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Our Vegetable Travelers

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Principal Horticulturist, United States Department of Agriculture

With 32 Paintings by Else Bostelmann

MY FRIEND'S garden was only a tiny one in his back yard, but he was as proud of it as if it had been a farm.

Noting my surprise at the uselessly small amounts of dozens of kinds of vegetables, he explained that, being a city dweller, he never had seen vegetables except in stores and on the table and had been curious to see "how all those things grow."

"So far, I've grown only American vegetables," he said. "Next year I want to go in for foreign things. Do you know a good place where I can get seeds of foreign plants?"

Glancing over his jumble of plants and making a rough mental calculation, I said: "Those tomatoes, snap beans, peppers, lima beans, and potatoes are the only truly American vegetables you have. All the others are foreign—onions, radishes, lettuce, spinach, beets, chard, cabbage, broccoli, collards, carrots, parsley, turnips, peas, asparagus, soybeans, mustard, eggplant, and the rest of them.

"The foreign plants in your garden outnumber the native ones by about five to one."

"What do you mean, 'foreign'?" he asked. "I bought the seed for all these right here in town, and I've always eaten most of these things. They're common."

"Yes, they're common to us," I agreed, "but their ancestors were foreigners to America, the same as your ancestors and mine."

Thus my friend became interested in the origins as well as the growing habits of plants, and now he includes plant history as part of his hobby.

When Dr. Grosvenor, Editor of the NATIONAL GEOGRAPHIC MAGAZINE, asked me if I would help in presenting this story, I welcomed the chance to answer a few of the most often-asked questions about the origin, nature, behavior, and travels of the vegetables now most commonly grown in the United States.

More Vegetables Eaten than Ever Before

Americans have become great vegetable eaters. We eat more "store vegetables" than ever, and the growing of vegetables in home and community gardens has become more extensive than at any time in our history except during periods of national emergency.

We like our vegetables fresh from the garden; we like many of them raw; and we want them the year round. Our use of fresh, canned, and frozen vegetables—except potatoes and sweet potatoes—has increased, per person, steadily for 25 years and more, while our use of potatoes and grains has steadily decreased.

"Truck crops" we call our vegetables. The expression has no connection with the fact that they are commonly hauled to market in motor trucks (formerly in wagons or carts), but it reveals an interesting bit of history about the early vegetable business.

One old meaning of the word "truck," derived from the French word *troquer*, is "to barter or exchange." In the United States the word developed a special meaning as a synonym for vegetables in general because of the practice of bartering or dealing in small lots of them in the market.

Vegetable growing in America today has come far from the days of small items that were commonly bartered; it has become big business. The truck gardeners who worked

W. J. Stead, USDA

World-traveled Vegetables Grow in an American Garden

Upper leaves have been cut away from a plant of sprouting broccoli to show the fine clusters of edible flower buds, first grown in Mediterranean lands and Asia Minor (page 176). Kohlrabi and hard-heading cabbage in the basket were developed in northern Europe (pages 171 and 175); the snap beans are native Americans (page 158). This model victory garden was grown during World War II by a vegetable specialist of the United States Department of Agriculture's Plant Industry Station at Beltsville, Maryland.

small areas near towns and cities are being displaced by truck farmers who grow huge fields of vegetables farther and farther away from the centers where they will be used.

What is a vegetable, exactly? What is the difference between a fruit and a vegetable? Is a tomato a fruit or is it a vegetable?

These questions are asked many times in our work, not only from curiosity but often for business reasons.

We can give some very confusing answers because there are no definitions that will hold without qualifications or exceptions.

In 1893 the Supreme Court of the United States rendered a decision to the effect that the tomato is a vegetable! An importer had argued that tomatoes were fruit and hence, at that time, not subject to duty. The court held the tomato to be a vegetable because it was usually served at dinner in, with, or after the soup, or with fish or meats that constitute the main part of the meal.

In the last few years in the United States a much larger part of our tomato crop has been canned in the form of juice than as whole tomatoes. Apparently we now drink a major proportion of our tomatoes before the main part of any meal, as we drink a large share of our crops of oranges and grapefruit. Many tomatoes today are also made into preserves with sugar, or eaten raw, like fruits. Still, the tomato is "legally" a vegetable.

Of course all botanists know that by botanical definition the tomato is a fruit. They also know that the snap or green bean, the pod of peas, the garden pepper, the okra pod—to name a few—also are fruits, *botanically*. Still, no one doubts that they are vegetables.

Muskmelons and watermelons, too, botanically are fruits; they meet the Supreme Court's implied definition of fruits, and still they are grown by truck farmers, and agricultural students in America study melons in courses on vegetable culture.

The cucumber and the muskmelon are rather closely related; they belong to the same genus, *Cucumis*. They are similar in habits of growth and in structure; both are grown by truck farmers by similar methods,

and both move through the same channels of trade. The fruits of both are eaten raw.

Yet we say that cucumbers are vegetables and that muskmelons definitely are fruits!

Thus it is evident that there is no clear-cut distinction between plants called vegetables and those called fruits. Specific plants are arbitrarily placed in one of these two categories as a matter of custom.

Here we shall be consistent with the inconsistencies of our American language and customs, and deal with melons along with other truck crops. Melons are truck crops, yet they are fruits.

Generally speaking, however, we classify as vegetables those annual plants of which the immature succulent roots, bulbs, stems, blossoms, leaves, seeds, or fruits are eaten; also those perennial nonwoody plants of which the roots, stems, leaf stalks, or leaves are eaten.

W. J. Head, USDA

Like a Jeweler, a Tomato Breeder Needs Magnifying Glasses

At the Beltsville Plant Industry Station, William S. Porte removes the anthers —pollen-bearing bodies—and petals from a tomato flower (page 160). A day later the flower will be cross-pollinated with pollen of a selected parent to produce a hybrid.

Scientific Detectives Trace Plants' Origin

The ways archeologists, historians, geographers, botanists, and others have tried for centuries to find out where our vegetables came from makes an interesting story in itself.

Shrewd scientific detectives are still at the job, trying to fill the gaps in our knowledge and to define with ever-increasing exactness where this or that species originated.*

Nowadays these investigators are driven on by a practical purpose. If we know the origin of a plant, we know where to look for different forms having characteristics that might be valuable in present-day crop breeding.

Plant-hunting expeditions are sent to the supposed region of origin of a species in the hope of finding cultivated or wild forms, or even closely related species, that may help improve our crops.

The early students of plant origins had only folk tales, sketchy records of travelers, and old writings to help them. Such sources gave a few valuable clues, but most vegetables came into use as food long before there were any known written records.

As prehistoric peoples moved about, even from one continent to another over land

* The work of numerous scientists has been drawn upon freely in preparing this article, especially: *Origin of Cultivated Plants*, by A. de Candolle; *Stuertevant's Notes on Edible Plants*, edited by U. P. Hedrick; *Botanical-Geographic Principles of Selection*, by N. I. Vavilov; and *The Origin of Indian Corn and Its Relatives*, by P. C. Mangelsdorf and R. G. Reeves.

National Geographic Photographer B. Anthony Stewart

No King of Old Had at His Finger Tips Such a Vast Variety of Vegetables

Shoppers in this Giant Food Store in Washington, D. C., can help themselves to eggplant, squash, lima beans, cauliflower, tomatoes, beans, carrots, radishes, and numerous other vegetables and fruits both in and out of season because of the country's great diversity of climate and efficiency of storage and transportation. Many are shipped as far as 3,000 miles, from Florida, California, Texas, or other warm States, to parts of the Nation where snow still covers the ground.

bridges or short stretches of water, they sometimes carried with them seeds of plants they had learned to use for food. By the time the oldest known records were written or carved, many plants were known over relatively vast stretches of the earth, particularly in Eurasia and parts of Africa.

This wide scattering of vegetable plants at the very dawn of history complicates the task of determining the exact region where they were first used as food.

Because some vegetable has been known from the beginnings of history in widely separated lands, the people in each of those lands believed the plant to have been there "always," to have originated there. Modern research has shown many of those beliefs to be wrong. Exploration and archeological search have uncovered many new clues.

One of the best evidences of origin of a cultivated plant is finding the place where its ancestral form is still growing in the wild. But finding wild forms as weeds in a particular place, or finding cultivated plants that have escaped into the wild, proves nothing about their origin. Wild carrot grows over much of the United States, but it is not native here.

Botanists now rather generally accept the theory that the region having the greatest diversity of forms of a given kind of plant is the probable center of origin of that plant.

Of many important crops, however, no one has ever been able to find a wild form anywhere in the world. Maize (Americans call it "corn") is an important example (page 155). Either its wild parent has vanished from the earth or it has become isolated in some areas of the South American lowlands where literate man has never penetrated.

Number of Tribal Names Gives Clue

Plant names help the plant historian. Finding numerous names for a single plant among widely scattered tribes in a primitive country indicates antiquity of the plant in that area. If there is no such multiplicity of names in languages of other lands, the plant is suspected of being native to the land where it has many.

When the white man first came, he found our present common bean (*Phaseolus vulgaris*) widely scattered in North, Central, and South America, with each tribe that grew it having its own name for the bean.

For example, it was called *sahe* or *sahu* by the Indians on the St. Lawrence River; *oga-*

ressa by the Hurons; *tuppuhiguam-ash* by the northern Algonquins; *malachxil* by the Delawares; *okindgier* by Indians on the Roanoke River; *ayacotle* and *etl* by the Aztecs.

Each tribe had grown this bean "always," meaning as far back as their folk tales could tell them.

Many kinds of beans were known in the Old World, but for this particular one there were no descriptions or names in Old World languages until after 1492. During the 450-odd years since Columbus's discovery of America, our American type of bean has become spread all over the globe and has long been grown in many lands—China, for example.

The Chinese have grown such a diversity of forms of this species that China has been designated by one authority as a "secondary center of origin or distribution." Nevertheless, other available evidence points to a strictly American origin (page 159).

Other American vegetable species, too, were so quickly scattered over the earth after about 1500 and were grown so extensively that for many years their American origin was overlooked. Some—peppers, for instance—were believed to be of Oriental origin (page 166).

Former confusion over the bean, the garden pepper, and the sweet potato (page 168) show how easy it has been to lose sight of the hemisphere of origin of certain plants even within recent historical times. Imagine the difficulty of tracing back the history of Old World plants to the country of their origin after they had been shuttled about over Eurasia and parts of Africa for thousands of years!

Findings of Archeologists Help

The archeologists, too, have made their contributions to plant history. Ancient carvings, records in stone, ornaments, and decorated utensils describing or depicting food plants have been found in tombs and remains of dwellings in many parts of the world (p. 151).

Even seeds of very ancient varieties of vegetables have been found. We should say "remnants" of seeds, because the life had long since gone out of them when found. Fragile shapes of matter that would crumble with little more than a touch were often all that remained. The seeds could be identified, but, contrary to recurring tales, they would *not* grow.

Many sincere persons have been victims of one hoax or another involving seeds alleged to have been found in an Egyptian tomb or some other very ancient repository. In the best of faith, enthusiastic recipients of such seeds have planted them, and then, amazed by their growth, shouted their discovery to the world.

On one occasion seeds of a grain were found in the wrappings of an Egyptian mummy. They were planted and they grew. This appeared to be a most unusual case until it was discovered that the seeds came from incompletely threshed straw of a recent crop used in packing the mummy for shipment.

Microscope Helps Show Corn's Ancestry

In recent years the microscope has been used successfully in technical studies in heredity in trying to ferret out obscure characteristics of different species that may be native to different regions.

It is now possible with some plants to confirm their supposed origin with reasonable certainty by the shapes of the chromosomes, those minute structures within the cell which are the seat of the hereditary mechanism of the plant.

For example, although maize almost certainly originated in South America, our North American types have chromosomes more like those of the maize of Central America than that of Peru.

Thus it appears that our North American kinds of corn are directly descended from Central American forms, which in turn are the result of prehistoric hybridization between South American maize and a closely related wild species of Central America having the same ancestor as maize (page 155).

This remarkable piece of genealogical detective work required many years of investigation by many men and a 315-page monograph to bring the whole story together.

Much human progress had been made even before history began. Some civilizations, including sizable cities, rose, flourished, and disappeared with only circumstantial evidence today as to what happened to them.

How were the people of those cities fed? What did they eat? Where did their food plants come from? Were those plants wild or cultivated? There must have been an agriculture, since cities cannot feed themselves on wild plants and game alone.

Agriculture, the purposeful rearing of animals and the cultivation of plants, began to develop in the last part of the Stone Age, along with man's learning how to make pottery and how to sharpen tools by grinding instead of chipping.

Agriculture did not come about all over the inhabited parts of the earth at the same time. In some parts of the world there are primitive cultures, even today, that have developed little if any beyond the Stone Age.*

*See "Earth's Most Primitive People," by Charles P. Mountford, NATIONAL GEOGRAPHIC MAGAZINE, January, 1946.

Man's first efforts at agriculture doubtless were directed to those plants which produced a good yield of palatable seeds that could be stored easily for food, or which produced large, fleshy, underground parts that would persist in the soil from one season to the next and could be dug up when wanted. Many highly perishable leafy vegetables and fleshy-fruit vegetables came into cultivation later.

Eastern Mediterranean Contributed Most

Of the eight or ten main centers of origin of vegetables and other economic plants, the lands about the eastern end of the Mediterranean Sea and well inland are credited with the largest number of vegetables now grown in America. Among them are asparagus, beets, broccoli, cabbage, cauliflower, celery, endive, kale, lettuce, parsley, parsnips, and rhubarb.

This area, from Asia Minor to Egypt, includes the world's most heavily traveled corridor of prehistoric migrations and also a wide range of climatic and soil conditions.

We cannot be sure that all plants apparently originating there actually did so. Many kinds may have been carried there by migrants from farther east or north.

Several vegetables of supposedly primary origin in the Mediterranean, such as cabbage, lettuce, beets, and parsley, show other centers of origin or distribution in the Near East, and vice versa. Likewise, many kinds of vegetables show centers in both the Middle East and the Near East, such as peas, Indian mustard, carrot, onion, and muskmelon; or in both the Middle East and India.

The Mediterranean center, the Near East center, including the trans-Caucasus area and Mesopotamia; and the Middle East center, including Afghanistan and adjacent areas, tend to make a large geographic unit from west of the Himalayas to the Mediterranean.

Although there were barriers to movement of prehistoric peoples within this area, those barriers were less formidable than those to the east and south. The migrating peoples certainly carried seeds with them.

Early inhabitants of Mesopotamia, the non-Semitic Sumerians, had developed an advanced civilization, with important cities and trade with other lands, even before 4000 B. C., when most of the world was far less advanced.

Where they came from we don't know, but they doubtless brought seeds of crop plants. By about 2750 B. C. they had touched the Mediterranean.

Then Semitic peoples from the west invaded Mesopotamia, and later the Aryans from the east shoved into it, each doubtless carrying seeds of their favorite food crops.

Still later the Aramaeans, a people from the northwest, invaded the country.

In 539 B. C. the Persians took over.

Thus there was a gradual crossing and re-crossing, infiltration and transportation of peoples from west, north, and east that can be traced vaguely for thousands of years.

Peoples, animals, and doubtless plants, as well as ideas, religions, and cultures, became distributed. So it is not surprising that many species have more than one center of development and that it is not possible to say finally which center developed first.

About the time the New Stone Age man of the Near East was pushing to the eastern Mediterranean, in the third millennium B. C., he was also moving through Asia Minor, across the Dardanelles, along the coast of the Black Sea, and into the Danube Basin of Europe. His arrival appears to have coincided with the first agriculture in eastern Europe.

The plants first cultivated in Europe are Asiatic in origin, and archeological finds indicate that their culture in Europe is less ancient than in the Near East and middle Asia.

Migrations into the Aegean and middle Mediterranean, both by water and by land, further distributed a large number of Asiatic plants into southern Europe.

Early peoples of the Near East either dominated or influenced the whole of Eurasia in prehistoric times, and indirectly, therefore, the rest of the world. Recent botanical evidence of western Asiatic origin of so many of our present vegetables is accordingly in no conflict with the archeological evidence of the rise of civilizations all over the globe.

Plant Immigrants from the Orient

The Far East has given the world more cultivated plants of all kinds than has any other large area. Among these are many vegetables now grown in America, including various mustards, radishes, Chinese cabbage, soybeans, cucumbers, eggplant, and cowpeas.

The Chinese center of plant origins, chiefly in central and western China, was the most prolific, and that of middle and eastern India next. While Malaya and Indochina have contributed many economic plants, few are classed as vegetables and none is important in America.

Despite the evidence of contact between China and western Asia in prehistoric times, there is less evidence of diffusion of plants back and forth between China and middle Asia than between the Mediterranean and middle Asia. Geographic barriers have tended to keep isolated these cultural and biological

areas of China, seat of one of the oldest continuous cultures now in existence.

Abundant evidence of late Stone Age man has been found in China. He lived in rude villages, hunted, fished, farmed, had domestic animals, and presumably used several of the vegetables cultivated today.

India has contributed many of the world's cultivated plants, but of these only three are important as vegetables in America: cowpeas (black-eyed peas), eggplant, and cucumbers.

In the hazy prehistory of India there is far less evidence of numerous large migrations of peoples and cultures—and plants—than in the areas to the west. This may be one reason why the numerous vegetables and related crops originating in India are not more important outside India today.

Africa has contributed only two vegetables common to us, okra and watermelons, and Australia not a single one.

New World Enriched Old's Larder

Perhaps the least ancient, but not the least important, agricultural civilizations were developed in the New World, chiefly in mountain valleys of Central America and in the Andean and neighboring areas of South America.

These civilizations had developed so recently and had been so completely isolated from Eurasian and African cultures that they had made no evident contributions to Old World agriculture, arts, customs, thought, or racial composition before Columbus.

Very soon, however, after the voyages of Columbus and the Spanish explorers, the world was enriched by many important new food plants from the Americas, including maize, potatoes, sweet potatoes, tomatoes, peppers, squash, common beans, and lima beans.

By the time of the early American explorations, Eurasian civilizations were highly developed, with means of travel and methods of disseminating ideas and goods. Thus the finding of valuable New World food plants was followed by their world-wide exploitation at an almost explosive speed. Within a couple of hundred years many American plants, previously unknown elsewhere, were becoming important foods on every continent.

Archeological and racial evidences suggest

S. G. Morley, Carnegie Institution

Ancient Maya Carved This Corn God Sowing Maize

A young man with a conventionalized ear of corn as a headdress scatters seed from the bag in his left hand upon the head of the Earth Mother, not visible here because the 5½-ton stone had been broken in two when found in 1921 at Piedras Negras, Guatemala.†

that man first reached the Americas far back in the Stone Age by slow migration from eastern Asia. He came either by way of a land bridge then connecting Asia and North America where Bering Strait now narrowly separates Alaska from Soviet Russia, or by rafts or skin boats across that strait.*

At that stage of his development man was no farmer. He subsisted by hunting, fishing, and harvesting whatever food the wild plants might offer him. It is thus improbable that this early migration involved any transport of Asiatic species of plants to America.

* See "Exploring Frozen Fragments of American History," by Henry B. Collins, Jr., in the May, 1939, NATIONAL GEOGRAPHIC MAGAZINE.

† See, in the NATIONAL GEOGRAPHIC MAGAZINE: "The Foremost Intellectual Achievement of Ancient America," by Sylvanus G. Morley, February, 1922, and "Preserving Ancient America's Finest Sculptures," by J. Alden Mason, November, 1935. Archeology has played an important part in determining the history of useful plants.

Purdy, USDA

Inside the Bags, Busy Flies Pollinate Onion Flowers

In producing certain onion hybrids to increase disease resistance, yield, and other desirable qualities, the plant breeder first removes from the flower head of a pollen-sterile kind all flowers that have opened and thus might have been pollinated with unknown pollen. The head, with its remaining buds, is then enclosed in a cellophane, paper, or cloth bag, together with a number of flies and a flower head bearing the desired pollen. The insects, ordinary blue blowflies, transfer the pollen from one parent to the other when the buds open.

After untold generations this thin stream of man had trickled along the length of North America, through Central America, the Isthmus of Panama, and ultimately the full length of South America. Groups stayed behind along the way, as in Central America, and ultimately evolved distinct tribal characteristics and cultures. Others pushed on toward somewhat different destinies.

As these American Indians in different regions—even in the two different continents—became better adjusted to the environments into which they were going, they learned to take advantage of and even to depend upon the wonderfully productive native plants that they found in their respective parts of the Americas.

Two distinct civilization centers developed, and both became main centers of origin of our present important native crop plants. One was in Central America, the other on the slopes and plateaus of what is now southern Peru, Bolivia, and northern Chile.*

The Central American area was probably mainly dependent first upon beans, sweet potatoes, squash, and pumpkins, while the early Andean people grew maize, potatoes, and tomatoes.

Before the white man reached the Americas, however, further diffusion of the people had rather thoroughly distributed most of the crops over those parts of all the Americas where they could be grown successfully.

"Taming" Wild Vegetables

The difference between our cultivated varieties and the wild forms from which they came is due only in part to the fact that the

*See, in the National Geographic Magazine: "Further Explorations in the Land of the Incas," by Hiram Bingham, and "Staircase Farms of the Ancients," by O. F. Cook, May, 1916.

cultivated kinds are sown in rows, fertilized, weeded, and otherwise given favorable growing conditions.

If wild forms are planted and given the best of care, the plants might grow somewhat larger than in the wild or make somewhat larger yields, but they would still be "wild" plants. Merely continuing to plant all the seed from such plants year after year, and tending the plants carefully, would not make "cultivated" plants of them.

What, then, did prehistoric man do to improve wild plants? And how are our plant scientists any better at the job of improving plants than our prehistoric ancestors were?

The important distinction between "wild" and "cultivated" plants is that wild plants perpetuate themselves under conditions of chance pollination and natural selection only. Our cultivated plants are the result of innumerable generations of either purposeful or unwitting selections by man. Man adds nothing to the hereditary make-up of the world of plants, but does take advantage of the endless diversity that Nature provides.

Prehistoric man noticed that some plants were better for his use than others; so naturally those were the ones he chose, century after century. Since he planted seeds of plants or fruits that he had chosen to use, he more or less automatically practiced plant selection of a sort.

Geneticist Speeds Plant Improvement

Thousands of years of discarding what is undesirable to man and propagating what is desirable to him developed our cultivated plants. For man's needs they are considered highly superior to their wild ancestors, but in getting certain qualities desired by man we have unwittingly sacrificed other qualities—for example, the ability to survive under adverse conditions.

By choice of parent plants, controlling pollination, and wise selection and testing of the plant offspring through successive generations, the modern plant breeder may obtain, in a few years, especially desired combinations of *existing* hereditary factors that might not be *found* in the wild in hundreds or even thousands of years. But he must first find somewhere in the world the parent plants that already possess the hereditary factors needed.

The geneticist creates no new factors, but he does invaluable rearranging of existing factors. He is rapidly finding factors that no one has known about, and he learns how they are inherited, so that plant improvement can be carried forward speedily.

The art and practice of plant improvement goes back to prehistoric times, but the science of *how* specific characters are inherited was born since the birth of many men now living. We could still make plant progress without the science of genetics, but it would be too slow and costly.

Plants Shown in Countries of Origin

In the 32 paintings that accompany this article, the backgrounds typify the general regions in which each of these vegetables originated. They illustrate those areas, or well-known features of them, as they appear in modern times. Most crops illustrated are far older than any signs of civilization that can be seen in those lands today.

The fruits, pods, and even the leafy edible parts of many of the vegetables are so hidden by luxuriant leaves that they cannot be seen without pulling the leaves aside. Roots and tubers are, of course, obscured by the soil.

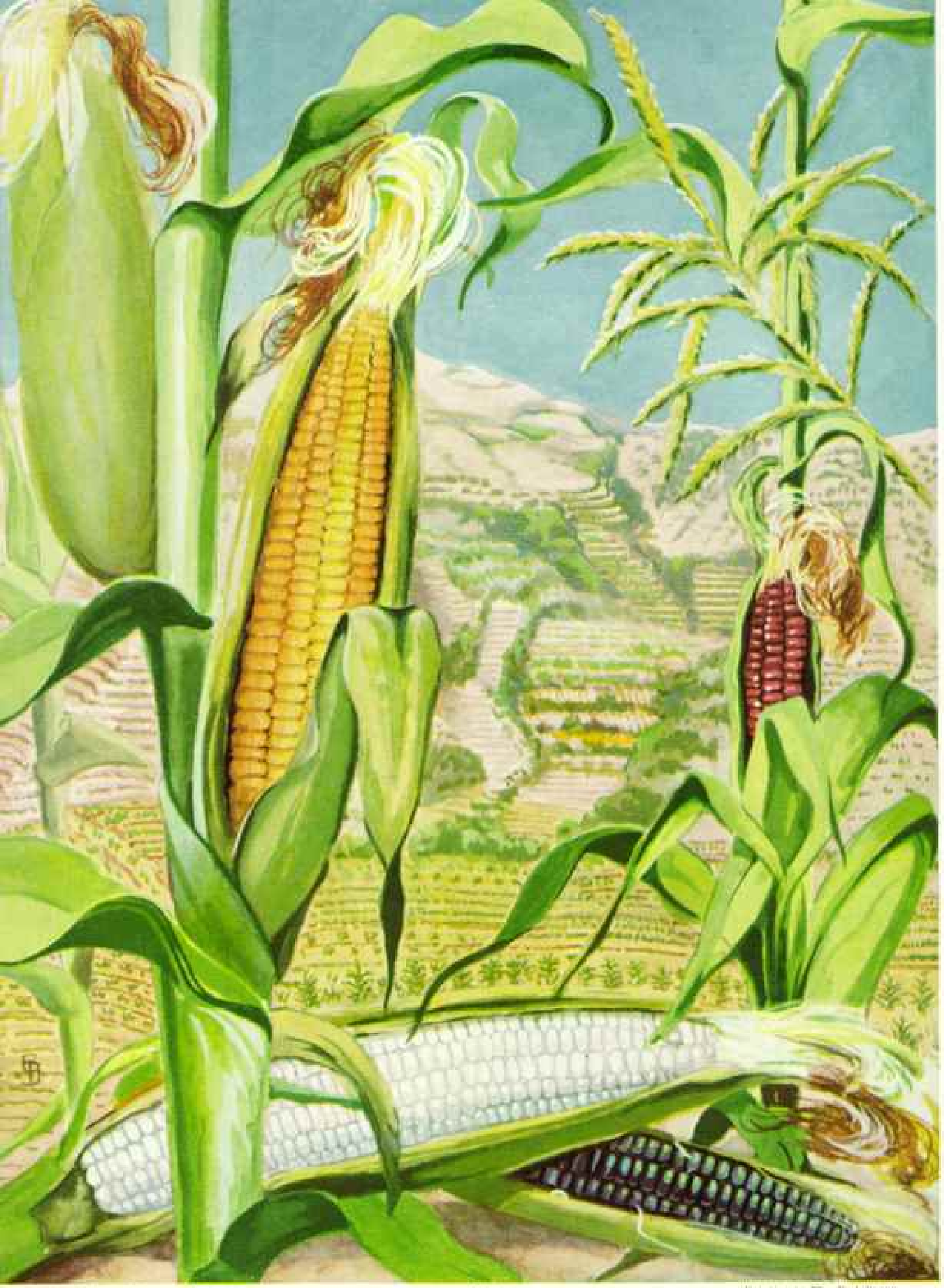
The fruits of melons and vining squashes are so large and so far apart on the vines that the illustrations cannot show the details of the way they grow. Few vegetables can be shown in detail as they grow in the garden.

To show the principal features of some crops, Mrs. Bostelmann had to remove a part of their leaves; to take only a branch of this kind or a piece of vine of that kind; to harvest the fruits of others and put them in a pile, omitting details of their natural habits; to harvest others from the soil; or to show some of the less common varieties that have growth habits convenient to our purpose.

Some of the vegetables, or parts of them, are painted about half natural size, while others, because of their large size, had to be greatly reduced.

Different stages of development, such as the harvest stage of some of the leafy salad plants and the flowering or seed-bearing stages of the same plants, are sometimes shown on the same plate, although these different stages of development actually occur months apart. Only by such devices can the artist condense such a wealth of form and color into so little space and in such a beautiful manner, as she has done previously with flowers.*

* See "The World in Your Garden," by W. H. Camp, with 24 paintings by Else Bostelmann, NATIONAL GEOGRAPHIC MAGAZINE, July, 1947. The many articles on plants and plant hunting which have appeared in the NATIONAL GEOGRAPHIC MAGAZINE include the following by David Fairchild: "Hunting Useful Plants in the Caribbean," December, 1934; "Hunting for Plants in the Canary Islands," May, 1930; "New Plant Immigrants," October, 1911; and "Our Plant Immigrants," April, 1906; also "Peacetime Plant Hunting About Peiping," by P. H. and J. H. Dorsett, October, 1917; and "Hunting the Chaulmoogra Tree," by Joseph F. Rock, March, 1922.



Painting by Else Bostelmann

Sweet Corn Descends from Maize Grown on Andean Slopes

Maize, a gigantic grass, sustained the remarkable pre-Columbian civilizations of the Americas. Sweet corn has become important only in the past 100 years; yellow, white, "black" (dark purple), and reddish kinds are grown today.

As American as Apple Pie

SWEET CORN (*Zea mays* variety *saccharata*) is a sugary-seeded kind of maize, as the "saccharin" part of its scientific name indicates.

The old four-letter Anglo-Saxon word "corn" means grain of any kind, and except in the United States it does not refer specifically to Indian corn, *Zea mays*. The American Indian word "maize," however, is understood the world around, and even Americans are again learning to use it.

Maize apparently went through its first great period of development in the Andes, probably in southern Peru, where primitive, but not wild, forms are still grown by the Indians. No one has ever succeeded in finding wild maize or the wild parent from which maize first came.

Far back in prehistoric times, it is believed, somewhere in the lowlands to the east of the Andes, the unknown parent of maize gave rise to a new and distinct parent form through mutation, producing a kind of maize in which each kernel was completely enclosed in husks. That was so long ago that the Indians now have no name for it and it has never been found, though representations of it appear on ancient Peruvian pottery. This so-called pod corn later mutated to a form without husks around each seed.

Marriage of Two Grasses

While this maize was first developing into an important food crop in the Andean region, there probably was no maize in Central or North America. There was, however, growing wild in those areas a rather distinct relative of maize, now called *Tripsacum*, that may have arisen from the same member of the grass family that maize came from.

When the Indians from the Andes carried some of their primitive maize to Central America, it somehow became hybridized with this kindred plant, *Tripsacum*. This new hybrid persisted as a distinct kind of plant and has been named "teosinte."

Teosinte, a hybrid of which maize is one parent, became crossed with maize, and the descendants of this cross ultimately gave rise to several kinds of corn never known in the Andean region: pointed popcorn, dent corn (our commonest kind), flour corn, and flint corn. Thus the Central and North American forms of maize most likely developed; they are different to this day from the forms grown in Peru.

After the new type arose, presumably in what is now Guatemala, it was carried up into the present southwestern United States and thence north and east over the whole territory where maize is now grown in North America. Before the white man reached America, most Indian tribes commonly grew maize of one kind or another except sweet corn.

The sugary character in maize doubtless occurred innumerable times as a mutation, but many Indian tribes either disliked it and threw it away or had trouble in perpetuating it. It is harder to produce and preserve the seed of sweet corn than that of other forms.

A few tribes, among them the Hidatsa, Mandan, Omaha, Pawnee, Ponca, and Iroquois, have been known to grow sweet corn in North America, and apparently it was known in Peru in prehistoric as well as modern times. Yet it never became important even in North America until after the arrival of the white man.

The first published mention of sweet corn was in 1801, although later articles referred to it as having been obtained in 1779 from a tribe of Indians along the Susquehanna River.

There was little interest in sweet corn until about a hundred years ago, when seedsmen in the eastern United States first began to list one or two varieties. By the time of the Civil War a few more varieties had appeared, and from then onward its popularity in America has steadily increased.

Now there is a wide range of kinds of sweet corn, from little four-inch ears growing on plants only two-and-a-half feet high up to seven- or eight-inch ears on plants as tall as eight feet; white, yellow, purple kernels; white cobs, red cobs; ears with 8, 10, 12, or more rows of kernels—or with kernels not in rows at all. Among the best-known ordinary varieties are Golden Bantam, Country Gentleman, and Stowell's Evergreen.

Most Sweet Corn Now Is Hybrid Type

Our modern hybrid sweet corns, such as Golden Cross Bantam, Ioana, Marcross, and scores of others, were developed by painstaking effort. The basic discoveries concerning hybrid vigor were made more than 50 years ago, but it took numerous scientists and corn breeders some 20 years to put hybrid corn production on a profitable, practical basis.

Each lot of hybrid seed from which gardeners and farmers buy their seed to plant is the result of a controlled cross between two especially developed parents.

Most of the seed sweet corn planted now is of the hybrid type. Ninety-eight percent of the sweet corn grown for canning in the United States is hybrid.

Painting by Else Bostelmann

Western South America Gave the Potato to the World

Blinded by lust for gold and silver, the Conquistadores virtually ignored this native food plant, destined to feed huge populations. The flowers of the potato are familiar to many, but few have seen its small seedy fruits.

World's No. 1 Vegetable

TODAY, in the world as a whole, the most important single vegetable is doubtless the potato. The word is believed to be derived from the Spanish discoverers' understanding of the South American Indians' name for the plant, *papa* or *patata*.

Over most of the United States, "potato" refers to *Solanum tuberosum*, the "white" or "Irish" potato, although in many parts of our South the term means "sweet potato" (page 168).

As to where our cultivated potato originated, no one can say more definitely than that it came from the Andean part of South America. The fragmentary and conflicting accounts of the old Conquistadores, traders, slavers, and plain pirates who made the early voyages to western South America are of little help.

Unfortunately the white discoverers of Peru, Ecuador, and Chile were so bent on their quest for precious metals and stones that they gave no proper attention to the other riches of those lands. They or some of their close followers certainly discovered the potato, a find far more valuable to mankind than the loot they carried away; but none of them considered the potato important enough to record definite facts about it.

Efforts to track down the origin of the cultivated potato, somewhat similar to those used in tracking down the origin of maize, have been less successful than with maize. Although the evidence is hazy, it suggests Chile as the country of origin. Many wild species of this plant grow in the cool parts of Peru, Bolivia, and Ecuador, but they seem generally more distantly related to our potato than do those now found along the coast and islands of mid-southern Chile.

Some have believed that the Incas improved the wild, bitter potato of Peru to make it one of the mainstays of their life, along with maize. It is more probable, however, that the form of potato so important to the Incas was carried up into the Peru-Bolivia-Ecuador region from Chile in prehistoric times by tribes that preceded the Incas by many hundreds, perhaps thousands, of years.

Indians First to Dehydrate Potatoes

When first found by the white man, the Indians of the high country of Peru had the original method of dehydrating potatoes, a method they still use. They merely spread them in the brilliant sun and let them dry out. At high elevations in southern Peru, where the seasons are more marked than nearer the Equator, the potatoes are exposed to freezing, after which they dry more rapidly. The product obtained by these methods would hardly be acceptable on our markets, but it meets the needs of the Indians. After drying, the potatoes can be kept from one harvest to the next. They are pounded into flour or cooked whole. Remains of prehistoric stores of these dried potatoes have been found in old ruins.

Indications are that the potato was unknown in Central or North America or the West Indies until Pizarro conquered Peru. The references to "batatas" in accounts of the voyages of Columbus and Magellan indicate sweet potatoes rather than white potatoes. Thus it seems possible that the white man first carried the potato out of its South American home to the other Americas as well as to Europe and elsewhere.

"Irish Potato" Not Irish at All

One story holds that Sir John Hawkins introduced the potato into Ireland in 1565, and another says Sir Walter Raleigh first grew it there in 1585. In any case, it became of importance in Ireland before it did in other European countries or their American colonies. The stories about it being found in Virginia when first visited by the English are now believed to be due to confusion with another tuber-bearing plant.

The plant became firmly identified with Ireland; hence the name "Irish potato," which persists in the United States today.

During the 17th and 18th centuries the potato was gradually introduced into most other countries where it is now grown. It was brought to New England in 1719 from Ireland by immigrants who settled at Londonderry, New Hampshire. The kinds grown in those days were not nearly so productive or so good to eat as our modern varieties and were not very well liked.

By the middle of the 19th century the potato was an important staple crop in northern Europe, the British Isles, North America, and to a less extent elsewhere. It formed such a large part of the food supply in Ireland that an epidemic of the late blight disease of potato in 1846-47 resulted in serious famine there.

Oriental peoples have never cared much for potatoes and have not learned to grow and to adapt them to their conditions, as have the people of most other lands of temperate climate. Soon after World War II, in studying vegetables in Japan, I was amazed to find the potato in a state of culture far below that of most other food plants in that country, although it has been known there for perhaps 200 years.

Painting by Else Bostelmann

Indians Carried Common and Lima Beans into Both Continents from Central America

Common beans (top) include "wax"-pod and green-pod snap varieties and the field kinds such as kidney and "pea" beans. Lima beans (bottom) need a warmer climate. Neither was known in Europe before Columbus.

Two New Beans from America

BEFORE Columbus, the Old World was familiar with numerous kinds of beans, but neither our common bean, *Phaseolus vulgaris*, nor the lima bean, *P. lunatus*, was known. Their American origin is fixed by descriptions and references to finding them at many widely scattered points over the Americas about 1500 and soon after.

The word "bean," like the word "vegetable," is indefinite. It is used to refer to the seeds of many different kinds of plants.

Our use of the expression "common bean" is in accord with the scientific name *Phaseolus vulgaris*, which means exactly that. It includes our dry, field varieties, such as Navy or Pea Bean, Red Kidney, Pinto, Great Northern, Marrow, and Yellow Eye. It also includes all our edible-podded garden beans called stringless or snap beans and formerly called string beans. (Some varieties *are* stringy.)

The English first used the name "kidney bean" in 1551 to distinguish our American common bean from Old World types.

In the South and some other parts of this country lima beans are commonly called "butter beans." In New England this colloquialism is sometimes used to refer to yellow-podded ("wax") varieties of snap beans.

Lima Bean a Native of Guatemala

Not long ago Brazil was believed to be the country of origin of lima beans, but new evidence points to Guatemala. Wild primitive lima beans have been found there, along with a remarkable diversity of cultivated forms. Their distribution from Guatemala has been traced by the various "prehistoric varieties" left along Indian trade routes.

One course of prehistoric "bean migration" extended up through Mexico into what is now our Southwest, thence eastward to spread from Florida to Virginia. The lima beans grown by the various Indian tribes over all that territory varied from the present small types used by the Hopi Indians in the Southwest to the Sieva type found in the East.

Another course extended down through Central America into Peru, where the large-seeded, large-podded types were developed in the warm coastal areas. The name "lima bean" obviously came from Lima, Peru, one point at which the species was found by early European explorers.

A third, but less extensive, branch of development extended eastward through the West Indies and thence southward toward the mainland of South America. This Caribbean branch of the species contains types that tend to develop poisonous quantities of cyanide under certain conditions, but the other two branches have not shown this treacherous tendency. These "bad actors" are generally very small, nearly round, and often are hardly recognizable as lima beans.

There is an almost endless diversity of seed sizes, shapes, and color combinations among the lima beans, although few colored varieties are now grown in the United States.

Since dry common and lima beans are highly concentrated foods and are easily carried and stored for long periods, the explorers and slavers of the early 1500's found them ideal for replenishing their ships' stores. Supplies were obtained from Indians in numerous places in the Americas and incidentally carried to the farthest parts of the earth—Europe, Africa, the East Indies, India, the Philippines.

By the late 1700's there were many records of the lima bean in all those places. Apparently it was first recorded in Europe about 1591. It is far less important in most of Europe than is the common bean, since it requires warm weather for good growth.

The bush varieties of lima bean are of rather recent development (since 1875), although the dwarf mutation on which they are based had doubtless recurred innumerable times before anyone thought of making use of it.

The common bean also is believed to have originated in Central America and to have undergone somewhat the same distribution as the lima bean. Because of its greater range of cultivation all over the Americas at the time of discovery, and its greater diversity in North America, it is probable that its culture is even older than that of the lima bean.

Beans a Mainstay of Indian Diet

When the white man discovered the Americas, beans were almost as universally grown as maize and supplemented maize in the diet to a very important degree. Climbing beans were generally planted along with maize all over the Americas.

Maize is high in starch but deficient in certain proteins, while beans are high in those proteins. The combination of beans and maize, we know in the light of modern nutrition, met most of the requirements of those Indian tribes of Central America that used little or no meat. The Indians invented succotash.

The pods of some forms were eaten in the green state, at least by white men, virtually from the time of their discovery. It was less than a hundred years ago, however, that truly stringless, nearly fiberless, tender-podded varieties, such as we know today, were developed.

Painting by Else Bostelmann

Pre-Columbian Indians Grew Many Kinds of Tomatoes for Food, Yet Whites Long Considered the "Love Apples" Poisonous

All these have been cultivated since before the white man came—small pear-shaped tomatoes, cherry-sized ones, large-fruited red and yellow kinds, the tiny "currant" tomato.

The Tomato Had To Go Abroad To Make Good

ONE of the strangest things about the history of the tomato *(Lycopersicon esculentum)* is the fact that, although it is of American origin, it was unknown as food in this country until long after it was commonly eaten in Europe. Until hardly more than a hundred years ago it was generally thought to be poisonous in the United States. Long before it was considered here as fit to eat, it was grown only as an ornamental garden plant, sometimes called "love apple."

The mistaken idea that tomatoes were poisonous probably arose because the plant belongs to the Nightshade family, of which some species are truly poisonous. The strong, unpleasant odor of the leaves and stems also contributed to the idea that the fruits were unfit for food.

Our word "tomato" is but a slight modification of *tomati*, the word used by the Indians of Mexico, who have grown the plant for food since prehistoric times. Other names reported by early European explorers were *tomatl*, *tumatle*, and *tomatas*, probably variants of Indian words.

In Their Native Andes, Tomatoes Grow Wild

Cultivated tomatoes apparently originated as wild forms in the Peru-Ecuador-Bolivia area of the Andes. Moderate altitudes in that mountainous land abound today in a wide range of forms of tomato, both wild and cultivated. The cultivated tomato is very tender to cold and also rather intolerant of extremely hot or dry weather, a characteristic reflecting the nature of the climate in which it originated.

Presumably the cultivated species of tomato was carried from the slopes of the Andes northward into Central America and Mexico in the same way as maize, by a prehistoric migration of Indians. Since few primitive forms of tomato are found in Central America and Mexico compared with the number in South America, this probably occurred in relatively recent times—perhaps in the last two thousand years.

Because of the highly perishable nature of the fruit, it seems likely that the tomato was among the last of the native American species to be adopted as a cultivated food plant by the Indians and that it remained of little importance until after the arrival of the white man. Lack of evidence of its use by North American Indians further suggests its rather late movement from South America.

For more than 200 years after 1554, when the first known record of the tomato was written, it was being gradually carried over the globe. European writers mentioned seeing it in far places, but not in what is now the United States.

Italians first grew the tomato about 1550 and apparently were the first Europeans to eat it. About 25 years later it was grown in English, Spanish, and mid-European gardens as a curiosity, with little or no interest in it then as food. The French gave it the name *pomme d'amour;* hence the English and early American term "love apple."

One early Italian writer called the tomato *poma Peruviana*, suggesting that it was introduced from Peru. Another called it *poma d'oro*, or "gold apple," indicating that the earliest introductions were yellow-fruited. By the middle of the 18th century the tomato was grown for food extensively in Italy and to some extent in many European countries.

Thomas Jefferson Grew Tomatoes

Not until after the Declaration of Independence do we find any record of the tomato as being grown by white men in this country. Thomas Jefferson, a remarkably progressive Virginia farmer as well as a statesman, grew it in 1781. It was supposedly introduced to Philadelphia by a French refugee from Santo Domingo in 1789 and to Salem, Massachusetts, in 1802 by an Italian painter.

Tomatoes were used as food in New Orleans as early as 1812, doubtless through French influence; but it was another 20 to 25 years before they were grown for food in the northeastern part of the country. Many persons now living recall being told that tomatoes were poisonous.

The various shapes and colors of tomatoes known today in the United States were found in America by the earliest explorers. Plant breeders have improved the size and smoothness of the fruit and the productivity of the plants, but have introduced nothing basically new in form or color.

As a food of world-wide importance, the tomato is about the newest. It has been cultivated and bred so assiduously in Europe that European varieties are now contributing important characters to the improvement of the crop in the United States. Italy has long been famous for its excellent tomato paste, made from small, oblong, rich, red tomatoes; and spaghetti is hardly spaghetti without tomato sauce.

After having made good abroad, the tomato has attained great importance in its native hemisphere. Today, in the United States alone, hundreds of thousands of acres yield millions of tons of tomatoes.

Squash Named from an Indian Word

OUR word "squash" comes from the Massachuset Indian word *askutasquash*, meaning "eaten raw or uncooked." Although the Indians may have eaten some forms of squash without cooking, today we like our squashes cooked.

The late-growing, less symmetrical, odd-shaped, rough or warty kinds, small to medium in size, but with long-keeping qualities and hard rinds, are usually called winter squash. They belong, almost without exception, to the species *Cucurbita maxima* or *C. moschata*.

