5962, 5963
Wells
how to make artesian well, **9**-3120
Welsh. A Celtic people with some Iberian blood who were formerly known as Cymri. The mountains of Wales formed a refuge and a rallying-ground for the Gaels and Brythons who fled from the Teutonic invaders of England. They have the typical Celtic temperament: they are mercurial, vehement, voluble and eloquent, imaginative and quick-witted, but lack the steadfastness typical of the English.
Welt shoes, manufacture, **10**-3566, 3570-76
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Good King Wenceslas, by John Mason Neale, **17**-6108
Wenchow or **Yungkia,** China, on the Wu River, near the coast of the East China Sea. Wenchow is a walled city. It became important as a port after it was opened for foreign trade in 1877. Much of its trade is in agricultural products from the surrounding regions. Population, 700,000.
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Wergeland, Henrik, Norwegian writer, **19**-7012
Wescott, Edward Noyes, American writer, **13**-4789
Wesley, Charles (1707-1788). English hymn-writer and evangelist. He has written some sixty-five hundred hymns; two of the best known are Hark, the Herald Angels Sing and Jesus, Lover of My Soul.
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West Indies, Danish, bought by U. S., **19**-7102
West Jersey, American colony, **2**-551
West Point Military Academy
* West Point and Annapolis, **18**-6701-10
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fort in Revolutionary times, **18**-6701
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West Virginia. Mountainous eastern state; area, 24,181 square miles; capital, Charleston. Largest city, Huntington. Coal iron and petroleum are the chief minerals. Lumbering, the manufacture of iron and steel and glass are also important. Abbreviation, W. Va. Nickname, "Panhandle State" or "Mountain State." Flower, rhododendron. Motto, "Montani semper liberi" (Mountaineers always freemen). Separted from Virginia in 1863. Population 1,901,974.
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Wheel lock guns, account of, **8**-2847
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Wheeler, Edward L., American writer, **14**-4960
Wheeler, William A., vice-president of U. S.
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Wheeling, West Virginia, seat of Ohio County. It is located on the Ohio River in the northwest part of the state. The city is known for its hand-rolled cigars, and it also makes steel, patent medicines, pottery, boxes and enamel ware. Wheeling Island in the Ohio River makes up a part of the city. For short periods the city has been the state capital. It was settled in 1769 as the first town on the Ohio River. Population, 61,099.
Wheelock, Eleazar, founder of Dartmouth College, **12**-4313
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When the Fire Alarm Rings, * **6**-2175-84
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White Paper, name given to diplomatic documents, account of, **1**-74-75
White pines, trees, **13**-4636
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White rhinoceros, of Africa, **5**-1830-31
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White River. American river, rising in northwestern Arkansas; flows into the Mississippi River. 800 miles.
White-rot, marsh pennywort
Picture, **16**-5731
White Russia. District in Western Russia. One of the republics of Soviet Russia, under the name of Byelorussian or White Russian Soviet Socialist Republic; its capital is Minsk. In 1941 it was overrun by the Germans. Estimated population, 5,567,976; area, 48,494 sq. mi.

White Sea. Deep gulf in the coast of Arctic Russia, containing the port of Archangel. Its fisheries are important.
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White Squadron, of U. S. Navy
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White Strand Bay, Newfoundland, 12-4297
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Whydahs, birds, 8-2970, 2972
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Wichita, Kansas, seat of Sedgwick County. The city is built where the Little and Big Arkansas rivers meet to form the Arkansas in the south-central part of the state. Oil is found in the vicinity, and oil-well equipment is made in the city. Airplanes, motor vehicles, flour and lamps are also manufactured, and the city is important as a trading center for the surrounding agricultural districts. The city was settled in 1870. Population, 114,966.
Wickham, H. A., brought seeds of rubber plant to England, 4-1414
Wicliffe, John, *see* Wyclif, John
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Wieland, Christoph Martin, German author, 17-6269, 6270
Wife of Usher's Well, The, famous early ballad, notes on, 2-722
Wiggin, Kate Douglas, American writer and educator, 6-2280; 14-4961-62
Wight, Isle of. Island off the coast of Hampshire, England, from which it is separated by the Solent and Spithead. The climate is mild and there are many popular watering-places, including Shanklin, Sandown, Ventnor, Ryde and Cowes. Area, 147 square miles; population 88,454.
Wigwam, Indian tent, 12-4447
Wild carrot (Queen Anne's lace), plant, 15-5394
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Wild cat. *Picture,* 2-490
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Wild fruits of the countryside, * 11-4019-28
Wild geranium, flowering plant, 18-6579
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Wild Goat's Kid, The (story), 1-201-03
Wild plants. For special plants, *see* their names.
Wild sarsaparilla, flowering plant, 18-6579
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The Selfish Giant, 4-1338-40
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Wilderness, Battle of, 7-2440
Wilhelm, *see* William II, German emperor
Wilhelm Meister, novel by Goethe, 17-6270
Wilkes Barre, Pennsylvania, seat of Luzerne County. It is located on the Susquehanna River in the northeastern part of the state. Anthracite coal is mined in the region, and mining equipment is manufactured in the town. Textiles, railway equipment, tobacco and foodstuffs are also produced. The site was settled in 1769, and it was named for two members of the British Parliament, John Wilkes and Isaac Barre, who sympathized with the colonies. Population, 86,236.
Wilkins, Sir George Hubert, Polar explorer, 15-5388
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What is a will-o'-the-wisp? 10-3475-76
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Willard, Archibald M., American artist
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Willard, Emma, American educator, 14-5268
Willard, Frances Elizabeth, American educator and temperance worker, 14-5270
Willemstad, seat of government of Curaçao, a group of islands in the Caribbean Sea. The islands belong to the Netherlands and are located north of Venezuela. The city is on St. Anna Harbor, which is on the south of the largest island, also called Curaçao. Oil is shipped from Venezuela to be refined, and straw hats are made. Population, 39,700.
William I, the Conqueror, king of England
* conquest of England and reign, 5-1571-74
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William II (the Red), king of England, 5-1574
William III, of Orange, king of England
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Williams, Vaughn, English composer, 19-7153
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Wilmington, Delaware, seat of New Castle County. It is located in the northern part of the state where the Brandywine and Christiana rivers flow into the Delaware. There are several famous old churches in the city, of which the best known is Old Swedes' Church, said to be the oldest in the United States. The world-famous Du Pont plant is located at Wilmington, and other industries include shipbuilding, leather tanning, paper milling and tobacco manufacturing. Swedish settlers started a fort on the site in 1638. In 1731 it took the name Willington in honor of Thomas Willing who planned the town,

Wilmington (*continued*)
but later the name was slightly changed. Population, 112,504.
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Wilson, C. T. R., English physicist, **4**-1228
Wilson, Mrs. Edith Bolling, wife of Woodrow Wilson, **8**-2811-12
Wilson, Edmund, American writer and critic, **14**-5019-20
Wilson, Henry, vice-president of U. S.
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Wilson, Richard, British painter, **6**-2229-30
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Wilson Dam. *Picture,* **7**-2314
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Wind Cave National Park, South Dakota, **4**-1300; **7**-2287
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illustration from, **11**-4109
Wind instruments, in orchestra, **4**-1291
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Windermere, Lake. Largest and one of the most beautiful of the English lakes, on the border of Westmoreland and Furness. It is about 10 miles long and a mile broad.
Windflower, *see* Anemones; Pasque flower
Windhoek (Windhuk), capital of Southwest Africa. It is situated in the center of the country, and is an important trading center for the surrounding country in which fruits are grown. About one-third of the people are whites. Population, 19,000.
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Why are some winds warm and some cold? **16**-6021
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Blow, Blow, Thou Winter Wind, by Shakespeare, **10**-3484
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charts of prevailing winds (color), **16**-6026-27
wind-measuring instruments, **10**-3528
Winds and Ocean Currents, * **16**-6029-33
Windsor. Berkshire market town containing Windsor Castle, the chief English royal residence. Founded by William the Conqueror, this contains the beautiful Gothic St. George's Chapel, and has a splendid park.
Picture, **18**-6488
Windsor, Ontario, on the Detroit River opposite Detroit, Michigan. Windsor is one of the largest and most important cities of Canada. It is connected with Detroit by a bridge, tunnels and ferries. Windsor's location on the river and on the border makes it important for trade and for industry. Paint, machinery, automobiles, chemicals and cereals are manufactured. The site was settled early in the 19th century, and the city took its present name in 1836 from an English town. Population, 117,965.
Ambassador Bridge, **1**-34
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Detroit-Windsor Tunnel, **2**-523
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Windsor Castle, England
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Winnipeg, capital of Manitoba, and one of the largest cities of Canada. It is built at the meeting point of the Red and Assiniboine rivers about 60 mi. north of the United States border. The city is important to the western section of Canada as a distributing center for the agricultural regions, and it is important to all the country for manufacturing. Grain elevators, foundries, meat-packing plants and printing shops make up some of the leading industries. The first settlement was made about 1738 as a fort. The name means "the water." Population, 229,045.
Picture
old Fort Garry, **3**-942
Winnipeg, Lake. Lake in Manitoba, Canada, covering 9,459 square miles. It receives the waters of Lakes Winnipegosis and Manitoba and the Saskatchewan River and is itself drained by the Nelson River, which flows into Hudson Bay.
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Picture, Eddystone Tower, **10**-3577
Winston-Salem, North Carolina, seat of Forsyth County. The city is in the northwestern part of the state and is world famous as a tobacco center. Besides tobacco products, clothing, tin foil and air-conditioning equipment are manufactured. Until 1913 the city was two separate towns, Winston and Salem. Salem was founded in 1766 and Winston in 1849. Population, 79,815.
Winter
* cause, **1**-238
effect on plant life, **2**-509, 512
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The Winter Night, by John Greenleaf Whittier, **16**-5826
Winter, by Shakespeare, **10**-3484
Winter-moth, **18**-6530-31
Wintergreen, flowering plant, **18**-6579-80; **19**-6937
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Winthrop, John, governor of Massachusetts Bay Colony, **2**-548; **10**-3487
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See also Radio telegraph
Wireless telephony, *see* Radio telephone
Wirephoto, means of sending pictures by wireless, 17-6058-59
Wireworms, larva of click beetles, 18-6627
Pictures, 18-6624-25
Wisconsin. Forest and prairie state bordering the Great Lakes; area, 56,154 square miles; capital, Madison. Wheat-growing, dairying, lumbering and cattle-raising are important. The manufactures are large and varied. Milwaukee is the largest city and the chief commercial centre. Abbreviation, Wis. Nickname, "Badger State" or "Copper State." Flower, violet. Motto, "Forward." Wisconsin is an Indian name. First settlement, Green Bay, about 1669. Population 3,137,587.
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Wisconsin River. American river, rising in northern Wisconsin. Flows into the Mississippi River. 400 miles.
Wisent, European bison, 4-1263
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Wistar, Caspar, early button manufacturer, 12-4503
Wistaria. A genus of high-climbing and hardy shrubs of the bean family. Most wistarias are trained to climb walls, porches and the like. Their purple clusters are unusually beautiful and fragrant.
Witch hazel, shrub, 13-4781
Wizard of Menlo Park, The, * 5-1891-94
Woad, plant
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Wolfe, James, general
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capture of Quebec, 2-683; 3-783
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death of Wolfe by B. West, 3-776
Wolfe, Thomas, American author, 14-5009-10
Wolfram (W), formerly called tungsten. Chemical element. Heavy metal. Atomic number 74; atomic weight 183.92; melting point 3370°C.; boiling point 5900°C.; specific gravity 19.3. Wolfram steels are used in high-speed tools and in armor plate. Other alloys of wolfram are important. The very high melting point of wolfram makes it suitable for filaments in electric lamps, for electric furnaces and other electrical uses.
Wolframite, tungsten ore, 18-6640
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Wonder of Cellulose, The, * 8-2747-55
Wonder of the Modern Zoo, The, * 19-7131-36
Wonderful, Wonderful Music, * 18-6695-6700
Wonderful Amphibians, * 15-5454-58
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What makes a knot in a piece of wood? 8-2872-73
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Why does iron feel colder than wood? 9-3354
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Woollcott, Alexander, American writer, **14**-5017-18
Woolson, Constance Fenimore, American writer, **13**-4790
Woolworth Building, New York City
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Worcester, Massachusetts, seat of the county of the same name. The city is in the eastern part of the state on Lake Quinsigamond and the Blackstone River. Shoes, tools, textiles and envelopes are among the leading products manufactured. The city dates from 1713, although an earlier settlement had been made that proved unsuccessful. Population, 198,741. *See also* **10**-3404
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Can we think without words? **16**-5961
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How is it that a worm lives when cut in two? **2**-463
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Wright, Richard, American writer, **12**-4432; **14**-5014
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What is it that makes wrinkles in old people's faces? **5**-1809
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Why will a slate pencil write on slate but not on paper? **3**-877-78
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How are the marks put into writing paper? **18**-6558
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Wrynecks, birds, **9**-3368
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Wuppertal, Germany, on the Wupper River in the western part of the country. Until 1929 it was two cities, Barmen and Elberfeld. Barmen was noted for the manufacture of textiles, and Elberfeld was known for its schools. The making of chemicals, dyes and various types of cloth are now important. Population, 324,962.
Wuthering Heights, novel by Emily Brontë
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Wyle, Florence, Canadian sculptor, **14**-5080
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Wyoming. Rocky Mountain state; area, 97,914 square miles; capital and largest city, Cheyenne. On an average it is over 7,000 feet above sea-level. Stock-raising, sheep-raising and mining are the most important industries. Abbreviation, Wyo. Nickname, "Equality" (Suffrage Pioneer). Flower, Indian paintbrush. Motto, "Cedant arma togæ" (Let arms yield to the gown). Wyoming means "mountains and valleys alternating." First settlement, Cheyenne, 1867. Population 250,742.
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Teapot Rock, near Casper, **18**-6427

