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## MAN'S WINGED ALLY, THE BUSY HONEYBEE

### Modern Research Adds a New Chapter to Usefulness of the Insect Which Has Symbolized Industry Since Early Bible Times

BY JAMES I. HAMBLETON

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**D**OES the buzz of a bee recall an unfortunate encounter, or is it a reminder of sweet music in a blossom-decked meadow?

To a beekeeper, and there are some 800,000 in the United States alone, no music is more welcome. Many laymen, however, have not had the pleasure of having their hands in a hive of bees, and to them every buzz is a signal of danger.

Since early Bible times the honeybee has been a symbol of industry, and honey a simile of plenty. The study of honeybees and their remarkable life history has inspired philosophers, whose writings are replete with references to them.\* But modern research now enables us to pen a new chapter about them.

In the United States today these bees yield about 100,000 tons of marketable honey annually; but in helping maintain our agriculture they are of even more importance. They may be likened to the enzymes in our food, small and mysterious, but highly essential to our well-being.

#### EARLY EXPLORERS BROUGHT BEES

The honeybee is not a native. There were none in North America when the Spanish explorers arrived. Settlers coming

\* See "Our Friends, the Bees," by A. I. and E. R. Root, in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1911.

in later expeditions brought them, and at first the Indians called them the "white man's fly." Since then they have followed man in his migration and settlement of every part of the United States and Canada.

Until recently these insects' chief usefulness to man was their production of honey and beeswax—no mean service, since for centuries honey was virtually the only available sweet. But now, as pollinating agents, they perform a far more important duty.

In the pioneer stages of American agriculture, bumblebees and other native pollinating insects that fed upon nectar and pollen were plentiful everywhere. But the planting of vast areas which once were forests, prairies, and swamps with fields of grain, orchards, and gardens upset the delicate balance of Nature.

Wide-spread cultivation of single plants in huge acreages brought about an abnormal condition of insect population. Injurious species, afforded an enormous food supply, prospered and multiplied until now serious insect pests menace almost every important crop.

Insecticides must be used to protect farm crops, particularly fruits. Unfortunately, these materials kill not only harmful but beneficial insects. The toll includes honeybees and other wild bees, as well as the efficient bumblebees—all the insects that carry pollen from one blossom to another.



Photograph by Jacob Gaynt

#### THERE IS A RIGHT AND A WRONG WAY TO OPEN A HIVE.

An expert never stands in front of a colony or moves with nervous jerks; such tactics irritate the bees. A puff or two from the smoker (foreground) disorganizes the entrance guards (see Plate 1) and sends all workers rushing to the honey cells. There they load up, apparently fearing fire is about to destroy their home. Then the keeper removes the cover, sends a few whiffs of smoke into the hive from above, and inspects the frames. The card tacked to the hive records the condition of the colony.

Even yet we scarcely realize the dependence of many plants upon insects to effect pollination.

The cutting of wood lots and the clean cultivation of our fields have added to the difficulty of survival of our useful insects, with the result that more and more dependence has to be placed upon the honeybee, the only pollinating insect that can be propagated and controlled.

#### SEX LIFE OF THE PLANTS

Some plants bear only male flowers, which produce pollen but no fruit, and female flowers in the same species occur on a separate plant. To set fruit, pollen from the male plant must be carried to the female flower.

Some plants simultaneously bear both male and female flowers, but still require cross-pollination to set fruit. Then there is a third class in which both sexes occur in the same blossom. Some of these plants can set fruit with their own pollen. But in many plants pollen from another is necessary to set a full crop of fruit or seed.

The blossom of the apple, for example, contains both sexes, but in most varieties the pollen produced is not suitable for pollinizing its own blossoms. Its flowers must be fertilized by pollen from an entirely different variety. Thus, if blossoms of the Grimes Golden are cross-pollinated from the Jonathan, a good set of fruit should result, but the pollen of the Stayman produces little or no fruit when transferred



Photograph courtesy U. S. Department of Agriculture

#### A LANDLORD OUSTS HIS TENANTS, BUT PROVIDES A MODERN HOME

He puffed smoke into the old hive, then broke it open. Lifting out chunks of comb and honey, he brushes off the clinging bees near the door of the new hive (right), which they occupy readily. The keeper may destroy the old hybrid queen and give the colony a prolific young Italian (see text, page 425 and Color Plate VII). The exposed brood combs are thick and black, indicating that many generations of larvae have been reared in them.

to the Grimes Golden. When all pollen except its own is excluded, the Grimes Golden produces little or no fruit.

#### "THE PRIESTS OF THE FLOWERS"

"The priests of the flowers" honeybees have been called, since they perform the marriage ceremony of the plants.

Although the honeybee is by no means domesticated, it is easily controlled. Consequently, millions already are being moved from one section of the country to another and placed in orchards and on farms. Bee men in the South even offer for sale a pollination package, a wire cage filled with bees.

The grower distributes the requisite number throughout his orchards, opens the cages, and leaves the rest to the bees.

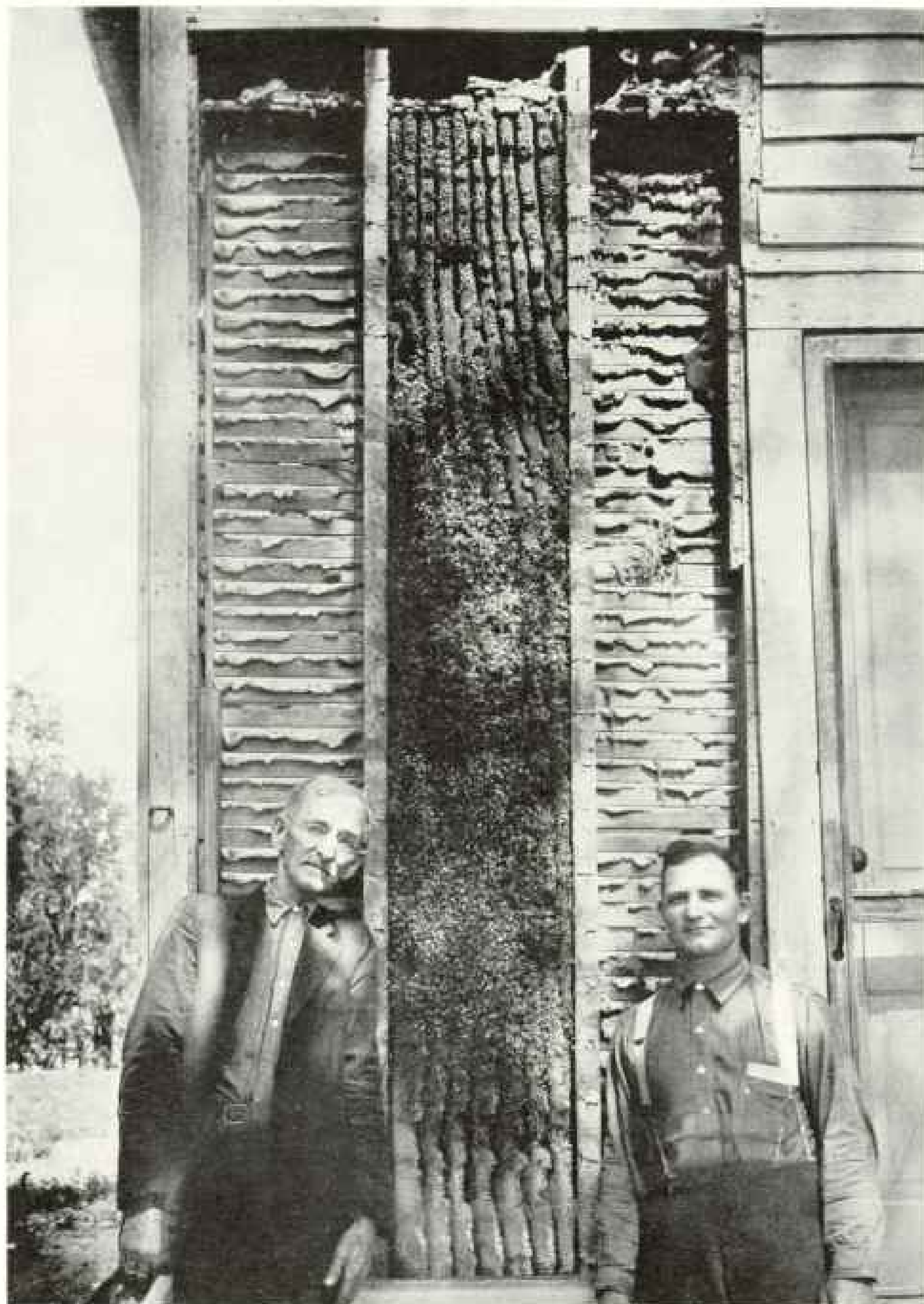
Hundreds of full colonies are rented to orchardists during the peak of the blooming period. The bee has also largely replaced the camel's-hair brush in pollinating cucumbers under glass.

Were it not for the work of the honeybee, most of our apple, pear, plum, and cherry orchards would bear poor crops, the growing of certain forage crops would be unprofitable, and the variety and quantity of our vegetables would be materially reduced.

#### BEE CITIZENS OF MANY LANDS

Honey and beeswax are produced over a wider geographical range than any other agricultural crop. There is scarcely a country in which honeybees are not kept. They inhabit the Tropic and Temperate Zones,





Photograph by Grover Mobley.

**A RUNAWAY SWARM BUILT THIS HONEYCOMB SKYSCRAPER**

If a beekeeper isn't on hand to capture a swarm as it issues, the whole group, after clustering, may make a "bee line" for a hollow tree, a vacated woodpecker nest, or even a rocky cavity in the earth (see illustration, page 406, and text, page 412). This colony chose the space between the inner and outer walls of a building in Garden City, Kansas, which they occupied until ejected by the State Bee Inspector, who stands at the right.

they are found in the deserts, on the mountains, in the plains, and in swamps, and as far north as Alaska.

Scattered over the world are several distinct races, such as the Italian, Carniolan, Caucasian (Color Plate VII), and Cyprian. All races, everywhere, react in almost the same manner. A skillful beekeeper can succeed in Australia as well as in Ohio, provided he keeps an eye to the weather and studies the local flora.

If honeybees are properly handled, there is no more danger in caring for them than in raising chickens. However, the belief that bees learn to know their master and will not sting him is without foundation.

During the active season the average life of a bee is six weeks. The first two weeks are lived almost exclusively within the hive (Plates II and VI), but thereafter the bees pass most of the daylight hours in the fields when the weather is good, in search of pollen and nectar. Since the beekeeper rarely opens the hive more than once a week, there is little opportunity for the bees to become acquainted with their owner.

Some persons are so constituted that one sting may prove highly dangerous to them and require immediate medical attention, but these cases are rare. Although it may not be dangerous to most persons, a bee sting on the eyelid, the lip, or the face does not enhance a person's beauty.

#### THE WEDDING FLIGHT OF A QUEEN

During the active season, a normal colony contains one queen, a fully developed female; thousands of unproductive worker bees, which are females only partly developed; and several hundred drones, or male bees (Plate II). The queen is endowed with great powers of reproduction, since she can even produce male progeny without mating, but she cannot produce female bees, workers or queens, without going through the marriage ceremony. Thus, the maligned drone is indispensable to the completion of the immortal cycle of the honeybee.

Upon the wedding flight of the queen depends the subsequent development of the colony. On a bright spring day the virgin queen emerges from the hive and soars away to seek a mate from among the hundreds of drones cruising about in the warm sunshine. Blissfully, perhaps, the drone is seeking an encounter that will cost him his life but insure the perpetuation of his race.

A moment after mating, the drone dies and the newly mated queen at once becomes a widow. But this one mating enables the queen for the rest of her life, three or four years, to perform her maternal duties.

A few days after returning to the hive, she begins egg laying, slowly at first; but at the height of her career she may lay as many as 1,500 eggs a day and maintain this rate for days at a time (Plate III).

She lays two kinds of eggs. One kind is unfertilized and hatches into a drone, or male bee. Mating has no influence upon this part of her family. Her sons are not the sons of her mate or husband, and are consequently fatherless, but they can claim a grandfather.

The other type of egg is fertilized by the queen with a male cell, of which she retains an almost unlimited number in a special organ of her body. The fertilized egg hatches into a female bee, usually a worker.

Thus both workers, or neuter bees, and queens come from the same kind of egg. Yet the two show marked differences. The queen has the function of reproduction; the worker bee has not. The queen bee possesses teeth on her mandibles, or jaws; the worker bee has smooth jaws. The worker bee has pollen baskets (Plate V); the queen lacks them. The worker bee has a straight, barbed, unretractable sting; the queen has a curved, smooth sting. The worker bee loses its life after stinging, but the queen does not (Plate IV).

A worker bee takes 21 days to develop from the egg to the adult, while a queen, who is much larger, requires only 15 or 16 days. The colony itself has the power of determining whether a fertilized egg shall develop into a queen or a worker bee.

During its normal existence, only one queen is necessary to maintain the population of a colony. Unlike the worker bee, who lives but six weeks, the queen may live two, three, or more years, but eventually she also becomes old and decrepit. Then a new queen must be raised to carry on the life of the colony.

#### HER MAJESTY IS FED "ROYAL JELLY"

The raising of a new queen is entrusted to the worker bees. An egg or a newly hatched larva less than three days old is selected. The cell in which the larva is deposited is broken down and enlarged and the heiress apparent is given special care and attention from this time on. For the



Photograph by J. C. Carter

#### A NEW HOUSING PROGRAM GETS UNDER WAY

Without veils or gloves, these Chinese coolies are capturing a black mass of bees clinging to the foot of a tree on the hillside. They trust the good-natured swarmers, which are gorged on honey consumed before leaving their old home. The swarm is smaller than those that issue from well-cared-for colonies.

first three days worker and drone larvæ are fed royal jelly, a milky white secretion from the glands in the heads of worker bees (Plate III). After the third day a coarser food, such as nectar and pollen, is given them. The queen larvæ, however, are fed royal jelly exclusively throughout the larval stage, which lasts five and a half days.

The difference in diet during the two and a half days, therefore, determines whether the larva will develop into a bee that cannot reproduce but possesses all other maternal instincts, or one that has the function of reproduction but lacks all maternal instincts, for the queen becomes

virtually an egg-laying machine.

There is no evidence that she has anything to do with the regulation of the colony. She gives no attention whatsoever to the raising of her young. She does not help feed them, nor does she gather stores, or take part in the defense of her family. These duties fall exclusively to the lot of worker bees.

From the endless flight of bees at the entrance of the hive, it would appear that most of the energy of the colony is consumed in the rather hazardous task of gathering nectar, pollen, and water (Plate IV). However, the work done by the corps of young bees approximates that of the field bees, since every conceivable task within the hive must be performed by the bees not yet old enough to fly.

The hum of industry within the hive continues throughout the 24 hours. Before the queen lays, each cell which is to receive an egg must be cleaned and polished until it

shines. Since she lays 1,500 eggs a day, and it requires three days for the egg to hatch, there may be as many as 4,500 eggs in the hive to be cared for at one time. The number varies with the season.

Upon hatching, the young bee is a footless and blind larva and as such goes through an intensive feeding period of six days (Plate II). Thus the nurse bees are taking care of six different sets of larvæ, each age group requiring special care and food. Within six days a larva will increase in weight as much as 1,500 times and therefore it requires constant feeding. After the sixth day the larva is given no more food;

a porous cap is placed over the cell and it spins its cocoon. In this stage it remains for 12 days, developing from a wormlike grub into a fully matured worker bee. Thus the period from egg laying to maturity is 21 days, and there will be 12 sealed-in age groups in the hive at one time (Plate II).

The nursery duties occupy only a portion of the available workers. Others build new comb from the wax which they themselves secrete. Hundreds of new cells are necessary to store incoming nectar. The bee that brings the nectar from the field does not deposit it in the cell, but gives it to a nurse bee, who, in turn, places it in that part of the hive where the process of conversion into honey will begin.

#### THE HIVES ARE AIR-CONDITIONED

Newly gathered nectar generally contains so much water that, if it were immediately stored, it would soon ferment. The bees, therefore, remove the excess moisture, largely through a well-organized and efficient system of fanning (Plate I). In the midst of a good harvest a hive may lose one-fourth as much during the night as it gained the previous day.

The temperature is regulated much more closely than in most modern homes. The bees are able, even with a range of 50 degrees outside, to keep the temperature of the brood nest within two or three degrees of normal. The warm weather of midsummer finds each colony well equipped with a cooling system composed of a corps of fan-



© R. O. Pease

#### AFRICAN NATIVES HANG THEIR HIVES AMID THE BLOSSOMS

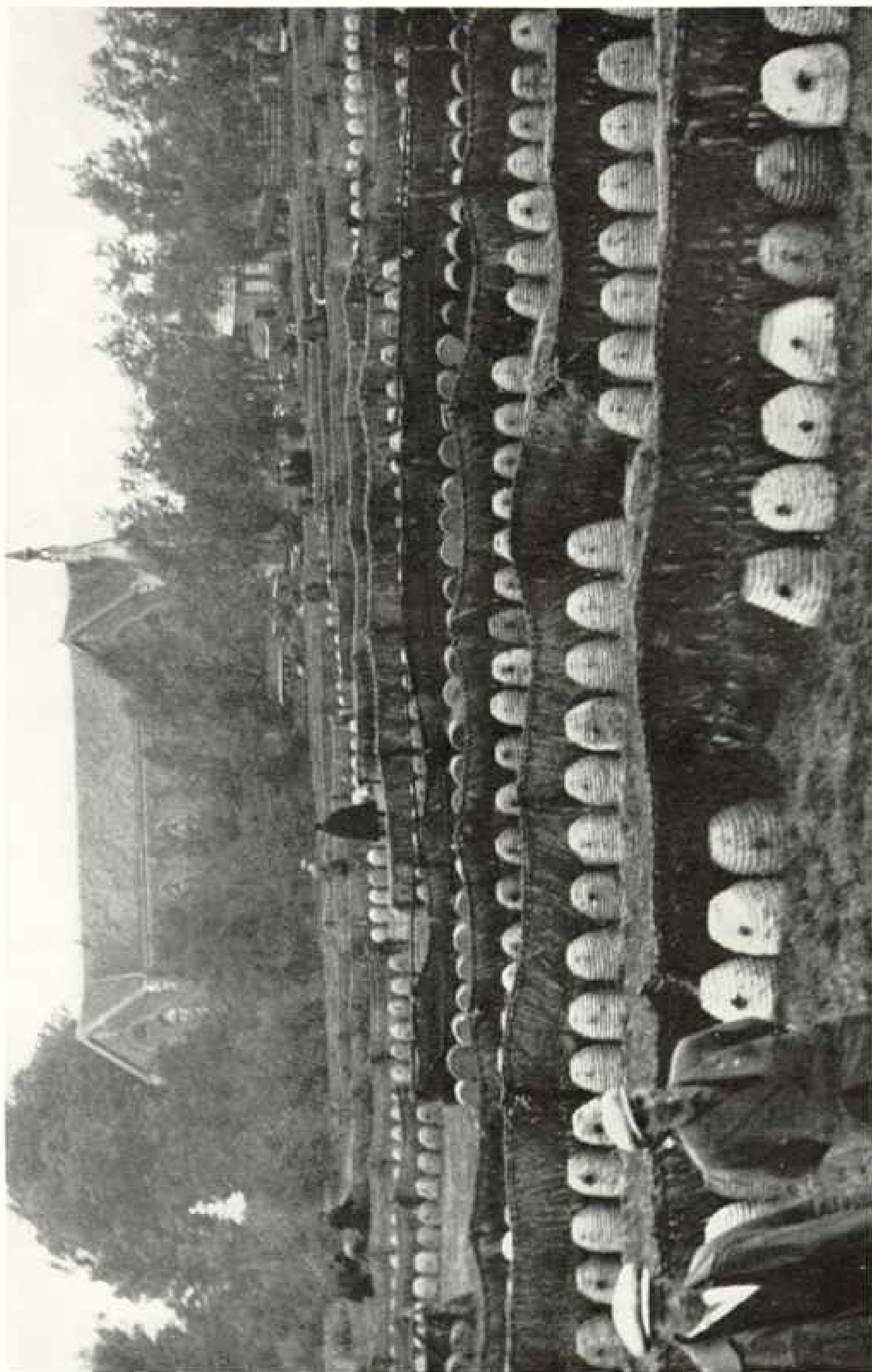
Modern beekeepers place their colonies near the ground, enabling heavily laden workers to enter easily. A hollow tree trunk closed at each end except for a small hole for the bees to enter serves as this hive in Kenya. To tap the sweet harvest is a messy, risky job if the bees have not been smoked to death beforehand.

rearing must be maintained uniformly throughout the active season.

Transforming nectar into rich, mellow honey requires more than the evaporation of excess moisture. The bees add certain enzymes which convert the complex sugars of the raw nectar into simple sugars, known to the chemist as dextrose and levulose. When honey is eaten, these sugars are therefore absorbed without any preliminary digestion, that having taken place in the body of the bee.

The skillful bee chemists not only preserve for us the sweetness of the flowers, but the perfume, the mineral salts, and certain





© Kurt and Margaret Lubbock

**"BUY HALF A ROW OR NONE" IS THE CUSTOM IN THIS DUTCH BEE MART**

Buyers and sellers once a year bargain noisily for some 2,000 skeps, or straw hives (Plate VI), each inhabited by about 20,000 bees. Reed mats, row upon row, protect the colonies from wind and rain. Natives boast that this market in Veenendaal, Province of Utrecht, The Netherlands, is the largest of its kind in the world.



Photograph by Willard R. Calver

"LOOK, THERE GOES A BIG DRONE!"

The children are studying the brood nest of the glass-walled observation hive in the Smithsonian Institution, Washington, D.C. (see drawing, page 411). In the glass dome on top, bees have begun to construct the irregular honey-combs they make when unguided by frames. The fountain jar (right) contains sugar syrup, fed to the bees when nectar is scarce. Behind it slopes a long glass passageway used when the bees garner nectar outside.



© Kurt and Margot Lubinski

A FALL WOULD SPILL PANDEMONIUM!

Netherland country folk bring their bee skeps for miles to the Veenendaal market, where bidders lift the colonies to estimate the honey content (see illustration, opposite page). Inmates of the heavier hives are "brimstoned"—killed by sulphur fumes—and the honey is removed, while the lighter ones are kept through the winter in the hope that they will make more honey during the next season.



© Kurt and Margot Lubinski

#### STOGIES AND SMOLDERING PIPES AID MECHANICAL SMOKERS

As long as seller and buyer slap hands after each bid, no bystander may interfere by raising the offer, according to the rules of this Netherland bee exchange. When bees swarm in the market, the new colony is publicly sold and the proceeds are donated to charity.

nitrogenous products which the plants liberate in the nectar. All these ingredients are processed in the laboratory of the hive so that we have many varieties and colors of honey (Plate VIII), each peculiar to its flower, each with its distinctive bouquet, color, and characteristic flavor.

#### EVERY YOUNG BEE HAS ITS TASK

Young bees perform manifold duties in maintaining the colony, which, being a self-sustaining community, imposes upon each individual certain health, sanitation, and protective duties. A temperature of about 93 degrees Fahrenheit must be maintained in that part of the hive where the queen lays and where all the young bees are reared. This is a concentrated area near the center of the hive, spherical in shape, its size depending upon the population of the hive and the season of the year.

After a cell has served as a cradle for the birth of a young bee, it is thoroughly cleaned. Abnormal larvæ are not permitted to mature as deformed adults, but are removed from the hive. Sick and ailing bees are also encouraged to leave and

to die outside. Any bees that die while at work are immediately carried out and consigned to the winds.

When they are from a week to ten days old, the bees venture into the outside world for the first time, usually on short flights of only a few feet in front of the hive. During these so-called play flights, they learn to use their wings and no doubt also note the location of their homes. Toward the close of their duties within the hive young bees appear more often at the entrances until they eventually take over the duty of defending the colony (Plate I). Several dozen may assume this responsibility.

#### A SHORT AND BUSY LIFE

On their first trip to the field, young bees gather water or propolis. The latter is a resinous, gumlike material called bee glue, garnered largely from the buds of various plants and trees. It is used to close the cracks in the hives, to smooth over rough places, to cement the combs securely in place, to regulate the size of the entrances the better to guard the hive, and to control the temperature.

The next duty is that of gathering pollen and, finally, nectar. In an emergency the field bees can resume nursery duties again, but when a bee becomes old enough to work in the field it usually dies in its boots, literally working itself to death.

A newly emerged bee is covered with fluffy golden hair. After four weeks in the field it is darker, much of the hair has been worn from its body, and its wings are tattered and torn (Plate VII). Eventually it will no longer be able to sustain itself in flight. Thus its life span is measured largely by the amount of work done. The bees reared late in the fall, when there is little or no work to be done in the fields, live all winter.

Whenever plants are in blossom and it is warm enough for the bees to fly, they go forth at daybreak and continue until nightfall, or until it becomes too cold or rainy to work. Drop by drop the nectar comes into the hive. The storage of more food than the colony can consume for its own needs seems an incredible task, yet in a favorable locality strong colonies have brought in as many as 25 pounds of nectar in a day.

A steady stream at the entrance continues day after day, the bees going several miles and returning unerringly to their homes. Bees have flown eight and a half miles away from the hive in search of food, although usually they forage within a mile or two of the hive, going no farther than necessary.

#### A SINGLE-TRACK INSTINCT

In gathering nectar and pollen, the bees do not fly aimlessly, as butterflies do, from one species of flower to another. If a bee starts working on dandelions, for example, it will continue throughout the trip to visit only dandelion blossoms, and in all likelihood it will continue working on dandelions as long as it can obtain a modicum of nectar or pollen. Another bee from the same colony may concentrate on apple blossoms, in which case it carefully avoids the blossoms of pear trees or other varieties. It may even have to fly over acres of dandelion-studded meadows before reaching another apple tree, but its instinct keeps it to a single track.

Such constancy makes the bee a dependable pollinizing agent. If it collected indiscriminately from the flowers, its work would be less effective (see text, page 402).

The pollen of the apple would not benefit the blossom of the pear, and vice versa. Changes in atmospheric conditions, or in the plants themselves, may cause a wholesale change in the work schedule.

Some plants secrete nectar only a few hours a day, while other plants may continue throughout the day; and, since bees wisely seek the richest source of nectar, they may suddenly desert one plant for another that proves more tempting. The richness of this sparkling drop of nectar, which the blossom offers to the bee in exchange for the pollen from another blossom, causes the bee to accept the highest bidder.

Although bees invariably effect pollination in the blossoms from which they obtain either nectar or pollen, the latter is so indispensable to the welfare of the colony that the bees are compelled to visit countless numbers of flowers which secrete little or no nectar but which do furnish them with pollen. Thus the bees pollinize numerous varieties of plants.

#### WHY A BLOSSOM "WEARS" PERFUME

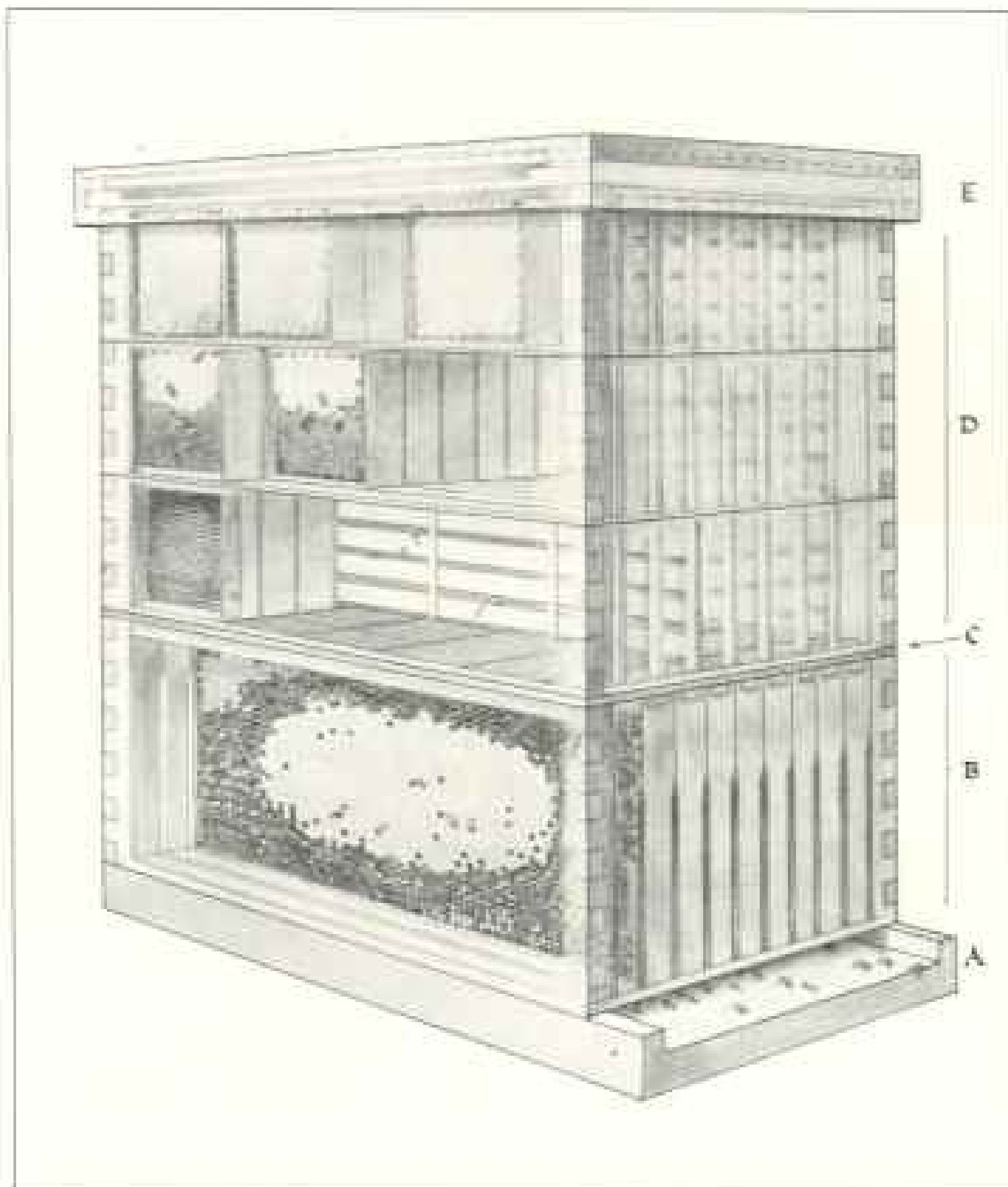
The worker bee is particularly adapted to gather pollen. Almost every part of its body is covered with hair (Plate V). Many of the hairs are long, lacy, and branched; spikelike hairs even grow between the facets of its compound eyes (page 426). When a bee alights on a flower that has abundant pollen, the pollen grains become entangled in its numerous hairs, and in gathering a load to carry back to the hive, the bee brushes over the stigma of the blossom, inadvertently transferring to its sticky surface grains of pollen. For this act the blossom lives and offers its alluring perfume and enticing nectar.

Shortly after pollination is effected, the blossom wilts. After thoroughly covering itself with pollen, the bee hovers above the flower for several seconds, combing the pollen from itself and packing it securely in the two pollen baskets on its hind legs (Plate V). Thus it can carry two pellets, each almost as large as its head.

#### "BEE BREAD" IN THE HIVE'S PANTRY

Upon reaching the hive, the bee inserts its hind legs into a cell and pries off the two pellets of pollen. There a young bee, with its head, rams the pollen into a compact cake into the bottom of the cell. Pollen is not mixed with honey. It is stored in sep-





Drawing by Hashime Murayama

## AN ARTIST'S VIEW OF A HONEYBEE WORKSHOP

Bees enter the "city's" guarded gateway across the bottom board (A). The queen lives in the 10-frame nursery or brood chamber (B). The patch of capped cells in the long lower comb contains the brood, not honey. Immediately above, a wire screen, or "queen excluder" (C), with spaces large enough to allow only workers to pass through, prevents Her Majesty from invading the honey storehouse above and laying eggs in (D). No larvae are found in the square honeycombs, which may some day grace a family table. The cover (E) protects the colony from rain, and contains an insulating air space.

arate cells close to the brood nest, where it is readily available to the nurse bees (see text, page 406).

The pollen furnishes the fat and protein in the diet of the honeybee, while the nectar supplies the carbohydrate. The adult bee can sustain itself on a pure carbohydrate diet, but the developing bees must have the other two ingredients. Pollen stored in the hive is often referred to as "bee bread."

Early in the spring, when the alders and willows are putting forth their fuzzy catkins, the bees go forth to search for food so that the queen may start egg laying. From then on, progress depending upon the

weather and the amount of food available, brood rearing continues at a constantly accelerated pace. Within a few weeks the hive becomes so populous that there is no more room where the queen can lay and no more space in which to store honey.

With food available from myriads of flowers, but with no place to store it, the bees prepare to relieve the congestion. The time has come when some must go. This corresponds to the time when fledglings are pushed over the rim of the nest and made to seek their own way in the world. But with the honeybee the young are left to carry on in the established home, and it is the old queen and the flying, or older, members of her family who search for other quarters and begin the labor of constructing a new home.

The first indication that swarming may be imminent appears when thousands of

bees cluster at the entrances, literally loafing. The hive boils over with bees. Inspection within reveals the presence of several pendulous peanut-shaped queen cells (Plate III), an almost infallible indication that the hegira is about to take place. Each queen cell holds a prospective heiress, possible successor to the old queen.

## SWARMING THEIR GREAT ADVENTURE

The reigning queen and her daughters do not wait until the heiress actually arrives, however, but on the first bright warm day after the queen cells are sealed a mighty commotion heralds the issuance of the swarm. This usually takes place from 10 to



Photograph courtesy U. S. Department of Agriculture

ALL TUCKED IN WITH FELT QUILTS FOR A LONG WINTER'S REST

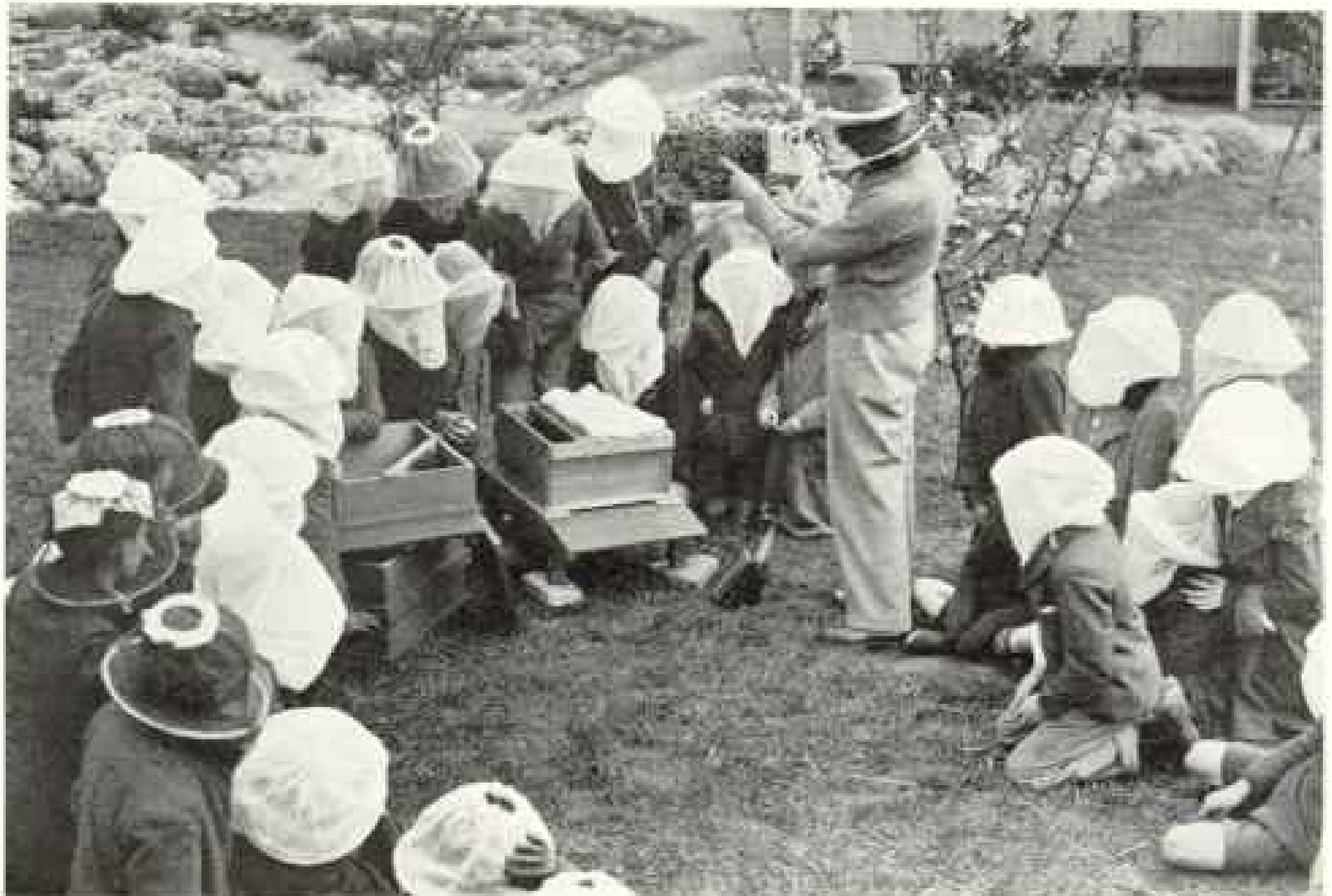
Honey-filled supers, which were stacked high above these brood chambers during the summer, have been removed, leaving only enough food to last the bees through cold weather (see Plate VI). Queens cease egg laying as freezing weather approaches and then workers go outside only on occasional warm, sunny days. Though during the honeyflow bees may work themselves to death in six weeks, those hatched late in the fall live until spring (see text, page 411).



Photograph by Herman H. Kreider

THIS TURKISH BEEKEEPER STACKS HIS HIVES

Boxes have no movable frames inside, honeycombs being firmly attached to the under side of the covers. Open a hive, turn the lid upside down, and the family life of the colony is disclosed. A stone wall at the rear provides protection from wind, and the reed matting over the apiary keeps out moisture and cold.



Photograph from Topical Press Agency.

**HEAD VEILS MAY GIVE STUDENTS CONFIDENCE, BUT BEES WILL FIND A WAY!**

This class, which included 40 English youngsters, ranging in age from eight to 12½ years, harvested 150 pounds of honey in one season from four colonies near London.



Photograph courtesy U. S. Department of Agriculture

**A CLUSTER OF HOMESTEADERS INSPECTS A NEW HOUSE**

When swarming, thousands of bees rush pell-mell from the old hive, setting up a buzz heard hundreds of feet away. The disorderly cloud usually settles first on a near-by bush or tree limb before setting out for a home of their own choice (see illustration, page 406, and text, page 412). This keeper has captured such a swarm and laid it in front of a new hive, which the bees will enter willingly. Tied trouser legs keep crawlers from exploring.

12 o'clock in the morning. Most of the bees that have attained flying age (and this includes virtually all the field bees) rush out of the hive, tumbling over one another in their eagerness to taste the thrills of the great adventure.

Back and forth in front of the hive, in sharp straight flights, they take wing until thousands are in the air, the queen with them. Likely as not, this flying entanglement will shortly move toward some tree or fence post. A few bees settle, and then a few more, until within 10 to 15 minutes all have alighted in a tightly packed mass.

Shortly after the swarm settles, scout bees fly in all directions to search for a new abode, or, being fore-minded, they may have attended to this duty several days before. If a place already has been located, the bees may take to the air again within a few minutes. Assuming a formation that looks like a hazy smoke ball 10 to 20 feet in diameter, the swarm gradually works its way through the tree tops and, clearing all obstructions, seems to float like an enormous soap bubble, making a "bee line" toward its new home.

If the scouts fail to find a hollow tree or a cozy nook in someone's attic, the bees will continue to hang at their first stopping place for several hours, or even for several days. Should the scouts fail entirely in finding habitable quarters, the bees may decide to "camp out" and build their comb in the open air.

All the young bees, the brood, the honey, and the combs, including interest and good will, are left in the parent hive.



Photograph by International News

#### DON'T STROKE THIS BEARD OF BEES!

A Vincennes, Indiana, fancier handles his pets gently and says he has little fear of stings. Apiarists are stung frequently, but some are less affected by the poison than others (see text, page 405). Bees are most agreeable about midday. Their anger rises quickly if the keeper blows his breath across them, or squeezes them, or if they become entangled in his hair.

