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BRITANNICA JUNIOR ENCYCLOPÆDIA

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For Boys and Girls

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Prepared under the supervision of the editors of

ENCYCLOPÆDIA BRITANNICA

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KEY TO PRONUNCIATION

It is of especial importance that an encyclopaedia for children give the pronunciation where the boy or girl might go astray. In all such instances the pronunciation in BRITANNICA JUNIOR ENCYCLOPÆDIA is clearly marked. The accent is shown by the mark (′). The sounds for the different letters, when not self-evident, are as follows:

ā as in *pale*
ã as in *care*
ă as in *bat*
ä as in *farm*
à as in *task*
a̰ as in *ball*
ē as in *be*
ĕ as in *met*
ē as in *her*
ī as in *mice*
ĭ as in *tin*
ō as in *cold*
ŏ as in *not*
ô as in *for*
oi as in *oil*
o͞o as in *loot*
ou as in *out*
ū as in *use*
ŭ as in *run*
u̯ as in *pull*
ü as in French *début*, German *über*
g (always hard) as in *gay*
j for *g* as in *gentle*
K for *ch* as in German *Bach* or Scottish *loch*
n̓ (nasal) as in French *bon*
th as in *think*
t͟h as in *thee*
t̨ as in *picture* (Sound varies from *t* to *ch*)
z̨ as in *pleasure* (Sound varies from *z* to *zh*)

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OF CHICAGO

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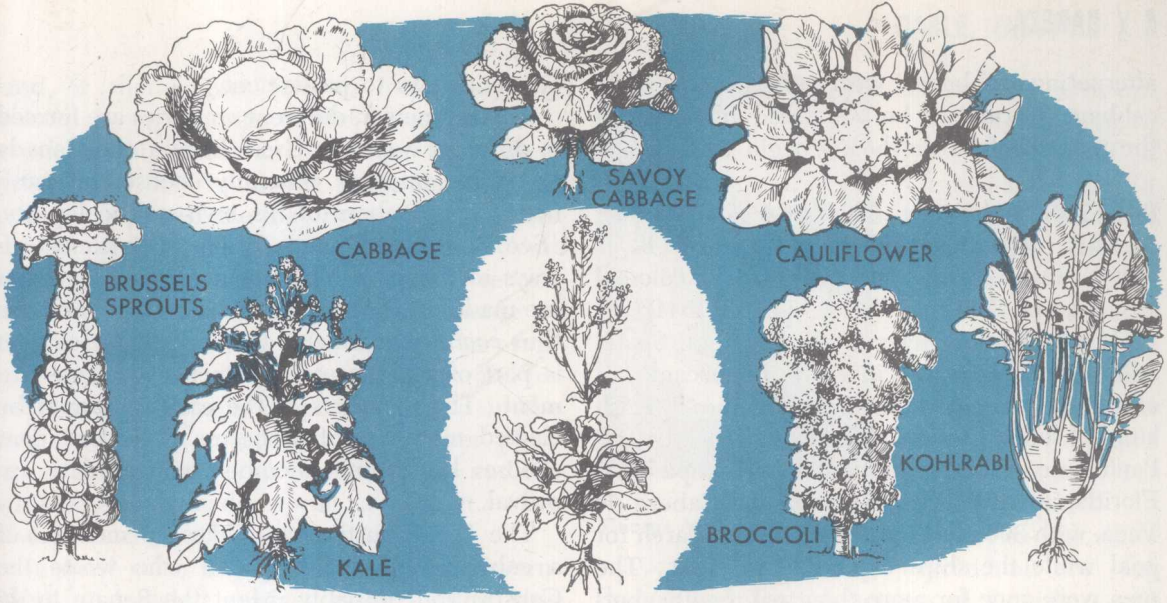
Let knowledge grow from more to more and thus be human life enriched

A cart leaves little room for passing on this Isle of Sark highway. See CHANNEL ISLANDS, ENGLISH CHANNEL.



The wild cabbage is still found growing on the seacoasts of Europe. From it, many common plants have descended, including the seven shown here.

CABBAGE (*kăb'ĭj*) is a biennial vegetable. It grows in several forms, which have been developed by long cultivation of the wild cabbage, *Brassica oleracea.*

The wild cabbage is a useless plant that grows along the seacoasts of Europe where it has grown for centuries. It has showy, yellow flowers and frilled leaves. Of the many cultivated plants that have been developed from it, some are raised as ornamental plants, some as fodder for animals, and some as food for man. The best known of the last group are common, or head, cabbage, kale, Brussels sprouts, cauliflower, broccoli, and kohlrabi. The differences among these plants are in habits of growth and in their forms and flavor.

Head cabbage has one central bud surrounded by leaves growing tightly about it. They fold over the bud and form a large, solid head. Red and white cabbages have smooth leaves; the savoy cabbage has green, wrinkled leaves. Fresh head cabbage is eaten raw in salads or cooked as a vegetable. Red and savoy cabbages are varieties of head cabbage. Red cabbage is a favorite for pickling, and savoy cabbage is usually cooked before being served. A favorite German dish is sauerkraut. It is made by packing alternate layers of shredded cabbage and salt in wooden barrels or earthenware jars. After slight fermenting, the sauerkraut is sealed up until used. The Korean national dish is *kimchi,* made from spiced, fermented cabbage.