The small, quick-growing forms that are eaten before the rinds and seeds begin to harden are called summer squash and belong to the species *C. pepo* (page 164).

Pumpkins also belong to that species, but large, late, smooth, symmetrical forms of *C. maxima* and *C. moschata* are sometimes called "pumpkins" regardless of species.

The word "pumpkin"—improperly pronounced "punkin" by most Americans, including myself—is derived from the old French term *pompion*, meaning eaten when "cooked by the sun," or ripe. In modern French, pumpkin is called *potiron*.

Spread from South and Central America

All three species of squashes and pumpkins are native to the Western Hemisphere. *C. maxima*, represented now by such varieties as Hubbard, Delicious, Marblehead, Boston Marrow, and Turks Turban, apparently originated in northern Argentina near the Andes, or in certain Andean valleys. At the time of the Spanish conquest it was found growing in such areas and has never since been found elsewhere except as evidently carried by man.

Unlike maize and tomatoes, this species had not been carried into Central or North America or even northern South America at the time of discovery of the New World. It was unknown to the Old World until the 16th century, and the oldest known definite record of it is dated 1591.

Since this is a plant that requires a fair amount of hot weather for best growth, it has never become very well known in northern Europe, the British Isles, or in similar areas with short or cool summers. Only long-vining plants are known in this species.

C. moschata, represented by such varieties as Cushaw and Winter Crookneck Squashes, and Japanese Pie and Large Cheese Pumpkins, is a long-vining plant native to Mexico and Central America. This species and *C. pepo* apparently originated in the same general area, Mexico and Central America. Both are important food plants of the natives, ranking next to maize and beans. The flowers and the mature seeds, as well as the flesh of the fruit, are eaten in some areas.

Before the advent of the white man, *C. moschata* and *C. pepo* had been carried over all parts of North America where they could be grown, but they had not been carried into South America as had beans, which originated in the same general region. They were generally grown by Indian tribes all over what is now the United States. Many of these tribes, particularly in the West, still grow a diversity of hardy squashes and pumpkins not to be found in our markets.

Although winter squashes are grown in many lands today, they are relatively unimportant with few exceptions. They are grown extensively in tropical America, in Japan, and in certain districts in the United States. The calabazas of the West Indies and the forms grown by the natives of Mexico and Central America are not of uniform, pure varieties such as we grow, but are extremely variable as to size, shape, color, and quality. Since these species are normally cross-pollinated, it is difficult to keep a variety pure.

In Japan just after World War II I found squash growing on trellises over the doorways or on the sides of houses, at the foundations of burned-out buildings where vines can grow over the ruins, and beside and over small streams on horizontal trellises of poles.

Much "Pumpkin Pie" Is Really Squash

The largest "pumpkins" grown and bragged about are often *C. maxima*, really squashes; and much of the pumpkin pie we eat is made from *C. maxima*, squash. The best commercially canned "pumpkin" is not pumpkin but Delicious, Boston Marrow, or similar squash. The flesh of these varieties of squash is much richer and more nutritious than that of pumpkin.

Several years ago a North Dakota horticulturist bred a small variety of turban squash as a substitute for the sweet potato, which does not thrive on the northern Great Plains. This little Buttercup squash has flesh surprisingly similar to sweet potato in taste and quality.

Hard-shelled Winter Squash, Borne on Long Trailing Vines, Was an Important American Indian Food

The large Hubbard, Delicious, Cushaw, and Turks Turban (left to right) are long-keeping kinds; the small Acorn (left) is more akin to the summer squashes (page 165).

Long Before "Frost Is on the Punkin," Summer Squash Is Harvested

SUMMER SQUASH varieties *(C. pepo)* are properly harvested for food while tender and immature, before either the seeds or the rinds have become firm or tough. The fruits are cooked with no prior preparation except washing and perhaps cutting into pieces of convenient size. In English-speaking countries other than the United States, they are generally called "vegetable marrows."

This kind is apparently the one most frequently described as "squash" by European visitors to our Atlantic coast during the early to late 17th century. Early in the preceding century, however, the European observers had referred to this type as a kind of gourd because of its superficial resemblance to Old World gourds.

Known in Europe from Colonial Times

A vining variety introduced as new in America in 1881 happened to be exactly like one described in Germany in 1552 and recognized as of American origin. Fruits like our present White Bush Scallop or Cymling were accurately illustrated by the French botanist Matthias Lobel in 1591, and the bush form of squash plant was known in Europe in the 17th century, if not earlier.

The White Bush Scallop was called Symnel in 1648, but Thomas Jefferson, in 1803, wrote it "Cymling," the commonest name for it in our South today. Our Summer Crookneck of today, named as a variety in seed catalogues as early as 1828, appears to be the same as a squash described by Champlain in 1605.

Thus it seems that the culture and use of summer squashes has been well known in Europe from the beginnings of colonial times here. Both European and American gardeners still grow many varieties that are substantially the same as those grown by pre-Columbian Indians.

The summer squashes have long been popular in Italy, as indicated by the names and varieties developed there—Cocozelle and Zucchini, for example—which have lately become popular in America.

Because of the fantastic success of hybrid corn (maize) in the past 20 years, plant breeders have developed hybrids of other plants in efforts to increase yields through hybrid vigor, and this has been tried with summer squash. Some success has been obtained, but the necessity of going over the seed-parent plants repeatedly at short intervals to remove the pollen-bearing flowers greatly increases the cost of producing hybrid squash seed as compared with hybrid corn seed (page 155). The object is to allow pollen-bearing flowers to develop only on those plants especially developed for furnishing pollen and thus ensuring that the seed which forms on the seed-parent plants will be hybrid.

The mistake that too many gardeners—and some farmers—make in producing summer squash is letting the fruits become too tough and poor in quality before harvesting them. To be really good, the fruits of Cymling, Summer Crookneck, Summer Straightneck, Zucchini, the vegetable marrows, and such varieties must be harvested while so young that the rind has not developed noticeably.

The plants must be gone over every two or three days in hot weather, lest many fruits become too old before harvest. It requires only four to six days after bloom for a fruit of many of these varieties to reach the harvest stage. After two or three more days they are too old and tough to be desirable.

The American species of summer squash is grown to some extent in the warmer parts of Asia, but it is not well adapted to those lands. Orientals depend mainly on Asiatic forms of gourds for a product that is similar to our young summer squash fruit. These Asiatic gourds have not found favor in America because they are extremely rank-growing, late, and their fruits are considered here as less pleasing to the taste than our own squashes.

Little Pumpkins Grown on "Bushes"

A few years ago there was developed an early, very small-fruited variety of pumpkin borne on plants like those of bush summer squash. It is called Cheyenne Bush Pumpkin and was bred for adaptation to the short season and low average temperatures of the high plains east of the Rocky Mountains. The fruit is allowed to mature before use, as is that of most pumpkins.

This is perhaps as good a place as any to point out that *neither squash nor pumpkin will cross-pollinate either watermelon or muskmelon.* Growing squash or pumpkins near melons will not affect the quality of the melons, despite the persistent belief that it will make the melons taste like pumpkins. Bad weather, poor soil, or disease may make melons taste bad, but it is not due to crossing of squash or pumpkins with melons.

Summer Squash and a Rotund Relative, the Pumpkin, Are Also Native Americans

Golden Summer Crookneck, Golden Summer Straightneck, Zucchini, Cocozelle, and White Bush Scallop (left to right at bottom) are all "bush" kinds, eaten when immature. The large field pumpkin beside them—ideal for a Halloween jack-o'-lantern—belongs to the same species, but grows on long vines.

Painting by Allen Beechtemann

Garden Pepper, Both a Vegetable and a Condiment

THE garden pepper *(Capsicum frutescens)* is not related to the true pepper *(Piper nigrum)* from which we get the common black pepper on our tables.

Why do we call *C. frutescens* "pepper"? The answer goes all the way back to Columbus. He had set forth on his famous voyages to find a short route to India and the East Indies largely for trade. Spices from the East were important in commerce and therefore of much interest to Columbus and his commercial-adventurer associates. When they found the Indians of the West Indies growing and using fiery forms of *Capsicum*, the product was thought to be a kind of pepper.

As early as 1493 Peter Martyr wrote that Columbus brought home with him "pepper more pungent than that from the Caucasus." In 1494 the physician to Columbus's fleet on his second voyage referred to the plant in a letter to Spanish authorities; 20 years later the plant and its uses were described in detail by another explorer for Spain.

This intense interest in the pungent forms of *Capsicum* from the very time of their discovery, accompanied by definite records and descriptions, is unique in the history of American plants. While important plants such as the potato were long ignored, to the spice-conscious discoverers this pepper was an unexpected and most welcome find.

Ancient Indians Liked Fiery Food

Fragments of different types of peppers have been found in Peruvian ruins believed to be more than 2,000 years old. Fruits of the pepper are unmistakably illustrated in the elaborate embroidery of an Indian garment unearthed near the coast of Peru and believed to date back to about the first century. The Olmecs, Toltecs, and Aztecs also are known to have cultivated and used peppers extensively.

In the first half of the 16th century, voyagers to the Americas encountered many forms of peppers, not only in the West Indies but in Central America, Mexico, Peru, Chile—wherever they touched the American Tropics. By the beginning of the 17th century virtually every form known today had been found, all being grown by the Indians.

Anyone familiar with Mexico or our own Southwest knows that the Mexicans and Indians today eat almost incredible quantities of hot peppers. They are marketed and used fresh, both green and red ripe, as well as in the dried mature form.

Peppers were introduced into Spain in 1493, were known in England by 1548, and in Central Europe by 1585 or earlier. In the 17th century they were taken to India and southeastern Asia by the Portuguese. Peppers became so common there that their American origin was long overlooked, despite the fact that in India they are all consistently called "chillies."

In Spain the hot peppers are called *chili* (from Chile), and certain hot kinds are called chili peppers in the United States. A mixture of chopped meat and beans, highly flavored with chili pepper, is called *chili con carne*—"chili with meat."

The mild or sweet kinds in Spain are called *pimenta* or *pimiento*, while in the United States "Pimiento" refers to only a single type of thick-fleshed, bright-red sweet pepper. It yields the brilliant stuffing in olives, the red particles in "pimento cheese," and the pimiento we buy in tiny cans or jars.

A distinctive form of long, thick, bright-red pepper with nonpungent flesh has long been cultivated in Hungary and adjacent areas under the name of *paprika*. There is now a small paprika industry in this country. The tabasco pepper is the basis of pungent tabasco sauces made in our South.

Cayenne pepper is the dried, ground fruit of a long, slender form of hot "red pepper." This form, named for a coastal city in French Guiana in South America, was doubtless taken to Asia by Spanish or Italian explorers and re-introduced into America from there.

Sweet Peppers Most Important in United States

All these forms are important commodities of trade and add zest to the world's cookery. In the United States, however, the nonpungent, large-fruited form has become by far the most extensively grown.

As a boy in the Middle West, I heard our large, sweet, garden peppers commonly called "mango peppers," but that term is rarely used in America today. Now, when we say "peppers" without any qualifying word, we usually mean sweet or nonpungent kinds that are eaten as a vegetable, either cooked or raw in salads. Large quantities are now being commercially preserved in brine, or even diced and dehydrated for use in vegetable and salad mixtures after re-freshening.

Peppers, Valued as Spices, Were Columbus's Most Immediately Successful Plant Discovery in America

Hot kinds at right were especially prized, but now the large, sweet, bell-shaped and the conical Pimiento varieties are much more popular in the United States.

Painting by Else Bostelmann

Sweet Potato, Another American

THE SWEET POTATO (*Ipomoea batatas*) is another of the native American plants found by Columbus and his shipmates. Although it was probably found on various islands of the West Indies on some of the earlier voyages, it is not definitely mentioned in their records until the fourth voyage.

In the islands off the coast of Yucatán and Honduras the sweet potato was called *axi* and *batatas* or *betatas* by the natives; in 1514, Peter Martyr named nine varieties that grew in Honduras. It was taken to Spain about 1500 and several kinds were cultivated there by the middle of the 16th century, including red, purple, and pale or "white" varieties.

Cultivation of sweet potatoes was tried unsuccessfully in Belgium in 1576. John Gerarde, of London, claimed that in 1597 he grew the plant in England (probably without much success) and that it was known in India, Barbary, and other hot regions.

Early Spanish explorers are believed to have taken the sweet potato to the Philippines and East Indies, from which it was soon carried to India, China, and Malaya by Portuguese voyagers. The original introductions from America into the Pacific and Far East were so unobtrusive that the origin of the plant was long overlooked, many believing it native to southern and southeastern Asia.

Especially Important in Tropical Areas

The sweet potato has become far more important in subtropical and tropical areas than has the Irish potato because it thrives in a hot, moist climate, while the latter requires a cool climate. Thus it has never become popular in Europe and it still is little known even in the warmer Mediterranean areas. It is important in the warm Pacific islands, the East Indies, India, China, and is now the third most important food crop in Japan.

Apparently the sweet potato was introduced to Kyushu from China some time around 1700, by way of the Ryukyu Islands. In southern Kyushu today it is commonly called *kara-imo*, meaning Chinese potato; but in most of the other parts of Japan it is called *satsuma-imo* (Japanese potato). The relatively recent introduction of the sweet potato into Japan seems in itself a good argument against its Chinese or other Asiatic origin.

In the past 25 years, plant breeders in Australia and in the warmer parts of the Soviet Union have taken great interest in its food-producing possibilities and have sought to develop its culture on a large scale.

Sweet potatoes were cultivated in Virginia in 1648, possibly earlier, and are said to have been taken into New England in 1764. They were grown by the Indians of our South in the 18th century, but we do not know how much earlier. In the South today they are generally preferred to Irish potatoes as a staple food; in the North the reverse is true.

Generally speaking, the northern consumers prefer the so-called "dry-fleshed" type of sweet potato, such as Big Stem Jersey and Little Stem Jersey, while the southerners prefer the "moist-fleshed" type, such as the Porto Rico and Nancy Hall varieties. A strange fact about these two types of sweet potato is that the "dry-fleshed" ones have more water in them than the "moist-fleshed" ones do!

The soft, rich, "moist" varieties are erroneously called "yams" in the United States. This confusion in names is unfortunate, since the yam is an entirely different plant, belonging to the genus *Dioscorea*. True yams are still a curiosity in the United States.

The flesh of most sweet potato varieties is white or nearly so, although in the United States we prefer yellow or orange-fleshed varieties because of their valuable carotene (provitamin A) content. Some kinds have purple flesh, but they are not grown here.

Skin colors range from nearly white through shades of buff to brown or through pink to copper, even magenta and purple. Americans are prejudiced against the purplish skin colors because certain "red" varieties formerly grown here were of poor quality.

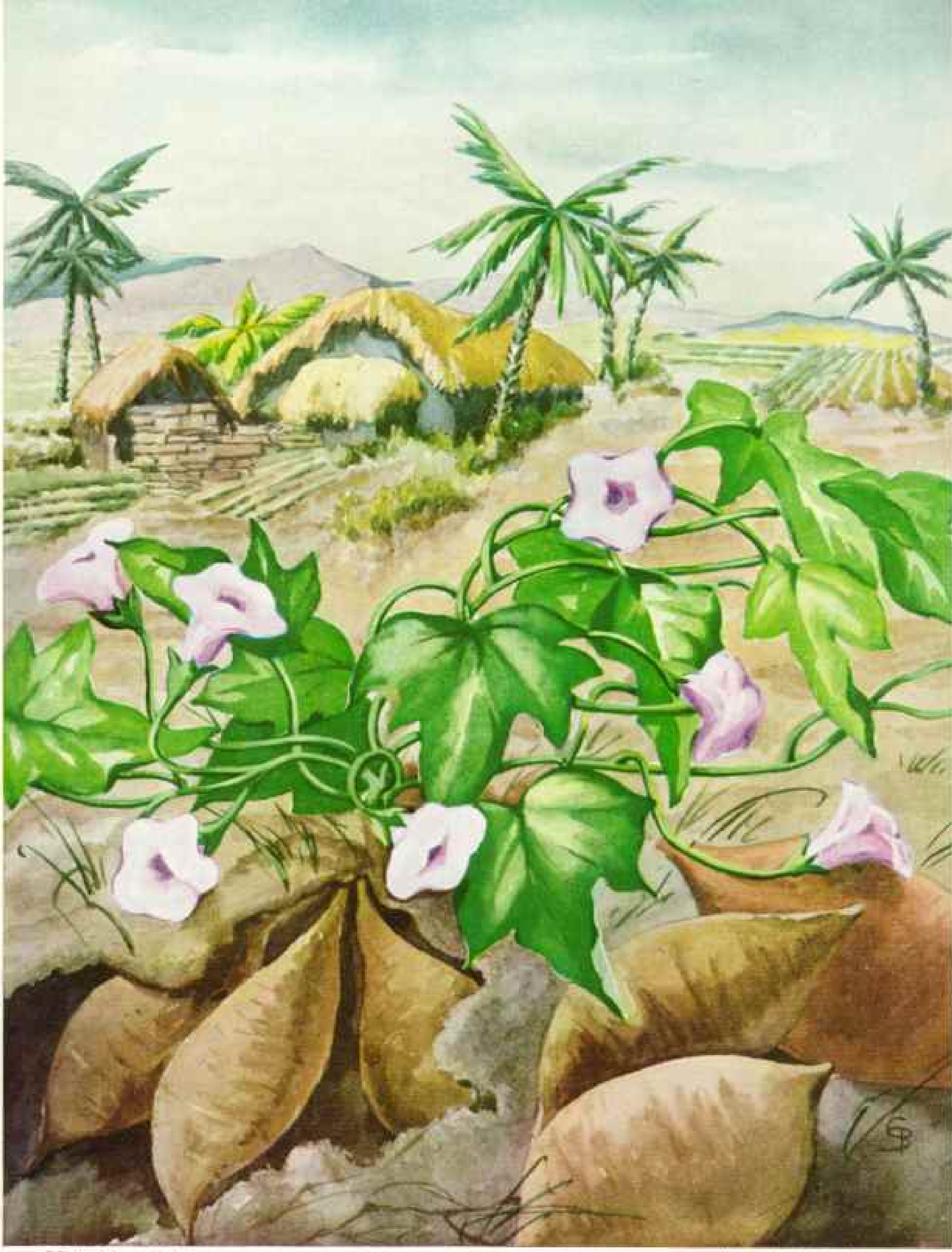
Many Fed to Livestock in South

In our northern States the sweet potato is used only as human food, and to only a small extent. In the South a large part of the crop is fed to livestock, and efforts are being made to breed varieties that will produce large yields cheaply enough to permit their culture entirely for stock feed or industrial use.

The sweet potato generally contains more starch than the Irish potato, and the starch has properties that are especially useful in many food products and manufacturing processes. As yet, however, the growing and handling of the crop is too costly for it to be produced especially for starch manufacture.

Sweet potato candies, ice cream, cookies, and related delicacies prepared from this vegetable are not yet widely known, but they are surprisingly good.

Except in the Tropics, the sweet potato rarely flowers under ordinary field conditions and more rarely sets seed. Thus sweet potato breeders in the Temperate Zones, as in Japan or the United States, must resort to special methods of training and greenhouse culture, or even send their parent varieties to the Tropics for flowering and hybridization.



Earliest Voyagers to Tropical America Found Sweet Potatoes

These nuggets of tasty, golden root were first seen by Europeans in the West Indies, on some of the first islands visited. White potatoes were not found until some years later in western South America (page 156). The sweet potato blooms freely in the Tropics, but rarely in the United States. Its trumpet-shaped blossoms are like the flowers of its relative, the morning-glory.

Kohlrabi and Brussels Sprouts Are European

CERTAIN vegetables of American origin have been called "new" in the sense that they have attained widespread importance in the last two hundred years or thereabouts, although those plants doubtless were used for food in America for hundreds, even thousands, of years before its discovery. Kohlrabi and brussels sprouts, however, apparently were unknown anywhere more than a mere 400 to 500 years ago. They appear to be *really* new, and the only common vegetables of North European origin.

Although kohlrabi (*Brassica oleracea* variety *caulo-rapa*) and brussels sprouts (*B. oleracea* variety *gemmifera*) appear radically different from each other, they are merely different horticultural forms or races of the same species, *Brassica oleracea*, to which common cabbage, kale, broccoli, and cauliflower belong. They all came from a common parent, "wild cabbage" (page 172).

"Kohlrabi" Means "Cabbage Turnip"

"Kohlrabi" is a German word adopted without change into our language, *Kohl* meaning cabbage and *Rabi* meaning turnip. This "cabbage" with a turniplike enlargement of the stem above ground was apparently developed in northern Europe not long before the 16th century. The marrow cabbage from which it probably came is a cold-tender, non-heading plant with a thick succulent stem, while kohlrabi as we know it is a hardy vegetable, evidently developed in a cool climate.

The first description of kohlrabi was by a European botanist in 1554. By the end of the 16th century it was known in Germany, England, Italy, Spain, Tripoli, and the eastern Mediterranean. It is said to have been first grown on a field scale in Ireland in 1734, in England in 1837. In the United States, records of its use go back to 1806.

The plant is easy to grow, is remarkably productive, and an ideal garden vegetable if one does not make the mistake of planting too much of it. Some of my war-gardening friends became literally fed up with it a few years ago when they planted long rows of it in their gardens, all at one planting time, and then at harvest tried to eat it all to keep it from being wasted!

Kohlrabi has never become an important vegetable, but it is one of those things of which most of us would enjoy a limited amount. Some dislike its flavor, which is similar to that of the turnip but milder and sweeter if the vegetable is harvested before it becomes too old and tough.

Two main types are grown in America, white and purple. The "white," actually light green, is much the more popular although the purple variety is most attractive. In Europe, fancy kinds with frilled and deeply cut leaves are sometimes grown for ornament.

Like other members of the species *B. oleracea*, kohlrabi is a biennial—meaning that it requires parts of two growing seasons, with a cool rest period (wintertime) between, in order to produce seed.

Brussels Sprouts Require Cool Climate

Brussels sprouts are so named partly because the plant is supposed to have been grown since time immemorial in the vicinity of Brussels in Belgium. Though it probably first attained importance in that area, or even was developed there, it has been known for about 400 years. The first rough description of it was in 1587, and some famous botanists as late as the 17th century referred to it only as something they had heard about but had never seen.

The brussels sprouts plant is really a tall-stemmed cabbage in which many tiny heads ("sprouts") form along the stem at the bases of the leaves instead of making one large head at the top of a short stem. After a head of common cabbage is cut from the plant, numerous tiny heads often will grow from the remaining stem in much the same manner as in brussels sprouts.

Brussels sprouts need a long, cool growing season, like that of northern Europe and the British Isles. Most of the crop grown in America is produced on Long Island, New York.

Because this plant is so new and so limited in the places where it can be grown easily, its history has hardly begun. By 1800, however, it was commonly grown in Belgium and France, and by 1850 it was becoming popular in England, where it is in high favor today.

Although this vegetable has been known since about 1800 in America, it is far from common here and not highly popular.

Varieties range from short to tall, but are otherwise not strikingly different. The existence of few forms and the lack of many names, or old names, support the belief that the brussels sprouts is a new form botanically as well as agriculturally.

Since this plant is actually a form of cabbage, it will hybridize freely with common cabbage and other forms of the same species: kale, cauliflower, kohlrabi, broccoli, and collards. In the production of seed for planting, cross-pollination with any of these other forms is disastrous, because such seed will produce intermediate mixed offspring.

Northern Europe Contributed These Two Members of the Cabbage Clan

Brussels sprouts (left) and kohlrabi (right) are the only vegetables that originated there, with the possible exception of rutabaga (page 188). Both were developed from wild cabbage brought to Europe from the world's greatest center of origin of vegetables now grown in America—the warm lands near the Mediterranean. They date from the late Middle Ages and thus are the newest forms of cabbage. Brussels sprouts grow well in Britain and helped feed the British people during World War II. "Kohlrabi" is German for "cabbage turnip."

Greeks and Romans Grew Kale and Collards

KALE and collards are similar in many respects, differing in little more than the forms of their leaves. They are, in effect, primitive cabbages that have been retained through thousands of years.

Although more highly developed forms, such as cauliflower, broccoli, and head cabbage, have been produced in the last two thousand years or so, the kales and collards have persisted, although primitive, because of their merits as garden vegetables.

These leafy nonheading cabbages bear the Latin name *Brassica oleracea* variety *acephala*, the last term meaning "without a head." They have many names in many languages, as a result of their great antiquity and widespread use.

Kale is often called "borecole," and in America collards are sometimes called "sprouts." "Kale" is a Scottish word derived from *coles* or *caulis*, terms used by the Greeks and Romans in referring to the whole cabbagelike group of plants. The German word *Kohl* has the same origin.

"Collards" is a corruption of *colewort*s or *colewyrts*, Anglo-Saxon terms literally meaning "cabbage plants."

The cabbagelike plants are native to the eastern Mediterranean or to Asia Minor. They have been in cultivation for so long, and have been so shifted about by prehistoric traders and migrating tribes, that it is not certain which of those two regions is the origin of the species.

The original "cabbage" was undoubtedly a nonheading kind with a prominent stalk or stem, and the kales and collards are not far removed from it. Wild forms have become widely distributed from their place of origin and are found on the coasts of northern Europe and Britain.

Known for at Least 2,000 Years

Apparently none of the several principal forms of kale and collards that we know today are new. All have been known for at least two thousand years.

The Greeks grew kale and collards, although they made no such distinction between them as we make today. Well before the Christian era the Romans grew several kinds, including those with large leaves and stalks and a mild flavor; a crisp-leaved form; some with small stalks and small, sharp-tasting leaves; a broad-leaved form like collards; and others with curled leaves and a fine flavor. "Coles" were described also in the 1st, 3d, 4th, and 13th centuries by European writers.

It might appear that the Romans carried the coles to Britain and France, since the plants were so well known to the Romans and the species has been popular in those countries for so long. On the other hand, they may have been taken there somewhat earlier by the Celts (page 174).

The first mention of the kales (coleworts) in America was in 1669; but because of their popularity in European gardens it is probable that they were introduced somewhat earlier.

Although many forms of *Brassica oleracea* are now known in parts of the Orient, they are not nearly so popular as the Far Eastern species of *Brassica* (page 215).

Kale and collards have remained minor commercial crops in the United States, although collards are the standard winter greens in home gardens of the South. Neither crop thrives in hot weather, which gives the plants a strong, unattractive flavor. Cool growing weather, fall frosts, and mild winters, however, impart a high sugar content and fine flavor.

Rich in Minerals and Vitamins

Those who know both kale and collards usually consider the latter to have the better eating quality. Nutrition experts in recent years have sought to popularize both plants because they are unusually rich in the minerals and vitamins provided by green leafy foods.

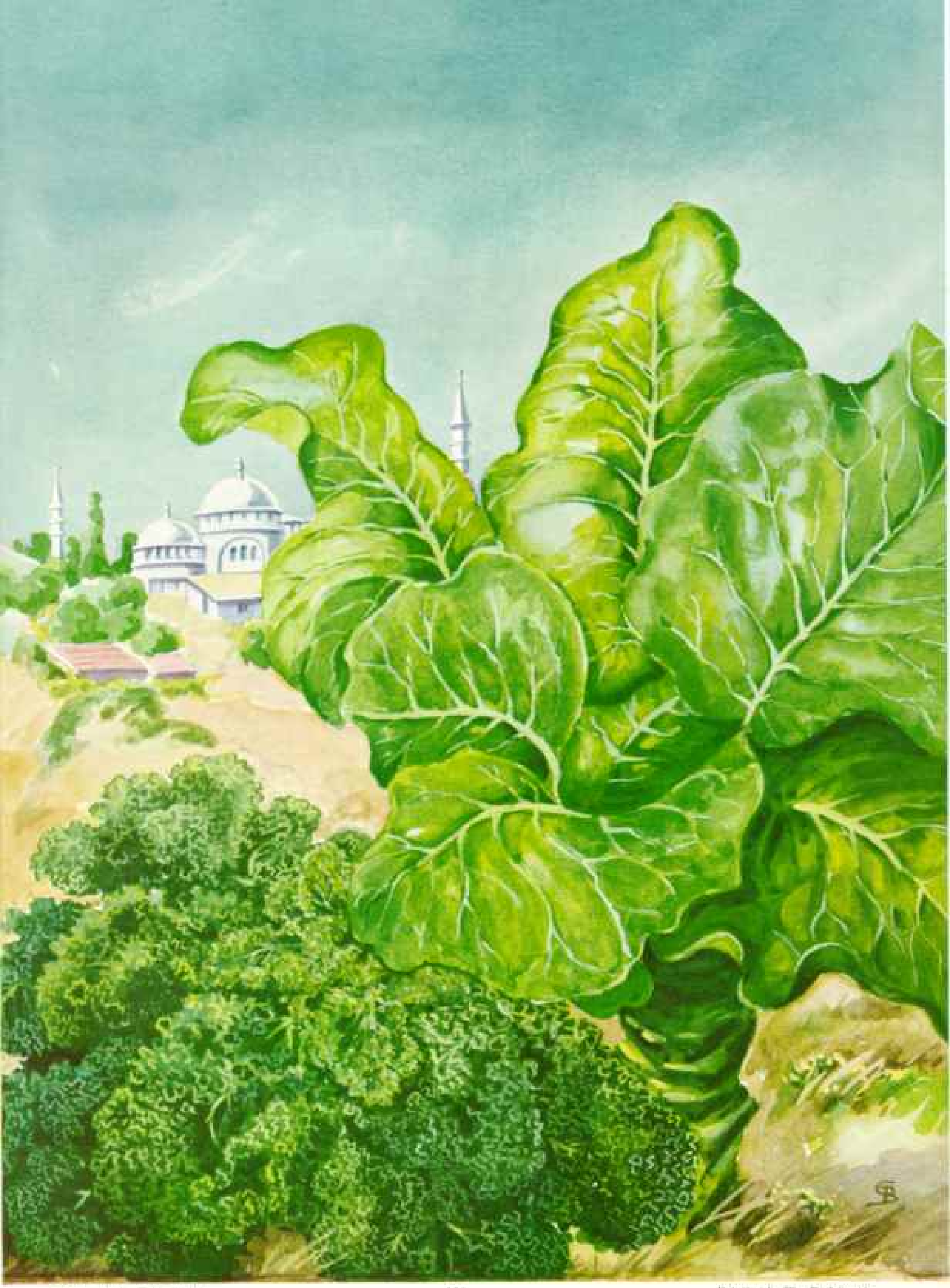
Before the "newer knowledge" of nutrition, our experts bemoaned the poor diet of southern farmers, especially the Negroes, and were amazed to find so many of those people to be apparently well nourished. The ubiquitous collard patch on every farm, and in nearly every dooryard where there is room, is now believed to play a most important part in furnishing the necessary vitamins and minerals.

On one truck farm I saw a beautiful 10-acre field of collards. The farmer explained it was not for sale, but "just a collard patch for the hired hands."

All varieties of collards appear rather similar, but the kales show interesting diversity: tall and short; highly curled and plain leaved; blue-green, yellow-green, and red; erect and flat-growing; in various combinations and gradations of these characters.

Until the last few years kale and collards were marketed only in the natural state. Now, however, several enterprising American canners are preserving them in tin, especially in a finely chopped or "sieved" form as food for babies or persons requiring a special diet.

Kale and collards are among the easiest of all vegetables to grow. They are biennials, putting up their flower or seed stalks in the spring of their second season of growth.



Kale (Left) and Collards (Right) Are the Most Primitive Cultivated Cabbages

These leafy, nonheading cabbages that originated in the eastern Mediterranean and westernmost Asia are little different from the wild forms of cabbage first used for food in prehistoric times.

Of Cabbages and Celts

THE word "cabbage" is an Anglicized form of the French *caboche*, meaning "head." It has been used, loosely, to refer to loose-heading (or even nonheading) forms of *Brassica oleracea* as well as to the modern hard-heading type classified as *B. oleracea* variety *capitata*.

The Celts of central and western Europe had much to do with the distribution and popularization of cabbage as a food plant. Although the evidence points to the eastern Mediterranean and Asia Minor as the place of origin of the species, Celtic knowledge of it was so ancient as to have influenced the Latin name, *Brassica* (from the Celtic word *bresic*, meaning "cabbage").

Introduction of "cabbage" into Europe has been generally ascribed to the Romans, but it seems probable that the Celts introduced it even earlier. The Celts invaded Mediterranean lands repeatedly from about 600 B. C. to the beginning of the Christian Era, reaching into Asia Minor around 278 B. C. They also reached into the British Isles in the fourth century B. C. Shortly before the beginning of the Christian Era the Romans spread into northern Europe and into Britain.

In view of those movements, it is not surprising that the history of the development of the cabbagelike group of vegetables has been confused between the Mediterranean or Asia Minor, on the one hand, and northern and western Europe on the other.

Most of the European and Asiatic names for cabbage can be traced to one of three Celtic or part-Celtic root words. *Kopf Kohl* (German), *cabus* and *caboche* (French), *cabbage* (English), *kappes*, *kraut*, *kapost* (Tartar), *kopi* (Hindu), and others, all are related to the Celto-Slavic *cap* or *kap*, meaning "head." *Kaulion* (Greek), *caulis* (Latin), *kale* (Scottish), *kaal* (Norwegian), *kohl* (Swedish), *col* (Spanish), are related to the Celto-Germanic-Greek *caul*, meaning "stem."

Hard-heading Kinds Unknown to Romans

In southern Europe, Mediterranean peoples developed those forms of cabbage that are tolerant to warm climates (not hard-heading); the hard-heading cabbages were developed in the cooler parts of Europe by peoples largely Celtic, Nordic, or of mixed blood and culture involving Celtic or Nordic peoples. Had there been a hard-heading variety in ancient Rome, it certainly would have attracted enough interest for the old Roman writers to have described it.

"White" (hard-heading) cabbages were apparently unknown until after the time of Charlemagne, who died A. D. 814. Albert of Cologne, in the 13th century, referred to a headed cabbage, and in 14th-century England the words *cabaches* and *caboches* were used, indicating then a distinction between heading and nonheading cabbages (coleworts).

It was not until 1536 in Europe that unmistakably clear descriptions of hard-heading cabbage were recorded. At that time also a loose-heading form called *romanos*, and later called *chou d'Italie* and *chou de Savoys*, for the Italian province, was described. This "savoy cabbage," a crumpled-leaved kind having high quality, was grown in England in the 1500's.

Cartier Brought Cabbage to America

Cabbage was introduced to America in 1541–42 by Jacques Cartier, who planted it in Canada on his third voyage. Because of its popularity among Europeans, it was doubtless planted in what is now the United States by some of the earliest colonists, although there is no written record of it until 1669. In the 18th century it was being grown by American Indians as well as by the colonists.

Hard-heading cabbage was unobserved in Japan as late as 1775. It is believed to have found its way eastward in comparatively recent times and is still of minor importance in the Orient. There are no Sanskrit or other ancient Eastern language names to indicate that it has been long in the Orient.

The round-headed form is the oldest of the hard types of cabbage and is the only one described during the 16th century. In the 17th century, flat-headed and egg-shaped varieties appeared, and in the 18th century conical or pointed kinds were first described.

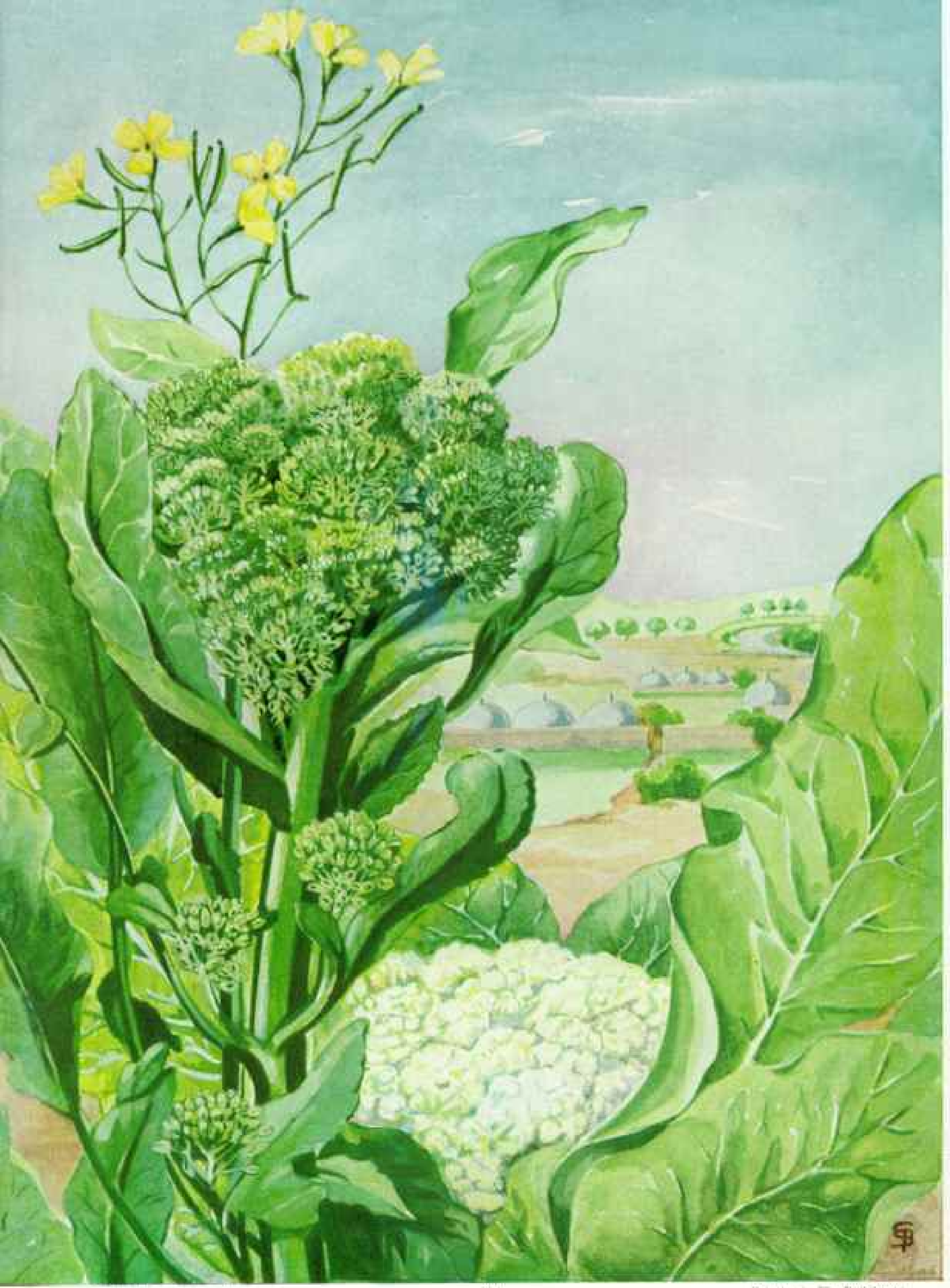
Germany, France, and the Low Countries were by far the most productive of new varieties. Most of the varieties grown in the United States even today originated in Germany and the Low Countries.

"Red" cabbage (magenta to purplish) was first described in England in 1570, all of the early varieties being round-headed. Now there are red varieties of all the various head shapes. The "red" color is confined to the "skin" of each leaf and stem, the cells beneath possessing normal green or white color. When cut before cooking, a head of red cabbage presents a pretty contrast of red and white.

Savoy-leaved and red cabbages are little grown in the United States. Red varieties, however, are popular in northern Europe and savoyed varieties in the warmer parts of Europe. Most cabbage grown in this country is of the smooth-leaved green or white kind.

Head Cabbage Got Its Start in Southern Europe, Was Perfected Farther North

Loose-heading varieties originated in northwest Italy and southeast France; hard-heading kinds were developed in northern Europe in the Middle Ages. A cabbage plant at the seed-bearing stage is shown at right.



Painting by Elsie Bostelmann

Sprouting Broccoli (Left) and Cauliflower (Right) Are Edible Flower Parts

The partly developed flowers and portions of the flower stalks are eaten. Long before heading cabbage was known, the ancients of Mediterranean lands were eating these cabbage flowers.

Cabbage Flowers for Food

BROCCOLI and cauliflower are two more kinds of *Brassica oleracea*, so similar that both are designated as botanical variety *botrytis*, from a Greek word meaning a cluster like a bunch of grapes.

"Broccoli" is an Italian word taken from the Latin *brachium*, meaning an arm or branch. "Cauliflower" comes from the Latin terms *caulis* (cabbage) and *floris* (flower). These "cabbages" are grown for their thickened, profuse, undeveloped flowers and flower stalks instead of for their leaves.

Broccoli has two distinct forms. One makes a dense, white "curd" like that of cauliflower and is called "heading broccoli" or "cauliflower broccoli." The other makes a somewhat branching cluster of green flower buds atop a thick, green flower stalk two to two and a half feet tall, and smaller clusters that arise like "sprouts" from the stems at the attachments of the leaves. This form is called "sprouting broccoli."

Some years ago an observant gentleman came into my office to discuss the origin of sprouting broccoli. He insisted firmly that it must be the result of a cross between cabbage and asparagus, because it had the flavor of cabbage and the fleshy stem of asparagus!

Apparently this gentleman had never seen cabbage plants push up their flower stalks, else he would have realized that the developing flower stalk of cabbage and of sprouting broccoli are botanically the same thing. Neither did he realize that cabbage and asparagus are much too distantly related to hybridize.

In 1860, at the Cirencester Agricultural College in southern England, the wild cabbage from the seacoast was subjected to simple breeding and selection procedures. From these wild plants, which resembled crude kales, forms of broccoli and other related cabbagelike varieties were developed, demonstrating their common ancestry.

Broccoli Increasingly Popular in America

Like the other forms of *B. oleracea*, the parent type of these cabbages is native to the Mediterranean and Asia Minor. The Romans grew sprouting broccoli and prized it highly, according to Pliny, in the 2d century after Christ. This is the same form that has remained popular in Italy.

Despite its antiquity, sprouting broccoli apparently was unknown in England until about 1720, when it was introduced as "sprout cauliflower" or "Italian asparagus." "Green" broccoli, which was doubtless the sprouting form, was mentioned in an American book on gardening in 1806, but it must have been known here for many years before that.

It is surprising that such an excellent vegetable as sprouting broccoli, known for more than 2,000 years in Europe and perhaps 200 years in America, should have become popular here only in the past 25 years. Americans of Italian origin had grown it for generations in the vicinity of New York and Boston before Americans generally appreciated its attractive qualities. Since 1925 it has suddenly become an important market and home-garden plant in the United States. It is also being grown for quick-freezing.

We occasionally see another "sprouting" type in this country, called *raab* or *broccoli raab*, which is entirely different from the true Italian sprouting broccoli. A low-growing little plant with turniplike foliage, it should not be confused with broccoli of *B. oleracea*.

Aristocrats of the Cabbage Clan

Cauliflower and cauliflower broccoli have much the same *early* history as sprouting broccoli. The oldest record of cauliflower dates back to the 6th century B. C. Pliny wrote about it in the 2d century after Christ. In the 12th century three varieties were described in Spain as introductions from Syria, where it had doubtless been grown for more than a thousand years.