Within a few days, a new queen issues from the oldest of the queen cells. Apparently aware that she is born to the royal purple, she at once seeks to clear the hive of any possible rivals. She makes a thorough search for queen cells and mutilates each by tearing a hole in its side. She may even render the occupant *hors de combat* by giving her a fatal thrust with her sting.

#### THE VIRGIN QUEEN PLANS HER WEDDING

A few days after emergence the young virgin queen selects a day for her wedding flight (see text, page 405). She usually chooses a clear, warm, quiet day because



her honeymoon is short, and she must make the most of it. Only when she leaves the hive with a swarm, probably a year hence, will she have another occasion to fly.

Mating always takes place on the wing, and if conditions are such that the queen cannot fly she will die a virgin. The strongest drone is her mate, for the queen is a good flyer, and the weak are thus eliminated in this wise provision to maintain the strength and vigor of the race.

Before the queen has had time to return to the hive after the mating flight, the drone will have fallen to the earth dead. There is an old saying that the drone no sooner becomes a husband than he is a corpse, and the queen no sooner a bride than a widow.

Because of her specialized duties and the fact that she does not engage in outside work and is not subject to the hazards of weather and enemies that might prey upon her, the queen may live to the ripe old age of three or four years. When she becomes too old, or when she can no longer produce queen and worker bees, or if she becomes accidentally crippled, the bees will raise another queen to replace her and for a while both mother and daughter may work side by side in the hive. But this arrangement does not last long. The old queen will shortly disappear.

The marked differences between the queen and worker bee, both of whom come from the same kind of fertilized egg, have already been mentioned (see text, page 405). Their difference in behavior is even more pronounced. The worker bee is armed with a straight sting, the end of which is barbed like a harpoon (Plate IV and page 427). When a worker bee stings, it cannot disengage its sting. The violent effort of tearing itself loose from the well-anchored sting so severely damages the tissue of its body that it dies within a few minutes. Normally it can sting only once, and in doing so it defends not itself but the colony.

#### A QUEEN FIGHTS ONLY A QUEEN

The sting of the queen, instead of being straight and barbed, is smooth and curved. It is constructed so that it can easily be withdrawn when she uses it. The queen seemingly does not realize that she possesses this very effective weapon. She may be picked up and handled as harmlessly as a kitten. Her instinct to battle is aroused only in the presence of a rival queen.

If the queen gets into the wrong hive in returning from her mating flight, a royal battle is sure to ensue, and the two queens fight it out until death comes to the weaker. The worker bees make no attempt to protect their own mother. Here again is the survival of the fittest. Close observers say that when two queens in a rough-and-tumble battle get into such a position that both are apt to receive a fatal thrust, the bees separate the two and then let them come together again until one or the other has the advantage. If the mother queen is slain, the intruder, having proved her superiority, is allowed to take the place of the former queen.

If the queen used her sting indiscriminately, she might easily lose her life in meeting an enemy with which she could not cope. If she were being handled by her keeper and attempted to free herself by stinging him, he might instinctively retaliate by crushing her frail body. Should he do so, it would jeopardize the future life of the colony, especially if there were no larvæ in the hive from which a successor could be raised. For her protection, therefore, she depends upon her own daughters or sister workers, who far outnumber her and whose sacrifice is not so fatal to the well-being of the colony.

#### THE DRONE IS A DINER-OUT

The drone usually is regarded as a lazy individual, but, after all, he is the father and is entitled to certain respect. He gathers no food, nor does he help defend the family; he has no tools to collect sweets nor has he a sting to defend even himself. During his brief existence, however, he has certain privileges not accorded his sisters. He can safely visit neighboring colonies. Neither workers nor queens are accepted in other hives, but during the breeding season drones are allowed to come and go as they please.

When the breeding season is over, and the honeyflow comes to a close, the bees become more economical with their food supply, which must carry them through the long, cold winter. Then they drive all the drones from the hives, thus dooming them to perish soon for lack of food and shelter.

The person who can recall the names and faces of several hundred acquaintances is unusual; yet in a family of 80,000 individuals the bee instantly recognizes every member. It is evident that recognition is not

IN FIELD AND HIVE WITH THE BUSY HONEYBEE.



ALERT GUARDS POUNCE UPON A HAPLESS STRANGER.

Although the bumblebee is much larger and stronger than the attacking honeybees, the ferocious fighting workers make quick work of the casual visitor with their stings. Each colony has a distinctive odor, so that sentinels even recognize and pounce on invading honeybees from other hives.

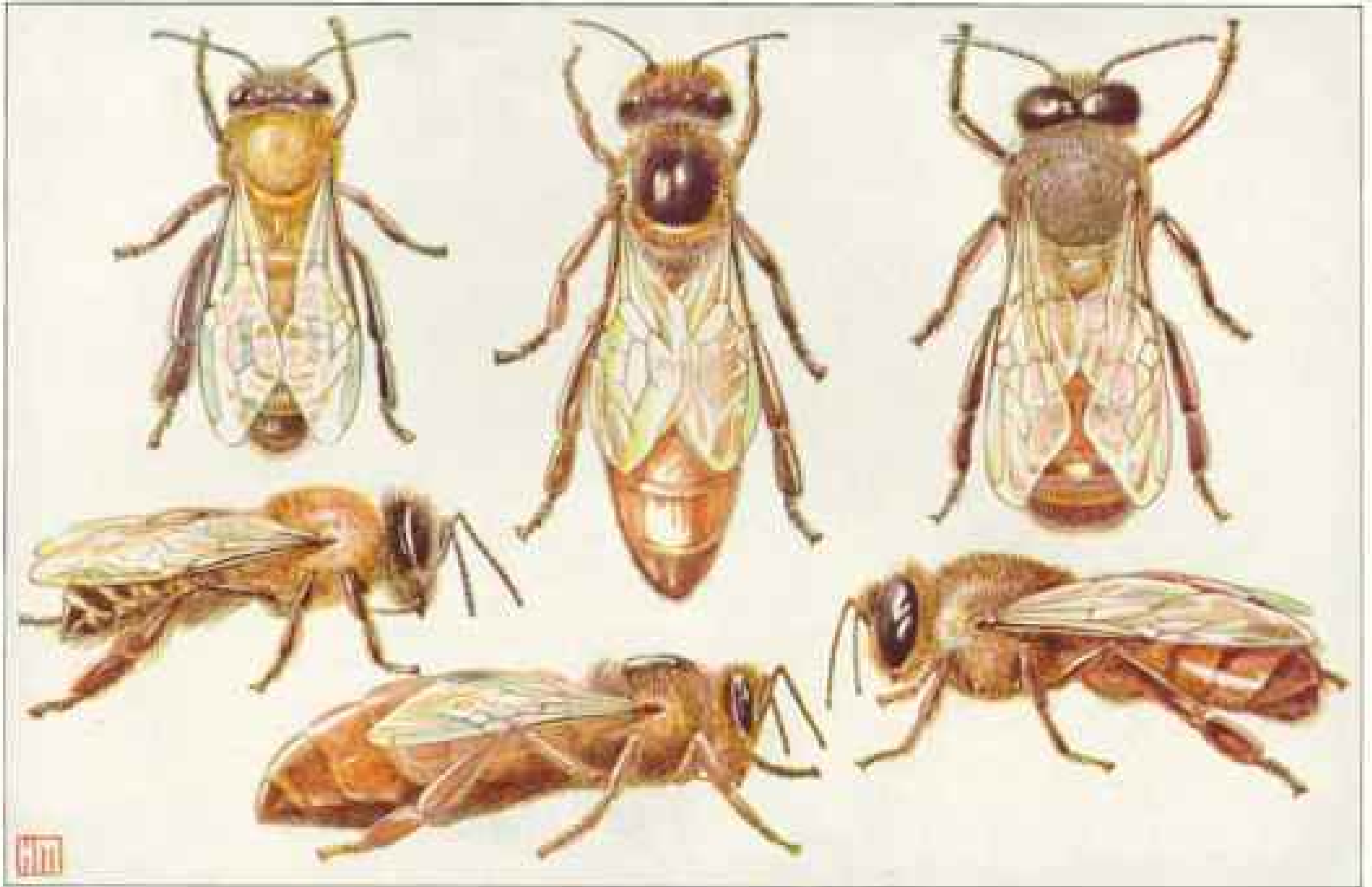


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Paintings by Hashime Murayama

THE AIR-CONDITIONING APPARATUS OF A BEEHIVE HUMS AT ITS DOOR.

The idea of an air-cooled home is not new. A corps of firmly anchored fanners make their wings vibrate on a sill, thus causing circulation and keeping the temperature even within. This process also draws moisture from the newly gathered nectar, which is evaporated to the consistency of honey.



THREE KINDS OF HONEYBEES ARE FOUND IN A COLONY

The mother of all bees in a hive is the queen (center), whose long body is more graceful than that of her children, worker (left) and drone, or male (right). All figures three times life-size.



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THE GROWTH OF A BEE FROM EGG LAYING TO BIRTH

Three days after the egg is deposited by the queen (right), a tiny grub emerges (left column, second from top). For six days the larva is fed by workers, increasing its weight 1,500 times. Then it spins a cocoon (second from bottom, left) and becomes a fully developed worker bee (bottom center). Above the queen is a cell of pollen, and above that, one of honey.



IN FIELD AND HIVE WITH THE BUSY HONEYBEE



THE QUEEN'S LADIES IN WAITING KEEP HER WELL FED AND PREENED. Her diet is not honey and pollen, but "royal jelly," a secretion from head glands of her daughters. Workers (lower right) are cleaning cells. Two baby bees are gnawing their way out.

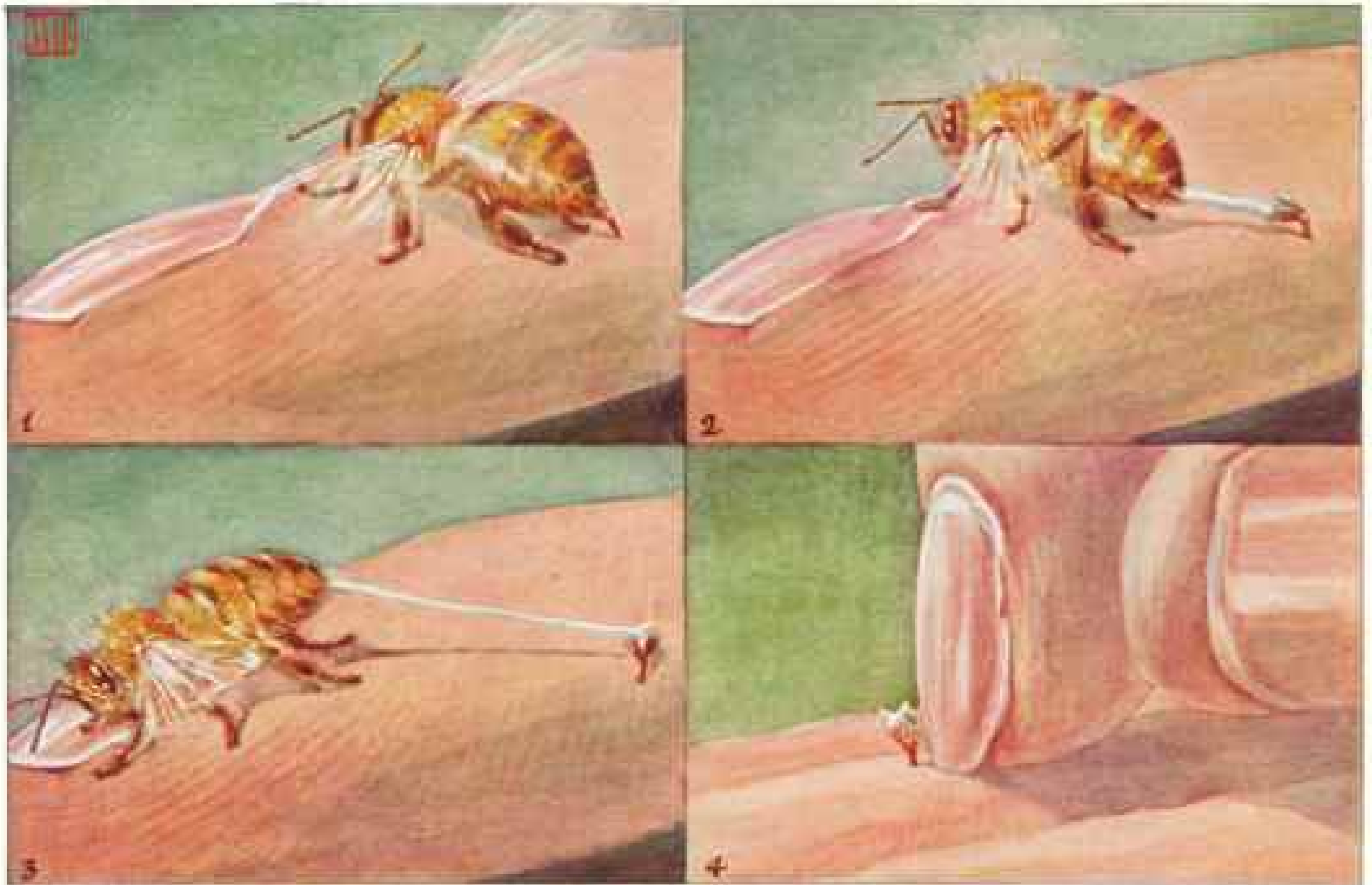


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THE QUEEN'S ROYAL BIRTH CHAMBER RESEMBLES A PEANUT SHELL

Although a queen is much longer than a worker or drone, she emerges from her pendulous cell only 16 days after the egg is laid, instead of the 21 days usually required for her industrious sisters. A drone perches on a group of male cells at the right, and on the opposite side are workers' cells. Mating takes place only on the wing outside the hive, after which the male dies.



A STING IS WORSE FOR THE STINGER THAN THE STUNG

The bee inserts its tiny harpoon in the flesh (1) so firmly that when attempting to withdraw it (2 and 3) the barb is severed from its body, tearing its delicate tissues and killing the bee. After a bee stings, scrape out the still throbbing stinger (4); pulling it forces more poison into the wound.



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ONCE A BEE HAS DRUNK AT A POOL, IT RETURNS AGAIN AND AGAIN

Honeybees consume quantities of water, as do cows, for they must supply water and the creamy secretion called "royal jelly" on which are fed the queen and larvae during brood rearing. Honeybees always attend strictly to business while drinking, and will not attempt to sting unless molested.



IN FIELD AND HIVE WITH THE BUSY HONEYBEE



A BUMBLEBEE TAPS THE HONEYSUCKLE AND WISE HONEYBEES FOLLOW BEHIND

Nectar is buried so deeply in many flowers that bees cannot insert their tongues to obtain it. Bumblebees cut holes in the lower part of the corolla with their sharp jaws and take out some nectar. The honeybee, with smooth jaws that cannot cut flower tissue, revisits the spot and obtains a sweet load.



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BRILLIANT PORTULACA BLOSSOMS YIELD AN ABUNDANCE OF CONVENIENT POLLEN

The bee literally rolls in the yellow dust of the flower, coating its hairy body. Then, hovering over the blossom, it combs the pollen off and packs it securely in baskets on the rear legs. Usually a bee obtains only one kind on a trip, so many workers entering the hive bear differently colored loads.



OLD-FASHIONED STRAW SKEPS GIVE WAY TO MODERN HIVES

The honey of former days, squeezed from the comb, was dark and often contained foreign matter. Whirling centrifugal machines now throw out the honey from shaved combs, yielding a cleaner, better product. A few puffs of smoke drive the guards back into the hive and make the bees more docile.



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AN APIARY AT THE CLOSE OF THE SEASON IS PILED HIGH WITH HONEY HARVEST

The rearing of the brood is confined to the lowest layer, the upper "supers" being reserved for marketable honey. Since usually not more than 200 colonies may be operated profitably in one yard, beekeepers owning thousands of hives may scatter their yards over several hundred miles.

IN FIELD AND HIVE WITH THE BUSY HONEYBEE.



WORKERS TAKE RINGSIDE SEATS AS TWO RIVAL QUEENS FIGHT TO A FINISH

In such struggles for supremacy, the battle is interrupted by the onlookers only when it appears both may die. Here a golden Italian queen is about to sting to death her darker adversary below, a gray Caucasian. Should their own mother be killed, bees will readily accept the new queen.



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A WORK-WEARY FIELD BEE PASSES ITS LOAD TO A YOUNG NURSE AT THE HIVE

Wings tattered and torn, golden hair gone from its body, this aged black, but once yellow bee is about to expire. The gray bee (right) is an immigrant from the Caucasus Mountains, the yellow ones being from Italy. Both kinds are thoroughly at home in the United States.





BEES BUZZ WHERE SWEET CLOVER BLOSSOMS GROW

Two hundred pounds of honey per season from one hive are not unusual in the Great Lakes-region, where this drought-resistant, soil-enriching plant is grown extensively.



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THE MOST SKILLFUL CHEMIST HAS BEEN UNABLE TO DUPLICATE THE PRODUCT OF THE BEE

Each species of flower produces honey of a characteristic color and flavor. The honey from the yellow star thistle of Sacramento Valley is yellowish green (left). That from orange blossoms has a pronounced bouquet. White buckwheat produces very dark honey. Appalachian tulip trees yield a rich wine-red, while from the purple blossoms of alfalfa comes a light honey.



through the sense of sight; instead, it is effected by the more highly developed sense of smell.

Every colony has a distinctive family odor, different from that of every other colony. If a strange bee attempts to enter a hive, the guards at the entrance detect its alien odor and drive it away (Plate I). When a colony is divided into two parts, the parts placed in separate hives and given queens that are sisters, the bees in each half develop different odors. Within a week's time they become total strangers to each other. Were the halves united again, the bees would disregard the existence of any relationship.

It sometimes happens that a beekeeper unites two or more colonies, which separately are too weak to produce a crop or to survive a hard winter. The usual method is to place one hive on top of the other, inserting a sheet of newspaper between them. The bees from both sides gnaw small holes in the paper and, in doing so, they "rub noses," but the holes at first are not large enough for the bees on either side to engage in combat. The apertures permit the mingling of the odors of the two units, so that by the time the holes are large enough for the bees to pass through, the two parts have an identical odor. Thus union takes place peacefully.

#### "CORONATION" OF A NEW QUEEN

If it becomes necessary to place a new queen in a colony, it is essential that she be properly "introduced." The old queen is removed at least an hour before the newcomer is "presented." In this interval the colony discovers that it is queenless and it may start constructing new queen cells.

Even though the colony desires a queen, it would not do to release the usurper, because her strange odor would antagonize the bees and endanger her life. She is placed in a wire cage to protect her from assaults. Although her new subjects would kill her were she suddenly released, they feed her by inserting their tongues through the meshes of the wire.

After the queen remains in this cage for two or three days, she will have lost much of the odor of her former hive and acquired that of her new abode. Even then her actual release must be accomplished quietly and without excitement. Her cage is provided with a plug of soft candy. Two or three days are required for the bees to

tunnel through. Meantime the odors have mingled, and the queen can walk out on the combs of her new home without undue risk.

Honeybees help perpetuate their race by their insatiable desire to gather nectar. Unlike bumblebees, hornets, yellow jackets, and wasps, honeybees cannot live from hand to mouth. They must store enough food during the summer to keep the colony alive throughout the winter. Of the four other insects just mentioned, all the individuals in each colony die at the approach of winter except the young mated queens, and these simply crawl into protected places where they hibernate. During this period they require no food.

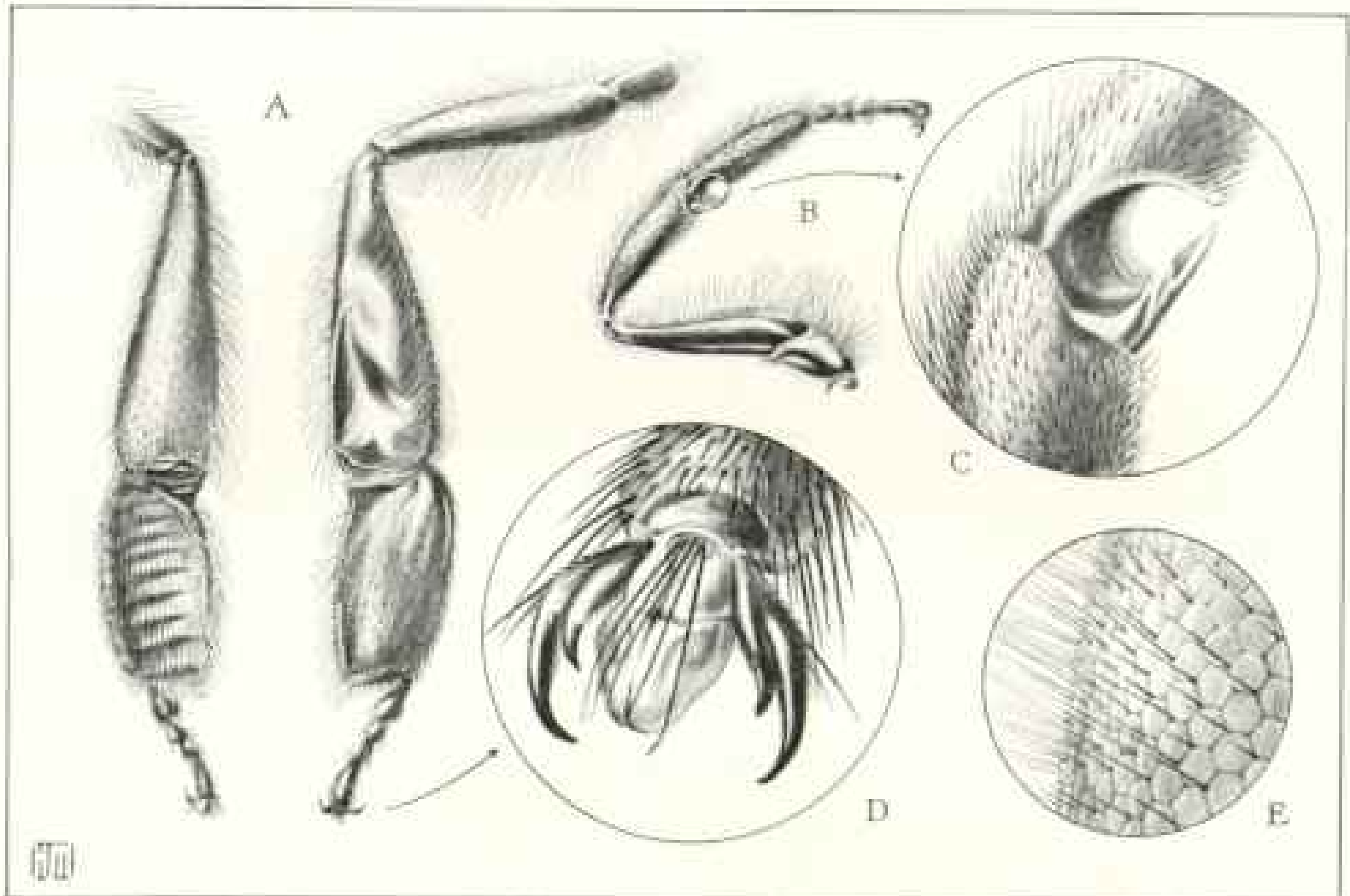
Among honeybees, only the drones die in the fall. The queen and the workers live and are semi-active throughout the winter (see text, page 411). It is important, therefore, to gather enough food during the summer to maintain the colony during seasons when insect activity largely ceases.

At the end of the swarming season, which coincides with the height of the breeding season, the queen lays fewer and fewer eggs until fall, when the rearing of the brood entirely ceases. Cold weather has overtaken the colony by this time, imposing changes in its organization to cope with low temperatures. Individual honeybees die of chill at temperatures well above freezing; in fact, they seldom fly when the temperature is lower than 45 degrees Fahrenheit. Hence the colony must maintain a life-sustaining temperature when the thermometer dips to zero or lower.

#### REGULATING WINTER TEMPERATURE

During the active season the bees spread over the entire interior of the hive; when winter comes, they gather in a spherical, compact cluster with the queen in the center. Those on the outside are crowded in a sort of insulating shell to prevent escape of heat. Those on the inside are in looser formation. Those in the center carry on muscular activity, which generates sufficient heat to keep the bees from chilling.

The bees do not permit the periphery of the cluster to fall below 57 degrees Fahrenheit; thus the colder the outside temperature becomes, the more muscular activity they must perform to maintain warmth. The bees composing the insulating shell change places at frequent intervals with those of the interior.



Drawing by Hashime Murayama

THE WORKER'S LEGS AND FEET ARE VERSATILE AND ITS EYES ALL-SEEING.

With the broad lower segment of its hind leg (A—inside left, outside right) the honeybee brushes sticky pollen from its body and sweeps it into the basket formed by the stiff hairs on the longer joint immediately above. In an aperture on each front leg (B) is a handy and perfect comb (C—magnified) with which the worker cleans its rodlike antennae. The sharp claws on each foot (D) enable the honeybee to cling to rough surfaces, while the pad between, kept moist with a sticky liquid, serves well on hard and slippery surfaces. Some 5,000 hexagonal-shaped facets, with interspersed hairs (E), make up each of two compound eyes. In addition, the honeybee has three simple eyes.

The average colony consumes from 30 to 50 pounds of honey during the winter and early spring, the quantity depending upon its strength, prevailing temperatures, and the condition of the hive. A thoughtful beekeeper packs his colonies in sawdust or other insulating material (see page 413), or places the bees in a properly constructed cellar during winter. Thus he decreases the consumption of honey and prevents the bees from aging too rapidly, insuring them sufficient vitality in the spring to renew brood-rearing activities.

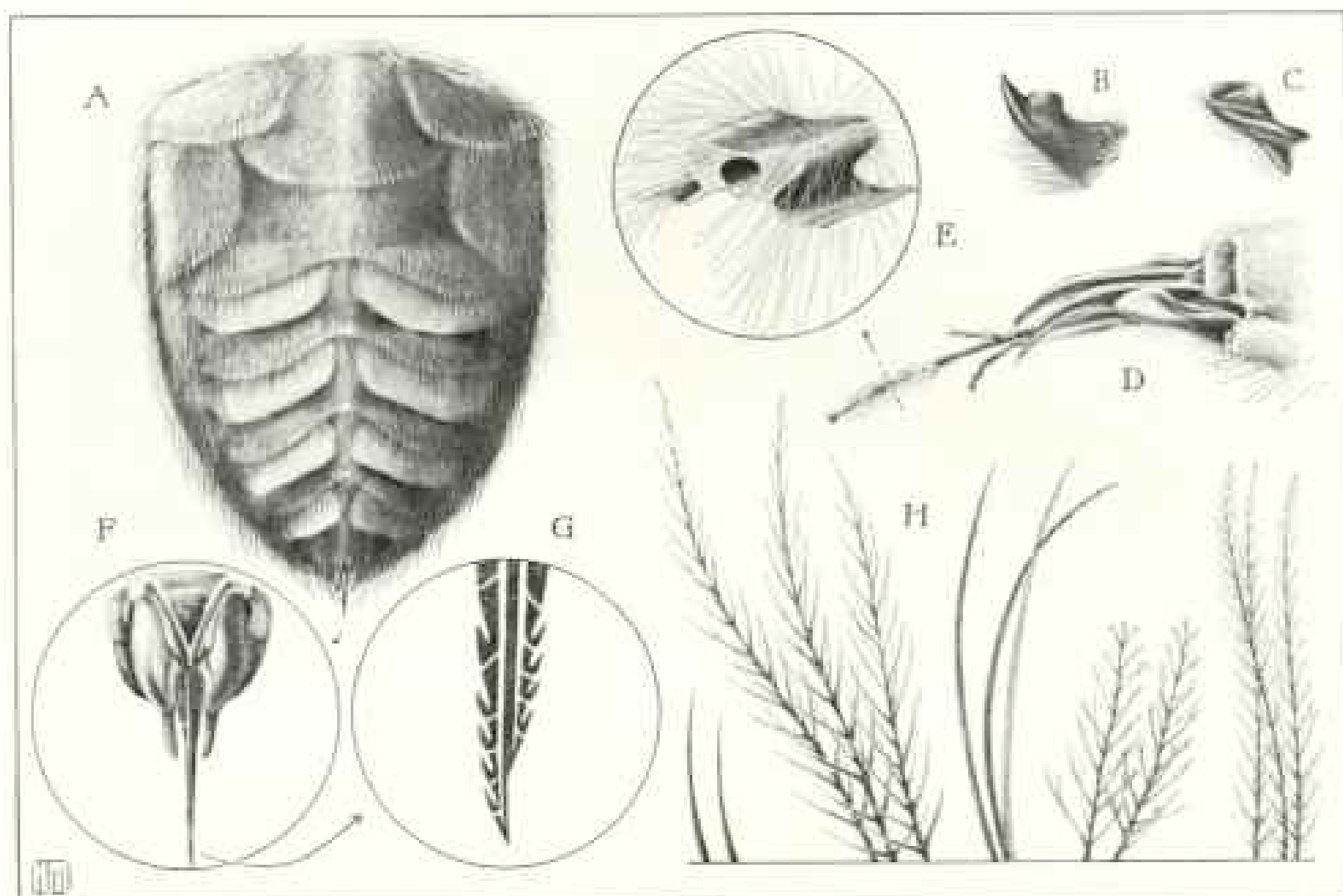
The U. S. Department of Agriculture estimates that there are approximately 4,650,000 honeybee colonies in the United States. This number will require about 165 million pounds of honey for its own consumption during winter; and, to carry on brood rearing and honey production during the active season, will need double this amount. Thus honeybees in this country gather some 500 million pounds of honey to maintain themselves during the year,

without a drop being available to place on our tables.

The marketable crop of honey in the United States varies widely from year to year, but a fair average is about 200 million pounds, making a grand total of approximately 700 million pounds credited to the labor of this insect. It has been estimated that if a single worker bee could gather enough nectar to make one pound of honey, she would have to work every day in the year for more than eight years, and in doing so she would travel approximately three times around the earth.

BEEKEEPING BENEFITS THE COMMUNITY

These astounding figures indicate the tremendous benefit honeybees render to our agriculture. To gather so much honey, they must visit myriads of plants in which pollination is effected. Therefore it can be understood why honeybees are of infinitely greater value to the community in which they are kept, in producing crops of



Drawing by Hashime Murayama

#### THE HONEYBEE'S ANATOMY VIEWED THROUGH A MICROSCOPE

The wax glands are located beneath the eight scales (A), that fit like shingles under the bee's abdomen. The circles below show enlarged details of the stinger (F), including poison sacs and the appendages that are left in the flesh. The stinger, highly magnified (G), is composed of two barbed lancets, each sharper than the finest needle. Poison flows down a central canal formed between the two lancets, which alternately work themselves deeper into the wound (see Plate IV). In the circle (E) is a cross section of the hollow, hairy tongue which protrudes from the mouth (D). The queen's toothed jaw (B) contrasts with the smooth mandible (C) of the worker. The various types of hair (H) that grow on a bee's body resemble certain plants.

seed and fruit, than they are to their owner, who is paid in honey and beeswax.

The supposition that the keeper of bees has nothing to do but watch the honey and money roll in is fallacious. Keeping bees is a specialized job, and one must have an inherent love for them. A thorough knowledge of bee behavior, gained only through experience, is a primary requisite.

Attention must be given to a vast number of details. There are plenty of griefs in connection with the business: the loss of bees during the winter is heavy; diseases of bees take a large annual toll; and wax moths, which destroy the combs, cause further losses. The operation of an apiary requires close personal supervision. Thus the production of honey is largely a one-man affair. In favorable localities, however, honey production is as remunerative as any other branch of agriculture.

Although hundreds of plants secrete nectar, only about two dozen species furnish honey in market quantity. The layman

thinks of a spacious garden as a rich haven for honeybees, but often such is not the case. All the flower gardens in the beautiful city of Washington probably would maintain not more than two dozen colonies of bees. Honey production on a commercial scale must be carried on where there are many acres of a plant from which the bees can obtain more nectar than is needed for their immediate requirements.

In most sections of the United States there is usually one particular flower from which the bees produce a surplus crop. In carrying on brood rearing, and in obtaining enough honey for their own needs, they visit flowers of endless variety. Bees freely visit apple blossoms; for example, yet apple-blossom honey is practically unknown. There are too few apple blossoms, and the blossom period is in early spring when honey requirements of the colony are so great during brood rearing that the bees consume the nectar as rapidly as it is gathered. The same is true of many flowers.



Photograph by Wilhelm Tobien

GERMAN BEEHIVES, LIKE SCARECROWS, WEAR STRAW SKIRTS AND TIN-PAN HELMETS

The Marienwerder flower girl explains that the grotesque coverings protect the colonies from the rain and sun. Such old-fashioned hives cannot be inspected readily. Sometimes a colony becomes queenless and dies before the keeper discovers the absence of the "mother." In Europe, as in the United States, modern equipment is rapidly replacing such apiaries.

Perhaps the most concentrated honey-producing section in the United States is that surrounding the Great Lakes, where the white Dutch clover, the common variety that grows so abundantly on our lawns, reaches the peak of perfection. There the bees also produce a surplus from alsike clover, sweet clover, basswood, buckwheat, and occasional crops from raspberry and milkweed.

Another rich area is on the Pacific coast, where the heavily scented orange groves furnish thousands of pounds of highly flavored honey. The foothills of California supply sparkling sage honey and a bountiful quota of alfalfa honey comes annually from the Imperial Valley.

The whitest honey of all, often water-white, is produced from the fireweed, which grows in the burnt-over forests of Washington and Oregon. The Intermountain States send to our eastern and foreign markets carloads of alfalfa and sweet-clover honey, heavy and flavorful. The Dakotas and the surrounding States rank high in large crops. There 100 pounds a colony from sweet clover (Plate VIII) and alfalfa

is not unusual, and crops of 200 to 250 pounds to the colony are frequent in favorable seasons.

Many kinds of honey plants occur in the Southern States, where the honeys run the gauntlet of the color scale. Usually the honeys from the South are dark, spicy, and highly flavored.

Probably no other food is produced over a wider area than honey. Wheat, corn, milk, and potatoes are almost universal, yet their production is restricted to areas having certain soil and climatic conditions, whereas the mountains, the swamps, the deserts, the wind-swept plains, and the Tropics all add their quotas of honey.

Surely no other food has such romantic associations. Every drop of honey has its origin in the bosom of a delicate flower, where it has been exposed to the rays of the summer sun and bathed with the morning dew. You have only to close your eyes and picture fields of clover, and fill your lungs with the perfumed air from myriad nodding blossoms; or in memory to walk again through scented orange grooves to realize the origin of this incomparable food.



## SUMMERING IN AN ENGLISH COTTAGE\*

### Quiet and Loveliness Invite Contemplation in the Extra "Room," the Garden of the Thatched House

BY HELEN CHURCHILL CANDEE

AUTHOR OF "LIFE'S PATTERNS ON THE RIVERS," IN THE NATIONAL GEOGRAPHIC MAGAZINE

WE ARE a sizable crowd, we who dream of summering in England in a quaint vine-clad house "hundreds of years old, my dear."

The big houses of the age of house parties, houses which can lock off one or two wings without missing the 20 or 30 rooms, are not wanted much now. The tale of their diminishing glory is a sad one; we will not review it. They represented a romantic phase of English life, and although most of them are now clubhouses, boarding schools, or convents, they conjure sentimental thoughts of the life once led there.

Our personal dreams are not of these. What the American of adventurous spirit asks of England for the summer is a smallish house, even a cottage. But it must be under a style name like Tudor, or more romantically Elizabethan, or, perhaps, Queen Anne and the Georgian, either late or early. Mayfair is full of fascinating real-estate offices, most of them seeming like private homes, with their open fires, Chippendale chairs, and bookcase desks.

#### MUCH IS IN THE NAME

"Mr. Upperton and Partners" is the diverting and reticent sign over the door of one of these. Lovely way of expressing it; Upperton, Stoggs, Chait and Jones is outdone by the dignity of "and Partners."

Any of these gentlemen can teach the eager American client new uses of English words and phrases in real-estate jargon, whether or not he offers the ideal ancient house and romantic garden. And it is here that we learn that the rent of unfurnished houses is denoted in pounds sterling, while the furnished house smartly demands guineas—an extra shilling on each pound.

\* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "A Vacation in a Fifteenth-Century English Manor House," by George Alden Sanford, May, 1928; "Vagabonding in England," by John McWilliams, March, 1934; "England's Sun Trap Isle of Wight," by J. R. Hildebrand, January, 1935; "Down Devon Lanes," by Herbert Corey, May, 1929; "Through the Heart of England in a Canadian Canoe," by R. J. Evans, May, 1927; etc., etc.

We also learn that Company's water "laid on" merely means that domestic water flows from taps instead of being pumped up from well or cistern. Indeed, one must not visibly shudder to learn that for 200 years houses have been occupied by gentry, modern smart people among them, who have had no running water, no lights except kerosene lamps, no telephone. Incredible! Without the tireless English servant, the English gentry must have died out for lack of comforts.

#### THE QUESTION OF "DILAPIDATIONS"

It was the Partners who dropped odd words from time to time, and from whom we were obliged to ask their meaning. One of the Partners asked a strange question.

"Are you prepared to pay dilapidations?"

It was disconcerting.

"But we don't want a house that is actually in a state of decay."

The Partner patiently explained that any sort of damage or breakage must be restored by the tenant. Let me leap ahead of the story and say that my bill for dilapidations was four shillings, about one dollar, for a flower holder. But it often happens that one must assume the dilapidations of the previous tenant, which may include repairs and decorations of importance. So it is a word to excite suspicion.

We also learned another phrase. We selected a house which we thought a perfect gem, only to be told that it was not available for "instant possession." The present tenant had the place for four years longer.

Rent days are not the prosaic first of the month. They come four times a year. Their names are full of suggestion; Lady Day, Midsummer, Michaelmas, Christmas. It makes a romantic pleasure of paying rent. Our Lady seems the spiritual recipient of the first; Midsummer has its night of Shakespeare's Dream; at Michaelmas life's ways are brightened with purple daisies; and at Christmas, is not everyone glad to be loving and giving?



Photograph by W. Robert Moore

HALF-TIMBERED HOUSES OF SANDWICH SAW CANTERBURY PILGRIMS PASS.

Strand Street still parallels the Stour, but the river is silted up, and three famous golf courses now lie between the town and the sea. Present-day seekers for beauty, pleasure, or historical lore reach this one of the Cinque Ports by motor.

If anyone wants to know the English country, let him go house hunting. Those marvelous "and Partners" sent us off to Nature's cozy-corners that casuals never find. They are everywhere, but as ingeniously concealed as a bird's nest. There may even be a sign which says, "Dangerous narrow road. Enter at your own risk." But that is just the kind of place to insist upon penetrating.

Enter on foot if you are afraid, but the car can squeeze in. You find yourself in one of those incomparable roads like tunnels of living green. Earthen banks of ivy and wild flowers rise ten feet high to be topped by tall trees sprung from the original hedge planted a hundred years ago. The road keeps you guessing by making such curves

that there is no penetrating the secret of what lies ahead.

All at once a gate. Within, a bit of woodland, flower-brightened; beyond that, a sunny garden, moldy mossy walls, lattice windows, creepers all abloom and reaching to the roof tiles, which are toned from dull red to gentle green by two centuries of soft rains and sun (see opposite page and pages 442, 444, 447).

Who would not penetrate the wood to gaze closer—especially when armed with a handful of permits from Upperton and Partners? Without the slightest thought of restraining ourselves, we passed through the bit of flowered woodland gay with yellow primrose patches and Heaven's own color in massed bluebells. But on emerging



Photograph by Maynard Owen Williams

#### THATCH-ROOFED COCKINGTON LURES WALKERS FROM TORQUAY

The postman of the countryside sets his bicycle outside the gate and marches through a rich display of flowers, the pride of every ancient cottage. A distributor of the Royal Mail through English gardens becomes almost an expert horticulturist.

from the screening trees and seeing the open garden lying in the sun and the house forming a part of it, we gasp and halt. It is of a beauty that demands worship, and in return bestows joy.

Garden and house are one. From the lawn's edge the white pinks in solid band reach to bewildering ranks of delphinium blues which, in turn, attain the roses climbing to the eaves. And such roses! Not ramblers, but rich things such as florists in the town sell in costly dozens.

#### "TO-BE-LET"—FOR 65 YEARS

Behold us arrived at the house of our dreams. The silence is balm, the perfumes intoxicate. Suddenly high above, the wild joy of a singing bird.