Kale is used for winter greens or fed to cattle. It resembles the wild cabbage in that all the leaves grow to full size and remain separate from one another. Brussels sprouts are tiny cabbagelike heads that form along an elongated stalk. At the top of the stalk are leaves that are full and open.

The cauliflower is made up of delicately flavored flower buds compacted into a head and surrounded by leaves. The Italians developed a hardier variety of cauliflower called broccoli. The heads of the flower buds are smaller and looser than those of cauliflower, and there are more leaves. Broccoli sprouts, like Brussels sprouts, form small heads near the base of the plant stalk. In each small head are many flower buds. Kohlrabi has a ball-shaped enlargement of the stem just above the ground.

Most forms of cabbages are hardy and grow well in any fertile, well-drained soil. The seed is planted in specially prepared beds, and the seedlings are transplanted. As soon as the heads are well grown and firm, the crop is harvested. The most serious diseases of cabbages are clubroot and black rot. These can be controlled by

alternating cabbages with other crops. The cabbage worm can be combated by spraying the plants before the heads begin to form.

CABEZA (*kä bā' thä*) **DE VACA** (*thä vä' kä*), **ALVAR** (*äl' vär*) **NUNEZ** (*nōō' nyāth*) (1490?–?1560), was a Spanish explorer and the colonial governor of Paraguay from 1542 to 1544.

He was born in Jerez de la Frontera, Spain. After military service in Italy, he became an officer in an expedition sent by the Spanish king to settle Florida. The expedition, led by Panfilo de Narvaez, landed near Tampa Bay, Florida, in April 1528. Narvaez and Cabeza de Vaca, with 300 men, started inland to search for gold while the ships explored the coast. The men were gone for more than two months, battling swamps and hostile Indians. When they finally returned to the sea exhausted and without food, the ships were gone so they ate their horses and used the hides to make five small boats. In these they started for Mexico.

One by one the boats were lost, including the one that carried Narvaez. The last two were shipwrecked on an island the men called the Island of Ill Fate. Of the 80 men cast ashore 15 lived through the winter, but only Cabeza de Vaca and three others survived to start again for Mexico. They reached Mexico City in 1536, after eight years of wandering among Indian tribes along the Gulf coast and in northern Mexico.

In 1540 Cabeza de Vaca was made governor of the Rio de la Plata region of South America. He reached Asuncion, the capital of Paraguay, in 1542, but was soon deposed and sent back to Spain in chains, accused of not tending to the king's interests. He was imprisoned from 1551 to 1556.

Cabeza de Vaca's report of his overland wanderings inspired the explorations of Francisco Vasquez de Coronado.

CABINET (*kăb'i nĕt*) is a group of governmental advisers. In the United States they are heads (secretaries) of executive departments who also act as advisers to the president. The British have heads (ministers) of departments (ministries). They decide on policies and recommend laws to parliament.

The cabinets in different countries are formed in different ways. In Great Britain and Canada the prime minister generally chooses his cabinet from members of his own political party. (See ENGLAND; CANADA.) They are almost always members of Parliament. French cabinets are made up of men of various parties, and are thus *coalition* cabinets. In the U.S. the cabinet is part of the executive branch of the government. The members of the cabinet cannot be elected members of Congress. The president chooses his cabinet members with Senate approval.

The U.S. Constitution makes no mention of a cabinet. In fact, the men who wrote the Constitution probably meant the Senate to do the work of a cabinet. George Washington, however, found it easier to ask the heads of the three executive departments and the attorney general for advice.

By 1793 these advisers were called the cabinet. As the U.S. government grew larger, new departments were added so the cabinet grew also. After 1966 there were 12, but the Post Office Department was dropped in 1971, leaving 11. (See UNITED STATES GOVERNMENT.)

In the United States, cabinet members do not recommend laws to Congress as members of the British cabinet do to Parliament. Their main duties are to carry out the business of their departments. They suggest to the president laws and policies which help them to carry out these duties. The president may then recommend that Congress pass these laws.

British Cabinet

The British cabinet is a committee made up of members of the party which controls the House of Commons. They are chosen by the prime minister, who is also the leader of that party. They are heads of the main administrative departments and direct the lawmaking work of Parliament.

Cabinet government is the term used to describe the way English and Canadian governments work. It means that the cabinet is responsible for doing what the majority party in the legislature wants done. In Eng-

land, if the cabinet fails to introduce laws wanted by a majority of the House of Commons, or introduces an important bill that is defeated in the House, the prime minister has only two choices. He may resign for the entire cabinet, or he may dissolve the House of Commons and call for a new election. The second way is now the usual one in England. If the election shows that the country has supported the policy of the prime minister and his cabinet, they remain in power. But if in the new Parliament members of the other party are in the majority, the cabinet resigns and the winning party leader forms a cabinet. (See PARLIAMENT.)

In most other European systems of government a defeated cabinet resigns. The king or president tries to form a cabinet from a different party without having to dissolve the Parliament.

How the Cabinet Developed

The word cabinet first came to be used for a group of governmental advisers in 17th-century England. It is from a French word meaning "small room." Those men who met with the king in his private office, or cabinet, became known as the cabinet.

During the reign of Queen Anne (1702–1714), the Queen learned that the business of government went better if most of her advisers were chosen from the party which controlled Parliament. This meant changing the cabinet when the House of Commons changed. King George I (1714–1727) rarely attended cabinet meetings, and George II (1727–1760) made this a custom. The prime minister, Sir Robert Walpole, became the real leader. From then on the power of the prime minister depended upon his keeping a majority of the House of Commons.