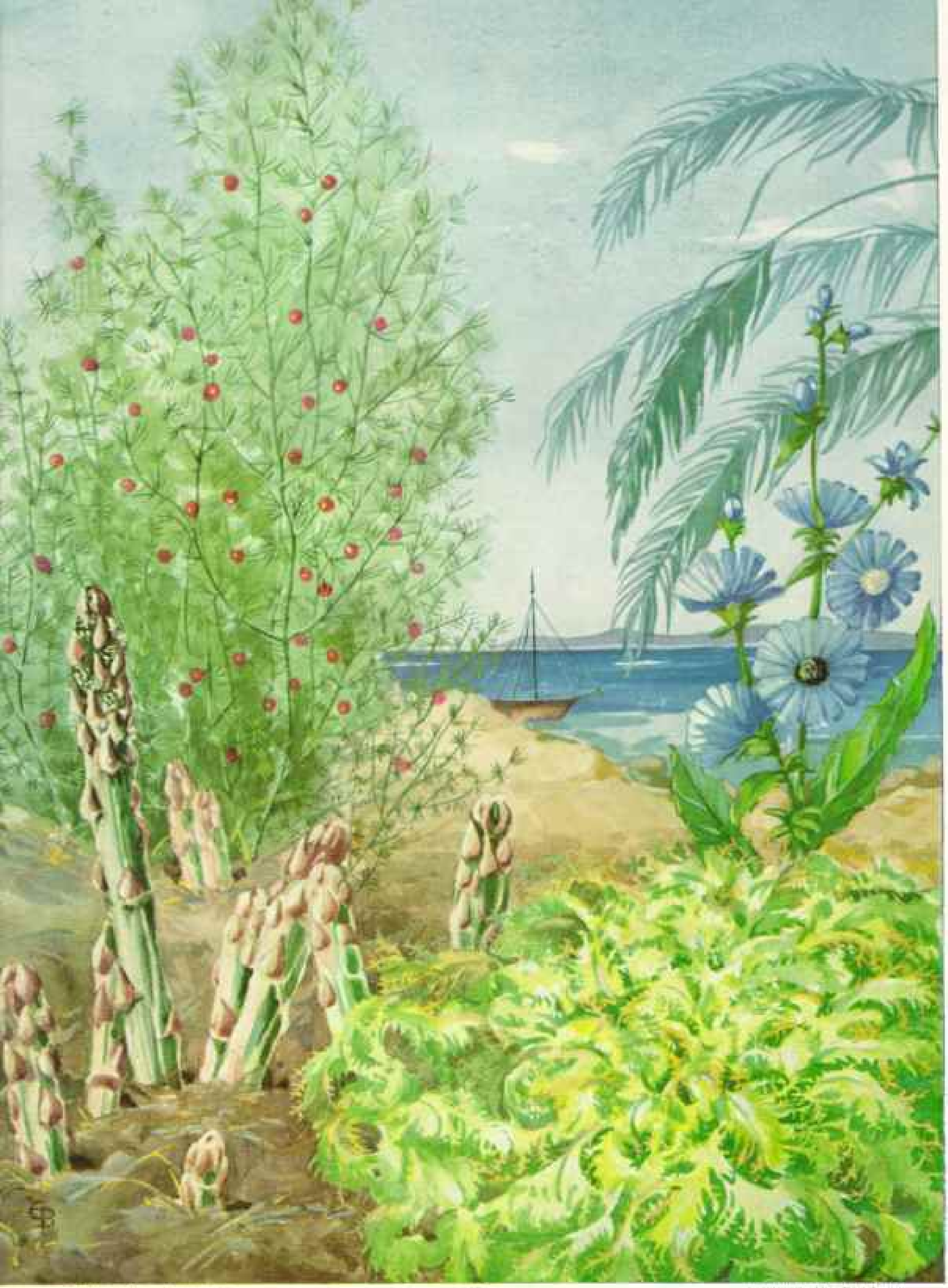
Cauliflower in Turkey and Egypt was mentioned in the 16th century by European writers, but it had been certainly known in those places for 1,500 to 2,000 years or more. In England in 1586 cauliflower was referred to as "Cyprus coleworts," suggesting recent introduction from the island of Cyprus. For some time thereafter, Cyprus was mentioned as the source of seed for planting in England. Cauliflower was an item on the London vegetable market as early as 1619. It was grown in France around 1600.

A hundred years ago, as many as a dozen varieties were listed in American catalogues, as many as are commonly listed today.

Cauliflower and cauliflower broccoli appear alike. In fact, "winter cauliflower" on our markets is cauliflower broccoli, hardier and slower-growing than cauliflower.

Most varieties of cauliflower and cauliflower broccoli are sensitive to climate, requiring cool temperature with moist air. In India, however, where the plant was introduced long ago, heat-tolerant types have been developed.

The sensitivity, difficulty of culture, and relatively high price of the cauliflowers have made them the true aristocrats of the cabbage family. Some wag has defined cauliflower as "a cabbage with a college education."



Painting by Elsa Bonfelmann

Asparagus (Left) and Endive (Right) Are Ornamental When Grown to Flowering

Native to the Mediterranean and Asia Minor, these plants were harvested from the wild for food long before the Romans began to cultivate them. Garden asparagus is distinct from the florists' asparagus "fern." Wild chicory, related to endive, is now a weed in many parts of the world.

Green Gifts from the Mediterranean

OUR common garden asparagus (*Asparagus officinalis*) is only one of several species of asparagus that are edible, but it is by far the most important. Our name for it is the Latinized form of the old Greek word, and its name in most other modern languages is easily recognized as of the same origin: *asperge* (French), *Sparge* (German), *asperge* (Dutch), *espárrago* (Spanish).

English and American colloquialisms are sparagrass, sparrowgrass, and, among larger growers of the crop, just "grass."

Asparagus Once Considered a Cure-all

Asparagus is believed native to the eastern Mediterranean lands and Asia Minor. It commonly grows wild over much of that country today and also in the trans-Caucasus, Europe, and even in many places in the United States where it has escaped from cultivation. It thrives along riverbanks, shores of lakes, and even close to the salty waters of seacoasts, tolerating considerable salt in the soil in which it grows. It has been found "wild" in so many places that there has been much argument as to where it actually originated.

Before asparagus was used for food, it had quite a reputation as a medicine for almost anything from the prevention of bee stings to heart trouble, dropsy, and toothache!

The Greeks apparently collected asparagus only from the wild, since they gave no directions for cultivating it. The Romans, however, as early as 200 B. C. gave detailed gardening instructions that would be considered good today, except for one thing—they preferred the seed of wild plants for planting. Three hundred years later, such progress in development had been made that the cultivated forms were consistently as good as the best wild plants.

In Roman times asparagus was not only eaten "in season" but was dried for later use. It was simply and quickly prepared by boiling the dried shoots. The Emperor Augustus is supposed to have been very fond of it and to have originated a saying, "Quicker than you can cook asparagus."

North Europeans and Britons have been eating asparagus for as long as there are any records about them. Its introduction into the Americas and other lands made no ripple worth noting at the time, but because of its old popularity it was presumably taken to those lands by early voyagers. It is now a universally popular vegetable.

Asparagus is unusual, among our garden plants, in its flowering habit. While nearly all of our vegetables bear both stamens and pistils (containing pollen cells and egg cells, respectively) on the same plant or in the same flower, asparagus has two kinds of plants. About half bear only staminate flowers; the others bear only pistillate flowers from which the little red seed-bearing fruits develop. Both kinds must be grown near each other if seeds are to be obtained. The pistillate plants produce larger and better shoots than the staminate plants, but not quite so many of them.

Asparagus is a perennial plant which, under the best conditions, will remain productive up to 30 to 35 years and will live much longer. Formerly it was grown almost entirely with the soil ridged up high over the roots at harvest time so that the shoots would develop in the dark and be white, as harvested. Now, however, we have learned to prefer green shoots which develop in the light, so that ridging is no longer so common.

Endive Related to Chicory

Endive is shown with asparagus in the painting only because it is native to the same general region as asparagus, and, like it, was used as food by the ancients of Mediterranean lands. The two are not at all related botanically and are grown and used quite differently. Endive (*Cichorium endivia*) is closely related to chicory, which has been introduced as a garden plant and has escaped and become a weed over large areas of the Temperate Zone.

Endive was eaten by the Egyptians and by the Greeks long before the Christian Era. The Romans of the first century after Christ also used it, both as a salad and cooked as greens.

Two kinds of endive were grown in northern Europe in the 15th century. Several 16th-century writers described the plant in England, France, and Germany. European colonists brought it to America, where in 1806 three varieties were described, substantially the same as those grown today.

Many people dislike the slight bitterness of endive, but others consider it rather sprightly. It is easily grown, is an attractive ingredient of raw-vegetable salads, is more tolerant to heat than lettuce, and especially for an autumn salad crop in our gardens it deserves far more popularity than it now enjoys in America.

French endive, or witloof chicory (*Cichorium intybus*), closely related to endive, is little grown as a vegetable in America, but is popular in France and Belgium. The dried, ground, and roasted root of common chicory is used as an adulterant of coffee and even as a substitute for it.

Painting by Else Bostelmann

From a Wild Thistle of Mediterranean Lands Came Our Globe Artichoke

Before the Christian Era a gigantic thistle, cardoon, was cultivated for its leaf shoots, which were grown in the dark to make them white and tender. The Italians later developed this form with fleshy edible flower parts.

Edible Flower Buds of a Gorgeous Thistle

THE globe artichoke (*Cynara scolymus*), also called "French artichoke" and "green artichoke," derives its common name from the northern Italian words *articiocco* and *articoclos*. This latter term is supposed to involve the Ligurian word *cocali*, meaning a pine cone, to which the Ligurians aptly compared the flower head of the artichoke, a kind of thistle.

Believed to be native to the western and central Mediterranean lands, the species was apparently carried to Egypt and farther eastward some 2,000 to 2,500 years ago.

Until comparatively recent times the leaves rather than the flower heads were eaten. One who is not familiar with this plant might well wonder, upon first seeing it full-grown, how either the leaves or flower heads could be eaten, since they appear rather coarse and unappetizing.

Rome, Greece, Carthage Grew Artichokes

Another form of this same species is commonly called "cardoon" (from the Latin *cardus*, meaning "thistle"). Of this only the young tender leaves or undeveloped tender flower stalks are eaten. These parts are grown so they will develop in darkness and thus be white and tender. It was this form of *Cynara* that was known to the ancient Greeks and Romans.

The cardoon, or leafy form, was grown about ancient Carthage and in Sicily, Greece, and Italy before the Christian Era. It was one of the most popular garden plants in Rome in the 2d century after Christ, bringing a higher price than any other. It was used both as "greens" (a potherb) and as a salad plant.

This forerunner of the artichoke looks like an enormous thistle plant, as does the artichoke plant. Cardoon has been grown over all the Mediterranean countries for many hundreds of years, but was introduced into England as late as 1656 or 1658. It was being grown in America in the 18th century.

In some parts of Spain an extract of the dried flowers of cardoon was used as an agent for curdling milk for making cheese.

The first record of the modern form of artichoke, having a flower head with an edible fleshy basal structure and also bracts with edible fleshy bases, came from Naples about 1400 or a little later. From Naples this artichoke was taken to Florence and then to Venice. From Italy it was introduced into England and France.

The artichoke never became nearly so popular in England or in English colonies as in France, Spain, and the colonies settled by the French and Spanish. It is grown in the United States to an appreciable extent in only two districts: Louisiana, settled by the French; and the mid-coastal part of California, settled by the Spanish. Three varieties were mentioned in this country in 1806, certainly many years after its first use here.

Considered a Luxury in America

In the United States the artichoke is considered a luxury. Its food value is low, yields per acre are relatively small, and it is poorly adapted to most of our country because of its exacting climatic requirements. Few Americans are familiar with it, although some thousands of acres are grown, mainly in California, for a limited market.

From the early 16th century two main types have been recognized: those with conical flower heads and those nearly globular in form. The color of the outer parts of the bracts ranges from light green ("white") to purplish (or "violet") and reddish purple. Spineless forms are now preferred.

The artichoke will not "come true to seed." I have tried growing it from seeds and have learned to my sorrow how true that is. Out of several scores of plants, not one produced a really good head, and they varied widely from the parent plant in color, development of spines, and other features.

Propagated by Sprouts

The artichoke is grown as a perennial, and good varieties are propagated by sprouts that arise from the crowns of the plants in spring. The sprouts grow true to the plant from which they arise.

No flower heads are obtained in the first year of growth. If the heads are not harvested in the immature stage for food, but instead are allowed to develop fully, they produce a showy bloom like that of a thistle but larger. The petals of the myriad flowers that emerge from each head are light purplish or violet. The fleshy base from which these flowers rise is the principal edible part of the immature flower head.

The artichoke belongs to the same family as thistles, sunflowers, lettuce, salsify, chrysanthemums, and thousands of other species. The true artichoke should not be confused with the so-called Jerusalem artichoke—which did not come from Jerusalem and is not an artichoke. The Jerusalem artichoke (*Helianthus tuberosus*) is native to North America, and, as its Latin name indicates, is a tuber-bearing sunflower. A few plants are occasionally grown here for the crisp, small tubers, which are pickled or made into relish.

Painting by Elsa Bostelmann

Salsify (Left) and Parsnip (Right) Have Been Cultivated for 2,000 Years

Earlier these root crops from the eastern Mediterranean and Asia Minor were gathered wild. Salsify's seed head is like that of a gigantic dandelion. The parsnip flower and seed head resemble those of celery (page 184).

Two Mediterranean Root Crops

PARSNIP (*Pastinaca sativa*), like its more popular relative, carrot, has escaped from cultivation and persisted in the wild. Some reports of its occurring wild have been erroneous, however. Our native water hemlock (*Cicuta*), for example, looks somewhat like the parsnip, but is highly poisonous.

Wild plants resembling parsnips should not be taken for food except by persons who are skilled in identifying both the poisonous and nonpoisonous kinds.

Parsnips are believed to be native to the eastern Mediterranean area and northeastward, including the Caucasus. The word *pastinaca* of the Romans may have included parsnip along with carrot. In Roman times the parsnip was supposed to have medicinal as well as food value. We have no proof that the Greeks and Romans cultivated parsnips, although they used wild ones for food.

There is a story that the Emperor Tiberius was so fond of parsnips that he had them imported each year from Germany, where they grew in profusion along the Rhine. It is possible that the Celts of that part of Europe had brought the parsnip back from their forays to the east hundreds of years before.

Early English Colonists Brought Parsnips

The modern parsnip was definitely illustrated in Germany in 1542. Eight years later it was again illustrated, under the German name *Pestnachen*, apparently a Germanized form of the old Roman *pastinaca*. By the mid-16th century it was a common vegetable, being one of the staples of the poorer people of Europe, as the potato is today.

The 16th-century German parsnips were long, like our more popular varieties today. They were doubtless introduced into England no later than the 16th century, since they were well known by the first English colonists in America. They were grown in Virginia in 1609 and were common in Massachusetts 20 years later.

Even the American Indians readily took up the growing of parsnips. In 1779 Gen. John Sullivan in his forays against the Iroquois destroyed stores of parsnips grown by these Indians in western New York.

The "round" form of parsnip, varying from top-shaped to round, is rarely grown in America. Its origin is unknown, but it was described in France in 1824.

About a hundred years ago the well-known variety called Student was originated at Cirencester, England, from seed of the wild parsnip obtained from the gardens of the Royal Agricultural College.

The parsnip is a hardy biennial. In spring there arises from each root a tall, much-branched stalk that flowers and produces seeds. Its seeds are rather short-lived, requiring nearly ideal storage to preserve their vitality for more than a year.

The sweetness of the roots of the parsnip becomes well developed only after they have been exposed to cold, but not necessarily frozen, for a few weeks. The roots may be frozen solid without injury if left in place in the garden until they have thawed. The roots of several hardy vegetables will survive freezing in the soil, undisturbed as they grow, but will not survive freezing and rapid thawing in air.

There is no evidence that parsnip or other edible roots that go through the winter in the soil, even if they freeze, become poisonous.

Salsify Tastes Like Oysters

Salsify (*Tragopogon porrifolius*) is sometimes called "oyster plant" or "vegetable oyster" because its flavor when cooked suggests that of oysters. The edible part of this plant is the long, fleshy, white root.

The name "salsify" is derived from the French *salsifis* without change in pronunciation and with little change in spelling. Salsify is also called "goatsbeard" because its thin grasslike leaves emerge in a rather compact tuft from the crown atop the sturdy root.

This species is distinct from the so-called black salsify, or scorzonera (*Scorzonera hispanica*), and from Spanish salsify, or golden thistle (*Scolymus hispanicus*), neither of which is commonly cultivated in America. Spanish salsify was described by the Greeks and Romans, but they apparently had no interest in the species that we now grow, although it was native to their part of the world. Salsify is often found growing wild in meadows and pastures in the Mediterranean countries to which it is native, and is now cultivated generally there. In ancient times it was not cultivated, but was collected from the wild.

T. porrifolius was eaten in Germany and France in the 13th century, but was not grown in gardens at that time. It seems to have been brought under cultivation in Europe during or soon before the 16th century. It was grown in the 16th century in England as an ornamental plant as well as for food.

Since about 1600 salsify has been cultivated widely in Europe, and it was introduced into America before 1800. It grows slowly, requires a long season for its development, is often disappointing in its yield, and is rather exacting in its requirements.

Celery (Left) Was Medicine to the Ancients, but Parsley (Right) Was a Food; Romans Thought Eating Parsley Warded Off Drunkenness

In Europe large-rooted forms of celery, called celeriac (center), and of parsley are more popular than in America. Parsley was cultivated when celery was still wild.

Celery First Used as a Medicine

CELERY (*Apium graveolens*) is believed to be the same plant as *selinon*, mentioned in Homer's *Odyssey* about 850 B. C. Our word "celery" comes from the French *céleri*, which is derived from the ancient Greek word. The old Roman names, as well as those in many modern languages, are derived from the same root word and sound remarkably similar. This indicates a rather recent *wide* distribution and use of celery.

Smallage, a plant now cultivated in gardens for flavoring purposes, is apparently "wild" celery, the plant that has been known as celery in the Mediterranean countries for thousands of years. Wild celery grows in wet places over Europe, the Mediterranean lands, Asia Minor, the Caucasus, and southeastward toward the Himalayas. It is believed to have originated in the Mediterranean area. Chinese writings of the 5th century after Christ mention it.

Europeans "Tamed" the Wild Celery

The oldest record of the word *céleri* is in a 9th-century poem written in France or Italy, giving the medicinal uses and merits of the plant. When its culture in gardens was begun in the 16th century in Italy and northern Europe, it was still a primitive plant, like smallage, and was used for medicinal purposes only.

In France in 1623 use of celery as food was first recorded. For about a hundred years thereafter its food use was confined to flavorings. In France and Italy, by the middle of the 17th century, the little stalks and leaves were sometimes eaten with an oil dressing.

In the late 17th and early 18th centuries, in Italy, France, and England, were seen the first evidences of improvement of the wild type. Gardeners also found that much of the too-strong flavor could be eliminated, making the stalks better for salad use, by growing the plants in late summer and fall, then keeping them into the winter.

By the mid-18th century in Sweden, the wealthier families were enjoying the wintertime luxury of celery that had been stored in cellars. From that time on, its use as we know it today spread rapidly. We do not know what group of European colonists brought it to America, or when, but four cultivated varieties were listed here in 1806.

All through the 19th century in America, England, and much of Europe, it was believed necessary to blanch the green edible portion of celery to rid it of unpleasantly strong flavor and green color. This was done by banking the plants with soil. Some kinds, like Pascal and Utah, that remain green when ready for eating, are now considered to be of the finest quality.

Many so-called "easy-blanching" or "self-blanching" varieties have appeared in the past 50 years. Generally, these self-blanching sorts are inferior in quality to the best green varieties, but can be grown successfully under less favorable conditions of soil and climate.

Celeriac, or turnip-rooted celery, is a kind that forms a greatly enlarged, solid, more or less globular body just below the soil surface. It is not used raw, but is especially suited for use in soups and stews.

Celeriac was developed from the same wild species as were our present improved varieties of celery, and at about the same time. About 1600, Italian and Swiss botanists gave the first descriptions of it. A hundred years later it was becoming common in Europe, but was hardly known in England. It has never become highly popular in England or the United States, but is a common vegetable all over Europe.

Parsley Was Thought To Prevent Intoxication

Parsley (*Petroselinum sativum*) belongs to the same family as celery, and its Latin name reveals a relationship to the very old Greek *selinon* mentioned above. In the 4th and 3d centuries B. C. the Greek word definitely meant "parsley." The Latin *Petroselinum* means "rock parsley," referring to its habit of growing in rocky places. The plant is native to the same area as celery.

In contrast to celery, parsley has a long and definite ancient history as a food plant. It was well known as a flavoring and garnish by the ancient Greeks and Romans, who even used it in festive garlands. Eating it was supposed to ward off intoxication!

Both the crowded, dense-leaved type and the broad open-growing type were described by Theophrastus in the 4th century B. C. The curled and plain types were common to the Romans in the 1st century or before and in northern Europe in the 13th century.

Parsley supposedly was introduced into England from Sardinia in 1548. European colonists brought it to America in the 17th century.

Parsley, like celery, produces a "turnip-rooted" form, commonly called Hamburg parsley, which is used in the same way as celeriac.

Painting by Else Bostelmann

Beets and Swiss Chard Are the Same Species. Both Were Well Known to the Romans

Chard (right) is a primitive, leafy beet that produces no fleshy root. Round beets (left) are the most modern form. The tall, much-branched plant at the left margin has gone to seed.

First Beets Yielded Only Greens

SWISS CHARD, garden beets, stock beets, or mangel-wurzels, and sugar beets all belong to the same species (*Beta vulgaris*) and will intercross readily. The pollen is wind-borne and may fertilize the pistillate flowers of any plant of the same species over long distances.

Seed crops of garden beets, for example, must not be grown within several miles of a sugar-beet seed crop lest the two kinds become cross-pollinated, a condition ruining the purity of the seed of one or both kinds.

The species is a biennial that grows best in a cool climate.

Ancients Ate Just the Leaves

Chard, as Americans use the term, applies specifically to the leaf beet (*Beta vulgaris* variety *cicla*), or beet that develops no enlarged, fleshy root. We use the term as a synonym of Swiss chard; "chard," however, also may refer to the succulent blanched petioles of the leaves of the globe artichoke and cardoon (page 181). The Romans called this plant *beta*, the Arabs *selq*, and the Portuguese *selga*—apparently an adaptation of the Arabic name.

The wild beet occurs widely over the Mediterranean lands, Asia Minor, the Caucasus, and the Near East. It is believed to have originated in the Mediterranean area, spreading eastward in prehistoric times, with a secondary region of development in the Near East.

The leaves of the various kinds of beets in ancient times were harvested from the wild for use as a potherb. Although our modern varieties of chard show improvements in compactness of growth, in size, and in eating quality over the ancient forms, the several types of chard grown today have been known for hundreds, some for thousands, of years.

In the 4th century B. C., Aristotle wrote of red chard, and Theophrastus mentioned light-green and dark-green kinds. The Romans as well as the Greeks knew chard well and wrote frequently of its use. It was apparently unknown in the Far East until the Middle Ages, being mentioned in China only from the 7th century. The lack of a Sanskrit name for chard suggests that it was spread from west to east after truly ancient times.

Chard has been used in Europe for as long as there are definite records of food plants there. In the 13th century a German writer used the name *acelga* (*selga* is still used in Spain and Portugal), indicating that it was well established in the Iberian Peninsula. In the 16th century a Swiss botanist described a yellow form, the latest to be recorded, completing the list of types now known. Thus, although the red and yellow chards are little grown today in America, they are not new.

Beets of the types that produce large, fleshy, edible roots were unknown before the Christian Era. The ancients used the root of the wild beet or chard apparently for medicinal purposes only.

In the 2d and 3d centuries the Roman epicures first gave recipes for cooking the root of *Beta vulgaris*, some claiming it was better food than cabbage. This must have referred to a fleshy root, not the hard, fibrous root of chard, although the roots in question were probably selected from wild plants.

The next known record about beet root was among some 14th-century English recipes, revealing its use in England.

The red beet with a turniplike root was first described as a food plant in Germany in 1558 and was a rarity at that time in northern Europe. The improved beet was called "Roman beet" in the 16th century in northern Europe and France, indicating its introduction from Italy.

All through the 17th and 18th centuries very few kinds of garden beets were known and they remained unimportant. Up to about 1800 only two kinds, Red and Long Red, were listed by English seedsmen. Popularity on the Continent grew faster than in the British Isles.

In the United States in 1806 only one variety—Red—was listed in a leading catalogue, but in 1828 four kinds were listed. The Bassano variety, still grown today, was common in Italy more than a hundred years ago. The Flat Egyptian, an American production, also cultivated today, was first grown around Boston about 1869. Other varieties grown in America are of more recent introduction.

Colors of garden-beet varieties may range all the way from extremely dark purplish red to bright vermilion and to white. The roots of some varieties, when cut transversely, show distinct light and dark rings, even white alternating with red or purple, like a target.

Beets Take Kindly to Dehydration

Beets are not only commonly grown in home gardens because of their easy culture and quick productiveness, but tens of thousands of acres are grown annually in this country for canning.

During World War II it was found that among all the vegetables dehydrated for military or civilian use, beets were one of the most satisfactory.

The Turnip (Right) Is Older than History; the Rutabaga (Left) Almost Modern

From their original home in westernmost Asia and the eastern Mediterranean, turnips spread over most of Asia before recorded history. Rutabaga, a cabbage-turnip hybrid, appeared in the Middle Ages.

Turnip and Its Hybrid Offspring

MUCH confusion surrounded the origins, even the identity, of turnips and rutabagas, or "Swedes," for a long time. They are distinctly different species.

Most varieties of turnip are white-fleshed and most varieties of rutabaga are yellow-fleshed, but there are also white-fleshed rutabagas and yellow-fleshed turnips. Rutabaga leaves are smooth like cabbage leaves, while those of the turnip are somewhat rough, with sparse, stiff "hairs" over them.

The most significant difference between them, however, is in the make-up of their mechanisms of heredity, the structures of their individual cells. The turnip has 20 chromosomes, while the rutabaga has 38. And thereby hangs a tale—the tale of the origin of the rutabaga.

Study Indicates a Turnip-Cabbage Cross

Recent botanical detective work indicates that a rather rare kind of hybridization between some form of cabbage (18 chromosomes) and turnip (20 chromosomes) resulted in the new species, rutabaga (20 + 18 = 38 chromosomes).

No one knows when or where this occurred, but the new species was probably first found in Europe some time in the late Middle Ages. There was no record of it until 1620 when the Swiss botanist Caspar Bauhin described it.

Turnip (*Brassica rapa*) is of ancient culture, many distinct kinds having been known to the Romans at the beginning of the Christian Era. Some of those varieties bore Greek place names, indicating earlier culture and development by the ancient Greeks.

In the first century Pliny described long turnips, flat turnips, round turnips. He wrote of turnips under the names *rapa* and *napus*. In Middle English this latter term became *nepe*, *naep* in Anglo-Saxon. One of these words, together with *turn* ("made round"), became our common word "turnip."

Man appreciated the usefulness of the turnip during the prehistoric development of agriculture, and the plant was so easy to grow in so many places that it became widely distributed all the way from the Mediterranean across Asia to the Pacific.

The European types of turnip, our commonest kinds, developed in the Mediterranean area. The basic center of the Asiatic kinds is in middle Asia, west of the Himalayas. There are also two secondary centers—eastern Asia and Asia Minor.

The European type of turnip was grown in France for both food and stock feed at least as early as the first century after Christ.

In the England of Henry VIII, turnip roots were boiled or baked, the tops were cooked as "greens," and the young shoots were used as a salad. (In parts of our South today turnip leaves for greens are called "turnip sallad.")

The turnip was brought to America by Jacques Cartier, who planted it in Canada in 1541. It was also planted in Virginia by the colonists in 1609 and in Massachusetts in the 1620's. The Indians adopted its culture from the colonists and soon grew it generally.

Since colonial times the turnip has been one of the commonest garden vegetables in America. It is primarily a cool-weather crop, suitable for summer culture only in the northernmost States or at high altitudes.

European varieties of turnips are biennial. One Oriental variety commonly grown here, however, called Shogoin, will go to seed in its first season if planted in the spring.

A few varieties of leaf turnips (no enlarged root) such as Seven Top are grown only for greens. The leaves of the turnip are usually rich in the minerals and vitamins that are essential to health, but the roots have a relatively low food value. In this country the roots are usually eaten boiled, either fresh or from pit or cellar storage. In Europe kraut is commonly made from the sliced roots.

Rutabaga Also Called "Swede"

Rutabaga (*Brassica napobrassica*) gets its name from Swedish *rotabagge*. In England and Canada it is commonly called "Swede," or "Swede turnip." The French called it *navet de Suède* (Swede turnip), *chou de Suède* (Swede cabbage), and *chou navet jaune* (yellow cabbage turnip). It was known in the United States about 1800 as "turnip-rooted cabbage." Although common names suggest a Scandinavian origin, this is not certain.

Rutabaga was apparently known on the Continent many years before it was grown in England. It was little known in England in 1664 when it was grown in the royal gardens. It was used for food in France and southern Europe in the 17th century. Both white and yellow-fleshed varieties have been known in Europe for more than 300 years.

The rutabaga requires a longer growing season than our turnips, but, like the turnip, it is sensitive to hot weather. Its culture is therefore confined largely to the northernmost States and Canada and to northern Europe and Asia. It is a staple crop in northern Europe, but a minor crop in America and in the Orient. It is more nutritious than the turnip, chiefly because it contains more solid matter.

Painting by Else Bostelmann

Our Garden Rhubarb Came from the Eastern Mediterranean and Asia Minor

The rhubarb, or "pieplant," of American gardens is distinctly different from the Chinese rhubarb that is grown for its medicinal root. Rhubarb leaves should never be eaten; they are sometimes poisonous.

Near Eastern Plant in American Pies

RHUBARB'S economic and dietary importance in America is limited, but it is a rather unusual plant among our common vegetables and there is widespread interest in growing it.

Our word "rhubarb" comes from the French *rhubarbe*, which is a contraction of the Late Latin term *rheubarbarum*, referring to a species of rhubarb called *rheum barbarum*. In America rhubarb is also called "pieplant" because of its common use in making pies.

About a dozen so-called species of rhubarb have been described from various regions in Eurasia, but little is known about their relationships or origins. Our most popular varieties belong to the species *Rheum rhaponticum*, which is believed native to the eastern Mediterranean and Asia Minor. Other edible species are found wild in middle Asia and in China.

Only the Stalks Are Edible

The earliest records of the use of rhubarb date back to about 2700 B. C., in China, where the root was used for medicinal purposes. The root of the Chinese type is still used in medicine. The rhubarb root contains a number of potent substances that would cause violent disturbances to the digestive system if eaten.

Only the fleshy leaf stalks, the enormous petioles, of the rhubarb are edible. The leaf blades or leaves definitely should *not* be eaten. They contain harmful substances that sometimes are present in amounts large enough to cause serious illness, or even death, if eaten.

Rhubarb of the garden type was introduced into Europe from the East relatively late. It was cultivated at Padua, Italy, about 1608, and some 25 to 30 years later seeds of it were obtained for planting in England. In the early 1700's there were several references to the culture of the plant in Europe and England, but not until 1778 was it definitely recorded as a food plant there. Then it was used for making tarts and pies.

An amateur gardener in Maine apparently got rhubarb from Europe about 1790 to 1800 and introduced it to market gardeners in Massachusetts. By 1806 it was used in New England tarts and pies, but not extensively. By 1822 it was generally grown in Massachusetts and was sold in the vegetable markets there. Seed of rhubarb was listed in an American seed catalogue in 1828.

Various rhubarbs were introduced into Europe and England in the late 18th and early 19th centuries from China and India.

A U. S. Patent Office Report * of 1861 described how the Afghans near Kabul blanched the leaf stalks of a wild species of rhubarb. As the sprouts emerged, loose gravel was piled over them, forcing the stalks to grow through as much as one and one-half feet of gravel. Sometimes earthen jars were inverted over the plants, forcing the stalks to grow white and crookedly.

Victoria and Linnaeus have been the commonest varieties of rhubarb for generations. They are both large, productive kinds having leaf stalks that are light green or tinged and streaked with crimson. In recent years definitely crimson or "red" varieties have been in demand because of their attractiveness. Among these are Ruby and MacDonald.

Grows Best in North

Rhubarb is a perennial. It is not adapted to hot climates and actually requires a good winter rest, imposed by a long cold period, in order to thrive year after year. In North America it grows to perfection in the northernmost States and in southern Canada.

Under favorable conditions some varieties will produce almost incredibly large plants—great clumps of leaves with leaf stalks up to three feet long and as thick as a boy's wrist. The leaf blades are sometimes two to two and one-half feet across.

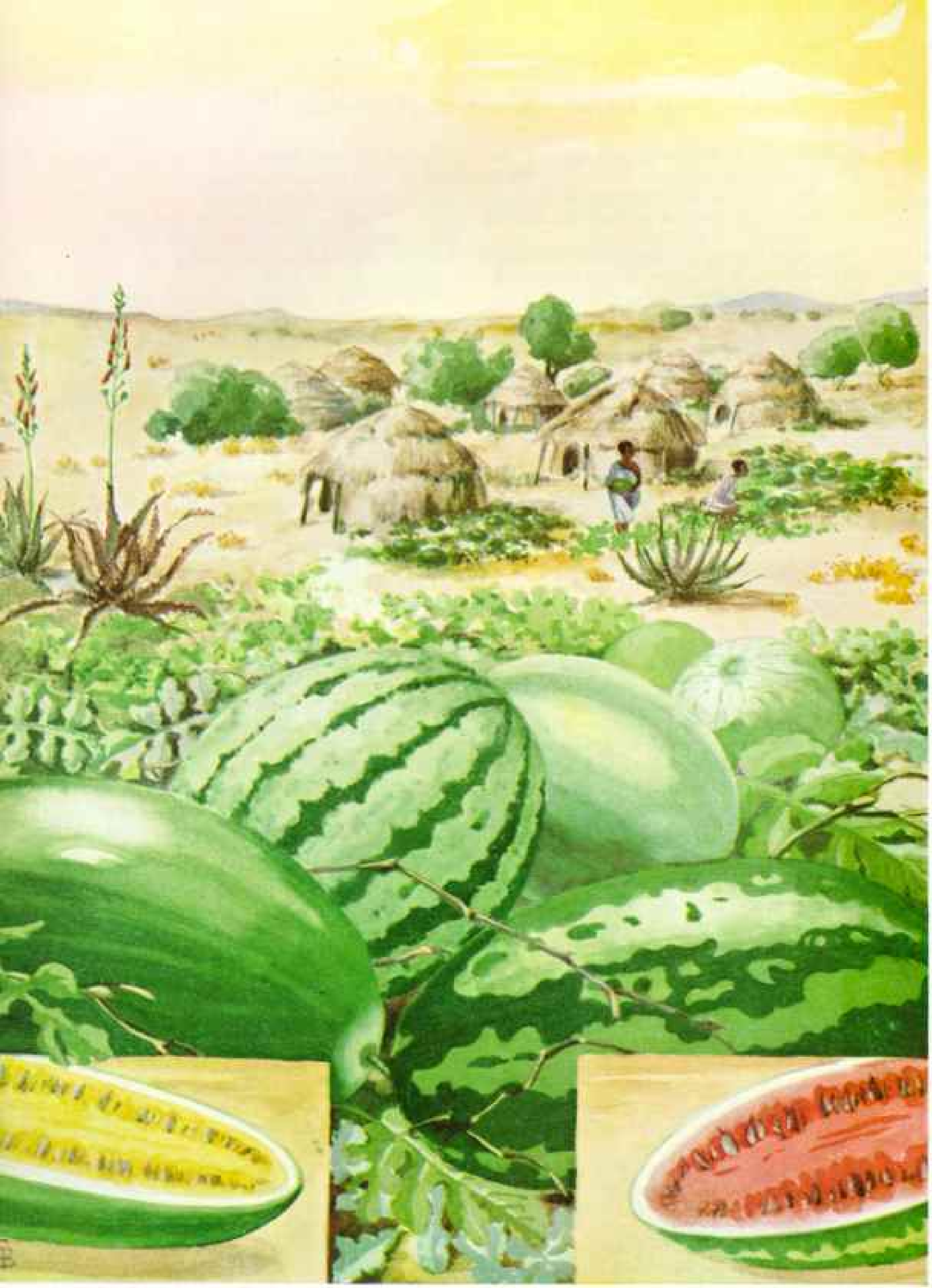
In the spring large seed stalks arise to a height of three to four feet. Gardeners usually cut these seed stalks out as soon as they appear, because seed production is believed to interfere with the best possible growth of leaf stalks.

Rhubarb, like many other horticultural plants, does not come true to seed. The only way to keep varieties "pure" and uniform is to propagate them vegetatively, by dividing the clumps of plants.

A "piece" of rhubarb plant for planting in the garden must contain some of the large fleshy root together with some of the compact underground stem structure and buds from which the leaves arise. It takes about three years for a newly propagated plant to reach a fairly productive stage.

A few gardeners grow fields of rhubarb for "forcing." After the plants have become large and sturdy in the field, the entire underground parts are taken from the field in the late winter or very early spring before growth starts and planted in special heated houses. In these warm, dimly lighted structures leaf stalks grow rapidly and attain fine quality.

* Before the establishment of the U. S. Department of Agriculture during the Presidency of Abraham Lincoln, our Government's early efforts in agriculture were conducted by the Patent Office.



Africa's Greatest Contribution to the Joy of Eating Is Watermelon!

Cultivated thousands of years ago in the Valley of the Nile, watermelon is still found wild in the interior of Africa where it originated. Sometimes in dry periods it forms the only water supply.

An African Native of World Popularity

THE WATERMELON *(Citrullus vulgaris)* is hardly a vegetable, but it is such a universally popular truck or garden crop that it has a place in this article.

The culture of the watermelon goes back to prehistoric times. It was grown by the ancient Egyptians, as revealed by pictures that survive to the present. Old names in Arabic, Berber, Sanskrit, Spanish, and Sardinian are all unrelated, indicating great antiquity of culture in lands about the Mediterranean and east as far as India.

The long and general culture of the watermelon from North Africa to middle Asia led to the view that it was of Asiatic origin, although it had never been found wild in Asia or elsewhere. Finally, however, about a hundred years ago, the great missionary-explorer, David Livingstone, settled the question of its origin. He found large tracts in central Africa literally covered with watermelons growing truly wild.

In the wild state both bitter and sweet melons occur in the same locality, but the bitter ones appear no different from the sweet. The natives knock a hole in each fruit to taste the juice before taking it for food or drink.

Important Water Source in Dry Times

In certain semidesert districts the watermelon is an important source of water to the natives during dry periods; even today there are districts in Africa where it is cultivated for that purpose. One explorer, writing in this Magazine, stated that he had depended entirely upon watermelons for his water supply for as long as six weeks.*

Watermelons have been grown to an important extent in the warmer parts of Russia, Asia Minor, the Near East, and Middle East for thousands of years, although they appear to have reached China only about a thousand years ago.

A wide range of sizes and shapes, rind, seed, and flesh colors was described by European botanists of the 16th and 17th centuries; in fact, all the shapes, sizes, and colors that we now know. These include yellow and white flesh as well as red flesh, and speckled seeds as well as white, red, brown, and black. There are also green-seeded varieties.

The plant was doubtless known many hundreds of years ago in all European countries where it could be grown. It was brought to America by some of the earliest European colonists, being common in Massachusetts in 1629. The Florida Indians were said to have been growing watermelons by the mid-1600's, and Father Marquette, French explorer of the Mississippi, mentioned them in 1673 as being grown in the interior of the country.

In America the watermelon is used almost entirely as a dessert, to be eaten fresh—and cold. The rind, however, is made into preserves or sweet "pickles" to some extent. The seeds are used in this country only for planting.

Watermelon Beer in Russia

In southern Russia a beer is made from watermelon juice, or the juice may be boiled down to a heavy syrup like molasses for its sugar.

In Iraq, and in Egypt and elsewhere in Africa, the flesh of the melon is used as a staple food and animal feed as well as a source of water in some dry districts.

In the Old World, particularly Asia, the seeds are roasted, with or without salting, and eaten from the hand. Orientals also preserve watermelon by salting or brining large pieces or halves in barrels.

Although melons weighing 25 to 40 pounds are most popular in America, our seed catalogues have listed small varieties such as Baby Delight, Northern Sweet, and Sweet Siberian for many years. These small five- to ten-pound melons have long been grown in the cooler parts of the country where the summers are short.

Greatly oversized watermelons have no sound market value. They are too difficult to handle without damage or wastage; most customers do not want them; and they are likely to be inferior in quality to those of normal size. Modern emphasis is upon high quality of garden products rather than mere size, although of course large yields per unit of land are always sought.

Although the watermelon will *not* cross with pumpkin, squash, or cucumber, it will cross with the so-called preserving melon, or citron, which is simply a hard, white-fleshed watermelon, good only for preserving. Cross-pollination with citron will cause no harm unless the seed of the fruit from a cross-pollinated flower is planted. Such seed will produce mixed melons of poor quality.

"Seedless" watermelons have been produced experimentally in recent years by two wholly different methods, neither of which appears practical as yet for use by farmers and gardeners.

* See "Adventures Among the 'Lost Tribes of Islam' in Eastern Darfur: A Personal Narrative of Exploring, Mapping, and Setting Up a Government in the Anglo-Egyptian Sudan Borderland," by Maj. Edward Keith-Roach, NATIONAL GEOGRAPHIC MAGAZINE, January, 1924.

Okra, or "Gumbo," from Africa

OKRA *(Hibiscus esculentus)* is also called "gumbo" in this country, although the latter term is more often applied to soups or other dishes which contain okra. Both of these names are of African origin. "Gumbo" is believed to be a corruption of a Portuguese corruption, *quingombo*, of the word *quillobo*, native name for the plant in the Congo and Angola area of Africa.

Okra apparently originated in what the geobotanists call the Abyssinian center of origin of cultivated plants, an area that includes present-day Ethiopia, the mountainous or plateau portion of Eritrea, and the eastern, higher part of the Anglo-Egyptian Sudan. Considering the little contact between that region and the rest of the world within historic times, it is not surprising that little is known about the early history and distribution of okra.

The routes by which okra was taken from Ethiopia to North Africa, the eastern Mediterranean, Arabia, and India, and when, are by no means certain. Although it has been commonly cultivated in Egypt for many hundreds of years, no sign of it has ever been found in any of the ancient monuments or relics of old Egypt.

Since the Spanish Moors and the Egyptians of the 12th and 13th centuries used an Arab word for okra, it probably was taken into Egypt by the Moslems from the East who conquered Egypt in the 7th century. It requires no stretch of the imagination to suppose that the plant earlier was taken from Ethiopia to Arabia across the narrow Red Sea or the narrower strait at its southern end.

From Arabia okra was spread over North Africa, completely around the Mediterranean, and eastward. The absence of any ancient Indian names for it suggests that it reached India after the beginning of the Christian Era.

Wild Okra on the Upper Nile

Although the plant has been well known in India for a long time, it is not found wild there. Modern travelers have found okra growing truly wild, however, along the White Nile and elsewhere in the upper Nile country as well as in Ethiopia.

One of the earliest accounts of okra is by a Spanish Moor who visited Egypt in 1216. He described the plant in detail, as cultivated by the Egyptians, and stated that the pods when young and tender were eaten with meal. (Southerners in our own country know how to cook it with corn meal—slice the pods, dip the pieces in meal, and fry them.)

Because of the outstanding popularity of okra in the French cookery of Louisiana, and its slow gain in popularity elsewhere in this country, it is safe to assume that it was introduced to this country by the French colonists of Louisiana in the early 1700's. It had been introduced to the New World, however, before 1658, reaching Brazil supposedly from Africa. It was known in Surinam in 1686.

Strangely, records of okra during early American colonial times are lacking, although it must have been common among French colonists. It was being grown as far north as Philadelphia in 1748; Jefferson said it was known in Virginia before 1781, and from about 1800 onward numerous garden writers had something to say about it. Several distinct varieties were known in 1806.

As is true with a number of our less generally popular vegetables, many people fail to appreciate this one because they do not know how to use it. The first and commonest mistake that gardeners make is to let the pods become too old and tough before harvesting them. They grow very fast, and in hot weather will become unfit for use in less than a week from the time they start developing from the pollinated flower. The plants must be gone over at least every second day and the pods harvested when only three to five days old.

Important Crop in South

Okra is rarely used "straight" except when fried with meal, just a little of it usually being cooked with other vegetables or put into soups and stews. Okra alone is generally considered too "gooey," or mucilaginous, to suit American tastes. In recent years, however, it has become an important commercial crop in certain localities in the South, where thousands of tons of the pods are grown for the large soup companies.

Okra is easily dried for later use. A little dried okra in prepared dishes produces much the same results as does the fresh product.

In some lands the seeds rather than the whole young pods are of most interest. When ripe the seeds yield an edible oil that is the equal of many other cooking oils. In Mediterranean countries and the East, where edible oils are scarcer than in our country, okra oil is no rarity.

The ripe seeds of okra are sometimes roasted and ground as a substitute for coffee. A close relative of okra, roselle, is used as a source of fiber for cloth. In Turkey, the leaves are used in preparing a medicament to soothe or reduce inflammation.

Painting by Else Bostelmann

Okra, Related to Cotton, Is Native to the Abyssinian Plateau

In prehistoric times okra was carried from Ethiopia to Arabia and also down the Nile; thence by the Moors to Europe and probably by the French to America. Pods are best when only three or four days old.

Universal Boon to the Salad Bowl

LETTUCE *(Lactuca sativa)* is without doubt the world's most popular salad plant. Both its common and its Latin name are based on an easily noticeable characteristic—it has a heavy, milky juice. The word "lettuce" is probably derived from the Old French *laitues* (plural of *laitue*), meaning "milky," referring to this plant. The Latin root word *lac* ("milk") appears in the Latin name *lactuca*.

The ancient Greeks called lettuce *tridax;* the old Persians, *kahn*. Although its culture was widespread in ancient times, it is neither so old nor was it so widely grown in prehistoric times as a number of other garden crops.

Lettuce Often Found Wild

Cultivated lettuce is closely related to the wild lettuce, *L. scariola*, from which it was doubtless derived. Wild lettuce is now widely scattered over the globe, but it originated in inner Asia Minor, the trans-Caucasus, Iran, and Turkistan.

According to Herodotus, lettuce was served on the tables of the Persian kings of the 6th century B. C. In the 5th and 4th centuries B. C., other great Greek writers described and praised its virtues.

Lettuce was popular among the Romans about the beginning of the Christian Era, and had been brought to a fairly advanced state of culture and improvement. In the first century after Christ Roman writers described a dozen distinctly different sorts, some of which were fairly common.

Common garden lettuce (L. *sativa*) was known in China in the 5th century, if not earlier. In addition, a form of "stem lettuce" is native to China. The so-called asparagus lettuce and others with long, narrow leaves and tall, thick, succulent, edible stems are of this type. They are grown in America only as curiosities.