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Harpy tomb and Nereid monument, **15**-5346
Xavier, St. Francis, Jesuit missionary
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Xenon (Xe). Chemical element. Inert gas (*see* Inert gases). Atomic number 54; atomic weight 131.3; melting point —112°C.; boiling point —107°C. There is one part of xenon in twenty million parts of air.
Xenophon, Athenian historian and general, **7**-2567, 2569; **16**-5751
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Silk, tea, copper and lacquered ware are exported, and shipbuilding is also important. The city was practically destroyed by an earthquake in 1923 and by allied bombing during World War II. With U. S. aid, the city is being rebuilt. Population, 968,100.
Yonkers, New York, on the Hudson River, 14 miles north of New York City. The manufacture of elevators was begun in Yonkers by Elijah G. Otis in 1854, and since that time the city has developed as a manufacturing center. Carpets, wire, hats and chemicals are also made. The city was settled in 1650 and was named for Adrian Van der Donck who was known as De Jonkheer. Population, 142,600.
York, Pennsylvania, seat of the county of the same name, on Codorus Creek in the southeastern part of the state. York is important as a trading center for the surrounding agricultural area, and as a manufacturing city. Machinery, paper, bricks and shirts are made. The Continental Congress met at York in 1777 and 1778 when the British held Philadelphia. The first national Thanksgiving proclamation was made in York. The city was founded in 1741 and was named for the Duke of York. Population, 55,712.
York. Historic capital of Yorkshire, England, on the Ouse. Still surrounded by medieval walls, it has many picturesque streets and buildings, but its chief glory is its splendid Minster, with three towers of over 200 feet. Built on the site of a 7th-century church, it is famous especially for its stained-glass windows. Population 100,000.
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Youngstown (*continued*)
duced. The city was founded in 1797 by John Young and was named for him. Population, 167,720.
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Ypres. A town in West Flanders, Belgium, on the Yperlie, famous for its manufactures of linen, laces and woolens. Around it were fought some of the most important battles of World War I in 1914, 1915, 1916 and 1917 by British, French and Belgian troops against the Germans. The Canadians held the line in 1915 at Ypres when gas was used for the first time by the Germans. At the end of the war the town was a wreck, as the Germans had bombarded it, destroying the famous cathedral and Cloth Hall. Population 17,000.
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Ytterbium (Yb). Chemical element. Atomic number 70; atomic weight 173.04. One of the rare-earth elements. *See* Rare-earth elements.
Yttrium (Y). Chemical element. Atomic number 39; atomic weight 88.92; melting point 1490°C.; specific gravity 5.5. Yttrium compounds occur with compounds of the rare-earth elements. *See* Rare-earth elements.
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Zaragoza (Saragossa), Spain, on the Ebro River. The city is in a rich farming section of the northeast part of the country. It is important as a trading and railway center. Carriages, glass, candles and porcelain are made. The old city dates from before Christ, but a new section has grown up that is quite modern. The Roman Emperor Augustus named the town Caesarea Augusta when it was a Roman colony, and the present name comes from that Roman name. Population, 293,000.
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Zinc (Zn). Chemical element. Bluish white metal. Atomic number 30; atomic weight 65.38; melting point 419.5°C.; boiling point 907°C.; specific gravity 7.14. Zinc is produced from its ores chiefly in the United States, Belgium and Canada. "Galvanized" iron is iron covered with zinc to prevent corrosion. Zinc and copper form brass, which has many uses. Zinc oxide ZnO, and zinc sulfide are white pigments; zinc oxide is used in rubber and in ointments.
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Zurich, Switzerland, capital of the canton of the same name, at the meeting point of the Limmat and Sihl rivers on the north shore of Lake Zurich. The city is a religious and an educational center. Zurich has a botanical garden that is world famous. Silk-weaving and the manufacture of paper, cotton, candles and machinery are the leading industries. Zurich is an ancient city; it was important in Roman days as a military outpost. Population, 336,400. *See also* **16**-6007
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INDEX TO POEMS

AND NURSERY RIMES



INDEX TO POEMS AND NURSERY RIMES

IN this index, poems are entered under author, under title, and under first line. That is, each poem is entered three times. The arrangement is alphabetic, like a dictionary.

The authors' names are printed in black type, and the titles of all the poems by one man are printed below his name, indented, or set a little to the right.

To find a poem by its title, look under the first word, not counting *The, A,* or *An* at the beginning. For instance, a poem named *The Daffodils* would be entered under *Daffodils.*

To find a poem under its first line, look under the first word, and in this case you must include *The, A,* or *An* at the beginning, as the whole first line is given, including the initial word. For instance, the first line *The breaking waves dashed high* will be found under the word *The.*

In arranging the entries, all the entries beginning with one word are put together, before any of a longer word that begins with the same letters. For instance, all the entries beginning with *In* come before those beginning with *Into;* all those beginning with *The* come before those beginning with *There.*

Nursery rimes usually have no author. They are entered under the first line, and under the title if there is one.

We can learn to enjoy poetry more and more, by reading it and by thinking about it. We take pleasure in the sound of the words, in the pictures they call up in our minds, and in the feeling that the poem gives us. A person who reads and loves poetry has all his life a source of pleasure that other people do not have: he sees more of the beauty in the world; he feels more keenly the joy, the sorrow, the picturesqueness, and the nobility of human life. It is worth while to cultivate this love of poetry while you are young, and the collection here gives you many kinds to enjoy.

You will be glad afterward if you learn by heart lines or parts of poems that please you especially. When you are older, it will not be so easy to learn them or to hold them, but what you learn now will enrich your thinking all your life. For instance, when you are taking a country walk, if you recall a beautiful line about the sky, or some flower or animal, or any other sight, you will find your pleasure heightened. If you learn a line or a verse that makes it easier to be brave, or kindly, or thorough in your work, you will find that often in your life it will come into your mind and help you. If you have read or learned a poem about some person or historical event, you will be more interested when you meet that person or event in your history lessons or your reading. Another reason for learning bits of poetry is that sometimes we can add to the interest or pleasure of other people in quoting them.

In reciting any poetry, be careful to speak it according to its meaning, stopping at the natural places, and not always at the ends of the lines. You are fortunate to have such a collection as this—the best thought of many minds, clothed in beautiful language —and the more you read in it the more you will enjoy it.

If you have a mind that memorizes readily, you might like the plan of learning one poem or quotation a week, and keeping a list of them in a little note-book. It will be interesting to hunt for something new to learn each week. It is important to say them over often, from the list in your note-book, till they are firmly in your mind. After a little while, you will find they almost say themselves, and then you have them surely in your memory treasures. If you have a friend to practice them with, so much the better. Two or three friends, or a little group, could make a Poetry Club; each choose a poem a week, and then recite them to each other. It might be interesting to keep secret what you have chosen, till the meeting.

Above all, be sure to go over the poems till you can not forget them. Perhaps years from now, when you are a grown person, busy and tired, they will come into your mind like fine music, and you will think, "How glad I am I learned so many poems from THE BOOK OF KNOWLEDGE."

You will find classified lists of poems, arranged according to subject matter, beginning on page 7541.

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If you can keep your head when all about you, **7**-2530
I'm growing old, I've sixty years, **12**-4273
In a wood they call the Rouge Bouquet, **10**-3738
In After Days, by Austin Dobson, **19**-6992
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In days of yore, from Britain's shore, **7**-2365
In Flanders Fields, by John McCrae, **10**-3739
In Honor of the City of London, by William Dunbar, **13**-4536-37
In May, when sea-winds pierced our solitudes, **3**-1135
In Praise of a Beggar's Life, **13**-4601
In School-Days, by John Greenleaf Whittier, **7**-2529
In somer, when the shawes be sheyne, **13**-4533
In the merry month of May, **13**-4600
In the name of the Empress of India, make way, **16**-5709
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Indian Children, by Annette Wynne, **1**-98
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Invictus, by William Ernest Henley, **5**-1890
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Isle of Long Ago, by Benjamin Franklin Taylor, **6**-2244
It came upon the midnight clear, **17**-6098-99
It Couldn't Be Done, by Edgar Guest, **7**-2528
It fell about the Martinmas time, **8**-2903
It is an ancient Mariner, **11**-3927
It little profits that an idle king, **12**-4269-70

It sleeps among the thousand hills, **6**-2243
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It was many and many a year ago, **12**-4346
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Ivy Green, The, by Charles Dickens, **3**-1136