CABLE (*kā'b'l*), **GEORGE WASHINGTON** (1844–1925). George Washington Cable was a United States novelist whose books describe life in 19th-century Louisiana. He wrote about such exciting events as family feuds and voodoo ceremonies and gives colorful word pictures of carnival balls and the old French quarter in New Orleans.

Brown Brothers

George Washington Cable.

Cable was born in New Orleans of a Virginia father and a New England mother. He fought for two years in the War Between the States as a cavalryman for the Confederacy. In the city records he read about New Orleans in the past and became interested in the creoles—the white descendants of the French and Spanish settlers of Louisiana and the Gulf states. He used their stories as background for his tales, which were collected in his first book, *Old Creole Days*, published in 1879.

His next book, a novel called *The Grandissimes* (1880), is his best, but he kept writing until shortly before his death on January 31, 1925.

Other good books by Cable are *Madame Delphine* (1881) and *Dr. Sevier* (1885).

CABLE, ELECTRIC. An electric cable is a bundle of wires made to carry electricity. Each cable is made to carry a certain voltage (electrical pressure) in as small a container as possible. Cables are put together in many ways, depending on their use. Some have only one conductor, or wire, to carry the electricity. Telephone cables may have as many as 2,200 wires. Different conductors are put into cables for different uses. Some are just one wire. Others are made up of many small wires "stranded" or twisted together.

The coaxial cable, which carries television as well as telephone messages, has a copper tube not much bigger around than a pencil. In the center of the tube is a single wire about the size of a pencil lead. This is held in the center of the tube by small disks of porcelain placed about an inch apart along the wire. Because of its size and shape, the copper tube can carry not only hundreds of telephone messages at the

same time, but also provide television channels. Cables now being used usually have eight of these coaxial units, or combinations of hollow tube and copper wire.

The Pirelli cable has a special kind of conductor that is twisted around a long hollow tube made of copper ribbon wound in spirals. The hollow part is filled with an insulating liquid kept under pressure.

How Cables Are Made

In cables that carry the same kind of current, the many wires can touch one another. But in cables that carry different voltages, insulation is needed to prevent the wires' touching. If the insulation breaks and the wires touch, a "short circuit" stops the flow of electricity at the break.

There are many kinds of insulation. For high-tension cable, which carries more than 7,500 volts, the insulation is often paper soaked in an insulating oil. It is wound by machine around the copper conductor. The paper is made in strips about $\frac{3}{4}$ inch wide, its thickness depending on the amount of voltage to be used. The cable is then wound on a metal reel. Reel and cable are put into a drier to take out all the moisture which the paper may have absorbed from the air. Then the cable is soaked in an insulating oil. Finally, the soaked cable is drawn through a machine which forms a lead sheath, or covering, around it. This sheath must fit exactly to prevent moisture from entering and damaging the cable.

In making a multiconductor cable (one with many conductors), each conductor is insulated separately. Then they are put on a machine which "cables" them, or twists them together and winds one belt insulation around them all. Paper "fillers," which are put on before the belts, make the cable perfectly round. Finally, the lead sheath is added.

Telephone cable may carry as many as 1,100 pairs of wires. Each separate wire is coated with a plastic called polyethylene and given a special color. One group of 100 wires may be red, another lavender, another blue. These groups are said to have a red, or blue, or lavender tracer. Color is used to make it easier for an installer to locate a particular pair of wires. If the telephone cable is to be used outdoors, each individual wire is first wrapped with paper pulp before being coated with the plastic. The kind of outer insulation put on a telephone cable depends on whether it is to be used outdoors or in a building. Outside cable is wrapped in plastic before being coated with lead. Inside cable is covered entirely with plastic.

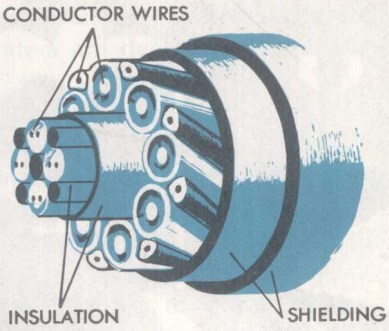
Some power companies use a combination of rubber and paper insulation for special purposes. Still others use a combination of rubber, varnished cambric, and paper.

Stringing or Laying Cable

There are many ways to string cable. It may be above ground or below. If strung above ground, the cable may be insulated or it may be bare. In an aerial power cable the conductor is often made of aluminum for lightness. If the aerial cable is covered with lead insulation, a small amount of antimony is put into the lead to make it tough and to keep it from crystallizing, which would weaken it. If the aerial cable is to carry low voltage, it may be insulated with rubber over which a weatherproof braid is woven in a single or double layer. If no insulation is used, the cable is usually large in size and coated with tin to protect the copper.

Many overhead high-voltage power lines extend all over the country. Their high steel towers are a common sight. But in the near future they may be considered a danger to aviation. Laws may be passed to put them underground.