As in the development of the cabbages, the primitive forms of lettuce were loose, leafy, and sometimes "stemmy" types; the loose-heading and firm-heading forms occurred much later.

Cos lettuce (romaine) forms an erect, compact rosette of elongated leaves, approaching the character of a head. It is relatively tolerant to heat and evidently was developed in a moderately warm climate. The old records and its name indicate an Italian origin.

Light-green, dark-green, and red-spotted forms of romaine were described in 1623. The type was common in Italy in the Middle Ages and is said to have been taken to France from Italy in 1537 by Rabelais. Toward the end of the 16th century it was still rarely grown in France and Germany. It is grown to a minor extent in America, but deserves more attention for home gardens.

Firm-heading forms had become well developed in Europe by the 16th century, but when they first were developed is unknown. The oak-leaved and curled-leaf types, and various colors now known, were all described in the 16th and 17th centuries in Europe.

Columbus evidently carried lettuce to the New World, for its culture was reported on Isabela Island (now called Crooked Island) in the Bahamas in 1494. It was common in Haiti in 1565. When it was introduced into South America is not known, but it was doubtless soon after the discovery. It was under cultivation in Brazil before 1650.

Lettuce was doubtless among the first garden seeds sown in every European colony on this continent.

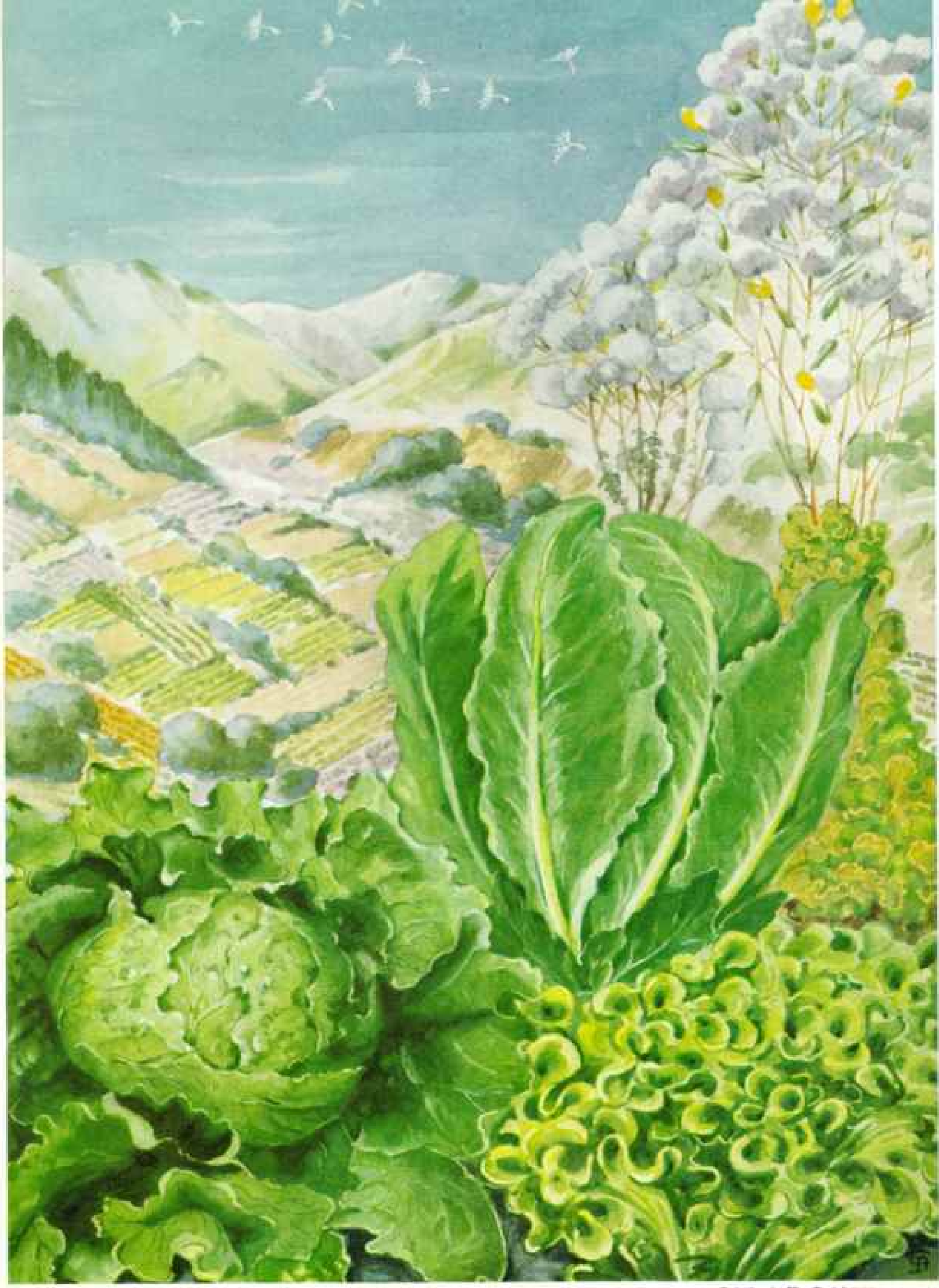
Loose-leaf lettuces are still popular for home gardens because they are so easy to grow. Since, however, the loose-leaf form is highly perishable after harvesting, it is now rarely grown in the United States for sale except in greenhouses.

Most of our present commercial lettuce is of one strain or another of the New York variety or of the several Imperial strains. Although they differ in adaptability and behavior in the field, these Imperial and New York strains appear much alike to the final consumer. They are erroneously called "Iceberg" lettuce. Iceberg is a variety with red-tinged leaves and no commercial importance.

Disease-resistant Strains Developed

One of the outstanding plant-breeding accomplishments of modern times is the development of the Imperial and related strains of lettuce. These were developed for resistance to mildew and brown blight, diseases that were rapidly wrecking the huge lettuce industry of the Southwest about 15 to 20 years ago. Now nearly all of the lettuce grown in the Southwest is of these Imperial strains. Generally they are not well adapted to the East or South.

Lettuce is an annual plant that requires a relatively cool climate for good leaf and head growth. Hot weather causes it to become bitter and hastens the elongation of its stem into a tall seed stalk. The stems or "cores" of head varieties elongate too soon if grown in too warm weather, either preventing heading or causing the heads to be loose and of poor quality. Head lettuce is exacting in its climate, soil, and cultural requirements.



Painting by Else Bostelmann

The World's Most Popular Salad Plant Hails from the Near East

Loose-leaf lettuce (lower right) is the most primitive cultivated kind. Romaine (middle right) gets its name from its Roman origin. Hard-heading kinds (left) appeared during the Middle Ages in Europe.

Muskmelons Originated in Persia

THE MUSKMELON (*Cucumis melo*), like watermelon, is hardly a vegetable, but it is an important truck and garden crop. There is a tendency in America to refer to muskmelons merely as "melons," but that is confusing because watermelons are also loosely called "melons."

The most popular type of muskmelon in America is the small, oval, heavily netted kind commonly called a cantaloupe. All cantaloupes are muskmelons, but not all muskmelons are cantaloupes.

Muskmelons have a wide range of other forms, sizes, and flesh qualities, such as the Honey Dew, Casaba, and Persian types; the large Bender, Montreal, and such odd varieties as the elongated Banana should not be called "cantaloupes."

Muskmelon will not cross with watermelon, cucumber, pumpkin, or squash, but varieties within the species intercross freely.

Muskmelon is so named because of the delighful odor of the ripe fruits. *Musk* is a Persian word for a kind of perfume; *melon* is French, from the Latin *melopepo*, meaning "apple-shaped melon" and derived from Greek words of similar meaning.

Muskmelon is native to Persia (Iran) and adjacent areas on the west and the east. Persia and the trans-Caucasus are believed to be the main center of origin and development, with a secondary center including the northwest provinces of India, also Kashmir and Afghanistan. Although truly wild forms of *C. melo* have not been found, several related wild species have been noted in those regions.

The oldest supposed record of muskmelon goes back to an Egyptian picture of the period around 2400 B. C. In an illustration of funerary offerings of that time appears a fruit that some experts have identified as muskmelon, although others are not so sure.

Columbus Brought Muskmelon Seeds

The Greeks appear to have known the fruit in the 3d century B. C., and in the 1st century after Christ it was definitely described by the Roman philosopher Pliny, who said it was something new in Campania. The Greek physician, Galen, in the 2d century, wrote of its medicinal qualities, and Roman writers of the 3d century gave directions for growing it and preparing it with spices for eating. The Chinese apparently did not know the muskmelon until it was introduced to their country around the beginning of the Christian Era from the regions west of the Himalayas.

Culture of the muskmelon spread westward over the Mediterranean area in the Middle Ages and was apparently common in Spain by the 15th century. Columbus carried seeds of it on his second voyage and had them planted on Isabela Island in 1494. This was doubtless its first culture in the New World. About this same time Charles VIII of France reputedly introduced muskmelons into central and northern Europe from Rome.

A Spanish writer of 1513 recognized the extremes of quality commonly found in the fruits of this plant and said: "If it is bad, it is a bad thing, we are wont to say that the good are like good women, and the bad like bad women."

The frequent occurrence of poor flavor within the species doubtless explains why its culture spread no more rapidly than it did.

Before the end of the 16th century, the muskmelon doubtless had been introduced by the Spaniards to many places in North America. In the first English colonies in Virginia and Massachusetts it was grown. The North American Indians were commonly growing it in the 17th century, as their cousins of tropical America had learned from the Spaniards to do a century earlier. In the mid-1600's the Indians of Florida, the Middle West, and New England grew it.

Many Grown in Imperial Valley

The muskmelon is reported to have been introduced into Bermuda in 1609 and by the Spaniards into California in 1683. It was grown in Brazil before 1650.

The principal types and various sizes, shapes, and colors now grown were known in the 16th century. That does not mean, of course, that our present varieties date back that far, but that the main characteristics found in our varieties were also known in those days. Improvements have been made in uniformity within varieties, in size and shape of fruits, and especially in thickness and quality of flesh.

Practically all of the cantaloupes now grown in California's Imperial Valley, the greatest melon-producing district in the country, are of special strains recently produced by plant breeders to resist the disease called powdery mildew.

Ancient Persians and Their Neighbors Knew Luscious Muskmelons, Native to Iran and Near-by Lands

Kinds familiar today include, left to right, the long Banana variety, Santa Claus, large Montreal, cantaloupe, and Honey Dew—all muskmelons of Persian lineage.

Painting by Else Bostelmann

Carrots for Valuable Vitamin A

THE CARROT *(Daucus carota)* gets its name from the French word *carotte*, which in turn comes from the Latin *carota*. It has been known since ancient times and is believed to have originated in Afghanistan and adjacent areas.

A wide diversity of forms unknown in America is found in middle Asia and also in Asia Minor. Apparently some primitive forms were carried to Asia Minor far back in prehistoric times, and many distinct kinds were later developed there. Among the kinds strange to us in America are some with purplish-red roots, colored like garden beets, and some with fuzzy light-gray leaves.

Our common carrot is called the Mediterranean type, because it has long been known in Mediterranean countries and was probably developed there from kinds carried from Asia Minor. In the Far East is still another form, the Japanese carrot, that is commonly three feet long or more.

Mothers Say, "Eat Your Carrots, Junior"

As is true of a number of other vegetables, it seems that the first interest in carrots as food developed from their supposed medicinal value. Greek agriculturists and physicians around the first century of our era wrote of carrots and their value as a stomach tonic.

Are we amused now by the ancients' attaching such medical importance to the carrot? Why should we be? In America in the past 25 to 30 years the humble carrot has risen from an obscure root, considered mainly as a delicacy for horses, to a position of genuine importance as human food.

How did it happen? Our doctors and nutrition experts made us believe carrots are "good for us"; we know that varieties with a deep orange color are rich in carotene, or provitamin A, found also in other yellow vegetables and in green leaves. Vitamin A is found in such foods of animal origin as fish-liver oils, butter, and egg yolks.

Perhaps the ancient Greeks were the real discoverers of the benefit of carrots in the diet. However, they did not know the reasons and lacked the teaching facilities used to induce us to eat our carrots.

The carrot was certainly cultivated in the Mediterranean area before the Christian Era, but it was not important as a food until much later. There is a long gap of about 900 years between the writings of the Greeks and Romans of the first to third centuries and the next clear records about the carrot.

By the 13th century carrots were being grown in fields, orchards, gardens, and vineyards in Germany and France. At that time the plant was known also in China, where it was supposed to have come from Persia.

By the 16th century nearly all the botanists and writers on gardening, all over Europe, were familiar with the carrot and were describing many kinds, including red and purple kinds in France, yellow and red kinds in England. About 1600, in England, carrots were common enough to be grown as a farm crop as well as in small garden plots.

Carrots Arrived Before the *Mayflower*

European voyagers carried the carrot to America soon after discovery of the New World, as is shown by Sir John Hawkins's reference to it on Margarita Island, off the coast of Venezuela, in 1565. It was grown by the struggling colonists of the first permanent English settlement in the New World, at Jamestown, Virginia, in 1609. Twenty years later the Pilgrims, or some of those who followed them closely, were growing it in Massachusetts. The Pilgrims themselves may have introduced it there. Before the middle of the 17th century it was known in Brazil.

Even the American Indians rather promptly took up carrot culture. In forays against the Iroquois in upper New York State in 1779 Gen. John Sullivan's forces destroyed stores of carrots as well as parsnips (page 183). The story is told that children of the Flathead tribe in Oregon liked carrots so well that they could not resist stealing them from the fields, although they resisted stealing other things.

The carrots having spherical roots and tapering roots have long been known, but the cylindrical stump-rooted sorts are of rather recent development, first grown in America about 60 years ago.

All varieties of importance in this country are deep orange in color, although yellow and even white kinds are known. Some of the deep-colored varieties are erroneously referred to as "red." This error has even crept into the name of a currently popular variety, Red Cored Chantenay, which is a rich orange color, not red. It is interesting, however, that pure carotene, which makes carrots yellow or orange, appears red.

In addition to the large quantities marketed fresh, we now find carrots canned, and even frozen, especially in an attractive mixture with green garden peas. During the war many thousands of tons were dehydrated and shipped overseas in sealed metal containers in an atmosphere of carbon dioxide or nitrogen to prevent loss of carotene.

Painting by Else Bostelmann

Vitamin-conscious Americans Now Eat Carrots for Health as Well as Taste

Grown in the Near East since time immemorial, the carrot was thought by ancient Greeks to have a beneficial effect—but they did not know why. Modern science has found that this vegetable is rich in carotene, which produces vitamin A. Round, top-shaped, "half-long," or long, all richly orange-colored carrots are high in vitamin content. Until a generation ago carrots were grown on a large field scale, mainly for storage in root cellars, like turnips or potatoes. No one thought of eating them raw, in salads, or cut into long "sticks."

Onions and Other Pungent Lilies

THE bulbous onion and its numerous relatives belong to the Lily family. Some of these alliums are distinctly ornamental; a few others, notably garlic, leek, Welsh onion, and chive, are common vegetables. All of the edible forms have related flavors and odors that are due principally to a volatile, irritating substance.

Our word "onion" comes from the Middle English *unyun*, from the French *oignon*, which came in turn from the Latin *unio*, meaning "onion." Ancient names for this plant in Sanskrit, Hebrew, Greek, and Latin are apparently unrelated, indicating widespread culture of onions from prehistoric times.

Onions from Mid-Asia

The common onion (*Allium cepa*), leek, and garlic originated in middle Asia, with secondary centers of development and distribution in western Asia and the Mediterranean lands. The Welsh onion is believed to be of Chinese origin. The word "Welsh" here is a corruption of the German *welsch*, meaning "foreign," and has no reference to Wales.

Onions were used extensively by the ancient Egyptians, as shown by drawings and inscriptions on their monuments. The Bible states how, during the wanderings of the Israelites in the wilderness, they longed for the onions, leeks, and garlic they had had in Egypt.

In the first century many varieties of onion were known: long, round, red, yellow, white, strong, and mild kinds. For a time in the Middle Ages it appears that the onion was less popular than leek and garlic, while now the reverse is true.

The onion was introduced by the Spanish into the West Indies soon after their discovery. From there it soon spread to all parts of the Americas. Onions were grown by the earliest colonists and soon afterward by the Indians.

The Welsh onion (*A. fistulosum*) never forms a rounded bulb—only one to several long white scallions. This form is most popular in the Orient, but is grown almost everywhere. In Japan it is often incorrectly called "Japanese leek."

One form of onion, the so-called Egyptian tree onion, or top onion, produces "sets" (tiny bulbs) at the top of the stalk instead of flowers and seeds.

The leek (*A. porrum*), like the Welsh onion, forms only a cylindrical instead of a rounded bulb. The leaf of the leek, however, is flattened and solid, while the leaf of the onion is cylindrical and hollow.

Our word "leek" comes from the Anglo-Saxon *leac*. The Romans called it *porrum*, that term being retained in its present Latin name. It has been used for food from prehistoric times.

In the first century the Romans considered that the best leeks came from Egypt, where they had been known in earliest Biblical times. The Emperor Nero is reported to have been nicknamed Porrophagus because of his inordinate appetite for leeks. He imagined that frequent eating of leeks improved his voice!

In the 6th century the Welsh won a victory over the Saxons and attributed their success to the leeks they wore to distinguish themselves in battle.

Leeks have been common all over Europe for as long as we have records of food plants. In America, by 1775, they were cultivated by the Indians as well as the colonists.

Garlic (*A. sativum*) has a long history that parallels that of the onion and leek. The word "garlic" comes from the Anglo-Saxon *garleac* (*gar*, meaning "spear" or "lance," and *leac* meaning "leek"). Homer wrote of it in the ninth century B. C.

Garlic Eaten for Strength, Courage

The Romans disliked the strong flavor and odor of garlic—as do many Americans—but fed it to their laborers to make them strong and to their soldiers to make them courageous. It is supposed to have been introduced into China in the first or second century B. C., and references to it there occur from the 15th century onward. Europeans, especially those of the countries touching the Mediterranean, have used it commonly for two thousand years and more. Most Americans use it sparingly.

The first reference to garlic in America is the statement that Cortés fed on it in Mexico. Doubtless it had been introduced into the West Indies or Central America earlier by the Spanish, for it is not native to Mexico. The Indians in Mexico, Peru, and what is now the United States all took up its culture promptly and liked it better than any of the other root or bulb crops from Europe.

Chive (*A. schoenoprasum*) is an Old World plant now found wild in modern Italy and Greece. It is believed to be native to the eastern Mediterranean. The word "chive" is an Old French form of the French *cive*, derived from the Latin *cepa*, meaning "onion."

Chive has been grown for hundreds of years in European gardens and in the British Isles.

The plant has attractive blue flowers, but they produce no seed. It is propagated by planting the bulbs, which increase in number each year, forming dense clumps.

Painting by Elsa Bostelmann

Onions and Their Kin Provided Food Flavors in Early Biblical Times

Israelites, after fleeing from Egypt, pined for some of them in the wilderness (opposite page). Large onions and small chives (left), dry garlic and green leek (right) differ in pungency and flavor. All have an odor characteristic of that part of the Lily Family to which they belong.

Garden Peas and Spinach from the Middle East

PEA (*Pisum sativum*) gets its English name indirectly from the Latin *pisum*. In Anglo-Saxon the word became *pise* or *pisu*; later, in English it was "pease." So many people thought pease was plural that they persisted in dropping the "s" sound, thus making the word "pea." The Latin name resembles the older Greek *pisos*, or *pison*.

Many different species have long been called "pea," so that this word alone is not definite. In much of our own South today "peas" usually means some edible variety of cowpeas. In referring to what most of the United States understands as "peas" (*P. sativum*), the southerner says "English peas."

The main center of origin and development of this pea is middle Asia, from northwest India through Afghanistan and adjacent areas. A second area of development lies in the Near East, and a third includes the plateau and mountains of Ethiopia. In these areas wild peas of related species have been found, along with a remarkable diversity of cultivated forms of *P. sativum*, but wild *P. sativum* has never been found.

This pea was first grown only for its dry seed. Some varieties are grown extensively today for the dry seeds for "split peas" for soup. The varieties known until about a thousand years ago had seeds that were much smaller, dark colored, and otherwise different from our garden types.

Cave Men Ate Primitive Peas

Seeds of primitive peas have been found in lake mud beneath the positions of houses of the Swiss lake dwellers, dating back perhaps 5,000 years to the Bronze Age. Peas also were found buried in a cave in Hungary, believed by some to date back even further.

Despite recurrent claims, this species of pea has not been found among any of the ancient Egyptian treasures, but it has been found in diggings on the site of ancient Troy. The Aryans from the East are supposed to have introduced peas to the Greeks and Romans, who grew them before the Christian Era. Greek and Roman writings indicate that the crop was held in no special favor.

There is no hint of "green peas" until after the Norman Conquest of England. In the 12th century, among other foods stored at the famous old Barking Nunnery, near London, were "green peas for Lent." Nothing really definite was recorded about them, however, until 1536, when they were described in detail in France. The edible-podded pea was also known at that time.

Before the end of the 16th century, botanists in Belgium, Germany, and England described many kinds of peas—tall and dwarf, with white, yellow, green seed colors; smooth, pitted, and wrinkled seeds.

Garden peas were not common until the 18th century. Toward the end of the 17th century they were still such a rare delicacy that fantastic prices were sometimes paid for them in France.

"This subject of peas continues to absorb all others," Madame de Maintenon wrote in 1696. "Some ladies, even after having supped at the Royal Table, and well supped too, returning to their own homes, at the risk of suffering from indigestion, will again eat peas before going to bed. It is both a fashion and a madness."

The English developed fine varieties; hence the common designation "English peas" in America.

About a hundred years ago the famous Austrian monk, Gregor Johann Mendel, was working with peas in laying the foundation of the modern science of genetics.

Spinach Hails from Persia

Spinach (*Spinacea oleracea*) has remarkably similar-sounding names in the languages of many widely separated lands, indicating that its spread to those lands has been comparatively recent.

Our name for spinach comes from the Old French *espinache*, which was derived from Arabic or Persian words of somewhat similar sound. The Armenian name is *spanax* and the Spanish is *spanacha*, or *espinaca*. The technical Latinized name *spinacea* is a term devised by botanists probably no earlier than the 12th or 13th century.

Spinach is native to Iran (Persia) and adjacent areas. It apparently was unknown outside its native land until about the beginning of the Christian Era. Even then it was unknown to the Greeks and Romans.

The earliest record of spinach is in Chinese, stating that it was introduced into China from Nepal A. D. 647. Old writings indicate that it reached Spain about A. D. 1100, having been brought from North Africa by the Moors. They in turn probably got it by way of ancient Syria and Arabia.

The prickly-seeded form of spinach (still grown today) was known in Germany in the 13th century and by the 14th century it was commonly grown in European monastery gardens. A cookbook of 1390 for the court of Richard II contained recipes for *spynoches*. Smooth-seeded spinach was described in 1552.

It is not known when spinach was first brought to America, but it was doubtless in early colonial times.

Painting by Elsa Bostelmann

Peas Were Introduced into Europe During the Stone Age; Spinach Came Much Later

Both were native to the Near East. Primitive peas were eaten by Swiss lake dwellers and European cavemen (opposite page). Spinach was unknown beyond its homeland until 1,500 to 2,000 years ago.

Pickles and Salads Owe a Debt to India

ALTHOUGH India has given the world a large number of important food and other crop plants, only four vegetables are among them. One of these is the cucumber (*Cucumis sativus*). The others are eggplant, Indian mustard, and cowpeas.

The English word "cucumber" comes from the Latin name *cucumis*. The Bohemian *agurka*, German *Gurke*, Greek *aggouria*, and our word "gherkin," meaning a small cucumber pickle, all trace back to an old Aryan word. Sometimes today we facetiously refer to this vegetable as "cowcumber," not realizing that English writers of 300 years ago called it "cowcumber" in all seriousness.

The cucumber is believed native to the great Indian center of plant origins which lies between the northern part of the Bay of Bengal and the towering Himalayas. It has never been found wild anywhere, but species closely related to it have been found wild in that region of India.

That the cucumber was carried westward from India long before written history is indicated by the profusion of ancient names for it in widely separated lands to the west: Aryan, Greek, Latin, Arabic, Armenian, and others. Contrary to often written claims, there is no proof that the ancient Egyptians grew it.

One old record claims that the cucumber was introduced into China as "recently" as the second century B. C. At the beginning of the Christian Era it was grown in North Africa as well as in Italy, Greece, Asia Minor, and the countries to the east.

A Favorite Food of Tiberius

The Romans used highly artificial methods of growing the cucumber when necessary to have it for the Emperor Tiberius out of season. He is reported to have eaten cucumbers every day in the year.

Charlemagne had cucumbers grown in his gardens in 9th-century France. They were known in England in the early 1300's, but the art of growing them was apparently lost there as a result of a long period of war and turmoil. Cucumbers were reintroduced into England from the Continent some 250 years later.

Columbus brought the cucumber to the New World, along with many other vegetables. He had them planted in Haiti in 1494, and possibly on other islands.

Reports of finding the Indians in Canada growing cucumbers in 1535 seem hardly probable so soon after Columbus introduced them into the West Indies. Some form of native squash or gourd could have been mistaken for cucumber. Reports that in 1539 De Soto found the Indians of Florida growing cucumbers "better than those of Spain" are more credible.

Explorers who touched Virginia in 1584 mentioned cucumbers. Presumably they had been spread by Indians after introduction by Spaniards far to the south. They were grown in the first permanent English settlements, in Virginia in 1609 and in Massachusetts in 1629.

Before the American Revolution the eastern tribes of Indians as well as the colonists were growing cucumbers generally. They were grown in Brazil before 1650.

English Variety Nearly Two Feet Long

Most of the distinct types of cucumber grown today were known at least 400 years ago. Present forms range from thick, stubby little fruits, three to four inches long, up to the great English greenhouse varieties that often reach a length of nearly two feet.

The most popular European and American varieties now have smooth, dark-green skin. Some Russian varieties are short, thick, and have a rough, netted brown skin. Large white varieties of a thick, irregular shape were grown in France in the 19th century for use in cosmetics. That form is supposed to have reached northern Europe from Spain.

One of the most interesting things about the enormous English "forcing" (greenhouse) type of cucumber is that, as marketed, it is almost completely seedless. Its fruits will develop without any pollination of the pistillate flowers, and therefore without forming seeds.

How, then, does the grower obtain seeds for growing this seedless cucumber? He has only to pollinate the flowers by hand, or put bees into the greenhouse to do the job for him. Varieties commonly grown in America do not have this ability to form fruits without pollination.

The so-called "gherkins" that we buy pickled in bottles or glass jars are simply pickled small cucumbers. The true gherkin, or West Indian gherkin, is a different species (*C. anguria*) that is rarely grown in the United States. It produces a warty (or "prickly") oval fruit about an inch long.

Cucumbers Come from the Warm Hills and Valleys of Northeast India

Of great antiquity in the Middle East and Far East, the cucumber was carried westward in prehistoric times. Ancient Mediterranean civilizations knew it well.

Painting by Elsa Bostelmann

Painting by Else Bostelmann

Eggplant and Indian Mustard—Two More Natives of Subtropical India

Besides purple and yellow eggplant (left), red, white, greenish, and variously striped forms are known. Most of our fancy garden mustards are of Indian origin.

Eggplant and Indian Mustard, Two More Asiatics

EGGPLANT (*Solanum melongena*) is so called because the first varieties known to English-speaking people bore colorful egg-shaped fruits.

The Spaniards of the 16th century called eggplants *berengenas*, or "apples of love," while some of the botanists of northern Europe of the same period called the species *Mala insana*, or "mad apple," because they thought that eating it would make a person insane. Equally unfounded was the idea in medieval Europe that it had remarkable properties as a love potion.

Eggplant is believed to have originated in the Indian center of plant origins, which includes Assam and Burma. There are many entirely different names for it in ancient Sanskrit, Bengali, and Hindustani, indicating its antiquity in India.

In a secondary center, in China, small-fruited kinds developed that were distinctly different from those of Indian origin.

Although cultivated in India, China, and adjacent areas from remote prehistory, eggplant appears to have been known to the Western World no more than about 1,500 years. The numerous Arabic and North African names for it, and the lack of ancient Greek and Roman names, indicate that it was carried into the Mediterranean area by the Arabs in the so-called Dark Ages, or early Middle Ages. *Melongena*, now part of the scientific name, was a 16th-century Arabic name for one kind of eggplant.

One of the oldest records about eggplant is in a Chinese book written in the 5th century of our era. The next oldest records are from Arabia in the 9th, 10th, and 12th centuries.

Moors Took Eggplant to Europe

The Moors carried eggplant westward as far as Spain, where it was known in the 12th century or earlier. In northern Europe it was first mentioned by Albert of Cologne in the 13th century, but not until the middle of the 16th century was it well known there.

Yellow and purple varieties were introduced into Germany from Naples about 1550. Fifty years later, white, ash-colored, and brown varieties were also known in Germany, including round, oblong, pear-shaped, and long-fruited kinds.

Travelers to India in the 18th century described all of these and also green-fruited and variegated varieties grown by natives there. In 16th-century Europe varieties were known both with and without spines on the stems, leaves, and calyx of the fruits.

The eggplant was among the plants introduced early into America by the Spaniards. It was grown in Brazil before 1650. In the United States purple and white varieties for ornament were described in 1806. Until a mere 50 years ago many varieties of eggplant grown in America were for ornament only.

In this country today we grow only the large purple sorts, but people of other lands, especially in the Orient, prefer varieties with small elongated fruits that can be fried or otherwise cooked whole. In Japan eggplant is the third or fourth most important vegetable (after sweet potato, radish, and perhaps Chinese cabbage).

Indian Mustard Grown for Greens

Indian mustard (*Brassica juncea*) in this country is usually called merely "mustard." Most of our large-leaved, fancy, pungent, garden mustards grown for greens belong to this type. Black mustard (*B. nigra*) and white mustard (*B. alba*) are of interest mainly for their seeds rather than for their meager leaves.

Our word "mustard" is derived from the Old French *moustarde*, which in turn came from the Latin *mustum*, meaning "must." In this sense "must" refers to the fresh juice or crushed pulp of grapes or other fruit, with which the ground seeds of mustard were mixed for use as a condiment.

Indian mustard has evolved into various types over so much of the middle half of Asia (excluding the eastern and western parts) that three different centers of development have been found. It apparently originated in northwest India and adjacent areas, followed by further development in the secondary center of eastern India, Assam, and Burma and also in China.

Our principal varieties are a large plain-leaved one, Elephant Ear, and two curly-leaved varieties, Fordhook Fancy and Southern Curled.

A number of "Japanese" mustards (*B. japonica*) are similar in growth habit and in leaf and seed quality to some of the Indian mustards. They are, however, basically different in their hereditary make-up and do not cross readily with varieties of *B. juncea*.

Cowpeas Are Just "Peas" in the South. Northerners Hardly Know Them

Another native of India, the cowpea reached Africa before history was written and became a common food of African natives. Our edible varieties of cowpea came to America from Africa with the first slaves.

Companion of Misery in Slave Ships

ALTHOUGH most of our common introduced plants reached the Americas by way of Europe, the cowpea (*Vigna sinensis*) was brought from Africa to Jamaica about 1675 by slave traders. They carried cowpeas as part of their ship stores for feeding their tragic cargoes. They also planted the seeds to grow food in Jamaica.

Because of the plant's adaptability to tropical conditions and the high food value of its seeds, its culture spread generally over the West Indies in the early 18th century. It is believed to have reached Florida from the West Indies about 1700. It was grown in 1714 in North Carolina and in 1775 in Virginia.

In 1775 in Florida edible varieties were apparently much the same as our commonest kinds today. Some had well-rounded white seeds with a black "eye" (present variety Black-Eye); others had seeds crowded so closely in the pod that the ends of the seeds were flattened (present varieties called "crowders," as Brown Crowder, Cream Crowder). These same kinds were described as common in the West Indies in 1756.

George Washington wrote in a letter in 1791 that "pease" (meaning cowpeas) were rarely grown in Virginia, but in 1797 he bought 40 bushels of seed for sowing on his plantation. Since the English pea is not suited to the hot weather of the South, the edible varieties of cowpeas became more popular there, and southerners became accustomed to applying the term "pea" to the cowpea instead of the English pea.

Most of our edible varieties appear to have come from Africa along with the slaves, while most of the "field" varieties (used for stock feed and soil improvement) have been much more recently imported from India and China.

Black-Eye Most Popular

The Black-Eye is by far the most important edible variety of cowpea grown in the United States, although the "crowders" (Purple Hull, Lady, and others) are listed by American seedsmen, especially in the South. The cowpea is much more popular as a vegetable in our South than elsewhere in this country.

As a garden vegetable, the pods are usually harvested when the seeds are about fully grown and the pods are beginning to fade in color, but before either the seeds or the pods begin to dry out. The "peas" are then shelled out of the pods and cooked with a piece of fat pork. They are of fine quality and highly nutritious, with a flavor and savor of their own.

The name "cowpea" is of American origin and was first used in print in 1798. When this crop was first grown in the United States, it was called "pease," "callicance," and later, "corn-field pease," because of the early custom of planting it between the rows of field corn. It has also been called "southern pea" and "southern field pea." These names distinguished the species from *Pisum sativum*, the English pea, or garden pea (page 204).

In India, the land of origin of the cowpea, it has at least 50 distinct common names. One Hindu name is *chowlee*, which sounds somewhat like cowpea but probably has no connection with our word. Another name in India is *lubia*. The numerous old names, including one in Sanskrit, indicate that the plant was in cultivation in prehistoric times.

In India two related plants are catjang (*Vigna catjang*), a bush type, and asparagus bean (*Vigna sesquipedalis*), a climbing type.

Peregrinations of a Pea

The cowpea was carried from India to Arabia and Asia Minor, thence down into Africa in prehistoric times. A prehistoric form that was introduced into Africa ages ago persists there like a truly wild plant. Despite the finding of a wild form only in Africa, other evidence points strongly to the Indian center as the origin. The cowpea is grown to some extent in all parts of Africa where crops can be grown. It reached China before the days of recorded history.

The early Greeks and Romans either were unfamiliar with this plant or they failed to distinguish it among the various "peas" and "beans" about which they wrote. A Greek medical man of the first century of our era roughly described a plant that may have been the cowpea.

Italians of the 14th century knew the plant, which could have reached them by way of Asia Minor or through Africa. Later its culture became common in the Mediterranean area, but not in northern Europe because the climate there is too cool for it.

Is the cowpea a pea or is it a bean? It is distinctly different from both English, or garden, peas and garden beans. Botanically, it appears more closely related to the plants we usually call beans than to those we call peas.

In the South cowpeas are called simply "peas"; but the dry seeds of the Black-Eye variety, as grown for food, are marketed as "beans"! The terms "pea" and "bean" are far from exact; they are applied loosely, in accordance with custom, rather than for any technical reason.

Painting by Else Bostelmann

In the Western World the Radish Is the Most Popular Chinese Vegetable

Our little round or long, white or red kinds bear slight resemblance to the monstrous varieties grown by the Chinese and Japanese for cooking and for pickling. In the Orient radishes are the most widely eaten of vegetables.

Orientals Eat Giant Radishes

SCORES of species of Chinese origin are grown as vegetables in China and Japan, but among them only radishes, Chinese cabbage, certain forms of mustard, and soybeans are commonly found in American vegetable gardens (pages 215 and 217).

Radish (*Raphanus sativus*) gets its English name, as well as similar names in French and Italian, from *radix*, the Latin word for "root," especially a radish root. The technical name of the genus, *Raphanus*, is a Latinized form of an old Greek expression *raphanos*, freely translated as "easily reared" —an apt name.

Many ancient as well as modern names are known in many languages, indicating the long history of cultivation of this plant. China is believed to be the country of origin, since truly wild forms have been found there. Middle Asia appears to be a secondary center where many different forms developed after the plant was introduced from China in prehistoric times.

Ancient Egyptian records show that radishes were a common food in Egypt before the Pyramids were built.

Radishes were so highly valued by the ancient Greeks that small replicas of them were made in gold; beets were shown in silver and turnips in lead. The Greeks of the third century B. C. wrote of the radishes of their day, and an ancient Greek physician wrote a whole book about the plant.

The Romans, at the beginning of the Christian Era, also were familiar with the radish. Their writers described various kinds, including the small, mild, early, round, and long forms (like ours) as well as the large later types weighing several pounds each.

100-pound Radishes Reported

The large, late radish seems to have been known in northern Europe and England much longer than the small, early kinds. This big radish was more like the present Oriental varieties than our kinds. It was described in Germany in the 13th century, but no small ones were recorded in that part of Europe until the middle of the 16th century.

A German botanist in 1544 reported seeing radishes weighing a hundred pounds.

Radishes have been found as escapes from cultivation in Spain, Sardinia, and Greece.

Some have claimed that the radish was unknown in England before 1548, but that seems hardly probable in view of its early importance among Mediterranean peoples and its ease of culture almost everywhere. It was common in England in 1586.

Radishes were seen in Mexico about 1500 and in Haiti in 1565, indicating that they were among the first European crops introduced into the Americas by Columbus and his immediate followers. They were among the first crops grown by the English colonists in this country, and have been popular here ever since.

Pickled Radishes Popular in Orient

In China and Japan, most of the radish crop is pickled in brine, in much the same way that we pickle cucumbers. Nearly a third of the tonnage of vegetables grown in Japan is radish (*daikon*). The radishes are pickled whole in large tubs, with rice hulls added to the brine. The pickled product assumes a rather attractive yellow color but, to the Westerner, a most unattractive odor.

This pickled radish is a staple item in the diet of every Japanese. It is salty, sprightly in flavor—even though offensive to uninitiated Westerners—and adds savor and zest to his predominantly drab diet of rice. The radish, however, is low in food value. Some of the Oriental varieties are grown for cooking.

In China, one kind of radish, without an enlarged root, is grown for the oil in its seeds.

In India the rat-tailed radish (*Raphanus caudatus*) is grown for its fleshy, edible seed pods, which reach a length of eight to twelve inches. In Egypt and the Near East another form is grown only for its tops, for greens.

While there is probably nothing actually unwholesome about the tops of our varieties, they are far less palatable than leaves of turnips and other members of the cabbage clan.

Round radishes range in size from that of a cherry to that of a basketball; long ones range from the size of one's finger up to more than two feet long and five or six inches in diameter. These very large kinds, grown in the Orient, are started in plant beds, then transplanted to the field or garden, about a foot apart in the row. They are harvested in late autumn or early winter before danger of their being frozen. Oriental spring radishes are not so large. Oval or olive-shaped radishes are also known.

Radishes of white, red, or red and white are the commonest in America. Few gardeners grow the Round Black Spanish or Long Black Spanish, which are medium large, with black skin and a pungent, firm, crisp, snow-white flesh. These, along with the faintly rose-colored China Rose and the White Strasburg, belong to the group of so-called winter radishes, which can be stored in the same way as beets and turnips.

Painting by Else Bostelmann

Chinese Cabbage (Left) and Chinese Mustard Are Newcomers to the West

Strangely, these delectable salad plants have become established in the Western World only within the past century, although their culture in the Orient is probably as old as that of the radish (page 212). Even today they are little grown in Europe and America.

Missionaries Sent Seeds of These to Europe

CHINESE cabbage *(Brassica pekinensis)* and Chinese mustard *(Brassica chinensis)* are so similar in their origin, history, and plant characters that it is best to deal with them together.

These common names are simply modern Anglo-American terms that indicate our impressions of what these two plants are. In America we often use the Chinese name *pe-tsai* for Chinese cabbage. Both vegetables, in effect, are mild-flavored "mustards." The first one makes an erect, moderately compact, nearly cylindrical "head," suggesting a kind of cabbage; the other develops a clump or cluster of leaves that does not form such a distinct head.

Chinese cabbage has been erroneously called "celery cabbage" because of the fancied similarity of shape of the head to a bunch of celery, but it is not related to celery in any way. Furthermore, the implied similarity is far-fetched.

Some varieties of Chinese mustard have neat leaf blades that are somewhat spoon-shaped, with long, white, erect leaf stalks, all forming a clump so dense that they were long confused with *pe-tsai* by Americans. This type is only one of the remarkable diversity of leaf shapes and growth habits found within the species in the Orient.

Slow To Spread from Asiatic Homeland

Chinese cabbage and Chinese mustard are native to eastern Asia, possibly to Japan as well as to eastern China. They are mentioned in Chinese literature of the 5th century after Christ, but are much older than that.

Since Indian mustard, also from China, has had world-wide popularity for centuries, it is strange that these two close relatives appear to have been introduced into other lands so recently and to have remained of little importance in most lands. It may be because they are less adaptable to various soils and climates than Indian mustard.

These plants were unknown in Malaya and the East Indies until carried there by the Chinese traders. Hundreds of years ago Chinese on business abroad established "islands" of Chinese culture and customs in foreign lands, very much as modern people do. Chinese writers of the 15th century pointed out that Chinese cabbage and Chinese mustard could be obtained in Malacca, where there was a Chinese colony, but they were not commonly grown in Malaya.

The first record of these "mustards" in Europe was in 1751, but they remained oddities there for a hundred years or more. During the 18th century various European missionaries to the Orient sent seeds of these varieties to Europe from time to time, but they failed to become popular.

The most prominent seedsman of France introduced Chinese cabbage to his country in 1845, but again it failed to "catch on." The seed even became exhausted or lost and the plant was reintroduced later.

Bewildering Diversity Grown in Orient

There has long been confusion over the botanical identity of Chinese cabbage, Chinese mustard, Indian mustard, and various closely related forms. The Chinese and Japanese have done so much breeding or selecting within these species for hundreds of years that there is an almost unbelievable diversity of varieties in each species.

It is impossible to determine to what species some of these things belong, merely upon seeing them in the garden. The numerous forms grade into one another with no clean line of demarcation. The distinction even between Chinese cabbage and Chinese mustard is often vague.

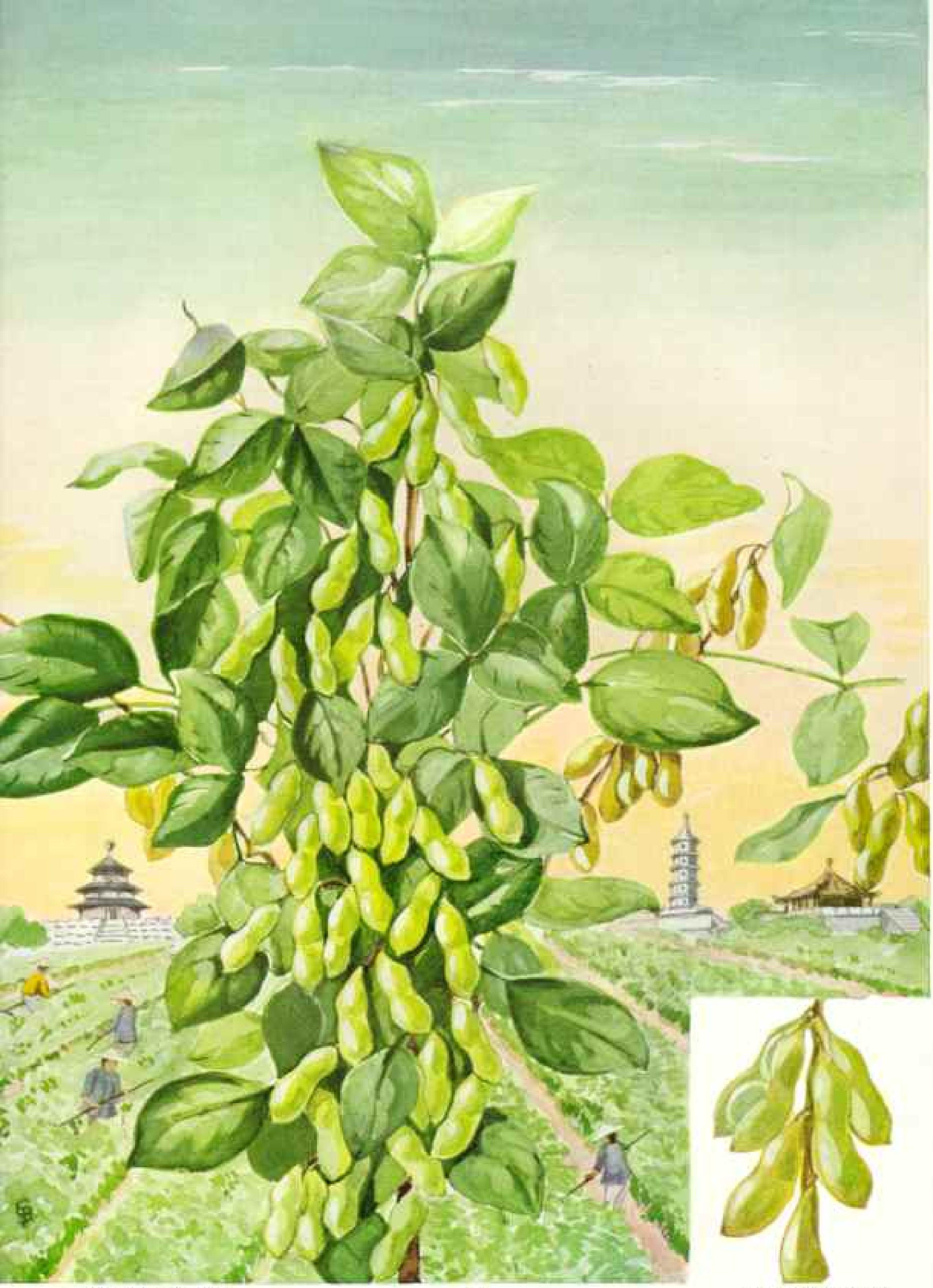
In America we prefer such varieties of Chinese cabbage as Chihli, which forms a long, slender, nearly cylindrical head that is relatively solid and weighs one to two pounds when trimmed. I was amazed at the enormously thick, squat types, weighing ten to twelve pounds, that the Japanese prefer. The variety sold in this country as Pak Choy is not Chinese cabbage, strictly speaking, but Chinese mustard.