"Hark, hark! the lark at heaven's gate sings," I whisper. We have never heard one before, but we know it by the romantic instinct which hides, often suppressed, in the consciousness of modern man.

While we stood entranced, the shameless impudence of our intrusion was brought to our notice by the appearance at the entrance door of a man servant, correctly dressed and silently interrogative.

We fell to earth even as does the skylark when his song is finished. We produced our permit. We showed it. He would not let us in. He was adamant. What was wrong?

We staggered away. We felt a kinship with Adam and Eve as we left the perfumed garden with one last hopeless look at the

beauties and the extended arm of the butler inexorably expelling.

Back to London to garrote the Partner who had played false to our noblest desires.

But he said the fault lay with the servant. The house *was* to-be-let (note the phrase) and was at our service; the lease was for sixty-five years! Exclamation marks rattled about in our heads.

The hunt for the ideal takes on the aspect of a tour. It is possible to get about by commodious omnibuses. They set one down on the main roads, where local motor cars with drivers can be hired.

#### HOUSES "SPRUNG FROM THE SOIL"

Gradually one comes to know the districts not too far from London where certain types of the ideal house have sprung from the soil. I use the phrase purposely. It is a requisite of our ideal English small house that it should look as if it had pushed itself up from Nature's laboratory of the earth, just as the shrubs, flowers, and trees have done. They are close kin. They all live together in beauty and harmony.

The garden is, in fact, a room of the house, a gathering room, especially at the hour of afternoon tea on sunny days. Often I lunch in mine, throwing bits to the birds, and sniffing the flowers. True, there are wasps at the feast, but I should be forgiven if I ignore pests, wasps that sting, slugs that disgust, earwigs with scuttling ways.

These districts not too far from London contain an entrancing variety of old styles.

Yet it is to be remembered that the house of carved interiors and scrolled gables is a specialty of Kent; the thatched roof hides beside the roads of Hampshire's New Forest; the cottage of light-gray stone makes glad the villages of the Cotswolds; and the Georgian, or rather 18th-century houses, scatter their elegant lines in all parts of the land. Timber and plaster houses tempt one almost everywhere with their Tudor charm.

If I had a proper car, I would wheel it off Southampton docks pointed westward. There lies the witching wood of the New Forest, where fine leafage piles delicately up and up against the sky, and where the road slips softly into mossy turf of green, sun-spangled. There the road bemuses and leads one into poetry, wakes the memory of history which is half romance, of ladies slim and alluring riding or strolling through the woods with cavaliers of marvelous costumes and piquant devotion.

Down a slope where brown leaves of yesteryear make a clean carpet for this, is the wood of aged beech where William Rufus met tragedy. The place has fallen into eternal peace and beauty.

#### THE COUNTRY OF THATCH

Out in the sunny tangle of open lands the wild forest ponies roam free amid gorse and broom and heather. The impudent little breed scorns charmingly the passer-by in the motor car. He knows many a cover where man and motor may not go. Farther along, where the road strikes the edge of the wood, stand ideal cottages with thatched roofs. The windows of the second story are veritable eyes which kindly contemplate. The casement of one is thrown back and the rosy face of a girl laughs with pretty boldness (see page 440).

This is a country of thatch. More cottages watch by the roadside. Some are inns, but are so elegantly kept that only a lover of the picturesque, a potential artist, would be living there. The thatched cottage is the loveliest dwelling on earth, and we vow to have one (431, 433-5, 440, 447).

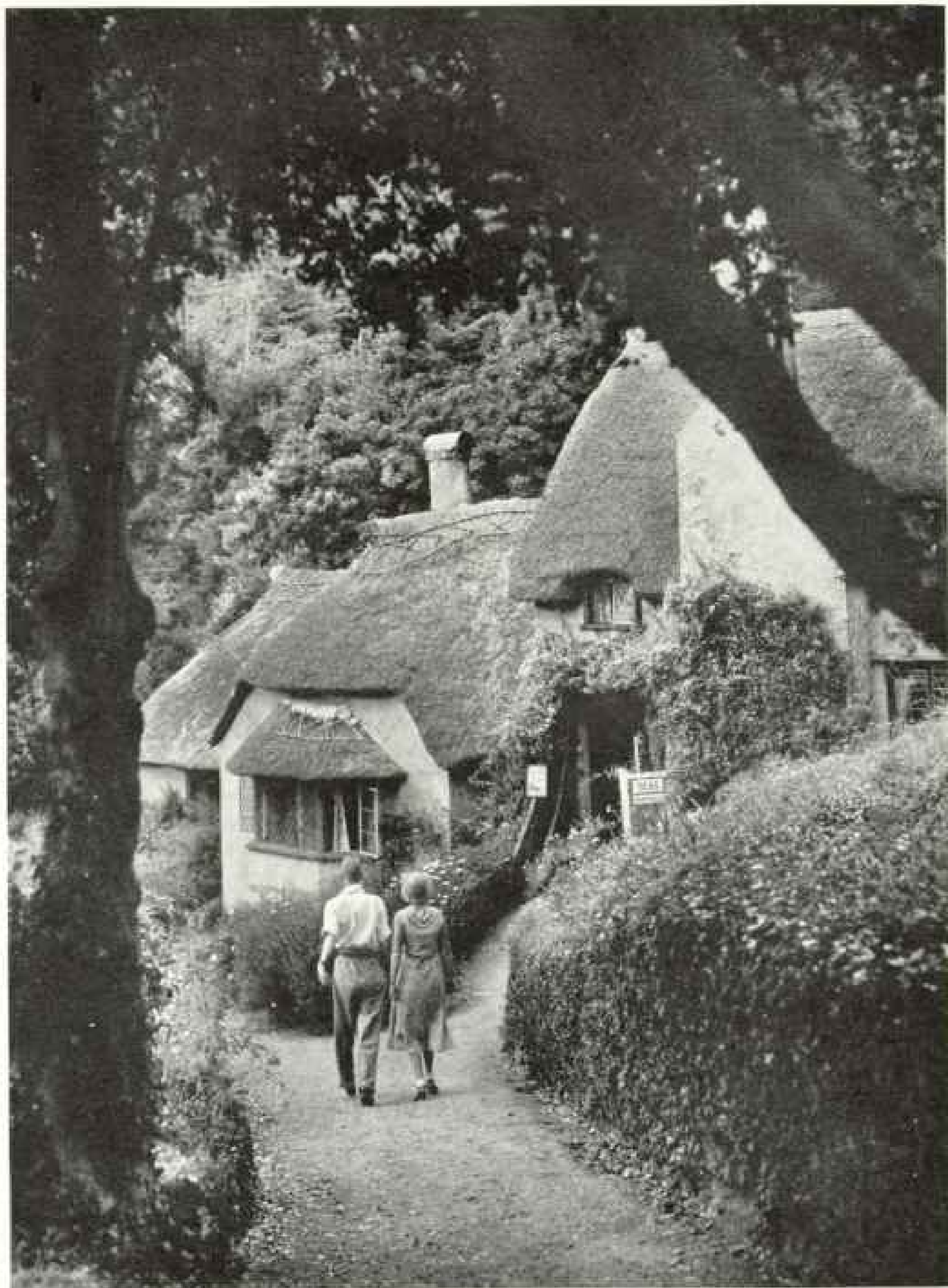
After Lyndhurst, and then more wilderness, the car drifts away from the sea in spite of the lure of the Isle of Wight and its Needles, for near the shore lies an endless region of thickly set villas of red brick standing stark in the last Victorian struggle against beauty.

Ahead lies one of the richest of all districts for those who hunt the ideal house, the hills of the Cotswolds. Gradually its little stone houses catch you in the spell of their beauty. They spread themselves beside the road, taking on almost human qualities. They lift their gables with dignity; they spread their mullioned windows with frankness. They show reserve in unbroken spaces. Their symmetry seems of the highest art, yet it is said these lovely houses were built by simple artisans. They took the warm, light stone of the land, and even the roof tiles are made of it.

All seems a pearly gray, and on this ideal color climb the bright flowers of the garden. A gentleman's house gone into poorer hands; it seems, when suddenly out of a Cotswold cottage piles a workman's family. Not at all—it is the other way about when one of these exquisite tasteful small homes is occupied by a family of consequence.

If I had that proper car, this is where I should linger long, and drift from road to

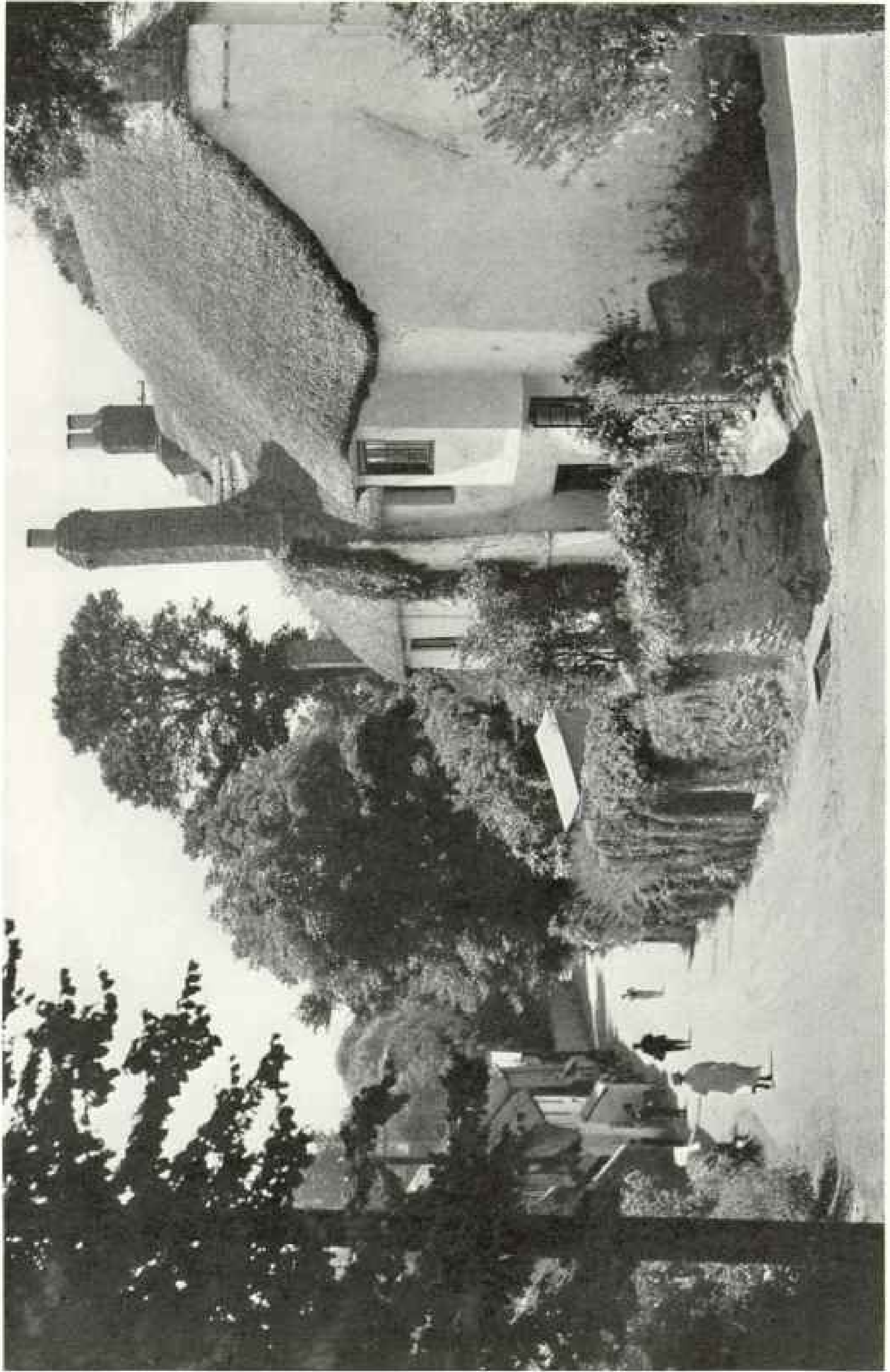




Photograph by Maynard Owen Williams

THEY FOLLOW THE PATH TO A SYLVAN PARADISE ON SELWORTHY GREEN

Around the common lawn rustic cottages are grouped, and visitors come here from far and wide to drink tea served by pensioners of a famous family. In providing a sanctuary for its aged servitors, the Acland Estate has preserved a bit of English charm amid modern changes.



Photograph by Maynard Owen Williams

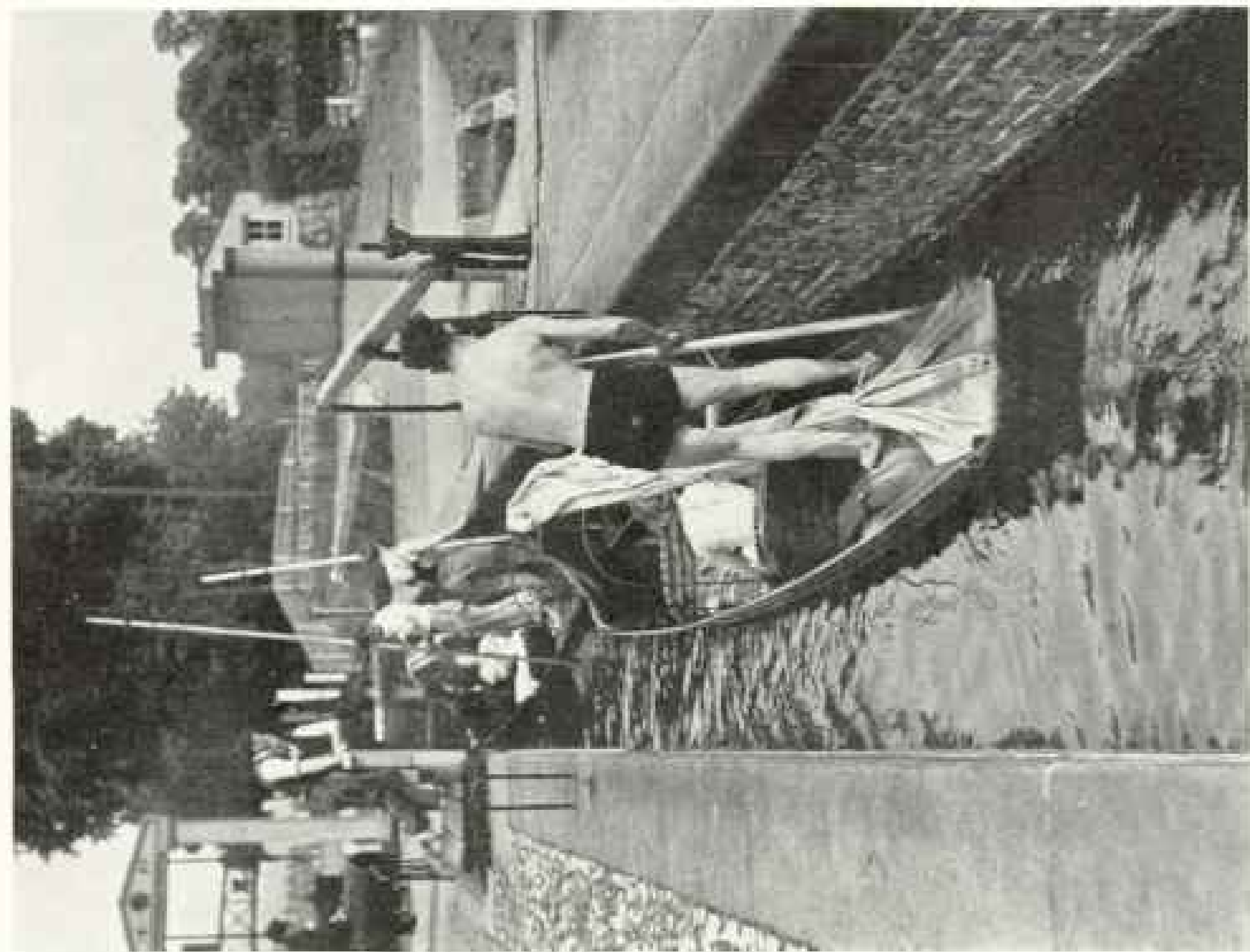
LANGUAGE, AS WELL AS FLOWERS, LINKS THURLESTONE WITH THE NOSTRILS:

This unchanging village, close to large hotels, a golf course, and a bathing cove, takes its name from a seagirt stone with a thirl, or hole, in it. The Anglo-saxon "nostril" has become "nostril." To say you are "thrilled through" is to add two more linguistic links with the name of this obscure hamlet of south Devon.



LEPER HOUSE, POOR HOUSE, STUDIO—NOW A HOME

In this 900-year-old cottage, Sir Harry Johnston found "a room in which to work. . . . It exudes peace." Presented to the late explorer, writer, artist, and administrator, this isolated retreat, built for lepers, is being remodeled as a home for a trusted servant of the versatile author of "The Gay-Donkeys."



THE NARROW LOCK FOR PUNTS AT "TIDE-END-TOWN"  
 Photographs by Maynard Owen Williams

Kipling's name for Teddington was true to geography rather than language, for these water gates mark the upper limit of tidewater in the Thames. Punters who are in a hurry haul their flat-bottomed craft "over the rollers," but pay the same sixpenny fee as that for the hydraulic lift (see page 455).

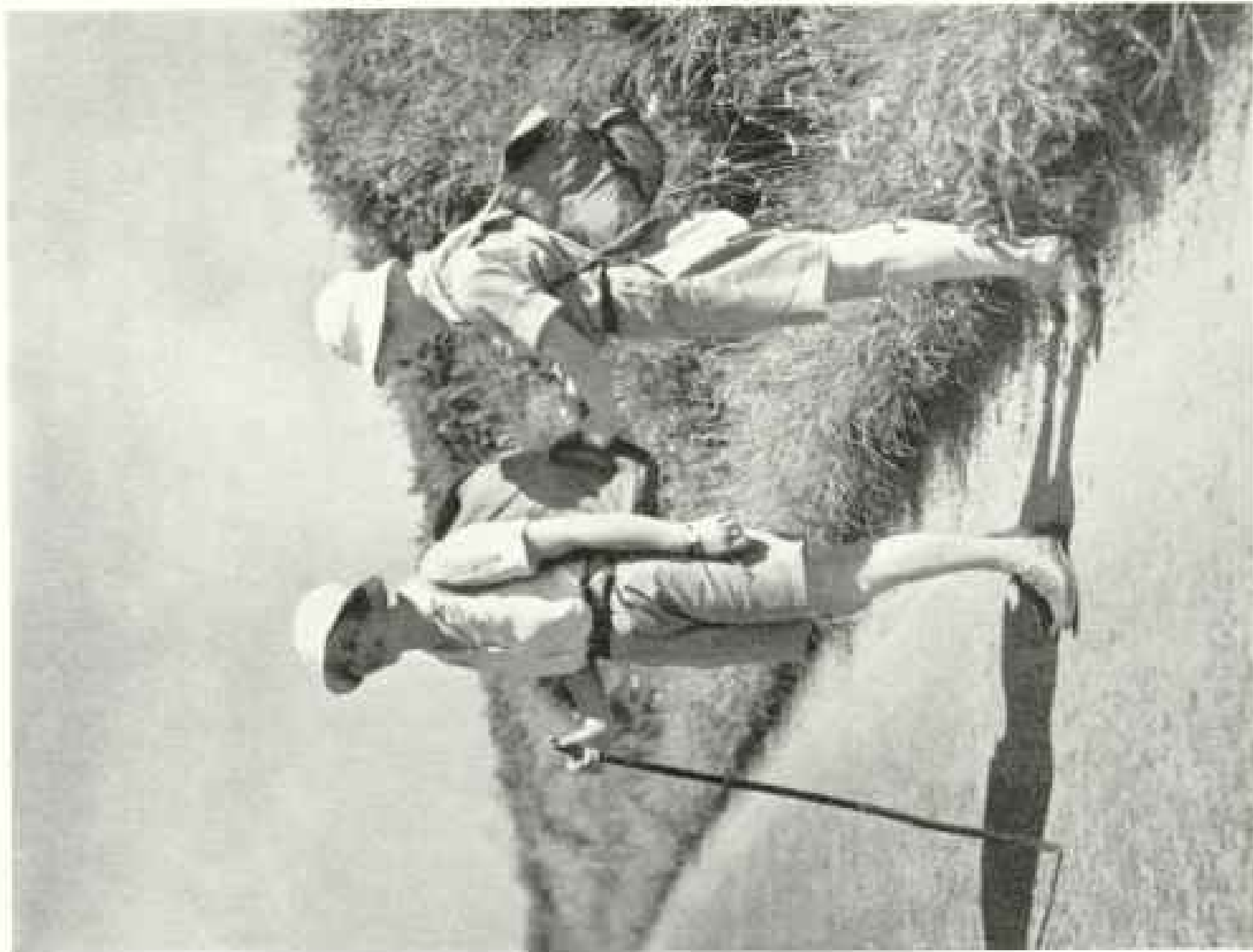


Photograph by Maynard Owen Williams

**STRANGELY LACKING IN HISTORY IS BODIAM CASTLE, NEAR BATTLE ABBEY**

This imposing battlement, Lord Curzon's gift to the Nation, is now administered by the National Trust, under which an increasing number of historic sites and splendid landscapes are preserved from destruction or exploitation. Cyclists' clubs and picnic parties frequent the hillside sloping down to this lakelike moat reflecting 14th-century towers, whose chief distinction is that they remain after braver butwarks have fallen to ruin.





VISITORS FROM THE ANTIPODES TRAMP THROUGH CORNWALL.

"Do you live here?" these girl hikers near Bude were asked. "Half a world away—either way" was the reply of these Australian members of the Youth Hostels Association, which provides walkers with accommodation for one shilling a night.



Photographs by Maynard Owen Williams

PREHISTORY AND THE PRESENT, PICTURED ON DARTMOOR

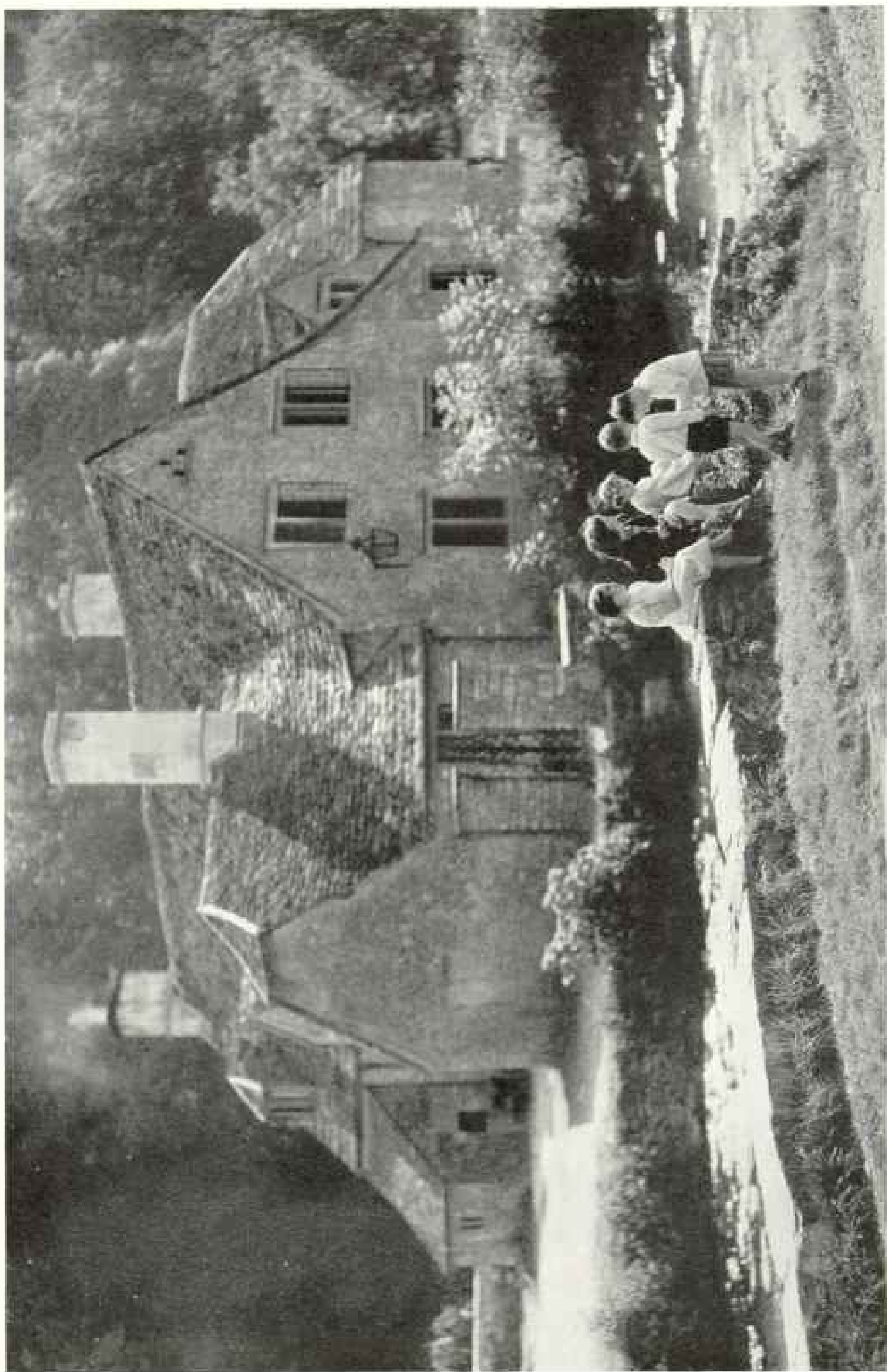
Little is known of the origin of the burial chambers, the stone circles, and the avenues lined with strange monoliths found in Devon. Some members, such as this one between Chagford and Post Bridge, were carved into crude crosses by the Christianized Celts.



Photograph by Maynard Owen Williams

BREEZES OFF BRISTOL CHANNEL SWEEP TOWARD THE EXMOOR OF LORNA DOONE

Down toward Lynmouth, nestling at the mouth of the Lyn, slopes Countisbury Hill, notorious among motorists for its steep descent from the moorland to the sea. On the saddle in the upper center stands Lynton. Behind the headland is the Valley of Rocks, where scenes from Blackmore's classic were recently filmed.



Photograph by Maynard Owen Williams

ONE STONE COTTAGE OF CASTLE COMBE—AN ENGLISH DREAM VILLAGE

It is one of many obscure hamlets whose appeal makes the exploration of rural Britain by motor a thrilling adventure (see text, page 432). A caterpillar arouses the interest of the boys, but the girls think such fuzzy, squirmy things are too "creepy" for close inspection.



Photograph by Clifton Adams

## FROM A WINDOW "A ROSY FACE LAUGHS WITH PRETTY BOLDNESS"

There may be ugly buildings roofed in thatch, but so general is the charm of a straw roof on a cottage bowered by roses and honeysuckle that one unconsciously attributes beauty to all such. Except for the fire risk, straw thatch is a desirable roofing and, if well laid, will last for 20 to 30 years. This house, near Romsey, seems to have sprung from the soil of old Hampshire (see text, page 432). Hazel strips, called spars, are pegged to the thick roof at ridgepole and eaves.



lane, from village to farm, and drink in every detail—the Tudor ornament over the leaded windows, the lovely flat arch of the front door, the beauties of the back of the house, the flowers and a cunning use of shrubs and creepers piling one thrilling beauty upon another against the light-gray stone.

I should creep up to Worcestershire and shamelessly stare and stare at all the houses of old Broadway where America's Mary Anderson has long lived. There in Broadway the light-stone cottage of the Cotswolds is worshiped as an ideal. No one can see it there and not decide to possess it.

#### HISTORY AND HOUSES

Then the car would search elsewhere, in Gloucestershire, for instance, for there are stone houses there as well. But London is getting far away. Tudor houses built in the years 1580 to 1690 are enthroned in the heart as an ideal, but I should make the car fly down to Sussex and Kent, that brave old country used by adventurers as dock room, a landing place for Romans and for Norman William and his hordes of fighters.

They dig up nowadays the walls of Roman villas and the mosaic floors of baths. Old fortresses and castles of the Normans still stand down there along the coast and in the hop lands.

But I should hunt out the old farms, and the ancient houses of villages. They have a beauty all their own, with their bricks turned to pink and softened brown. Many have an end gable of stone fashioned in the grand curves which fascinatingly recall the Walloons who brought with them their own traditions of art when driven to England by religious persecutions. Those curvilinear gables have, too, a Spanish flavor, a late Renaissance caper of free-drawn curves. History? How dull it can be! But how it makes the mind leap eagerly from post to post on the backward trail to find the starting place of old house designs.

Fascinating interiors those Walloon cloth weavers constructed to make the homes of their exile resemble those they had left. The flight of the car to Kent shows that the brick house of the weaver or the farmer is another one we will take.

It is with a purpose, a deliberate intent, that the car would come this way. It is the road of that enticing structure, the house of timber and plaster, or timber and brick ingeniously laid.

It is eternally lovely, bewilderingly fantastic. How did modest man fancy such a house easy to build, and practical? The beams, black and exposed, seem to represent superhuman effort in the interest of beauty. The curved ones, the purely ornamental ones, fascinate the eye. The overhanging second story is a fantastic denial of architecture's law of the large base. But the charm, the unending charm of this quaint dwelling! Ellen Terry lived in such a house near Tenterden, in Kent. They are everywhere, all over England. Decidedly we should have one. Are they not full of Shakespeare lore and thoroughly reminiscent of his times?

Next my car should fly on a different quest. It should take me to look at all the old brick garden walls in England. And this because they always conceal a treasure, and my car and I are on a treasure hunt.

#### BEHIND SOME GARDEN WALLS

These walls that rise from the edge of lone country roads crack like a whip at the mind to waken it. A monotonous line of dull gray brick they may be to him who never penetrates beyond, but what is seen on the inside is what has value. A mile of wall on the highway means that on the other side of it is the great park of a wide estate. It keeps up the old tradition of the medieval castle.

But it is the high brick wall of the small house that brings out a rush of curiosity. Is the house so valuable, is the family so exclusive, that all the world should be shut out? No; the purpose of such a wall is that life may be led outdoors with the same feeling of intimacy as pervades life in the house. In this way, the garden may become one with the house and furnish extra rooms of living green lawns, flowers, and shrubbery.

These rooms are for showing the delights of being alive. In them the children play all day, making a castle in the green depths of an old laurel. The youngsters play ardent sets of tennis, the servants form a refreshment room with tables and chairs for cool drinks and never-failing tea.

And the wall itself! On the outside it shows a dull and dusty face, but on the inside it is an adjunct to paradise. Ivy possesses it beside a flower bed, making a rich drop curtain before which the flowers raise proud spires of color. Birds, too, nest there, the tiny English robin that hops into your heart with colorful affection, and, if there



Photograph by Clifton Adams

PERHAPS THIS COTTAGE SAW SIR PHILIP SIDNEY PASS TOWARD PENSHURST PLACE

The author of "Arcadia" and hero of Zutphen lived at the manor house near by. Of him the oft-told story is related that riding back from battle, mortally wounded, he refused a cup of water in favor of a dying soldier with the words, "Thy need is greater than mine." Kentish cottages are never allowed to decay, not even after hundreds of years of use. Part of one's pleasure and pride—not duty—is to care for the floral setting.

are no cats, the dainty, smartly dressed peggy-wagtail.

On top the wall is stonecrop, and rock-roses, and wallflowers sprout from cracks. Down in the distance where the gardener conjures seedlings, the wall is covered with young peach trees and cherries spraying like fans flat against the wall.

The house that goes with the wall? Ah, that is of the time of Queen Anne, if one is lucky. It has a front of repeated windows, with a central door always open to show through to the garden behind the back door. It is of soft old reddish brick, with its roof sloping from four ways to a ridgepole on which the thrushes sing at morn and the merle blackbird at evening until dark sets in. And the roof in color is Nature's effort to soften red with green.

Or, the house within the walls may be Georgian or even of the English Regency of the early eighteen hundreds.

All of these kinds of houses would I see if I had a proper car. And from among them all, I would obtain that one best suited to my needs in which to lead the ideal sum-

mer life. But if I failed to find and obtain the house of dreams, I would think the quest alone had brought lasting joy.

Fate rewarded persistence. I found the ideal house after rejecting the idea that the only way to find an unoccupied small house was to buy a village "pub" or tavern, or a picturesque length of cottages damned by the name of almshouses. But the pubs are not for sale. There goes with them a rare and valued license to sell ale and spirits. That is why they have not been allowed to fall down during the centuries. And neither are the charming Tudor almshouses for sale.

FOUND—THE "HOUSE OF DREAMS!"

But the long road leads at last to the house of dreams. Lest it be of a different style from your house of dreams I do not describe it. It lies far from the road, with a winding drive over the meadow and under tall trees, and its high brick wall shuts in two acres of garden paradise of which the house is a part.

Each morning a perfect servant wakes me with a cup of early tea left at my bedside.



Photograph by Maynard Owen Williams

#### ENGLAND'S LEAFY LANES SHUT OFF THE MOTORISTS' VIEW

For economy, the farmer, like many of his neighbors, fenced his land with a two-foot bank of earth. Nature covered it with ivy and wild flowers. Saplings planted on top grew to nearly forest size; and thus developed one of the entrancing byways of England. Here a *Geographic* staff car explores a Devon lane near Dartmouth.

I look from my pillow at my three windows, trying to decide which is preferable, red roses or pink when thrust within the room and screening the sky outside.

At eleven another cup of tea. "Would you like to try gammon and spinach for luncheon?" says cook who brings it. "A frog he would a-woosing go. 'Heigh-ho,' says Rowley," I quote lazily, associating gammon with nursery rhymes.

"Beg pardon, madam," says cook. "Gardener says he wants a besom, the wind bashed the flowers about and the path needs sweeping. And shall I light the fire in the copper for the sheets?"

An unknown tongue.

"Cook, where can we get ice?" I can't serve warm cocktails to the American friends coming today.

"The fish-man is the only one who has it, ma'am."

#### NO BOTTLES FOR THIS MILKMAN

I look out the back window of the only bathroom and lose all chagrin in absorbing the delightful sight of the milkman approaching. He is young and gay, singing

as his horse steps high. He is dressed entirely in white linen, with a long pelisse. He has a low two-wheeled cart in which he drives standing, with the back of the cart open and slanting like that of a chariot.

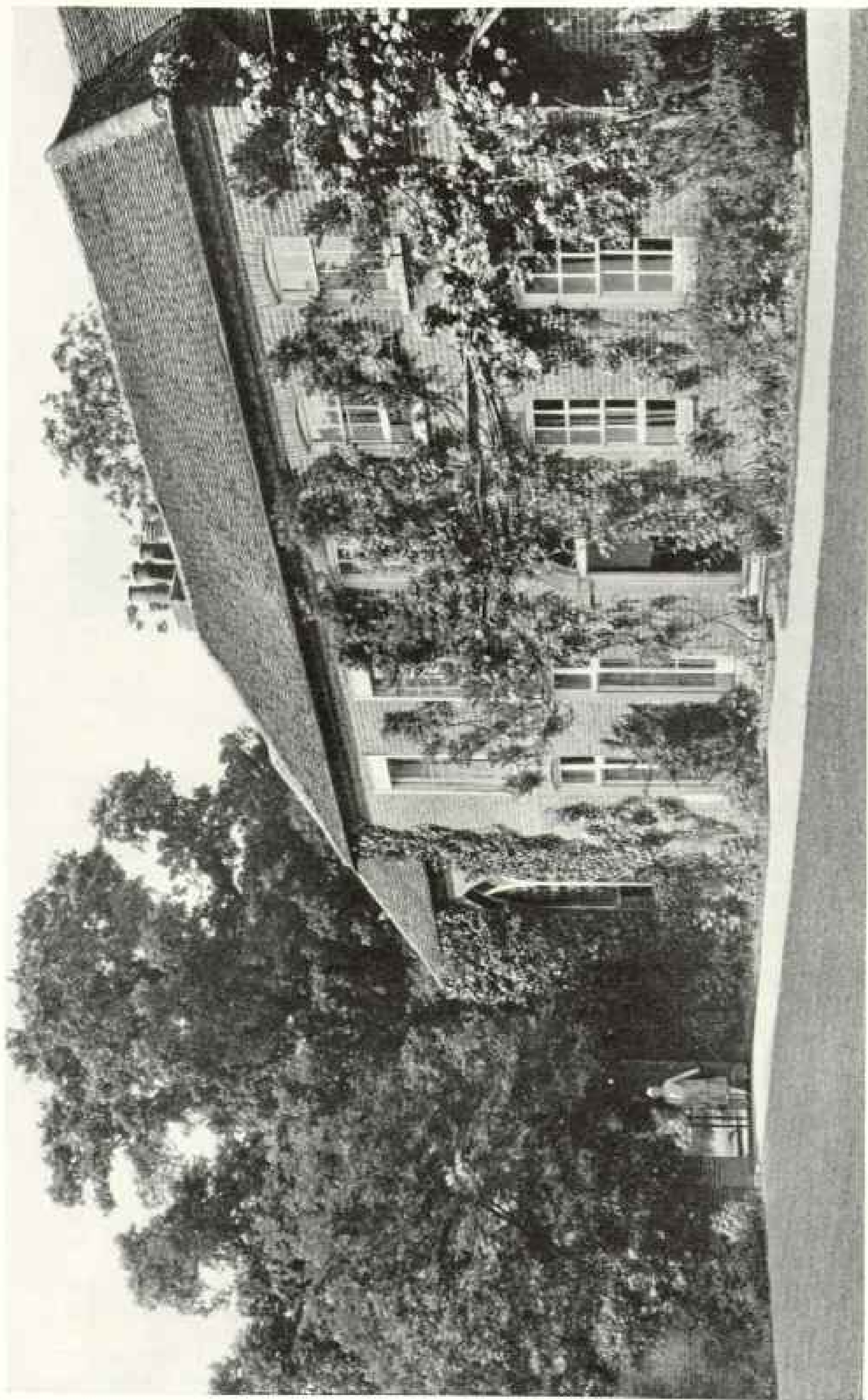
His milk is in three high cans of burnished copper which flash like fire in the sun. Bottles? He never 'eard of them. They must be un'andy things. His milk comes straight from the cows you see grazing on yonder meadow.

#### MUSHROOMS FOR THE LADY OF THE HOUSE

The gardener's little sons are hastening across the long meadow path, a right of way, to choir practice. One of them stops with a tiny basket for me. Mushrooms! Ivory and pink. Delicious. The child hunted them through the meadow for me. He likes them, too, but "the lady" should have first claim on whatever her property yields.

I feel like the chatelaine of a castle, with my serfs as dear to me, and as especially mine, as my own children.