Every city has thousands of cables running in all directions under its streets. At first these were on poles and buildings. But with the rapid growth of cities early in the 20th century, the cables became both ugly and dangerous. The crisscross of overhead wires got in the way of builders and firemen. Bad storms left a tangle of lines hanging in the streets, and put thousands of lights, telephones, telegraph offices, street railways, and fire and burglar alarms out of order. For these reasons nearly all power lines and telephone circuits are now laid underground. In the United States, these are usually laid in pipes of terra cotta, tile, con-



Left: Coaxial cables can carry at the same time hundreds of telephone conversations and several television programs from city to city. Right: A cross-sectional view of the coaxial cable showing conductor wires, insulation, and shielding. Much of the cable is shielding which keeps the messages from mixing with each other.

crete, pressed fiber, or treated wood. But the "Parkway" cable used by airports and air beacons is flexible, armored with steel tapes, and has no lead sheath. It is laid directly on the ground or in ditches which are then filled with dirt.

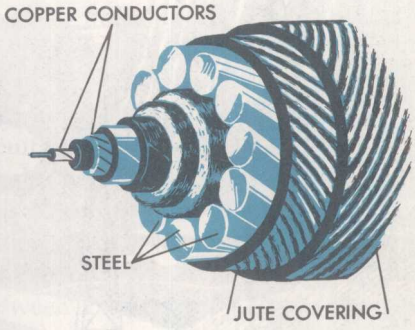
Almost all cable is shipped from the factory on huge reels. When cable is to be installed under the streets, the reel is set up on supports, so it can turn. The pulling end of the cable is put down into a manhole. A pulling wire or cable is fastened to it, coming up through the next manhole. The cable is then drawn in by truck or tractor, one length at a time, and the cable ends are spliced together in the manhole. In this way, work goes on from manhole to manhole.

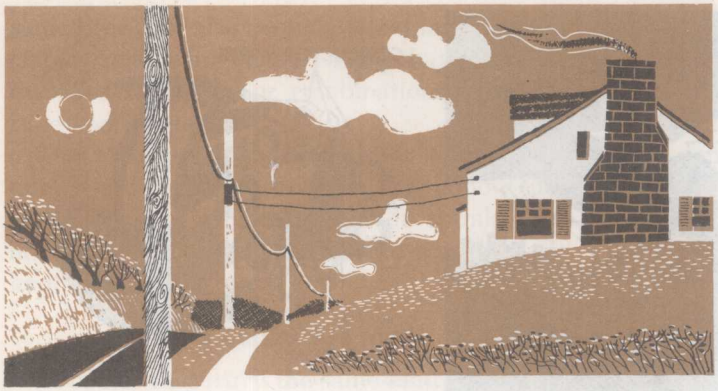
Many kinds of cable run underground through a city. Fire departments and police departments use them. The telegraph and telephone companies have a great network of cables. Railroads use them to operate signal systems and to carry electricity for power. Harbors, rivers, and bays are crossed and recrossed by cables of many kinds. Coast defenses must have cables for gunfire control, signaling, mine exploding, and dozens of other purposes. Ships use great quantities of special cables and so do mines, quarries, and oil well operations.

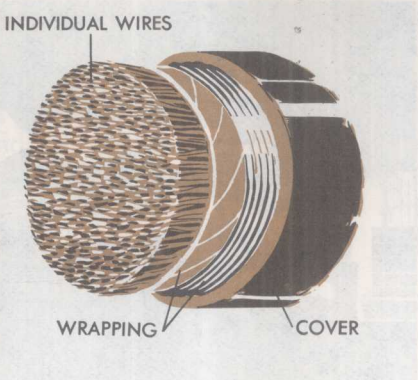
History of Underwater Cables

Underground cables to carry electricity were not possible until men learned how to keep electricity from escaping from bare wires into

Left: Cables that carry telegraph and telephone messages are laid under the oceans between continents. Right: Cross-sectional view of a submarine telephone cable. The center copper wire is only one-tenth of an inch in diameter and can carry 36 voices at the same time. The many outer layers are for protection.







Left: Telephone cables strung on poles or laid underground link together telephones throughout the United States. Right: A cross-sectional view of a telephone cable, showing hundreds of pairs of fine copper wires that are connected with individual telephones.

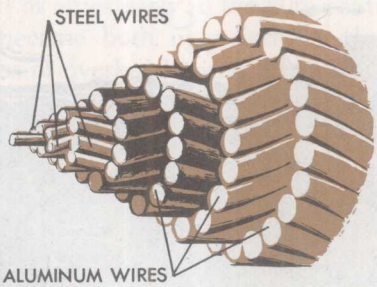
the ground. This is what insulation does. Much of the history of the electric cable is therefore the story of discoveries in insulation.

About 1812 a Russian inventor exploded a mine under water by electricity, using a cable insulated with rubber. In 1816 glass tubes sealed with wax were used underground by an English scientist. Yarn soaked in pitch was tried. Gutta-percha was much used in Europe. Vulcanized rubber and a machine which enclosed the cable with a lead sheath were two great steps forward. (See RUBBER.) In 1890 paper soaked in oil began to be used in England. Polyethylene and vinyl plastics have proved to be good insulators.

The first cable to be laid under water was for the telegraph. As early as 1841, Samuel F. B. Morse had planned an undersea telegraph cable. (See MORSE, SAMUEL F. B.) The first successful one was laid under New York harbor. The English Channel was spanned in 1850. In 1857 Cyrus W. Field, a United States merchant, joined Lord Kelvin, an English scientist, in trying to span the Atlantic Ocean from Newfoundland to Valencia, Ireland, with a submarine cable. Two warships were used to lay the cable, the United States *Niagara* and the British *Agamemnon*. Each ship carried half the cable. It was spliced in mid-ocean and then unreeled as the ships steamed toward opposite shores. The cable broke several times while being laid, which is probably why later cables were laid in one piece.