Americans Like Them Best in Salads

Chinese cabbage and Chinese mustard are without the pungency or "hotness" of Indian mustard. Therefore, when cooked they are lacking in distinctive flavor. They are most commonly eaten raw as salads rather than cooked as potherbs. Indian mustard is much better for cooking as greens. The mild, sprightly succulence of Chinese mustards in salads is delightful.

Chinese cabbage and Chinese mustard are annual plants that grow best in a mild climate. If they are planted at such a season that they encounter very hot weather, they will shoot to seed without forming the attractive and productive kind of plant that is desired. Over the warmer half of the United States they generally do better when planted in summer for an autumn crop than when planted in the spring.

The varieties that we grow have been introduced from the Orient.



Painting by Else Bostelmann

China's Soybean Is One of the World's Great Food Plants

Vegetable varieties of soybean were almost unknown in America a generation ago, though important in China and Japan for thousands of years. Large crops of other varieties are grown here for oil, feed, meal, and industrial use.

Vegetable Soybeans Are New in America

THE SOYBEAN is not at present a widely popular garden vegetable in the United States. Its valuable properties are becoming appreciated, however, and it deserves to be used far more.

Soybeans *(Soja max)* have been grown in the Orient for more than 5,000 years, but, strangely enough, they appear to have been known in the Western World a scant 250 years. It is puzzling, indeed, that this plant of Chinese origin should have become established so late in the West (including western Asia, Europe, and the Americas), while many other species from China have been known and valued in the West for thousands of years. The wild soybean is still found in China.

The old Chinese name of this plant was *sou*, from which the names *soi*, *soy*, and *soja* doubtless were derived; hence our term "soybean." In support of the belief in its great antiquity of culture, there are more than 50 names, many of them quite different, for soybean in the Orient. Western names are remarkably similar as a result of its recent introduction into the Western World.

The first written record about soybean goes back to an old Chinese *Materia Medica* written between 2900 and 2800 B. C. There is, however, no known record of it in a European language older than A. D. 1712, when a German traveler reported finding it in Japan in 1691 and 1692.

Ship Captain Brought Soybeans to America

Some recent popular articles might be interpreted to mean that the soybean was unknown in the United States even a generation or two ago. Actually, the first record of it in this country was in an old encyclopedia published in Philadelphia in 1804. That article said it was a plant adapted to Pennsylvania and well worthy of cultivation there. It had been introduced about 1800 by the captain of a clipper ship who bought some of the beans to supplement his ship's stores. In 1829 it was being grown at Cambridge, Massachusetts, where it was considered a luxury.

In 1853 a Patent Office report referred to the soybean as the "Japan pea." It had been imported from Japan through San Francisco in 1850, then carried to Illinois and Ohio.

When Commodore Perry returned from his famous expedition to Japan in 1854, he brought additional seeds of the soybean. Between 1873 and 1900 a few more samples of seed were imported, either from Europe—where there was a mild interest in it as a new plant—or from Japan. But as recently as 1900 only eight varieties of soybean were known in the United States, and they were all field types rather than "vegetable" types.

Although the soybean was introduced into France by missionaries returning from China in 1739 and was grown in the Royal Botanic Gardens at Kew in England as early as 1790, it has remained an unimportant crop in Europe. There it has been grown more as a vegetable than as a field crop, just opposite to common practice in the United States.

About 15 million acres of soybeans are now grown annually in this country, chiefly for stock feed, oil for industrial purposes, flour for use in bakery and meat products, and proteins for the making of plastics. Foam fire-fighting materials are also prepared from soybeans.

The vegetable varieties of soybeans are gradually gaining favor in the United States, and a few companies are canning the immature seeds. They can also be preserved by dehydration or quick-freezing.

It was only about a dozen years ago that many Americans began to learn about vegetable varieties of soybean; yet their use as a vegetable is at least 1,500 years old and probably much older. In eating quality they are far superior to the field varieties, which are hardly suited for use as fresh garden vegetables.

Seedsmen in this country now list several varieties suitable for fresh use as a vegetable. Among them are Bansei and Fuji for early harvest; Hokkaido and Jogun for midseason or late harvest; Seminole and Rokusun for culture in the South.

The plants of most varieties are relatively large, so that the rows need to be two to two and one-half feet apart in the garden, with two to three inches between plants in the row. Since they take longer to reach harvest than many other vegetables and are rather large-growing, they are not well adapted to very small gardens or to regions having short, cool summers.

A Highly Concentrated Food

The seeds of the soybean are exceedingly rich in oil and in protein. Although the yields may not appear as large as those of many other vegetables, the yield of true food value is good because the seeds are a highly concentrated food. The flavor is distinct and the texture rather smooth and buttery. Like most "new" foods, the soybean may require repeated trials to appreciate it and to learn how to use it. Gardeners should consult their local experts about varieties and methods of growing and using this ancient "new" vegetable.

Appalachian Trail Hikers Step Through the Gate to a Natural History "Life Class"

Plants and animals, as well as geology and history of the region, are displayed at Bear Mountain, on the New York stretch of the A. T. Youngsters registering in this section of Palisades Interstate Park receive a tag and a booklet teaching respect for nature and park property. Five tags win them a silver Park Ranger badge.

Skyline Trail from Maine to Georgia

By Andrew H. Brown

Illustrations by National Geographic Photographer Robert F. Sisson

ON AUGUST 5, 1948, a certain shoe manufacturer missed the chance of a lifetime. He should have been on a bleak mountaintop to greet a tired but happy hiker in ragged footwear.

The weary walker was Earl V. Shaffer of York, Pennsylvania. On that day he reached the summit of Mount Katahdin, in central Maine.

Thousands had preceded Shaffer to that rocky pinnacle. But he had just walked more than 2,000 miles over the full length of the Appalachian Trail. He had left Mount Oglethorpe, Georgia, on April 4. He was the first, so far as the record shows, to traverse that Olympian footpath in a single continuous journey.

I asked the redoubtable hiker how many pairs of shoes he wore out in four months of "hoofing it" over rock and rubble, on leaf mold and pine needles, through swamp and stream bed.

"One pair of boots lasted the whole way," he replied. "But they were in tatters at the end."

Long, Long Trail A-winding

On his long walk Shaffer's durable shoes tickled the mountain backbone of the eastern United States. He spent 123 nights on the trail, several of them in fire towers. Traveling alone, he averaged 17 miles a day.

The only "enemies" Shaffer met were two copperheads and a rattlesnake. In his light pack he carried food, spare clothing, and a poncho. He slept when possible in lean-tos and ate corn bread he cooked in a pan.

The Appalachian Trail, popularly the "A. T.," is a public pathway that rates as one of the seven wonders of the outdoorsman's world.

Over it you may "hay foot, straw foot" from Mount Katahdin, with Canada on the horizon, to Mount Oglethorpe, which commands the distant lights of Atlanta (map, pages 222-3). Of course the route may be reversed.

On this fabulous footway you will sometimes cross a road or railroad, skirt a town, or cut through a farmer's fields. Most of the way, though, you'll be far from man and his works. In more than 2,000 miles of mountain-hopping through 14 States, eight national forests, and two national parks, the Trail ties together long stretches of utter wilderness.

When I set out to see the Trail, I adopted a more modest plan than Mr. Shaffer's. I visited the high spots of interest and elevation, by-passing less noteworthy parts by car. On my north-to-south trek I still saw plenty of choice mileage at first hand from the vantage of my own two feet.

A Parade of Peaks and Ranges

Along the Trail peaks and ranges in a mighty parade hunch their great shoulders skyward.

What a majestic sweep of high country! Katahdin, Bigelow, Saddleback, and the Mahoosuc Range; White Mountains, Green Mountains; the Berkshires and the Taconic Range; the Hudson Highlands, Kittatinny Mountain, and the long, long Blue Ridge; the Unakas, Great Smokies, Cheoahs, and Nantahalas.

Viewed close by, they loom green or rocky-topped. In the middle distance they shade to blue. At the far-off limits of sight the endless ranges take on the purple, mauve, or misty-gray hues of a painted backdrop.

Though the Trail follows the direction of the mountains of eastern North America, it cuts across the main travel ways from the Atlantic Plain to the heart of the continent. Since early days, passes in these Appalachian uplands have funneled westbound feet, horses, wagons, barges, trains, and now even airplanes.

In Maine, west of the Kennebec River, I followed in the footsteps of Benedict Arnold. He passed that way on his ill-fated winter attack on Quebec in 1775. In Virginia I came upon Daniel Boone's Wilderness Road that took pioneers over the mountains to Kentucky and Tennessee.

I crossed major rivers of the Atlantic seaboard—Connecticut, Hudson, Delaware, Susquehanna, Potomac, and James.*

I paralleled the age-old Indian trail, the

* See, in the National Geographic Magazine: "Long River of New England (the Connecticut)," April, 1943; "The Mighty Hudson," July, 1948; "Potomac, River of Destiny," July, 1945, all by Albert W. Atwood; and also "Henry Hudson, Magnificent Failure," by Frederick G. Vosburgh, April, 1939; "Down the Potomac by Canoe," by Ralph Gray, August, 1948; "Approaching Washington by Tidewater Potomac," by Paul Wilstach, March, 1930; "Great Falls of the Potomac," by Gilbert Grosvenor, March, 1928.

At Bear Mountain, Naturally, There's a Bear

This five-month-old youngster lives only an hour or so from Broadway. He's an attraction at the Trailside Museums of the Palisades Interstate Park, 45 miles from New York City (page 218). Born in the winter, a bear cub can take care of himself by the second spring. He eats both vegetable and animal food. In the fall, Park naturalists set free most of the living turtles, snakes, raccoons, muskrats, flying squirrels, skunks, and foxes exhibited all summer. The Appalachian Trail crosses the Hudson via near-by Bear Mountain Bridge.

Great Indian Warpath, which once reached from Pennsylvania to Alabama. But my course writhed along ridge crests a half-mile or more closer to the sky than the redskins' old-time "through way."

My path was within 150 miles of half a dozen of the country's biggest cities; one part or another of the Trail lies in easy reach of more than half the population of the United States. Yet people were novelties along much of the route.

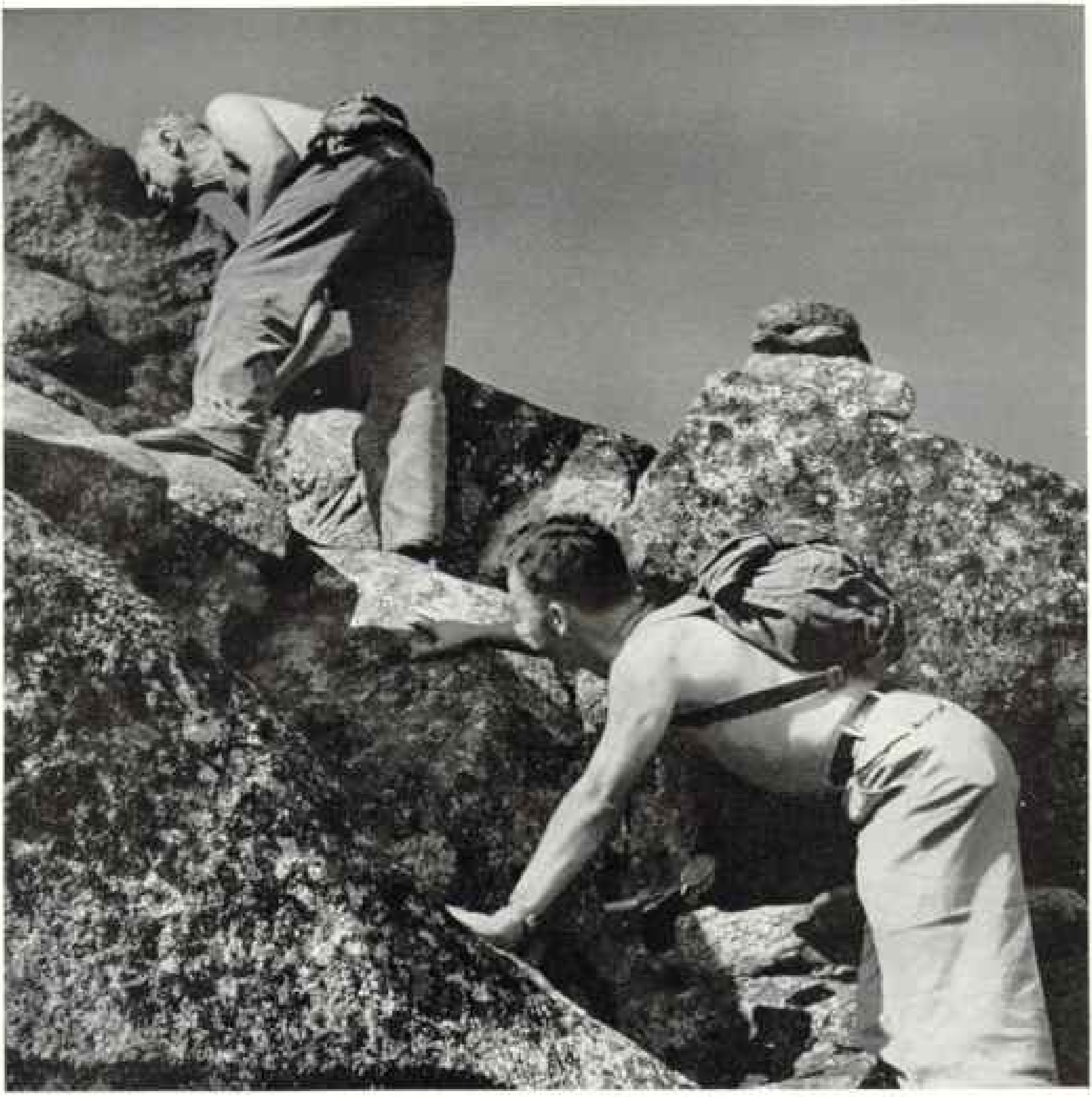
Unspoiled mountain reaches support a numerous array of plants, animals, birds, and insects, and hold almost all the kinds of minerals found in the eastern United States.

Maine to Georgia—2,050 Miles

The Trail started in 1921 as a dream of Benton MacKaye. It is only 12 years since the last two miles of the Trail, a stretch in western Maine, were cut out and marked.

On a sunny summer noontide I bestrode the tiptop of Mount Katahdin, zero milestone at the north end (pp. 238, 239). There a sign told me that my Georgia goal, Mount Oglethorpe, was 2,050 miles away. Below spread a panorama of a third of Maine, splashed with dozens of lakes.*

* See "Maine, the Outpost State," by George Otis Smith, NATIONAL GEOGRAPHIC MAGAZINE, May, 1935.



Scaling Steep Slopes, Climbers Become Men Who Walk Like Bears

Camera, filters, and finder dangle below the photographer's chest as he clambers cautiously up the Dudley Trail on Pamola peak, Mount Katahdin, Maine. Ahead of him crouches John W. Webber (page 239). Lichens speckle boulders in a bleak world far above tree line.

I turned west—and started walking!

Ahead were thousands of A. T. rock cairns, white blazes, and metal markers challenging pursuit like the chalk arrows in a boyhood game of cops and robbers.

The Trail led me first through the Maine woods Thoreau explored. The second evening I put this in my notebook:

"After filling my canteen in a brook, I legged it through a swamp, angled up a ridge, and followed blazes through a maze of abandoned lumber roads. Ferns and berry bushes grew rank through rotted logs of ancient corduroy.

"From dense hardwood groves I clambered up ledges where dwarfed spruces and pines grew in cracks. Clouds masked the sun.

"A bear, a dim blur of black, started away up a gully. There were wheezing and the crashing of branches until he topped the ridge; then silence and aloneness more complete than ever. Thunder muttered far away. A rising wind sighed through the pines."

Lumbermen Made Maine History

At Nahmakanta Lake I stopped at one of Maine's countless "sporting camps." The porch of the lodge fronted on a white sand beach. In the living room mounted trout and salmon hung on the walls.

Where the Trail in Maine skirted water, I took to boat or canoe.

Muscle men of the Maine woods wrote fabulous history. Scot and Indian, Irishman and Finn, French Canadian and Pole, they played nursemaid to rafts of floating timber. In their big double-ended bateaux they "rode herd" on the spring log drives. They blew jams with one part dynamite and two parts "guts."

I jumped to western Maine to traverse rugged Bigelow Mountain. In a lean-to I found this notice: "Due to nonpayment of bills, telephone and electric light services have been discontinued. But on payment of $4.37 these services will be restored."

Next I headed for Old Speck. On the crest of that lofty peak I met a Vermont postman who had spent each of the last five of his 71 years camping along the Trail.

John, a New York friend, joined me in New Hampshire's White Mountains, hikers' paradise. During a ten days' trip traveling light from hut to hut of the Appalachian Mountain Club and the Dartmouth Outing Club, we covered the whole A. T. in the White Mountains.*

We topped the Carter Range and the Presidentials, circled the Pemigewasset Wilderness, and looped through the Franconias to Lonesome Lake and Mount Moosilauke.

The longest exposed section of the Trail is in the White Mountains. For 19.5 miles it is above tree line, wide open to all the storms that blow. This stretch is notorious for sudden, dangerous, and fickle weather changes.

In a hundred years, 23 persons have perished on Mount Washington. Scores more have been rescued.

The Appalachian Mountain Club's *White Mountain Guide* spotlights the hazards on Mount Washington: "*Caution:* The appalling and needless loss of life on this mountain has been due largely to the failure of robust trampers to realize that wintry storms of incredible violence occur at times even during the summer months. Rocks become ice-coated, freezing fog blinds and suffocates, winds of hurricane force exhaust the strongest tramper, and, when he stops to rest, a temperature below freezing completes the tragedy.

"If you are experiencing difficulty from the weather, abandon your climb. Storms increase in violence with great rapidity toward the summit. The highest wind velocities ever recorded were attained on Mount Washington. Since *the worst is yet to come*, turn back without shame, before it is too late. . . ."

These words were not written about Mount Everest, but about a peak only 6,288 feet high! (Page 240.)

We Fight a Blizzard—in Late June!

We learned the soundness of this advice during a climb on a spur of Mount Washington in late June. On that trip John and I were backpacking up the Davis Path, bound for the Appalachian Trail at the Lakes of the Clouds Hut (page 243).

As we pushed above tree line, blue sky swiftly grew gray. A knifing gale brought a smother of snow.

We faced into the blast, climbing stubbornly from one rock cairn to the next. It grew colder. We decided it would be safer, as long as we could grope from cairn to cairn, to make for the Lakes Hut. There we would find warmth and food. Here we could only huddle in the lee of thin scrub—if we could get down to it.

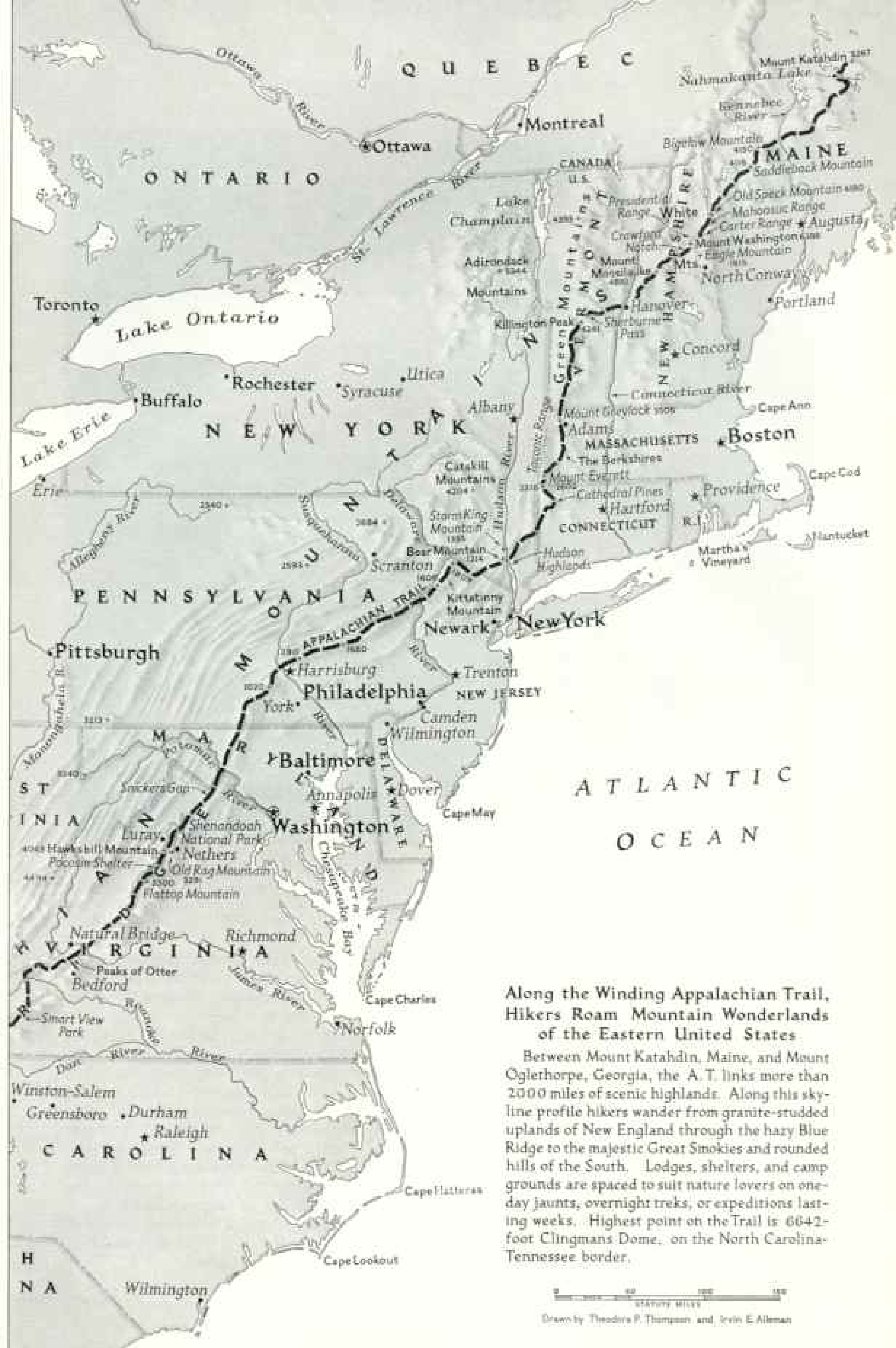
Battling the storm made us gasp for breath. Two hours behind us was a bright and breezy summer day.

An hour later we pushed open the door of the Lakes of the Clouds Hut, two frosted ghosts with aching muscles.

For 36 hours we were marooned with seven other impatient hikers. The temperature dropped to 22° F., three inches of snow fell, and icicles fringed the cabin eaves.

It was January in June on the A. T.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "From Notch to Notch in the White Mountains," by Leonard Cornell Roy, July, 1937.



ATLANTIC OCEAN

Along the Winding Appalachian Trail, Hikers Roam Mountain Wonderlands of the Eastern United States

Between Mount Katahdin, Maine, and Mount Oglethorpe, Georgia, the A. T. links more than 2000 miles of scenic highlands. Along this skyline profile hikers wander from granite-studded uplands of New England through the hazy Blue Ridge to the majestic Great Smokies and rounded hills of the South. Lodges, shelters, and camp grounds are spaced to suit nature lovers on one-day jaunts, overnight treks, or expeditions lasting weeks. Highest point on the Trail is 6642-foot Clingmans Dome, on the North Carolina-Tennessee border.

Drawn by Theodore P. Thompson and Irvin E. Alleman

After a 2,000-mile Jaunt, Sisson Reaches the Trail's South End, Deep in Dixieland

The photographer reads the sign on Mount Oglethorpe, Georgia, southern terminus of the Appalachian Trail. The 3,290-foot mountain was named for Maj. Gen. James E. Oglethorpe, 18th-century English officer who founded Georgia. Markers put up by the Georgia Appalachian Trail Club read, "Georgia to Maine!"

"If you don't like the weather, wait a minute!" is an old White Mountain saying.

At the Lakes Hut we had our first lesson in the mysteries of "gooferdom." Some city folk are surprisingly mountain-wise. Others come wide-eyed and helpless to the hills. The latter mostly are first-time visitors to the mountains. "Goofers," as they are called, are prone to ask silly questions.

Hutmasters, always ready to help beginners, still enjoy poking fun at them. Answers to some of the commonest questions are posted at Pinkham Notch and the Lakes of the Clouds:

"Yes, the fellows on the hut crew do all the cooking and they would make fine wives.

"The little sacks on the gasoline lamps are mantles, and break if you poke them.

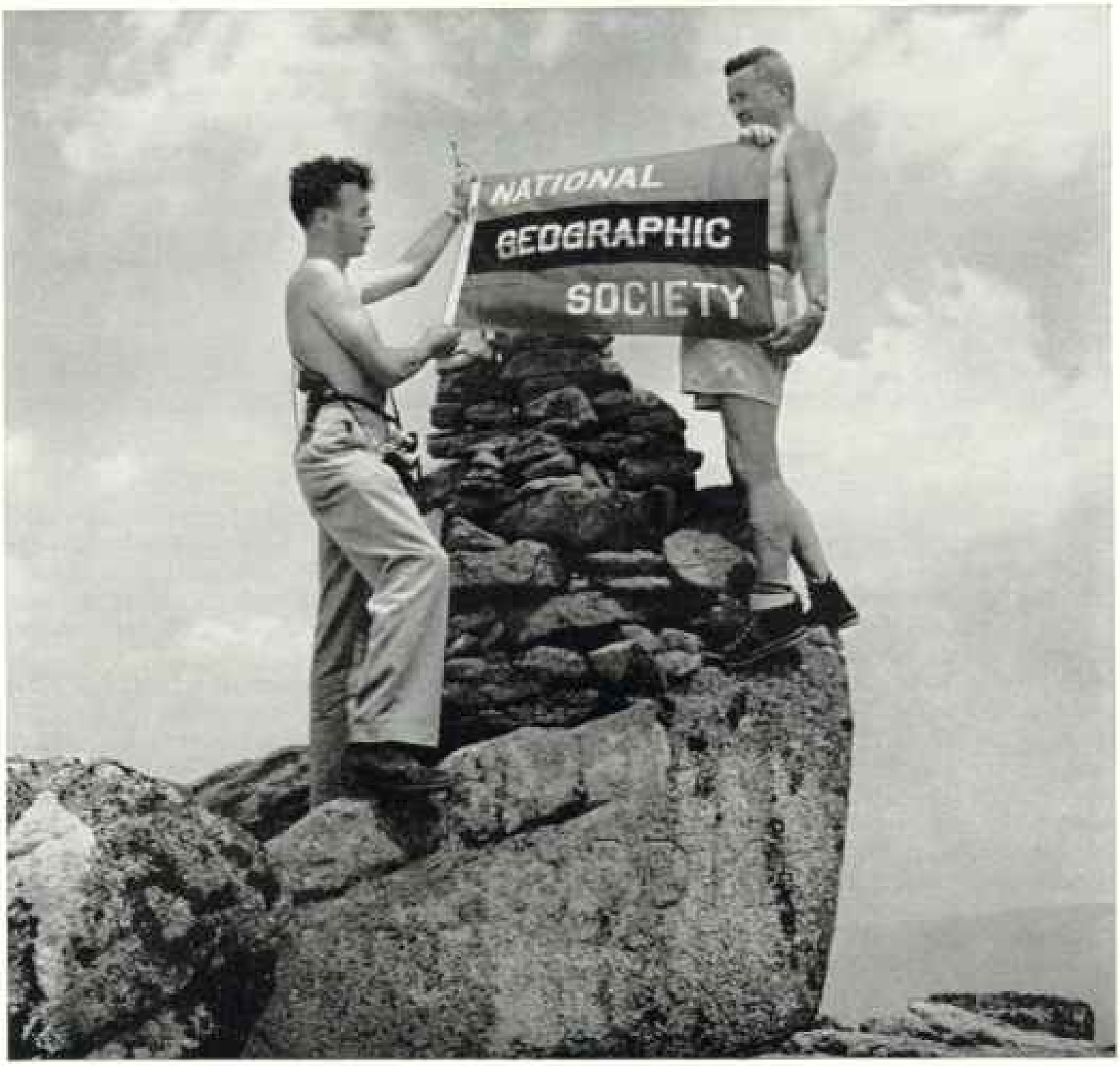
"The big rock piles are cairns to mark the trails, and we leave them out all winter.

"We have no fireplaces because so little wood grows above tree line.

"No, there is nothing to see in Pinkham Notch; the mountains get in the way."

To tease goofers, Joe Dodge, the "laird" of Pinkham Notch, has invented a whole menagerie of frightsome creatures. Among them are "dingmahauls," green-whiskered "cumatabodies," and treacherous "cumnearyers," which are born either with long left or right legs, depending on whether they circle the mountains clockwise or counterclockwise.

Once a hutful of novice hikers at the Lakes of the Clouds saw the door blow open to admit an oddly garbed mountaineer.



North Anchor of the A. T. Is Away "Down East" atop Mount Katahdin

National Geographic cameraman Bob Sisson (left) and a friend unfurl The Society's flag on the barren summit, where it seemed to Thoreau "as if some time it had rained rocks." Sisson and the author did not hike the whole Appalachian Trail, but leapfrogged along its length.

He wore full-dress tails, starched shirt and collar, and a tall silk hat!

The eccentric visitor asked for a cup of coffee, paid for it, and went out again into the windy night. He volunteered nothing, and everyone in the hut was speechless.

As we roamed the heights of the Presidential Range, John and I shared the feelings of the tramper who said: "I consider a hiker with a pack on his back as a self-sufficient individual, with all the petty entanglements of his life brushed aside like cobwebs."

We dropped down through spruce scrub on the slopes of Mount Pierce to the Mizpah Spring Shelter and slid gratefully out of packs.

While I unrolled the sleeping bags, John built a fire. The big pack basket gave up tin plates, silverware, nesting kettles, frying pan, folding reflector oven, small bags of tea, sugar, salt, and jars of butter and jam.

While we ate our dessert of raisins and chocolate, our kettles bubbled with washing water. We chopped some wood, then showered each other with dipperfuls of warm water.

Mountain Breezes Whisper Lullaby

The fire threw nervous shadows on the encircling woods. We watched the flames die down, dipped a last drink from the bucket, and took a long look at the starry sky. A breeze rustled the treetops and caressed us with the spruce-scented breath of the forest. Blissfully tired, we slipped into the snug cocoons of our sleeping bags.

This was the life! Rude but adequate shelter, the warmth of fire and blankets, food to satisfy urgent hunger, cool water to quench thirst.

From the White Mountains I went to Sherburne Pass in Vermont's Green Mountains. Then, walking southward, I was on the Green Mountain Club's Long Trail, with which the Appalachian Trail coincides from that point to the Massachusetts border.

I pushed up Killington Peak, second highest summit in Vermont. In the hush of dense spruce woods there was no sound save the chirp of juncos, and no movement but the flick of a nuthatch through a sunbeam on a brown tree trunk.

Moving on south, I topped Mount Greylock, pinnacle of Massachusetts.* Next milestone was Mount Everett. A fire lookout tower spiked the summit. The old warden described the piece of New England within his view and the folk who visited his eyrie.

"We're probably bein' watched," he said. "There's an old geezer who sets up his tent over in that pine grove. He picks ginseng and watches passers-by through an old nautical spyglass. He's 78 years old.

"One day I found a young chap campin' on that little lake down there. Said his family offered him a trip round the world when he got out of college, but he told 'em he'd rather come up here and camp out for six months and study birds; and he did.

"Week or so back, a girl came through hikin' on the Appalachian Trail all by herself. Packin' her sleepin' bag and food, too. I told her to be careful with fire and to look out for snakes, an' she went on down the trail."

"You have plenty of visitors up here," I said.

"Yes, indeedy! The railroad brings lots of hikers up to this country. Then there've been ski trains, foldboat trains, bicyclin' trains. They even used t' have a mystery train. When you got on that one, you didn't know where you was goin'.

"Once a big bunch clum up here in the rain wearin' city clothes and nice shoes. After that the railroad people decided folks like to know what's ahead of 'em, and gave up them mystery trains as a pore job."

Trail Crosses Hudson at Bear Mountain

From Connecticut's** majestic Cathedral Pines I jumped to the Bear Mountain Section of the Palisades Interstate Park, in New York State. Between hikes on the A. T. and its offshoots I visited the Trailside Museums and nature trails (page 218). A zoo exhibits wild animals of the region (page 220).

From subarctic summits of Katahdin and the White Mountains to Georgia's mountain hollows that grow corn and tobacco, the Trail is a laboratory for the naturalist.

It is a continuous "life class" of animals, birds, and insects, of trees, shrubs, and wildflowers. Geology is always underfoot.

You may see deer bounding away through the brush anywhere along the Trail, but they are most common from Pennsylvania north.† Black bears explore the berry patches, both North and South. They're such a problem at parking places in the Great Smokies‡ that Park officials have erected signs like those in Yellowstone National Park cautioning motorists not to feed them.

Club "For Beating Porcupines Only"

Porcupines are amusing pests along the Trail in New England. A shelter on Bigelow Mountain in Maine once displayed this cryptic notice one occupant had affixed to a stout stick: "This club to be used for beating porcupines only."

Rattlesnakes may crawl across the Trail anywhere from New Hampshire to Georgia, copperheads from Massachusetts south. Many hikers carry snake-bite treatment kits. But trampers can avoid trouble by keeping their eyes open for the reptiles.

Snake-wise Charlie Dodson of Virginia told me: "A copperhead—he's bad ef you don' see 'im, but crowd a copperhead an' he'll sell out fast."

One hiker, primed to meet snakes, deer, bear, and coons, was hardly prepared for the "wildlife" he nearly ran into around a bend of the Trail in Virginia.

There in the path stood an elephant! It seems the venturesome pachyderm had escaped from a circus truck in Snickers Gap.

Mid-point of the Trail is in southern Pennsylvania. From that State the Trail crosses the western "handle" of Maryland, "touches base" in West Virginia, and enters Virginia. One fourth of the Trail lies in Virginia.§

*See "Northeast of Boston," by Albert W. Atwood, National Geographic Magazine, September, 1945.

**See "Connecticut, Prodigy of Ingenuity," by Leo A. Borah, National Geographic Magazine, September, 1938.

†See "Penn's Land of Modern Miracles," by John Oliver La Gorce, National Geographic Magazine, July, 1935.

‡See "Rambling Around the Roof of Eastern America," by Leonard C. Roy, National Geographic Magazine, August, 1936.

§See, in the National Geographic Magazine: "Appalachian Valley Pilgrimage," by Catherine Bell Palmer, July, 1949; "Maryland Presents——," by W. Robert Moore, April, 1941; "West Virginia: Treasure Chest of Industry," by Enrique C. Canova, August, 1940; "Roads from Washington," July, 1938.

New England's Green Glory Holds These Hikers Spellbound. Vermont Boulders above Sherburne Pass Make a Fine Grandstand

College students and summer hotel workers gaze afar from Deer Leap Mountain overlooking a lovely rolling countryside. South from this peak the Appalachian Trail coincides with Vermont's Long Trail.

In my years of living in Washington, D. C., I've spent many week ends in the closed shelters in Virginia's Shenandoah National Park. They are maintained and operated by the Potomac Appalachian Trail Club.

A visit to Pocosin Shelter was typical. Ten of us—four girls and six boys—drove from steaming Washington to the Blue Ridge for a week end 3,000 feet up in the cool hills.

We parked the cars just off the fire road close to the Skyline Drive. The enclosed cabin, built of squared chestnut logs, had a stone-flagged front porch; in one corner was an open fireplace. All hands pitched in to get supper on the table in a hurry.

One couple grilled sizzling steaks. Rolls crisped in tin plates tilted toward the flames. The lid of a huge gray coffeepot fluttered.

Against the fading sky a whippoorwill swooped. We moved a table from the porch to the hard-packed ground in front. Everyone pounded the table with tin plates. Soon the "chef" slapped down a red-hot steak before each famished customer (page 234).

One of the girls forked out steaming ears of corn. Taunts and chatter gave place to brief demands mumbled through busy jaws: "Butter, please!"—"Pass the rolls"—"Who's got the salt?"

Someone handed out apples, and we watched the peels curl in the coals. The yellow disk of the full moon lifted in the east. One of our party softly played a harmonica.

Cabins Provide Everything but Food

Pocosin, like the other three closed shelters in Shenandoah National Park, has double-deck bunks with mattresses and blankets. It contains a stove, cooking utensils and dishes, adequate tableware—everything for the hiker's comfort except food.

All these cabins are near enough to roads so that it's easy to tote in grub, even for several days' stay. Each hut is kept locked. To the reserving party the key is lent for the period of use.

Mountain Grandeur Dwarfs Hikers Enjoying the View from Charlies Bunion

In this Great Smokies section, the Appalachian Trail is carved from the rocky flanks of a 5,400-foot peak. This pinnacle, stripped of trees by a forest fire, was named for a guide's sore toe.

The mountains seem to "smoke" like volcanoes in the hot June sun. Gray mists rise from valleys and swirl in billowy patterns around the summits. Over all hangs the blue haze that gave the Great Smoky Mountains their name.

Walkers on the A. T. in the Smokies follow the ridge-crest boundary between Tennessee (in this view) and North Carolina (behind the camera).

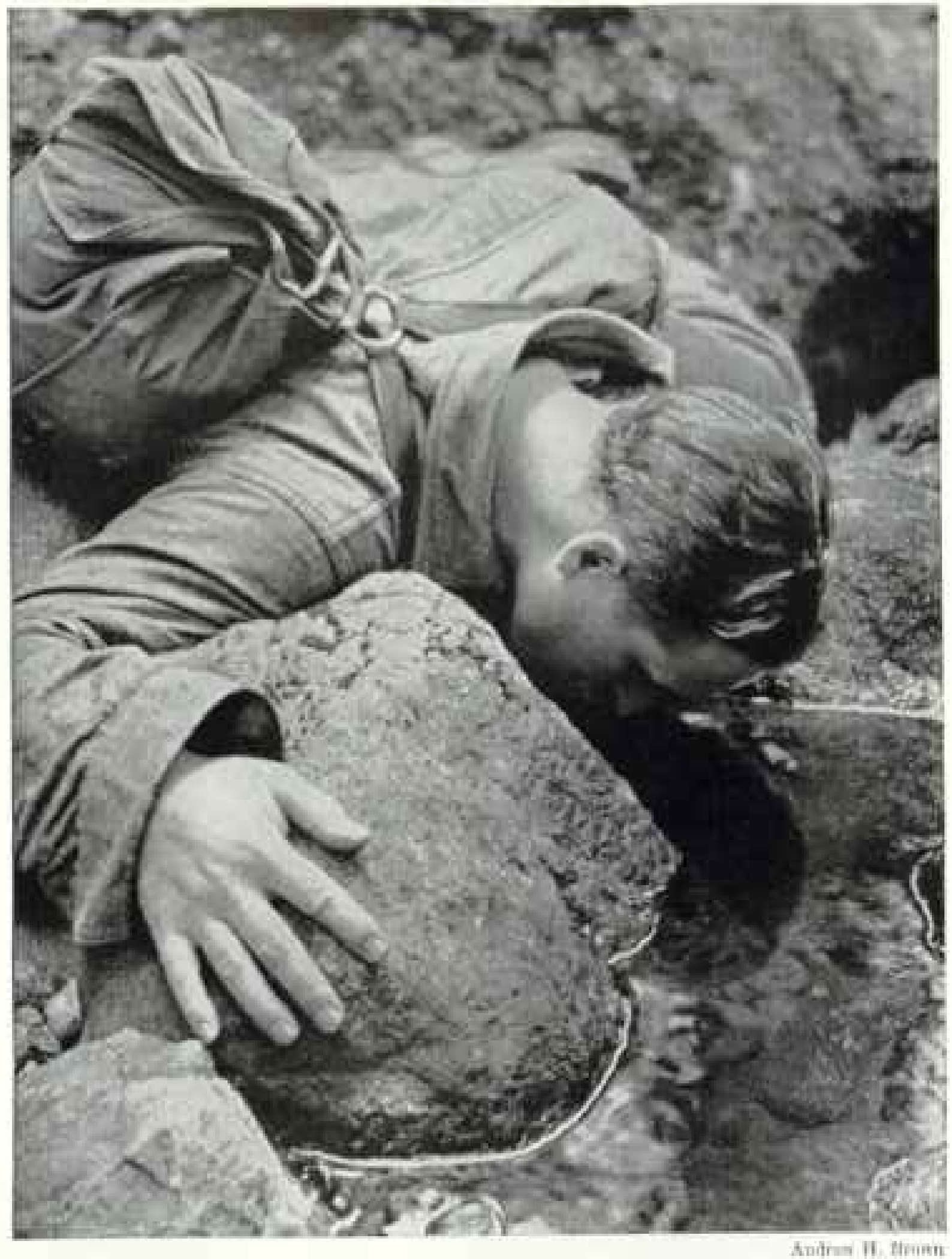
Clouds partly veil Mount Le Conte, 6,593-foot "Grandstand of the Smokies." Atop this third highest peak in the Smokies is a lodge for visitors.

Red spruce and balsam fir clothe the saddle and form "comb teeth" on distant ridges.

Andrew H. Brown

White Blazes on Trees Guide Appalachian Trail Hikers

Regularly, volunteers like this girl take paintpot and brush into the woods to freshen A. T. markers. On winding sections, blazes are placed within sight of each other. Blue blotches mark side trails. Double blazes warn of abrupt changes in route.



Andrew H. Brown

A Hiker Gulps Cold Water from a Rocky "Cup"

Robert Bumstead, of Philadelphia, drinks from a clear spring beside the Appalachian Trail near North Conway, in New Hampshire's White Mountains. This section of the A. T. follows the old Crawford Path, once a popular bridle trail from Crawford Notch to Mount Washington.

Guidebook, Maps, and Trail Signs Point the Way

The girl reads signs at the foot of Beaver Brook Trail to the summit of Mount Moosilauke, New Hampshire. Dartmouth Outing Club and A. T. symbols share space on the top marker. Tree growth and storms rapidly undo the trail makers' work. Constant labor keeps the pathways from reverting to wilderness.

On the east side of the Blue Ridge, in northern Virginia, five miles by side trail from the A. T., the pathway merges with a rutted country road leading to the tiny mountain community of Nethers.

Lady in a Blue Poke Bonnet

In a green dooryard beside the gurgling Hughes River we met gray-headed Mrs. Carrie Dodson. When she pulled off her big blue poke bonnet and smiled, the sun lighted a friendly face.

"Water? Why, sure. Come down to the spring."

A man was daubing tar on her cabin's sloping roof.

"That's my son, Charlie. I have four sons. Only two of them are still with me."

At the edge of the woods gushed a cold spring. We washed away our thirst and sat on the mossy ground. As we talked, it developed that Mr. Dodson was "daid."

"He was shot 28 year ago," Mrs. Dodson told us. "Right up the holler a piece. My baby boy was one year old."

"How did it happen?"

"I was sittin' in the yard peelin' apples for apple butter. It was a dark, rainy day. I was goin' down to the store later, so I asked my man for a little money. He gave it to me and went off down the road. I never saw him again.

"It was midnight when they come and told me my husband was shot. They never told me much about it. They was a whole passel of 'em. Maybe they was fightin'. I don't know. Some said the bad man aimed to shoot another one and hit my man."

Mrs. Dodson showed us her two beehives and two black pigs. Her sturdy cabin was more than 80 years old, she said.

So must all pioneer homes have looked. Squared logs, much patched with planks. A stone chimney held together, not with cement,

By Leaps and Bounds He "Rides the Rope" Down a Cliff

This climber kicks away from the rock face as he descends the Needle on Eagle Mountain, New Hampshire. In alpinist lingo, he is "rappelling." Friction of the rope passing over shoulder and around right thigh prevents too swift a drop. Doubled line runs around a tree or boulder above. At a safe stopping place the climber pulls the rope down and loops it around a new anchor point.

When Violent Rains Sweep the Mountains, Even the Hardiest Hikers Take Shelter

These five wait for a letup under an overhanging rock along the Appalachian Trail in New Hampshire. One girl holds out a cup to catch a drink. Her companions register resignation, curiosity, disgust, and despair.

but with hard-caked clay that had washed out of the upper courses. A good tin roof was the only modern touch.

We sat outside on a bench against a picket fence, shaded by a grape arbor older than the Dodsons could remember. Under a few plum trees a rooster herded his hens before him. Beyond the fence were rows of tomatoes, squash, string beans, potatoes, and corn.