It was mid-May when I entered the garden now my own. I closed the door of

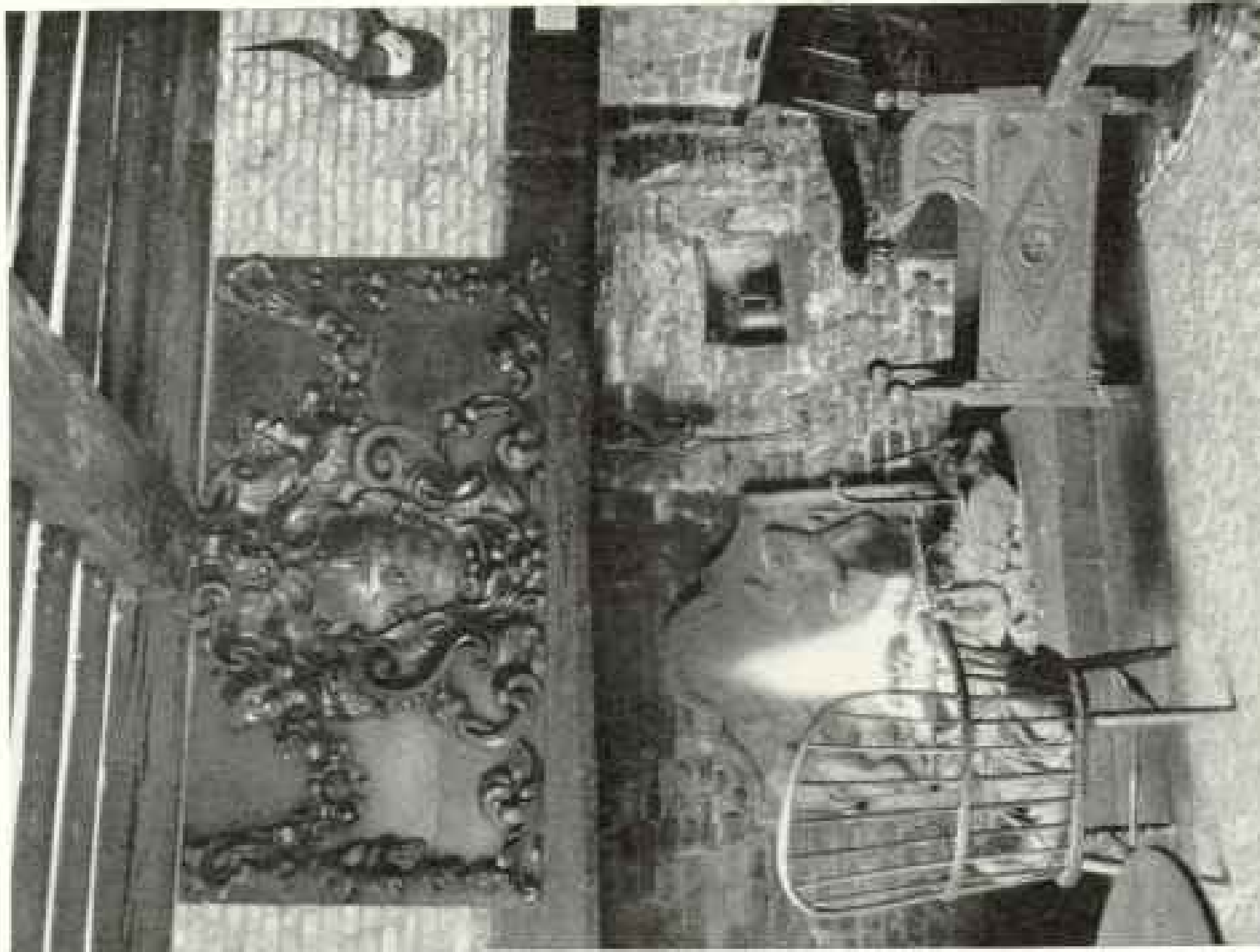


Photograph by Clifton Adams

IN THIS HISTORIC CLOCK HOUSE AT STOKE POGES THE AUTHOR LIVED WHILE SHE EXPLORED THE ENGLISH COTTAGES

A drapery of roses, wisteria, and ivy, in which are hidden nests of robins, thrushes, and merles for morning choruses, conceals its 200 years. Ivy over the gate spreads so wide and thick that only hard showers spatter the visitor. From here a field path leads to the "country churchyard" which inspired Gray's "Elegy." In her garden, Mrs. Candee entertained the late Clifton Adams, brilliant staff photographer of the National Geographic Society.

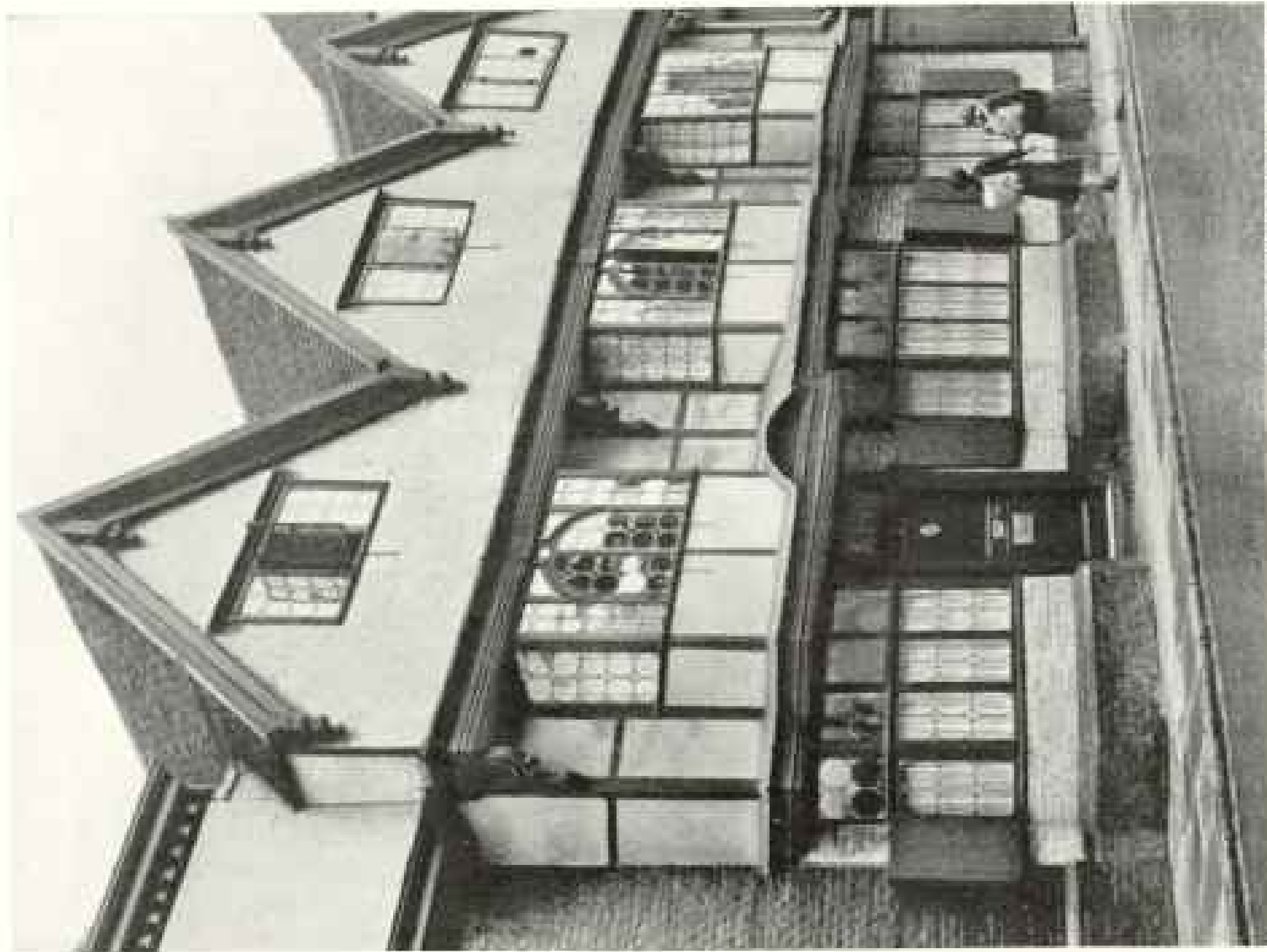




Photograph by Moynard Owen Williams

**UP THIS CHIMNEY, MANY A SMUGGLER ESCAPED THE LAW**

Although it is said to be 400 years old, The Mermaid at Rye is a mere infant among English inns. Until the sea retreated and left far inland the former ally of the Cinque Ports (Sandwich, Dover, Hythe, Romney, and Hastings), this quaint hostelry was a meeting place for lawless enthusiasts who devised their own methods of free trade. In the heavy canopied beds of this inn are secret hiding places where the traveler concealed his valuables.



Photograph by W. Robert Moore

**HERE DAVID COPPERFIELD FIRST SAW THE FAWNING URIAH HEEP**

The House of St. Agnes, in Canterbury, posed, folk say, for a word portrait by Charles Dickens: "At length we stepped before a very old house . . . with long, low, lattice-windows bulging out . . . and beams with curved heads on the ends . . . so that I fancied the whole house was leaning forward, trying to see who was passing on the narrow pavement below. The old-fashioned brass knocker on the low, arched door twinkled like a star."

the high wall behind me and stood, ecstatic, under the heavy roof of ivy that arched above. Silence, utter silence; perfumes subtly blended; color in carefully plotted harmony. House and garden lay purring in the sun.

A stretch of soft lawn, masses of glossy shrubbery, and the house itself were all bordered with a wide band of forget-me-nots through which rose-red tulips thrust their cups. That solid band of blue amazes one who encounters forget-me-nots only as delicate stragglers.

I could not know that presently the gardener would snatch it all up and cart it away in a wheelbarrow, with a robin, who superintended the work of exterminating toothsome insects, perched on the board; nor could I know that the lovely sight would be replaced at once with snapdragons contrasting with Mrs. Simpkins' pinks, white as snow, fragrant as spicy Araby. And after that a show of delphiniums and gladioli. And always roses, roses, roses!

Cook and gardener appeared, mortified, heads bowed with shame that the mistress should have had to open the garden door with her own hands. They seized everything portable from the car and from me. A tray of tea appeared and was slipped onto a low table in the drawing room; then my perfect servitors softly vanished. When sure they were gone, I set the tea-tray on the low steps outside and felt the delight of the true vagabond.

#### HEY-NONNY-NONNY, AND HOT WATER BOTTLES

Tea. The playful American makes jokes about it. My housemaid gives it to me at three-hour intervals all through the day. At first protesting, I arrived at understanding. The chill of the English climate demands it. The frequent cheering cup makes of the stomach a comfortable hot-water bottle that warms the entire body.

The cup, at waking, steels one against the chilly passage to the bath; that at eleven gives more energy for work; that at five o'clock is an open hospitality; that at bedtime puts one to sleep.

Besides tea, there are hot-water bottles as bed invites. Yes, even in May, even in June. Sheets in England grow proud of their glacial linen, and even men use hot bottles. They even acquire affectionate names, such as Carmencita or Don Juan, the choice being left to the sleeper.

A lady's bed prepared for a June night may properly have two hot-water bottles within it, and, laid outside as sleeping apparel, a jaeger gown, a Shetland jacket with swansdown, and a pair of knitted bootees. I have seen such preparation.

But all of a sudden come delightful hot days when housemaids cease running about with armfuls of puffed rubber bags, like nurses in a maternity ward with a crop of infinitesimal babies.

The perfect English servant means to most Americans at home a cold butler and a noncommittal footman. I sing the humbler cook and housemaid, adding the gardener. They make of the humble home a heaven for those who have been trained and suppressed by impersonal servitors.

The cook caters, orders, plans, watches the butcher's book, and serves delicious meals. But she does call a layer cake a "sandwich," and cookies "biscuits." And her tart is the reverse of ours, a deep dish of fruit with a complete crust of delectable pastry on the top only.

As for the housemaid, she is always on her knees. She seems to think floors are better hand-cleaned and rubbed with wax. The result is that the colors of rugs glow gemlike against a dark and glossy border. Yet, when mealtime comes, she is smart and spick-and-span in uniform.

The gardener—I hesitate to say how intimate we become over cabbages and kings, and how learnedly he snubs me when I slip from Latin names for flowers into familiar ones. But he will persist in raising clumps of goldenrod as a noble exotic, in flower beds.

It is at tea time in the garden that he approaches me and talks dignified superstition. The rooks are flying overhead in a bewildering cloud, some peeping, some cawing. They fly after two or three huge leading birds, and are kept together by strong-willed scouts, who border the mass and herd them as do shepherd dogs a flock of sheep.

"Going to their feeding-ground in the meadows. The rookery is in the trees of the Manor Park," says gardener. And for the first time I applied its real meaning to the word rookery, having hitherto thought it man's shelter in disrepair. Some day I shall take up the rooks as a study. They need a press agent to do for them what Maeterlinck did for the bees and Fabre for the mantis.



Photograph by Maynard Owen Williams

#### QUIET ENFOLDS A LOVELY ENGLISH GARDEN

This cottage of Broad Clyst, near Exeter, boasts 300 years, its thatch renewed three or four times a century. The first view of it claims the eyes, but a forest of lilies sends a cloud of perfume which turns the head, and spears of lavender beside the path pique the sense of romance.

Over the sunny peace of the garden hums the sound of a distant bell. It is from "the ivy-mantled tower" of the old church. One, it strikes, and I listen to a thrush. Another stroke hums from the bell—it had not finished. And at long intervals the dignity of tolling was maintained.

"It would be for old Darrant, ma'am; he had a stroke last night," insinuated the gardener, coming near with softened step and taking off his hat with a long look toward the bell.

At another time, some tuneful fragrant morning in June, the bell peals out its best varieties of bell ringers' changes. Joy bells they are, gay wedding bells. And if you run fast over the meadow path, the church can be reached in time to see the bride and her maids come down the rose-bordered path from the ancient church door to the lich gate. And all the time the bells cry joy.

Then again at sunset, for no reason at all, seemingly, a flood of sound from the old church booms and clangs through space. The bells have gone mad. They ring all their changes; gay ones, loud ones, sober

ones, slow and fast. What is the matter? Bell practice. It keeps on for one hour, for two hours. I had hitherto ignored bell ringers. Now I find they hold the village together as a group with sentiment. It is they who dispense news, who tell of the dignified dead, of the rejoicing of married youth, and who call folk from far and near to Sunday services.

"WE MISSED YOU AT CHURCH"

That latter call it were well to answer in person and regularly. One bright Sunday I lazed all morning in the garden, lost in its charm. Next day five neighbors called to inquire if I were very ill; they had missed me at church.

\* \* \* \* \*

Cook came to me with scared face, not willing to trust a private matter to the housemaid. Wide-eyed, she said with voice lowered, "Mr. Anstey is here. He says he must see you, ma'am. I told him you was busy, but it was no good. He set himself to wait."

"Mr. Anstey? Who—"

"He's the policeman from Dumton." She was evidently visioning my arrest.

At the back door the law awaited me in blue uniform and helmet, excessively tall, young, lacking two front teeth. The sergeant, he explained, at the nearest police station wished me to call and explain why I was in England and how long I was going to stay. In fact, to answer important questions.

When a policeman is sympathetic he is a help in trouble, but a policeman who harbors suspiciousness is a worry to the secret self.

#### EVERY ALIEN AN OBJECT OF SUSPICION

The sergeant, whom I hastened to visit in the police office, was a decent chap, dyed with the solemnity of his work, but cheerfully informing me of my duty as an alien. Clear he was, and firm, but he set forth a great nuisance. I must report to him on arrival in the county. If I wished to spend a day or two at any other place I must inform him of my going. I must report to the police of my arrival there, inform them of my departure, and report to him on my return home.

He gave me a little book in which officials were to record all these things, and I left his office blind with emotions of fear and indignation. I felt myself to be a suspect of the Government.

Cook felt that way about it, too. She did not say so, but her manner for a time was that of a mother shielding a wayward and misunderstood child.

When Mr. Anstey called again, she suffered visibly until she learned he had come to sell me tickets to the policemen's ball, which would take place 40 miles away. A legacy of the war and its fears was that little book of restrictions given me by the police sergeant.

There came an evening in July that refused to close in. It reached a bright six

o'clock and stayed there. At eight o'clock the sun was nearly two hours high. Three friends from London, only 20 miles away, remarked it as they drove up for dinner. The wondrous long day of England was at its best.

The lady was known as the Pearl of Mayfair because she was just that, a fine result of favorable circumstance. Of the men, one was a banker poet, the other the author of a new novel at the top of all lists.

The garden held my group close in a perfumed atmosphere shot with slanting light, where liquid thrush notes dropped music.

And after a little while a sudden plea, "Oh, do let us have dinner here on the lawn!"

Deftly the table was placed with auxiliaries for wine and dishes, and all sat around it in absolute delight. Politics were used as a stirring subject—everyone knows politics in England, women as profoundly as men—and lasted until the entrée.

Then the author was coaxed to speak of his next book, into which was to be infused the spiritual growth of the century. As he spoke, ruminantly and poetically, the shadows grew long and the sun was visible only on the topmost leaves of the tallest trees. The lady who was Mayfair's Pearl inspired him, as she did everyone, with her beauty, her brilliance, and her understanding.

When the silver moon floated up with clouds of pink embellishing it, and the evening birds sang in the half-dark, we seemed to lay hearts and minds before each other in a hitherto unknown freedom.

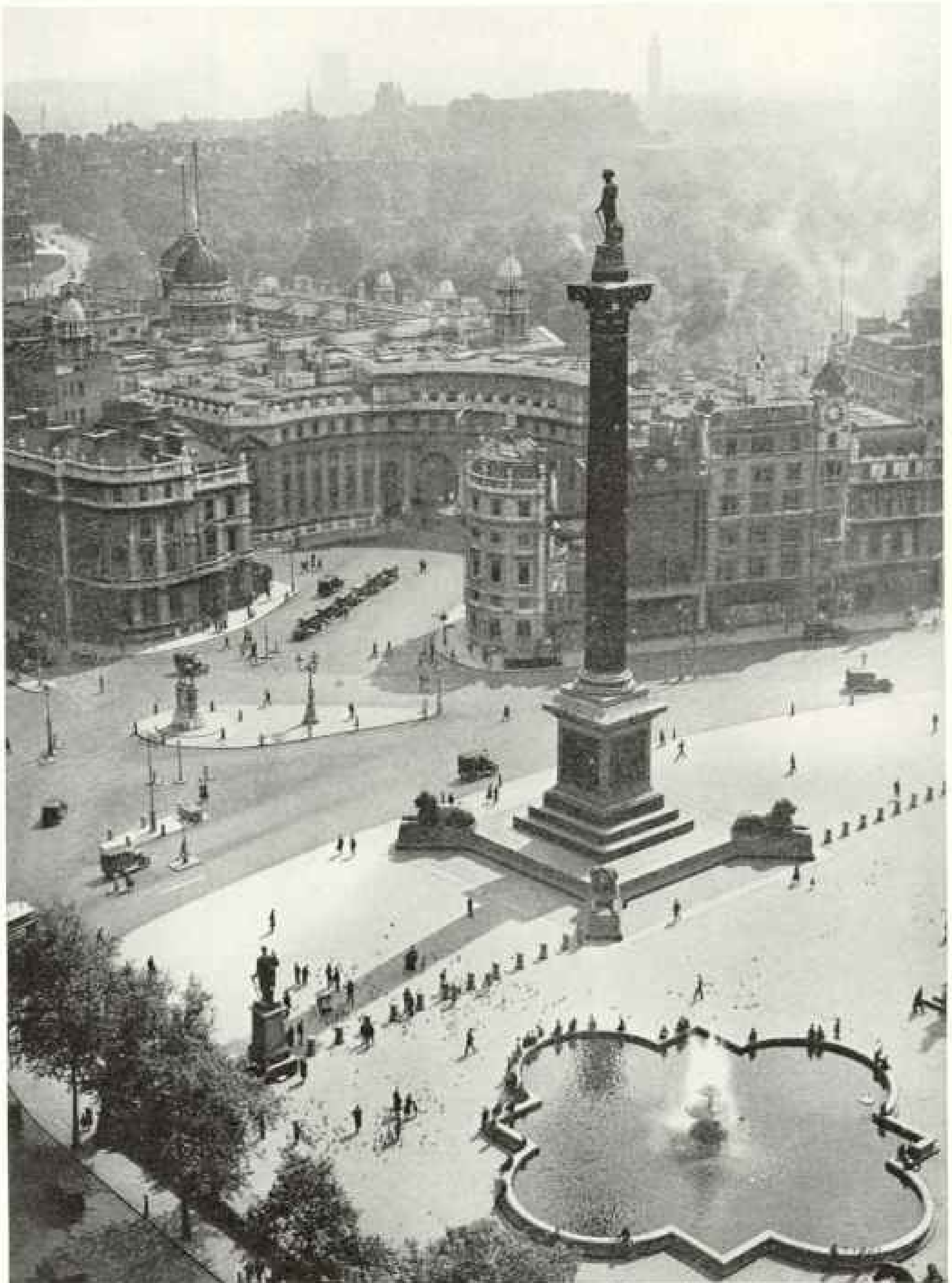
The spell was upon us, the wondrous spell of the English garden. A nightingale sang in the holly. Lights appeared in the windows of the house.

"I seem to have acquired something I lacked on coming here," said the author as we gazed out over the garden of roses, the full moon lighting our glowing faces.

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*Notice of change of address of your NATIONAL GEOGRAPHIC MAGAZINE should be received in the offices of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your June number, The Society should be notified of your new address not later than May first.*





Photograph from Topical Press Agency, Ltd.

LORD NELSON LOOKS DOWN ON THE ADMIRALTY WHENCE HE SET OUT FOR TRIUMPHS

The column to England's one-armed, one-eyed sea hero rises from Trafalgar Square. Originally the Royal Mews sheltered here the King's hawks and horses. Beyond the antennae, which maintain communication across the Seven Seas, are the greenery of St. James's Park, and in the distance the campanile of Westminster Cathedral, only 32 years old but built in the style of early-Christian Byzantium.



SMALL PASSENGER STEAMERS CRUISE THROUGH LONDON'S 70-MILE HARBOR.

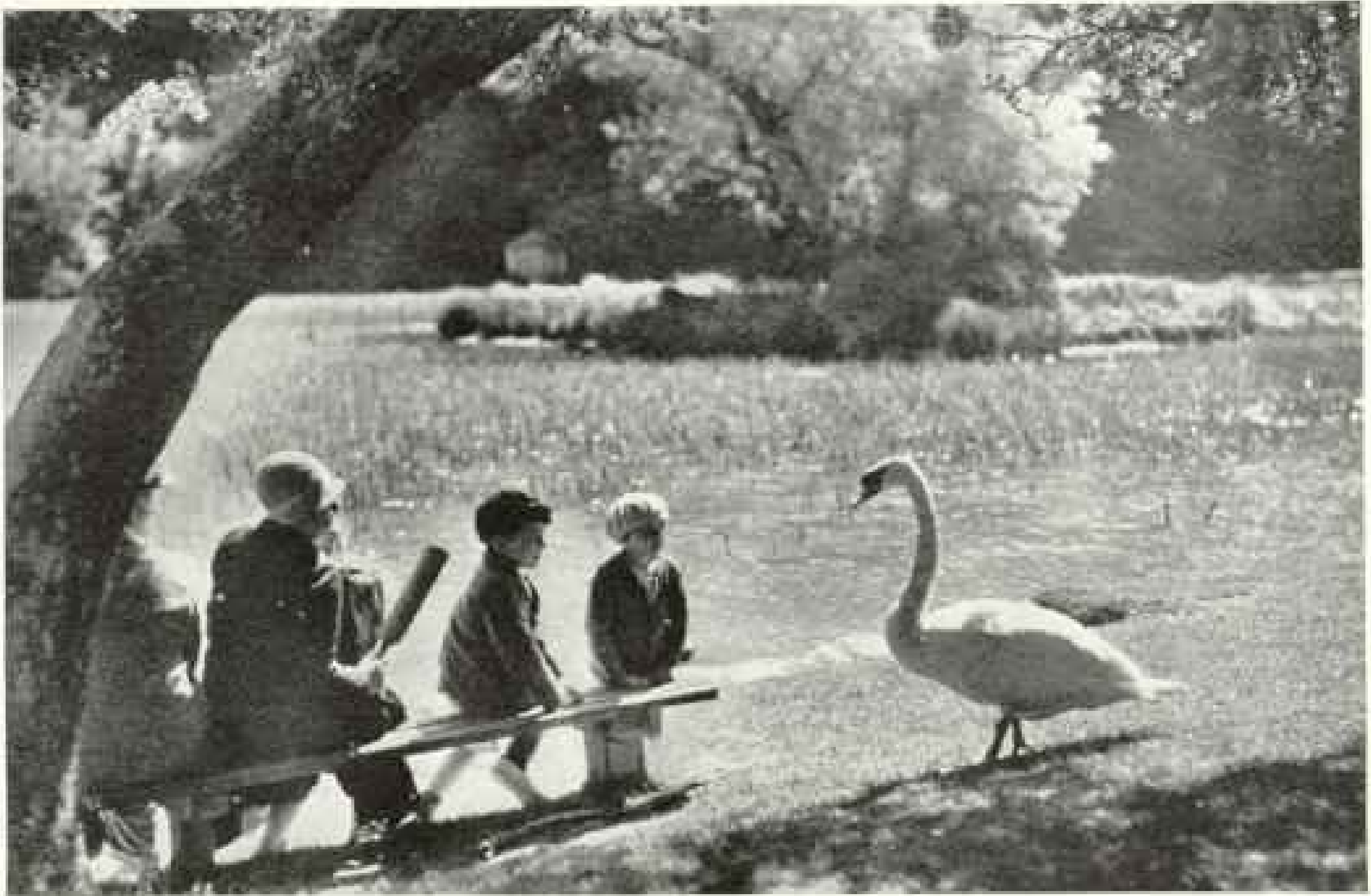
In Upper Pool, above Tower Bridge—named from the Tower of London rather than its own towers—Scouts and travelers are about to make a tour of the docks.



Photographs by Maynard Owen Williams

ALL DAY LONG CHILDREN FEED FAT PIGEONS IN TRAFALGAR SQUARE

Guarded by the four Landseer lions, the Nelson Column (see illustration, page 449) is the rallying point of many a demonstration, during the wildest of which, on Armistice Day, 1918, the plinth was marred.



"ONE STEP CLOSER AND I'LL USE YOUR HEAD FOR A CRICKET BALL"

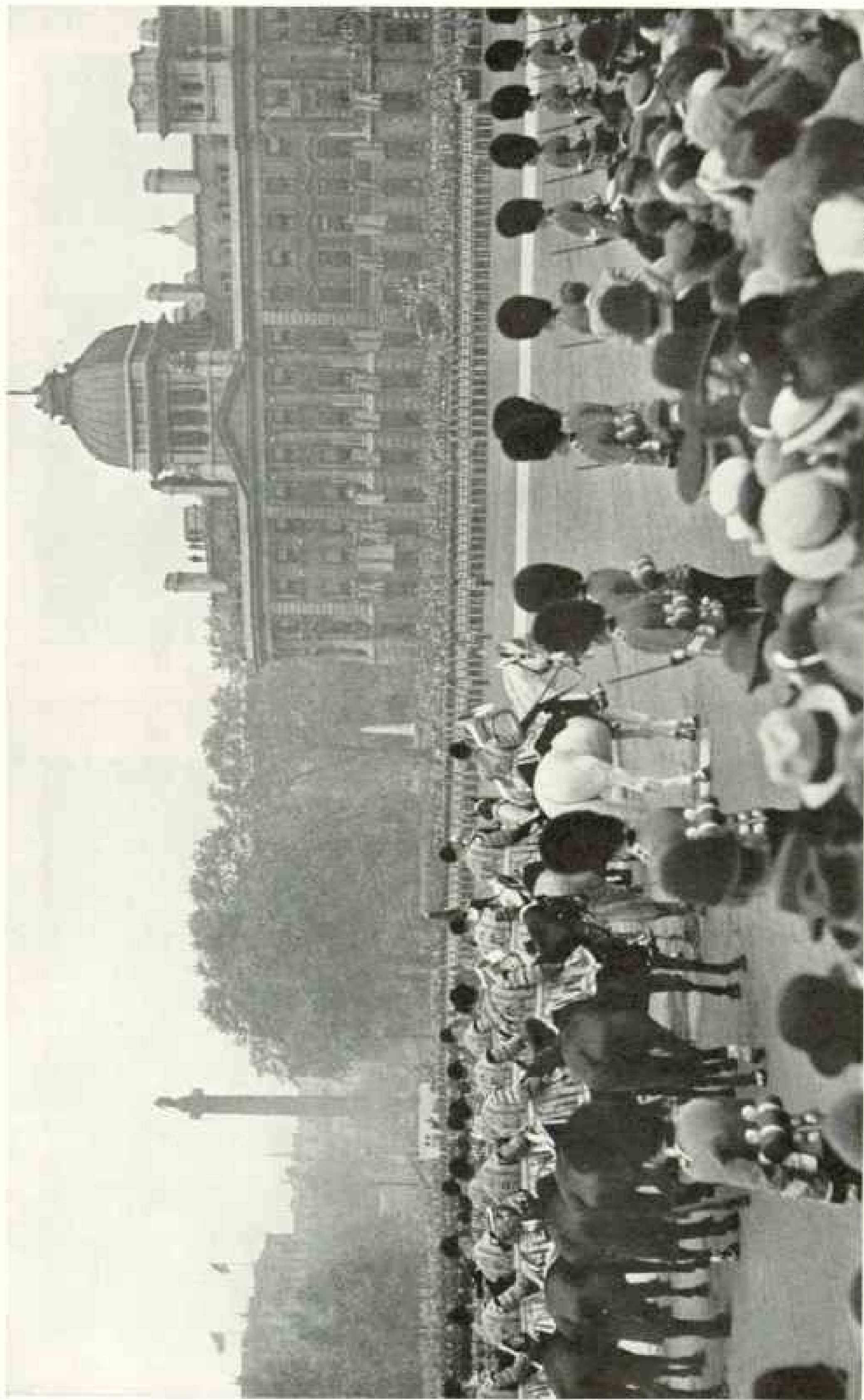
Beside the pretty Sussex lake attached to Arundel Castle, one begging swan has inspired more apprehension than compassion as a mother prepares to defend her young.



Photographs by Maynard Owen Williams

THROUGH WATER LIKE LIQUID LEAD A SNOWY SWAN CHARGES THE CAMERA

While his mate is nesting beside the moat at Ightham Mote, this swan cruises about in her defense. He has long been a favorite with visitors to this splendid manor (see illustration, page 454).

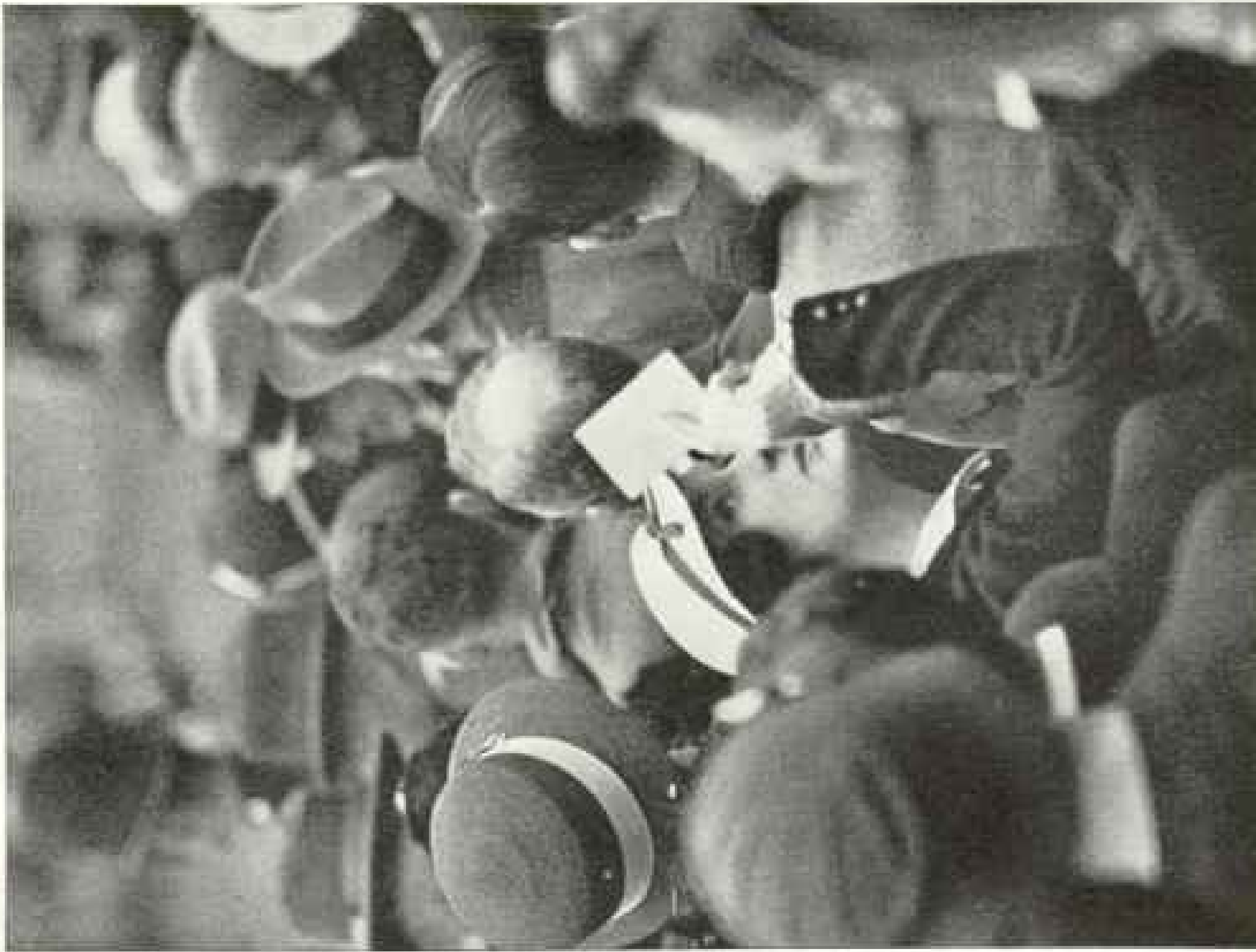


Photograph by Maynard Owen Williams

**TROOPING THE COLOUR IS THE HOUSEHOLD BRIGADE'S BIRTHDAY TRIBUTE TO ITS COLONEL-IN-CHIEF—THE KING**

On June 3, bands play, feet tramp, colors are dipped, and His Majesty, on a splendid chariot, reviews the troops on the Horse Guards Parade in London. A part of England's "thin red line" is drawn up on parade against the Admiralty in the background (see illustration, page 449). Music is furnished by the mounted band of the Royal Horse Guards. Waterloo Place, in the midst of which rises the Guards' Memorial column, is related to the Crimean rather than the Napoleonic wars.





**PATRIOTISM NOT VANITY USES A MIRROR FOR A PERISCOPE**

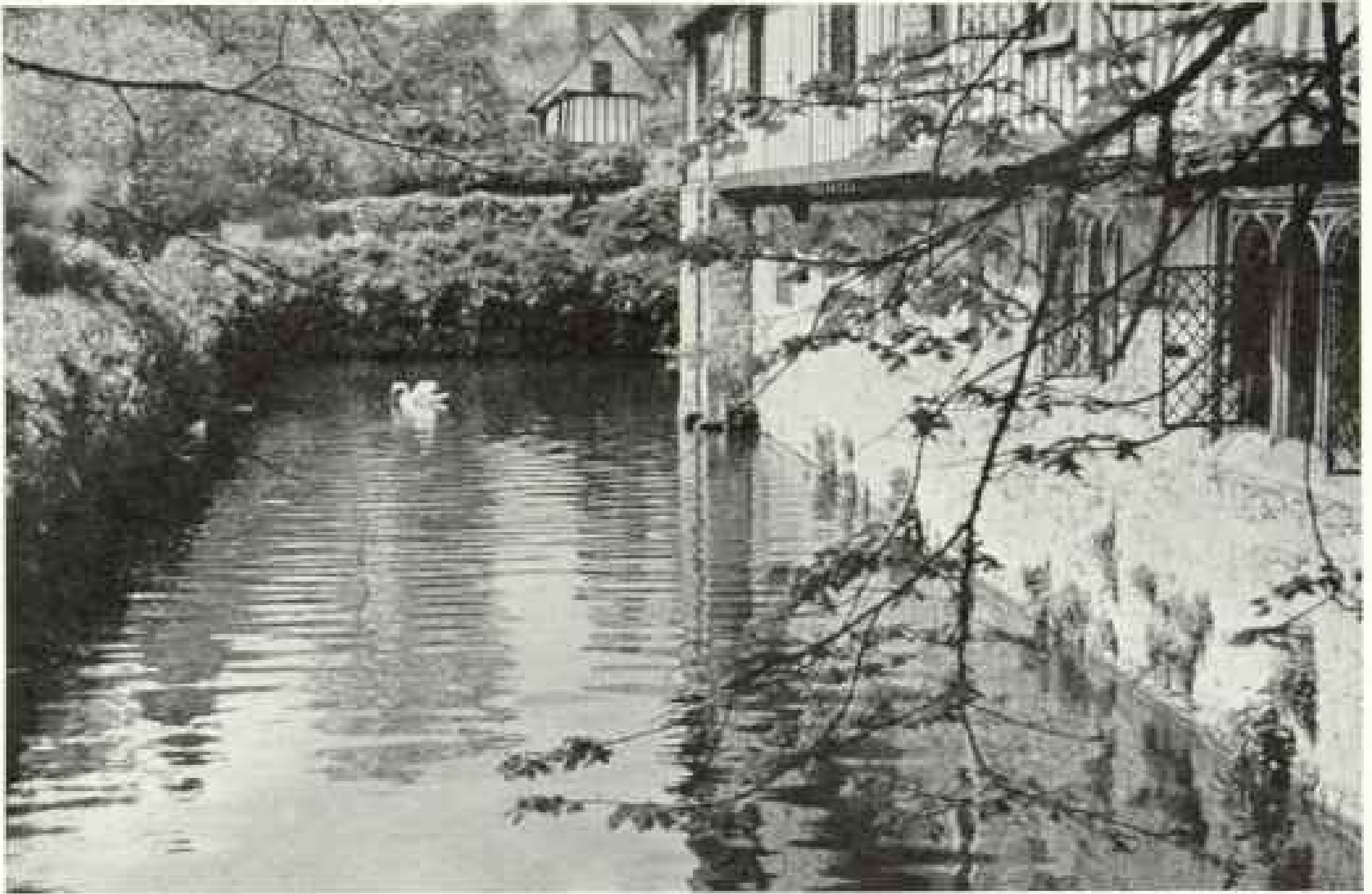
From the step ladder from which he pictured the Trooping of the Colour (opposite page), the photographer saw this girl, wedged in among the privileged spectators, using her pocket mirror to look at the resplendent Horse Guards.



Photographs by Maynard Owen Williams

**ON CLOVELLY'S SLOPES TWO HOBBIES ARE EXEMPLIFIED**

The shady Hobby Drive, by which cyclists and pedestrians—but no motor—may approach Clovelly, was so named because the generous donor constructed it "for fun." Tandem riding is a favorite pastime of Britain's young folk.



IGHTHAM MOTE IS A DELIGHTFUL MAZE OF STYLES AND PERIODS

An Early English crypt, a Decorated hall, a Tudor chapel, and Elizabethan outbuildings make up a pleasing whole in stone, half timber, and brick. Whether "Mote" refers to water ditch or meeting place is a moot point, but the swan finds the surroundings to his taste (see page 451).



Photographs by Maynard Owen Williams

MEN OF DEVON WON THESE TROPHIES IN "BRITAIN'S SALAMIS"

Readers of Charles Kingsley will remember Bideford, where the author wrote a part of "Westward Ho!" These guns, preserved in Victoria Park, are thought to have come from the Spanish Armada galleon *San Juan*. The boy's bow suggests the weapons used by Kingsley's heroes in New Granada.



VENERABLE TREES FRAME A SUSSEX PASTORAL

Tiny Great Britain, with half as many sheep as the United States, imports much meat, and a stock joke is, "Why do they call it 'Canterbury Lamb'?" "Because it comes from New Zealand and is mutton." As decorative features in Britain's countryside, sheep are more common than deer and just as appropriate.



Photographs by Maynard Owen Williams

## EXCURSION STEAMERS MAKE THE UPPER THAMES AN IMPORTANT WATERWAY

Thanks to nearly 50 locks between Lechlade and tidewater, the tiny Thames bears much traffic, most popular excursion the steamer trip between Kingston and Oxford. Motor boats are common, but near Maidenhead there are silent, electric canoes.



IN KENT EVEN THE CAMERA SEEMS TO LIE

With high-piled loads of autumn grain passing the spring blossoms of "England's Garden," the seasons seem mixed. But the "corn" was being restacked to make way for a new crop of hay. Collier Street, as this crossroad is called, is shown on few maps.



Photographs by Maynard Owen Williams

CYCLING ICE CREAM VENDERS FLAUNT THE SIGN "STOP ME!"

And these two little girls certainly have him stopped! A few years ago ice cream was little known. Now the cooling product of London factories is sold along hundreds of miles of English roads.



## WONDERS OF THE NEW WASHINGTON

### Efficient Modern Structures Rise in the Biggest Government Building Program Since the Capital City Was Founded in a Wilderness

BY FREDERICK G. VOSBURGH

**F**ROM a cruising blimp a quarter of a mile above the Potomac we gazed down upon the new Washington.

As always, the simple grandeur of the White House, the Capitol, the Lincoln Memorial, and the towering Washington Monument, now freshly washed with soap and water, drew the eye and made the heart beat faster. But near them new wonders had appeared.

Quietly and steadily, with so little fuss that residents were hardly aware of it, thousands of carloads of stone and metal—whole mountains in the aggregate—have been hauled into the city and reared into monumental buildings.

Acres and acres of old, unsightly structures have been razed on Capitol Hill, around its base, and along broad, historic Pennsylvania Avenue. In their place stretch parks, wide boulevards, or long, handsome houses of government.