Finally, on August 13, 1858, the first telegraph message crossed the ocean over this submarine cable. It worked for about three

Left: High-tension cables on steel towers carry electricity all over the country. Right: A cross-sectional view showing lightweight aluminum conductor wires around the stronger steel core.



months, but then burned out because the electric current was too strong for the insulation.

By 1865 Field had raised enough money to try another cable. Meanwhile, Lord Kelvin had invented a telegraph instrument which did not need such a strong current. The first cable broke when about two-thirds of the way across from Ireland. The following year, another cable safely reached Newfoundland. Shortly afterward, the broken end of the lost cable was found and spliced to another piece. There were then two cables working.

The longest unbroken stretch of cable runs 3,600 miles from Vancouver Island, Canada, to Fanning Island in the Pacific. The longest connection, 8,000 miles, is between British Columbia, Canada, and Australia. This cable is divided into sections with stations on islands along the way. The 7,000-mile San Francisco-Philippine Islands line has stations too.

When there is a break in the insulation of a cable, or when a cable snaps in two, as it sometimes does because of earthquakes, the broken place is found by electrical tests made at either end of the line. A repair ship then goes to the spot, raises the broken ends by a deep-sea grappling anchor, and makes the necessary repairs. Sometimes the repairs can be finished in a day. But if the waters are deep and rough, it may take months.

Out in deep water lies the cable ship, with perhaps thousands of miles of cable coiled ready to pay out as it steams from land to land. Before it starts, however, the shore end of the cable is brought in, supported on floating casks.

Courtesy Western Union

Telegraph cables could be laid under the Atlantic before telephone cables because the telegraph simply sends impulses along the wire. But with the telephone the voice waves become too weak unless they are strengthened along the way.

For this reason the first telephones across the ocean worked by radio. Since 1927 there have been 12 radiotelephone circuits spanning the Atlantic. But radio has magnetic interference from sunspots. Another disadvantage is that there are no more free radio channels for more service. So engineers had to invent a telephone cable that would carry voices across the ocean.

There were many problems. The human voice fades as it travels along the copper pathway. On land, the voice is given an electrical "boost" by means of repeater stations set up every few miles along a telephone line. But repeater stations could not be built out in the ocean. An amplifier to strengthen the sound waves would have to be built into the cable. This amplifier would have to be small enough to pass through the gear of the ship laying the cable, yet be able to withstand pressures of 6,000 pounds per square inch at the bottom of the sea.

The discovery of the small electron tube solved the problem. With it a repeater was made that was eight feet long and looked like only a slight fattening of the cable. Each repeater amplifies the voice currents passing through it about 1,000,000 times. In the cables across the Atlantic there are 51 repeaters spaced about 40 miles apart. The cable is $1\frac{1}{2}$ inches in diameter and weighs one pound per foot. It can carry 36 telephone conversations at the same time. This is three times the number of circuits of the radiotelephones now in use. Two cables are used to connect the circuit, because this kind of cable carries sound only in one direction.

A submarine telephone cable was first used in 1951 between Florida and Cuba. When this worked, plans were made for the cable ship

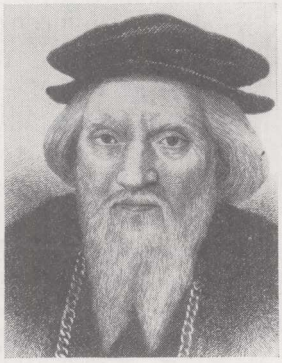
Monarch to lay the Atlantic telephone cable. It took seven months, working the better part of two summers, to lay the two cables. The cable enters the Atlantic at Clarenville, Newfoundland, and comes out at Oban, Scotland. Trunk lines connect Oban and London. It was put in service on September 25, 1956.

The cable cost $42,000,000. It should work without repair for about 20 years.

Another underwater telephone cable connects Port Angeles, Washington, with Ketchikan, Alaska.

CABOT (*kăb'ŭt*), **JOHN** (1450?–?1498) and **SEBASTIAN** (1476?–?1557). Like Columbus, John Cabot was a Genoese navigator who wanted to find a short route to the East. When news of Columbus' discovery was learned, Cabot was in England making plans to sail to an island called Brazil. He then made a new plan, and King Henry VII approved it. He and his three sons were given the right to find "isles, countries, regions, or provinces of the heathen and infidels, which before this time have been unknown to all Christians." They were promised the right of all trade with these lands on condition that they took possession of them for England. Their two voyages gave England its claim to North America. They also brought back the valuable news about the many fish off the coast of Newfoundland. (See NEWFOUNDLAND.)

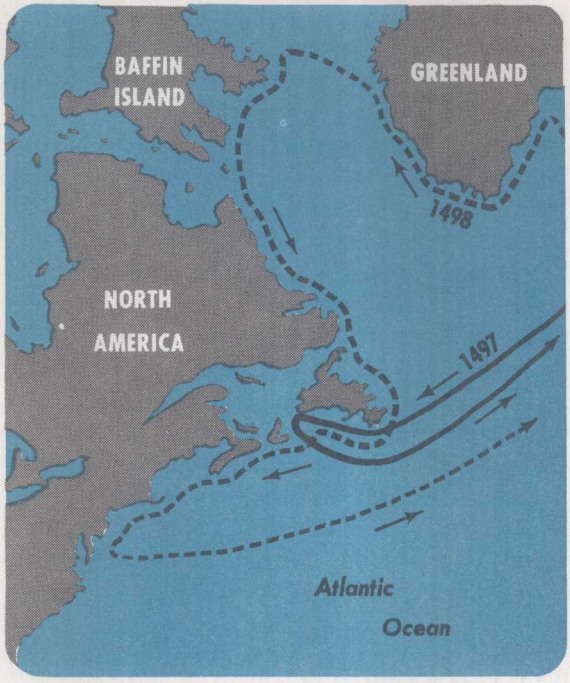
John Cabot's real name was Giovanni Caboto. He was a native of Genoa who became a citizen of Venice. From there he had sailed trading ships to the eastern Mediterranean and heard tales of Japan and the wealth of the Great Khan. These stories made him want to find a short route to the East.