Jack and Jill went up the hill, **5**-1779
Jack Sprat could eat no fat, **8**-2767
Jackson, Helen Hunt
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Jacques Cartier, by Thomas D'Arcy McGee, **18**-6647
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Jenny Kissed Me, by Leigh Hunt, **12**-4350
Jest 'Fore Christmas, by Eugene Field, **17**-6107
John, King, play by Shakespeare
To gild refined gold, to paint the lily, **10**-3478
John Anderson, by Robert Burns, **12**-4351
John Gilpin was a citizen, **2**-605-08
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The Song My Paddle Sings, **6**-2241
Johnson-Cory, William
Heraclitus, **10**-3741
Jonson, Ben
Epitaph on Salathiel Pavy, **13**-4597
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Joshua Fit de Battle of Jericho, **16**-5743
Judas Iscariot, by Robert Buchanan, **10**-3645-46
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Cowards die many times before their deaths, **10**-3478
Mark Antony's speech over the body of Julius Caesar, **10**-3480
Noblest Roman, **10**-3481
Jumblies, by Edward Lear, **9**-3109
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Kathleen Mavourneen, by Louisa Macartney Crawford, **7**-2525
Keats, John
A Thing of Beauty, **15**-5521
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Ode on a Grecian Urn, **15**-5522
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On the Grasshopper and Cricket, **19**-6991
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Star-Spangled Banner, **7**-2363
Kilmer, Joyce
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King Bruce and the Spider, by Eliza Cook, **5**-1639-40
King Bruce of Scotland flung himself down, **5**-1639-40
King Francis was a hearty king, and loved a royal sport, **5**-1639
King John and the Abbot of Canterbury, **8**-2905-06
Kingsley, Charles
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Lady of Shalott, by Alfred Tennyson, **5**-1644-46
Lake Isle of Innisfree, by William B. Yeats, **2**-736
Lamb, Charles
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Lead, kindly Light, amid the encircling gloom, **10**-3646
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Let us walk in the white snow, **17**-6255
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Life on the Ocean Wave, by Epes Sargent, **6**-2153
Light, by Francis William Bourdillon, **12**-4351
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Listen, my children, and you shall hear, **8**-3006-07
Listen to me, as when ye heard our father, **2**-735
Listeners, by Walter de la Mare, **4**-1271
Listenyt, lordynges, both elde and yinge, **13**-4535
Little Bo-peep, **16**-5927
Little Boy Blue, **14**-4946
Little Cowboy, what have you heard? **2**-481-82
Little drops of water, **15**-5329
Little Giffen, by Francis Orray Ticknor, **5**-1886
Little Jack Horner sat in a corner, **3**-1148
Little Lamb, who made thee? **3**-845
Little Miss Muffet, **4**-1531
Little Nanny Ettticoat, **3**-1148
Little one, come to my knee, **4**-1274
Little Orphant Annie, by James Whitcomb Riley, **2**-488
Little Polly Flinders, **17**-6383
Little Things, by Ebenezer Cobham Brewer, **15**-5329
Little Tommy Tucker, **3**-1146
Little Work, by George du Maurier, **9**-3338
Lochinvar, by Sir Walter Scott, **15**-5418-19
London, thou art of townes *A per se*, **13**-4536-37
Longfellow, Henry Wadsworth
Bell of Atri, **12**-4471-72
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Children's Hour, **1**-223-24
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Hiawatha's Childhood, **16**-5828-29
Paul Revere's Ride, **8**-3006-07
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Village Blacksmith, **7**-2527
Look, by Sara Teasdale, **12**-4349
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Lotos-Eaters, by Alfred Tennyson, **12**-4275
Lovelace, Richard
To Lucasta, on Going to the Wars, **12**-4350
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Winter, **10**-3484
Lowell, Amy
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Lowell, James Russell
Fatherland, **8**-3008
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Fountain, **16**-5830
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Lucifer in Starlight, by George Meredith, **19**-6991
Lucy, by William Wordsworth, **15**-5523
Lullaby, by Alfred Tennyson, **1**-223
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Luther, Martin
A Mighty Fortress Is Our God, **10**-3641
Lyte, Henry Francis
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M. N. O. Our pussy's in the snow! **8**-2766
Macbeth, play by Shakespeare
I dare do all that may become a man, **10**-3478
Tomorrow, and tomorrow, and tomorrow, **10**-3482
Macaulay, Thomas Babington
How Horatius Kept the Bridge, **4**-1379-86
McCrae, John
In Flanders Fields, **10**-3739
Macdonald, George
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McGee, Thomas D'Arcy
Jacques Cartier, **18**-6647
Mackay, Charles
Sea-King's Burial, **9**-3111-12
MacLeish, Archibald
The Reed-Player, **17**-6256
McLennan, William
The Hills of Skye, **2**-735
Mangan, James Clarence
Dark Rosaleen, **7**-2368
Mannyng of Brunne, Robert
Praise of Women, **13**-4535
Maple Leaf Forever, by Alexander Muir, **7**-2365
March of the Men of Harlech, **7**-2368
Markham, Edwin
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Marlowe, Christopher
Passionate Shepherd to His Love, **12**-4348
Was This the Face, from Doctor Faustus, **13**-4600
Marseillaise, by Claude Joseph Rouget de Lisle, **7**-2366
Marvell, Andrew
Mower to the Glow-Worms, **14**-5130
Mary, Mary, quite contrary, **10**-3718
Mary had a little lamb, **5**-1780
Masefield, John
Cargoes, **17**-6255
Spanish Waters, **12**-4274-75
Masters, Edgar Lee
Ann Rutledge, **17**-6254
Maxwelton braes are bonnie, **7**-2530
May in the Greenwood, **13**-4533
May nothing evil cross this door, **2**-737
Measure for Measure, play by Shakespeare
O! It is excellent, **10**-3478
Memory, by Thomas Bailey Aldrich, **16**-5824
Men of Harlech! in the hollow, **7**-2368
Mending Wall, by Robert Frost, **17**-6249-50
Merchant of Venice, play by Shakespeare
How far that little candle throws its beams! **10**-3478
Quality of Mercy, **10**-3482
Meredith, George
Lucifer in Starlight, **19**-6991
Merrily swinging on brier and weed, **3**-1007
Meynell, Alice
Chimes, **4**-1273
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Midsummer Night's Dream, play by Shakespeare
Fairy Songs, **2**-481
Where the Wild Thyme Blows, **10**-3485
Mighty Fortress Is Our God, by Martin Luther, **10**-3641
Millay, Edna St. Vincent
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Milton, John
On His Blindness, **14**-5127
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Mine eyes have seen the glory of the coming of the Lord, **8**-3002-03
Miniver Cheevy, by Edwin Arlington Robinson, **17**-6254
Minstrel's Song, by Thomas Chatterton, **15**-5419
Mohr, Father Joseph
Silent Night, **17**-6100-01
Monterey, by Charles Fenno Hoffman, **8**-3005
Montgomery, James
Daisy at Christmas, **3**-1136-37
Moo-Cow-Moo, The, by Edmund Vance Cooke, **3**-843
Moody, William Vaughn
Pandora's Song, **5**-1890
Moore, Clement Clarke
Visit from St. Nicholas, **17**-6106-07
Moore, Thomas
Believe Me, If All Those Endearing Young Charms, **12**-4343
Canadian Boat-Song, **6**-2244
Harp That Once Through Tara's Halls, **15**-5521
Last Rose of Summer, **3**-1140
Morning Song, by William Davenant, **14**-5130
Morris, George Pope
Woodman, Spare That Tree, **7**-2528
Mortifying Mistake, by Anna Maria Pratt, **1**-98
Morton, David
School-Boy Reads His Iliad, **19**-6990
Mountain and the Squirrel, by Ralph Waldo Emerson, **3**-845
Mower to the Glow-Worms, by Andrew Marvell, **14**-5130
Much Ado about Nothing, play by Shakespeare
For there was never yet a philosopher, **10**-3478
Much have I travell'd in the realms of gold, **19**-6990
Muir, Alexander
Maple Leaf Forever, **7**-2365
Music, When Soft Voices Die, by Percy Bysshe Shelley, **15**-5523
Musical Instrument, by Elizabeth Barrett Browning, **16**-5707
My beautiful! my beautiful! that standest meekly by, **3**-846
My Boy Tammie, **6**-2037
My Country, 'Tis of Thee, by Samuel Francis Smith, **7**-2367
My dear, do you know, **7**-2644
My Garden, by Thomas Edward Browne, **3**-1139
My heart aches, and a drowsy numbness pains, **3**-1008-09
My heart is like a singing bird, **12**-4351
My Heart Shall Be Thy Garden, by Alice Meynell, **3**-1139
My Heart's in the Highlands, by Robert Burns, **15**-5420
My House, by Louis Untermeyer, **2**-737
My little son, who looked from thoughtful eyes, **16**-5710
My love dwelt in a Northern land, **12**-4273
My mind lets go a thousand things, **16**-5824
My Native Land, by Sir Walter Scott, **7**-2363
My noble, lovely, little Peggy, **14**-5242
My Old Kentucky Home, by Stephen Collins Foster, **2**-734
My pa held me up to the Moo-Cow-Moo, **3**-843
My Room, by Gelett Burgess, **11**-4031
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My strength is failing fast, **9**-3111-12
My True-Love Hath My Heart, by Sir Philip Sidney, **13**-4597

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Nairne, Lady Caroline
Charlie Is My Darling, **14**-5238
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Good King Wenceslas, **17**-6108
Nearer, My God, to Thee, by Sarah Flower Adams, **10**-3640
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Vitae Lampada, **5**-1890
Newman, John Henry, Cardinal
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Nightingale and Glow-Worm, by William Cowper, **14**-5241
Night-Piece, by Robert Herrick, **4**-1271
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No stir in the air, no stir in the sea, **6**-2148-49
No sun, no moon! **4**-1517
No thyng is to man so dere, **13**-4535
Noblest Roman, from Shakespeare's Julius Caesar, **10**-3481
Norse Lullaby, by Eugene Field, **1**-228
Norton, Caroline
Arab's Farewell to His Steed, **3**-846
Not a drum was heard, not a funeral note, **10**-3740
November in England, by Thomas Hood, **4**-1517
Now the Day Is Over, by Sabine Baring-Gould, **10**-3639-40
Nymph's Reply to the Passionate Shepherd, by Sir Walter Raleigh, **12**-4348

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O! a wonderful stream is the River Time, **6**-2244
O beautiful for spacious skies, **8**-3003
O blithe New-comer! I have heard, **3**-1012
O blow the man down, bullies, blow the man down, **16**-5746
O bury me not on the lone prairie, **16**-5741
O Canada, by Robert Stanley Weir, **7**-2365
O Canada! Our home and native land, **7**-2365
O Captain! My Captain! by Walt Whitman, **10**-3737
O come, all ye faithful, **17**-6104
O dear, what can the matter be? **19**-6995
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O Little Town of Bethlehem, by Phillips Brooks, **17**-6099
O Mary, go and call the cattle home, **6**-2148
O Mother Dear, Jerusalem, **10**-3641-42
O my dark Rosaleen, **7**-2368
O my luve's like a red, red rose, **12**-4350
O say, can you see, by the dawn's early light, **7**-2363
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O, what can ail thee, knight at arms, **2**-487
O where hae ye been, Lord Randal, my son? **8**-2907
O wild West Wind, thou breath of Autumn's being, **19**-6985
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October, by John Murray Gibbon, **18**-6653
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Ode to a Nightingale, by John Keats, **3**-1008-09
Ode to the West Wind (part), by Percy Bysshe Shelley, **19**-6985
Of a rose, a lovely rose, **13**-4535
Of all the girls that are so smart, **12**-4349
Of wounds and sore defeat, **5**-1890
Off Rivière du Loup, by Duncan Campbell Scott, **6**-2152
Oh, a dainty plant is the Ivy green, **3**-1136
O, a wonderful horse is the Fly-Away Horse, **4**-1272-73
Oh, hush thee, my baby! thy sire was a knight, **1**-228
Oh, poor old Reuben Ranzo, **16**-5741
Oh sing unto my roundelay, **15**-5419
Oh! 'tis of a rich merchant, **16**-5743
Oh, to be in England, **16**-5707
Oh, to have a little house! **2**-734
Oh, to have died that day at Langemarck! **18**-6649
Oh where, oh where, has my little dog gone? **5**-1780
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Old King Cole, **11**-4120
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On His Blindness, by John Milton, **14**-5127
On the Death of Joseph Rodman Drake, by Fitz-Greene Halleck, **10**-3740
On the Grasshopper and Cricket, by John Keats, **19**-6991
On the green banks of Shannon when Sheelah was nigh, **3**-843
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On the Road, by Charles G. D. Roberts, **18**-6649
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Once in Royal David's City, by Cecil Frances Alexander, **17**-6105
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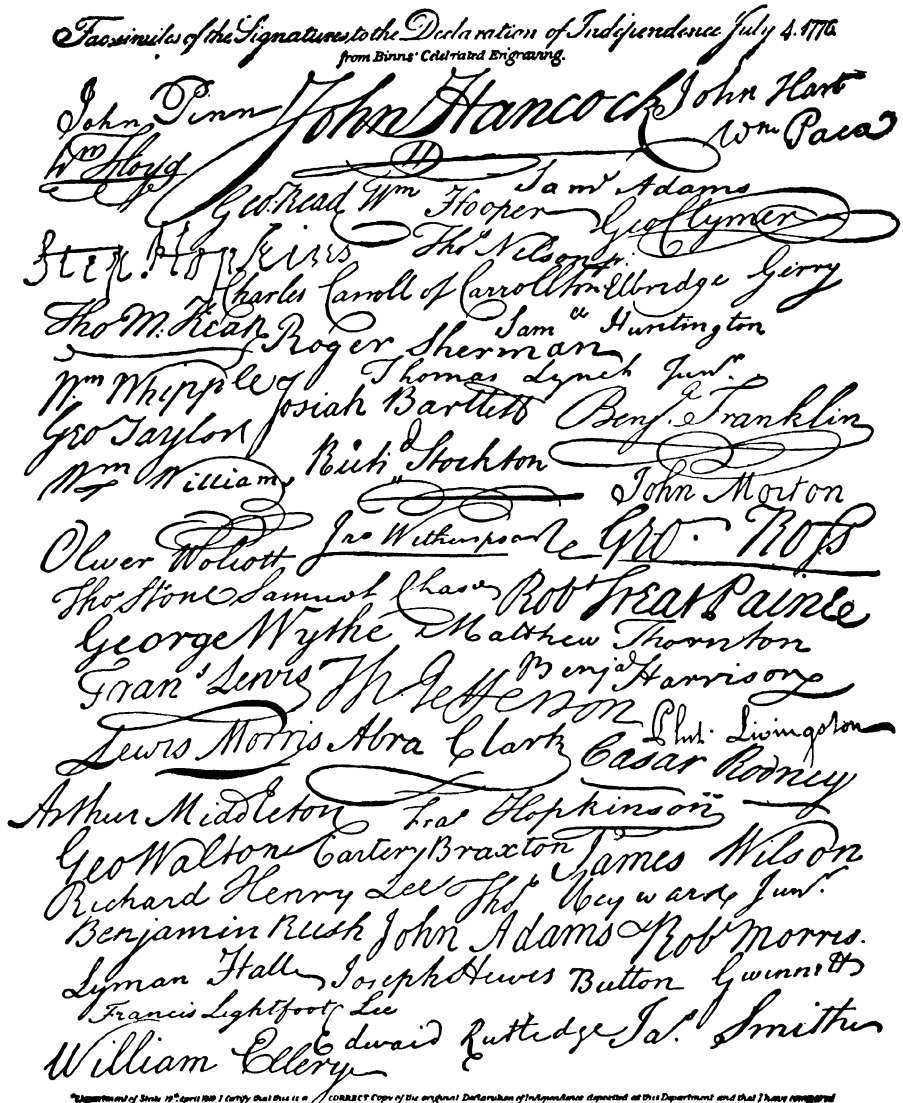
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THE SIGNERS OF THE DECLARATION OF INDEPENDENCE