Charlie Dodson came down off the roof. He told of a big trout he'd been stalking in a near-by pool "for years." And then if a friend he took fishin' didn't catch it right from under his nose!

No Better Eating than "Snappin' Turkles"

A country delicacy, Charlie said, was "snappin' turkles." He caught them by wading sluggish streams and running a hand gently under overhanging banks.

"I git bit now and then, but a man wouldn't want better eatin' than them turkles. 'Course, coon and squirrel is good, too."

We said good-bye and went up the path. Charlie came after us, holding something in his hand. We thought of "snappin' turkles," but it was a hummingbird.

"He got caught between the kitchen rafters and couldn't git out."

Charlie stroked the tiny creature's neck, then opened his hand. The bird did not fly.

"Is it hurt?"

"Just playin' possum. Watch!"

Charlie touched it, and it whirred away.

Mr. W. L. Lyle, a booster for Virginia's pyramidal Peaks of Otter, talked to me in his drugstore in Bedford. I had just left his beloved peaks, visible from the town.

"An old pioneer pass to the West led over the saddle between the Peaks of Otter, Sharp Top and Flat Top," he said. "People from under the Peaks fought against Chief Cornstalk and his fierce Shawnees in 1774 in the Battle of Point Pleasant, West Virginia, sometimes called the 'first battle of the American Revolution.'

A Nylon Tent, Made to Sleep Two, Adds Only 10½ Pounds to a Pack

Victor Howard, president of the Potomac Appalachian Trail Club, greets the new day at Big Meadows campground in Shenandoah National Park, Virginia. One side of the Army mountain tent is green, the other white. Thus, for military use, it blends with either a dark setting or snow. At both ends are net-covered ventilators, like the one above Howard's head. Mosquito-bar entrances, closed with drawstrings, keep insects out.

"From the fire tower on Sharp Top you can see into North Carolina and West Virginia, and can even pick out one point in Tennessee. At night you see the lights of every car passing over Natural Bridge.

"George Washington used Sharp Top as a base mark for one of his surveys. The highest boulder on Sharp Top was rolled down the mountain, hauled out by ox team to the railroad. Cut to size, it's now in the Washington Monument."

In southern Virginia the Appalachian Trail has been rerouted where it overlapped too closely with the Blue Ridge Parkway. The relocation prevents conflict between the interests of hikers and highway travelers.

The Blue Ridge Parkway, 70 percent completed, eventually will provide a spectacular high-country road linking the Skyline Drive in Shenandoah National Park with the Great Smoky Mountains National Park. The Parkway is a part of the National Park System. When completed, it will be 477 miles long.

The Blue Ridge Parkway, like the Skyline Drive, helps the A. T. walker by giving him easy access to scenic sections of the Trail.

It was in these once-remote highlands that a pioneer worker on the Trail met a mountain man who explained why his hill home was of raw wood.

"Ah'm too pore t' paint, an' too proud t' whitewash."

John Barnard, King of the Pinnacles

As I pushed deeper into the South, mountain farmers along the Trail looked me closely up and down when I asked a night's lodging. Once they took me in, however, their hospitality was liberal and kind.

The Appalachian Trail crosses southern Virginia's Dan River gorge at the Pinnacles of Dan.

At Such a Moment, Tired Backs and Aching Feet Are Forgotten

These two hikers tackle steaks broiled over open fires at the Big Meadows campground. On summer week ends and holidays, scores from Washington and other cities flock to this Shenandoah section to pitch camp and prowl the Blue Ridge wilds. National Park Service provides free tent and trailer sites here.

"Going to the Pinnacles? Well, be sure to find John Barnard."

I discovered Barnard's house beside a curving country lane.

I knocked. A tall man with gentle eyes answered. John Barnard said I might stay the night. Yes, he would take me to the Pinnacles tomorrow. He indicated a chair on the front porch, said he had a few chores to do, and left.

I tipped gently back and forth in a rocker. Black clouds banked up. It was quiet as a desert night. The shower broke and drenched the well-trimmed lawn, the round bed of geraniums ringed with pansies, and the rosebushes along the fence. A spate of water gurgled down the drainpipes.

Barnard appeared again, carrying a pair of slippers. He sat down and began to unlace his high-top work boots. Out of my pack I pulled an old pair of tennis shoes.

Mrs. Barnard brought to the porch soap, a towel, and a tin basin of hot water. Presently came the welcome word that supper was ready.

Bowls of vegetables and stewed fruit, platters of meat, plates piled high with hot biscuits and corn bread, pitchers of milk and cream, jars of honey and homemade jam crowded the big table.

There were squash, string beans, and mashed potatoes; hot veal and cold ham; applesauce and pears; and quantities of sweet, farm-fresh butter to slather on the hot breads. What a feast!

After dinner Barnard lit the parlor lamps. Our acquaintance ripened in their yellow glow. At bedtime I climbed a narrow flight of stairs to my room. It held a bed, a chair, a chest, and an old spinning wheel. The rumble of a distant thunderstorm soothed me to sleep.

Next morning we scrambled up the Pinnacles. John Barnard himself maintains about 12 miles of the Trail in this section. The

Pinnacles are three rocky spires that shoot straight up out of the Dan River gorge.

The A. T. route lay over and around huge cracked and broken rock masses intertwined with trees and shrubs. From the summit the Trail drops a precipitous 1,000 feet to the stream.

The Trail led out of Virginia into Tennessee,* where dwellers in remote cabin homes are more familiar with airplanes than with automobiles.

A tale tells of a hiker who looked down into a deep canyon and saw a lank fellow hoeing a corn patch. Steep cliffs seemed to make the hollow inaccessible. The trail walker shouted, "How do you get down there?" Came the reply, "Don't know. I was born yere."

From Rich Mountain I had my first view of the Great Smokies. In billowing majesty they loomed ever higher to the southwestern horizon. Among those piled-up peaks I presently found some of the finest trails on the whole A. T.

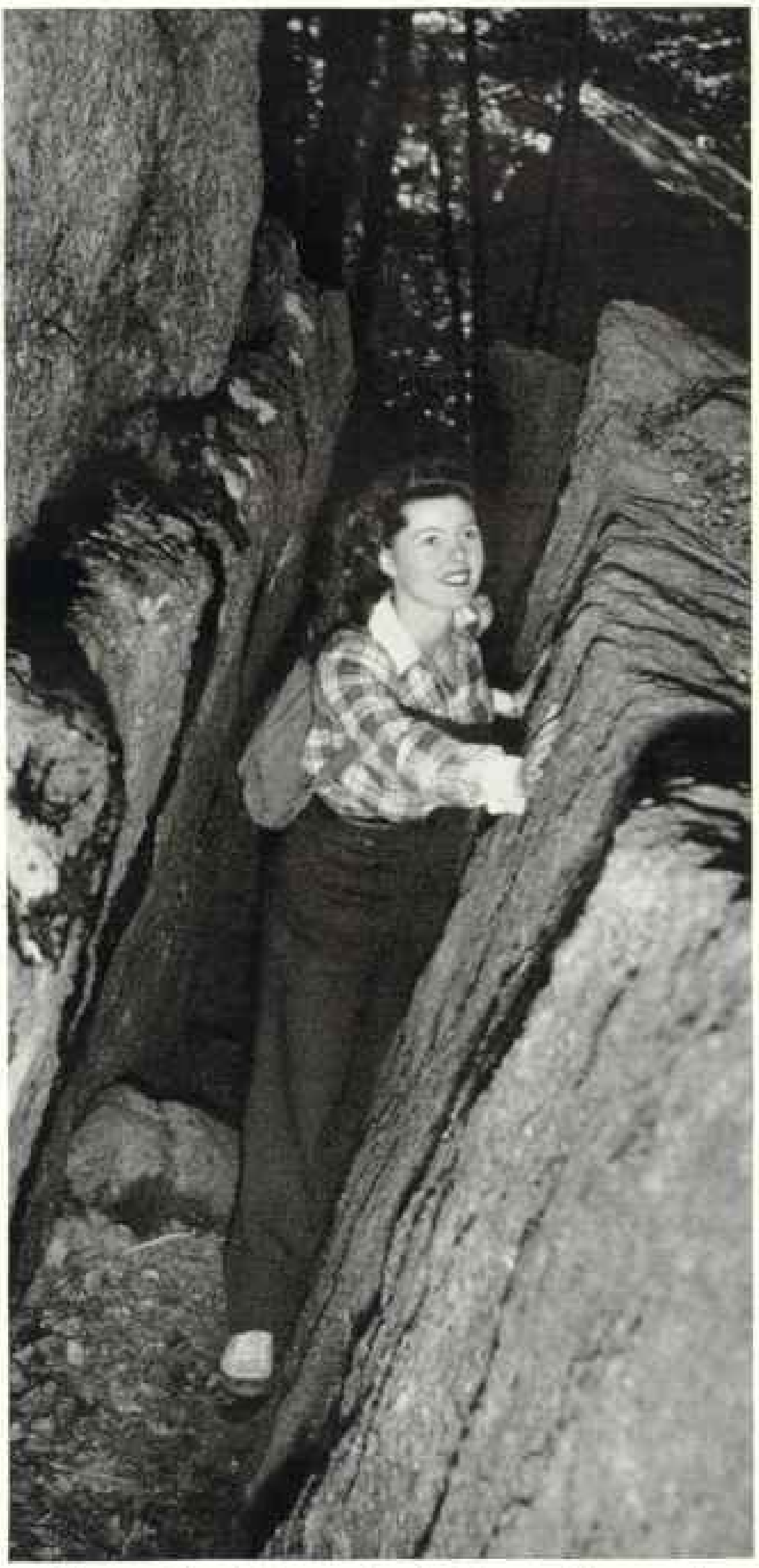
On Mount Le Conte (page 228) were rhododendrons thick as my leg, mountainsides carpeted with flame azalea and laurel, monumental hemlock and red spruce trees thrusting skyward like Jack's giant-reaching beanstalk.

Clingmans Dome Is High Point of Trail

At Clingmans Dome I reached the highest point on the Appalachian Trail—6,642 feet above sea level. Over an ocean of purple peaks a red sun sank into a turbulent immensity of boiling clouds.

The trees and shrubs of the Great Smokies and the Nantahalas offer sharp contrast to the hardy, dwarfed mountaintop growth of New England. Vegetation burgeons there with prodigal richness (page 251).

* "Highlights of the Volunteer State," by Leonard Cornell Roy, National Geographic Magazine, May, 1939.



Knapsack's a Nuisance in the "Lemon Squeezer"

This girl hiker inches cautiously through a rock crevice in Bear Mountain park, New York. The Hudson Highlands holiday area is dotted with 26 natural and artificial lakes, many with fine bathing beaches. Scattered throughout are stone shelters for hikers. The forest playland forms part of the 48,500-acre Palisades Interstate Park. Featuring scenic and historic spots, the Park extends from the Palisades, opposite New York City, to Storm King, 50 miles up the Hudson River.

The Great Smoky Mountains National Park now protects forever mountains spired and shaded with towering virgin evergreen forests. On the slopes and in the valleys rich soil feeds a lush profusion of flowering shrubs, huge tulip trees, and record stands of splendid native hardwoods. The multitude of wild flowers includes 26 kinds of orchids.

In the Nantahala Mountains in North Carolina,* I walked by moonlight down Wayah Bald to the famed Nantahala Gorge. No breath of air stirred in that majestic trough. The full moon flooded the valley with a soft and magic light.

Wisps and scarfs of mist draped peaks and canyon walls. The Nantahala River sparkled far below.

The A. T. crosses the gorge, which is so deep and steep-walled the Cherokee Indians called it *Nantahala*—"Land of the Noonday Sun."

Throughout its length the A. T. and its side trails offer a feast of tempting names. Most musical are the old Indian names, like Mataganon, Kokadjo, Kennebago; Ammonoosuc, Moosilauke, Popolopen, Menomini; Amicalola, Chattahoochee.

English meanings of some are obscure. Who cares, when they sing so sweetly?

Many place names along and near the Trail are simply descriptive: Sugarloaf, Saddleback, Hawksbill; Pulpit Rock, Hangover Mountain; Ice Water Spring, and Lonesome Lake.

Many others have a homely, vernacular tang as American as hot dogs, apple pie, or corn on the cob: Chunky Gal Mountain, the Lemon Squeezer, and Hogwallow Flat; Raccoon Run, Turkey Tail Lake, Dish Pan Ponds; Horse Heaven Mountain, Fodderstack Road, Devils Tater Patch; Jinny Grey Fire Road, Sweet Anne Hollow, and Fishin' Jimmy Trail.

Mount Oglethorpe, Southern Bastion of A. T.

South of the Nantahalas there was Georgia at last†—and trail's end suddenly very close. I walked up from Jasper to Mount Oglethorpe, goal of my journey.

The filmy veil of a shower drifted in from the west as I reached the summit. At this 3,290-foot dome the Blue Ridge ended, cut off with hardly a southward foothill. Below spread Piedmont Georgia.

I laid both hands on the white marble finger of the monument to General Oglethorpe, a beacon visible for miles from land or air.

In the clearing stood a sign bearing the simple notice: "Mount Oglethorpe, southern terminus of the Appalachian Trail, a mountain footpath extending 2,050 miles to Mount Katahdin in Maine. Georgia Appalachian Trail Club" (page 224).

Nailed to the sign was the last (or first, if you're heading north!) metal A. T. marker of the thousands that identify the soul-cheering, foot-tempting trail.

I had arrived.

Trail a Hobby for Thousands

Often I have been asked: "What is the Appalachian Trail?"

Essentially, it's a hobby for thousands of hiking fans. It's a voluntary recreational project.

Twenty-six major hiking groups and many individuals up and down the Appalachian region are responsible for the existence and maintenance of the Trail. Together they form the Appalachian Trail Conference, which is "the court of last appeal" in matters concerning the Appalachian Trail as a whole.

The A. T. Conference has no salaried employees. All the labor they do is done for love of the Trail and what it offers of intimacy with the out-of-doors. The work gives purpose to strenuous hours on mountain paths.

National and State park and forest services laid out and now maintain much of the Trail in the stretches passing through public lands. Boys of the former Civilian Conservation Corps built much of the pathway.

About half the Trail is over publicly owned lands (State and National parks and forests). The rest traverses private holdings.

Planned for the enjoyment of anyone in normal good health, the A. T. doesn't demand special skill or training to traverse. The only requirements for those who follow it are:

Exercise caution over rough or steep parts.

Wear clothing suitable to the latitude, elevation, and time of year.

Plan where to pitch your tent, or find other shelter along the way.

Carry enough food, or know where meals may be had.

For an extended A. T. trip, thorough preparation should be made. The condition of Trail stretches to be traversed should be carefully checked.

From many sections of the Appalachian Trail blue-blazed side trails lead to canyons and cascades, groves of giant pines or hemlocks, abandoned mountain homesteads, and breezy ledges that are sightly lunch spots. Sometimes these detours reach remote settlements where life goes on much as it did 200 years ago.

* See "Tarheelia on Parade," by Leonard C. Roy, National Geographic Magazine, August, 1941.

† See "Marching Through Georgia Sixty Years After," by Ralph A. Graves, National Geographic Magazine, September, 1926.

Appalachian Trail, Spanning 14 States, Takes Dartmouth's Campus in Its 2,000-mile Stride

Here in Hanover, New Hampshire, Dartmouth Outing Club members plan a hike in front of steepled Baker Memorial Library. The mountain footpath winds along the eastern United States skyline from Maine to Georgia.

Kodachrome by Robert F. Sisson

Mile-high Mount Katahdin, Maine's Tallest Peak, Shoulders the Sky at Appalachian Trail's Northern End

"A.T." hikers climb the dark ridge (right center) for the last few miles of the long scenic route. At Katahdin's foot, canoeists float on pine-rimmed Daicey Pond. Southern terminus of the Trail is 5,290-foot Mount Oglethorpe, in Georgia.

◂ A Holidaying Ballerina Shows How To Cure "Hiker's Foot"

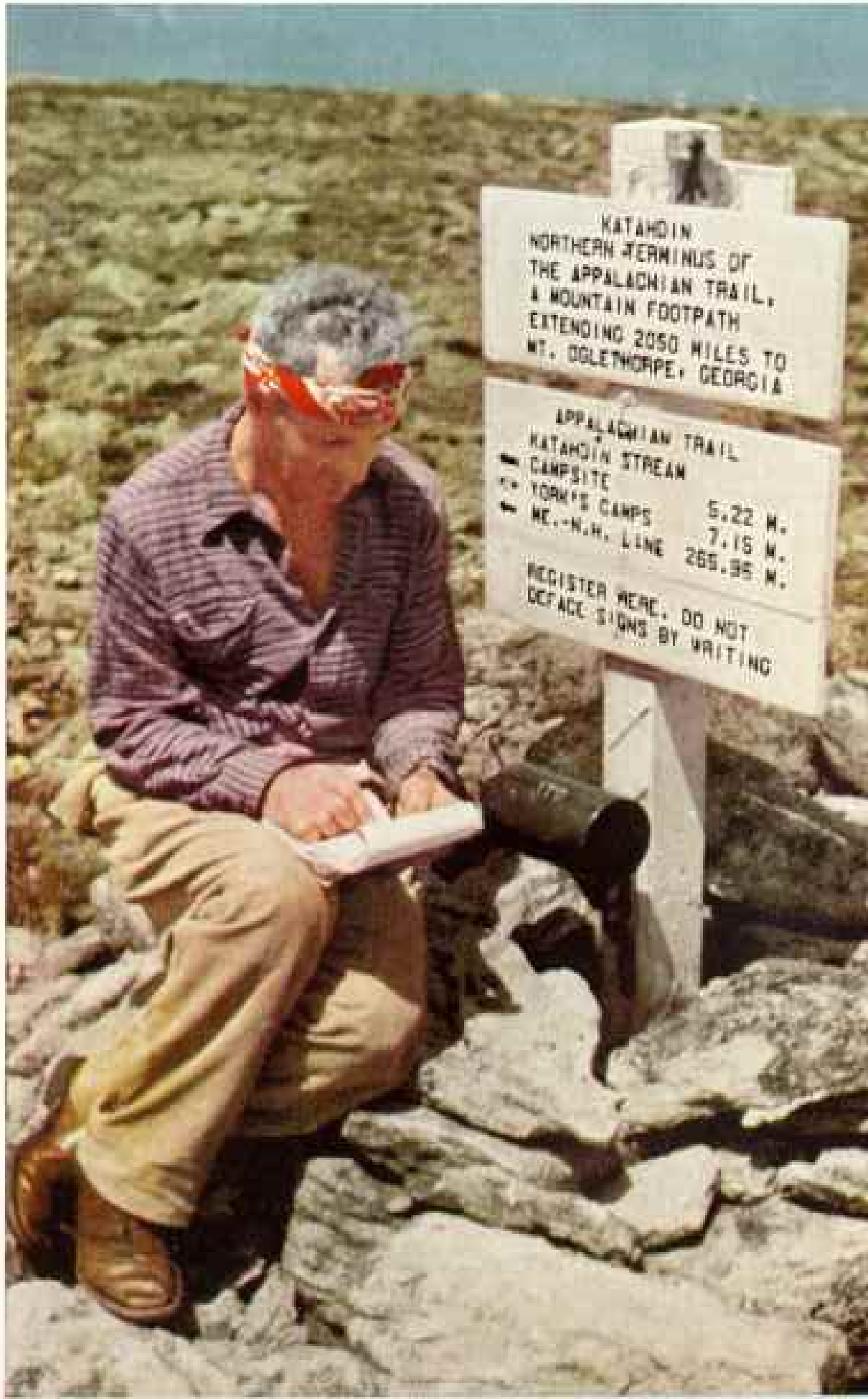
When toes and arches ache from hours on the trail, bathe them in cool mountain water, says Norma Owens, ballet dancer from Chattanooga, Tennessee. Here she sheds pack and gives herself a treatment in a rivulet near Clingmans Dome in Great Smoky Mountains National Park. Her resting spot is on a by-path of the Appalachian Trail.

Atop Mount Katahdin ▸ He Signs In at Trail's "North Pole"

Hiker John W. Webber adds his name to the roster kept in a tin can at one terminus of eastern America's mountain-hopping footpath. Katahdin's crown is a rocky wasteland; split stones brace the post topped by a sign bearing the A-over-T insignia of the Appalachian Trail. From this point climbers look down upon a wide Maine panorama splashed with dozens of lakes and ponds (page 238).

The A.T. is maintained by 26 hiking groups, members of the Appalachian Trail Conference, in cooperation with State and Federal park and forest services. Many private landowners help keep the Trail marked and cleared.

Kodachromes by Robert F. Sisson



Kodachrome by Robert F. Sisson

Cog Railway, Toll Road, and Foot Trails Cross a Rocky Wilderness to Reach Mount Washington's Summit

Here a train puffs like a teakettle up the north slope of the Presidential Range's monarch. Automobiles use the "Carriage Road" (right). Hikers are warned against fierce storms sweeping the New Hampshire peak even in summer (page 243). Beyond Great Gulf (center) loom, left to right, Mounts Jefferson, Adams, and Madison.

Far Below and Forgotten Lie Town and Everyday Troubles. Ahead Is High Country—Clean and Carefree!

Up Mount Greylock climbs a girl to join the Appalachian Trail. Below lies the Massachusetts paper and textile town of Adams, named after Revolutionary statesman Samuel Adams. Thunderbolt Ski Run, one of the steepest in the East, drops 2,060 feet down Greylock in 1.55 miles. From the summit five States are visible.

Kodachrome by Robert F. Sisson

Kodachrome by Robert F. Sisson

"The Mill Goes Toiling Slowly Around with Steady and Solemn Creak . . ."

These A. T. hikers visit the Elias Mabry Mill near Galax in the Virginia Blue Ridge. Grist- and saw-mills, wheelwright and blacksmith shops shared the buildings. The mill was restored in 1942.

Treeless Slopes Dwarf Lakes of the Clouds Hut; Yet It Can Shelter 80 Guests

The summit of Mount Washington (upper right) is the tiptop of New England—6,288 feet above the sea (page 240). Some of the world's worst weather buffets the peak in winter; its Observatory timed a gust of 231 miles per hour!

Kodachrome by Robert F. Sisson

Atop Old Rag Mountain, in Virginia's Shenandoah National Park, Climbers Find Boulders Big as Houses

Hikers' Appetites Need No Whetting. All Hands Pitch In To Cut Short the Time till "Soup's On!"

Trail walkers have moved in for the night at Old Rag Lean-to, built of squared native chestnut logs at 2,000 feet on Old Rag Mountain.

Kodachrome by Robert F. Sisson

Kodachrome by Robert F. Sisson

Says the Park Ranger: "It'll Be a Warm Pull over the Shoulder of Hawksbill, but There's Cool Water up at Rock Spring"

The ranger points on the map to a path over Hawksbill Mountain (left), highest point in Shenandoah National Park. These hikers have come by car to Crescent Rock Overlook on the Skyline Drive near Luray, Virginia. Like the Drive, the A. T. follows the Blue Ridge crest.

← What Could Be Better than Corn Fresh from Trailside Field?

True Miller plays a hot ear like a harmonica during a noontime halt near Smart View Park, Virginia. Feasting on fresh vegetables bought from farmers along the way is one of the delights of Appalachian Trail hiking. But hikers on long trips are advised to carry their own food. Appalachian Trail handbooks recommend precooked and dehydrated foods, because of their light weight. With full provisions for a week's trip, packs of a two-person expedition should not weigh more than 35 pounds apiece, say the experts.

Witch Hobble Berries → Taste Like Dates or Raisins

But the pits are so large there's only a nibble of flesh in each shiny fruit. Drooping branches of the shrub (also called "hobblebush") often dip to the ground and take root, forming loops that trip the passer-by. Witch hobble's white blossoms bloom in May; the fruit ripens in August. Norma Owens admires a plant growing near the summit of the Great Smoky Mountains on a trail near Clingmans Dome.

Kodachromes by Robert F. Sisson

Color Floods the Blue Ridge Forest When Rhododendrons Burst into Bloom

In June rhododendrons (*Rhododendron catawbiense*) stage their annual show on slopes above Camp Kewanoee, near Virginia's Natural Bridge. This species has been widely transplanted to city parks and gardens.

Kodachrome by Robert F. Sisson

Lustrous Evergreen Leaves Give a Rich Setting to the Showy Flowers

Members of the Natural Bridge Appalachian Trail Club rest in a blossom-hedged glade while the leader pulls a thistle from his thumb. The Catawba rhododendron is one parent of many ornamental hybrids.

Kodachrome by Robert F. Sisson

Near Flattop Mountain, in the Virginia Blue Ridge, the Trail Passes Through "Feudin'" Country

Here a mountain man, with his "houn' dawgs," looks down upon Zeddie Morris's house and corn patch. Rusty tin roof contrasts strangely with the old cabin's weathered timbers and field-stone chimney. In such remote "hollers" live descendants of early homesteaders who sometimes settled differences with gunplay.

In the Great Smokies They Ride Through Acres of Flame Azalea

Even near the top of Gregory Bald, almost a mile above sea level, spring warmth sets the Tennessee-North Carolina border highlands afire with these brilliant relatives of the rhododendron.

The Appalachian Trail was planned for hiking rather than riding, but many sections may be reached by excellent bridle paths. This mounted party rode up from Fontana Village, a recreation center on Fontana Reservoir.

Abundant rainfall and dense forest turn the Great Smokies into a natural "sponge." Down their slopes and from hidden reservoirs within the earth pour millions of tons of water into the Tennessee Valley Authority's man-made lakes. In this botanist's paradise grow more than 1,300 kinds of shrubs, trees, and flowering herbs. Great Smoky Mountains National Park alone counts more species of native trees than all Europe. Nature students have identified more than 1,700 species of fungi, 330 mosses and liverworts, and 230 lichens. Through the wilderness wander mammals, ranging from big black bears to shrews smaller than mice.

Kodachrome by Robert F. Sisson

Painting by Charles J. Fox, New York

For 50 Years Gilbert Grosvenor Has Piloted The Geographic's Voyages by Land, Sea, and Air

Famed statesmen, State governors, noted geographers and kindred scientists paid tribute to his Golden Jubilee as directing head of the National Geographic Society (President since 1920) and Editor of the National Geographic Magazine since 1899. Dr. Grosvenor took over a local Society of fewer than one thousand. Today, nearly two million are enrolled. The Board of Trustees presented this fine portrait to The Society for permanent exhibition.

Gilbert Grosvenor's Golden Jubilee

By Albert W. Atwood

FOR half a century the National Geographic Society and Gilbert Grosvenor have been so closely identified that it is impossible to think of one without the other.

This is because Dr. Grosvenor has given the labors of a lifetime to this one cause, and devotedly and persistently concentrated upon it a most unusual combination of talents, loyalty, and enthusiasm.

On May 18 and 19, 1949, The Society's Board of Trustees honored him on his fiftieth anniversary as Editor of the National Geographic Magazine with a dinner and the first presentation of the new Grosvenor Medal.

Always accepting praise modestly, this generous, gracious, and gentle Editor invariably gives unstinted credit to others. He said at the anniversary celebration in Constitution Hall:

"I would not have you exaggerate my part. I realize more keenly than anyone else possibly can that the success of the National Geographic Society, which you generously ascribe so largely to my humble efforts, was brought about by the wise counsel and unswerving support always given me by the distinguished gentlemen of the Board of Trustees and by the faithful and brilliant services of the many remarkably able men and the wonderfully skillful women composing The Society staff.

"I am deeply touched by the fact that you wished to come to my party. . . . I am most grateful to you for your ever cheerful, efficient, and resourceful assistance. By your good work you have made possible the honor I have just received. I would share this trophy with every one of you and I do share it in my heart."

But no generous protestations on Dr. Grosvenor's part can alter the truth of the statement that the growth of the National Geographic Society has been due to the activating personality of one man. The youth of 23, who in the spring of 1899 took the job of editing a slim, pedantic journal, read by only a learned few, had, to outward appearances, a very dim future.

There was no money, no other paid employee, no paid contributor, and its office was only half of a rented room. For five years the President of The Society, Alexander Graham Bell, out of his own resources, paid the Editor's salary, and for several months the Editor himself addressed and carried the magazines to the post office for mailing.

From such an unpromising beginning Dr. Grosvenor has built what is numerically the largest educational and scientific society in the world. Instead of one employee, there are now 800. Instead of a few hundred copies a month, the presses now turn out enough in a single issue to make a bookshelf ten miles long.

Under the long-continued leadership of Dr. Grosvenor, the science of geography has been popularized and humanized—taken into the homes of the people.

The Editor pioneered in the use of photographs, especially natural color pictures, as magazine illustrations. Personally he directs the preparation of the legible and accurate maps for which The Society is famous.

Dr. Grosvenor is an inveterate traveler. He is constantly getting new ideas from his many trips. Usually he is accompanied by Mrs. Grosvenor, going by airplane, ship, train, caravan, and on foot. Together the Grosvenors have combed the world for facts, ideas, and photographs, and continue to do so. He is an expert photographer. The National Geographic Magazine has used hundreds of his pictures, such as the Norway color series in August, 1948.

During his long service, Dr. Grosvenor has been instrumental in launching many of the scientific research and exploring expeditions which The Society has sponsored or co-sponsored.

In recognition of this service, many natural features discovered or surveyed by these expeditions have been named after him. These include a mountain range (discovered and named by Admiral Byrd), an island, a fish, a shell, a glacier, a natural bridge, a street, a lake, and a Chinese drug plant. Thus the Grosvenor name is to be found in Antarctic and Arctic regions, in Peru, China, Alaska, and Utah.

His long editorial tenure sets a record. No other living editor of an American magazine of such large circulation has served so long. Yet he continues his editorial duties with unabated enthusiasm.

Thus there was every reason why the Trustees of The Society should honor Dr. and Mrs. Grosvenor on his fiftieth anniversary as Director, then President of the National Geographic Society, and the Editor of the National Geographic Magazine.

The dinner was given on May 18 by the Trustees of The Society at the Chevy Chase Club, Chevy Chase, Maryland. It was unofficial, and attended by those of the staff whose names appear on the masthead of the National Geographic, by department heads,

Washington Post

To "The Chief," on His Editorial Golden Jubilee, Goes the Grosvenor Medal Award

Dr. Charles Franklin Kettering (right), distinguished inventor, formerly Vice President in charge of General Motors Research Laboratories, and Life Trustee of the National Geographic Society, made the presentation May 19, 1949, at Constitution Hall, Washington, D. C. More than 4,000 guests, including ambassadors, Government leaders, and senior members of The Society in the Nation's Capital, witnessed the ceremony.

and by a few personal friends (page 257).

From a golden box, hidden under the table, Dr. Thomas W. McKnew, Secretary of The Society, drew forth five beautifully bound portfolios of letters of esteem, from President Truman, Governors of the 48 States, geographic societies the world over, explorers, scientists, educators, personal friends, and members of The Society.

Also he found in the box an illuminated scroll from distinguished and titled members of The Society in Great Britain in which Dr. Grosvenor was thanked for "all that you have done to further the closest understanding among the English-speaking peoples."

President Truman wrote: "Under your direction The Society's magazine has become a household institution in the homes of America and throughout the nations of the world—in short, wherever there is a postal system and wherever geographic knowledge is esteemed.

"It has added to the wealth of geographic knowledge by expeditions of exploration on land, on sea, on the bottom of the ocean, and in the air, and particularly by a cartographic program necessitated by far-flung changes in national boundaries.

"All this has been accomplished in the five decades since you took the helm. It is a record of outstanding accomplishment. Accept my hearty congratulations and best wishes for your continued happiness through many more years of activity and achievement."

General of the Air Force H. H. Arnold (ret.), a Trustee of The Society, wrote from his California home that long before airplanes or radio or other scientific development stepped in to make the world the very small place it is today, Dr. Grosvenor's activities "were effectively shrinking distances and dissipating barriers.

"With your intimate knowledge of far places perhaps you can—but most of us cannot—think of a spot in the world of any consequence where your influence is not now felt, and has been for many, many years.

"The feet you have set itching, the people you have transplanted, the travel bureaus you have started, the commerce you have stimulated, the explorations you have inspired and pioneered, the discoveries you have made, and the countless ramifications of all these things—all have stemmed from your inexhaustible reservoir of ideas."

"The NATIONAL GEOGRAPHIC MAGAZINE has attained a prestige and affection among readers," said Governor George T. Mickelson, of South Dakota, "rarely reached by any magazine. Wherever it circulates, it has become a part of family life and education. 'I saw it in THE GEOGRAPHIC' carries practically conclusive and absolute confirmation."

Dr. John Oliver La Gorce, Vice President of The Society and Dr. Grosvenor's close and senior associate, presided.

"It has been my good fortune to work for, under, and with Dr. Grosvenor for 44 years," he said when introducing the banquet speakers, all

The Grosvenor Medal—First Awarded to Its Namesake

On the obverse side, Laura Gardin Fraser's design shows a profile of Dr. Grosvenor. Ship's wheel symbolizes his love of the sea; compass rose indicates THE GEOGRAPHIC's questing to far corners of the earth. Two birds represent the Editor's hobby—ornithology; cardinal at right, and bristle-thighed curlew whose nesting place, hunted for 163 years, was found by a Society expedition in 1948. Signs of the zodiac rim the reverse, and a globe suggests The Society's seal. This gold medal, shown in exact size, will be awarded by The Society's Board of Trustees for "outstanding service to geography."

National Geographic Photographer Robert F. Sisson

Dr. Grosvenor, Flanked by Associates in His Life Work, Responds to Golden Jubilee Tributes in Constitution Hall

Rear Adm. Richard E. Byrd, USN (ret.), first to fly over North and South Poles, sits at left beside Mrs. Grosvenor (page 251). At Dr. Grosvenor's left are Trustees of the National Geographic Society: Franklin L. Fisher, Chief, Illustrations Division; Thomas W. McKnew, Secretary; J. R. Hildebrand, Assistant Editor; Juan T. Trippe, President, Pan American Airways; Melville Bell Grosvenor, Assistant Editor; Vice Adm. Emory S. Land, USN (ret.), President, Air Transport Association of America; Rear Adm. L. O. Colbert, Director, U. S. Coast and Geodetic Survey; Elisha Hanson, lawyer and naturalist; Dr. Alexander Wetmore, Secretary, Smithsonian Institution; and Dr. Lyman J. Briggs, formerly Director of the National Bureau of Standards, now Chairman of The Society's Research Committee. In right background are National Geographic expedition leaders: former U. S. Senator Hiram Bingham, Machu Picchu; Gilbert Grosvenor La Gorce (for Dr. William Beebe, bathysphere descent); Dr. Robert F. Griggs, Valley of 10,000 Smokes; Maj. Gen. Orvil A. Anderson, USAF, stratosphere flights; Dr. William M. Mann, animals of Netherlands Indies; and Dr. Paul A. McNally, S.J., Vice President, Georgetown University, Canton Island eclipse.

Secretary McKnew Presents an Illuminated Scroll from British Friends. It Praises Work for Harmony Among English-speaking Peoples

Also read were letters from President Truman, Governors of 48 States, and distinguished friends of The Society. Beside Dr. Grosvenor are Mrs. John Oliver La Gorce, right; Dr. La Gorce, Associate Editor; Mrs. Grosvenor; Alexander Wetmore, Secretary of Smithsonian Institution; Leroy A. Lincoln, President of Metropolitan Life Insurance Company; Lloyd B. Wilson, Chairman, Chesapeake and Potomac Telephone Cos.; Mrs. Robert V. Fleming; Mrs. Emory S. Land; and Mrs. L. O. Colbert.

National Geographic Photographer Robert F. Sisson

National Geographic Photographer Robert F. Sisson

Father, Son, Steadfast Friend—They Form a Geographic Editorial Team

Dr. Grosvenor chats with Dr. John Oliver La Gorce (left), Associate Editor of the National Geographic Magazine, and Melville Bell Grosvenor, Assistant Editor. Scene is the Chevy Chase Club, Chevy Chase, Maryland, where the Board of Trustees of The Society honored Dr. and Mrs. Grosvenor at dinner on May 18, 1949. Dr. La Gorce and Mr. Grosvenor joined the editorial staff 44 and 25 years ago, respectively.

Trustees of The Society. "And I am very proud of the fact that in more than four decades there has never been five minutes when we were not the best of friends."

Dr. Lyman J. Briggs, for years the Director of the National Bureau of Standards and now Chairman of The Society's Research Committee, told how Dr. Grosvenor invariably encourages the scientists to carry on despite disappointments and obstacles.

Lloyd B. Wilson, Chairman of the Board of Chesapeake and Potomac Telephone Companies, said that The Society "comes as near perfection in the things it does as any institution I know."

Emory S. Land, Vice Admiral, U. S. Navy (ret.), and President, Air Transport Association of America, said that Dr. Grosvenor "represents to millions of people happiness and confidence in the future."

"No man of my acquaintance has had so unique a career as Dr. Grosvenor," said Leroy A. Lincoln, President of the Metropolitan Life Insurance Co. "He is a leading scientist, a leading geographer, a leading publisher, a leading businessman, all merged into one."

Dr. Alexander Wetmore, Secretary of the Smithsonian Institution, told in some detail of Dr. Grosvenor's extraordinary interest in birds. He said that fifty years ago ornithology was an unknown subject to the general public, and that much of the present interest of millions of people in birds has been due to the space which Dr. Grosvenor has given the subject in the National Geographic.

A portrait of Dr. Grosvenor by Charles J. Fox was unveiled at the dinner by Mrs. Robert C. Watson, Jr., Dr. Grosvenor's eldest granddaughter. Franklin L. Fisher, a Trustee of The Society, made the presentation.

The last speaker was Dr. Grosvenor, who with engaging informality paid personal tribute to many present. Of Dr. La Gorce he said: "I can't tell you what the friendship of Dr. La Gorce has meant to me through the years and what it has meant to The Society. He has been associated with everything The Society has done since it had a membership of 10,000, and many of its fine things he has developed. He has greater capacity for mak-

To

Gilbert Grosvenor, Sc.D., LL.D., Litt.D.

— on his —

GOLDEN JUBILEE

As Editor, The National Geographic Magazine

1899-1949

Geography for every man was your dream when you took charge of the National Geographic Society fifty years ago.

Increasing membership from 1000 in 1899 to 1,800,000 in 1949, your inspired leadership has made that dream come true.

Lessons in geography, which academic language makes difficult, you lighten for readers with words plain folk understand and enjoy.

By thus popularizing this science, you have won world acclaim; yet you have accepted praise modestly and given generous credit to others.

Every member of The National Geographic staff marvels at your grasp of world affairs and your intuitive perception of reader appeal.

Reaching a kindly hand to all lands, you have done more than many makers of state treaties to promote friendship among nations.

To you, differences of customs and opinion among peoples are subjects for enlightened discussion, not causes for dispute.

Gracious tolerance such as yours can spring only from deep understanding of human nature.

Reasonably you might elect to rest now, but you go on with undimmed enthusiasm.

Old is a word which does not occur to us when we think of you.

Somehow your soaring spirit defies the years.

Vigorous participation in everything new keeps you young.

Ever to us you are our tireless Chief whom we hope to follow for years to come.

Nothing we say can add to your stature; your record speaks for itself.

Over all the world may your eager intelligence continue to range even as the migrating birds you love.

Receive with our heartiest congratulations on your National Geographic Golden Anniversary the assurance that our admiration, loyalty, and affection are always yours.

250

This Testimonial of Affection Bears Signatures of Geographic Trustees and Staff

Heads of many departments also record their esteem for "The Chief" in this illuminated acrostic by Leo A. Borah.

National Geographic Photographer Robert F. Sisson

Aviation's Leaders Laud an Editor Whose Flights Have Girdled the Globe

Vice Adm. Emory S. Land, USN (ret.), President of the Air Transport Association, speaks at Dr. Grosvenor's Golden Jubilee banquet. He holds a copy of the Washington, D. C., *Evening Star* containing Clifford K. Berryman's cartoon tribute to the geographer. Beside him are (left to right): Dr. Robert V. Fleming, Treasurer of the National Geographic Society and President of Riggs National Bank, Washington, D. C.; Mrs. Alexander Wetmore, wife of the Secretary of the Smithsonian Institution; Dr. Lyman J. Briggs, Chairman of The Society's Research Committee; and President Juan T. Trippe, of Pan American Airways.

ing friends—great friends—and holding them than any other man I have ever known."

Five of Dr. Grosvenor's six children attended the dinner (the sixth was in Norway). He spoke feelingly of his joy in the fact that his only son, Melville Bell Grosvenor, had joined the organization 25 years ago, adding, "As Solomon said, 'A wise son maketh a glad father.'"

Grosvenor Medal Presented Before 4,000

The official medal presentation took place the following evening in Constitution Hall, and was attended by 4,000 guests, including senior Washington members of The Society.

One of the features of the celebration was the presence on the platform, unknown in advance to Dr. Grosvenor, of twelve leaders of the National Geographic Society's notable field expeditions, undertaken during his long service. A composite motion picture of the highlights of these expeditions, showing the far-flung activities of The Society, with brief commentary by each leader, was shown.

First, Dr. La Gorce presented Rear Adm. Richard E. Byrd, USN (ret.), "the first man to fly over the North Pole and the South Pole. His achievements in exploration and discovery have won for him the highest awards of the Congress of the United States, medals and citations of the National Geographic Society and of leading scientific organizations throughout the civilized world. The Society has been proud to cooperate in Admiral Byrd's long series of Arctic and Antarctic expeditions" (page 261).

The expeditions described and illustrated ranged from former U. S. Senator Hiram Bingham's uncovering of the lost Inca city of Machu Picchu, Peru, in 1912-13, to Dr. Dillon Ripley's expedition to the mysterious kingdom of Nepal, completed only a few weeks before the anniversary.

Dr. Robert F. Griggs described the Valley of 10,000 Smokes; Maj. Gen. Orvil A. Anderson, the stratosphere flights; Dr. Paul A. McNally, S.J., the eclipse of 1937 from Canton Island; Dr. William M. Mann, the collection of live animals from the Netherlands Indies; Dr. and Mrs. Matthew W. Stirling, archeological discoveries in Mexico and Panama; Dr. Francis J. Heyden, S.J., the 1948 Pacific eclipse; Dr. Maurice Ewing, the Mid-Atlantic Ridge; Dr. Arthur A. Allen, the discovery of

National Geographic Photographer John E. Fletcher

Famous Explorer, Devoted Wife, and Colleagues Honor a Notable Career

Rear Adm. Richard E. Byrd, USN (ret.), is recipient of two National Geographic medals for his polar flights. Mrs. Grosvenor, daughter of Alexander Graham Bell, accompanied the geographer-editor on many of his world travels. Beside her (left to right): Dr. John Oliver La Gorce, Vice President of The Society and Associate Editor of The Magazine; Dr. Robert V. Fleming, Treasurer of The Society, who served as chairman of the Constitution Hall ceremony; and Dr. Charles F. Kettering, who presented the Grosvenor Medal.

the nesting place of the bristle-thighed curlew; and Dr. F. M. Setzler, the 1948-49 expedition to Stone Age Arnhem Land in Australia.

The climax of the ceremony was the presentation for the first time of the Grosvenor Medal, especially created by the Board of Trustees for the occasion.

Dr. Grosvenor has received honors from many other geographic societies and honorary degrees from many universities, but the Trustees realized that no honor would lie closer to his heart than this recognition from his own Society.

The chairman, Dr. Robert V. Fleming, The Society's Treasurer and a member of its Board of Trustees, read the letter of congratulation from President Truman (page 254) and then introduced Dr. Charles F. Kettering. Also a Trustee of The Society and formerly Director of Research and Vice President of General Motors Corporation, as well as a distinguished inventor in his own right, Dr. Kettering made the formal presentation of the medal (pages 254 and 255).

"Presenting this medal," Dr. Kettering said, "is the most appreciated of all the many pleasures life has brought me.

"If there ever is 'one world,' " he added, "a copy of the NATIONAL GEOGRAPHIC will be on the center of the table!"

When the large gold medal was presented to Dr. Grosvenor, he held it up for the vast audience to see, in a friendly, unstudied gesture as if to share it with his friends, which brought the crowd to its feet for prolonged cheering.

"Every morning when I look into my mirror," he said, "I am going to say to my mirror, 'You lie.' Then I shall take this beautiful medal, look at the idealized Grosvenor face on it which Mrs. Fraser has modeled with fingers of genius, and chuckle to myself! My descendants happily will not know the difference between fact and fiction."

On the platform stood a basket of 50 golden roses presented to him by his colleagues and 800 associates. The inscription, "To Our Beloved Chief," meant as much to him, he told the audience, "as this glorious medal."

And he went on to say that "our great Society is the first and, I believe, the only one in the world that has enlisted, not a select few, but hundreds of thousands of people in a joint cooperative effort for research and exploration and the diffusion of geographic knowledge."

Incredible Andorra

By Lawrence L. Klingman

Illustrations by National Geographic Photographer B. Anthony Stewart

SATAN rode a fast-stepping, high-spirited stallion, mighty fine for the flatlands, but on the mule trail above Canillo, Andorra—high in the Pyrenees between France and Spain—that fancy thoroughbred just didn't belong. Picking its proud way among the boulders, it slipped, and the Devil, to save himself a second Fall, grasped wildly out for support, but down he went, too.