Brown Brothers

John Cabot.

So on May 2, 1497, he sailed his tiny ship, the *Mathew*, into the Atlantic. Seven weeks later he landed probably on Cape Breton Island. He found traces of men but saw none. On the way home he discovered the islands of St. Pierre and Miquelon, and by August he was back in Bristol harbor. He brought no riches, but King Henry and the merchants of Bristol were pleased to learn that the wonderful Orient was only 700 leagues (about 2,100 miles) west of Ireland. They therefore financed a second expedition.



Approximate routes of Cabot's voyages.

In the spring of 1498 Cabot set out with several ships. Some authorities think he reached Greenland and tried to sail around it by going up the eastern coast. Since they only got farther into the ice, the crew mutinied and Cabot had to turn south. He probably went to Baffin Island, Labrador, and Newfoundland; he may have travelled as far south as Delaware.

Cabot was the first man to explore the continent of America. Like Columbus, he believed the land was Asia. It is likely that he died shortly after his return to England.

It is not certain that the sons, Sebastian, Lewis, and Santius Cabot, went with their father on his voyages. But Sebastian became chief pilot to the king of Spain. In 1525 he set sail for Asia, which was known to be thousands

of miles beyond America. But hearing of silver to be found, he sailed up the river Plata south of Brazil. He stayed nearly five years in the country. On his return he fell into disfavor with the king. But in 1549 he settled in London, having been granted a pension by King Edward VI. In 1551 he became first governor of the Company of Merchant Adventurers, which arranged many daring voyages.

CACAO (*kä kä'ō*). Cacao beans grow on a tropical tree. They are used both as a food and flavoring in cocoa and chocolate products. The word *cacao* comes from two Maya words meaning "bitter juice" and refers to the tree or the fresh bean. (See CHOCOLATE AND COCOA.)

Long before Columbus discovered America, cacao was cultivated by the Mayas of Central America and the Aztecs of Mexico. The cacao bean was used as money by both the Aztecs and the Mayas. Today, West Africa produces most of the world's cacao. Ghana is the world's leading cacao country followed by Nigeria. Ivory Coast and Cameroon are also important in West Africa. In Latin America, Brazil, the Dominican Republic, Ecuador, and Mexico are the leading cacao producers.

Cacao beans grow as seeds in a pod, which is the fruit of the cacao tree. The trees grow well in the warm, moist climate of the area between 20 degrees north and south of the Equator. The trees are 15 to 25 feet tall and must be protected from the sun, wind, and plant diseases. The many large leaves almost hide the clusters of small pink flowers which grow along the trunk and main branches of the trees. At any season of the year, it is possible to see leaves, blossoms, and pods of all sizes and many colors on a single cacao tree. The ripe pods are 6 to 14 inches long. Each pod contains 25 to 50 white seeds, or beans, in a mass of pulp, all of which turns brown when exposed to the air.