As told in the introductory matter, the Declaration of Independence was not signed on July 4, 1776, though it was adopted on that date. The official copy was signed by the members present, August 2, 1776, though some absentees signed later. The official copy bears the signatures of the delegates from New York who did not vote for the Declaration, as their state did not instruct in favor of independence until July 9. On the other hand, Robert Livingston, one of the committee which drafted the Declaration, was called to duties in New York and never signed. Thomas McKean, of Delaware, was present on July 4, but absent later and was permitted to sign in 1781.

Some of the men who signed the Declaration were later prominent under the Confederation and the Constitution. Others were not heard from afterward. Some were old and died before the Constitution was adopted. We see the names of John Adams and Thomas Jefferson, later presidents of the United States. Benjamin Franklin was useful before and after the Declaration. John Hancock was prominent in Massachusetts, afterward as well as before. Samuel Adams, the great agitator, signed the Declaration, but was inclined to oppose the Constitution, though his opposition was not active. Benjamin Harrison was the father of President William Henry Harrison, who was in turn the grandfather of President Benjamin Harrison. Charles Carroll is said to have added the descriptive phrase "of Carrollton" to his name in order that there might be no confusion if the signers should be proscribed by Great Britain. James Wilson led the fight for the adoption of the Constitution in Pennsylvania. Richard Henry Lee did his utmost to prevent Virginia from adopting the Constitution, but later became United States Senator and a strong supporter of the new government. Robert Morris was the financier of the Revolution, and also held office under the Confederation.

TWO IMPORTANT HISTORICAL DOCUMENTS

IN the following pages we are giving you the text of the Declaration of Independence and the Constitution of the United States. Both are important documents in the history of the United States. We have talked about them in different volumes of our book, and here we give you the opportunity to see for yourselves what they say. A real historian always goes back to "original sources" in writing his books, and here you may see two of the documents such as historians use. Perhaps you will find that you had wrong impressions about them. The editor's comments are in different type.

THE DECLARATION OF INDEPENDENCE

IN Volume Four you will find the events leading up to the Declaration of Independence told at length. As you have seen, the adoption of the Declaration was not a sudden act. From the date of the Stamp Act in 1765 the colonists had been actively resisting King and Parliament. They had met in two Continental Congresses in defiance of British rule; blood had been shed at Lexington and Concord, Moore's Creek and Bunker Hill. Ticonderoga and Montreal had been captured, Quebec had been attacked, and Boston had been besieged.

In spite of all these events the colonists had been slow to move for absolute independence, but during these ten years of dispute the belief that separation was necessary had grown stronger. One by one states had declared for independence. On June 7, 1776, Richard Henry Lee, of Virginia, offered a resolution in Congress "that these United Colonies are, and of right ought to be free and independent states." Action was postponed for three weeks in order that the delegates might hear from home. Voting in Congress was by states, and the vote was cast as a majority of the delegates present directed. If the delegates were evenly divided, the state lost its vote. On July 2, 1776, the resolution was taken up in the Committee of the Whole. Nine states voted to adopt the resolution. New York was excused, as the delegates had no instructions; Delaware was divided; and only South Carolina and Pennsylvania were opposed. Strictly speaking, therefore, July 2, 1776, is the day upon which Congress voted for independence. The next day Congress met in regular session, and the three states last named voted formally with the nine in favor of the resolution declaring the United States independent.

Meanwhile, on June 11, a committee consisting of Thomas Jefferson, John Adams, Benjamin Franklin, Roger Sherman and Robert Livingston had been appointed to draw up a declaration of the reasons for separation. This committee reported on June 28, and the document was discussed in the Committee of the Whole before independence had been formally voted. The document itself is the work of Jefferson, though a few corrections were made by other members of the committee of five, and a few amendments by Congress. On July 4, 1776, the corrected and amended Declaration was adopted by vote of the twelve states, but it was signed on that date only by John Hancock, the president of Congress.

On July 9 New York instructed for independence, and on July 19 Congress voted that the document be engrossed on parchment and signed by every member. This copy was made, and on August 2 it was signed by all the members present, including the delegates from New York, who had not voted for independence on July 2, 3 or 4. As you are told under the copy of the signatures, one man did not sign at all, and another signed in 1781.

So you see that independence was declared, not on July 4, but on July 2 and July 3. The formal Declaration was adopted on July 4, but it was not

signed on that day, but on August 2 and later. The parchment copy of the Declaration is kept in the Department of State. Facsimile copies were later made for the signers and their families, but the ink has now faded to such an extent that many of the signatures can hardly be read. In the text which we give we have followed the spelling and the punctuation of the official engrossed copy, which differs somewhat in these particulars from the original copy adopted by Congress.

THE DECLARATION OF INDEPENDENCE

In Congress, July 4, 1776

THE UNANIMOUS DECLARATION OF THE THIRTEEN UNITED STATES OF AMERICA

WHEN in the Course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume among the Powers of the earth, the separate and equal station to which the Laws of Nature and of Nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness. That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed, That whenever any Form of Government becomes destructive of these ends, it is the Right of the People to alter or to abolish it, and to institute new Government, laying its foundation on such principles and organizing its powers in such form, as to them shall seem most likely to effect their Safety and Happiness. Prudence, indeed, will dictate that Governments long established should not be changed for light and transient causes; and accordingly all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same Object evinces a design to reduce them under absolute Despotism, it is their right, it is their duty, to throw off such Government, and to provide new Guards for their future security.—Such has been the patient sufferance of these Colonies; and such is now the necessity which constrains them to alter their former Systems of Government. The history of the present King of Great Britain is a history of repeated injuries and usurpations, all having in direct object the establishment of an absolute Tyranny over these States. To provide this, let Facts be submitted to a candid world.

He has refused his Assent to Laws, the most wholesome and necessary for the public good.

He has forbidden his Governors to pass Laws of immediate and pressing importance, unless suspended in their operation till his Assent should be obtained; and when so suspended, he has utterly neglected to attend to them.

He has refused to pass other Laws for the accommodation of large districts of people, unless those people would relinquish the right of Representation in the Legislature, a right inestimable to them and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their Public Records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved Representative Houses repeatedly, for opposing with manly firmness his invasions on the rights of the people.

He has refused for a long time, after such dissolutions, to cause others to be elected; whereby the Legislative Powers, incapable of Annihilation, have returned to the People at large for their exercise; the State remaining in the mean time exposed to all the dangers of invasion from without, and convulsions within.

He has endeavoured to prevent the population of these States; for that purpose obstructing the Laws for Naturalization of Foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new Appropriation of Lands.

He has obstructed the Administration of Justice, by refusing his Assent to Laws for establishing Judiciary Powers.

He has made Judges dependent on his Will alone, for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of New Offices, and sent hither swarms of Officers to harass our People, and eat out their substance.

He has kept among us, in times of peace, Standing Armies without the Consent of our legislature.

He has affected to render the Military independent of and superior to the Civil Power.

He has combined with others to subject us to a jurisdiction foreign to our constitution, and unacknowledged by our laws; giving his Assent to their acts of pretended legislation:

For quartering large bodies of armed troops among us:

For protecting them, by a mock Trial, from Punishment for any Murders which they should commit on the Inhabitants of these States:

For cutting off of Trade with all parts of the world:

For imposing taxes on us without our Consent:

For depriving us in many cases, of the benefits of Trial by Jury:

For transporting us beyond Seas to be tried for pretended offenses:

For abolishing the free System of English Laws in a neighbouring Province, establishing therein an Arbitrary government, and enlarging its Boundaries so as to render it at once an example and fit instrument for introducing the same absolute rule into these Colonies:

For taking away our Charters, abolishing our most valuable Laws, and altering fundamentally the Forms of our Governments:

For suspending our own Legislature, and declaring themselves invested with Power to legislate for us in all cases whatsoever.

He has abdicated Government here, by declaring us out of his Protection and waging War against us.

He has plundered our seas, ravaged our Coasts, burnt our towns, and destroyed the lives of our people.

He is at this time transporting large armies of foreign mercenaries to compleat the works of death, desolation and tyranny, already begun with circum-

stances of Cruelty & perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the Head of a civilized nation.

He has constrained our fellow Citizens taken Captive on the high Seas to bear arms against their Country, to become the executioners of their friends and Brethren, or to fall themselves by their Hands.

He has excited domestic insurrections amongst us, and has endeavoured to bring on the inhabitants of our frontiers, the merciless Indian Savages, whose known rule of warfare, is an undistinguished destruction of all ages, sexes and conditions.

In every stage of these Oppressions We have Petitioned for Redress in the most humble terms: Our repeated Petitions have been answered only by repeated injury. A Prince, whose character is thus marked by every act which may define a Tyrant, is unfit to be the ruler of a free People.

Nor have We been wanting in attention to our British brethren. We have warned them from time to time of attempts by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them by the ties of our common kindred to disavow these usurpations, which, would inevitably interrupt our connections and correspondence. They too have been deaf to the voice of justice and of consanguinity. We must, therefore, asquiesce in the necessity, which denounces our Separation, and hold them, as we hold the rest of mankind, Enemies in War, in Peace Friends.

We, therefore, the Representatives of the united States of America, in General Congress, Assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, do, in the Name, and by Authority of the good People of these Colonies, solemnly publish and declare, That these United Colonies are, and of Right ought to be Free and Independent States; that they are Absolved from all Allegiance to the British Crown, and that all political connection between them and the State of Great Britain, is and ought to be totally dissolved; and that as Free and Independent States, they have full Power to levy War, conclude Peace, contract Alliances, establish Commerce, and to do all other Acts and Things which Independent States may of right do. And for the support of this Declaration, with a firm reliance on the Protection of Divine Providence, we mutually pledge to each other our Lives, our Fortunes and our sacred Honor.

JOHN HANCOCK.

*New Hampshire**
JOSIAH BARTLETT
WM. WHIPPLE
MATTHEW THORNTON

Massachusetts Bay
SAML. ADAMS
JOHN ADAMS
ROBT. TREAT PAINE
ELBRIDGE GERRY

Rhode Island
STEP. HOPKINS
WILLIAM ELLERY

Connecticut
ROGER SHERMAN
SAM'EL HUNTINGTON
WM. WILLIAMS
OLIVER WOLCOTT

* This arrangement of the names is made for convenience. The states are not mentioned in the original.