In the angle formed by the intersection of Pennsylvania Avenue and the new Constitution Avenue, beautiful Champs-Élysées or Rue de Rivoli of Washington, rises a mighty wedge of masonry, the famed "Federal Triangle," eight blocks long (page 483).

#### TWENTY MILES OF CORRIDORS

In this single group is the most amazing collection of Government buildings that the world has seen. They make their own weather. In hottest summer the air inside is cooled to the temperature of a fine spring day.

Beneath the roofs of this Triangle, I knew, worked 17,700 Government employees, about as many as the entire population of Batavia, New York, or Daytona Beach, Florida. Every day dozens of people get lost in its 20 miles of corridors.

In sheer size the cluster of buildings was staggering, even from high above. It was as if half a dozen or more of New York's tallest skyscrapers had been laid on their sides, formed into a blunted arrowhead, and cut and twisted to make courts and wings.

One unit—the Commerce Department—is longer than the Chrysler Building is tall.

But it was not merely an impression of bigness that we had in the wandering blimp. Long ranks of majestic columns, graceful arcades, a wide plaza, and solid rock walls give a beauty and simplicity that make these enormous newcomers fit companions for the classic White House and Capitol.

"How long will these new buildings last?" I had asked the man in charge of them.

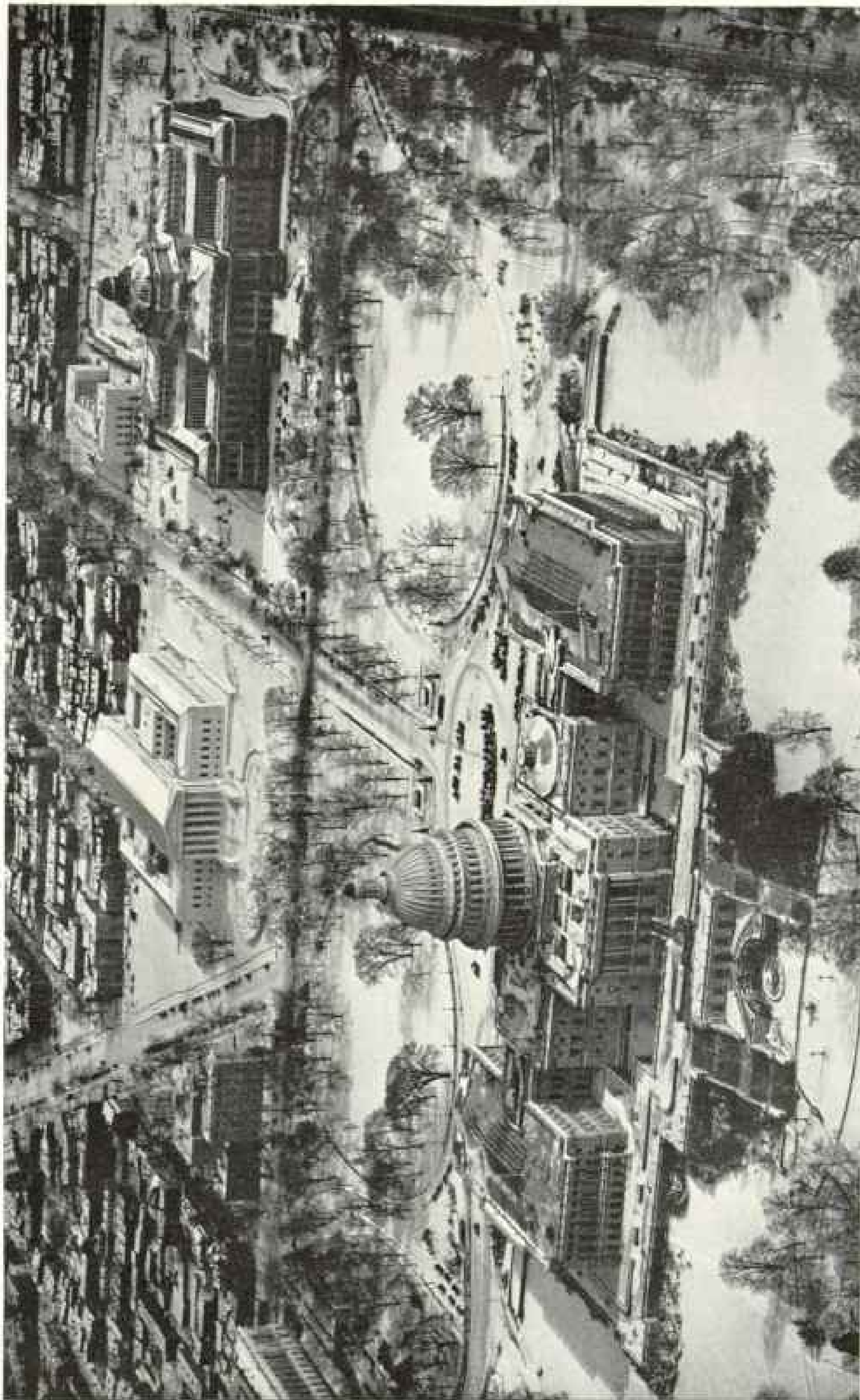
"It is just a question of how long limestone will withstand the elements," was the reply.

#### A MARBLE TEMPLE OF THE LAW

The airship turned, and far off in the distance, beyond the Capitol dome, appeared a gleaming white marble temple, comparable in beauty even to the noble Lincoln Memorial. This is the new United States Supreme Court Building, the only real home of its own that the Nation's highest court has had (pages 458 and 462).

For the first time in American history a citizen now might gaze upon the separate, permanent abodes of the three branches of his Government—legislative, the Capitol; executive, the White House, and now, for the judicial, long sheltered in the old Senate chamber, this temple whose dignity and impressiveness match the majesty of the law itself.

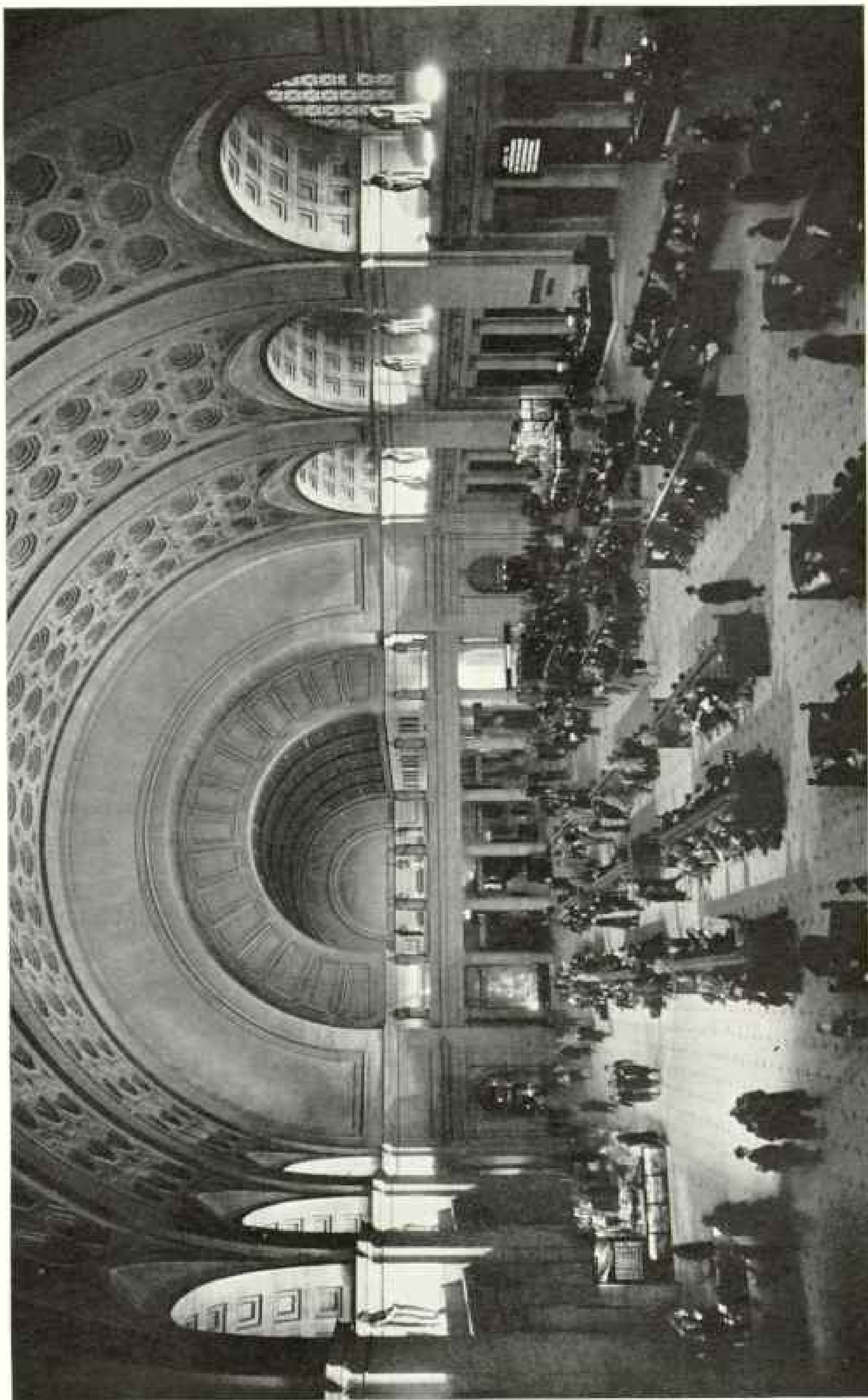
How America has grown, and is growing still! New offices have been added to the White House. They are even talking about enlarging the Capitol, carrying out a plan envisioned more than 70 years ago (see page 458 and Color Plate V). In those huge new buildings downtown, thousands of brains and hands are needed to help do the work of a modern President. The 136 clerks who made up the entire staff of employees when first the American Government moved to the new Federal City by sloop and stagecoach in 1800 could be tucked away and lost in a single wing.



Photograph by Edwin L. Wisland from Goodyear Airship Enterprise

BEYOND THE DOME OF THE CAPITOL GLEAMS THE NEW SUPREME COURT BUILDING

Its marble is as white as the snow itself; its classic lines harmonize with the Capitol. The architects were the late Cass Gilbert, Cass Gilbert, Jr., and J. R. Rockart, of New York. Across the street at the right stands the Library of Congress, soon to be doubled in capacity by an annex to the right of the white-marble Folger Shakespeare Library. There have even been hearings on enlarging the Capitol by extending the center eastward toward the plaza where the cars are parked.



Photograph by Edwin L. Wisner and Willard R. Calver.

**VAULTED CEILINGS OF THE UNION STATION ECHO TO THE COMING OF THE GREAT AND THE LOWLY**

On a thousand errands they cross this threshold of the city—statesmen, job hunters, business men, high-school seniors seeking fun and knowledge, springtime pilgrims to see the cherry blossoms (Color Plates II and VII). Most of them pause as they emerge and sight the inspiring Capitol dome. To make this photograph, nine flashlight bulbs were set around the feet of the guardian statues and ignited simultaneously.



Photograph by Horydzak

A MINER AND HIS BURRO ARE WROUGHT IN ROCK

With a compressed air chisel, Sculptor James Earle Fraser of New York carves out a portion of a Commerce Department pediment depicting the mining industry. At the right in stone are the bulging muscles of a worker pouring molten metal.

As we cruised about, other splendid white buildings appeared, new jewels in the familiar setting along the Potomac.

Beyond the Lincoln shrine the new Arlington Memorial Bridge links North and South. Down the Virginia shore of the winding river a wide Appian Way, the Mount Vernon Memorial Highway, leads to the home and tomb of the Father of his Country.

From the steps of the Capitol all the way down to the river, two and a third miles away, sweeps a broad stretch of tree-dotted park land. Gone is much of the mushroom growth of temporary wartime structures. Their removal gives new beauty to this Mall,

main feature of the grand plan conceived by the Revolutionary soldier-artist, Maj. Pierre Charles L'Enfant, when he laid out this city with broad, sweeping, prophetic strokes to be the capital of a vast country. I wished he might ride with me today.

Hanging there between earth and sky, we seemed suspended in history, halfway between the past and the unfathomable future. How would the city look a hundred years hence, or twenty, or a thousand?

"Say, can you swing the tail around a little bit? I want the Capitol to move over into the center of this shot."

The voice of my photographer companion broke in upon my reverie. I came back to the remarkable present, when men fly about the sky and nonchalantly command the United States Capitol to "move over."

For an hour we flew, "shooting" pictures with an aerial camera like a small black cannon, now idling our

motors deferentially over the Capitol lest their roar disturb the Congressmen at weighty work below, now cruising up and down the Mall, while the airship's shadow raced along the ground.

MAGIC CHANGES ON CAPITOL HILL

For months now, returning travelers from Timbuktu or Tehran and pilgrimaging citizens from Dodge City or Dubuque have been pausing on emergence from Washington's Union Station and uttering exclamations of admiration and surprise.

No wonder! Instead of ugly brick walls and tar-paper shacks of World War vintage, a splendid park cut by wide drives sweeps



across to the Capitol. In the midst of the magnificent Plaza, if it be summer, a fountain plays, its water glowing with subdued colored lights (see illustration, page 471).

The Senate Office Building, off there at the left, has had its face lifted — and a handsome face it now is, with a long row of Roman Doric columns. A streetcar line that once marred the scene dips discreetly underground. Beneath a broad lawn is a subterranean garage in which 270 senatorial cars can be parked.

But to look upon the latest crowning glory of Capitol Hill one should stand on the front steps of the Capitol, where presidents are inaugurated, and see the new Supreme Court Building, its beauty heightened by the green of trees and grass.

It occupies a historic site. Early patriots in powdered wigs for-gathered at a famous old hotel run by William Tunnicliff on this spot before the War of 1812. After the British burned the Capitol in 1814, a building erected here housed Congress until the marks of the torch were erased. In Civil War times it was used as a military prison.

#### A SINGLE STONE WEIGHS 45 TONS

Everything about the Supreme Court's home is on a majestic scale.

"Look at those blocks of marble, one at each side of the steps," said a Government man who supervised its construction. "Each block weighs 45 tons. They are two of the heaviest marble blocks ever brought into Washington."

The two bronze doors weigh 3,000 pounds apiece. The eight Corinthian columns are



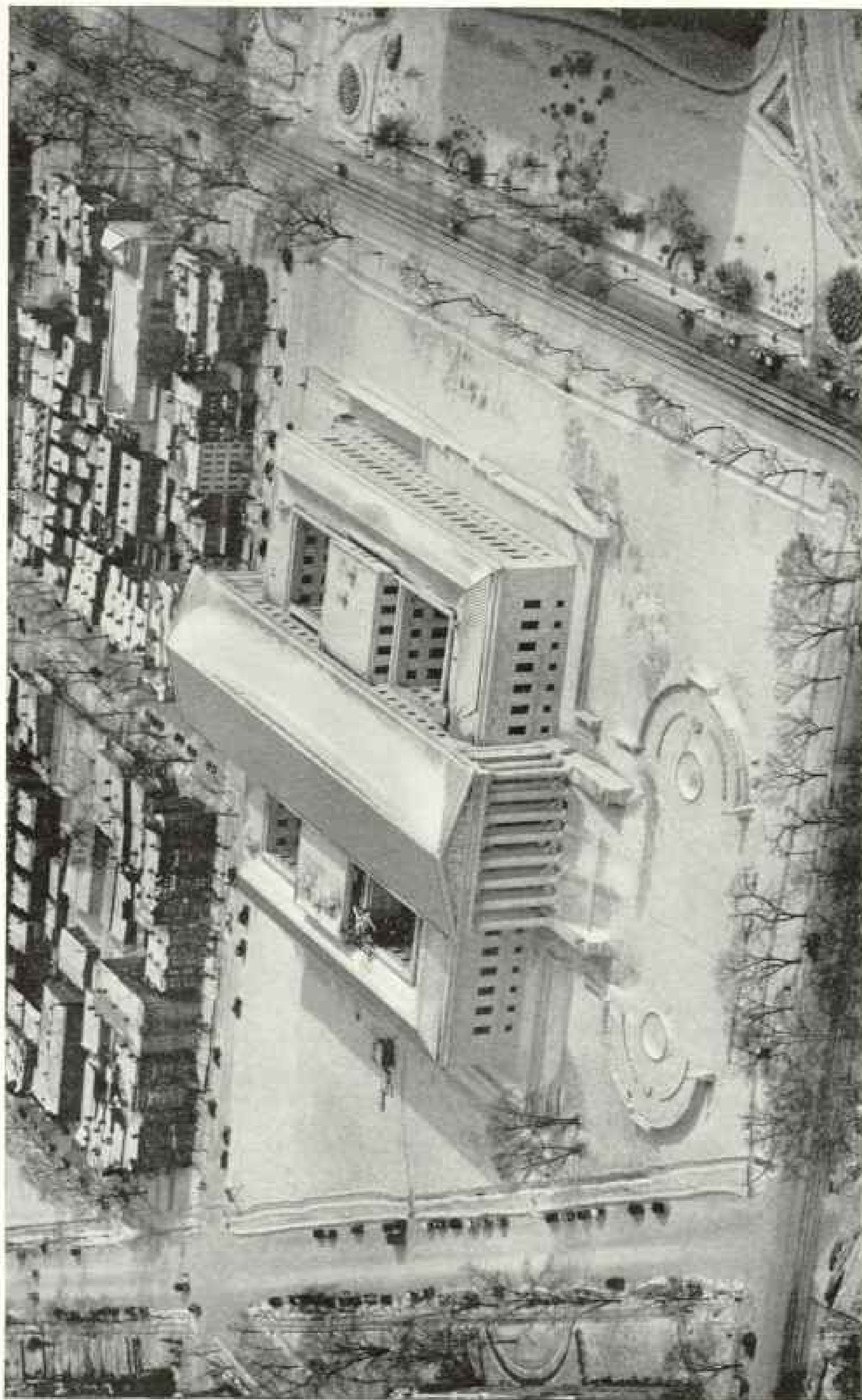
Photograph by Willard R. Culver

#### THE POST OFFICE DEPARTMENT HAS GRACEFUL CURVES

This vaulted arcade on the Twelfth Street side is a study in sunshine and shadow. The building, with its long, curving wings, was designed to form a partial frame for two plazas in the heart of the Federal Triangle (see illustrations, pages 482-3, and text, page 471).

51½ feet high. The pediment above them catches the eye, not alone for its size, but for its interesting sculptures in which the features of historic or living men are recognized (see illustrations, pages 463 and 465).

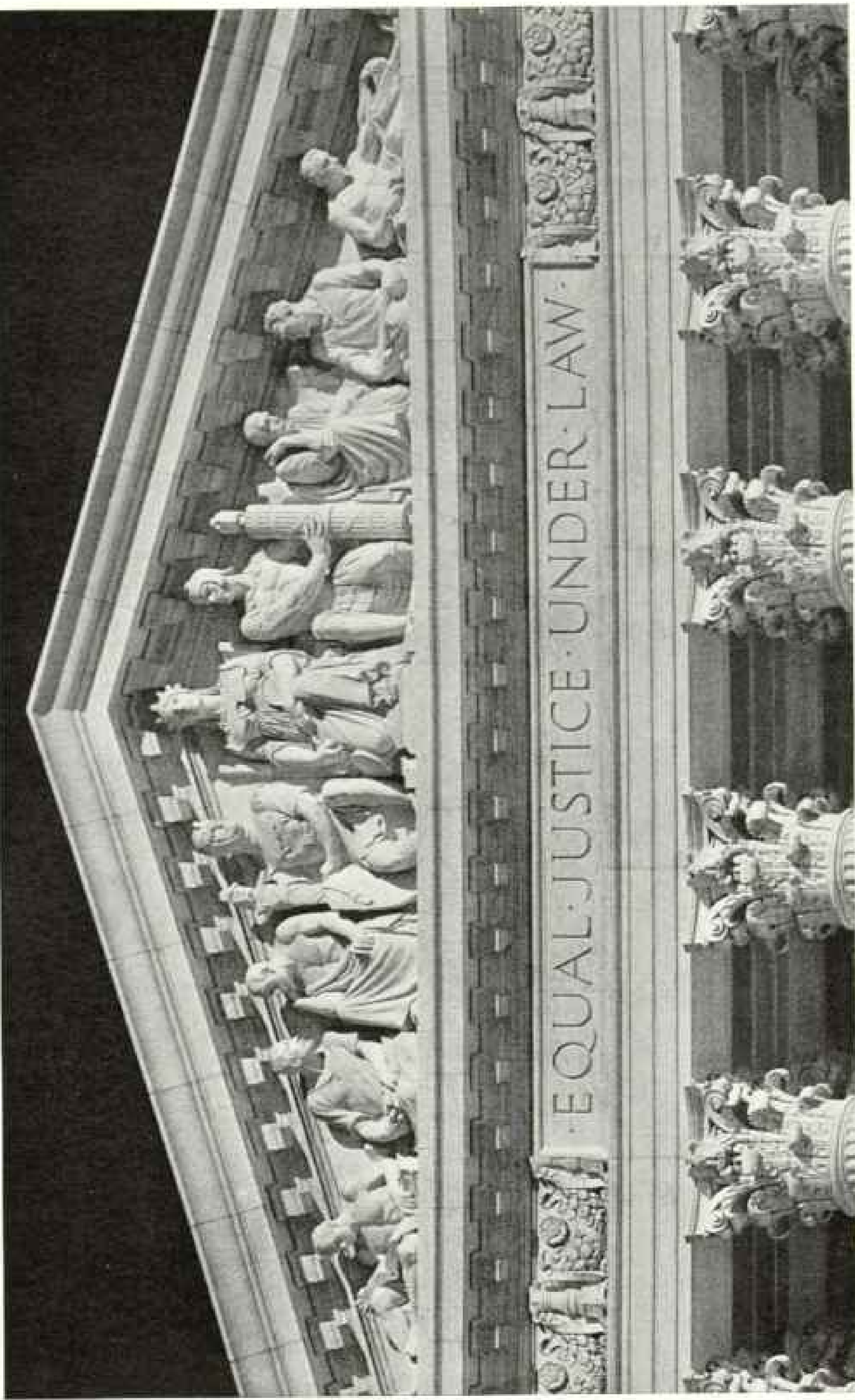
Inside the massive bronze portals a main hall lined with 36 stately columns—each made from one solid piece of stone—leads to the courtroom where the nine black-robed Justices will sit. At their own request, the room was made only about 60 per cent larger in floor area than the present Supreme Court room in the Capitol. Richly colored marble columns and sculptured panels lend beauty to the lofty chamber, 45 feet from floor to ceiling.



Photograph by Edwin L. Wisner from Goodyear Airship Enterprise

A CLASSIC TEMPLE OF PURE-WHITE MARBLE BECOMES THE HOME OF THE NATION'S HIGHEST COURT

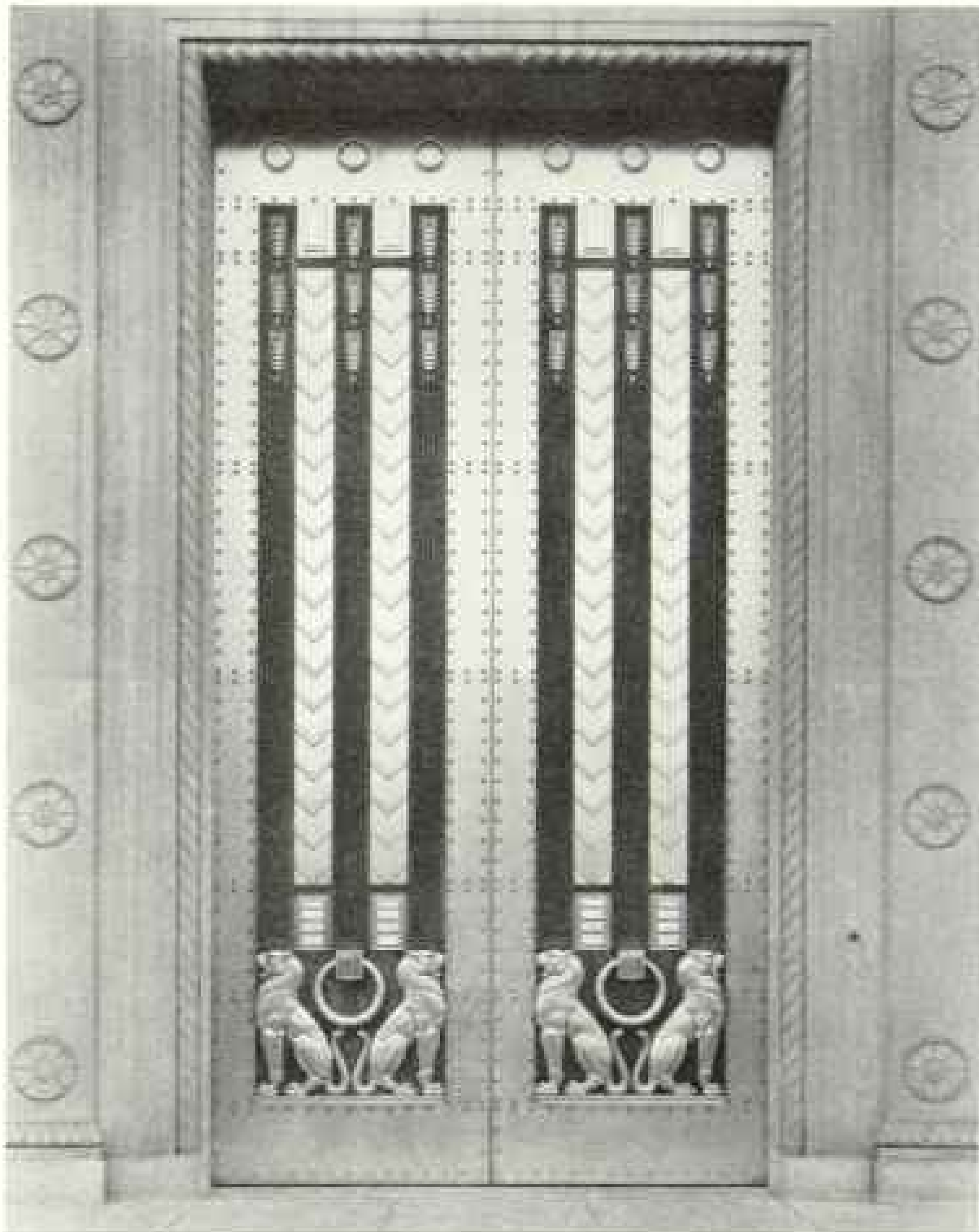
A former President and Chief Justice of the United States, William Howard Taft, was a moving spirit in the conception of the building, as he was in the construction of the Lincoln Memorial. Until shortly before his death he presided over the Supreme Court Building Commission, even calling a meeting around his bed in a hospital. Vermont quarries produced the gleaming white exterior; the marble facing of the four courtyards comes from Georgia; and most of the marble inside is from Alabama. In the courtroom alone foreign stone is used, with walls of ivory-vein marble from Spain and columns of light Siena old-convent marble from Italy (see text, page 461).



Photograph by Willard H. Culver

LIKE MICHELANGELO, SCULPTOR ROBERT ATKEN PORTRAYED THE FEATURES OF ACTUAL MEN

Faces of the three figures at the left suggest, respectively, the late Chief Justice William Howard Taft when a student at Yale; Elihu Root, former Secretary of State; and the late Cass Gilbert, one of the architects of the building. After the three conventional central figures, representing "Liberty Enthroned," guarded by "Order" and "Authority," appear likenesses of Chief Justice Charles Evans Hughes, Mr. Atken himself, and former Chief Justice John Marshall when a student. The figures with the recognizable features represent "Council and Research, Past and Present."



Photograph by Horyszak

**ALUMINUM DOORS OF THE JUSTICE DEPARTMENT ARE 20 FEET HIGH**

Roaring lions typify watchfulness and strength. Heads of wheat carry a connotation of fertility and the bread of life. Above the portals, but not visible here, are modern concrete mosaics with designs on a blue ground in red, black, and gold.

Behind the courtroom are the quartered-oak-paneled offices of the Justices, each of whom will have about as much space as all have together now in the crowded Capitol. Only three have offices there at all, and most of the members of the Court do much of their work at home. To assure the Justices privacy, the new building's corridors can be closed by big bronze gates.

The Attorney General and Solicitor General, who now have barely space enough for their brief-cases when they come to the Capitol to appear before the Court, are provided with spacious offices.

Under the courtyards are garages; out of sight is apparatus for conditioning the

air in most parts of the building; there are dining rooms for Justices and a cafeteria for visitors, council rooms for attorneys, and numerous libraries—space for 379,726 of the law's voluminous tomes.

In the Folger Shakespeare Library, down the street, reposes a fine collection of books and Elizabethan treasures, even the supposed corset of Queen Elizabeth, solemnly stowed away in a vault and shown only to a chosen few (pages 466-7-8).

**DOUBLING THE WORLD'S LARGEST LIBRARY**

Behind the Library of Congress a broad space is being excavated for an annex almost to double its capacity, although already it is the largest library in the

world, with 9,841,494 books, pamphlets, pieces of music, and other items at the latest count.

Down from Capitol Hill, past a shining new House Office Building lately reared beside the first one, the trail of the new Washington leads to Pennsylvania Avenue.

In some of its now vanished buildings—masses of rubble and ruined walls then—the first bricks flew in the "bonus army" riots of 1932.

Halfway along "The Avenue," between the Capitol and White House, there stretched off to the left in the early days of the city a dreary swamp where Washingtonians were wont to shoot "reedbirds."



Later the swamp was filled in, and the old Center Market, dubbed the Marsh or "Ma'sh" Market, was erected there. When I came to Washington four years ago, ramshackle market buildings still occupied the spot, and thousands of rats inhabited the premises which had long been a cornucopia for them.

An energetic Government hit upon this location as a key point in its building program. Here would rest the tip of the Federal Triangle. Wrecking operations began. Scientific Pied Pipers from the Agriculture Department disposed of the rats, which at first devoured the workmen's lunches.

On this unlikely site now stands a structure in many ways unique—the National Archives Building (see illustration, page 483).

Here for the first time is a worthy, safe, and permanent home for the precious records of the Nation, some scrawled in faded ink on yellowed paper by early patriot hands, others punched out on modern typewriters, or even contained in sound motion-picture films which will be preserved and shown here.

To guard against deterioration—to keep Father Time at bay as long as possible—both sunlight and natural air will be barred from the archive storage sections, which are windowless.

#### ANCHORING A BUILDING FOR ALL TIME

A person shut up there the year around would never know at first hand whether it was summer or winter, day or night, for the only light will be artificial and the temperature will be kept constantly about 72 degrees.



Photograph by Willard E. Calver

#### THE SUPREME COURT'S PORTALS WEIGH THREE TONS

Sculptured in bronze are scenes showing the progress of human justice from ancient Greece and Rome, and England at the time of the granting of the Magna Carta, to America and the rise of the power of the Supreme Court under Chief Justice John Marshall.

The air will be cleansed and excess moisture wrung out, lest it shorten the life of the paper.

"What is the life expectancy of such a building?" I asked the architects.

"It was built to last forever," came the answer.

Forever! Yet this was a structure built not upon rock but on land that once had been a swamp. By what engineering miracle was it possible to achieve firmness of foundation? I found out.

This building stands upon an enormous "scow" of reinforced concrete five feet thick, sunk deep into the ground and supported on more than 5,000 concrete piles



Sculpture by John Gregory. Photographs by Joseph Proll

VIVID CHARACTERS LIVE IN STONE

ranging from 15 to 35 feet long. But Washington is low, and this basal structure goes far down below the level of the Potomac. Under ordinary conditions the several strata of clay and gravel would keep the water out. But suppose the Potomac should rise in flood. Would not the incalculable power of the rising water lift the gigantic scow, building and all, and float it off down Pennsylvania Avenue? Or, if that is too overdrawn a picture, could it not at least move and crack this important structure?

All this the architects foresaw. In the center of the concrete scow they left a large sump hole. Down inside it are two electric pumps and a steam turbine. If the water rises above a certain level, it automatically kicks one of the pumps into action. If it climbs still higher, the second electric pump comes to the rescue. And if the flood increases, the mighty steam turbine goes into battle with almost enough power to pump out the whole Potomac. Through a main nearly nine feet in circumference the water would go belching back to the river whence it came.

#### A 120-TON STONE MAKES A GLADIATOR

Every piece of stone in the structure was chosen and laid with the idea of permanency. The base is granite from West Chelmsford, Massachusetts. For the superstructure an entire new bed of limestone was opened at Bedford, Indiana. The largest and finest stones ever quarried in this country were sought.

Two giant blocks weighing 120 tons apiece were hewn from Indiana's limestone hills. But they could not be shipped—not without enlarging railroad tunnels and strengthening bridges all the way from Bedford to Washington. Forthwith the sculptors went out to Indiana, and roughed the chunks down from 120 to a mere 90 tons. When the blocks reached Washington, it was found there was no rig big enough to pick them off the cars, and again the sculptors got busy. Working right in the railroad yards, they knocked off enough this time to bring each block down to 60 tons.

Now you may see them, flanking the main entrance on Constitution Avenue. The rock on the right has been carved in the form of a Roman gladiator, guarding the approach with sword and shield. On the other side is a female figure, holding a child, with a sheaf of wheat in the background, portraying fertility.

On entering this Archives Building, all documents will be fumigated, not so much to guard against disease germs as to end the activities of bookworms and their ilk which might eat through priceless pages.

Exactly what are the archives which will be stored here? The official answer has not yet been given.

The two prime United States documents, the Declaration of Independence and the Constitution, repose in carefully guarded cases in the Library of Congress. In various buildings are numerous other records.

"FEET . . . LIKE . . . LOTUS FLOWERS"

For instance, there is a letter that came from the Court of Burma in 1856, seeking a treaty of amity and commerce. That effusion, encased in the carved and hollowed tusk of an elephant, says:

"We, who are the Ministers and Generals of the King of Burma, the Overlord of all the kings of the Orient, the most Powerful Sun-rising King, the Lord of Sattan Elephant King, the Lord of Many White Elephants, and the Great Righteous Ruler; and we who are doing homage to the King by bowing our heads to his Golden Feet which are like the Paduma lotus flowers, write this letter to the President and Ministers who are the rulers of both Washington and the countries of the West."

One can imagine President Lincoln's enjoyment of a letter in which the King of Siam offered to stock the United States with elephants to roam in its "jungles" and serve as a source of beasts of burden. All the United States had to do was to send a steamship and the King would provide the cargo of young males and females, he explained, giving grave directions for the care and feeding of elephants *en voyage*.

With careful courtesy and apparently a straight face, Mr. Lincoln replied that his country's political jurisdiction "does not reach a latitude so low as to favor the multiplication of the elephant, and steam on land as well as on water has been our best and most efficient agent of transportation in internal commerce."

The royal elephant offer had been dispatched by the "Blessing of the Highest Super-Agency of the Whole Universe, the King of Siam, the Sovereign of all Interior Tributary Countries Adjacent and Around in Every Direction," but the American President signed himself simply, "Your good friend, Abraham Lincoln."



Sculptures by John Gregory Photographs by Joseph Pirelli  
AT FOLGER SHAKESPEARE LIBRARY



Photograph by Willard R. Culver.

**EVEN "QUEEN ELIZABETH'S CORSET" COMES TO WASHINGTON**

An order that was cabled to London won the relic which now reposes in the Folger Shakespeare Library. The faded garment, bound with red leather, was sold by an aged woman, Mary Ann Pilgrim, who said it had been in her family for 300 years. Tradition said the red-haired queen gave it to a wealthy friend, a Mrs. Shackles, who in turn gave it to a Mistress Pilgrim, one of her maids. Queen Elizabeth, incidentally, is credited with wearing England's first pair of black silk stockings in 1560.

At the State Department also, where few now see them, are such documents as the Emancipation Proclamation, bound with a red and blue silk ribbon, and the Kellogg-Briand Anti-War Pact of 1928, resplendent with red-silk ribbon and red seals.

**TONS OF ALUMINUM ADORN JUSTICE**

Across from the Archives Building toward the White House is the Justice Department's splendid new structure of stone and sleek gray metal (see illustration, page 483).

When the Washington Monument was being completed in 1884, a proud citizenry capped it with 100 prized ounces of a precious metal, aluminum. It cost a dollar and ten cents an ounce, almost exactly the same as silver then.

Earlier, French plutocrats vied for possession of aluminum forks and spoons more highly valued than solid gold.

With this in mind, a sight of the Department of Justice Building is astounding. In it there is enough aluminum to make not only forks and spoons but pots and pans for a whole city. If the metal today cost what it did when the Washington Monument was crowned, the amount used in this single building would be worth some \$8,500,000. Instead, it cost between \$400,000 and \$450,000, and that includes not only the metal but the entire work of fabricating it. American inventive genius played an important part in developing the electrical reduction process by which modern scientific alchemy now trans-

forms one of the commonest elements in the earth's crust into shining metal on such a scale that we see it on every hand.

A caller at the Justice Department swings open aluminum doors some 20 feet high (see page 464), boards an aluminum elevator, looks appreciatively at bas-reliefs cast in aluminum, runs his hand along aluminum stair railings, looks out aluminum-framed windows, and reads by the light of aluminum fixtures. In the Great Court, half the size of most city blocks, is a large aluminum fountain.



The gray metal adds an air of modern sophistication to a structure which in architectural feeling is Greek, with dignity and refinement its keynotes. It is impressive in size as well. A stroll around its limestone and granite walls would mean a walk of nearly half a mile, and inside are two miles of corridors.

#### CRIME FOUGHT BY THE "G" MEN

Most spectacular and interesting of all the activities housed in the Justice Department is the work of the Federal Bureau of Investigation, whose long arms have been reaching out and smiting "public enemies" all over the country.

"I want to see one of the 'G' men."

"Let's see if we can get a permit to see the files where they keep the fingerprints, or look at Dillinger's bulletproof vest."

With such comment, sight-seers already are finding their way in numbers to the first permanent home that the Justice Department has had since its organization. Their desires can be fulfilled, though few recognize the crack Government agents—known through the country as "G" men—who are accomplishing the most against crime. A small, quiet man they may pass in the hall has killed three criminals in gun fights and sent several notorious swindlers to prison.

On view here are some of the unbelievably murderous weapons desperadoes use.

"With this machine gun you could stand on the steps of the Treasury and shoot right through the engine block of an auto on Capitol Hill," an agent told me.

One deadly exhibit is a 20-gauge double-barreled shotgun which its gangster owner sawed off and fitted with a pistol grip. Fired at close range, it could hardly miss.

Up at the top of the building are the millions of fingerprints with which Uncle Sam can tell a criminal things about his life that he may have forgotten himself. Many a desperate public enemy has tried to erase the tiny telltale ridges and whorls from his fingertips with knife or acid. But they always grow back just the same.

In a constant stream from police and prisons all over the country come sets of fingerprints, at the rate of 2,500 a day. Every time one is filed, a little light flashes, and it is blinking constantly.

A few moments of quick, deft work, and the owner of the prints is identified abso-

lutely if he has a criminal record; and 47 per cent of them have! These experts don't even look at the name the fingerprinted man may have given. Men and names may lie, but fingerprints never!

Machinery does its part. There is a bank robbery. A scared teller sees that one man is of medium height, rather dapper, with a small mustache and a scar at the right side of his mouth. The Department has a special file of 10,000 public enemies—bank robbers, kidnapers, murderers. Each card includes a coded description. These can be fed through an electric searching machine, set to eliminate the thin men, fat men, short men, tall men, and to pick out the ones with scars. The "mechanical detective" may produce 20 or so, and from the pictures of these men on file the teller is able to select the one he saw.

I leafed through a voluminous nickname file: Ace in the Hole, Johnny Dingdong, Butterfat, Cross-Town Slim, Crookie, Australian Jimmy, Baby Face (there were several of them), Bad Egg. These are names that have stuck in underworld channels.

Suppose you are kidnaped and hear one of your captors say, "Look here, Pretty Boy." With that nickname and this file, the "G" men can accomplish wonders.

There are samples here of the typewriting of every make of machine in the world, even those in foreign languages, including the Arabic. There are well-equipped laboratories; files of paper watermarks, handwriting, and even tire treads.