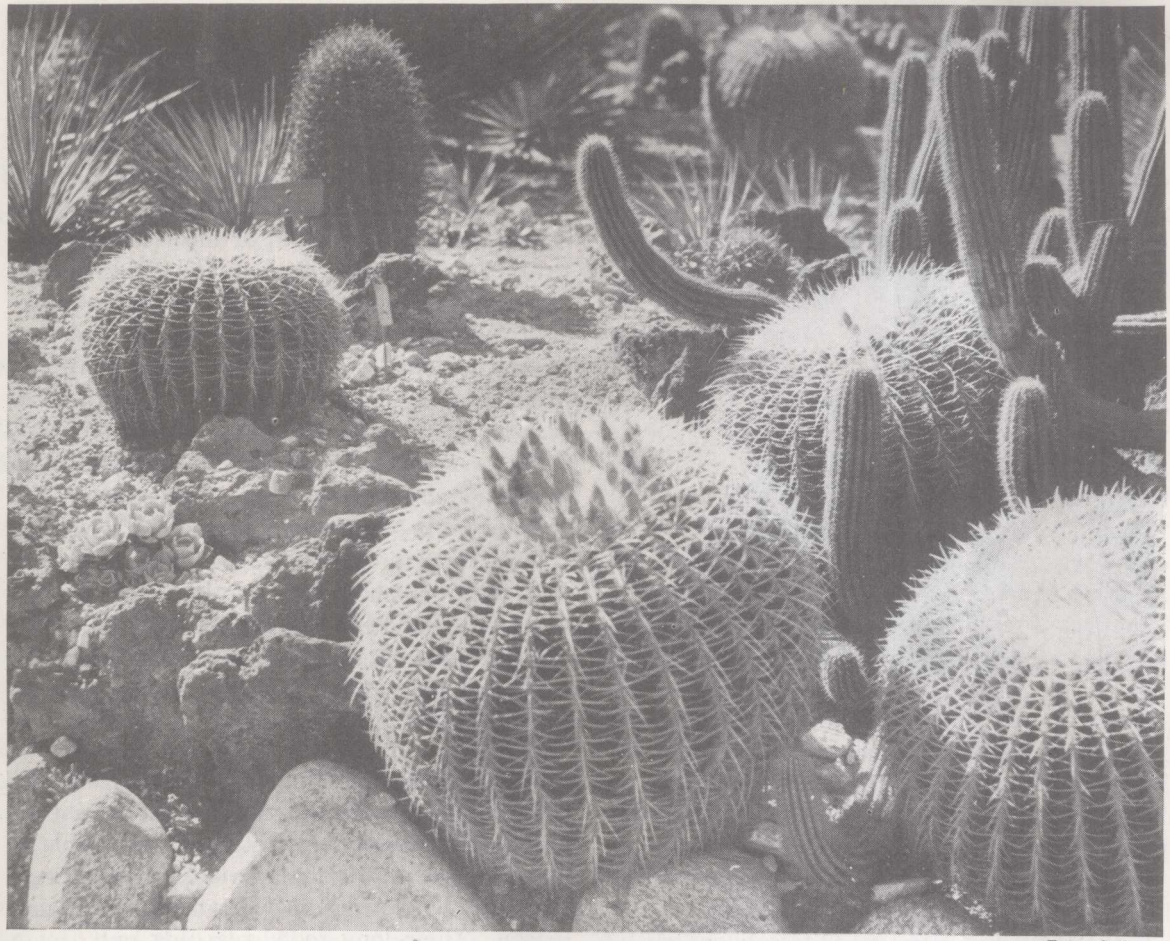
Workers cut the ripe pods from the trees with knives attached to long poles. The pods are cut open, and the contents are scooped into baskets. This pulpy mass is then piled in heaps and covered with banana leaves or placed in wooden boxes and allowed to ferment for several days so that the beans can be removed. The beans are dried and bagged for shipment to all parts of the world.

Cacao beans drying at a plantation in Trinidad before being bagged for shipment. Inset: Close-up of pod.

M. L. B. Morosoff, (inset) Ewing Galloway

CACTUS (*kăk'tŭs*). Plants, like animals, must be fitted for the places and climates in which they live. In dry desert regions they must be able to go without water for long periods. Cacti accomplish this by storing up water during the rainy season. Their long roots, reaching out over a large underground area, take up moisture and store it in the hollow or spongy insides of the thick, hard-walled stem, which is further protected by a waxy covering to prevent evaporation. In place of regular leaves which give off water in sunlight, cactus plants have spines or scales that not only prevent loss of water but protect the plants from thirsty animals. In some large cactus plants, the storage systems work so well that they can live for two years or more without water.

Except for their special structures enabling them to store water, cacti are regular flowering plants with blossoms that develop into seed-bearing fruits. The flowers of most cacti are beautiful, and a desert in full bloom is enchanting, with the bright yellow, red, and purple blooms springing from the fantastic, polished stems. Some types do not bloom until they are



Ewing Galloway

The barrel cactus is one of the smaller varieties which grow close to the ground.

several years old, and one, called the night-blooming cereus, opens its white, waxy flowers only in the middle of the night.

There are more than 1,000 species of cacti. They are natives of South and Central America, Mexico, and the southwestern part of the United States. A few varieties have been taken to the Mediterranean countries, where the prickly pear is known and eaten as the "Indian fig." The varieties differ greatly, ranging from the tiny pincushions, which grow close to the ground, to the giant Saguaro cactus, which is the state flower of Arizona. A forest of the giants is a weird picture. They grow from 30 to 70 feet high, and the arms branch out like great green candlesticks.

Indians living near the deserts make medicines and fermented drinks from the juice found in cactus stems. People also make delicious candies and preserves from the stems and fruits. The thornless varieties introduced by Luther Burbank have proved valuable to cattle growers as a juicy fodder.

Some of the smaller cacti make attractive miniature desert gardens, which are easy to grow. When they are planted in pots, good drainage is essential. The cactus should be watered every four days in summer and every two weeks in winter. The soil should be a mixture of loam, lime rubbish, broken bricks, and sand.

CADDIS (*kăd'ĭs*) **FLY.** Adult caddis flies look like small gray or brown moths. Their wings

The larva of the caddis fly gathers pebbles and sticks to make itself a house. Lower left is the larva in a stick case, and at right, a shell and pebble case. The adult fly (above) is drawn about 1½ times life size.

fold like tents over their bodies, hiding all but their long slender antennae and bright eyes. But unlike moths, they have hairs instead of scales on their wings. The caddis fly belongs to the order, *Trichoptera*, which means "hair wings." They live in the temperate zones all over the world.

The eggs are laid either in the water or just above the water. When the eggs hatch the young larvae have slender bodies, six legs, a strong jaw, and a pair of strong curved hooks on the back of their bodies.

The larvae settle at the bottom of the water and build a house or case. The cases are made of different materials—sand, pebbles, leaves, algae, or sticks. They are of many different shapes—cylindrical, rectangular, triangular, turtle-shaped, even snail-shaped. But each species uses its own kind of materials and makes its own shaped case. The cases are held together with cement and silk made by the larvae.