That happened long ago, but if today you are skeptical, Andorrans will show you La Roca de la Salve, the jutting granite block along the road, where you can see for yourself the long gashes marked by Satan's claws as he fell.

That trail is a one-lane dirt road now and the rocks have been cleared; but it's no longer safe to travel down it by mule, because you never know when a shiny new automobile will come speeding around a curve.

The driver of that automobile, whether it's a Lincoln or a cream-colored, red-leather-upholstered Delahaye you saw at the Salon d'Auto only a week before, is an Andorran peasant. And his wife seated beside him is certainly wearing nylon stockings and probably headed for town to make her weekly appointment at the beauty shop.

Electricity in Medieval Places

The 20th century has pierced the mountain-shelled isolation of Andorra and converted what was only a few years ago a sleepy little feudal country into Europe's most bewildering land of paradox. Feudal laws—and electricity in the lowliest peasant hut; modern hotels alongside stone houses three and four centuries old; shop windows displaying the luxury goods of all the world, such as cameras, Swiss watches, English woolens, American nylon stockings; and flocks of sheep and goats that ramble through the streets—this is Andorra.

Two more paradoxes explain the rest. Andorra is ruled jointly by "co-princes"—the President of France and the Bishop of Seo de Urgel in Spain. And this devoutly religious community has grown wealthy by smuggling and black-market trading.

A tiny triangle on the map, the country is only 20 miles across at its longest, 16 miles at its widest (page 265). Its gateways, the passes through the encircling Pyrenees, are all in the clouds, up the mountainsides on steep, tortuous roads and trails. For 700 years the mountains insulated the country from the social and industrial development of its neighbors.

In the 1920's, despite Andorra's opposition, France and Spain built roads to its borders. In 1933 the road on the French side was paved for motor traffic. It is open for five months of the year, from late June, when the snows melt, until mid-November, when they pile high again. But it has sufficed to change the ways of Andorran life (page 272).

Revolution, war, and international tension have made it a well-traveled road. Down it refugee Republicans fled from Spain after the Civil War. Outbreak of global war sent spies from both sides scuttling to this ideal vantage point and listening post.

In the tragic summer of 1940 it saw the flight of anti-Nazis from France. Later, Allied airmen shot down over Europe made it part of a regular escape route through Spain to Africa. Then the wheel came full circle as Nazi collaborators fled through Andorra to Spain.

Sheep Cross Border; Visitors Wait

We drove up the road from France on a stormy day in early November. At the border a convoy of six heavy trucks, surplus property sold by the United States Army, their green paint and insignia still untouched, was lined up before the French customs barrier. Forty feet up the road the barrier on the Andorran side had been raised to let a flock of some 100 sheep into France.

We waited half an hour while the Andorran drivers of the trucks cleared the exit formalities. By that time three more flocks of sheep had come down from Andorra, to mill around expensive American and European cars whose owners were having more difficulty in crossing the narrow strip of no man's land.

When we had cleared French control, there was another wait for a fifth flock of sheep. Then we plunged immediately into a new atmosphere (page 270).

The paved road ends at the border. Here, on either side of the dirt lane that succeeds it and runs on through Andorra to Spain, a collection of wooden shacks showing all the signs of recent and hasty construction had been thrown up. Their narrow windows were crowded with such merchandise as one found

Dust and Smoke Stir in the "Times Square" of Andorra; the Travel Season Is On

It is noon in Escaldes, the hotel and luxury-shop center. Cookstoves are lit; sidewalk cafes are filling (left). A wine barrel blocks pedestrian traffic, but no one bothers. Tattered streamers of a street dance hang from a line like laundry (center). Balconied houses, some centuries old, back up to the mountains. A wilderness lies only a few yards away (page 267).

in France only on the black market, from American cigarettes to Spanish cordovan leather shoes.

We sensed a Klondike air about this community. No gold had been discovered here; it was rather the equivalent of a western American frontier trading post of the past century, offering pioneers the last chance to purchase the products of the civilization they have left.

We entered one, a barrackslike structure, lit brilliantly by the glare of strong and unshaded light bulbs. Bolts of cloth, woolen and cotton, were stacked to the ceiling along the walls, with cases of canned goods, shoes, wines, electrical equipment, and groceries.

Modern Goods—and Salesmanship

We soon found that not only modern merchandise but salesmanship, too, had invaded Andorra. As my wife purchased bananas and oranges, I asked the proprietress for a box of matches.

"We have these, from Spain, with Don Quixote on the cover," she said, extending a box. "Have you read *Don Quixote?*"

I answered that I would take the matches, and, yes, I had read the book.

A Visiting Spaniard and Her Dachshund Examine a Pair of Nylons in Escaldes

Here rationing is unknown and luxury a commonplace. Two world wars and a Spanish civil war brought only prosperity to Andorra (page 262). In this shop the photographer noted automobile tires, spark plugs, typewriters, radios, shotgun shells, brief cases, watches, cosmetics, canned food, and other scarce items.

"Well, then," she said briskly, "you will be interested in this book about the book, and this one about Cervantes. And here we have some bracelets and brooches, very lovely, with the knight and Sancho Panza on them. And here are some picture postcards of the Cervantes country, and . . ."

She had everything, it turned out, except the original windmills. I finally escaped with only the matches and two postcards.

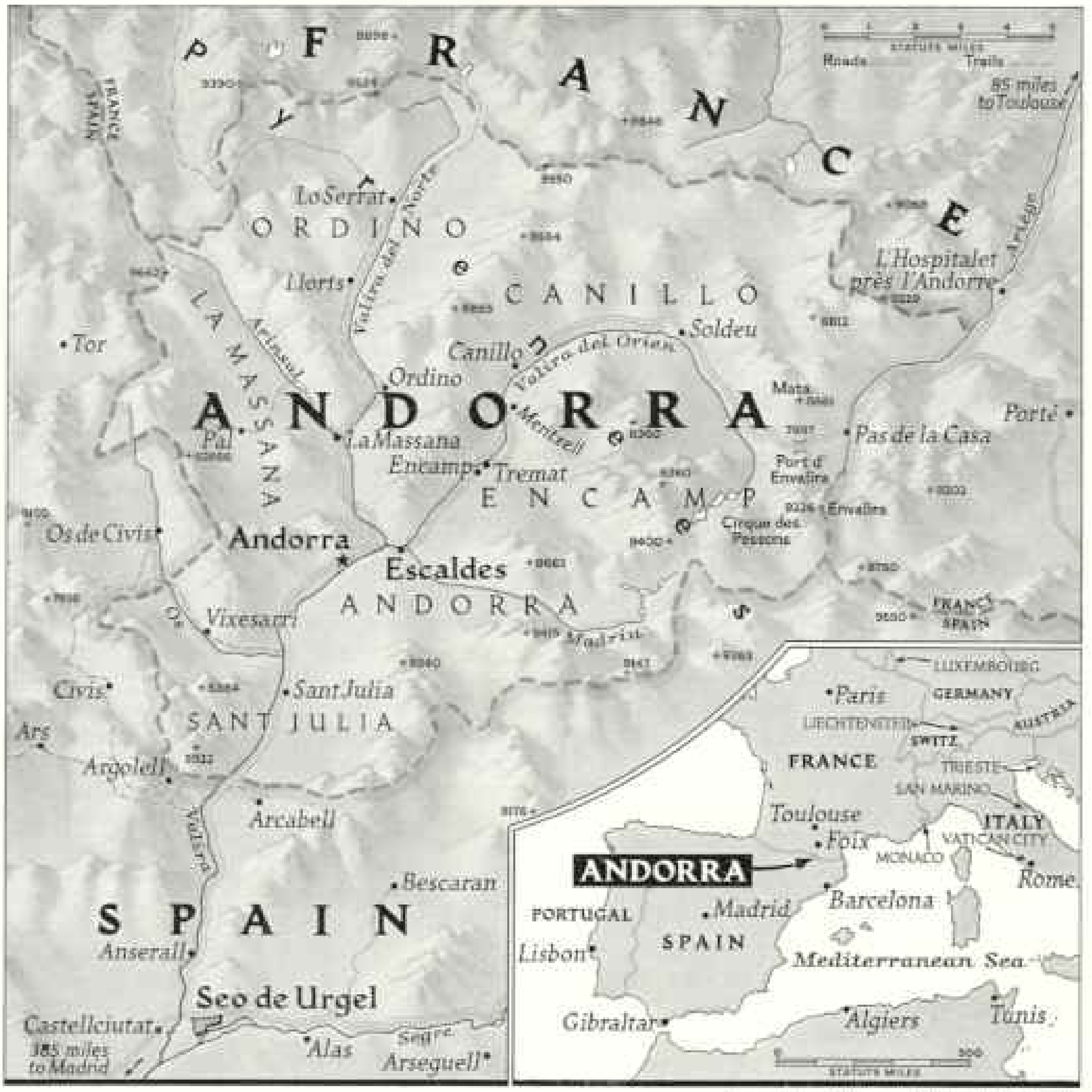
It was cold and raining on the muddy road as we wound back and forth following the mountain contours, climbing to the Port (or pass) d'Envalira, the 9,226-foot-high peak of Envalira to our left (page 281), and the 8,661-foot peak of Mata on our right, both wreathed with clouds and crowned with snow.

As we climbed, the rain changed to snow, but through the 7,897-foot pass we could see a patch of blue sky. We drove slowly, for the curves are sharp and bordered much of the way by sheer cliffs.

The blue patch in the sky gradually grew larger. Suddenly we were through the pass.

"Why, it's like finding Shangri-la!" my wife exclaimed. And so it was.

Below us stretched a splendid vista of warm and verdant valley, terraced fields dotted with farmhouses, villages, and cattle grazing peacefully in stone-fenced pastures.



Drawn by H. E. Eastwood and Irvin E. Alleman

Andorra, Pygmy of the Pyrenees, Is a Pinhead on the Map of France and Spain

Mother Europe has seven midget sons: Luxembourg (999 square miles), Trieste (275), Andorra (191), Liechtenstein (61), San Marino (38), Monaco (½), and Vatican City (1/6). Texas's King Ranch could nearly swallow the entire lot. With the exception of Vatican City, Andorra is the smallest in population, counting only 5,900 citizens. Los Angeles houses 300 times as many in an area not three times as large.

Beside the road ran the eastern branch of the Riu Valira—the River of the Valley—sparkling like a million diamonds as it tumbled down the mountainside, winding its way swiftly between giant boulders, foaming into white spray at the rapids, now and again plunging over a little waterfall, and then stretching its way to run smoothly down the valley.

Through the automobile windows came the first warm sunshine we had known since summer's end in France. Tense from the cold and the long, difficult drive, we relaxed at once, feeling as prisoners must who emerge from a dank dungeon into the fragrant summer air.

We drove on through Soldeu, Canillo (page 284), Encamp, three of the country's large villages, to Escaldes, best base for wandering through the country (pages 267, 278).

The typical Andorran is lean and dark, of less than average height, and, like many mountain people, extremely taciturn. There is an old Catalan proverb, "The fish opens his mouth once too often, and he dies," which the Andorran learns in his cradle.

Our first Andorran acquaintance, however, was a jovial fat man, bubbling over with good

humor and talk. We sat at dinner in our hotel together, for our first Andorran feast: soup with tiny disk-shaped dough patties, fried brook trout, a salad of endive and pimento, veal chops fried in olive oil with fried potatoes and asparagus, and a sweet, dry Spanish cake, all washed down with the countryside's favorite beverage, a half-and-half mixture of sweet red wine and dry white wine.

A Smuggler Reports His Business Good

Between the soup and the trout our jolly Falstaff told us he was a smuggler.

"Andorrans have always been smugglers," he said genially, ignoring my wife's raised eyebrows. "In the old days the local government sold citizens monopolies on the right to contraband certain articles. Those days there wasn't much to smuggle. But now business has never been so good, and there's plenty for all the competition."

After World War II, he continued over the fish, the big profits lay in the semilegal import-export trade, chiefly in automobiles. A car bought in France sold in Spain for twice its cost. Andorrans, with the prerogatives of both French and Spanish citizens, took advantage of the closed border blocking trade between their two big neighbors. They bought cars in France, registered them in Andorra, and then sold them in Spain.

I asked about the U. S. Army trucks we had followed on the road.

"Ah," he said, his chubby face lighting up, "this was the most profitable of all."

The French Government, he explained between mouthfuls of salad, acquired surplus American Army property in France. Trucks, greatly in demand all over Europe, were sold to individual Frenchmen for a million francs. Sales were on a priority basis, with former concentration camp victims and ex-prisoners of war getting first call.

"Now, I ask you," he said with a deep chuckle and a glass of wine, "where could a man four years in a concentration camp get a million francs? If he had had that much, he could have bought his way out from the Nazis."

Changes in Smuggling Practices

Andorrans lent the money to individuals, he continued, and repurchased the trucks, often giving their intermediaries as much as a half-million-franc profit. They could well afford this, because the trucks sold in Spain for the equivalent of two-and-a-half-million francs.

"And," he concluded with the veal and a bang on the table, "it was almost legal!"

With coffee and liqueurs we learned of changes in smuggling technique wrought by technological advances.

In bygone days, our friend related, the smuggler put his pack on his back and climbed the mountains, sticking to trails known only to his family for centuries and proceeding on foot to the French or Spanish town where his contacts, descendants of those who had dealt with his grandfathers, were awaiting him.

After World War II, three or four smugglers would drive in an automobile to within half a mile of the frontier. There all but the driver got out. Carrying packs and suitcases, they clambered over the mountain slopes and crossed the border at unpatrolled points to meet the car again on the road at a prearranged spot beyond the customs post. It is obviously impossible for either the French or the Spanish to patrol every foot of the wild mountain territory.

In olden times the main contraband commodity of Andorra was tobacco, for in both France and Spain tobacco manufacture has long been a government monopoly. When, early in the 18th century, tobacco cultivation was introduced in Andorra, both France and Spain energetically attempted to stamp it out. They met such determined resistance, however, that they soon gave up. Andorrans still raise more than 70,000 pounds of tobacco a year, most of which is smuggled into France, where the price is high.

But after the war there was more important contraband. From France to Spain went perfumes, radio parts, tires, silk, and pepper. All brought high profits. Pepper, for example, bought in France for 125 francs a pound, sold in Spain for the equivalent of 1,300 francs. From Spain to France went shoes and leather, fine woolens, oranges, sardines, and olive oil. Such sinister items of contraband as arms and narcotics were even more profitable.

Everything that passes through Andorra leaves part of its profit behind. No wonder, then, that the Andorran is now wealthier than his wildest dreams of 20 years ago. An Andorran peasant who makes only a few smuggling expeditions a year may earn 80,000 pesetas, a sizable fortune in either France or Spain.

Where Three Valleys Meet

Officially—and aptly—named the Valleys of Andorra, for it is the valleys which support life, the country has a population of 5,900 Andorrans and 1,500 Spanish Republican refugees. Catalan is the Andorran's native tongue, but he understands both French and

Paul from Three Lions

The Arm's-length Product of a Pint-sized Country Is as Strong as It Is Long

Home-grown tobacco, Andorra's cash crop, appears made to order for the smuggling trade. By muleback it crosses devious mountain passes on dark nights. This souvenir cigar, two feet long, was rolled at Sant Julia for sale to visitors.

Spanish. The franc and the peseta are interchangeably his official currency.

Escaldes, situated at a point where two of Andorra's three main valleys meet and converge to form the third, boasts some 1,000 inhabitants, which makes it the country's largest village. Its name is derived from the hot springs, sulphuric and magnesic, which bubble up from the mountainside at a temperature of 147° to 150° F.

These have made Escaldes a vacation haunt for many wealthy Frenchmen and Catalonians. The waters are piped to a fountain in the village square from which housewives draw steaming bucketfuls all day long, and to the modern hotels, all of which feature thermal baths.

Unfortunately for visitors, it has not occurred to most of Escaldes' hotelkeepers to heat their hotels with the hot water or even to pipe it to the individual rooms. On cold, brisk mornings we warmed ourselves as best we could by snuggling close to electric heaters, and the chambermaid had to bring hot water in a pitcher up two flights of stairs.

The water was the softest we had ever known. A touch of soap produced rich, foaming suds, and although my tough beard normally requires a new razor blade daily, I was able to use one for six days in Escaldes.

The dirt road running through the valleys is Escaldes' main street. Here it is bordered on both sides by splendid new hotels, with balconies looking out across the valley to the mountains and on houses three and four centuries old alongside.

At night the street was lit brightly and shop windows gleamed with displays (pages 263 and 264).

Off the main street, though, we found old Andorra, largely unchanged. Ancient buildings seemed to lean toward each other across narrow alleys where women chopped wood and men slaughtered pigs for salting and smoking against the long winter months.

Children played with their shaggy sheep dogs, and housewives gossiped gaily as they hung their washing on the balconies. Old men sat reflectively on door stoops smoking their heavy pipes. Over all hovered the odors of Andorran cooking—frying olive oil, garlic, and strong spices.

Escaldes' central position, plus its hotels and modern garages, made it the ideal base for exploration of the country. We found that we could reach any of the main villages

in only an hour's drive from here and that all of Andorra's important officials and enterprises were near by.

Only a short walk down the valley is the town of Andorra, Andorra the Old,* which is probably, with its 900 inhabitants, the world's smallest capital (page 288).

Here we found the ancient Casa la Vall, dating from the 1580's and almost unchanged since then. A simple rectangular stone building, with little ornament of any kind aside from the paintings in its chapel, the Casa is the seat of Andorra's government, as well as church, museum, prison, fortress, and monument. It is eloquently the main public edifice of a nation of farmers and shepherds. Twice a year, before Easter and before Christmas, the 24 councilors of the principality, four elected from each of the six parishes, meet here (page 277).

We were shown through the Casa by its keeper, an old woman who had to use both hands to insert its foot-long 7-pound key in the antique lock. To my wife, the most interesting of its rooms was the historic kitchen, a dark, cavernous room with a hole in the ceiling designed to serve as an outlet for the smoke from the cooking fires built flat on the center of the scarred stone floor.

"Could they really cook anything here?" she asked.

Our guide led us into a smaller room adjoining, where she showed us a framed document. It was the menu of a state dinner of 1688: chicken liver *à l'Andorrane* with rice; roast goose; ham and olives; stewed goat *au jus;* whole mutton *à la brioche;* almonds, sugared and grilled; coffee and cigars; wines of the countryside, and brandy.

Most of the excellent Andorran dishes we ate, we learned later, were cooked on wood or coal stoves, although there are some electric ranges in the valleys. Every Andorran kitchen, we also discovered, is equipped with a labor-saving device, a rack on the wall above the kitchen sink in which dishes are set sideways after washing, allowing the water to run into the sink and eliminating the necessity of wiping dishes.

A High Living Standard

To my mind, the Andorran lives at a higher standard than many other Europeans today. He is able to do it partly because of a historical and geographical accident amazingly unmodified by the passage of centuries.

"Great Charlemagne, my father, liberated me from the Saracens," the national anthem of Andorra recalls. With the breakup of Charlemagne's empire, Andorra became a bone of contention between the Counts of Foix, in France, and the Bishop of Seo de Urgel, in Spain, and many minor, undecisive wars were waged over the territory.

Finally, in 1278, Pedro III of Aragón intervened in the dispute, and on September 8 of that year the quarreling feudal lords signed the charter which still constitutes the basis of Andorra's semi-independence. It provided for joint overlordship by the Bishop and the Count, with a measure of local self-government vested in a council of Andorran landed gentry.

This skeleton put on very little flesh over the years. As feudalism died in France, the hereditary rights of the Counts of Foix passed first to the Kings, and later to the Presidents of France. In 1866 a minor social revolution extended to all heads of families the right of suffrage and election to the Council General. But the Bishop of Seo de Urgel and the President of France are still Andorra's co-princes, and every year the feudal tribute—460 pesetas, six hams, six cheeses, and a dozen hens to the Bishop, 960 francs to France's chief—is still paid.

Napoleon, who might have ended Andorran independence for all time, is reported to have said: "Andorra is too fantastic. Let it remain as a museum piece."

The supreme resident rulers of the principality are the *veguers* (administrative agents), one appointed for life by the French, the other named every three years by the Bishop.

Each veguer in turn selects an Andorran from a list submitted to him by the Council General as his *bayle* (deputy). These officials execute laws and customs which have been handed down from medieval times.

These laws and customs, which still give Andorra a museumlike quality, were described to us by B. Riberaygua Argelich, secretary-general of the Council. A vigorous middle-aged man, he comes from an old Andorran family and was educated in France and Spain. An attorney by profession, he is a scholar by love. He had just published, in Catalan, the first thorough study of Andorran folkways.

"By law and tradition," he told us, "the *cap de casa,* or head of the family, is the center of Andorran life. He rules not only his children and grandchildren but the servants of their households. He alone may vote for the members of the Council General, and, if he is a man without either creditor or debtor, may be elected a councilor."

Only the cap de casa, Riberaygua continued, may negotiate for the marriages of members of his family. Boys may marry at

* French, Andorre la Vieille; Spanish, Andorra la Vieja; Catalan, Andorra la Vella.

Kodachrome by B. Anthony Stewart

To Visit Meritxell Shrine, Few Andorran Pilgrims Need Travel More than an Hour

Fifty-nine hundred Andorrans own a Pyrenees homeland about three times the size of Washington, D. C. On Patron Saint's Day, September 8, they pack picnic lunches and pay homage to the peasant-garbed, wood-shod Virgin of Meritxell. Her statue, lost by Christians fleeing the Moors, was recovered centuries ago. Andorrans believe she preserved their independence against the squeeze of neighboring France and Spain.

Kodachrome by B. Anthony Stewart

Frontier Signs Say *"Alto"* (Stop) and Chains Block the Road, Yet the World Penetrates Andorra's Insulation

Near Pas de la Casa smugglers grew rich in the postwar years when next-door France shut her own border to Spanish trade.

Andorra Is Cheerful; What Does It Know of Income Taxes!

For centuries the country, refusing to turn the pages of history, clung to its own feudal ways. New highways, automobiles, movies, and radio are blowing away the cobwebs of medievalism.

Though brown and black remain the choice of grandmothers (right), the newer generation prefers gay garments (left). Young town women look on perfumes, nylons, and permanents as necessities. Farm wives, however, still toil in the fields, and prospective brides are judged on strength. Children live under a patriarchal system by which grandfathers direct family affairs and do the voting.

Andorra lacks its own newspapers, but not imported movie-fan magazines. "What about Hollywood?" is a frequent question. A radio station spreads the gospel of American music. Taxes are trifling.

Catalan, the national language, is familiar to many of Andorra's 1,500 Spanish refugees.

Kodachromes by B. Anthony Stewart

Kodachrome by B. Anthony Stewart

Andorra's Highway Writhes Through the Clouds; the 7,897-foot Pass Looks Across the Valley into France

Spanish refugees, fallen American airmen, fugitive Nazis, foreign spies, and native smugglers all traveled this road.

Andorra, the Capital, Has French (Left) and Spanish (Right) Post Offices, but None of Its Own

A French gendarme (center) passes two of the six native policemen. They have little to do; crime is negligible.

Kodachrome by B. Anthony Stewart

Storm Brews in the Pyrenees. Two Youthful Explorers Perched on a Boulder Stand Lost in Contemplation

These crags, discouraging the heavy artillery of invading armies, have maintained Andorra as a feudal museum piece.

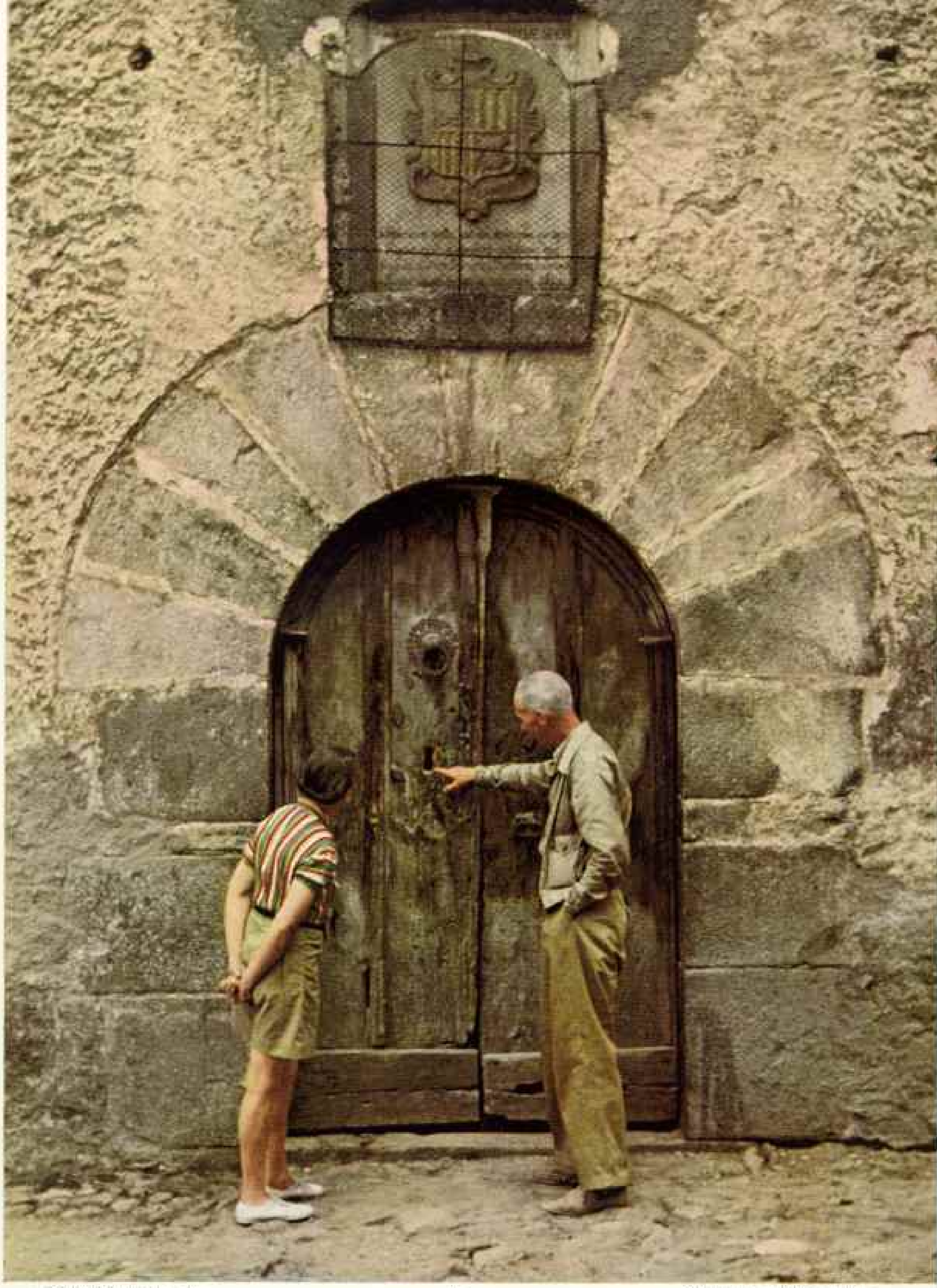
All Summer Long Sheep Graze the Lofty Pyrenees. Winter's First Sign of Snow Drives Them to the Valleys

Andorra's 17,000 sheep outnumber its people three to one. Land too rough for farming is their heritage. Among this herd the photographer saw many lamed by rocks. Here a lake in the Cirque des Pessons serves as their water hole (page 281). A shepherd stands under an umbrella (center).

Kodachromes by B. Anthony Stewart

Closes His Eyes, Aims at the Bull's-eye, and Misses Not a Drop

Relic of earlier days when glasses and cups were scarce on the road is the Catalan *porrón*, still a popular drinking instrument in Andorra. This festive citizen, drinking his red wine at Meritxell, scorns to touch lips with glass spout. The photographer saw him pour the stream against his forehead, direct the flow mouthward, and gulp every drop. Below: young Andorra holds the foot-long, seven-pound key to the parliament building (opposite page). The President of France and the Spanish Bishop of Urgel are Andorra's joint sovereigns, but its people elect their own parliament every four years.



Kodachrome by B. Anthony Stewart

English Visitors to Andorra Examine Parliament's Hand-size Keyhole

Casa la Vall, as the building is called, is church, jail, and museum as well as capitol. Here twice a year 24 lawgivers, clad in black, gather by donkeyback. Andorra's arms overhang the arched door.

Gurgling Valira River Sings a Lullaby to Escaldes

With a population of 1,000, Escaldes is Andorra's "metropolis."

Scalding-hot springs name the town and make it a popular resort. Nature's hot water is piped to housewives in the village square and to thermal baths in inns. Most hotel guests, however, get no running hot water; the chambermaid has to fetch a pitcherful.

Hotels and luxury shops line a dirt street whose dust is constantly churned by international traffic. To entice more vacationists, businessmen agitate for paving, but the tax-hating town fathers veto the project.

Notwithstanding its old-fashioned ideas, Escaldes attracts its share of vacationists, especially those from near-by Barcelona. They admire the town's centuries-old houses, whose building stones reflect the purple mountains from which they were quarried.

Life so revolves around two main forks of the Valira that the people call their country "the Valleys of Andorra." Here the east branch, flowing out of the Pyrenees, is almost glacier-cold. Below Escaldes it joins the Segre, later the Ebro, and eventually the Mediterranean.

Kodachrome by B. Anthony Stewart

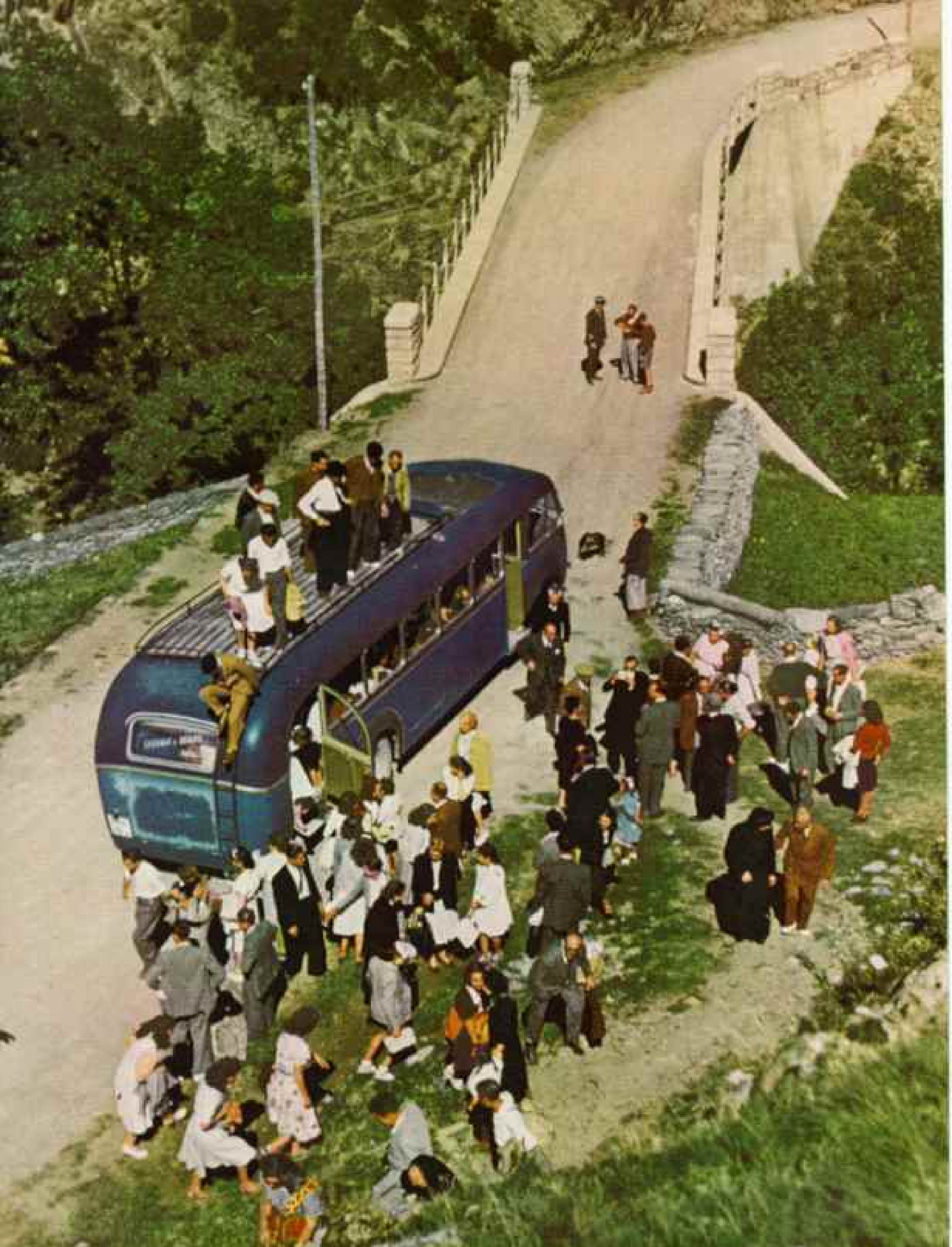
Central Disregards Andorra's None-too-busy Switchboard

Subscribers, mostly merchants, are few. Thrifty farmers see no need of telephones. Andorra's exchange serves the entire country.

Coffeemaker Roasts His Own in Tremat's Village Square

This operation seldom fails to attract a childish audience. The ball-shaped container, rotating above the fire, holds the beans.

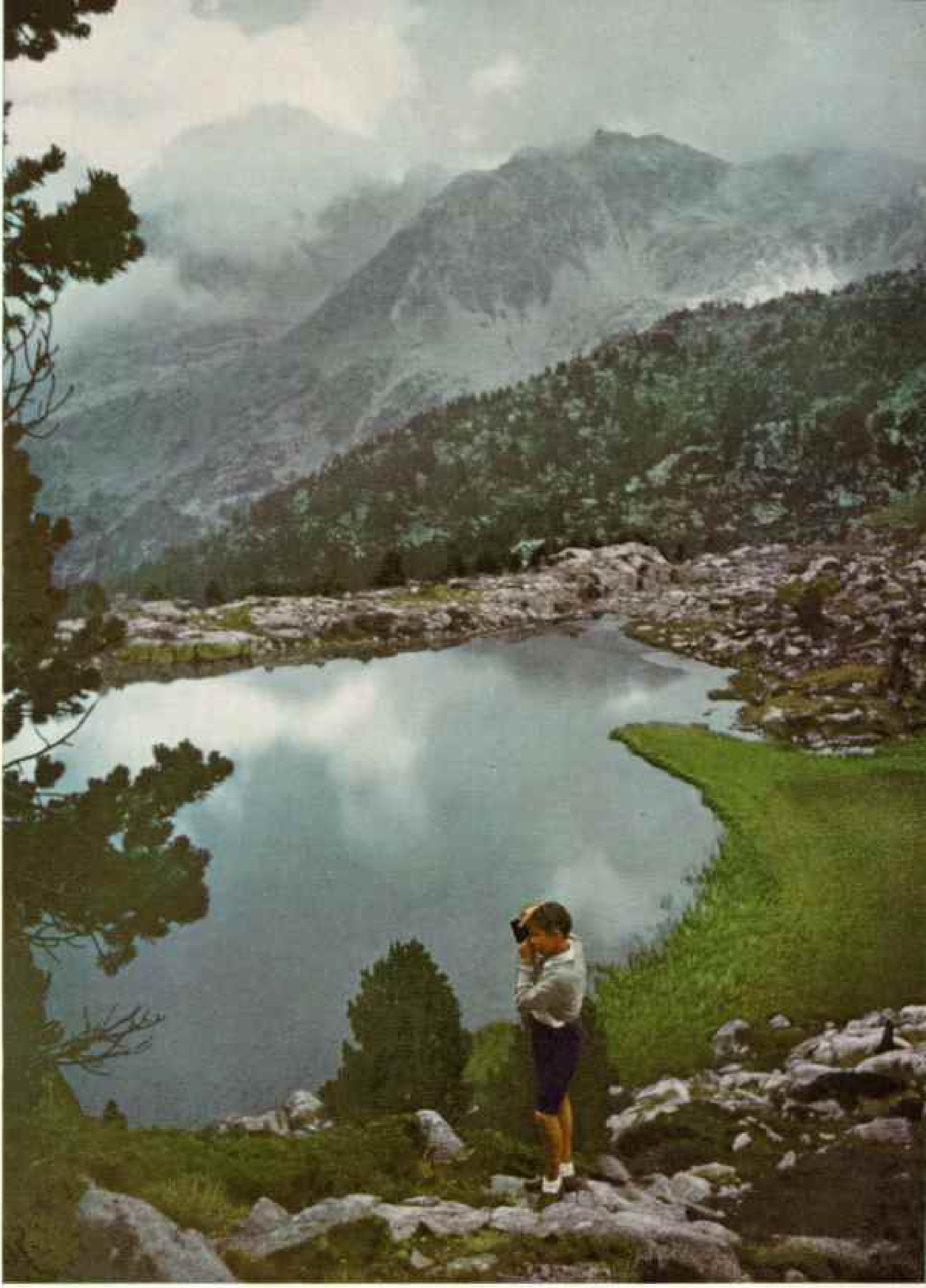
Kodachromes by B. Anthony Stewart



Kodachrome by B. Anthony Stewart

Loaded to the Roof, the Bus Leads a Roller-coaster Existence on Mountain Curves

From Spain to France, Andorra's coaches touch three countries in 30 miles. The hard-dirt road connects all major towns. These holiday-makers stop near Meritxell for Patron Saint's Day (page 269).



Kodachrome by B. Anthony Stewart

Pines, Misty Peaks, and Granite-cupped Tarn Reward a Young Photographer

Envalira Peak, one of Andorra's highest, shows a part of its 9,226 feet on the right. Miles off the beaten path, the pond is one of the lakes of the Cirque des Pessons (page 275).

Belled Horses Graze Boulder-sprinkled Hillsides. Shepherd's Summer Home Is the Windowless Stone Hut

Hillside Farmers Scorn Wheeled Vehicles. Their Ponyloads Call to Mind the "Straw That Broke the Camel's Back"

Kodachrome by B. Anthony Stewart

Kodachrome by B. Anthony Stewart

Weary Harvester Wastes Not an Upward Glance at Canillo's Terraced Ramparts

To an Andorran his patch of land is more valuable than gold. Wherever a plow may be drawn, there he is sure to farm. His ribbons of soil barely support him; surplus sons and daughters usually have to emigrate.

14 and girls when they are 12, but nowadays they generally wait a few years longer.

Should the Council mobilize the militia, only the cap de casa is obliged to serve. Against this contingency he must keep a rifle and ammunition ready in his home.

The cap de casa appoints his heir, who in turn becomes cap de casa. The heir may be a younger son, or even a daughter, and inherits by law all but a fourth of the property. However, so strongly do Andorrans feel about preserving their family estates that normally this law is circumvented, and the other heirs yield their fourth share to the main heir.

This strong attachment to the land, natural in a country where until only very recently the landless had to emigrate to live, is reflected also in an odd and complex legal tradition.

This provides that anyone who sells land retains the right to repurchase it at the sale price. Should the buyer resell the land, he, too, acquires this right; and so on for future purchasers. The tradition was long ago modified to limit the repurchase right to a fourth of the original sale. But after many years four or five claimants with this right may suddenly sue to rebuy the land. There are an uncounted number of lawsuits, growing out of this tradition, still unsettled after decades of litigation.

With this attachment to the land goes a deep devotion to the Roman Catholic Church, a strong family feeling, and intense clannishness.

No one can apply for Andorran citizenship whose family has not resided in the valleys for three generations, unless he marries an Andorran heiress.

Children born out of wedlock are not tolerated in the country. They must be sent over the border into either France or Spain to a foundling home. They may never obtain any rights in Andorra. Divorce is unknown.

Inheritance Laws Limit Population

The inheritance laws are responsible for Andorra's static population, which has fluctuated between five and six thousand for centuries, despite the fact that Andorrans normally have large families.

The disinherited have had to emigrate to France or Spain to earn their livelihoods, and there are more Andorrans in either country than in Andorra itself.

The inheritance laws create many cases of ill feeling within families, as many children compete for the cap de casa's favor.

From another source we heard the tale of Andorra's most recent murder, which had taken place some four years before our visit.

In a mountain wood neighbors found the body of an eldest son who had just become an heir. In accordance with the medieval tradition for cases of violent death, the rite of *visori* was performed. A *bayle* called out three times: "Dead one! Arise! Justice calls you!" Since no reply was forthcoming, he repeated, again thrice: "Dead one! Who killed you?" Again silence, and the bayle turned to the assembled crowd and pronounced three times, "Here is a dead one who will not reply," thus officially opening an investigation.

Andorra, an orderly country, has only six policemen, none of whom knows how to classify a fingerprint, but it took no great detective work to fix the guilt on a younger brother of the slain man.

In prison, the culprit confessed not only to the slaying of his brother but to the poisoning of his sister 15 years before so that he alone would inherit the one-fourth portion excluded from the patrimony of the main heir. On a Sunday noon, before the assembled populace in the square of the capital, he was sentenced to death. Within an hour he was shot.

Even today, with hundreds of refugees from Spain swelling the normal population, crime is almost negligible in Andorra. (No Andorran considers smuggling a crime.) In November, 1944, when France feared imminent trouble with Spain, 80 French gendarmes were sent into the country. Spain, in retaliation, sent in several companies of mobile guards, but after a short time withdrew them.

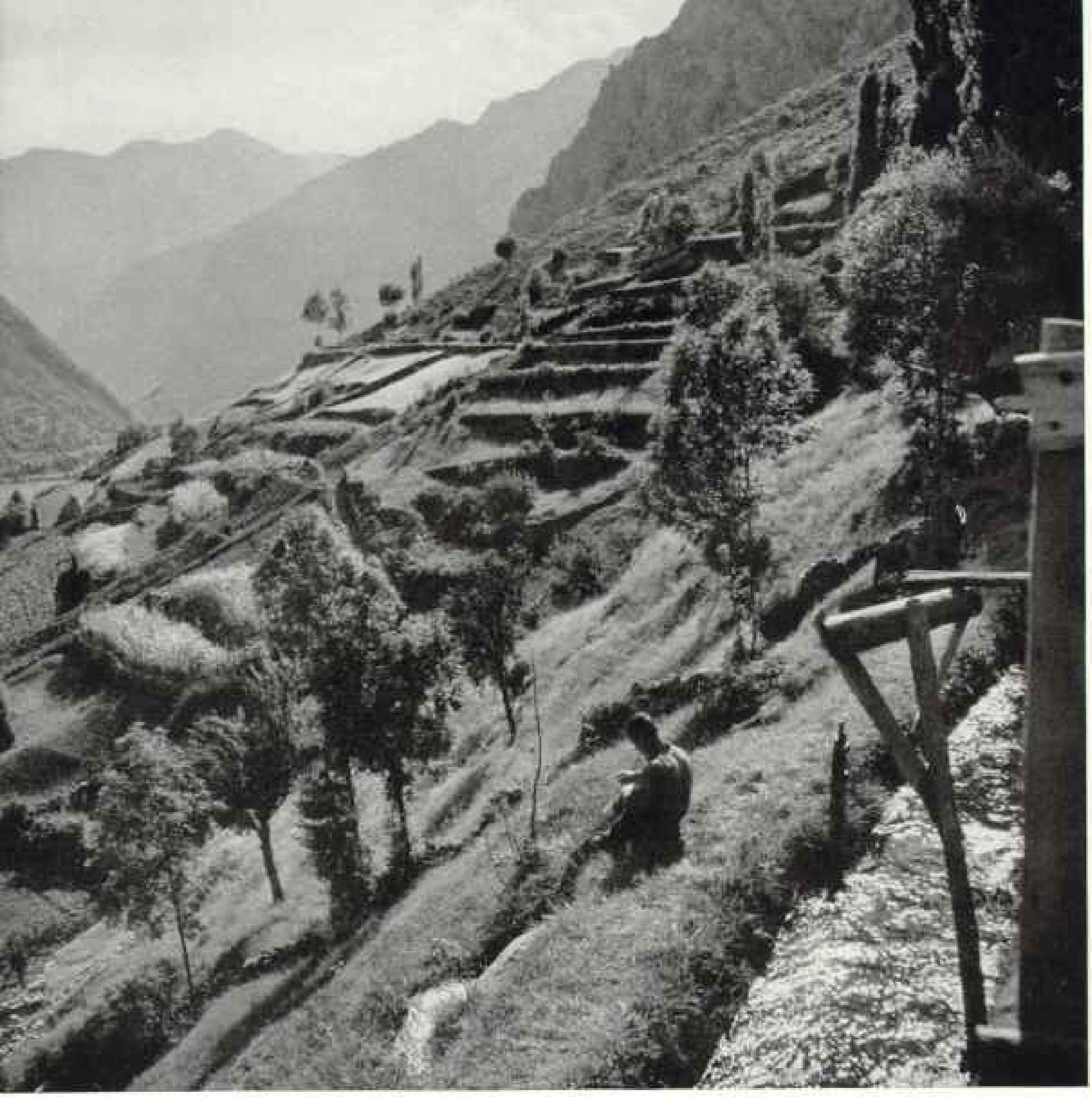
We sat basking in the sunshine one morning on a stone parapet on the cliffside at the edge of the town of Andorra, looking down on the Riu Valira and the green fields of the valley, talking with Paul Ramond, the French postmaster, and two of his daughters.