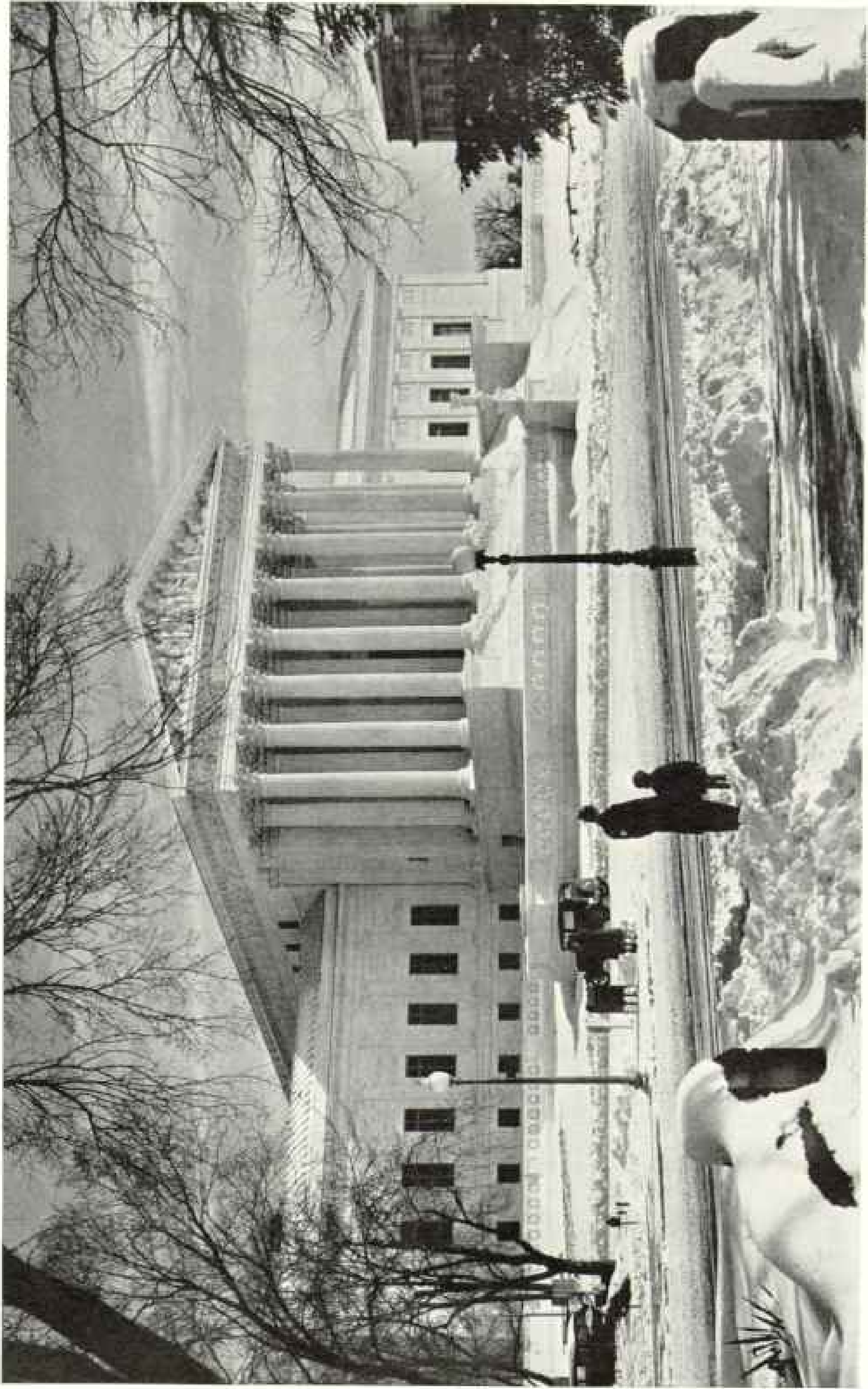
In the new building this important Federal Bureau has elbow room. In the old rented quarters men searching the files used to bump their heads against the ceiling.

#### TAXES REPLACE STEAMED OYSTERS

Across the street from Justice stands the Government's immense house of taxation, home of the Bureau of Internal Revenue. It was the first of all the Triangle buildings to be occupied, but it is the last to be finished, because it is still growing.

Already the building is so big that it has to have charts in the entrance lobby to give visitors their bearings. When completed, it will rival the enormous Commerce Building in size.

On the site of the new wing stood Harvey's, sacred to the steamed oyster which was supposed to have been "invented" here. To the original Harvey's Oyster House, once



Photograph by Willard K. Culver

A MARBLE TERRACE SURROUNDS THE DIGNIFIED NEW HOME OF THE SUPREME COURT

The building is of classic Corinthian design, with lofty columns, carefully studied proportions, and simple masses. It faces the Capitol across a vista of lawns and fine old trees. At the right is a corner of the Library of Congress (see illustrations, pages 458, 462-3, 465, and 471).



Photograph by Edwin L. Wisbard from Goodyear Amphip Enterprise

**WHAT CHANGES SINCE THE FOUNDING FATHERS LAID THE CAPITOL'S CORNERSTONE ON A FOREST-CLAD HILL!**

Newest gem is the Supreme Court Building, at the right, facing the Capitol (see pages 457-8 and 463). Others are the new House Office Building, in the foreground beside the old one which it supplements; and the Folger Shakespeare Library, at the right, beyond the Capitol and the Union Station. Lies the Senate Office Building, the right-hand wing of which is brand new. Through underground passageways Members of Congress go from their offices to the Capitol.

a blacksmith shop, President Lincoln and his wife came with other dignitaries to sample the novel delicacy. General Grant had a favorite seat in the Harvey's Restaurant that replaced it in 1866, and other famous patrons included Presidents Garfield, Arthur, Roosevelt, and Taft.

Here also once stood the Capital's first playhouse, the Washington Theater, later a dancing academy and assembly hall where several ante-bellum presidents held inauguration balls. A visitor to Washington in 1826 recorded that in a public ball here at Carus's he "saw the waltz introduced into society for the first time."

One day in 1859 Postmaster General Joseph Holt, scribbling a routine Government report, dipped his pen in the purple rhetoric of his time and wrote:

"The Post Office Department, in its ceaseless labors, pervades every channel of commerce and every theatre of human enterprise, and while visiting, as it does kindly, every fireside, mingles with the throbbings of almost every heart in the land.

"In the amplitude of its beneficence it ministers to all climes, and creeds, and pursuits, with the same eager readiness and with equal fullness of fidelity. It is the delicate ear trumpet through which alike nations and families and isolated individuals whisper their joys and their sorrows, their convictions and their sympathies, to all who listen for their coming."

Little did he dream that the words would be carved in stone around the arcade of a monumental Post Office Department Building. Yet there they are, flanked by inscriptions noting the growth of the Postal Service from "Colonial Post 1691" and "Continental Post Office 1775" to "Air Mail 1918."

ONE ISSUE OF THE GEOGRAPHIC WOULD  
FILL A 15-CAR MAIL TRAIN

How the imaginative Holt would thrill to the magic of modern air mail! In his day light pony express riders were racing over the plains, depending upon their speed to save them and their precious mail from hostile Indians. The United States postage stamp—so cheap and so taken for granted now—was only 12 years old, and registered mail was a novelty in operation just four years.

Today the Department personnel has increased more than sevenfold—from 32,320 to 237,600. The National Geographic So-

ciety, largest private user of the postal facilities in Washington, every month mails a million magazines. A single issue fills about 15 mail cars. They go out in waves, timed to reach members in far foreign countries and in near-by places almost simultaneously. In addition, The Society alone sends each week-day an average of 34 bags of first- and third-class mail.

Sometime perhaps, hundreds of years from now, future generations of builders or wandering archeologists may come this way and split open the cornerstone of this Post Office Department Building. If so they will find a bewildering array of information and objects, including the Bible, the Constitution of the United States, the American flag, Washington newspapers, and a medallion bearing the likeness of President Hoover. They were sealed inside on an autumn day A. D. 1932.

YOUNG LABOR AND COLOSSAL COMMERCE

Along Constitution Avenue for two whole blocks sweeps the columned front of the Interstate Commerce Commission, central connecting wing, and Labor Department, their ornate lighting fixtures glittering with gold leaf (illustration, page 482).

At the lofty cream and gold auditorium in the center, workmen were adding the final touches when I walked through.

Labor, the youngest Department, was just moving in from its rented quarters. Hung on the spick-and-span corridor walls were vivid Public Works of Art Project pictures—hands grappling with machinery as if to keep insensate cogs and wheels from throwing flesh and blood out of work; tenement streets and railroad yards; workingmen with the dignity of self-respecting labor.

Across the street in the building that is the colossus of them all, I called upon Commerce, that enormous modern Government Department whose servants count the Nation's noses, go down into steamship boilers and up among the air lanes, guard liners from icebergs, map the ocean floor around our coasts and keep the beacons burning, watch over fish and Alaska seals, record the triumphs of inventive genius, help extend the romance of modern trade and preserve its standards.

Its massive home forms the base of the Triangle (pages 482-3). To build it took 2,000 carloads of Indiana limestone, 150 carloads of Connecticut granite milled in Massachusetts, 1,400 tons of Missouri and



SPRINGTIME WREATHES A GARLAND FOR THE NATION'S CAPITAL



Autochrome Lumière by Jacob Gayer.

FROM A RAINBOW FOUNTAIN SPRINGS THE CAPITAL'S TALLEST MONUMENT

Within a few blocks of the heart of the city is the fountain and the adjacent reflecting pool, where on summer afternoons small boys sail miniature craft and in winter hundreds of citizens from colder climes indulge in skating.



© National Geographic Society

Finlay Photograph by Orrin R. Loomis

AT THIS SHRINE VISITORS FROM NORTH AND SOUTH MEET IN REVERENT ADMIRATION

Dignity, simplicity and strength mark this memorial of Colorado marble by Henry Bacon. Inside is a colossal seated figure of Lincoln, by Daniel Chester French. At night, graceful columns are etched against the trees and sky, and the Emancipator's kindly expression is brought out by lighting.



Autochrome Lumière by Jacob Gayer

THE SILVERY WASHINGTON MONUMENT PEEPS THROUGH A PINK FILIGREE

The budding of the Japanese cherry blossoms around the Tidal Basin is marked by the invasion of sight-seers, including many artists. For two weeks excursion trains, buses, and automobiles from every State and from Provinces of Canada bring thousands of visitors to attend the Cherry Blossom Festival.



© National Geographic Society

Finlay Photograph by Edwin L. Wishard

A TREASURE HOUSE OF ART IS THE NATIONAL GALLERY

This exhibit, housed in the National Museum building, one of the finest in the Capital City, was begun more than a hundred years ago. "Betty Wertheimer" (left) by John Singer Sargent and "Summer" (center) by Frank W. Benson dominate a corner of the recently installed Gellatly Collection.

SPRINGTIME WREATHES A GARLAND FOR THE NATION'S CAPITAL



*Autochrome Lumière by Oren R. Loufen*

HERE, EASTER MONDAYS, CHILDREN ROLL EGGS ON THE WHITE HOUSE LAWN

Then the President and First Lady usually appear briefly on the pillared south portico in the background. The mansion, formerly known as the President's House, first received its present name when it was painted white to obliterate smoke stains caused by fire during the War of 1812.



© National Geographic Society

*Autochrome Lumière by Jacob Gayer*

RED TULIPS BRIGHTEN A WALK IN LAFAYETTE PARK

From early spring to late fall, a corps of gardeners keeps the flower beds in Washington's parks and along the driveways constantly abloom. In some "Circles" and "Squares," ever-blooming roses remain throughout the season, while in others seasonal flowers replace those that have withered.



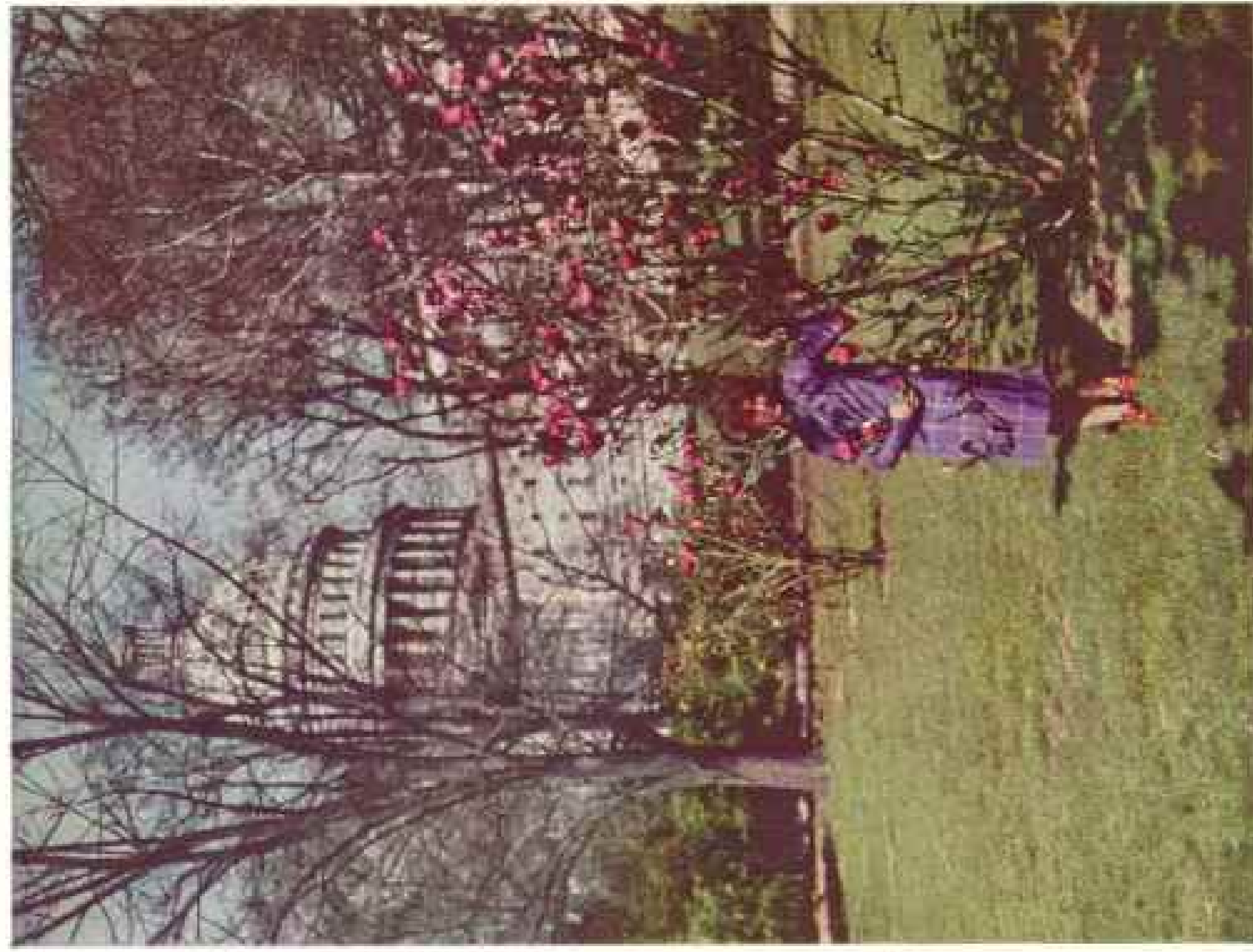
© National Geographic Society

Fielder Photograph by Newton Blakelee

GENERAL SHERMAN'S STATUE STANDS NEAR PENNSYLVANIA AVENUE, UP WHICH HE LED HIS ARMIES IN 1865

Around the base of the monument, erected by The Society of the Army of Tennessee with the aid of Congress, a file floor lists the battles in which the Civil War leader fought. "War's legitimate object is more perfect peace," is one of William Tecumseh Sherman's famous utterances inscribed on the bronze tablets on the pedestal. The colossal new Department of Commerce building overlooks Sherman Square, south of the U. S. Treasury.





© National Geographic Society

Autochrome Lumiere by O. R. Loudon.

**"A NATURAL PEDESTAL AWAITING ITS MONUMENT"**

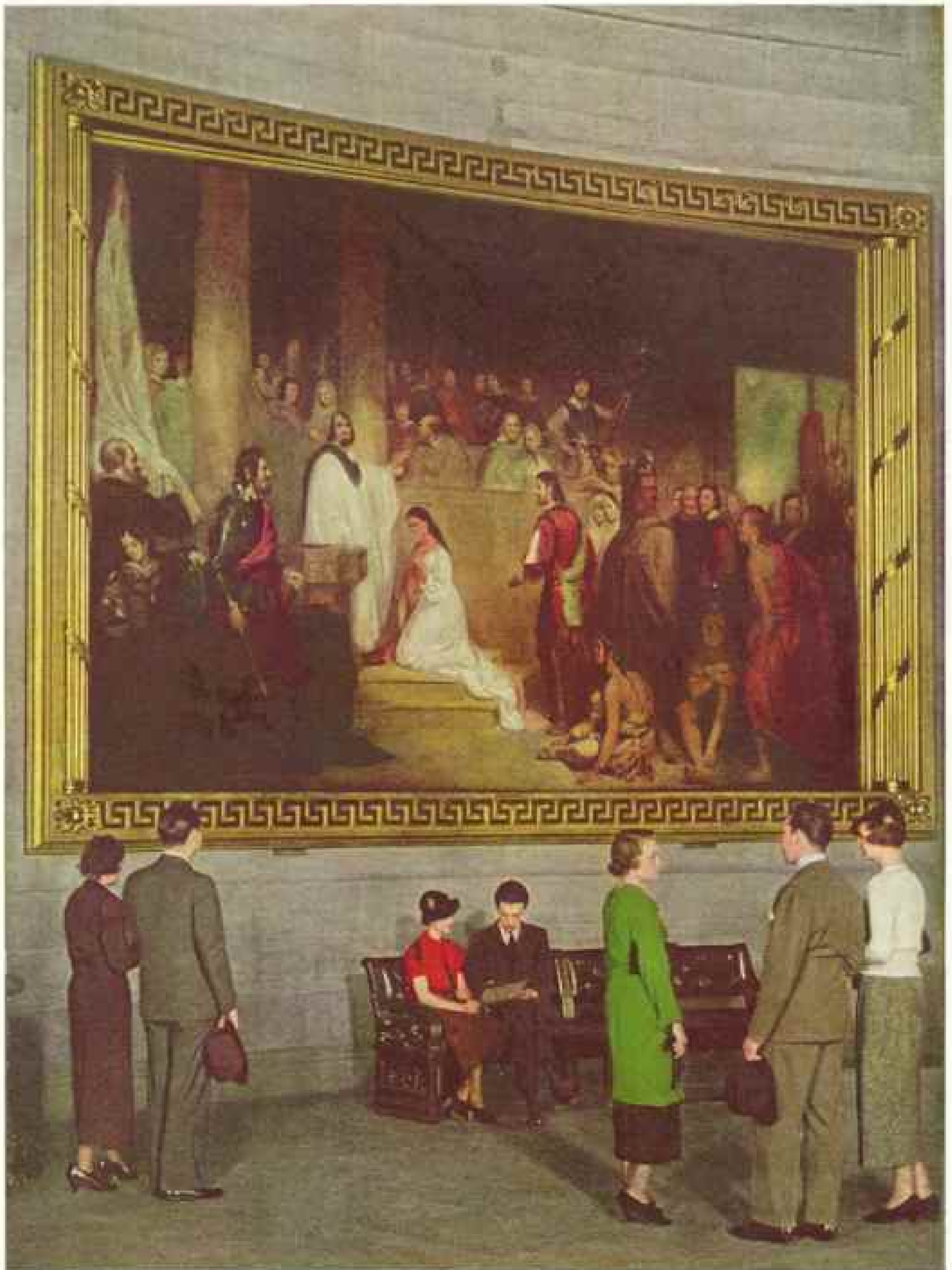
So Pierre L'Enfant, who drew the plans for Washington, described the future Capitol Hill. The massive white building covers the summit of a parklike mound, landscaped with more than 4,000 trees and flowering shrubs, including the famous Washington Elm.



Finlay Photograph by Clifton Adams

**THE WASHINGTON CATHEDRAL RISES ABOVE THE BISHOP'S GARDEN**

This verdant spot is a "Memorial Garden," for many of its trees, shrubs, and ancient carved stones were presented as monuments. Historic boxwood, yew, thorn, holly, and cedars of Lebanon border walks of stone cut from Virginia quarries owned by George Washington 150 years ago.



© National Geographic Society

Finlay Photograph by E. L. Withers and W. R. Culver

"THE BAPTISM OF POCAHONTAS" HANGS IN THE CAPITOL ROTUNDA

This huge painting by John Gadsby Chapman is one of eight by American artists which adorn the walls of the circular hall beneath the dome. The series depicts the following incidents in the Nation's history: "Landing of the Pilgrims," "Landing of Columbus," "Discovery of the Mississippi," "Signing of the Declaration of Independence," "Surrender of General Burgoyne," "Surrender of Cornwallis," and "Washington Resigning His Commission." Elsewhere in the building are hundreds of other works of art on canvas and in stone, honoring prominent men and commemorating outstanding episodes of American history.

SPRINGTIME WREATHS A GARLAND FOR THE NATION'S CAPITAL



Autochrome Lumière by Clifton Adams

A TOKEN OF GOOD WILL BY THE PEOPLE OF JAPAN TO THE PEOPLE OF THE UNITED STATES  
 To Mrs. William Howard Taft and other prominent citizens of Washington, the city owes its first  
 cherry trees—3,000 saplings presented to the City of Washington by the City of Tokyo.



© National Geographic Society

Finlay Photograph by Edwin L. Winter

YOUR SOCIETY'S YUNNAN EXPEDITION, LED BY JOSEPH ROCK, BROUGHT BACK THIS REGALIA

In The Society's headquarters are famous flags that have been carried over the North and South Poles, 11½ miles aloft into the stratosphere, and one that descended with Dr. William Beebe a half mile below the ocean's surface; rare birds; a library containing priceless geographic books; and an unexcelled collection of photographs from all over the world.





© National Geographic Society

Finlay Photograph by Newton Blakeslee

THE CHARM OF MERIDIAN HILL PARK IS ENHANCED BY A MAN-MADE CASCADE AND A FOUNTAIN-STUDED POOL

If the "Maid of Orleans" could see, this would be her view. The photograph was taken at the feet of Jeanne d'Arc and her bronze charger, one of the finest statues and the only equestrian memorial to a woman in the city. The figure by Alexis Rudier was a gift to the Nation from The Society of France in New York. The dome of the Capitol appears at the extreme left and the Washington Monument at the right.



Vermont marble, and additional tons of other kinds of stone from Minnesota, Colorado, and Georgia. Enough concrete piles to form a line eighty miles long if laid end to end support it—some 13,000 of them.

"In this building we have the world's largest precision camera for map reproduction," a Coast Survey employee told me.

Anyone who thinks of a camera as something to be carried in a vest pocket or set up on a tripod should see this one. It weighs 14 tons and fills a whole room.

"Why do they need such a big one?" visitors ask.

"Accuracy," is the answer.

With the old camera it was necessary to make several photographs and piece them together. This one makes negatives more than four feet square, and it is accurate to a thousandth of an inch.

One can see almost anything in this Commerce Building—if one walks far enough and doesn't get lost—including an aquarium.

In a big room at one end of the building are recorded the millions of patents which have helped give us such miracles as the telephone and electric light. Here is a copy of the first patent issued in America. It was granted by Massachusetts in 1646 to Joseph Jenkes of Lynn for a water mill. Early patents granted under the United States Government included new ways of making candles; flour and meal; type for printing—and an improvement in distilling.

An inventor in the old days had to supply a model, even if his brain child was a locomotive. One model, now in the Smithsonian Institution, shows a device to enable steamboats to lift themselves over sand bars. It was invented by Abraham Lincoln!

#### SOFT-COAL SMOKE IS DRY-CLEANED

In my wanderings over the new Washington, I thought it strange that I found no furnaces. Then I learned that most of these buildings, including the White House and the mighty Triangle structures, have their own private sun—the new Central Heating Plant. It steam-heats 71 buildings with a gross floor area of 380 acres.

There were no belching black clouds of smoke in sight as I approached that handsome structure of buff brick and limestone on one of the winter's coldest days. Out of the wide but low smokestacks drifted instead a light vapor which looked like steam, for the soft-coal smoke is literally

dry-cleaned by electricity. Bushels of soot and cinders are precipitated and removed. An earlier plan to wash the smoke with water was discarded lest a resulting acid eat the roofs off neighboring houses (page 485).

In a room filled with huge gray-painted masses of metal, pipes, and gauges, a handful of men moved quietly about. There was absolutely no dust, heat, or hurry; yet here at the rate of 27 tons an hour coal was pouring into the furnaces of six boilers five stories high (see page 488).

#### LOOKING INTO AN INFERNO

Out through more than three miles of tunnels, along which a Primo Carnera might walk erect, poured enough steam to do credit to a small volcano—steam at 200 pounds pressure to the square inch, flowing through some 14 miles of pipes to warm the President and thousands of Government workers, some more than a mile away. Only the buildings on Capitol Hill are not heated from this plant; they have a smaller one of their own.

"This is the biggest plant in the world devoted solely to producing heat," said the engineer who met me.

We walked down the rank of giant boilers. My companion climbed a step at the side of one, pried open a steel door, and over his shoulder I caught a glimpse of Hades.

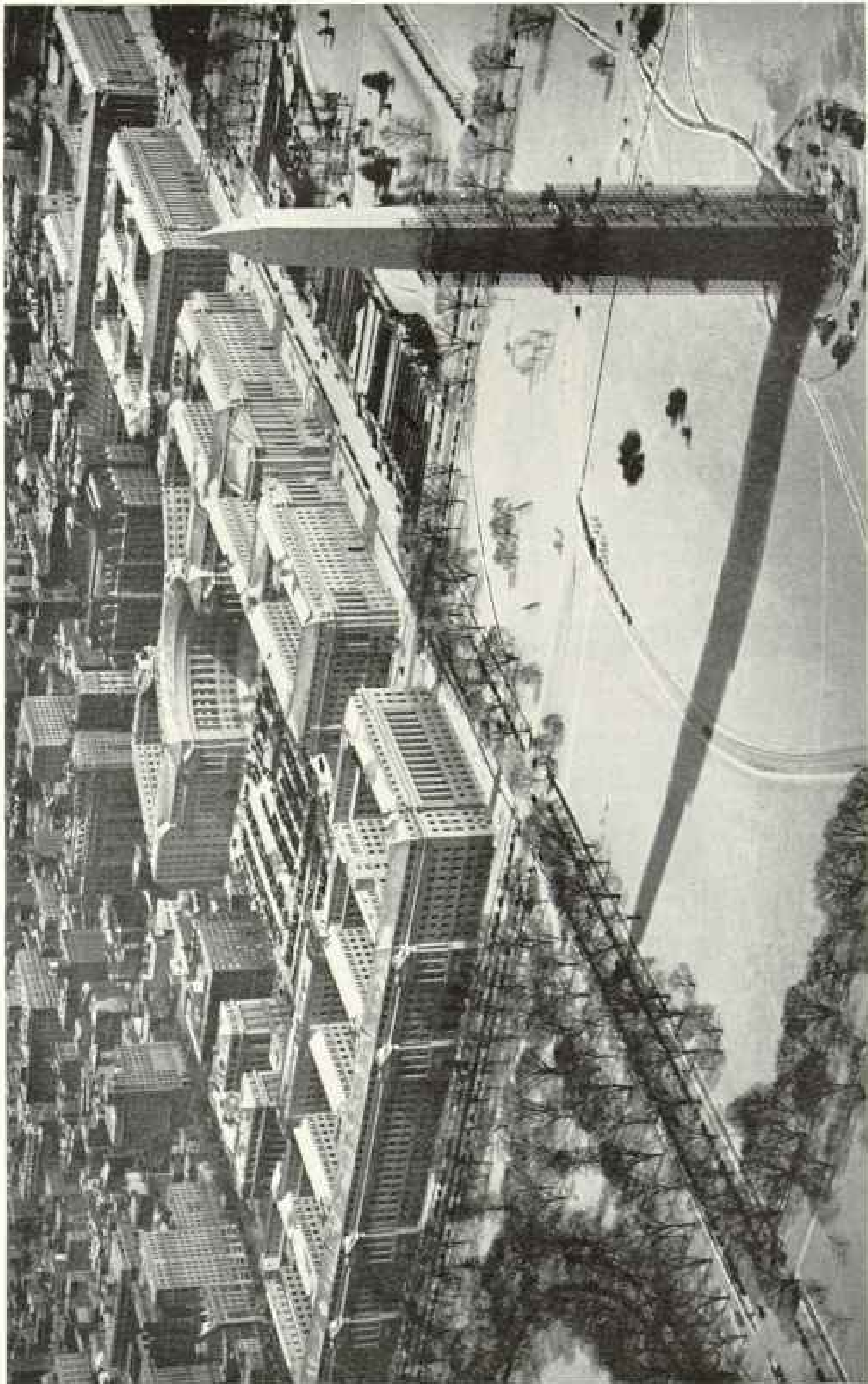
"Don't try to look at it directly," he warned. "It would blind you. Get up there and look at it through that blue glass."

I did, while the heat waves almost singed my hair. Fascinated, I gazed into what might have been the interior of a volcano, or the infernal regions, or the fiery furnace of the Old Testament.

In a brick-lined room, 20 feet wide, 26 feet long, and 27 feet high, 60 tons of coal blazed in furious conflagration. Through that red, shimmering interior rushed a tornado generated by high-powered fans blowing air in at the bottom and sucking it out from the top. Wind-swept flames leaped 20 feet high.

"Huh, that's no fire," said a workman as I stepped down. "You couldn't even get coffee hot on that! We could make it a whole lot hotter if we had to."

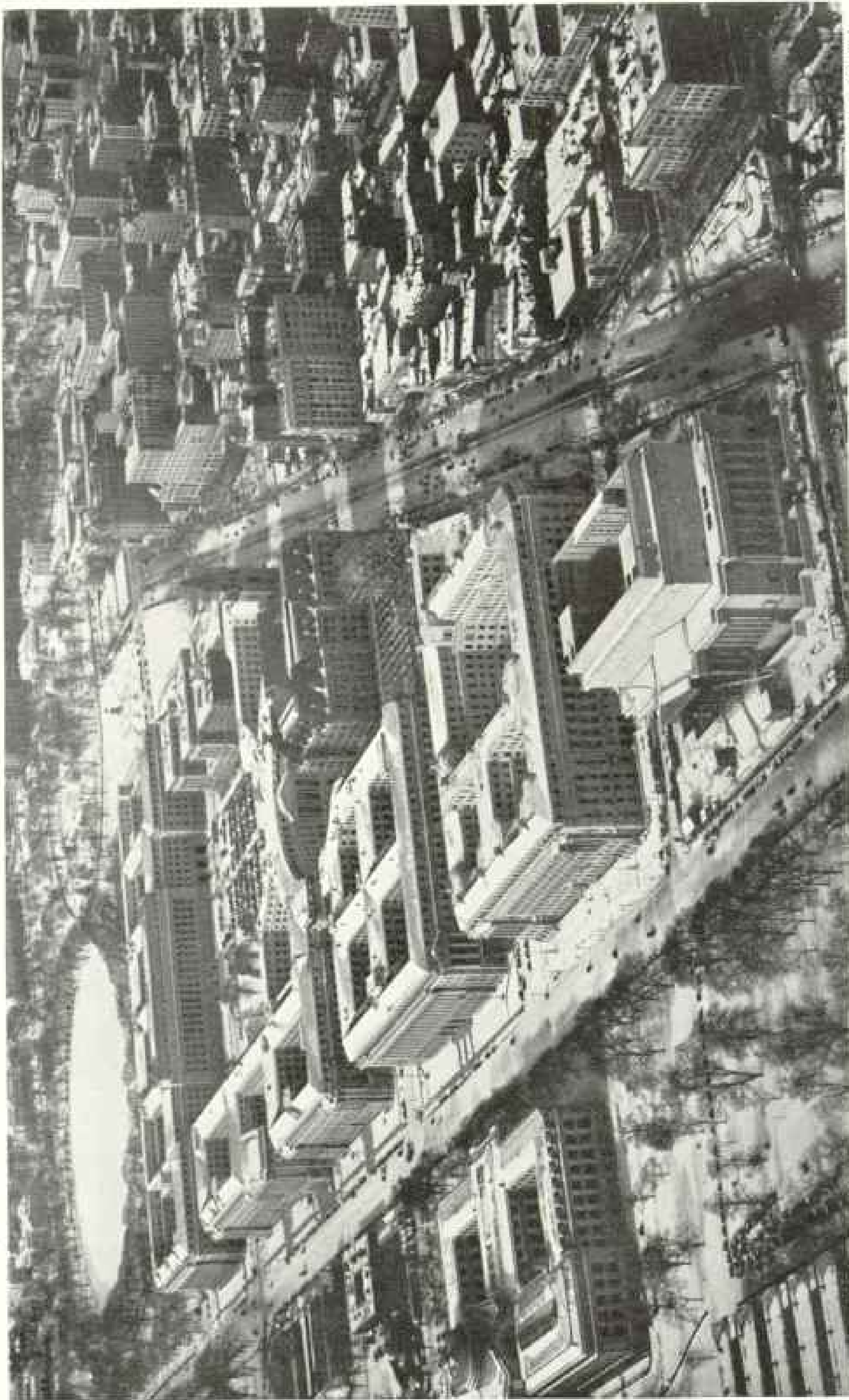
One man plus machinery stokes all these huge and hungry boilers, and jets of water under fire-hose pressure take out the ashes. The powerful streams wash them off the bottom of the fire and sluice them into a pit where roaring, grumbling machines grind



Photograph by Edwin L. Winbert

THE OLD WASHINGTON MONUMENT BEHOLDS A NEW SIGHT, THE FAR-FLUNG FEDERAL TRIANGLE

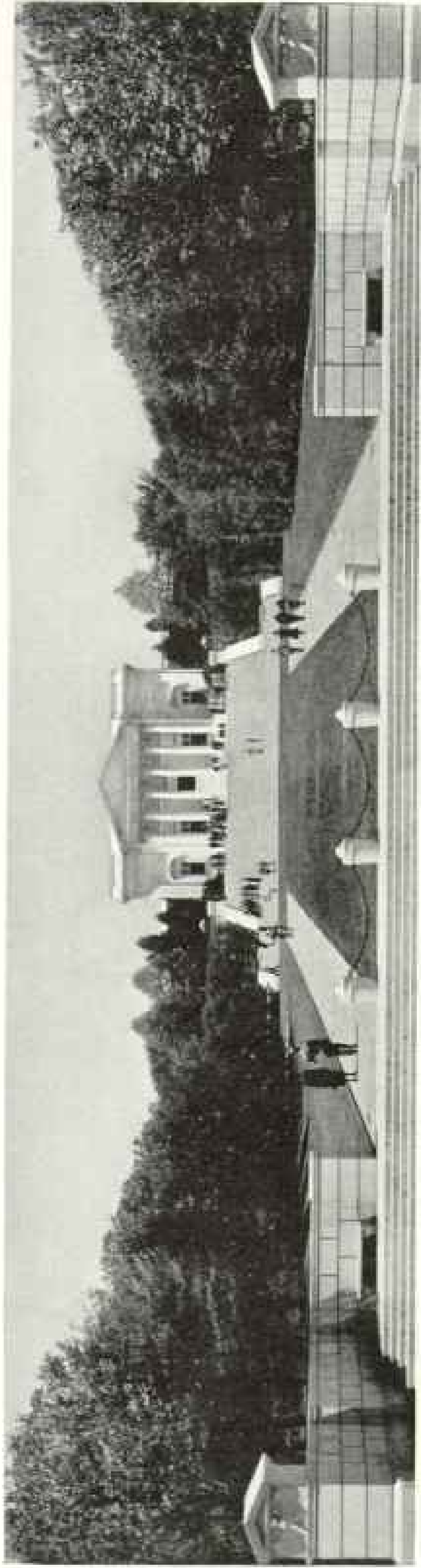
Newly scrubbed, the soaring obelisk still wears the workmen's steel scaffolding. A long finger of shadow extends to Constitution Avenue, along which are ranged the colossal Commerce Department, forming the base of the Triangle; then the Labor Department and Interstate Commerce Commission, in what seems to be a single huge building attached to the curving Post Office Department; next, Internal Revenue and the Justice Department. The Archives Building is out of sight (see opposite page).



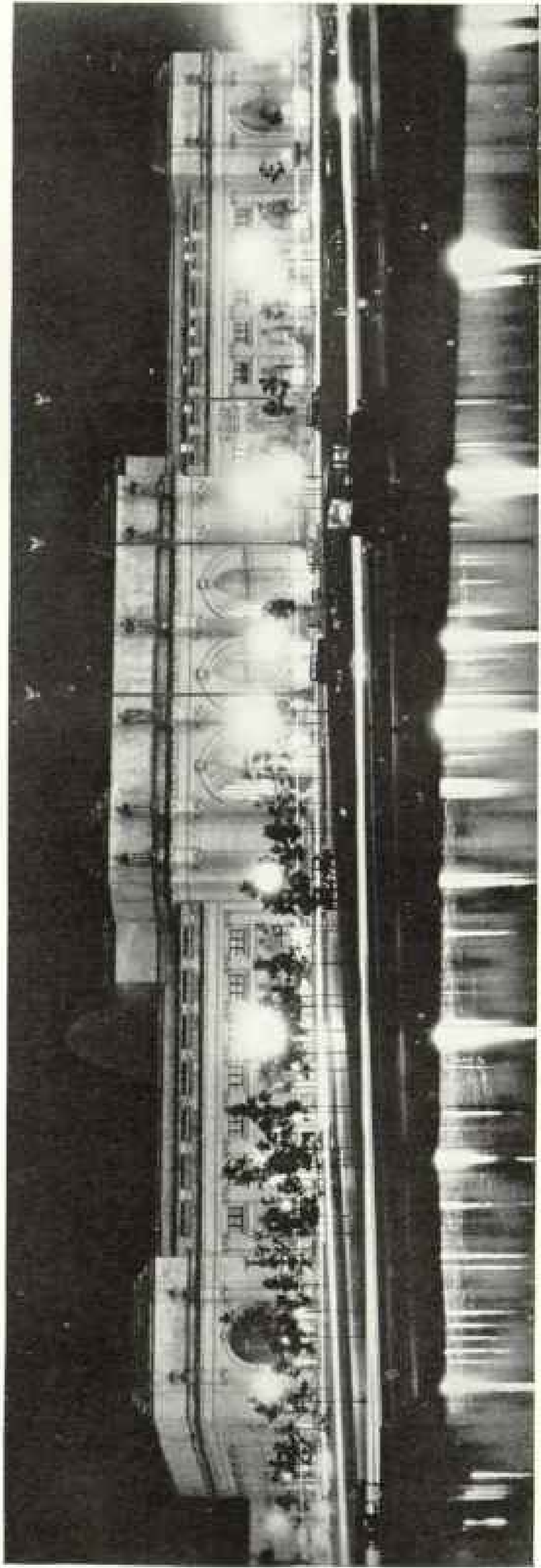
Photograph by Edwin L. Wisland

**THE TRIANGLE GROUP DRIVES A GIANT WEDGE BETWEEN CONSTITUTION AND PENNSYLVANIA AVENUES**

Its tip is blunt, as the pointed Apex Building has not yet been built. In the forefront stands the Archives Building, designed by John Russell Pope, of New York. Filling in the court will double its capacity. Beyond it are Justice, designed by Zantanger & Borie, of Philadelphia; Internal Revenue, by the Treasury's Supervising Architect; Interstate Commerce Commission, connecting wing, and Labor, by Arthur Brown, Jr., San Francisco; and Commerce, just this side of the Ellipse, by York & Sawyer, New York. The Post Office Department's new building, by Delano & Aldrich, of New York, is half hidden by its old granite home (with the tower), which eventually must go, together with two smaller buildings in the area (see opposite page). Pennsylvania Avenue points almost directly at the White House, near the top.



HIGH ON THE STEPS LEADING TO THE ARLINGTON MEMORIAL AMPHITHEATER RESTS THE UNKNOWN SOLDIER



Photograph by Hurdzank

LIGHTS MIRRORED IN A NEW REFLECTING POOL LEND A SOFT GLOW TO THE UNION STATION

At night, when electric radiance gleams across the Plaza, this inscription, carved on a granite panel over the main entrance, seems especially fitting: "Electricity—carrier of light and power, devourer of time and space, bearer of human speech over land and sea, great servant of man—itself unknown."