Some larvae eat plants, others small animals, and still others eat both. When the larva is full grown it closes its case and changes into the pupa form. After about two weeks it leaves its case as an adult. Some, called micro-caddis, are so small they can hardly be seen. Others may be an inch long. Large numbers may be seen around lights during the summer.

Because caddis flies live in every kind of fresh water, they are important fish food. They are also eaten by aquatic (water) birds.

CADIZ (*kä'diz*), **SPAIN,** is on the southwestern coast just west of the Strait of Gibraltar. Today it is not as great a port as it was in its early history. Many of the people earn a living from the naval base at Rota, which is also a supply center for the U.S. Mediterranean Fleet. The city exports sherry wine, salt, figs, cork, olives, salted fish, and Andalusian fighting bulls. A great deal of the Spanish coastal trade as well as cargoes for the Canary Islands and the Spanish possessions in Africa pass through the port.

Thirty-five hundred years ago, Phoenician ships anchored in a broad and sheltered harbor on the southwestern coast of Spain. The city owes its name to these ancient traders who called their port "Gades." Centuries later, during Roman rule, it became a special ally of the Empire. The importance and wealth of the city were known throughout the ancient world, and it is mentioned in the Bible.

Destroyed by the Visigoths in the 5th century, it was later rebuilt by the Moors. Cadiz was ruled by the Moors from 711 until 1262 when it became the chief port of the Spanish kingdom of Castile. This started its greatest period of prosperity. To Cadiz the great treasure fleets returned from America. It was also the starting point for many Spanish military

Fishing on the ocean front in Cadiz. The cathedral is in the background.

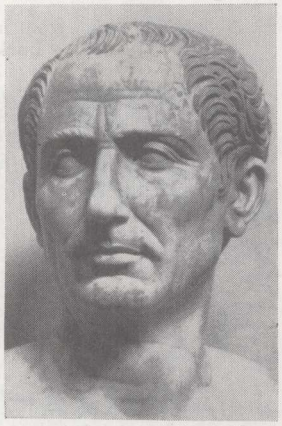
Courtesy Spanish Tourist Office

and commercial expeditions to the New World. As a result, the city was often attacked and looted during Spain's frequent wars. By the 19th century, it had lost much of its trade.

Cadiz is built on a small peninsula that is joined to the mainland by a narrow isthmus. The isthmus stretches about halfway across the mouth of the great harbor. Walls protect the city from the sea. The city has a mild, pleasant climate all year. Cadiz is surrounded by parks and promenades built so they will catch the sea breeze. Because of the climate, the houses are white and flat-roofed, with many windows and balconies. The plazas or public squares are planted with flowers and trees, often palms.

The population of Cadiz is 145,808 (1976 estimate).

CAESAR (*sē'zĕr*), **GAIUS** (*gā'yŭs*) **JULIUS** (102?–44 B.C.), was the greatest Roman general and statesman of his time. His mother was from a noble family, and from the time he was a boy Caesar wanted to enter politics. Nothing is known of his education except that he studied Greek and Latin literature with a tutor. His father, a government official, died when Caesar was 16. Three years later Julius Caesar started his political career.



Ewing Galloway

Julius Caesar.

In Rome a civil war between two rival generals had just ended in victory for Sulla, the leader of the nobles. Sulla was supported by the governing body in Rome. Marius, the defeated general, was the leader of the people's party. Caesar was related to Marius and was on his side. Caesar married Cornelia, the daughter of one of Sulla's chief enemies. Sulla wanted to put Caesar to death as a political enemy but did not when friends persuaded him that Caesar was too young to be dangerous.

The young politician left Rome and traveled to the East. When Sulla died in 78 B.C., Caesar returned to Rome. He was active in politics, as were most young men of noble Roman families. Next to Cicero, he became one of the greatest public speakers of the time, and soon was known as a champion of the people's party. His chief political rival was Pompey, the brilliant young general. Pompey had won such success as a lieutenant of Sulla that he was nicknamed Magnus, the Great. In 70 B.C. when Pompey was elected consul, one of the two rulers of Rome, Caesar supported his program. A few years later both he and Cicero helped Pompey to get the supreme command of Roman armies in the East. (See CICERO, MARCUS TULLIUS; POMPEY.)

For the next five years Pompey was winning important victories in Asia Minor. Meanwhile Caesar worked and schemed to win a position in Rome that would equal Pompey's. When Caesar was *aedile* (official in charge of public events), in 65 B.C. he gave the biggest gladiator shows the people of Rome had ever seen. To finance his shows he borrowed great sums of money from Crassus, a rich banker. Crassus, like Caesar, wanted to be as popular and powerful as Pompey. Conservative men like Cicero did not want changes in their lives. To them Caesar seemed a dangerous man who would use any means to gain power.

When Pompey returned from the East (62 B.C.) and resigned his command, the Senatorial party opposed him. Finally Caesar suggested that he and Pompey and Crassus form a political alliance which later became known as the First Triumvirate ("The Three"). With the votes and fighting power of Pompey's soldiers, Caesar's popular party, and Crassus' wealth, they could carry through any program they wished even though the Senatorial party objected. Cicero was forced to go into exile. Caesar, with his partners' aid, got the consulship for 59 B.C. and also a five-year military command in the province of Gaul. (See GAUL.)

Caesar had already fought a successful campaign in Spain, but no one guessed that this brilliant politician would be one of the greatest generals the world has known. The command in Gaul meant hard fighting, for both the Ger-