New York
- Wm. Floyd
- Phil. Livingston
- Frans. Lewis
- Lewis Morris

New Jersey
- Richd. Stockton
- Jno. Witherspoon
- Fras. Hopkinson
- John Hart
- Abra. Clark

Pennsylvania
- Robt. Morris
- Benjamin Rush
- Benja. Franklin
- John Morton
- Geo. Clymer
- Jas. Smith
- Geo. Taylor
- James Wilson
- Geo. Ross

Delaware
- Cæsar Rodney
- Geo. Read
- Tho. M'Kean

Maryland
- Samuel Chase
- Wm. Paca
- Thos. Stone
- Charles Carroll of Carrollton

Virginia
- George Wythe
- Richard Henry Lee
- Th. Jefferson
- Benja. Harrison
- Thos. Nelson, jr.
- Francis Lightfoot Lee
- Carter Braxton

North Carolina
- Wm. Hooper
- Joseph Hewes
- John Penn

South Carolina
- Edward Rutledge
- Thos. Heyward, Junr.
- Thomas Lynch, Junr.
- Arthur Middleton

Georgia
- Button Gwinnett
- Lyman Hall
- Geo. Walton

THE CONSTITUTION

THE Second Continental Congress, which planned resistance to Great Britain, appointed George Washington commander-in-chief, and adopted the Declaration of Independence, was a revolutionary body, chosen in defiance of Great Britain. It was composed of delegates appointed by the separate states, who sat together in one house. We have told you that each state had one vote, which was cast as a majority of the delegates present decided. There was no central government, and Congress had no power over the separate states.

After the Declaration of Independence it was determined to frame a written agreement between the states, a sort of constitution. A committee was appointed and reported a plan. This was known as the Articles of Confederation, and with some changes was adopted by Congress in November, 1777, and sent to the separate states for their approval. All the states except Maryland ratified the articles within eighteen months. This state had no claim to any lands beyond the Alleghenies and refused to ratify until the other states promised to surrender their claims to western lands to Congress. This was finally done and Maryland ratified in 1781, and then the Articles of Confederation went into effect practically at the end of the Revolution. On page 1695 we tell you something of the Articles.

As you can see, such a government can hardly be called a government at all. It could not get the money to meet its obligations and had the respect neither of the people of the United States nor of other nations. States often failed to send delegates to Congress. Sometimes as few as twenty, representing ten states or fewer, were present. There was much disorder in the country and many disputes between states. Some of them threatened to go to war with other states. Thoughtful men feared that the independence won with such difficulty would be lost if the states did not form some closer union.

The constant disputes between the states led Virginia to ask them to send delegates to a meeting in Annapolis, Maryland, in 1786 to discuss uniform laws about trade. Only five states were represented, and no action was taken, but the delegates discussed the misfortunes of the country and all agreed that the Articles must be amended. So they adopted a resolution, drawn up by Alexander Hamilton, asking that the states send representatives to a convention to meet in Philadelphia in May, 1787. Congress approved the idea, and all the states except Rhode Island finally elected delegates, though New Hampshire was not represented until many important decisions had already been made.

The Convention had been called to meet May 14, 1787, but only a few delegates were present, and not until May 25 was the Convention called to order in Independence Hall. George Washington was chosen president, and it was voted to hold the meeting behind closed doors. Fortunately several of the delegates, particularly Madison, kept full notes of the proceedings which were published long afterward, and so we know almost all that happened during those four months.

Fifty-five delegates from twelve states were present at some time or other during the Convention, though not all of them took an active part. On the whole it was an unusual body of men representing the wealth and intelligence of the states. Twenty-nine were college-trained, three were professors of law, and one was a college president. Thirty-one had studied law, twelve of them in Europe. Thirty-nine had been members of Congress, and eight had helped to frame their state constitutions. Several had been, or were at the time, governors of their states.

The oldest member was Benjamin Franklin, over eighty-one, but Jonathan Dayton of New Jersey was only twenty-seven, Charles Pinckney of South Carolina was twenty-nine, and Alexander Hamilton was thirty. James Madison, who was the most influential member of the Convention, was thirty-six, and Gouverneur Morris of Pennsylvania, who is responsible for the exact wording of many sections, was thirty-five. The average age was about forty.

At the beginning of the discussion the "Virginia Plan" was offered and received the support of the larger states. Representation in the lower house was to be according to population, and the lower house was to elect the upper, and both together would choose the president. Since Massachusetts, Pennsylvania, Virginia and North Carolina had much more than half the population, this plan would have given entire control to the larger states. The smaller states objected and offered the "New Jersey Plan," which strengthened the Articles of Confederation, but left undisturbed the equal vote of the states. To avoid breaking up the Convention the "Connecticut Compromise" was adopted after much debate. This gave equal representation in the Senate, but representation according to population in the House of Representatives.

Already some people were beginning to doubt the wisdom of slavery, but some of the Southern states said that it was necessary. So slavery was not abolished, and Congress was forbidden to interfere with the slave trade before 1808. Next came the question whether slaves should be counted when fixing representation. The South said yes; the North said no. After discussion it was decided that in levying direct taxes and fixing representations, a hundred slaves should count as sixty white persons. This is the three-fifths rule of which you have heard.

These are only a few of the compromises of the Constitution. Nearly every sentence, almost every word, was the occasion of discussion, and many decisions were later modified when new arguments were presented. When the majority had finally come to general agreement the whole was referred to a committee which smoothed out the rough places and arranged the sections. Their work was then discussed line by line by the Convention and referred to the Committee on Style, of which Gouverneur Morris was the leading member. The document was again revised by the Convention and engrossed upon parchment.

The delegates had worked all through the hot summer of 1787. Some became displeased because the Constitution seemed to provide for too strong a government, and went home. Forty-two remained till the end. Three of them, George Mason and Edmund Randolph of Virginia and Elbridge Gerry of Massachusetts, at the last felt that they could not sign the instrument. The remaining thirty-nine, representing every one of the twelve states sending delegates, signed the finished paper on September 17, 1787.

It was then sent to Congress, which sent it to the states. The Convention had voted that it should go into effect when ratified by nine states, but it was not at all certain that a sufficient number of states would accept the instrument, as some of the most prominent men in the country were opposed. However, Delaware began, December 7, 1787, and Pennsylvania followed on December 12, and New Jersey on December 18, 1787. With the new year Georgia ratified (January 2) and Connecticut (January 9). In these states there was little opposition, but in Massachusetts the result was doubtful. Finally (February 6) it was ratified by a narrow majority, with the recommendation that several amendments be added as soon as possible. Maryland followed (April 28), and South Carolina ratified (May 23), but also recommended amendments. New Hampshire held back until it saw what Massachusetts would do but ratified on June 21, making the ninth state. Virginia discussed the matter for more than three weeks, but finally ratified on June 25, also recommending amendments.

Though more than a sufficient number of states had ratified, the position

of New York between New England and the other states made it especially important. Sentiment in the state was generally opposed to the Constitution. Hamilton, Madison and John Jay published in the newspapers a series of eighty-five essays advocating adoption. The book made from them is called The Federalist and even to-day is one of the best works upon the Constitution. In the Convention Hamilton fought hard, and did convert some opponents. The fact that ten states had ratified and that New York would be left out of the government if it failed to ratify also had its effect. So finally (July 26) the convention approved.

Two states only were left outside, North Carolina and Rhode Island. In the former state the convention refused to ratify, saying that the rights of the states and the people were not sufficiently guarded. Twenty-six amendments were suggested and the Convention adjourned. Rhode Island submitted the question of ratification to the people, who voted against it by a large majority. So these two states had no part in the first elections or in organizing the new government. North Carolina ratified in November, 1789, but Rhode Island did not ratify until May, 1790, and then by a majority of only two votes.

What Is the Constitution

The Confederation was simply an agreement between separate states which preserved all their independence. The Constitution is more than this, for the states surrendered some of their rights to the new general government. It is, in fact, a compromise between a purely federal government and a strong centralized government. Madison said that the new government was partly national and partly federal, and to this day there is no better definition.

Certain matters, such as peace and war, regulation of commerce, navigation laws, coinage, the post office and the like, belong to the nation, which has the power to levy and collect taxes. Others, such as the ordinary protection of life and property, education, charity, roads and bridges, belong to the state, which also reserves all other powers not given to the national government by the Constitution. Some questions may interest both state and nation, and at different times they have caused trouble.

As you read the Constitution you will see that Article I has to do with the election, powers and duties of Congress; Article II, with the election, powers and duties of the President and other executive officers; and Article III, with the judicial power. Articles IV, V and VI contain many miscellaneous provisions, including the methods of amendment, and Article VII states how the instrument shall go into effect.

What Are the Sources of the Constitution

There is no one source of the Constitution, and, in fact, there is little in it that is entirely new. Some of the delegates were students of government and could discuss every government the world had known up to that time, and were familiar with the writings of philosophers and statesmen. Then, too, they knew English history and were familiar with the struggle of the English people toward freedom. They had drawn up the Articles of Confederation, and many provisions in that instrument were transferred to the new document. There are some entirely new ideas, but not many. The chief source was the experience of the colonists in America. We sometimes forget that the history of several of the states is longer before 1787 than since. In every colony the people enjoyed more or less self-government, and they had drawn up state constitutions after the Declaration of Independence. Experience and knowledge gained from all these sources went into the making of the Constitution. The wording of the document owes more to Gouverneur Morris than to any other individual. He was the leading member of the committee which put the decisions into final form.

Probably not a single member of the Convention was entirely satisfied with the document when it was finally adopted. For example, Hamilton wished the general government to have much more power, and he would have had most of the high officials chosen for life or good behavior. Gouverneur Morris felt much the same way. On the other hand, many men doubted whether the rights of the states and the people had been sufficiently protected. Benjamin Franklin expressed the feeling of many when he said: "I confess there are several parts of the Constitution which I do not at present approve, but I am not sure that I shall never approve them. . . . I doubt too whether any other convention we can obtain may be able to make a better Constitution. . . . Thus I consent, sir, to this Constitution because I expect no better and because I am not sure that it is not the best."

Washington himself, in January, 1788, before Virginia had ratified the instrument said in a letter: "There are some things in the new form I will readily acknowledge, which never did and I am persuaded never will, obtain my cordial approbation, but I then did concede and now do most firmly believe that in the aggregate it is the best Constitution that can be obtained at this epoch and that this or a dissolution of the Union awaits our choice and are the only alternatives before us."

However, as the instrument was discussed during the months after the adjournment of the Convention, many who had been disposed to criticize began to realize the greatness of the document. Thus we find Washington writing somewhat later: "It appears to me little short of a miracle that the delegates from so many different States (which States you know are also different from each other in their manners, circumstances and prejudices) should unite in forming a system of national government so little liable to well-founded objections. Nor am I yet such an enthusiastic, partial or undiscriminating admirer of it as not to perceive it is tinctured with some real (though not radical) defects."

The Amendments to the Constitution

Feeling as they did about their work, it is not surprising that the members provided for amendments. In Article V two methods are suggested. Two-thirds of each House may pass an amendment and send it to the states, or if the legislatures of two-thirds of the states request it, Congress must call a convention to propose amendments. Amendments adopted in either way become a part of the Constitution if adopted by the legislatures or by special conventions in three-fourths of the states. All the amendments have been adopted by the first method, except the Twenty-first.

Many amendments have been proposed, but only twenty-one have been adopted. The first ten were adopted within less than three years after the new government began, and are really a part of the Constitution itself. The Eleventh was adopted in 1798, the Twelfth in 1804. Then for more than sixty years there was no amendment. Between 1865 aand 1870 came the three Civil War amendments, then two in 1913, one in 1919 (though it did not go into effect until 1920), one in 1920, and two more in 1933. Immediately after the amendments we tell something of the history of each.

What the Test of Time Has Shown

Though many of the makers of the Constitution were not enthusiastic over the result of their labors, it has stood the test of time, and that is the hardest test. Though we speak of the United States as a new country, our government is one of the oldest, if not the oldest, in existence, for the government of Great Britain has been so much changed in the last hundred years that it is hardly the same, and the present governments of all the other European states are younger than ours. It is certainly the oldest written Constitution in the world.

When the Constitution was adopted, republics were few in number and small in area and population. Prophecies of failure were freely made, for Europe could not understand how a country could get along without a king. Now monarchy is becoming the unusual form of government. Many of the republics established later took ideas from the Constitution, though none adopted it without change. It was also studied in drawing up forms of government for the self-governing dominions under the British Crown, though of course there are many differences. When the Union of South Africa was being discussed, it is said, however, that The Federalist was quoted oftener than any other work upon government. It is interesting to note that in Canada the powers not specifically given to the Provinces are reserved to the Dominion. Australia, on the other hand, followed the example of the United States, and powers not specifically given to the Commonwealth are reserved to the States. Ireland of course is not composed of different states, and this question did not arise.