The girls, aged 18 and 20, wanted to know about Hollywood. Ramond was curious about towns all over America and about Americans who write to him.

"Not a day passes by," he said, "but I get at least one letter from America, with money enclosed, asking me to send Andorran stamps. Both the French and Spanish have post offices here, and we both have special stamps for Andorra. But ours must be more beautiful, because I get the most requests.

"I'm not allowed to send the stamps, so I write and tell them that. Of course I put as many stamps as possible on the envelope and postmark them with special care" (page 289).

Ramond, a wounded veteran of World War I, had brought his wife and five reluctant children to the mountains in 1935 when he received his appointment.



Soil Is Wealth. Every Inch Is Worked. Mountainsides Are Terraced Up to the Crags

This farmer drags his crops from an unwilling soil, but only necessity will compel him to part with it. He taps the irrigation canal flowing above Andorra town.

"Now we are all happy," he said. "Here is a clean and beautiful life, a paradise."

Both girls shrieked in protest. "Paradise! With no dances in the evenings and only one movie a week! And so few young men!"

There is a big modern movie theater in Escaldes now. It features not only French and Spanish films but Hollywood products as well. Its chief attraction is for the young, especially the younger women. The men still prefer their cafes, their traditional card games, and evenings full of talk.

No newspapers are published in Andorra, but the illustrated weeklies of both France and Spain are widely read.

Andorra has had telegraph connection with France since 1887, but with Spain only since the war. There is telephone service within the country, but, as we learned when my wife tried to call our daughter in Paris, no long-distance lines to either France or Spain.

This lack, we found on investigation, stems from the Council General's attempts to get more money from the concession than has yet been offered (page 279).

Smuggling Approved; Gambling, No!

The people of the Valleys long preferred to be left alone. In the 1880's a group of European promoters sought to establish a giant gambling casino in Escaldes, where it would be free from the restrictions imposed

by other governments. Handsome payment was offered Andorrans for the concession, but they turned it down.

Gradually the temper of the people changed. When in 1917 two Australian promoters, impelled by similar considerations, sought to establish a world-wide sweepstakes lottery headquarters in Andorra, the Council General succumbed to the lure of easy money and accepted the proposition. This time the co-princes joined to veto the scheme.

A concession was let, however, for the operation of a high-powered radio station which stands high on the hillside above Escaldes. Furnished with the best and most recent American equipment, including a large room stacked high with American jazz recordings, the station is heard far and wide.

Primarily directed to England, France, and other European countries where radio broadcasting is government-controlled and no advertising is permitted, Radio Andorra's programs are almost equally divided between commercials and ready-made entertainment. This enables it to pay a handsome tribute to the Council General.

The country's one bank and the hydro-electric company also pay a sizable portion of their profits to the Council General. And the Council is anxious to develop the mining of Andorra's deposits of iron ore.

Revenue from these concessions is sufficient to meet all national expenditures. Add to this the fact that the French, Spanish, and the Church support Andorra's schools, and it will be no surprise to learn that Andorran taxes are infinitesimal and that there is always a surplus in the budget.

"We may not always be so lucky as to have wars near our soil but not on it," one member remarked at a Council meeting.

I asked a leading Andorran why the Council General did not spend some of its budget surplus on paving Andorran roads because good roads would attract more tourists. He replied matter-of-factly that the Council would soon force the concessionaires to build roads.

This is part of an old Andorran technique. Over the course of centuries Andorrans have played their co-princes against each other, gaining concessions from both they could otherwise never have hoped to gain from one. Today the Andorran has almost all the privileges of both French and Spanish citizens, with few of the obligations.

Andorrans may live, work, and travel freely in France and Spain without the special permission and registration required of other foreigners. They pay no taxes to either country and are exempt from military service in both.

"Frenchmen look at Andorrans as the kings of France," Germain Soulié, the French veguer, chuckled. "Free in their native country, and freer than Frenchmen in France."

Andorra has always offered sanctuary to political refugees. Even during World War II many Spanish Republicans lived in the principality unmolested by either the Vichy or Franco regimes. Only Hitler violated the country's neutrality.

"First there were 'tourists,'" Soulié recalled for us. "Husky male tourists who always walked in perfect step. The only thing civilian about them was their clothes. Then came the Gestapo, asking questions and snooping. For there were Allied agents coming through shortly after the fall of France.

"Two Gestapo men used to come to my office every morning. They would walk in without knocking, sit down, and remain a while. Then they would ask me, 'What's new?' Always I would answer, 'Nothing's been new here for a thousand years.' Then they would go away.

"After a while it got so that when they came in I would ask first, 'What's new?' We never learned anything from each other."

Meanwhile, the Maquis (Underground) organized in France. Its leaders frequently came to Andorra to hide out between raids. Allied agents made it more and more their headquarters. And, most important, flyers shot down over Europe were coming through in large numbers on their way to North Africa. About 200 Americans alone passed through, we were told, as well as many British and Canadian aviators.

"Always the Gestapo sat and watched, although the strange faces must have warned them what was happening," Soulié said.

"Finally, in the summer of 1944, after the invasion of Normandy, they must have realized the jig was up," he continued. "They made a raid one night and kidnaped eight people—two American flyers, some Poles, and others I had never seen. They knew just where the hiding places were and went directly to them. They took their prisoners down to France in two taxicabs.

"Everyone was afraid. Nobody tried to stop them and nobody protested. Shortly after, the Gestapo, too, left."

Life in the Open

Andorran life is lived mainly in the open, in the free mountain air. Diligent terracing of the slopes has made a fourth of the land arable, and, in addition to tobacco, Andorrans

To the Feudal Capital of Andorra, the International Highway Carries the World's Ideas and Automobiles

In the unpaved plaza of Andorra town, sometimes used as a sheepfold, stands the country's only bank, which deals in francs and pesetas because Andorra has no currency of its own. Parked beside it is an American car. A French-made Peugeot with Andorra tags has headlights behind its grille and a baby buggy on its top.

Andorrans Lick Few Stamps; Internal Postage Goes Free

Mail for foreign delivery bears French or Spanish postage according to its destination. This letter, going from Andorra town to Sant Julia, near the southern border, is mailed at the Spanish post office (*correos*, "mails") (page 273). Animal figures, recently uncovered, may be of Moorish origin.

A Pretended Jailbird Tries an Iron Collar for Size

In Andorra, where laws are unwritten and smuggling is regarded as no crime (page 266), evil-doing is so rare that the photographer could find no prisoner in the outdoor lockup at Ordino. To help him out, this young English visitor obligingly substituted.

raise potatoes, spurred rye, oats, buckwheat, and maize on the mountainsides, to a height of 5,300 feet (pages 283 and 286).

Most of the land, however, is pasture. Andorra boasts an animal population of some 1,500 goats, 17,000 sheep, 400 cattle, and 300 mules. The sheep graze high in the mountains all summer, but are driven down to the near-by valleys in France for the winter. On the mountain trails the mule is still the only reliable method of transportation, and we frequently encountered him in the villages, too.

More than half of Andorra's population lives in the tiny parish of Andorra, which includes Escaldes. Each of the remaining five parishes—Canillo, Encamp, Ordino, La Massana, and Sant Julia—has only from 400 to 700 inhabitants.

Down in the valley near Andorra town the climate is mild, and the inhabitants boast of an average of 280 days of sunshine a year. On the slopes and in the high villages the winter snow falls heavily, piling up to 15 or 20 feet. But around Escaldes more than a foot of snow is rare.

Trout and other game fish abound in the streams and lakes that line the countryside, and high on the mountain crags Andorrans hunt the izard, or Pyrenean chamois. Everywhere are ancient chapels, solid stone structures which serve both as shrines and as refuges for wayfarers caught in a storm.

"There is tranquillity here," the one-armed teacher of Andorra's French school told us. Educated at the Sorbonne and long a resident of Paris, he had returned to his native valley as soon as a post was offered.

Education is not compulsory, but Andorra's children are about equally divided among the three free school systems, operated by the French, the Spanish, and the Church.

Schools are one-room, one-teacher affairs, instructing children of all grades up to the age of 14. Those who wish to study further go to France, Spain or both.

Although shut in by the beneficent mountains, even Andorra is not immune from world catastrophe. In 1933 hard times resulted in a minor upheaval when young Andorrans sought a political solution to their problems of unemployment, low prices for contraband, and the falling off of tourist travel.

After an hour's agitation at a meeting of the Council General they won the right of universal male suffrage. Backed by the French, this reform was instituted despite vigorous opposition from the Bishop of Seo de Urgel. It lasted until 1941, when the representative of Marshal Pétain joined the Bishop to rescind the law and reinstitute the old system under which only the *cap de casa* can vote (page 268).

Since then, despite the restoration of democracy in France, there has been no agitation for a return to this reform.

"When everybody is fed," a councilor said, "there are no politics here and nobody cares about the government."

Nevertheless, as Andorrans gathered in their cafes to play their traditional card games, murmurs of concern over the future were beginning to be heard. Raised from their former peasant standards by an artificial and temporary political situation, they were frightened by the prospect of a return to normalcy. Yet this seemed bound to come with the reopening, last year, of the frontier between France and Spain to commerce.

"Our wives are used to nylon stockings, fine clothes, and perfumes," the Andorran worried aloud. "How can we ask them to return to the old life?"

Andorra's leading citizens had great hopes of solving this problem by turning their country into a tourist mecca, with both winter and summer seasons. Plans had been made to keep the road from France open all year.

Golf courses were projected for the valleys and ski tows for the mountainsides, although many peasants objected that the cattle would be frightened by such unusual apparitions.

Already new hotels were going up. They were building mostly in Escaldes, which has the added attraction of the thermal baths. But they were building also in Encamp, in Ordino, and in Sant Julia, 6- and 7-story hotels in the brown and purplish-gray stone of the mountains.

The Bishop of Seo de Urgel has long expressed his opposition to the erection of gambling casinos or dance halls in the country. But this did not discomfit the planners.

They know that Andorra's chief attraction will always be its quaintness, its distance and isolation from the world, the purple beauty of its mountains, and the serenity of its lonely forests and lakes. They do not intend to stain the splendor of clear and breath-taking Andorran nights by a neon-lighted landscape.

And when the fever of the boom cools, the planners believe, a sane prosperity will once again make Andorra what it was in the olden days—an unchanging island of simplicity and a refuge for those who seek peace.*

* See, in the National Geographic Magazine: "Andorra—Mountain Museum of Feudal Europe," by Lawrence A. Fernsworth, October, 1933; and "Unique Republic, Where Smuggling Is an Industry," by Herbert Corey, March, 1918.

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In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for three hundred years.

In Mexico, The Society and the Smithsonian Institution, January 16, 1930, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 B. C. (Spinden Correlation). It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society-U. S. Army Air Forces Expedition, from a camp in southern Brazil, photographed and observed the solar eclipse of 1947. This was the seventh expedition of The Society to observe a total eclipse of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted $15,000, and in addition $75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

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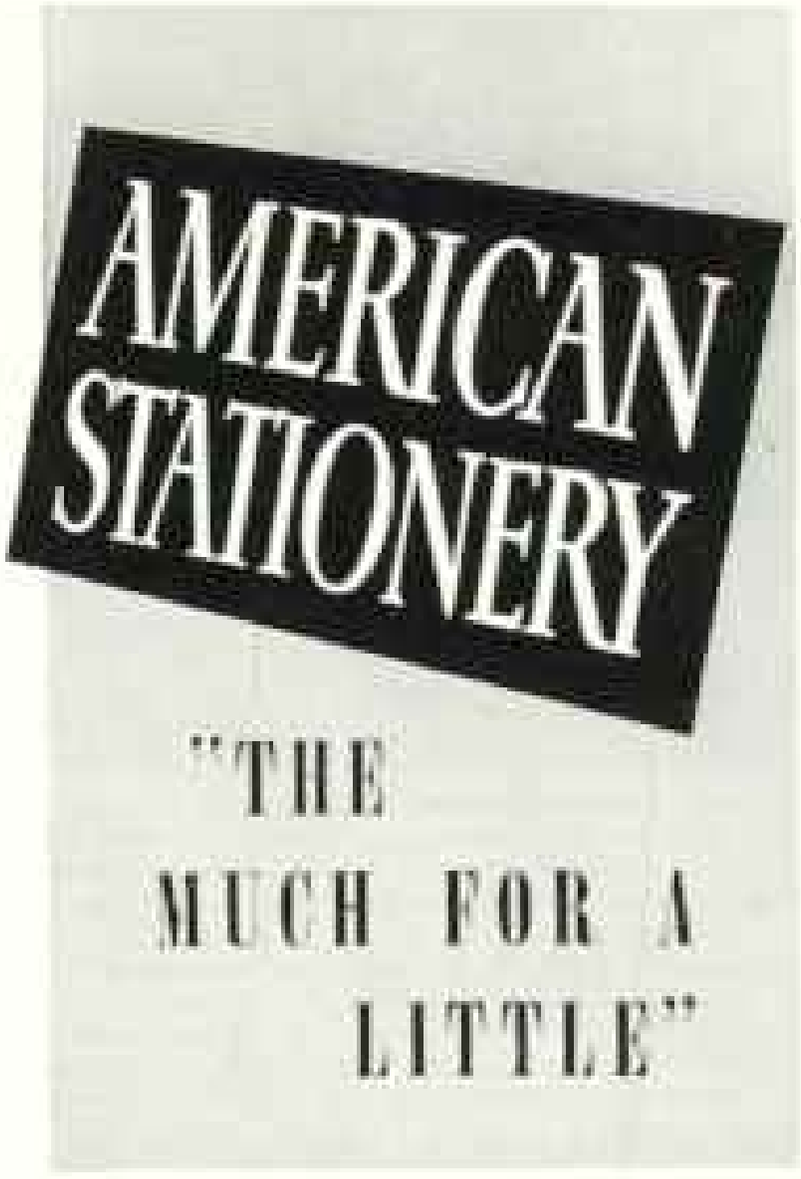

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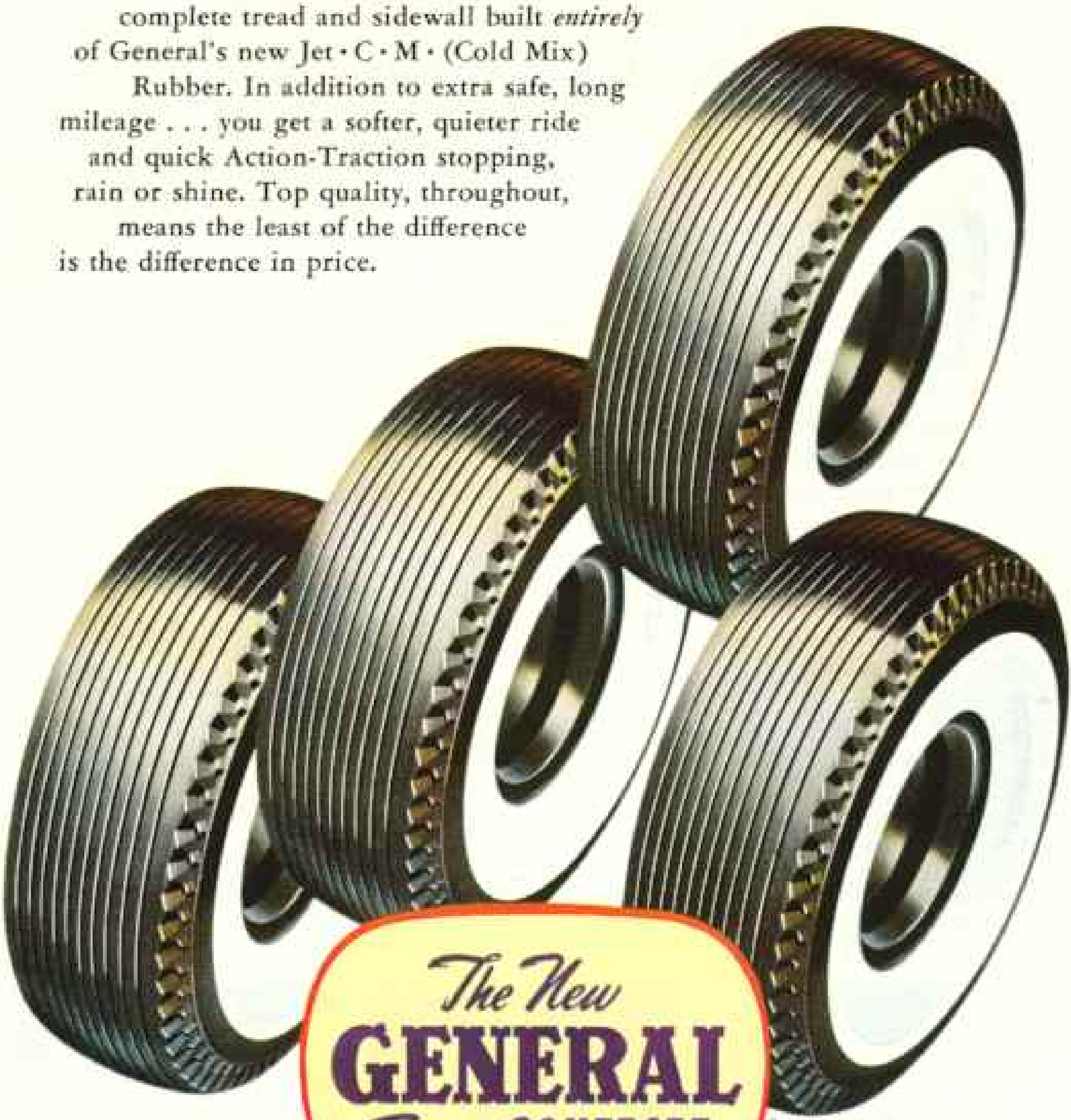

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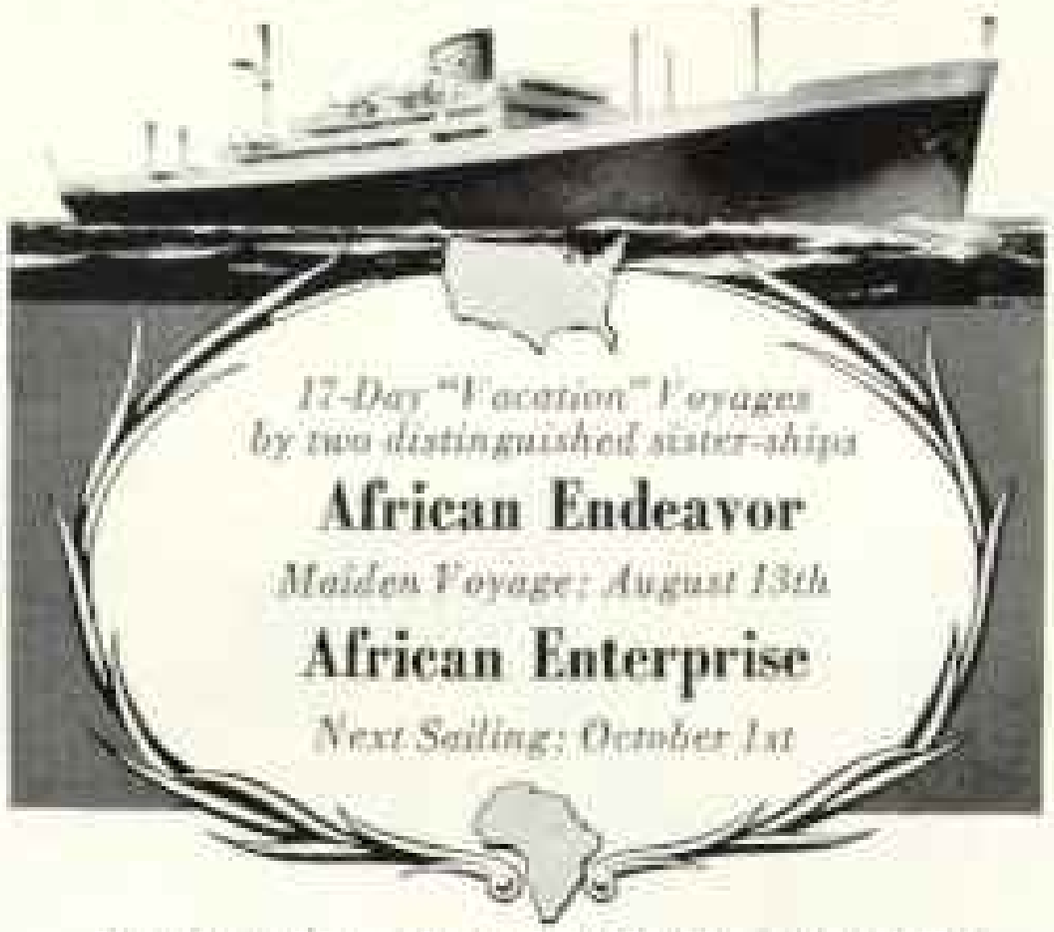

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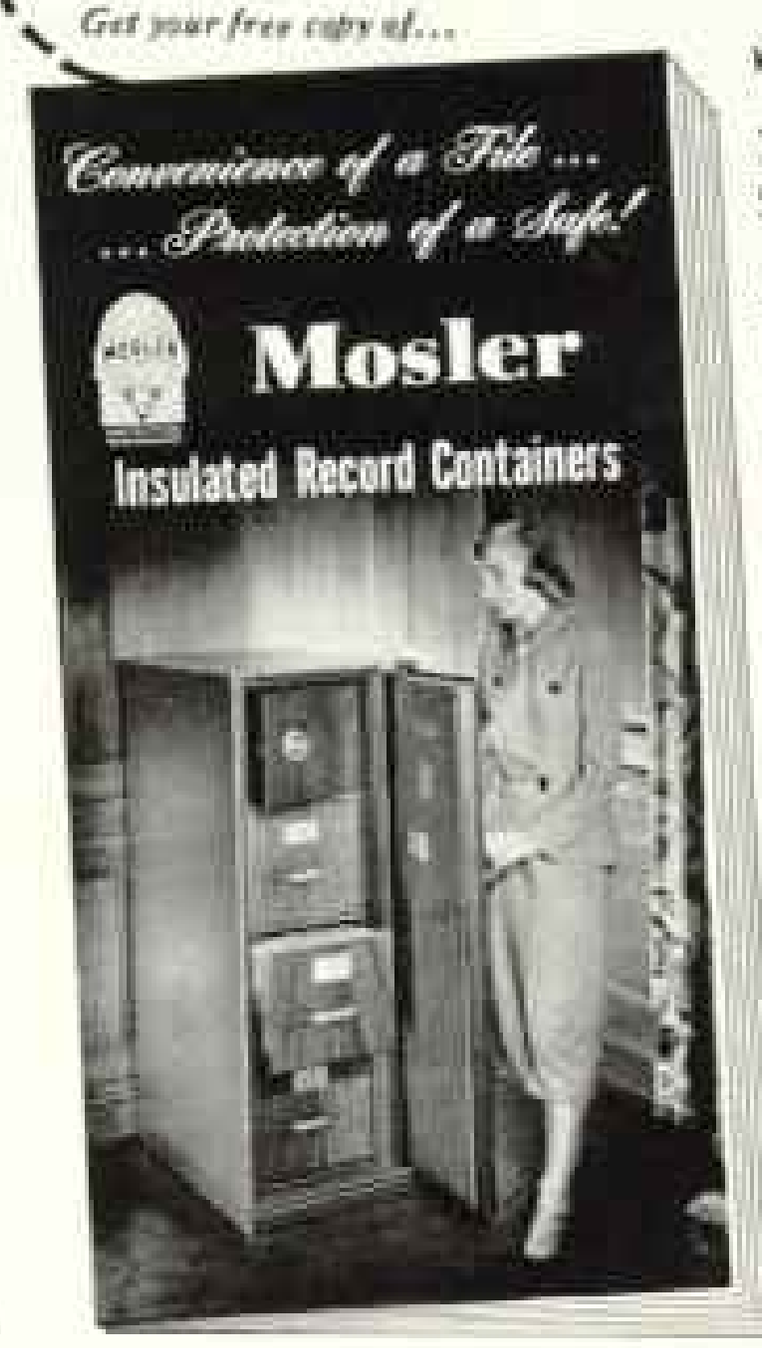

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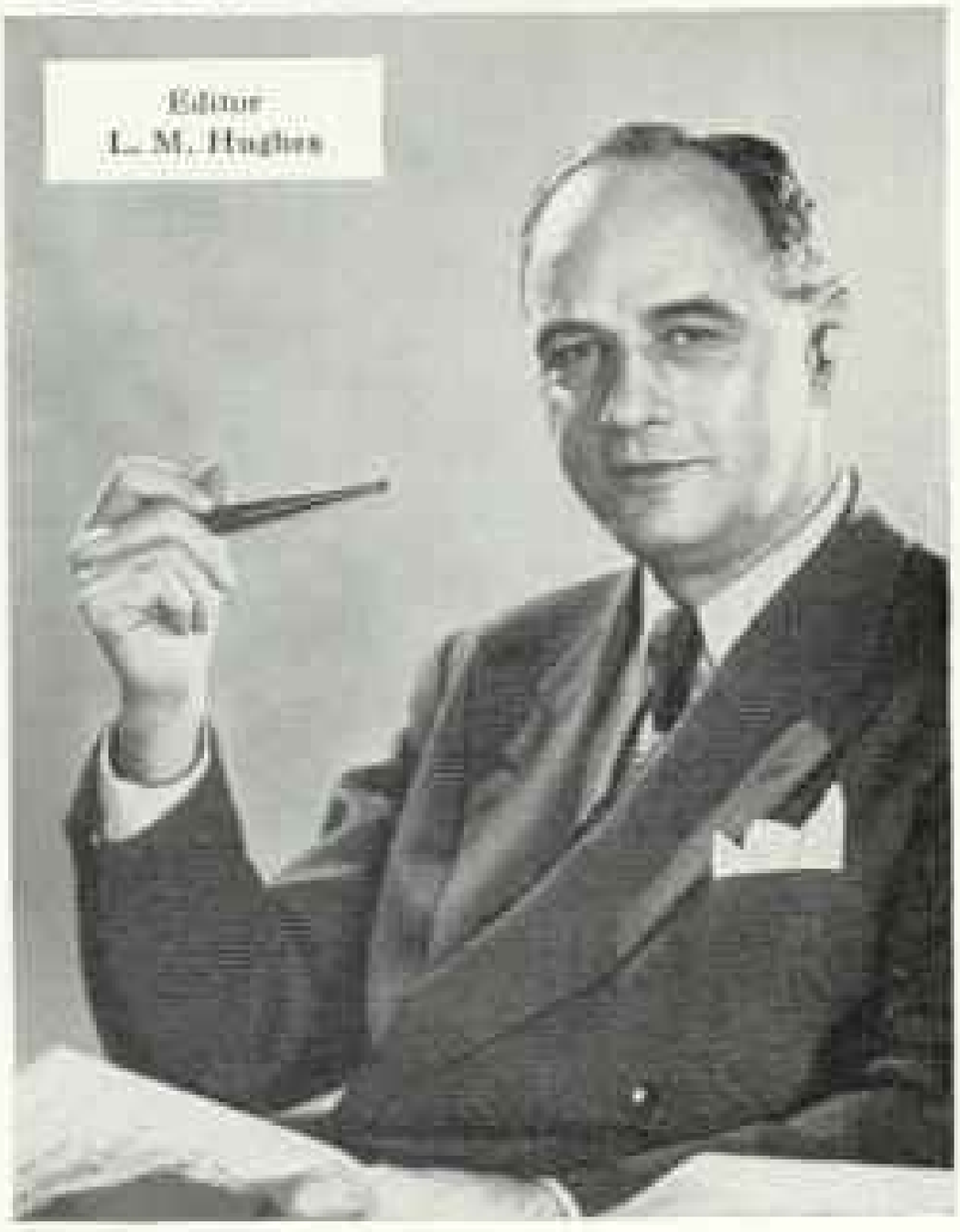

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*Named for its inventor, Dr. Edwin H. Land. Polaroid T. M. Reg. U. S. Pat. Off.

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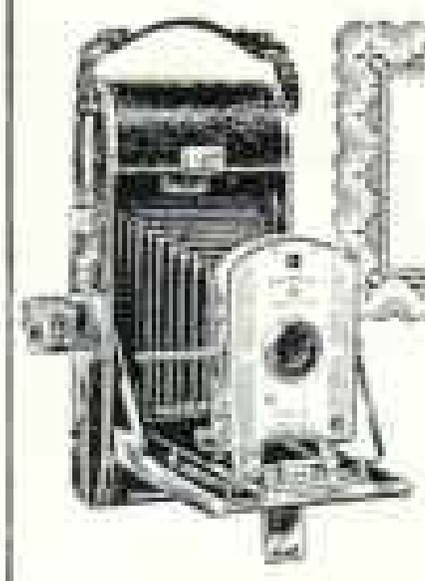

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IN MISSISSIPPI—THE BUCKEYE COTTON OIL COMPANY, Jackson. Cottonseed from Mississippi's famed cotton fields are the raw materials used by this plant to manufacture high quality vegetable oil for shortening and salad oil, high protein livestock feeds, cotton linters and cellulose.

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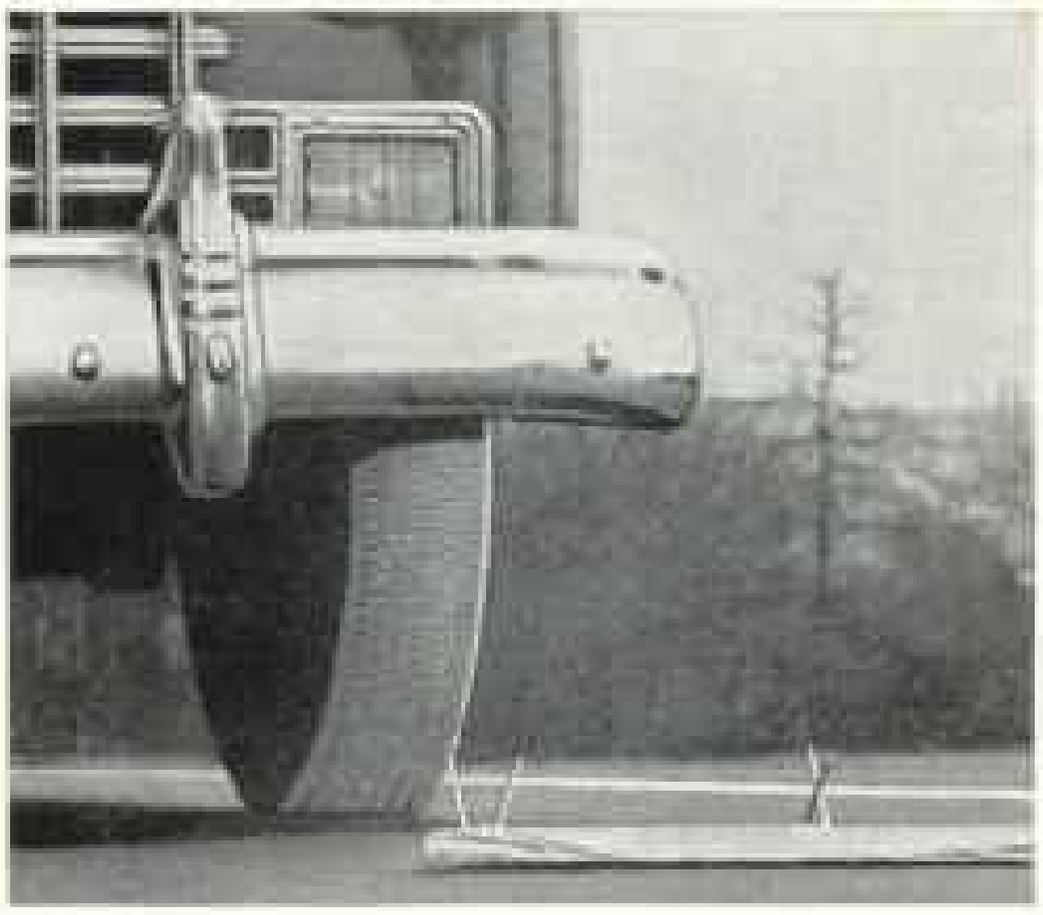
How to Fix a Flat *BEFORE* it Happens!



1. Running nails, glass, or other sharp objects into tires can (and does) happen to almost everyone who drives. But punctures need *not* mean flat tires, thanks to Bulkheading—a revolutionary principle of tube construction perfected and patented by Seiberling.

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3. Best way to fix a flat is *before* it happens, by equipping your car with Seiberling Sealed-Air Tubes, the *only* tubes with patented Bulkheads. Sealed-Air Tubes repair themselves, *seal punctures permanently while you ride.* Nearest you ever come to "repairing" a Sealed-Air Tube is pulling out a nail whenever you happen to see one.

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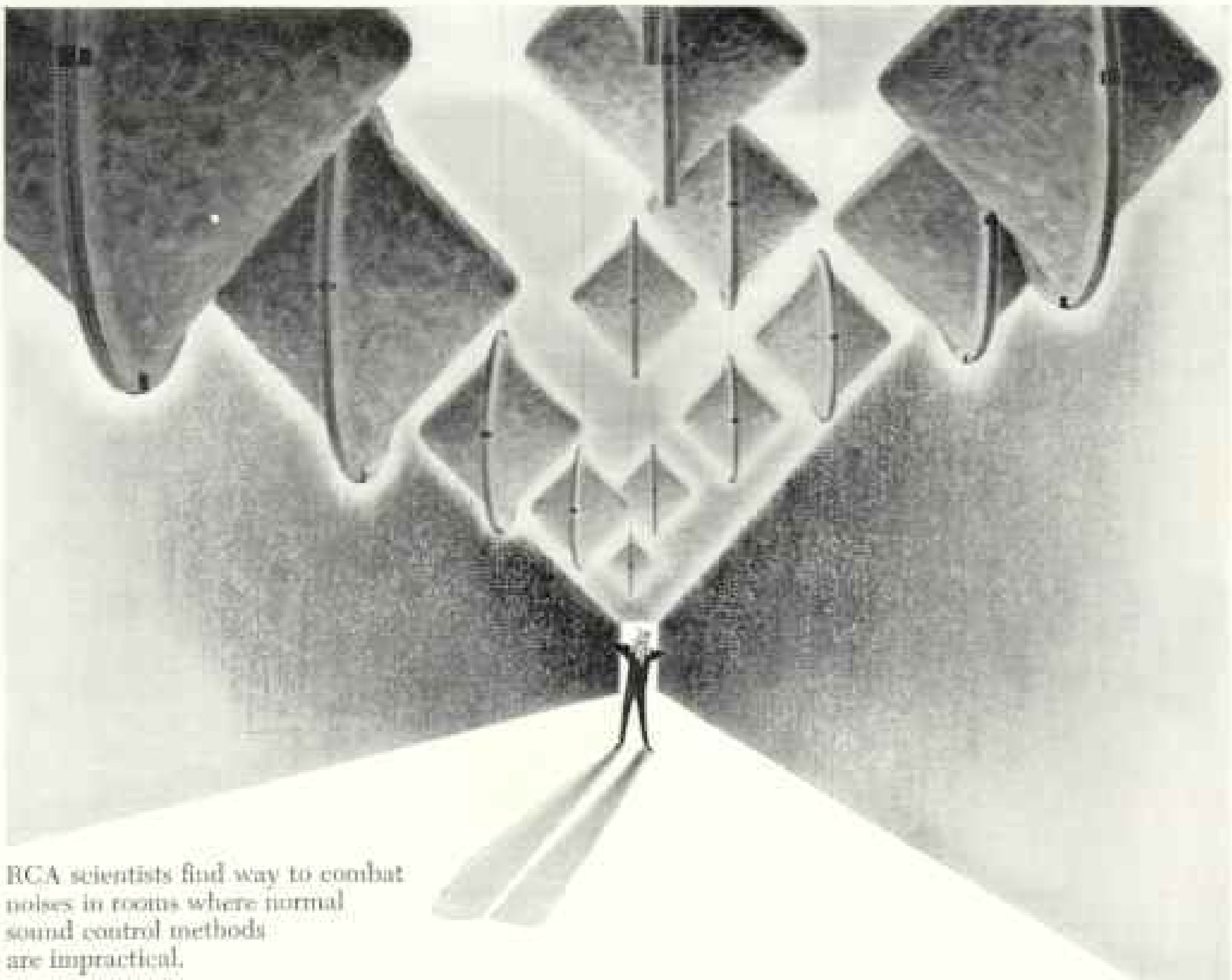

RCA scientists find way to combat noises in rooms where normal sound control methods are impractical.

These "Cones of Silence" **smother sound!**

You think of RCA Laboratories—in part—as a place where scientists work with *sound*, for radio, television, phonographs. This is true, but they are also concerned with *silence*.

One example is a recent RCA development, a way of killing clatter in places where conventional sound-conditioning—with walls or ceilings of absorbent materials—would get in your way. Overhead pipes, ducts or other fixtures might prevent the installation of a sound absorbent ceiling—and you wouldn't want to blanket a skylight.

RCA's invention solves the problem in this way: Cones of sound-absorbent substances are clamped together base-to-base... then hung in rows where not in the way. Light, inexpensive, easy to install, these "Cones of Silence" convert sound waves into heat energy, absorb from 60% to 75% of the clatter in a noisy room.

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The development of this new functional sound absorber indicates the type of progressive research conducted at RCA Laboratories. Such leadership in science and engineering adds *value beyond price* to any product or service of RCA and RCA Victor.

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Some hopeful facts about ALLERGIES

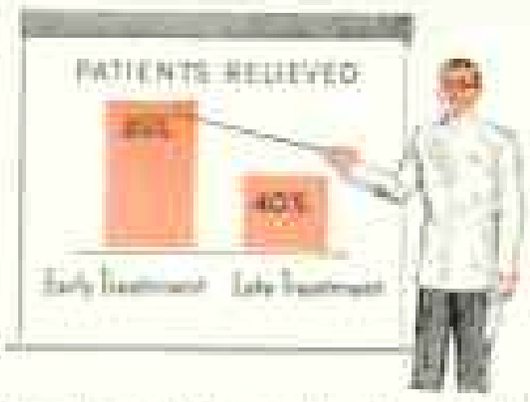
IT HAS BEEN estimated that one out of every two people in our country suffers, or has suffered, from an allergy. These people are unusually sensitive to certain things which are harmless to the average person.

Plants, dust, animals, foods, drugs, chemicals and bacteria are among the most common causes of allergic disorders. When susceptible persons come in contact with these troublemakers, it is thought that a substance called *histamine* is released by the body into the blood stream. This in turn may lead to sneezing attacks, skin rashes, digestive upsets or more serious conditions.

Fortunately, recent developments by medical science make it possible for the doctor to do more than ever before to relieve allergies. New drugs, known as antihistaminics, are helpful in many cases, especially those caused by substances which are inhaled. This includes hay fever which alone attacks some three and one half million people each year.

The doctor may recommend injections of the allergy-causing substance to help build up resistance to it. He may also suggest steps for avoiding or lessening contact with the troublemaker.

Recent research has shown that some allergic conditions improve when the patient is helped to resolve emotional conflicts. Today, authorities say that, with proper medical care, 3 out of 4 allergy victims can be greatly helped.



For the best results, treatment to increase resistance should be started in advance of exposure to the causes of allergy. Hay fever treatments, for example, are more than twice as effective when given before the pollen season starts rather than after.

There is still no "sure cure" for allergies, but patients who maintain close and continued co-operation with the doctor have the best chance for a great measure of relief. To learn more facts about allergies, write for a copy of Metropolitan's free booklet, 89-N, "Allergic To What?"

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Why Amphidasis has pink feet

WARBLERS AND FINCHES foraging for insects that feed on rosebushes undoubtedly have a harder time finding the larva of the moth *Amphidasis cognataria* than they do other choice morsels.

For Amphidasis is dressed up like a *rose twig*. His green skin is marked with spots, located and colored like leaf scars. And he holds his slender body at the same angle as the twig he imitates.

To complete the camouflage that foils his foes, Amphidasis has tiny pink forefeet—arranged to form the terminal bud of the twig that he pretends to be.

If you stop to think about it, Amphidasis, when he's keeping company with a rose twig, is perhaps a lot less likely to meet with a mishap than you are—even though you have no natural enemies.

Amphidasis has no bones to break when he takes a tumble, lights no fires to burn himself. He doesn't drive a car in roaring traffic.

The fact that accidents from these and other causes are happening at the rate of one every three seconds doesn't concern Amphidasis one bit. But it's a fact that's pretty important to you.

A split-second encounter with a truck as you step off a curb can lay you up and stop your pay for months. It could cost you enough to plunge your family into debt for years—but not if you have accident insurance.

If you're put out of the running by an injury, accident insurance pays your doctor bills and medical expenses, provides money for your family to live on while you're getting well.

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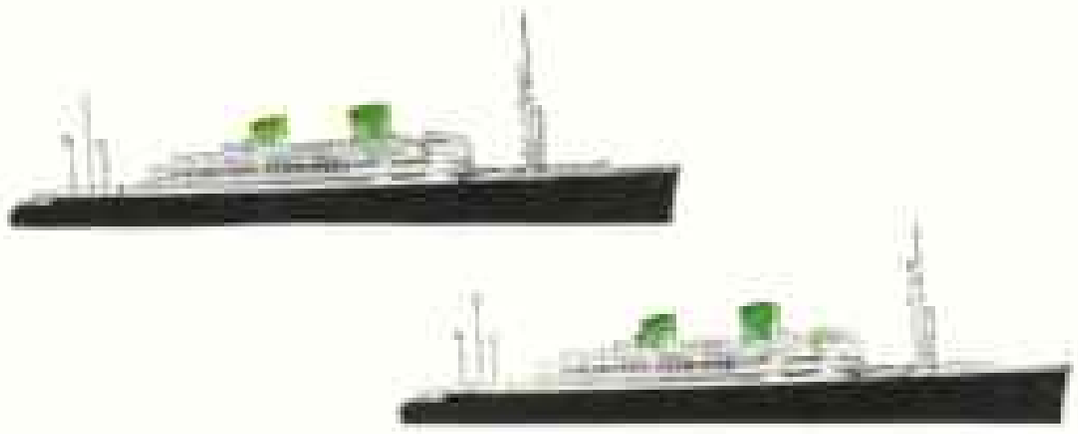

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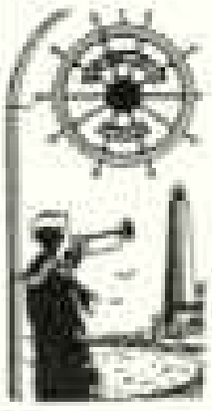

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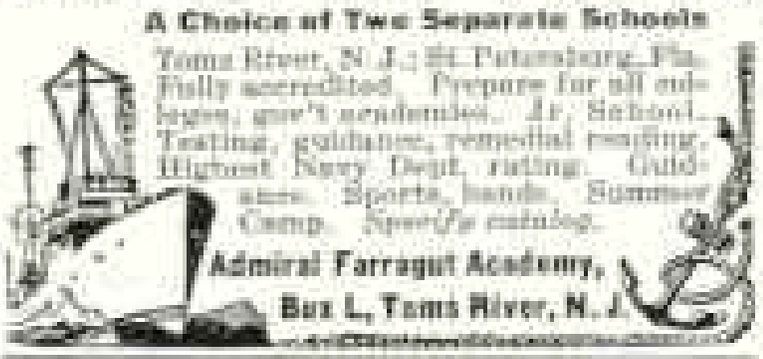

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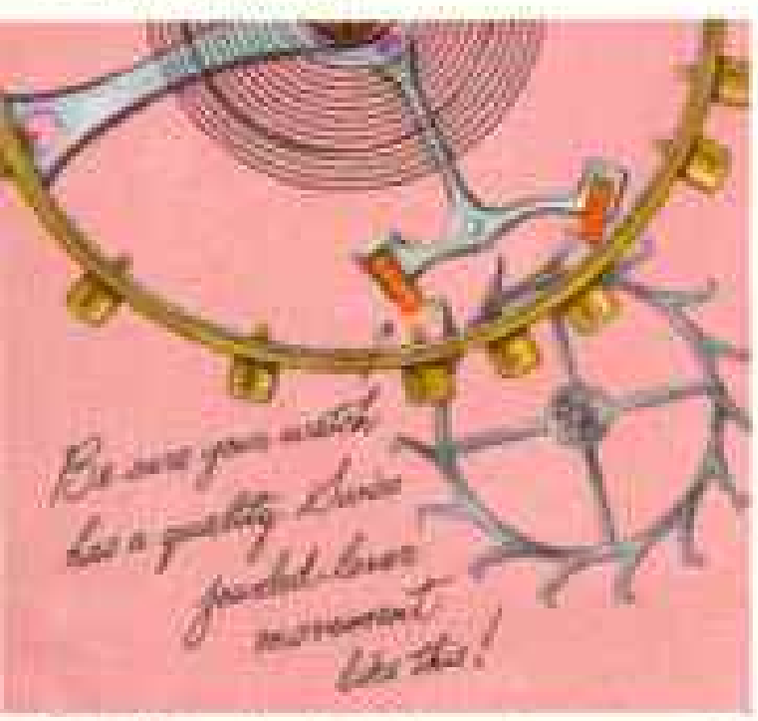

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