Photograph by Edwin L. Winward

IN THE AGRICULTURE DEPARTMENT IS ENOUGH FLOOR SPACE TO COVER A 41-ACRE FARM

From Agriculture's Administration Building, at the right, facing the Mall, and its huge South, or Extensible, Building behind it are issued the orders which result in the dispatch each day of some 44,000 Treasury Department checks totaling about \$2,400,000 to farmers for cooperating with the Government in reducing the output of cotton, wheat, corn, hogs, and other farm products in order to prevent surpluses and soaring prices. At the left, like a sawed-off skyscraper, appears the new Central Heat- ing Plant (page 481). Almost invisible, electrically "dry-cleaned" smoke drifts from its squat smokestacks. Uncle Sam's postage-stamp and paper-money-making plant, the Bureau of Engraving and Printing, lies beyond, near the Tidal Basin, which is fringed by the famous Japanese cherry trees (Color Plates II and VII).

them up, clinkers and all. About 14 truck-loads a day are hauled away to city parks for cinder paths, walks, and fill.

On a single cold day, some 600 tons of coal are swallowed up in this miraculous plant and transformed into heat and comfort for Government workers over downtown Washington.

"You could step into this tunnel and walk all the way to the Treasury Building," said the engineer as we entered an electrically lighted passageway with 18-inch conduits and smaller pipes along the sides.

I was bound for the Treasury and this was the shortest route, so I set off through the warm tunnel, first shedding my coat. A workman was sent along, "just in case." As we walked, the temperature ranged all the way from the freezing point near the exits to 140 degrees Fahrenheit in the hot spots. From my guide I learned that the conduits are in 100-foot sections which are about three inches longer when hot than when cold. Clever joints take up the slack and prevent the escape of steam which would wipe out every bit of life in the tunnel.

#### POISON GAS PROTECTS A GIANT SAFE

In a court inside the massive gray walls of the stately old Treasury Department, I found another interesting bit of the new Washington. There Uncle Sam has built himself a gigantic concrete, steel, and cast-iron strongbox, ingeniously safeguarded against attack by mob, master criminal, or even high-explosive air bombs.

Six and a half billion dollars in paper money was stored there when I was allowed to enter, the fabulous treasure stacked about in plain paper-wrapped packages like so much writing paper.

An ambitious burglar undertaking to tunnel in from below would have to pass through nine and a half feet of concrete and steel, and the slightest tap of pick, drill, or hammer would betray itself to sensitive electric "ears." An immediate alarm would bring Treasury guards, Washington police, and even a troop of cavalry galloping down from Fort Myer across the river.

Steel doors, one on each of the vault's two floors, weigh 18 tons apiece and are three feet thick.

Poison gas has a part in the defense scheme. If a safe cracker somehow passed the 14 iron gates which bar access from outside the building and attacked the vault's

doors with an acetylene torch, the flame would strike a stratum of chemicals and release gas so powerful it would penetrate a mask.

Even the White House across the street has a claim to inclusion in the story of the new Washington. Early in the present administration a swimming pool was installed. Now the President has a new oval office and the entire wing has been remodeled.

#### UNIVERSAL AS GEOGRAPHY ITSELF

The new air-conditioned home of the National Geographic Society (see Color Plate VII) contains stones from many States and foreign countries. Its front steps are of pink and gray North Carolina granite. Limestone blocks and columns of the façade come from Bedford, Indiana, and three green marble spandrels from the French Alps.

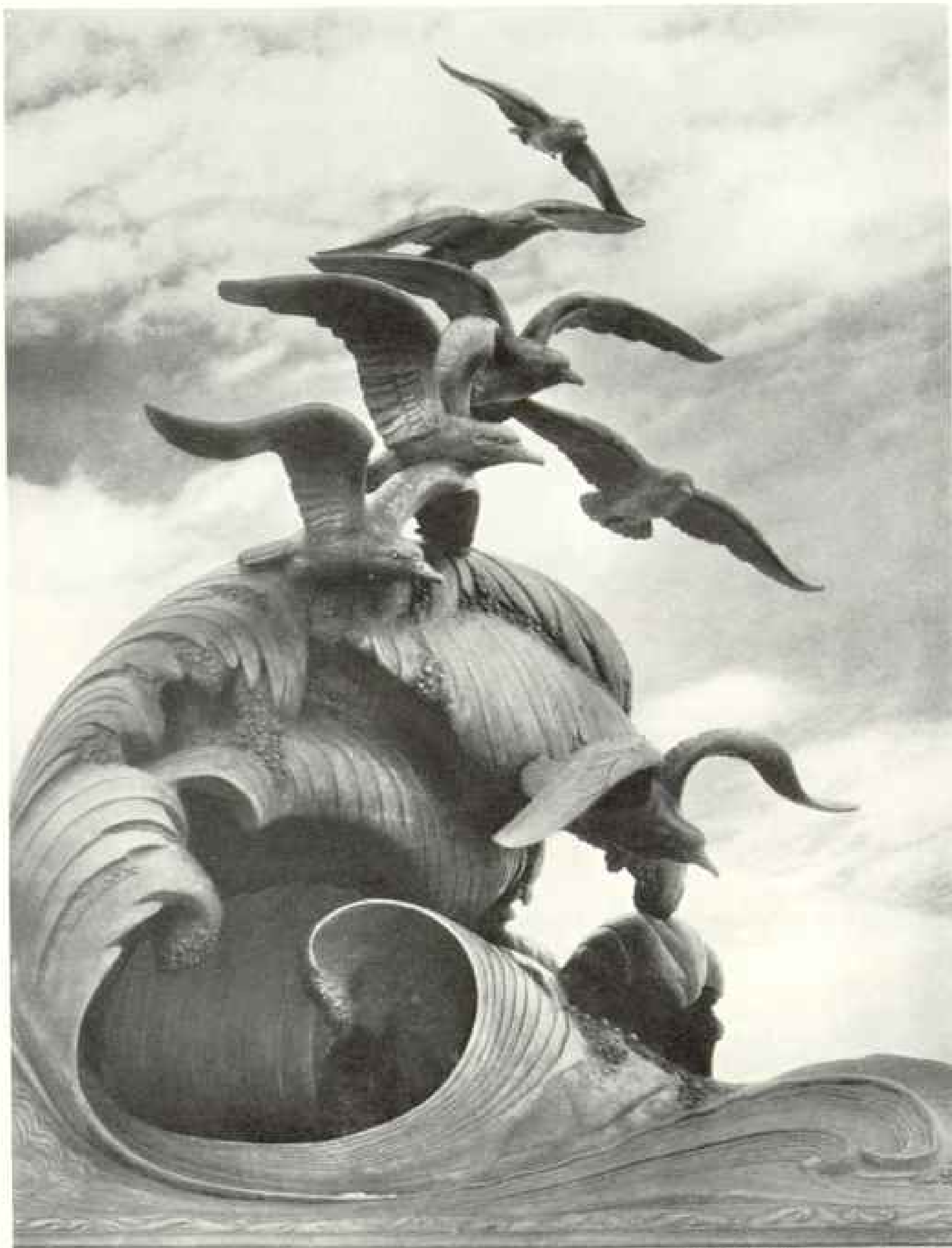
In the foyer gleam reddish-brown pillars and pilasters of polished Rojo Alicante marble from Spain. Walls are of lustrous Italian Botticino marble, a rich cream color, above a base of Belgian black marble. Brown Siena and gray Roman travertine form a large eight-pointed star in the floor.

Like a bronze medal seven feet in diameter, The Society's plaque of the Western Hemisphere is set in the center of the star; it weighs nearly half a ton. A floor border design combines Alps green marble from France, reddish Rojo Alicante, Belgian black, and yellow Mankato stone from Minnesota.

In other parts of the building are corridor walls of pink marble from Tennessee, and terrazzo floors which contain fragments of gray Tennessee, brown Siena, and Belgian black marbles. Asphalt floors in the Photographic Laboratory and cafeteria kitchen owe their origin to the famous Pitch Lake of Trinidad. Three hundred and fifty asbestos-lined filing cases safeguard The Society's priceless collection of 208,219 photographs.

#### THE NEW WASHINGTON LOOKS AHEAD

Many another structure forms a distinguished part of the new Washington—the glorious Arlington Amphitheater at "Fame's Eternal Camping Ground" across the Potomac (page 484), the Cathedral of St. Peter and St. Paul (Plate V), the National Shrine of the Immaculate Conception, at Catholic University, the Public Health



Photograph by H. Anthony Stewart

ON BUSHES A FLOCK OF SEA GULLS, ABOVE A CURLING WAVE

One of the newest and most unusual of all the Capital's monuments is the Navy and Marine Memorial on the Virginia bank of the Potomac. To motorists driving down the Mount Vernon Memorial Highway, it seems a flight of living sea birds. Cast in aluminum, with a sea-green electrolytic finish, it stands as a peculiarly fitting and inspired tribute to the country's men who "go down to the sea in ships." The architect was Harvey Wiley Corbett; the sculptor, Boggi del Fiatta.



Photograph by Willard R. Culver

#### INSIDE THE GOVERNMENT'S "MINIATURE SUN"

Without fuss or dust, this new Central Heating Plant on a single cold day turns 600 tons of soft coal into steam heat and pours it forth through many miles of tunnels, conduits, and pipes to warm 71 huge Government buildings scattered over downtown Washington. Along the sides of this corridor are ranged six immense furnaces, automatically stoked with coal fed through large pipes from above (see text, page 481).

Service, the Botanic Garden, the American Pharmaceutical Association, near the Lincoln Memorial, the new Red Cross Building, the Andrew White Quadrangle of Georgetown University, and Constitution Hall of the Daughters of the American Revolution.\*

#### A VITAL CITY OF MANY INTERESTS

A new Federal warehouse has given Uncle Sam needed "closet space." Down at the Interior Department expanded Government activities have literally raised the roof. Another story has had to be added. And a stone's throw away, a spacious plot is being cleared for a brand-new building to house this Department. Near by will be built an addition to the beautiful Pan American Union building.

Plans are afoot to make the National Capital a world art center. The Federal Reserve Board is to have a white marble

\* See "Washington Through the Years," by Gilbert Grosvenor, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1931.

home. A bird refuge has been created on the Potomac. A new airport is in the wind. Washington is never static.

On a day when spring was in the air I went up to one of the city's highest hills, Mount St. Alban, where a mighty Cathedral is rising like a hymn in stone.

Within the Great Choir stillness reigned. Heads were bowed in worship and reverie, while all about, to the lofty vaulted ceiling, rose the inspiring glory of the Gothic arch, like two hands with fingertips touching, raised in prayer.

The sun had come out brightly when I emerged, and high overhead I saw the gleaming silver sides of the circling blimp. It wheeled and floated and wheeled again, as if the people inside would never tire of looking down upon the city. Why should they? Here was no "modern Rome," no second Athens or reincarnated Byzantium. Here was Washington of the twentieth century, capital of a vast country, center of the American civilization, strong in its youth and confident of its destiny.



# A SUNDAY IN MEZÖKÖVESD

BY MARGERY RAE

“WANTED, female servant; wages by the month to be clothes, potatoes, carrots, beans—and sixty cents.”

This is *not* a line from a musical comedy, or a funny movie subtitle, but the translation of a bona fide “want ad.”

In an American newspaper it might reasonably have aroused curiosity, if not investigation by a local union, but it caused no unusual stir among the crowd of peasants in the small town of Mezökövesd in Hungary, as the town crier shouted it out. There was all the weekly news, as well as the rest of the “advertising” to be heard. The oral journalists of Mezökövesd were informing the townspeople of the week’s events, at the usual Sunday morning gathering (see illustration, page 490).

## FROM HUNGARY TO VASSAR

I had been visiting a friend in Budapest, and on this, the first Sunday in Lent, we had come to Mezökövesd, accompanied by a young Hungarian girl as interpreter. She had been an exchange student at Vassar the previous year.

“You will find it not so gay as last Sunday,” she told us. “There was a big dance last week and two weddings—a larger celebration than usual, because there are no festivities during the Lenten season.”

In spite of Lenten restrictions, there is little curbing of gaiety among the peasants on their treasured weekly holiday. True, we had no opportunity of seeing a marriage dance, and there were two funerals that afternoon. Nevertheless, the air was full of merry excitement and happy chattering. And no one can smile more wholeheartedly and infectiously than the young Hungarian girl!

I think of Mezökövesd as the most typical of Hungarian villages; there the traveler may see the real peasant life of the country. The town’s population is some 20,000; it is about three hours’ ride to the east of Budapest, and only two trains a day make the trip.

## THE WEEKLY CHURCH AND NEWSPAPER

Sunday afternoons the healthy lot of villagers parade in their festival finery, the heavily embroidered costumes ablaze with bright colors. And of a Sunday morning

the life of the town centers in the church, always crowded to the doors, and in the weekly “newspaper.”

Upon our arrival at 10 o’clock that morning we found the streets almost deserted. It was a brisk day, and we were glad to have the protection of our heavy coats. The sun teased us faintly at intervals, which was especially vexing, since we had a camera and copious material for pictures.

We walked to the center of the town, some distance from the railroad station, and entered the church. If it were not for the saving landmark of the church steeple, it would be easy to get lost in any Hungarian town. Since all the whitewashed mud houses are low, the guiding steeple can be seen from any place to which one may wander.

There was little standing room in the church, and we found the air too incense-laden to linger long. Besides, our presence was causing much curiosity, so that the chanting women, with shawl-covered heads, and the men, telling their beads, were being distracted from their devotions. So we left and walked about the square, marveling occasionally at the sight of an American-made product in one of the shop windows. And presently the church bells announced the close of the service.

## COW LOST; PLOW FOR RENT!

Then the church doors opened and crowds of black-clad figures poured out. As if waiting for this signal, two gendarmes took their places on opposite sides of the large square in front of the church and began to beat a vigorous tattoo on their drums. From the church the people gathered in two crowds about these officials, who drew forth important-looking documents of paper and began their reading.

It is an education and a revelation to hear the news of Mezökövesd. My friend translates from the Magyar: “A cow was lost on Tuesday. If anyone has found her let him report to the town headquarters.”

There was a long list of farms to rent and sell; plows to rent, servants to hire. The usual monthly wage of the servants is seldom more than three or four pengós (a pengó is worth about thirty cents) added to certain supplies and their needed cloth-



Photograph from Margery Rae

#### A CRIER READS THE TOWN'S ONE NEWSPAPER

When church service lets out on Sundays, two gendarmes beat their drums and collect large crowds of eager peasants. Then in loud voices they recite the news—"Someone has lost a cow," "plows to rent," "new laws," and so forth (see text, page 489).

ing. It is sufficient, no doubt; their wants are few.

Any national news of importance is told; new laws are read. It is an amusingly terse, clear effort, when one contemplates the columns of unread copy in our own metropolitan papers!

This rite over, the peasants depart to their homes and the town is suddenly as quiet as on a week day, for during the week all the young men and women are out in the fields, and only the very old and the very young remain in the village.

What any of them ate for dinner that Sunday had to remain unknown to us, for the only place in the town where food

could be purchased had but a meager offering of soup, omelet, cheese, and wine. Few visitors come, and a restaurant, to say nothing of a hotel, would find scanty patronage.

Even before we were back on the streets again we felt the stir of excitement. All seemed to know where the "foreigners" were eating, and they could not resist wandering past the window to look at us. Small boys openly stared, with faces pressed against the pane.

#### A PARADE OF VILLAGE FASHION

Very soon we were out among the gaily dressed crowds, on their weekly parade about the town. They wait always until the afternoon before donning their gorgeous costumes and then they pour into the streets like the sudden blossoming of a garden. Indeed, the pretty aprons are surprisingly like gardens, or bright flowers in a basket, or clusters of posies in the sunlight (see illustrations, pages 492 and 499).

Their embroidery is peculiar to Hungary. Small pieces of it, on sale at one

of the homes we visited, I must confess were too gaudy to attract me; but on a black apron and a tightly fitting jacket, it seemed most appropriate and quaint.

The men of the town are quite as ornately garbed as the women. They are smartly dressed in black velvet trousers made much like riding breeches, short jackets, and leather boots shined to a glow. Some of them also wear the long black aprons embroidered by a doting mother or an adoring and dutiful sweetheart. And all of them wear green hats, round and high—shaped somewhat like a derby—with feathers of varying size and color perched on the side. A fetching lot of fellows, and

not slow at flirting with the girls (page 492).

But the Sunday parades are not courting parties. Far from it! The men keep to themselves, and the women walk apart from them, for etiquette in Mezőkövesd does not permit any promenading in couples. Not even the married ones walk together.

And so the boys contrive their own little fun as they pass the maidens — calling to them, teasing them by pulling at one corner of their aprons, or tweaking a long braid of hair. Shiny faces blush and the girls giggle — and probably think it the very best part of the entire day!

It was fortunate that we had brought "Gizzy" along as interpreter; else many of our questions might have gone unanswered and many customs unexplained. She told us that unmarried girls always go bareheaded, even in the winter months. It is only after the marriage service that a young girl may put up her hair and wear the distinctive headdress of the married woman (see illustration, page 501).

Then the hair ribbons are dispensed with and the long braids are wound about the head, so that a cone-shaped cap can be pinned on. Over this is placed the satin shawl that marks the girl as a young matron (see page 499).

#### COURTSHIP IS CHAPERONED

The new brides are easily found. They will be walking together, few of them more than 18 years old, and some several years younger, still giggling when they pass their young husbands, and proudly conscious of their new coiffures!



Photograph from Margery Rae

#### BABY GETS A RIDE IN A BIG FANCY PILLOW

Cradled deep in the folds, with only its head protruding, the child is shielded from the buffets of jostling elbows. The gaudy bed is splotted with an arresting pattern that suggests the Paisley shawl. Like the mother's skirt, it is brightly embroidered.

"Courting? Oh, yes, when they meet at the Sunday balls," Gizzy told us. "And at home, too. But the mother is always present there, and it is more an ordeal than a pleasure. But every Sunday afternoon, except in Lent, they hold a dance, and the young people find it very satisfactory for getting acquainted and falling in love. I'm sorry you will not be able to see them dancing our *csárdás* in their costumes."

We wished to know the rest of the ceremony, and she continued to explain:

"When he has found his chosen wife, and she looks favorably on him, the young man asks her father. If the father is willing, the young fellow sends two of his friends



Photograph by Melville Chasner

**FORBIDDING NO GOOD TO SOME MAN'S HEART**

The twinkle in their eyes, the tilt to their walk, the coquettish swirl of their rainbow skirts is warning enough of danger ahead. But mother is always there as a chaparral! Strands of beads encircle their throats (see text, page 491).



Photograph by Emil P. Albrecht

**THREE YOUNG SPARKS BLAZE WITH STYLE**

A fetching lot are these my village swains. They are attired for a Sunday afternoon in green, derbylike hats, short jackets, ample laced sleeves, and long black aprons embroidered in gorgeous colors by dotting mothers or sweethearts (see text, page 493).





© Hungarian Press Photographic Exchange

LIKE A FLOWER GARDEN IN FULL BLOOM ARE THE GAILY COLORED CLOTHES OF THESE HUNGARIAN CHILDREN

They are the daughters of industrious parents of noble birth who settled in Mezőkövesd during the 15th-century reign of King Matthias Corvinus. These girls, gathered outside the church, wear jackets, skirts, aprons, and shawls decorated in vivid colors (see text, page 490).



Photograph from Margery Rau

PILED NEARLY TO THE CEILING WITH PAT PILLOWS IS THE BETROTHAL BED

The name and birth date of the bride is embroidered on the coverlet, suggestive of early American samplers. The young wife brings to her new home a complete trousseau of linens and clothes that she has spent years in making (see text, opposite page).

to ask formally for her hand, and this is considered the official announcement of the couple's engagement.

"Then follows the wedding at a Sunday dance. The bride, incidentally, must have complete furnishings for her new house, including linens and clothes for herself. Usually some money or a cow goes with her, too. A father of many daughters has his hands full to get her dowry together."

But her trousseau isn't so formidable as it would seem to us. Her new home consists of one or two rooms. Furnishings are few and simple. And the linens and embroideries that she brings are those she has worked at from early childhood days with this very occasion in mind.

We visited one family in the village that was considered extremely well-to-do. The husband was a tall, strong, and handsome young fellow, with a broad smile for us in

lieu of adequate conversation. His wife was lovely, with fine regular features, and a charming but serious manner. She proudly showed us her four children, the two little girls dressed in embroidered aprons like their mother's, and the boys in tight-fitting suits.

Gizzy was a distant cousin of the young wife, and later she told us that the girl had been married at the age of 15 to this man, who was considered an especially fine "catch." Now she was 26, and looking a bit matronly with her brood of four.

THE STOVE IS THE CORE OF A HOME

Their home was larger than most of the others, boasting of three rooms. The Hungarian heating system is unusually interesting. The peasants build their houses about the large stove, so that the heat is evenly distributed. The stove is of the same



Photograph by Erdelyi

## PEASANTS GREET THE DAWN WITH RAKE AND SCYTHE

These folk wear colorful clothes even to their work in the fields. Cloth of somber background is made less prosaic by many-hued borders and scalloped edges. An ox-horn holder for a whetstone hangs at the man's waist.

whitewashed mud clay as the house, and shaped like a large top that tapers into the ceiling. About the base is a ledge used as a seat (see illustration, page 496).

In one room, sitting in a rocking-chair near the stove, sat the aged blind grandmother, munching dried pumpkin seeds. The house was spick-and-span, as if it had been freshly painted inside and out that very morning. About the stove seat played the children, stopping at times to look at us with curious eyes.

In one corner stood an odd piece of furniture—a narrow bed, resembling a coffin more than anything else, piled high to within a foot of the ceiling with fancy pillows. This, the betrothal bed, we found in each house we entered. It seemed as necessary to home life in Mezökövesd as the stove itself (see opposite page).

Out in the kitchen we duly admired the

shining pots and pans. The central stove opens here for all the household cooking. Freshly baked loaves of bread do double duty, for they are used to press down the many pleats of the women's skirts. The kitchen had the only windows of the house; there was no ventilation elsewhere.

We left this happy home presently and walked along the narrow lane. There are no regular streets excepting the main thoroughfares. You go this way and that, off at an angle here, and shortly find yourself in a maze of pathways, and in the midst of countless snowy white houses, and yards of hay, straw, and barns.

Three giggling girls who had been following us were overjoyed to pose for their pictures. They told Gizzy that they all had been married within the last few weeks, and that within the next month they would go off to the fields with their husbands.



© Publishers Photo Service

#### LIFE INDOORS CENTERS ABOUT THE WHITE CLAY STOVE

Its open end, in the kitchen on the far side of the wall, is available for cooking purposes. In this neat room it makes a comfortable heating oven (see text, page 495). Peasants build their homes around such massive stoves to obtain an even distribution of heat. Surrounding it is a ledge seat, seldom unoccupied on winter evenings.





FIT FOR A QUEEN IS THE UNMARRIED GIRL'S STUNNING HEADDRESS

Each head is crowned by the exquisite *párta*, trimmed with gold or silver lace, and often studded with pearls and semiprecious stones. A long braid hangs over the fringed shawl and the pleated white skirt of the girl in the center.



© Hungarian Press Photographic Exchange

HORSES AND FINE DRESS ARE THE TRUE LOVES OF PEASANT LADS

Kimono sleeves and long, embroidered aprons do not impede the riding skill of these expert horsemen who disdain the use of a saddle. They are diligent and well-mounted farmer boys of the plains village of Mezökövesd.



Photograph by A. W. Cutler

**DOUBLE-DECKED RACKS OF WELLINGTON BOOTS SCREEN A MARKET CORNER**

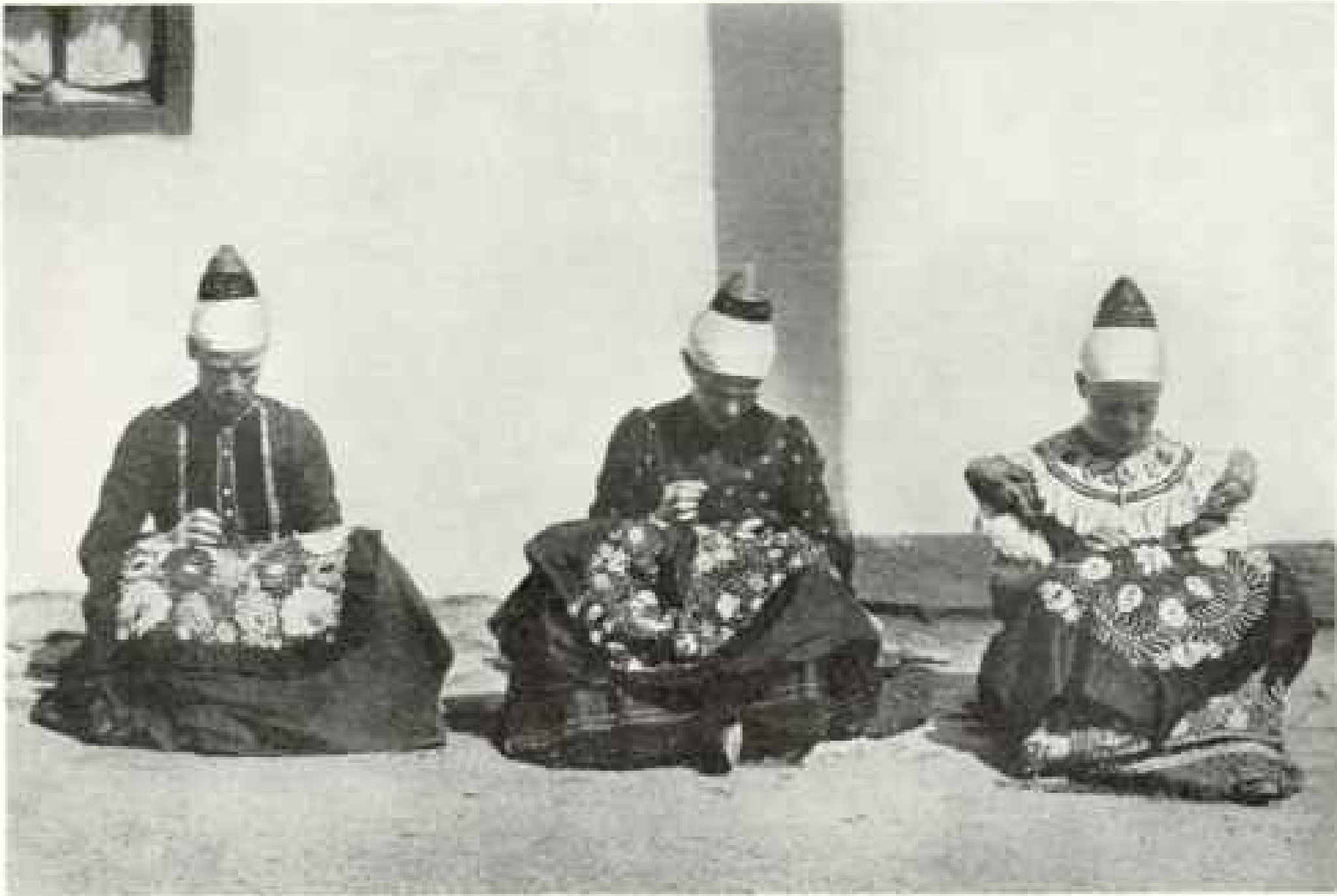
Every well-dressed gentleman of Mezökövesd owns a pair, and he keeps them polished to a lustrous glow. Laced shoes are rarely if ever worn by men in the village.



Photograph by Melville Chater

**OLD MAGYAR FOLK STOP TO CHAT AFTER CHURCH SERVICE**

Elderly women usually dress in black. When the author tried to buy one of the old and richly embroidered jackets worn in the village, she was told it would cost about \$50 at the current rate of exchange (see text, page 502).



Photograph from Margry Rae

#### CONICAL COIFFURES IDENTIFY THE YOUNG MATRONS

"Tying up a girl's head" is another way of saying she is married. On more formal occasions, the caps, covering long, spiral-wound braids, are hidden by a black satin shawl (see page 491).



Photograph by Melville Charter

#### A RESPLENDENT ROW OF MINIATURE MEZOKÖVESD MOTHERS

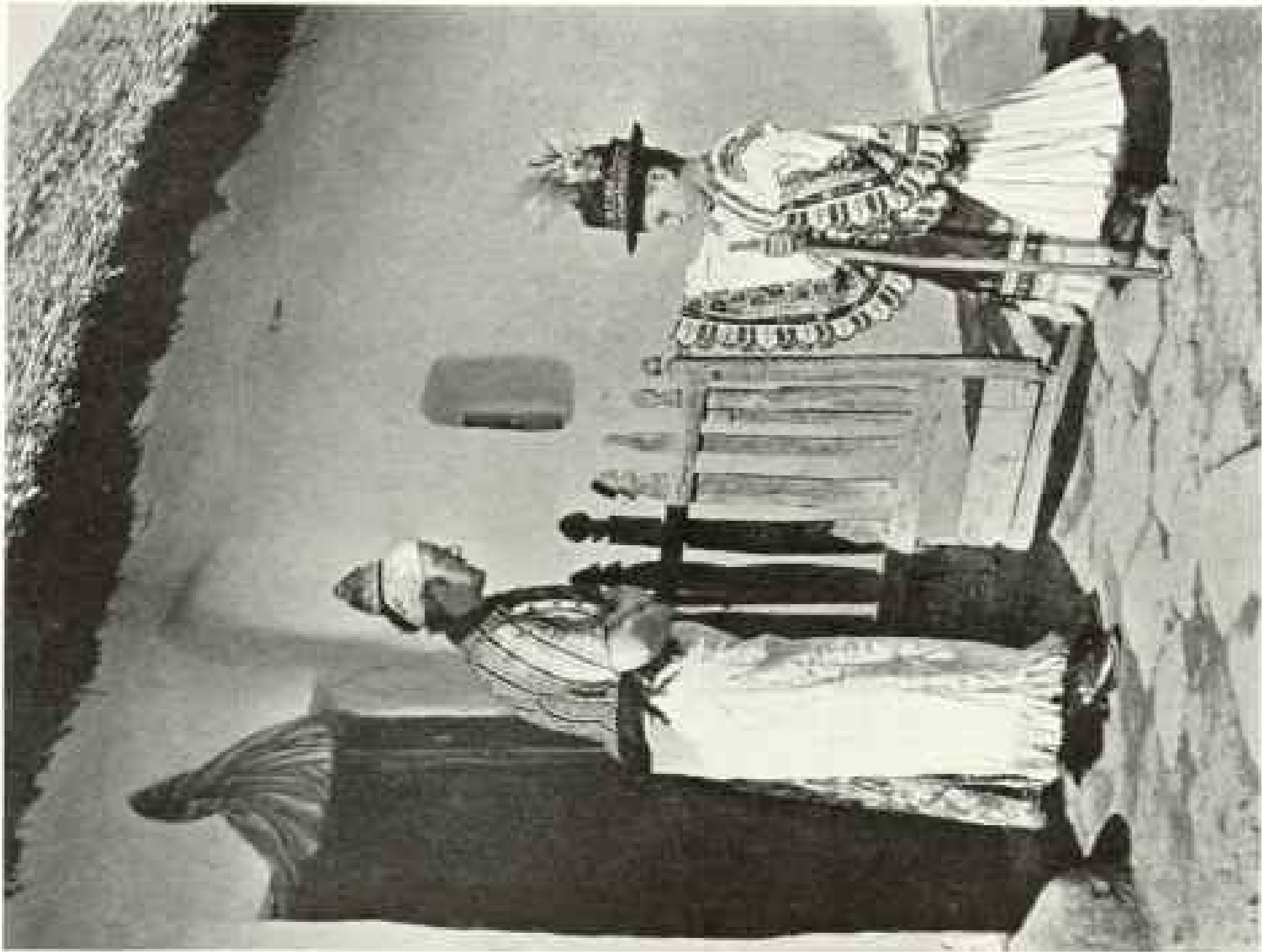
As each Scottish clan is distinguished by its own tartan, so each Hungarian village is recognized by its embroidery pattern. Little girls are taught to sew early and sometimes take long hikes to see new designs that might harmonize with their own.



Photograph by Wilhelma Föhren

**YOUTH BEGINS EARLY TO STRAIN AT THE LEASH**

The chubby youngster dons a military-type hat cocked rakishly on his head. His mother, wearing a light-fitting jacket and brightly embroidered black apron, tows him on the shady side of the street.



Photograph by A. W. Cutler

**"AND DON'T GET YOUR APRON SOILED!"**

So, possibly, the mother is admonishing her small son, a Hungarian interpretation of Little Lord Fauntleroy. He wears a feathered hat, wide sleeves decorated with colored wools and silks, and skirtlike trousers.

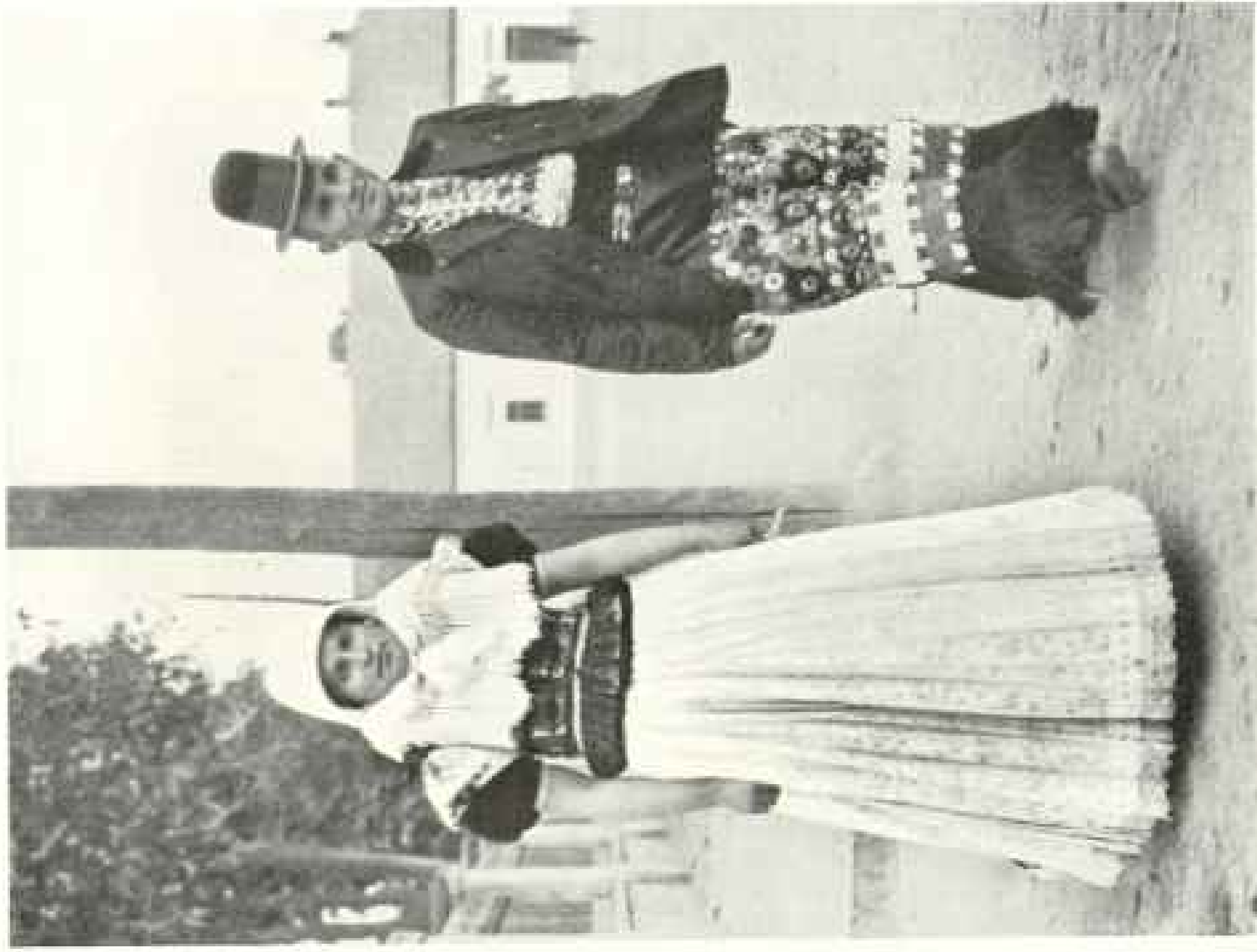




Photograph by Erdelyi

**ONLY ONCE WILL SHE WEAR THIS SUNBURST CROWN**

Rivalling the spread of a peacock's "fan," is the sparkling headdress worn by a Mezőkövesd maiden on her wedding day. When betrothed, a girl often gives her sweetheart a golden-embroidered garment called the "fiatcé's apron,"



Photograph by Melville Charter

**EVEN A MAN WEARS AN APRON IN MEZŐKÖVESD**

An elastic band holds his jaunty hat in place. Predominant colors in the gay fringed apron and embroidered skirt are orange, red, green, and purple (p. 492). The young woman's white pleated skirt is billowed by several petticoats.



© Hungarian Press Photographic Exchange

## THIS MIGHT BE AN ILLUSTRATION FOR A FAIRY TALE

The little girl, who could be the sister of Jack the Giant Killer, is actually the wee granddaughter of this powerfully built Magyar, who is lighting his pipe. He wears the plainsman's greatcoat made of felt—often of sheep-skin with the woolly side turned in—and adorned with colored embroidery and appliqué leather.

Once we were stopped by an old woman, who begged us for news of her husband, in America. He had left in 1910, promising to send for her. After the war she heard that he had married again. It was five years since she had heard from him, then in Columbus, Ohio. Poor soul, she was destined to stay in Mezökövesd, eking out a wretched livelihood as best she could.

Another stranded person was the janitor of the school, who had been in America for some years, and returned for a few months' visit in 1914. Caught by the war, he has been unable to earn enough money to return to the States.

At the next house where we stopped to make a call, the women were middle-aged and very much inclined to find out about us.

"How old is this girl?" one of them asked Gizzy about me. "Perhaps 24 or more," Gizzy answered. This brought a storm.

"And not married?" she cried. "Isn't her mother unhappy? How can she bear to hold up her head! I would kill myself if my daughter had not married by 20 years, at the most. What kind of parents can she have that they let her travel in these places alone! How more than dreadful!"

The other woman, her aunt, was highly interested in my raccoon coat, and stroked it in smiling admiration. She wanted to see whether the lining also was fur, and wished to examine my dress.

"Is it bear fur?" she inquired. "Do women in America really wear fur coats?"

Apparently men largely have a monopoly of such things in Hungary. Wealthy

older men have white fur coats, with the leather side out, and rich trimmings. The women wear their black embroidered jackets winter and summer. When we looked at embroideries on sale at one home, I asked how much the lady wanted for her jacket, and caused consternation.

It was beautiful, and the colors were as clean and bright as new. Finally she answered that it was thirty years old and very dear to her. But she would sell it for the equivalent of about fifty dollars. Obviously that meant a fortune in her eyes, and it was beyond my pocketbook at the time!

An interesting phase of the social life is



MORE THE FIDDLERS, MERRIER THE WEDDING

Wandering Gypsy entertainers attune their music to the mood of the occasion. When not quick and fiery, it is filled with sadness and melancholy. The scroll of the contrabass serves as a convenient hat-tree.



Photographs by A. W. Cutler

THE LAST STAGE IN THE MAKING OF CLOTH FOR A MAN'S TROUSERS

This work is done by individual families, not by a firm or company. The weaver moves the vertical frames up and down with her right foot and passes the bobbin of thread from right to left and left to right—a rather complicated affair. The long lever in the upper right releases the warp as desired; the four-handled spool winds up the finished cloth. In winter the loom is moved indoors.



© Hungarian Press Photographic Exchange

PUZZLE: FIND THE BABY IN THIS SEA OF FINERY

Feathered and be-spangled, the boy's hat is in keeping with the fanciful headdress and fluffy lace sleeves worn by his parent. A rose design is the central motif in the pattern of the baby's puffy pillow (see illustration, page 491). Yarns used are made at home and colored by vegetable dyes.

the community wells, where the women gather daily for their buckets of water. The water is drawn up by a long pole, out of reach of childish hands. This is the club of the neighborhood women, where they chat and exchange the latest news. I fancy that our visit furnished conversation for many days, and doubtless my single state was mourned over at great length.

We made our way back to the main street late that afternoon. Following the crowds, we came to an important funeral gathering, where everyone was paying respects to a policeman. His former comrades, resplendent riders on smart black horses, stood in a row. They wore cocky hats with enormous black plumes, and looked fairly regal. Several men were busy shining up the hearse.