In all these members of the "British Commonwealth of Nations" the Governor-General is appointed by the Crown, and in none of them is he anything like so powerful as the President of the United States. All of them have the "parliamentary system," which means that the legislative controls the executive. (See page 1833.) In the United States when the Congress and the President differ in politics the whole business of the nation may be brought almost to a standstill. This does not happen under the parliamentary system. The new republics which have sprung up in Europe as a result of the World War have generally adopted the parliamentary system. Dozens of republics have been established since the Fathers of the Constitution finished their work.

It was a new kind of government, as Madison said, and has proved both stable and flexible. It has been strong enough to stand the strain of foreign and domestic wars. It served for a nation of thirteen weak states along the Atlantic with less than 4,000,000 people. It continues to serve for a nation of forty-eight states stretching from ocean to ocean, with over 131,000,000 people, and with possessions beyond the seas. The young nation was almost entirely engaged in agriculture; the nation of to-day has become the greatest manufacturing country in the world. With little change the same Constitution and form of government have served both.

CONSTITUTION OF THE UNITED STATES OF AMERICA*

WE the People of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquillity, provide for the common defense, promote the general Welfare, and secure the Blessings of Liberty, to ourselves and our Posterity, do ordain and establish this CONSTITUTION for the United States of America.

Note. The original draft of the Constitution read: "We the People of the States of New Hampshire, Massachusetts," etc. As it was probable that some of the states would not ratify, the names of the states were omitted in the final draft, but there was no intention of overruling the powers of the states.

ARTICLE I

Legislative Powers—The House of Representatives

SECTION 1. All legislative Powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

SECTION 2. The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have the Qualifications requisite for the Electors of the most numerous Branch of the State Legislature.

No person shall be a Representative who shall not have attained to the Age of twenty-five Years, and been seven Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State in which he shall be chosen.

Representatives and direct Taxes shall be apportioned among the several States which may be included within the Union, according to their respective numbers, which shall be determined by adding to the whole Number of free Persons, including those bound to Service for a Term of Years, and excluding Indians not taxed, three fifths of all other Persons. The actual Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct. The number of Representatives shall not exceed one for every thirty Thousand, but each State shall have at Least one Representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to chuse three, Massachusetts eight, Rhode Island and Providence Plantations one, Connecticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

Note. Nearly all of this paragraph has been superseded by amendments or by circumstances. The income tax, which has been declared a direct tax, need not now be levied according to population (Amendment XVI). The three-fifths rule no longer

* Reprinted from the text issued by the State Department.

holds (Amendments XIII and XIV). The population to a representative is now over 280,000. The assignment of representatives to the states was changed after the first census of 1790 and every ten years afterward.

When vacancies happen in the Representation from any State, the Executive Authority thereof shall issue Writs of Election to fill such Vacancies.

The House of Representatives shall chuse their Speaker and other Officers; and shall have the sole Power of Impeachment.

The Senate—Election, Qualifications and Special Powers

SECTION 3. The Senate of the United States shall be composed of two Senators from each State, chosen by the Legislature thereof, for Six Years; and each Senator shall have one Vote.

Note. See Amendment XVII.

Immediately after they shall be assembled in Consequence of the first Election, they shall be divided as equally as may be into three Classes. The Seats of the Senators of the first Class shall be vacated at the Expiration of the second Year, of the second Class at the Expiration of the fourth Year, and of the third Class at the Expiration of the sixth Year, so that one third may be chosen every second Year; and if Vacancies happen by Resignation, or otherwise, during the Recess of the Legislature of any State, the Executive thereof may make temporary Appointments until the next Meeting of the Legislature, which shall then fill such Vacancies.

Note. These two paragraphs have been modified by Amendment XVII, which provides for the election of senators by the people.

No Person shall be a Senator who shall not have attained to the Age of thirty Years, and been nine Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State for which he shall be chosen.

The Vice President of the United States shall be President of the Senate, but shall have no Vote, unless they be equally divided.

The Senate shall chuse their other Officers, and also a President pro tempore, in the Absence of the Vice President, or when he shall exercise the Office of President of the United States.

The Senate shall have the sole Power to try all Impeachments. When sitting for that purpose, they shall be on Oath or Affirmation. When the President of the United States is tried, the Chief Justice shall preside: And no Person shall be convicted without the Concurrence of two thirds of the Members present.

Judgment in Cases of Impeachment shall not extend further than to removal from Office, and disqualification to hold and enjoy any Office of honor Trust or Profit under the United States: but the Party convicted shall nevertheless be liable and subject to Indictment, Trial, Judgment and Punishment according to law.

Note. Only a few officers have been impeached, and fewer have been convicted. In several cases the officer resigned, and therefore was not tried. One president, Andrew Johnson, was impeached but was not convicted, as you may read on page 2444. As you read in the last paragraph of Section 2, the House of Representatives must vote to impeach. That body also appoints a committee to prosecute the charges before the Senate sitting as a court.

SECTION 4. The Times, Places and Manner of holding Elections for Senators and Representatives, shall be prescribed in each State by the Legislature thereof; but the Congress may at any time by Law make or alter such Regulations, except as to the Places of chusing Senators.

Note. Congress in 1845 fixed the Tuesday following the first Monday in November as the date for choosing electors, in years that can be divided by four. In 1872 it was ordered that Representatives be elected on this date in the even years, though a few states were later permitted to elect earlier. Nearly all the states have adopted this day for state elections as well.

The Congress shall assemble at least once in every Year, and such Meeting shall be on the first Monday in December, unless they shall by Law appoint a different Day.

Note. See Amendment XX.

Congress—Membership, Rules, Procedure, Privileges

SECTION 5. Each House shall be the Judge of the Elections, Returns and Qualifications of its own Members, and a Majority of each shall constitute a Quorum to do Business; but a smaller Number may adjourn from day to day, and may be authorized to compel the Attendance of absent Members, in such Manner, and under such Penalties as each House may provide.

Each House may determine the Rules of its Proceedings, Punish its Members for disorderly behaviour, and, with the Concurrence of two thirds, expel a member.

Each House shall keep a Journal of its Proceedings, and from time to time publish the same, excepting such Parts as may in their Judgment require Secrecy; and the Yeas and Nays of the Members of either House on any question shall, at the Desire of one fifth of those Present, be entered on the Journal.

Neither House, during the Session of Congress, shall, without the Consent of the other, adjourn for more than three days, nor to any other Place than that in which the two Houses shall be sitting.

SECTION 6. The Senators and Representatives shall receive a Compensation for their Services, to be ascertained by Law, and paid out of the Treasury of the United States. They shall in all Cases, except Treason, Felony and Breach of Peace, be privileged from Arrest during their Attendance at the Session of their respective Houses, and in going to and returning from the same; and for any Speech or Debate in either House, they shall not be questioned in any other Place.

No Senator or Representative shall, during the Time for which he was elected, be appointed to any civil Office under the Authority of the United States, which shall have been created, or the Emoluments whereof shall have been encreased during such time; and no Person holding any Office under the United States, shall be a Member of either House during his Continuance in Office.

How a Bill Becomes a Law

SECTION 7. All Bills for raising Revenue shall originate in the House of Representatives; but the Senate may propose or concur with Amendments as on other Bills.

Every Bill which shall have passed the House of Representatives and the Senate, shall, before it becomes a Law, be presented to the President of the United States; If he approve he shall sign it, but if not he shall return it, with his Objections, to that House in which it shall have originated, who shall enter the Objections at large on their Journal, and proceed to reconsider it. If after such Reconsideration two thirds of that House shall agree to pass the Bill, it shall be sent, together with the Objections, to the other House, by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a law. But in all such Cases the Votes of both Houses shall be determined by Yeas and Nays, and the Names of the Persons voting for and against the Bill shall be entered on the Journal of each House respectively. If any Bill shall not be returned by the President within ten days (Sundays excepted) after it shall have been presented to him, the same shall be a Law, in like manner as if he had signed it, unless the Congress by their Adjournment prevent its Return, in which Case it shall not be a Law.

Every Order, Resolution, or Vote to which the Concurrence of the Senate and House of Representatives may be necessary (except on a question of Adjournment) shall be presented to the President of the United States; and before the Same shall take Effect, shall be approved by him, or being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the Rules and Limitations prescribed in the Case of a Bill.

Specific Powers of Congress

SECTION 8. The Congress shall have Power To lay and collect Taxes, Duties, Imposts and Excises, to pay the Debts and provide for the common Defence and general Welfare of the United States; but all Duties, Imposts and Excises shall be uniform throughout the United States;

To borrow Money on the credit of the United States;

To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes;

To establish an uniform Rule of Naturalization, and uniform Laws on the subject of Bankruptcies throughout the United States;

To coin Money, regulate the Value thereof, and of foreign Coin, and fix the Standard of Weights and Measures;

To provide for the Punishment of counterfeiting the securities and current Coin of the United States;

To establish Post Offices and post Roads;

To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;

To constitute Tribunals inferior to the supreme Court;

To define and punish Piracies and Felonies committed on the high Seas, and Offences against the Law of Nations;

To declare War, grant Letters of Marque and Reprisal, and make Rules concerning Captures on Land and Water;

To raise and support Armies, but no Appropriation of Money to that Use shall be for a longer Term than two Years;

To provide and maintain a Navy;

To make Rules for the Government and Regulation of the land and naval Forces;

To provide for calling forth the Militia to execute the Laws of the Union, suppress Insurrections and repel Invasions;

To provide for organizing, arming, and disciplining, the Militia, and for governing such Part of them as may be employed in the Service of the United States, reserving to the States respectively, the Appointment of the Officers, and the Authority of training the Militia according to the discipline prescribed by Congress;

To exercise exclusive Legislation in all Cases whatsoever, over such District (not exceeding ten Miles square) as may, by Cession of particular States, and the Acceptance of Congress, become the Seat of the Government of the United States, and to exercise like Authority over all Places purchased by the Consent of the Legislature of the State in which the same shall be, for the Erection of Forts, Magazines, Arsenals, dock-Yards, and other needful Buildings;—And

To make all Laws which shall be necessary and proper for carrying into Execution the foregoing Powers, and all other Powers vested by this Constitution in the Government of the United States, or in any Department or Officer thereof.

Note. Congress has exercised many powers not specifically mentioned above or elsewhere in the Constitution. For the most part they have been based upon the words "necessary and proper" in the paragraph above and upon the command to provide for the "general welfare" in the first paragraph of the section. The next question is what things are necessary and proper. Ever since the Constitution was adopted men have differed as to the answer. The Supreme Court has final decision. If the people are not satisfied the Constitution can be changed by amendment. Examples of such changes are the Thirteenth and the Sixteenth amendments.

Things Forbidden to Congress

SECTION 9. The Migration or Importation of such Persons as any of the States now existing shall think proper to admit, shall not be prohibited by the Congress prior to the Year one thousand eight hundred and eight, but a Tax or duty may be imposed on such Importation, not exceeding ten dollars for each Person.

Note. This paragraph became meaningless on the date mentioned.

The Privilege of the Writ of Habeas Corpus shall not be suspended, unless when in Cases of Rebellion or Invasion the public Safety may require it.

No Bill of Attainder or ex post facto Law shall be passed.

No Capitation, or other direct, Tax, shall be laid, unless in Proportion to the Census or Enumeration hereinbefore directed to be taken.

Note. The direct-tax provision of this paragraph has been modified by the Sixteenth Amendment.

No Tax or Duty shall be laid on Articles exported from any State.

No Preference shall be given by any Regulation of Commerce or Revenue to the Forts of one State over those of another: nor shall Vessels bound to, or from, one State, be obliged to enter, clear, or pay Duties in another.

No Money shall be drawn from the Treasury, but in Consequence of Appropriations made by Law; and a regular Statement and Account of the Receipts and Expenditures of all public Money shall be published from time to time.

No Title of Nobility shall be granted by the United States: and no Persons holding any Office of Profit or Trust under them, shall, without the Consent of the Congress, accept of any present, Emolument, Office, or Title, of any kind whatever, from any King, Prince or foreign State.

Things Forbidden to the States

SECTION 10. No State shall enter into any Treaty, Alliance, or Confederation; grant Letters of Marque and Reprisal; coin Money; emit Bills of Credit; make any thing but gold and silver Coin a Tender in Payment of Debts; pass any Bill of Attainder, ex post facto Law or Law impairing the Obligation of Contracts, or grant any Title of Nobility.

No State shall, without the Consent of the Congress, lay any Imposts or Duties on Imports or Exports except what may be absolutely necessary for executing its inspection Laws; and the net Produce of all Duties and Imposts, laid by any State on Imports or Exports, shall be for the Use of the Treasury of the United States; and all such Laws shall be subject to the Revision and Control of the Congress.

No State shall, without the Consent of Congress, lay any Duty of Tonnage, keep Troops, or Ships of War in time of Peace, enter into any Agreement or Compact with another State, or with a foreign Power, or engage in War, unless actually invaded, or in such imminent Danger as will not admit of Delay.

Note. Most of the things mentioned above as forbidden to the states are powers which they had exercised, or might exercise, under the Confederation, and which they here gave up to the general government.

ARTICLE II

The President—Election, Qualifications, Succession

SECTION 1. The executive Power shall be vested in a President of the United States of America. He shall hold his Office during the Term of four Years, and, together with the Vice President, chosen for the same Term, be elected as follows:

Note. The first draft made the term seven years and forbade re-election. This was changed when the method of election was changed.

Each State shall appoint, in such Manner as the Legislature thereof may direct, a Number of Electors, equal to the whole Number of Senators and Representatives to which the State may be entitled in the Congress: but no Senator or Representative, or Person holding an Office of Trust or Profit under the United States, shall be appointed an Elector.

Note. This paragraph was the result of much discussion. The convention first voted that the president should be elected by Congress. Later it was suggested that he be elected by the governors of the states, but some of the members were not satisfied with either method. It seemed impossible for the people to make a wise choice, as there were few newspapers and the citizen of Georgia knew less of New Hampshire than he now knows of Siam. So finally it was agreed that in each state

prominent citizens should be elected, and these should meet in the state capital, look over all the great men in the country and make a free choice. Everyone was pleased with this plan, but by 1800 parties had arisen and the system broke down. Though an elector cannot be punished if he does not vote for the party nominee, he is expected to do so, and always does.

The Electors shall meet in their respective States, and vote by Ballot for two Persons, of whom one at least shall not be an Inhabitant of the same State with themselves. And they shall make a List of all the Persons voted for, and of the Number of Votes for each; which List they shall sign and certify, and transmit sealed to the Seat of the Government of the United States, directed to the President of the Senate. The President of the Senate, shall, in the Presence of the Senate and House of Representatives, open all the Certificates, and the Votes shall then be counted. The Person having the greatest Number of Votes shall be the President, if such Number be a Majority of the whole Number of Electors appointed; and if there be more than one who have such Majority, and have an equal Number of Votes, then the House of Representatives shall immediately chuse by Ballot one of them for President; and if no Person have a Majority, then from the five highest on the List the said House shall in like Manner chuse the President. But in chusing the President, the Votes shall be taken by States, the Representation from each State having one Vote; A quorum for this Purpose shall consist of a Member or Members from two thirds of the States, and a Majority of all the States shall be necessary to a Choice. In every Case, after the Choice of the President, the Person having the greatest Number of Votes of the Electors shall be the Vice President. But if there should remain two or more who have equal Votes, the Senate shall chuse from them by Ballot the Vice President.

Note. This paragraph was superseded in 1804 by the Twelfth Amendment.

The Congress may determine the Time of chusing the Electors, and the Day on which they shall give their Votes; which Day shall be the same throughout the United States.

See Note Art. I, Sec. 4, above.

No Person except a natural born Citizen, or a Citizen of the United States, at the time of the Adoption of this Constitution, shall be eligible to the Office of President; neither shall any Person be eligible to that Office who shall not have attained to the Age of thirty-five Years, and been fourteen Years a Resident within the United States.

Note. Though it was possible for a foreign-born citizen to become president in the early years of the nation, none was ever elected. All of our presidents except Theodore Roosevelt were over forty-five when inaugurated, and most of them were over fifty. See pages 3937-54d.

In Case of the Removal of the President from Office, or of his Death, Resignation, or Inability to discharge the Powers and Duties of the said Office, the Same shall devolve on the Vice President, and the Congress may by Law provide for the Case of Removal, Death, Resignation or Inability, both of the President and Vice President, declaring what Officer shall then act as President and such Officer shall act accordingly, until the Disability be removed, or a President shall be elected.

Note. In 1791 Congress provided that in case of the death or disability of both president and vice-president, the president pro-tempore of the senate, and after him the speaker of the House of Representatives, should act as president. In 1886 the Presidential Succession Act provided that the members of the Cabinet (if eligible) should succeed in the order of the creation of their offices. The order of creation is State, Treasury, War, Attorney-General, Postmaster-General, Navy, and Interior. The departments not mentioned, Agriculture, Commerce, and Labor, have been created since 1886.

The President shall at stated Times, receive for his Services, a Compensation, which shall neither be Increased nor diminished during the Period for which he shall have been elected, and he shall not receive within that Period any other Emolument from the United States, or any of them.

Note. Up to the beginning of Grant's second term the president received $25,000 a year. From that time until 1909 the salary was $50,000. Since 1909 it has been $75,000, with $25,000 more for traveling expenses. In addition he has the use of the White House, some of the expenses of which are paid by the nation.

Before he enter on the Execution of his Office, he shall take the following Oath or Affirmation:—

"I do solemnly swear (or affirm) that I will faithfully execute the Office of President of the United States, and will to the best of my Ability, preserve, protect, and defend the Constitution of the United States."

The Powers and Duties of the President

SECTION 2. The President shall be Commander in Chief of the Army and Navy of the United States, and of the Militia of the several States, when called into the actual Service of the United States; he may require the Opinion, in writing, of the principal Officer in each of the executive Departments, upon any Subject relating to the Duties of their respective Offices, and he shall have Power to grant Reprieves and Pardons for Offences against the United States, except in Cases of Impeachment.

Note. The Cabinet is not mentioned by name in the Constitution. The only reference is that to "executive departments" in the paragraph above.

He shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur; and he shall nominate, and by and with the Advice and Consent of the Senate, shall appoint Ambassadors, other public Ministers and Consuls, Judges of the Supreme Court, and all other Officers of the United States, whose Appointments are not herein otherwise provided for, and which shall be established by Law; but the Congress may by Law vest the Appointment of such inferior Officers, as they think proper, in the President alone, in the Courts of Law, or in the Heads of Departments.

Note. These provisions have been the occasion of much friction between the president and the Senate. That body has often refused to ratify treaties made under the direction of the president, and has also refused many times to confirm his appointments to office.

The President shall have Power to fill up all Vacancies that may happen during the Recess of the Senate, by granting Commissions which shall expire at the End of their next Session.

SECTION 3. He shall from time to time give to the Congress Information

of the State of the Union, and recommend to their Consideration such Measures as he shall judge necessary and expedient; he may, on extraordinary Occasions, convene both Houses, or either of them, and in Case of Disagreement between them, with Respect to the Time of Adjournment, he may adjourn them to such Time as he shall think proper; he shall receive Ambassadors and other public Ministers; he shall take Care that the Laws be faithfully executed, and shall Commission all the Officers of the United States.

Note. Washington and Adams addressed Congress in person. Jefferson was a poor speaker and also thought that the practice was too much like the king's "Speech from the Throne." He sent his message in writing, and all other presidents down to Wilson followed his example. Wilson revived the earlier practice and was followed by Harding. Coolidge and Hoover, also Franklin D. Roosevelt, followed both practices.

SECTION 4. The President, Vice-president and all civil Officers of the United States, shall be removed from Office on Impeachment for, and Conviction of, Treason, Bribery, or other high Crimes and Misdemeanors.

ARTICLE III

The Judicial Department

SECTION 1. The judicial Power of the United States, shall be vested in one supreme Court, and in such inferior Courts as the Congress may from time to time ordain and establish. The Judges, both of the supreme and inferior Courts, shall hold their Offices during good Behaviour, and shall, at stated Times, receive for their Services, a Compensation, which shall not be diminished during their continuance in Office.

Note. The first Congress in 1789 fixed the number of Supreme Court justices at six. This number has been changed from time to time. At present the court consists of a chief justice and eight associate justices. Below the supreme courts are circuit and district courts. Each state includes at least one district, and the larger states are divided into several districts with one or more judges for each. In all there are about 167 district judges. In every district there is a United States Attorney who represents the United States, and a United States Marshal whose duties are similar to those of a sheriff in the state court. The whole country is divided into ten circuits, with three to seven circuit judges for each. These courts hear appeals from district courts, and in some cases their judgment is final. There is also a Federal Court of Claims, which examines claims against the United States, and a Court of Customs Appeals. Special federal courts are organized for the District of Columbia, Alaska, the Canal Zone, Hawaii and Puerto Rico.

SECTION 2. The judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the United States, and treaties made, or which shall be made, under their Authority;—to all Cases affecting Ambassadors, other public Ministers and Consuls;—to all Cases of admiralty and maritime Jurisdiction;—to Controversies to which the United States shall be a Party;—to Controversies between two or more States;—between a State and Citizens of another State;—between Citizens of different States,—between Citizens of the same State claiming Lands under Grants of different States, and between a State, or the Citizens thereof, and foreign States, Citizens, or Subjects.

Note. By the Eleventh Amendment a state may not be sued by a citizen of another state or by a foreigner.

In all Cases affecting Ambassadors, other public Ministers and Consuls, and those in which a State shall be Party, the supreme Court shall have original Jurisdiction. In all the other Cases before mentioned the Supreme Court shall have appellate Jurisdiction, both as to Law and Fact, with such Exceptions, and under such regulations as the Congress shall make.

The Trial of all Crimes, except in Cases of Impeachment, shall be by Jury; and such Trial shall be held in the State where the said Crimes shall have been committed; but when not committed within any State, the Trial shall be at such Place or Places as the Congress may by Law have directed.

SECTION 3. Treason against the United States, shall consist only in levying War against them, or in adhering to their Enemies, giving them Aid and Comfort. No Person shall be convicted of Treason unless on the Testimony of two Witnesses to the same overt Act, or on Confession in open Court.

The Congress shall have Power to declare the Punishment of Treason, but no Attainder of Treason shall work Corruption of Blood or Forfeiture except during the Life of the Person attainted.

ARTICLE IV

The United States and the States

SECTION 1. Full Faith and Credit shall be given in each State to the public Acts, Records, and judicial Proceedings of every other State. And the Congress may by general Laws prescribe the Manner in which such Acts, Records and Proceedings shall be proved, and the effect thereof.

SECTION 2. The Citizens of each State shall be entitled to all Privileges and Immunities of Citizens in the several States.

A Person charged in any State with Treason, Felony, or other Crime, who shall flee from Justice, and be found in another State shall on Demand of the executive Authority of the State from which he fled, be delivered up, to be removed to the State having Jurisdiction of the Crime.

Note. This means that a criminal fleeing into another state must be given up upon the demand of the governor of the state where the crime was committed. This is called Extradition.

No Person held to Service or Labour in one State, under the Laws thereof, escaping into another, shall, in consequence of any Law, or Regulation therein, be discharged from such Service or Labour, but shall be delivered up on Claim of the Party to whom such Service or Labour may be due.

Note. Under this provision Congress passed the Fugitive Slave Laws.

SECTION 3. New States may be admitted by the Congress into this Union; but no new State shall be formed or erected within the Jurisdiction of any other State; nor any State be formed by the Junction of two or more States, or Parts of States, without the Consent of the Legislatures of the States concerned as well as of the Congress.

The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States; and nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular State.

SECTION 4. The United States shall guarantee to every State in this Union a Republican Form of Government, and shall protect each of them against Invasion; and on Application of the Legislature, or of the Executive (when the Legislature cannot be convened) against domestic Violence.

ARTICLE V

How the Constitution May Be Amended

The Congress, whenever two thirds of both Houses shall deem it necessary, shall propose Amendments to this Constitution, or, on the Application of the Legislature of two thirds of the several States, shall call a Convention for proposing Amendments, which, in either case, shall be valid to all Intents and Purposes as part of this Constitution, when ratified by the Legislature of three fourths of the several States, or by Conventions in three fourths thereof, as the one or the other Mode of Ratification may be proposed by the Congress; Provided that no Amendment which may be made prior to the Year one thousand eight hundred and eight shall in any Manner affect the first and fourth Clauses in the Ninth Section of the first Article; and that no State, without its Consent, shall be deprived of its equal Suffrage in the Senate.

ARTICLE VI

All Debts contracted and Engagements entered into, before the Adoption of this Constitution, shall be as valid against the United States under this Constitution, as under the Confederation.

This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the land; and the Judges in every State shall be bound thereby, any thing in the Constitution or laws of any State to the Contrary notwithstanding.

The Senators and Representatives before mentioned, and the Members of the several State Legislatures, and all executive and judicial Officers, both of the United States and of the several States, shall be bound by Oath or Affirmation, to support this Constitution; but no religious Test shall ever be required as a Qualification to any Office or public Trust under the United States.

ARTICLE VII

The Ratification of the Conventions of nine States, shall be sufficient for the Establishment of this Constitution between the States so ratifying the Same.

Note. In this article the Convention plainly disregarded its instructions from Congress, which had voted that the changes should be approved by all the states. Since Rhode Island had sent no delegates to the Convention, it was expected that it would not ratify and that other states also might fail to approve. As you know, both Rhode Island and North Carolina failed to ratify, and the new government began without them.

Done in Convention by the Unanimous Consent of the States present the Seventeenth Day of September in the Year of our Lord one thousand seven hundred and Eighty seven and of the Independence of the United

States of America the Twelfth. In Witness whereof We have hereunto subscribed our Names.

Go. Washington
Presidt and deputy from Virginia

New Hampshire
John Langdon
Nicholas Gilman
Massachusetts
Nathaniel Gorham
Rufus King
Connecticut
Wm: Saml. Johnson
Roger Sherman
New York
Alexander Hamilton
New Jersey
Wil: Livingston
David Brearley.
Wm. Patterson.
Jona: Dayton
Pennsylvania
B Franklin
Thomas Mifflin
Robt Morris
Geo. Clymer
Thos. Fitzsimons
Jared Ingersoll
James Wilson
Gouv Morris
Delaware
Geo: Read
Gunning Bedford jun
John Dickinson
Richard Bassett
Jaco: Broom
Maryland
James McHenry
Dan of St Thos Jenifer
Danl. Carroll
Virginia
John Blair—
James Madison Jr.
North Carolina
Wm. Blount
Richd. Dobbs Spaight
Hu Williamson
South Carolina
J. Rutledge
Charles Cotesworth Pinckney
Charles Pinckney
Pierce Butler
Georgia
William Few
Abr Baldwin

Attest:
William Jackson, *Secretary*

Articles in Addition to, and Amendment of, the Constitution of the United States of America, Proposed by Congress, and Ratified by the Legislatures of the Several States, Pursuant to the Fifth Article of the Original Constitution.

I

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof, or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

II

A well-regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed.

III

No soldier shall, in time of peace be quartered in any house, without the consent of the Owner, nor in time of war, but in a manner to be prescribed by law.

IV

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

V

No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any Criminal Case to be witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

VI

In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining Witnesses in his favor, and to have the Assistance of Counsel for his defence.

VII

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any Court of the United States, than according to the rules of the common law.

VIII

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

IX

The enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.

X

The powers not delegated to the United States by the Constitution nor

prohibited by it to the States, are reserved to the States respectively, or to the people.

Note. We have told you above that several of the states, when ratifying the Constitution, proposed amendments. The first Congress, meeting in New York in 1789, adopted twelve amendments and submitted them to the states. Ten of the twelve were ratified, and on December 15, 1791, were declared to be a part of the Constitution.

XI

The Judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by Citizens of another State, or by Citizens or Subjects of any Foreign State.

XII

The Electors shall meet in their respective states, and vote by ballot for President and Vice President, one of whom, at least, shall not be an inhabitant of the same state with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which lists they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the President of the Senate;—The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates and the votes shall then be counted;—The person having the greatest number of votes for President, shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers not exceeding three on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the vote shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a President whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in the case of the death or other constitutional disability of the President. The person having the greatest number of votes as Vice-President, shall be Vice-President, if such number be a majority of the whole number of electors appointed, and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two-thirds of the whole number of senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States.

Note. In the election of 1800 Thomas Jefferson and Aaron Burr received the same number of electoral votes, and the tie was broken by the House of Representatives after much ill-feeling. To prevent such an occurrence in the future this amendment was sent to the states in 1803, and on September 25, 1894, became a part of the Constitution. It supersedes the third paragraph of Article II, section 1.

XIII

SECTION 1. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

SECTION 2. Congress shall have power to enforce this article by appropriate legislation.

Note. The Emancipation Proclamation of January 1, 1863, gave freedom only to "slaves within any State, or designated part of a State, the people whereof shall then be in rebellion against the United States." Slaves in those parts of the Confederacy then held by the Union forces and slaves in the four slave-holding states which did not secede were not freed. All slaves were freed by this amendment, which was sent to the states February 1, 1865, and declared to have been ratified December 18, 1865.

XIV

SECTION 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States: nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.

SECTION 2. Representatives shall be apportioned among the several states according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice President of the United States, Representatives in Congress, the Executive and Judicial officers of a State, or the members of the Legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion, or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

SECTION 3. No person shall be a Senator or Representative in Congress, or elector of President and Vice President, or hold any office, civil or military, under the United States, or under any State, who having previously taken an oath, as a member of Congress, or as an officer of the United States, or as a member of any State legislature or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may by a vote of two-thirds of each House remove such disability.

SECTION 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations and claims shall be held illegal and void.

SECTION 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

Note. This amendment has several parts and was intended to accomplish several purposes. The emancipation of the slaves did not make them citizens. In fact, it gave the whites in the slave-holding states greater representation, for now they could count all the negroes in the population instead of three-fifths of them, and these negroes could not vote. Then, too, several of the Southern states had passed rather harsh laws which applied only to negroes. Again, President Johnson had been liberal in pardoning Southern leaders, and Congress wished to take this power from him. It also wished to make impossible the payment of the Confederate debt. Therefore, the first paragraph declares anyone born or naturalized in the United States to be a citizen, and forbids discrimination. The second paragraph punishes by loss of representation any state which prevents citizens from voting, while the third limited the pardoning power of the president. The fourth forbids the payment of the Confederate debt. This amendment was submitted to the states June 16, 1866, and on July 23, 1868, became a part of the Constitution.

XV

SECTION 1. The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude.

SECTION 2. The Congress shall have power to enforce this article by appropriate legislation.

Note. In spite of the Fourteenth Amendment the Southern states were slow to give the vote to the negro. The Fifteenth was intended to force them to grant this right. It was submitted February 27, 1869, and was ratified March 30, 1870.

XVI

The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration.

Note. In Article I, section 9, third paragraph, Congress is forbidden to levy any direct taxes except in proportion to population. That is, states of the same population must pay the same amount of tax. The Income Tax is a tax levied on income rather than on population, and in 1894 the Supreme Court declared it to be a direct tax. Agitation to change the Constitution began, and July 12, 1909, the amendment was submitted to the states, and was declared to be ratified February 25, 1913.

XVII

The Senate of the United States shall be composed of two Senators from each State, elected by the people thereof, for six years; and each Senator shall have one vote. The electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State Legislatures.

When vacancies happen in the representation of any State in the Senate, the executive authority of such State shall issue writs of election to fill such vacancies: *Provided,* That the Legislature of any State may empower the executive thereof to make temporary appointments until the people fill the vacancies by election as the Legislature may direct.

Note. Dissatisfaction with the election of senators by the legislatures of the states began to spring up after the Civil War, and this amendment was submitted to the states May 16, 1912, and was declared ratified May 31, 1913.

XVIII

SECTION 1. After one year from the ratification of this article the manufacture, sale, or transportation of intoxicating liquors within, the importation thereof into, or the exportation thereof from the United States and all territory subject to the jurisdiction thereof for beverage purposes is hereby prohibited.

SECTION 2. The Congress and the several States shall have concurrent power to enforce this article by appropriate legislation.

SECTION 3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of the several States, as provided in the Constitution, within seven years from the date of the submission hereof to the States by the Congress.

Note. Opposition to the manufacture and sale of intoxicating liquors is not new in the United States; beginning with Maine in 1851, many states had passed prohibitory laws. This amendment was submitted to the states December 18, 1917, was declared ratified January 29, 1919, and went into effect January 16, 1920. See next page.

XIX

The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of sex.

Congress shall have power to enforce this article by appropriate legislation.

Note. Some colonial women demanded the right to vote, and in Massachusetts many did vote. The first constitution of New Jersey in 1776 gave them the right to vote, but it was taken away in 1807. The demand for equal suffrage grew in strength, and Wyoming, when organized as a territory in 1869, gave women equal rights. Other territories and states followed, and in May 21, 1919, when the amendment was submitted to the states, women had equal voting rights in fourteen states and partial rights in many more. The amendment was declared ratified August 25, 1920.

XX

SECTION 1. The terms of the President and Vice President shall end at noon on the twentieth day of January, and the terms of Senators and Representatives at noon on the third day of January, of the years in which such terms would have ended if this article had not been ratified; and the terms of their successors shall then begin.

SECTION 2. The Congress shall assemble at least once in every year, and such meeting shall begin at noon on the third day of January, unless they shall by law appoint a different day.

SECTION 3. If, at the time fixed for the beginning of the term of the President, the President elect shall have died, the Vice President shall become President. If a President shall not have been chosen before the time fixed for the beginning of his term, or if the President elect shall have failed to qualify, then the Vice President elect shall act as President until a President shall have qualified; and the Congress may by law provide for the case wherein neither a President elect nor a Vice President elect shall have qualified; declaring who shall then act as President, or the manner in which one who is to act shall be selected, and such person shall act accordingly until a President or Vice President shall have qualified.

SECTION 4. The Congress may by law provide for the case of the death of any of the persons from whom the House of Representatives may choose a President whenever the right of choice shall have devolved upon them, and for the case of the death of any of the persons from whom the Senate may choose a Vice President whenever the right of choice shall have devolved upon them.

SECTION 5. Sections 1 and 2 shall take effect on the 15th day of October following the ratification of this article.

SECTION 6. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of three-fourths of the several States within seven years from the date of its submission.

Note. The elections for President and members of the Congress are held early in November but the term of office did not begin until March 4 of the new year. Unless called in extra session, the newly elected Congress did not meet until December, thirteen months after their election. Meanwhile the session of the Congress which met in December of an even year, a month after the elections, was composed of members elected two years before, many of whom had been defeated for re-election. This has happened many times, and was disrespectfully called a "Lame Duck" session. For example, the elections of November, 1932, showed an enormous Democratic majority, but the Congress in session from December, 1932, to March 4, 1933, was Republican, elected in 1930, with a Republican President. By moving forward the session of the new Congress to January 3, two months after election, changes desired by the people can be put into effect sooner. The inauguration of the President is also advanced. The third section gives the Congress powers to provide who may be President in case of the death or inability of both President and Vice President between election and inauguration. This amendment was submitted to the States in March, 1932, and was ratified by the thirty-sixth state January 23, 1933.

XXI

SECTION 1. The eighteenth article of amendment to the Constitution of the United States is hereby repealed.

SECTION 2. The transportation or importation into any State, Territory or possession of the United States for delivery or use therein of intoxicating liquors, in violation of the laws thereof, is hereby prohibited.

SECTION 3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by convention in the several States, as provided in the Constitution, within seven years from the date of the submission hereof to the States by the Congress.

Note. The Eighteenth Amendment met with great opposition in some parts of the country and enforcement was difficult, particularly in the cities. Many citizens who were in sympathy with the purpose grew to believe that perhaps a mistake had been made in making prohibition a national rather than a state matter. So much dissatisfaction was expressed that on February 16, 1933, the Twenty-first Amendment passed the Senate and four days later the House. Heretofore all amendments have been ratified by state legislatures, and the second method (by conventions) has not before been used (see Art. V).

States immediately began to hold elections, and within less than nine months thirty-nine states had voted, thirty-seven in favor and only two against. Utah, the thirty-sixth state to ratify, held its convention and ratified December 5, 1933, thus making the amendment operative. This is the first time any amendment has been repealed.

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