Presently the coffin was carried out to the hearse, and the long procession started, the women singing mournful songs and the men carrying lighted candles.

Meanwhile a forlorn little funeral had passed in the midst of this splendor. A woman wearing a nurse's cap walked through the streets carrying a tiny casket in her arms. Preceding her came a young lad of five or six bearing a cross. The casket probably contained the body of a new-born baby.

Then again the church bells were ringing and the townsfolk began to drift toward the evening service. Their life centers about the church as about nothing else. The priest is their father and protector. They love to tell that the home of the priest once sheltered Emperor Franz Joseph. There, also, many years before when the Turks were storming Budapest, the Hapsburg crown was kept safely for a month.

The last train through Mezökövesd was due shortly, and we reluctantly took leave of the friendly villagers, whose farewells were made in the universal language of a broad smile and hearty wave of the hand.



## THE TANAGERS AND FINCHES\*

Their Flashes of Color and Lifting Songs Gladden the  
Hearts of American Bird Lovers East and West

BY ARTHUR A. ALLEN

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AUTHOR OF "BLACKBIRDS AND ORIBLES," IN THE NATIONAL GEOGRAPHIC MAGAZINE

ROSO, our Indian hunter, was obviously excited. He was familiar with most of the birds in the rain forest which caps the central Andes of Colombia, where we were camped, and he knew of our interest in any new or rare species. Whenever he discovered any bird strange to him, his natural reticence gave way to captivating enthusiasm.

Silently we stole down the dank trail through the moss-covered oaks until we came to a clearing where stood a large tree in full bloom with inconspicuous, greenish-white flowers. If the flowers were inconspicuous, the birds which flitted through the branches certainly were not.

### COLORS FLASH LIKE JEWELS

There were bright-green cotingas with red faces, others with heavenly blue backs and flashing yellow breasts; there were iridescent Callistes, other tanagers of several varieties, and honey creepers and humming birds that flashed like jewels.

But all these we had seen before and had learned to expect in the flocks that frequented the treetops of this temperate area near the Equator. Where, then, were the wonderful new birds that Roso had discovered?

"Look!" Roso pointed his finger toward a smaller tree as a flash of yellow and black and red marked their presence. To my eye they were no more brilliant than the tree full of chatterers and honey creepers, but to Roso they were "new birds," wonderful in their yellow bodies blending into red on their heads and set off by black wings and tails. They were tropical tanagers of a kind so similar to our own western tanagers (Plate II) that at first I thought some of these must have strayed southward from their winter quarters in Costa Rica instead

of going north into the United States. I told Roso that they were merely some of our birds from the North.

"Ah," he exclaimed, "we have many lovely birds here in the Tropics, but when your birds come down from the North they are so much more beautiful!"

Previously I had explained to him how the little redstarts and the yellow and the Blackburnian warblers, which he knew as winter visitors, passed the summer with me in New York. He could hardly be blamed for thinking of the United States as having the most beautiful birds, even though we in the North are equally certain that all the most brilliant birds live in the Tropics.

Roso had never seen any of the birds illustrated so beautifully by Major Brooks in this issue of *THE GEOGRAPHIC*, except the summer tanager. Although the scarlet tanager and rose-breasted grosbeak do pass the winter in northern South America, they wear a dull plumage like that of the female during the nonbreeding season; the summer tanager alone, for some reason, remains red throughout the year.

The other species of tanagers and finches, herein shown (such as the cardinals and pyrrhuloxias), either do not migrate at all or, at best, do not go farther south than Central America.

Could Roso have seen one of these plates brought to life, I am sure I could not have convinced him that any of his birds were more beautiful, such a glamour do we spread over the unfamiliar.

### THERE IS NO BLUE PIGMENT IN COLORS OF BIRDS

It will not be surprising if many readers, on looking over these pictures, ask why there is not a more tropical setting to the paintings, or if all these lovely colors exist on our own birds.

"Look! An indigo bunting!" We direct a friend's glance to the telegraph wire where we have heard a familiar song and see a well-known figure with its head thrown back and its bill open.

\* This is the eleventh article, illustrated by paintings by Maj. Allan Brooks, in the important *GEOGRAPHIC* series describing the bird families of the United States and Canada. The twelfth article, with paintings in color by Major Brooks, will appear in an early number.



Photograph by A. A. Allen

#### THIS WAS HARDLY THE MOTHER'S IDEA OF A HELPING HAND

But female scarlet tanagers are often fearless, and she went right ahead feeding her youngsters despite the strange "nest" in which she found them (see illustration, page 510, and text, page 511).

"What! That little black sparrow sitting on the wire? Why do you call it indigo? There is nothing blue about it." Such is the response of our prosaic friend. The next instant the bird flies down to a dandelion by the roadside and what was a little black bird on the wire becomes an intense indigo-blue creature, merely by a change in the angle at which the light comes from it to our eyes.

There is no blue pigment in the feathers of birds; neither, with rare exceptions, is there any green. The only pigment colors in ordinary birds' feathers are reds and yellows and blacks, and all the other colors are due either to a combination of these or to the superficial structure of the feathers overlying some other pigment.

Blue feathers, for example, contain only brown or blackish pigment overlaid by a layer of prismatic cells which reflect only blue light rays. Sometimes the structure is that of minute pits on the surface of the feathers. When they become filled with water during a rain, they lose their re-

fractive power, and the birds, apparently, change from blue to white, as in the tropical swallow tanagers.

Again, the blue color is due to minute air spaces in the superficial layer of cells, just as the blueness of the sky is due to minute dust particles, and the blueness of the milk on the boarding house table to the minute cream droplets. So long as our blue birds remain between us and the source of light, they are not blue birds at all and therefore may go unnoticed.

#### YELLOW BIRDS ARE CONSPICUOUS

Yellow birds are usually conspicuous because our eyes are very sensitive to yellow. But many birds have a blue-producing structure overlaid by a yellow pigment, so that the combination sends green light to our eyes. Then we say these birds are green. Wet the back of a parrot and it becomes brown, or scratch the surface of one of the green feathers with a knife and a dark mark is left. This is not because any green pigment is scratched off, but because the

yellow and the prismatic cells have been removed and the dark layer beneath exposed.

But there seem to be many red birds among these tanagers and finches. Why do we not see them more often? Certainly we have no trouble seeing a red traffic light—indeed, most of them seem to be that color when we are in a hurry. There are some reds, such as the iridescent throats of the humming birds, for which the structure of the feathers is responsible. But most reds, such as those of the tanagers and finches here shown, are due to pigment, and they register as red under all light conditions. To be really effective, however, the red must be exposed to direct sunlight.

Should a scarlet tanager alight in the middle of a sunlit lawn or a cardinal fly across the open space in a garden, either bird would attract attention, but most of the time they are sitting among the shadows of green leaves, where they are poorly lighted. The sunlight is reflected from the leaves more readily than from the birds, especially since our eyes are peculiarly sensitive to greens. Anyone who has trained his ear to recognize the songs and calls of the birds can easily find ten tanagers, while another, who has not learned to use his ears, will have difficulty in finding one.

During the winter many birds have their conspicuous marks veiled by gray edges to the feathers. These edges break off during the spring, exposing the color underneath. The male house sparrow, for example (Plate I), in winter seems to have only a narrow line of black on his throat, because the rest of his black cravat is concealed by the gray tips of the feathers, which break off during April (see illustration, page 508).

Red finches display no such gray edges to the feathers. But upon examining a feather with a lens, one will find that the red pigment occurs only in the main branches of the leaflike structure, the parts called the shaft and the barbs, while the more minute branches, or barbules, are gray. As these barbules wear off, the barbs with their color become more exposed and the feathers apparently get brighter. Thus the red finches (the purple finch, house finch, and redpolls) apparently brighten as spring advances.

#### THE FEMALES ARE NOT BRIGHT HUED

Were we to classify birds by color alone, we should have to place the males and females of these tanagers and finches in sepa-

rate species; indeed, almost in distinct families. The greatest confusion would occur when we had to put the same individual in two distinct species during winter and summer, for many of the brightest males, like the scarlet tanagers, rose-breasted grosbeaks, and indigo buntings, become dull like their mates during the winter.

It would be convenient if we could say that whenever males and females are different, the males assume the plumage of the females during the winter. But this is true only with certain species, while others persist in breaking the rule.

Thus the summer tanager male (Plate I) remains red throughout the year, and so do the cardinal (Plate III), the purple finch, the pine grosbeak (Plate VI), and the crossbills (Plate VIII). The yellow evening grosbeak (Plate V) never becomes gray like his mate, once he has acquired maturity, though the male goldfinch (Plate VII) does.

#### BIRDS BREAK CONDUCT RULES

No one has yet advanced a satisfactory explanation for these differences in seasonal styles among the males, but the inference is that the females are dully colored so as not to attract attention to the nest. Usually the brilliantly colored males in this family never assist in incubating the eggs, but even here there are exceptions, as in the rose-breasted and black-headed grosbeaks. Males of these birds not only sit on the eggs, but even break all rules of bird conduct by singing as they do so.

Whether because of the singing, or because of the bright colors of the incubating male, or because of the general fragility of the nest, there is a relatively high nest mortality among the rose-breasted grosbeaks, and some years very few young are reared. Then the species becomes scarce, because grosbeaks are not so persistent about re-nesting as are some other birds.

There is no one place in North America where all of the birds here illustrated can be found. The pyrrhuloxia, hepatic tanager, beautiful bunting, and Sharpe's seed-eater, for example, are not found very far north of the Mexican border. The pine and evening grosbeaks, redpolls, and crossbills are northern birds that, even in migration, seldom reach the Southern States.

The lazuli bunting, black-headed grosbeak, western tanager, rosy finch, house finch, green-backed and Lawrence's gold-



Photograph by A. A. Allen

#### HIS WINTER SUIT IMPROVES WITH WEAR

Gray tips to new feathers, grown in the fall, conceal the black, white, and chestnut of the male house sparrow, but the ends wear off before spring. Then the fresh, black throat-patch and chestnut head-stripe make this chirping English immigrant look his best (see Plate I and text, page 510).

finches are birds of the Pacific coast and the Rocky Mountain region, while the rose-breasted grosbeak, scarlet tanager, and indigo bunting are primarily birds of the eastern United States.

It is difficult to explain why each species has a restricted summer home when it is free to come and go as it pleases and often migrates extensively. It is still more difficult to explain how this whole group of birds got into North America originally. Certain of them, such as the tanagers, the cardinals, the blue, rose-breasted, and black-headed grosbeaks, and the "buntings," have close relatives in Central and South America and none in the Old World. Hence, we feel that our species came originally from the south. Furthermore, most of them are quite migratory and tend to return to the land of their ancestors each winter.

On the other hand, the evening grosbeak and the birds illustrated on Plates VI, VII, and VIII have almost exact counterparts in Asia and Europe. This leads us to suppose that either our species came from Asia, when Alaska and Siberia were continuous and when a subtropical climate

existed clear to the Arctic circle, or else that the Old World species emigrated from North America at that time.

In attempting to arrange all birds in an orderly series to show their relationships, ornithologists derive the family of finches (Fringillidae) from the families lower in the scale of evolution through the tanagers or tanagerlike birds, and they place the Fringillidae at the top of the avian series. Certainly today, the family of finches is more numerous than any other, more than 800 species and subspecies being known from the Western Hemisphere alone.

#### PINCHES FOUND EVERYWHERE EXCEPT AUSTRALIA

All grosbeaks, finches, sparrows\* (except the English, or house, sparrow), buntings, linnets, juncos, towhees, and crossbills, belong to the Fringillidae. The tanagers form a separate but closely related family.

The members of the finch family are found all over the world, except in Aus-

\* A later number of *THE GEOGRAPHIC* will contain 16 pages of color portraits of the sparrows by Major Brooks.





Photograph by A. A. Allen

#### THE LAST WORD IN HOME MAKING—A COTTON NEST

For nest lining, goldfinches readily adopt this material in place of thistledown. Put it out in a conspicuous place, and the birds may make their home in a garden that otherwise would fail to attract them (see text below, and page 527, and Color Plate VII).

tralia. The family includes such familiar cage birds as the canary and linnet, but is now thought to exclude the familiar little house sparrow (Plate I), which everyone calls a sparrow. Recent studies indicate that this street gamin really belongs to the family of weaver birds (Ploceidae), best represented in Africa, where the bright colors of some species and the interestingly woven nests of others have long made them famous as cage birds. The Australian "finches" also are assigned to this family of weaver birds.

Occasionally the house sparrow builds a nest among the branches of a tree instead of in a cranny of a building. Then he shows his weaver-bird affinity, for the nest is a large, untidy, globular affair with the hole near the bottom of one side.

The tanagers and finches are relatively poor nest builders, though an exception is the goldfinch, which makes a beautiful abode of cotton or thistledown (see illustration above). The nest of the indigo and the other "buntings" also is more elaborate and thick-walled, with a mixture of dead leaves among the grasses, fibers, and

rootlets that compose it, so that it will stand considerable abuse before falling apart.

With the majority of the others, the nests are flimsy cups of rootlets and weed stems, often dislodged by windstorms, and so poorly and openly constructed that the eggs are sometimes visible from below.

#### SOME CHEERFUL SONGSTERS

Reports of female grosbeaks and purple finches singing are usually traceable to one-year-old males still in female plumage, though I believe females occasionally sing a weak song somewhat like that of the males.

The finches include some of our favorite songsters, such as the canary already mentioned. The rose-breasted and black-headed grosbeaks have delightful, full-voiced, robinlike songs; the purple and house finches utter loud warbles; and the cardinal, while his piping whistles are comparatively simple, is perhaps the cheeriest of them all.

None of them has the pensive type of song of our thrushes, the European nightingale, or our southern mockingbird, but their voices have a freshness and cheer that



Photograph by A. A. Allen

#### LISTENING TO THE CONCERT? NO!

At close range birds often see best with one eye. This mother scarlet tanager (see Color Plate I) cocks her head, not to hear better the nestlings' noisy chirrup, but to watch the disappearance of a caterpillar, just dropped into a gaping mouth.

awaken thoughts of woods and fields, blue skies, and bright flowers.

#### YOUNG ARE FED ON "CEREALS"

As the shape and strength of their bills indicate, the finches are primarily seed-eaters, but they consume many insects during the summer and wild fruits during the fall. The goldfinch brings up his youngsters almost wholly on "cereals." These are served warm, for the parent birds swallow the seeds after cracking their hard coats and feed the youngsters by regurgitation.

Purple finches occasionally eat the hearts out of fruit blossoms and summer tanagers sometimes catch honeybees when other in-

sects are scarce. But, for the most part, these birds do little harm to man's interests and often they are of direct value because of the insects they destroy. The rose-breasted grosbeak, for example, is one of the few birds that feed on the Colorado potato beetle.

#### House Sparrow

(*Passer domesticus*)

House sparrows were introduced from Europe at Brooklyn, N. Y., in 1850 and 1852 by Nicolas Pike to destroy cankerworms which had become a pest in the shade trees. Being naturally prolific and adaptable, they were quick to spread in the eastern United States. For some 20 years they were confined largely to cities of the Atlantic coast, but by 1900 there was scarcely a hamlet from Maine to California that did not awaken to the chirp of this little immigrant (Plate I).

As stated, the house sparrow is not really a sparrow (see page 509). From the true sparrows it differs, among other

ways, in building a spherical nest.

House sparrows have three to six young in a brood and breed throughout most of the year. A warm day in January or February starts them carrying nesting material and, unlike most birds, the male is as assiduous as the female in this. The nests are usually placed in vines or crannies about buildings and are often objectionable on account of the litter. These birds are persistent about rebuilding as often as their nests are removed. But if one waits until the eggs are laid and then removes them all, the birds may move away and the nest can be taken down with some possibility that it will not be rebuilt.

The large flocks which assemble to roost during late summer and fall in the ivy on churches are often objectionable and can be discouraged only by repeatedly disturbing their sleep with poles or streams of water.

As the automobile has replaced the horse, and the sparrows' food supply in the cities has become less certain, their number has lessened, and in some places the starling, introduced in New York City in 1890 and 1891, has become a more serious pest.

It is interesting to watch the change in the appearance of the male sparrow in the spring. This is accomplished in true economy, without the change of a feather—merely by wearing out the old clothes. The new feathers grown in the fall after the nesting season are all edged with gray, which largely conceals the color patterns of chestnut, white, and black. By April, however, these gray tips break off and the black throat and chestnut head-stripe stand out as freshly as if the feathers were newly grown instead of belonging to last year's suit (Plate I and illustration, page 508).

Young sparrows in their first plumage resemble their mothers, except that their breasts are slightly streaked. Before winter, however, they are indistinguishable from their parents of respective sexes.

Sparrows' eggs are grayish white, with speckles or streaks ranging from green to black or brown and varying in number from none at all to so many that the entire ground color is obscured.

The house sparrow, as we know it, is found all over Europe and Asia, except in the Mediterranean countries and India, where it is replaced by closely related species of similar habits. In Africa and Asia are several paler and smaller varieties.

### Scarlet Tanager

(*Piranga erythromelas*)

Louis Agassiz Fuertes used to tell of overbearing two bird observers on the Cornell campus. One was complaining that he had not seen a scarlet tanager all spring, and the other was agreeing that they must be very scarce. Yet, in the tree directly over their heads, a tanager was singing at the top of its voice during their entire conversation (see Plate I).

*Hurry, worry, flurry, blurry*, the tanager seems to say, like a robin in a hurry with a cold, and *chip-burr* he calls when alarmed. Anyone in the northeastern United States and southern Canada who recognizes these

calls can find scarlet tanagers. Nearly every sizable wood lot has at least one pair, but those who do not know the song may think them scarce indeed.

The singing male often selects a dead branch from which to sing, but it is high in the crown of leaves or above it, so that he goes unnoticed.

Arriving about the first of May, the tanagers may be conspicuous at first, if the vegetation has been retarded, but they soon lose themselves in the treetops.

Standing at my front door early in June, at the height of the nesting season, I can hear from different directions the songs of three or four males. Yet we seldom see a tanager. Indeed, one year we found a nest in a pear tree within 25 feet of the porch, but we rarely saw the birds unless we watched expressly for them and then it was only when they took flight at our close approach.

We could always find the male by following his song, or, if we watched the nest continuously, we would occasionally see him slip in with a fat green caterpillar for his mate. After the eggs hatched, and especially when the young were leaving the nest, he was always around with a worm in his bill, and his *chip-burring* attracted our attention as he brought food to the youngsters.

Female tanagers are often remarkably tame, or, rather, have their maternal instinct powerfully developed, so that they will sometimes let one stroke them on the nest or will feed their youngsters even when they are held in one's hand (see illustration, page 506). Their nests are usually out of reach of the ground, on a horizontal branch of an oak or a hemlock, sometimes high, and are rather carelessly built of rootlets and weed stems.

The greenish-blue eggs are heavily marked with reddish-brown specks. The nests are often parasitized by cowbirds, and many a time I have glanced up into our mulberry tree at the call of a tanager, only to see a fluttering young cowbird receiving a berry from a deluded mother tanager.

Young tanagers in the nest resemble the female, but are slightly streaked beneath. These streaks, however, soon disappear. After nesting season the male changes his red for a greenish-yellow coat, but his wings and tail are black, edged with green, and he is easily distinguished from the female.

Leaving the nesting grounds in October for Colombia or Bolivia, where they spend

the winter, scarlet tanagers are not seen again until the following spring, when the males have once more molted their body feathers for red and have worn off the green edges on their wing feathers. Oftentimes, however, the molt is not entirely completed, so that the red is patched with yellow, or, at times (perhaps in yearling birds) the entire body is a much lighter yellowish red than is normal.

### Summer Tanager

(*Piranga rubra rubra*)

This is the common tanager of our South-eastern States, west as far as eastern Texas and Nebraska. Its arrival early in April from northern South America, where it has passed the winter, is often first made known by its curious call, which Dr. Chapman describes as a "clearly enunciated *chicky-tucky-tuck*" (see Color Plate I).

Its song is much clearer than that of the scarlet tanager and, to my ear, seems intermediate between that bird's song and the lay of the Baltimore oriole. Common in the open pinewoods of the South, it seems to prefer those with an undergrowth of oaks and hickories. It frequents the lower branches more than does the scarlet tanager and seems more willing to be observed.

The summer tanager seldom reaches the Northern States, but two years ago a beautiful male visited Buttermilk Falls State Park, south of Ithaca, New York, and, true to his reputation as a bee-eater, took up his station for several days near a hive belonging to the caretaker. When the bee owner discovered how many visitors the bird brought to the park, he cheerfully resigned himself to the loss of a few bees.

Summer tanagers build careless nests about 20 feet from the ground near the ends of horizontal branches, and, with their families, leave the United States in October. The eggs are similar to those of the scarlet tanager.

From New Mexico to California a variety known as Cooper's tanager (*Piranga r. cooperi*) lives among the cottonwoods of the river bottoms. It is slightly larger, with a somewhat longer bill and rosier under parts.

### Western Tanager

(*Piranga ludoviciana*)

Bird lovers in California look forward to the return of the western tanagers much as we in the East watch for the coming of their scarlet cousins. About the first week in

May they can be expected to pass through the lowlands and foothills and a week later they appear in the black oaks and incense cedars of Yosemite. For the rest of the summer they are among the most conspicuous birds throughout the forests of the Rocky Mountain region up to 10,000 feet, as far east as Colorado and Nebraska (see Color Plate II).

Western tanagers are never so abundant as robins or chipping sparrows, but, because of their conspicuous colors, courage, fondness for the open woods, and breezy songs, they are not easily overlooked. Their drawing two-syllable call note of *chee-tik*, and their song, consisting of a rapid repetition of the syllable *chēē wēr*, as Dr. Grinnell puts it, suggest the utterances of the scarlet tanager. The song is heard at all times of day from the middle of May until mid-July, and is one of the characteristic sounds of the Yosemite National Park.

Early in the season they feed largely on insects, but they are never as active in their pursuit as are warblers. Seeming to realize that they are conspicuous when moving, they spend much time sitting around or deliberately peering under leaves for caterpillars. A little later, however, when berries begin to ripen, they venture into the open and are often conspicuous about camp sites, feeding on buckthorn berries.

Nesting begins the last of May, when females may be seen gathering nesting material, often on the ground, and flying directly to their nests. The work of nest building devolves entirely upon her, though she is often accompanied by the male.

The nest is rather loosely constructed on a horizontal branch, usually about 20 feet from the ground, and the eggs, like those of other tanagers, are greenish blue speckled with brown. Once incubation starts, the two birds are rarely seen together, but the males remain conspicuous and often forage even on the ground. Although the male does not assist with home-building or hatching, he helps feed the young, both while they are in the nest and afterward.

During July and early August, when the families feed largely in the trees, they are less conspicuous than in late August and September, when they come down near the ground to eat berries. At this time, those which have been nesting higher in the mountains move down toward the lower land, so that during the few weeks just before leaving for the South the western tanagers seem



BIRD BEAUTIES OF THE TANAGER AND FINCH FAMILIES



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VIVID TANAGERS AND DINGY SPARROWS PRESENT A STUDY IN CONTRASTS

In spite of their brilliant colors, the North's scarlet tanager, with its jet-black wings, and the duller-red summer tanager of the South are more often heard than seen, so modestly do they move about among the green leaves. The yellowish olive-green females are so different that some observers mistake them for another species. The immigrant English, or house, sparrows, below, whose lively chirrup is so familiar in city streets and farmyards, now are thought to belong to the interesting family of weaver finches, some of whose exotic members in Asia, Africa, and the East Indies weave elaborate nests.

more numerous than at other times. The males then wear winter plumage and their heads are only slightly tinged with red.

By the first of October these tanagers have deserted California for their winter home, the Mexican plateau and the mountains of Central America as far south as Costa Rica.

### Hepatic Tanager

(*Piranga flava hepatica*)

To the ordinary observer the hepatic tanager (Plate II) and the summer tanager (Plate I) are almost identical. In reality, however, the hepatic tanager is a larger bird, with a more scarlet breast, a browner back, and much grayer cheeks.

The summer tanager ranges widely throughout our Southern States, but one is not likely to see a living hepatic tanager unless one ventures into the mountains of western Texas, New Mexico, or Arizona, or into Mexico itself.

There, among the oaks and pines of the mountains that rise from the desert, the hepatic tanager is sometimes found in comparative abundance. Its song is remarkably like that of the scarlet tanager, both in quality and volume. Its feeding and nesting habits are likewise similar, except that its eggs are a somewhat paler bluish green in ground color.

### Pyrrhuloxia

(*Pyrrhuloxia sinuata*)

It was on the King Ranch near Corpus Christi that I first made the acquaintance of this delightful bird (Plate II).

Our host, Mr. Richard Kleberg, had shown us the last of the whooping cranes making their final stand against extinction on the muddy shores of Laguna Larga. We had seen thousands of white-fronted geese and hundreds of little brown cranes getting ready for their trek back to Alaska for the summer. We had seen flocks of long-billed curlews and mountain plover, and white-necked ravens had scolded us from the tops of the yuccas.

Suddenly a slender, soft-gray bird darted across our path from one scrubby mesquite to another. Or was it gray? My eye seemed to catch a glow of red as it passed.

Out came my binoculars. But its back was toward me and at first I was almost sure it was only a female cardinal—a little grayer than our eastern bird, as the Texas variety is supposed to be.

A moment later, however, the gray bird turned, displayed a beautiful rose-red vest, and raised a saucy and most expressive scarlet crest. Its short, heavy, almost parrot-like bill gave it a patrician expression that left no doubt that I had discovered a real Texas aristocrat.

Later we saw others—cardinal-like in most of their actions, sometimes on the ground, sometimes in the bushes, but never far from some thorny tangle into which they could disappear at our approach. Their call notes were somewhat more wiry than those of the cardinals and their whistles were clearer, with less inflection.

These were pyrrhuloxias of the Texas variety, so their backs were somewhat darker and the region around their bills blacker than those of the kind seen in Arizona. Neither variety, however, extends its range very far north.

In their nesting and other habits the pyrrhuloxias are much like cardinals, building rather bulky nests of twigs, weed stems, and inner bark, bound with fine grasses, in thickets of mesquite or other thorny growth, and laying three to five finely speckled eggs.

### Cardinal

(*Richmondia cardinalis*)

All winter a beautiful male cardinal had been visiting our feeding log, regaling himself on the sunflower seed which we purchased for his benefit (Plate III). Occasionally he nibbled at the suet which we put out for the woodpeckers or picked at the chick feed we scattered for the juncos and tree sparrows, but he obviously preferred the sunflower seed.

He was welcome to all he could eat, for he was the only cardinal, so far as we knew, that had dared venture as far north as central New York. We rejoiced more at his discovering our food log than we had when the flock of evening grosbeaks found it earlier in the winter.

These grosbeaks are northern birds that only occasionally wander in winter as far south and east as Ithaca, N. Y. They were still visiting our log on the day when the cardinal announced his presence with a loud, cheery whistle. I conceived the idea of getting a photograph of the two together and thus showing on one photographic plate birds from the opposite ends of the country. This became a longer job than I had expected, because, though they both became regular boarders, their meal hours were

different. For ten days I kept a camera focused on the log, with a thread to one of our windows, before the opportunity arrived.

One noon, when I came home to lunch, the cardinal was munching away on the seeds, and one of the male grosbeaks was calling in the tree overhead. Having set the camera in the morning, I knew it was ready. Several thrilling moments of suspense ensued, and then the grosbeak dropped to the log. Just as I pulled the thread to take the picture, the cardinal lifted his crest in a beautifully expressive fashion, raised his wings, opened his bill, darted at the grosbeak, and knocked him off the end of the log. It all happened so quickly that the camera recorded not much more than a blur.

My second experience with a cardinal at Ithaca was less amusing. All winter this one had been coming to our window feeding station, braving the zero temperature and apparently not minding the icy blasts from the northwest, despite his southern origin. Spring was in the March air one noon when I stepped from my car near the feeding station window. I had scarcely looked around before I heard a scream from a bird in distress. The cry seemed familiar, yet I was sure I had never heard it before.

Looking up the hill toward the rock garden, I saw a flash of red as the cardinal headed straight for the spot where I was standing. Behind him came a northern shrike in hot pursuit.

Had I realized what was to happen, I might almost have caught the cardinal in my hands like a baseball as he flashed by. The next instant he had pitched headlong into the closed window and lay quivering at my feet. Blind instinct had directed him in distress toward the spot which had protected him all winter, but it had not taught him the meaning of glass.

In the States from Ohio and Pennsylvania southward we get best acquainted with the cardinal. There he often nests in the vines on the porch and performs in many lovable little ways before the eyes of his hosts. The male's attentiveness to the sitting female, his devotion to the young, his expressive crest, his cheerful whistle at all seasons, and his colorful presence amid winter snows are all a part of the everyday life in Dixie, as familiar as the call of the bobwhite and the song of the mockingbird.

Cardinals are not really migratory, but the young birds do a good deal of wandering in all directions after they are grown.

This doubtless accounts for individuals appearing north of their normal range in winter as often as in summer, such as those birds which found my feeding station in central New York. Their nonmigratory habit is likewise the underlying reason why the Florida, the Texas, and the Arizona birds are now recognized as races or varieties distinct from birds of the eastern United States as well as from the four or five other varieties of Mexico proper and Baja California.

In late April or early May the female cardinal selects her nesting site in a thick bush or vine, constructs her nest of rootlets, strips of bark, and grasses, and lays three or four bluish-white brown-speckled eggs. During the entire time the male is very attentive, often feeding her on the nest as well as feeding the young. He usually takes entire charge of the young when they leave home, and the female starts building another nest for a second brood. He takes his responsibilities with ludicrous seriousness.

Young cardinals are at first a dull, dark brown, with blackish bills, but before long they get lighter below, and the crests of the males are slightly reddish. Before winter they change all their feathers and become indistinguishable from their parents.

### Rose-Breasted Grosbeak

(*Heodymelas ludovicianus*)

I have always felt sorry for the male rose-breasted grosbeak (Plate III) since the first time I caught him in the act of sitting on the eggs and singing to himself.

Nature endowed him with beautiful colors and a rich, rollicking voice. A few minutes before, I had seen him glorying in both on the dead branch of a butternut over the elderberry bushes in which the nest was located. Surely he was intended only to add beauty and cheer to this careworn earth.

Yet there he was in all his black and white and rose red, inviting attention to the nest, while his mate, designed and colored by Nature especially for the work he was doing, was off gadding by herself and doing no good for anyone. In some birds whose males do all the incubating and caring for the young, Nature has reversed her usual custom and given the females the bright colors. But with the grosbeaks it is obvious that she has done her best to make the female inconspicuous and the male pleasingly brilliant—so why should he permit himself to get roped in on such a domestic



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THEIR STRIKING COLORS BLAZE AMID THE SCENERY OF OUR WEST.

The red-crested and red-waistcoated Arizona pyrrhuloxia, at the top with his consort, is better known in the southwestern United States as "gray cardinal" or "parrot-bill." They win man's affection by their cheery whistle and their habit of eating boll weevils. Hepatic tanagers, perched at the bottom, live in the mountains of Texas, New Mexico, and Arizona. In the Far West, especially near camps in our national parks, the western tanager, left, crimson of face, pours out to his yellow-green mate a song like the lay of the East's scarlet tanager (see Plate I).



BIRD BEAUTIES OF THE Tanager and Finch Families



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GROSBEAKS AND CARDINALS COMBINE FINE MANNERS AND FINE CLOTHES

A model husband—though somewhat henpecked—the East's handsome rose-breasted grosbeak, above, sings sweetly to his somber-clad spouse in a tree-top. These birds endear themselves to farmers by a fondness for potato bugs. The cardinals, or "redbirds" (male left, female right), beloved in the Southeastern States, range as far north as Pennsylvania. Often grain tossed on doorsills or window ledges will attract groups of a dozen or more of these flashing birds in late winter. Blue grosbeaks (right pair) are shy denizens of South Atlantic and Gulf States.

job as hatching eggs? But apparently it is common practice with the species and with most pairs the males spend fully as much time on the eggs as do the females.

During winter the male rose-breasted grosbeak looks much more like the female as he roams through the forest of central and northern South America, for the feathers of his upper parts and breast are edged with brown and he has a light line over his eye. By the time he reaches his nesting grounds in the northern United States and Canada, the last of April or the first of May, he is once more in his full breeding regalia. Then his voice rings out like that of a glorified robin, each phrase slurring into the next.

Occasionally as many as three or four rival males may be seen dashing madly through the trees in pursuit of one another, each singing at the top of his voice. More often, single birds in a territory of four or five acres will be heard, each caroling joyously, especially at dawn or dusk.

The plain, sparrowlike females would easily escape detection were their mates not so attentive, but as they gather dead twigs for their crude nests the males fly back and forth with them, apparently taking keen interest in the undertaking. An intruder is always greeted with a few metallic chipping notes, but soon is ignored.

The favorite location for a nest seems to be an elderberry bush five to ten feet from the ground, although horizontal branches of small oaks or elms are also used. The nests are poorly woven of twigs or weed stems, and often the eggs, spotted with chestnut and brown, can be seen from below.

The exact function of the heavy bills is not evident during the summer, when the birds are feeding their young and themselves largely on soft-bodied insects or fruit. Even the potato beetles, of which they are fond, do not require any such crushers to reduce them to a suitable swallowing condition. What they feed on during the winter that might require such a bill I do not know, for the only ones I have watched feeding were visiting a patch of pokeberries with a flock of tanagers on a mountainside in Colombia.

Immature grosbeaks resemble the females, except that the linings of the wings of the males are rose red instead of yellow, and there is a suffusion of rose on their streaked breasts. Some of their brownish wing and tail feathers are worn during their first nest-

ing season after they have changed the rest of their plumage to a dress like that of their fathers. First-year birds are, therefore, easily distinguished from the adults.

### Black-Headed Grosbeak

(*Hedymeles melanocephalus*)

Visitors to some of the western camp sites, such as those in Yosemite National Park, are sure to get acquainted with this large-billed, golden-brown and black bird foraging for crumbs around the tents or buildings (Plate IV). Here, constant association with man and his works has destroyed their natural timidity and they often hop about within a few feet of visitors. At such times their ridiculous little call note, *cek*, is in strong contrast to the loud, full, rolling and beautifully modulated song that bursts from their throats when they mount to the treetops.

During the height of the courtship period they can sometimes be heard singing in chorus at sunset, like our robins in the East. In his ardor the male grosbeak sometimes mounts into the air and sings on the wing.

The black-headed grosbeak passes the winter in central and southern Mexico, arriving in the United States in April and reaching its northern limits in May, where it stays until September. It is found throughout the Rocky Mountain region as far north as southern Canada, and from California as far east as western Texas and North Dakota. The Pacific coast birds are considered a different variety from those found in the rest of the Rocky Mountain region. Thus, in the western United States, where the rose-breasted grosbeak is unknown, this bird replaces it. Indeed, it is very similar to the rose-breast in all its habits, even including that of helping to incubate the eggs and brood the young.

Its food habits, too, are similar. Although it occasionally is objectionable about cherry orchards and may develop a fondness for green peas, the damage it does is relatively insignificant compared with its destruction of injurious insects, such as the black olive scale, potato beetle, alfalfa weevil, canker-worm, and codling moth.

As indicated in Plate IV, the female is less black and more streaked than the male. The young, as would be expected, resemble the female, but are paler beneath. In winter plumage the black of the males is replaced or concealed by brown.

### Blue Grosbeak

(*Guiraca caerulea*)

You may be disappointed in your first blue grosbeak. He may look more like a cowbird than the beautiful deep-blue creature you see in Major Brooks' painting (Plate III). It all depends on the point of view; that is to say, the angle at which the light comes from his feathers to your eye.

Blue grosbeaks are a good deal like indigo buntings in their habits, preferring tangles of weeds and berry bushes or willows, but they do not venture so far north, seldom getting north of Maryland in the eastern United States or central California in the West. From east to west the species has been split up into three varieties, but the ordinary observer would not recognize differences among the eastern, western, and California races.

In the fall the plumage of the adult male becomes edged with brown, while the immature males are fully as brown as the females.

The blue grosbeak's nest is like that of the other grosbeaks, being a rather flimsy, shallow affair of rootlets and weed stems. But, like the buntings' nests, it is placed in weeds, usually not far from the ground. The three or four eggs are bluish white and unspotted.

The blue grosbeak's song also is like that of the other grosbeaks, though weaker and sometimes suggestive of that of the purple finch or house finch. The bird frequently sits on the same song perch for long periods. The larger size and two brown wing bars easily distinguish it from the indigo bunting, and the absence of any chestnut on its breast differentiates it from the bluebirds and lazuli buntings.

### Indigo Bunting

(*Passerina cyanea*)

It is the middle of May before this charming bit of color appears in my garden, but he makes up for his late appearance by singing to us long after the other birds have ceased in late August (Plate IV).

His song is not the full-voiced type we get from the grosbeaks or the purple finches, but inclines to be thin and wiry. Many bird students have difficulty distinguishing it from that of the goldfinch, but if one listens attentively, one will notice that the bunting's notes are usually paired: *sweet, sweet—where, where, here, here—scit, scit*. Often he sings from the same perch

over and over, but again he leaves off abruptly in the middle of his song as if he had suddenly been distracted.

When he sings he is usually high in a tree or on a telegraph wire and, seen against the sky, appears only blackish, except as he turns his head occasionally and sends a flash of blue light to the observer's eye. Soon, however, he darts down to the undergrowth, for no matter how engrossed he may seem in his singing he always has one eye on the shrubbery beneath him for the appearance of his mate.

One may not be able to identify at first a plain brown bird that darts nervously from the weeds or berry bushes at one's approach, twitching her tail nervously. But scarcely has she given vent to her excitement with a metallic little *chip*, before she is joined by her brilliant consort, and the mystery is solved. Also a close scrutiny of her wings and tail will show a faint glint of blue, suggesting her real identity.

The indigo bunting is a bird of the eastern United States, spreading as far west as central Texas and as far north as southern Quebec; it winters in Yucatan, Central America, and Cuba. It arrives in the southern United States in April and does not leave until October, but it is more conspicuous in late summer when other birds have quieted down. Then the air is free for it to broadcast its happiness over the success of the first brood and the start of the second.

The nest is placed in a weed, fern, or berry bush within a few feet of the ground, and is well constructed of grasses and weed stems, usually with a few dead leaves woven into the bottom.

The male never incubates the eggs or broods the nestlings, but he often brings food to the female on the nest and is always assiduous in feeding the young. In this respect he is much more normal than the grosbeak.

During summer the food is chiefly insects, but one unusually cold May, when these were apparently scarce, several of the birds came to my feeding station in the garden and fed on chick feed with the song sparrows and chippies. As soon as the weather warmed up, they deserted us for their normal diet of insects.

One pair, however, remained to nest in a flowering raspberry bush in the rock garden and entertained us all summer. The female found the cotton we had put out for the yellow warblers and redstarts and used



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BRILLIANT BUNTINGS SEEM DIPPED IN THE SKY'S OWN HUES.

The indigo bunting, upper left, has the blues in his feathers only. Gaily this easterner sings and bustles about, while his mousy mate stays in the background. Sunset colors blend in the gorgeous "Joseph's coat" of the Southwest's beautiful bunting, upper right. Radiant silvery blue adorns the male of the West's lazuli bunting (right center pair), whose coloring recalls that of the familiar bluebird. Black-headed grosbeaks (lower pair) are westerners closely resembling, in all but plumage, the East's rose-breasted grosbeaks (Plate III).



BIRD BEAUTIES OF THE Tanager and Finch Families



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A GAUDY FELLOW, A MIDGET, A WANDERER, AND A MASQUERADER

The painted hunting, upper left, with his perfectly camouflaged greenish mate, hides his beauty in southern swamps and thickets; but many know him as "nonpareil" or "Mexican canary." A tiny finch of eastern Mexico and Texas is Sharpe's seedeater (upper right pair). Flocks of eastern evening grosbeaks, center, ramble in winter over all Northern States. Cheery, grass-hopper-loving dickcissels, lower, resembling miniature meadowlarks, forsook the eastern seaboard for interior States some 65 years ago and only rarely do individuals return.

it instead of the dead leaves that normally form part of the base of the nest, building a beautiful structure that compared favorably with any goldfinch nest, except for the latter's thistledown lining.

The indigo bunting's four or five eggs are pale bluish white, with no spots. Normally, two broods are reared each season, a new nest being built for the second family.

### Lazuli Bunting

(*Passerina amoena*)

One familiar with the indigo bunting in the eastern United States finds its exact counterpart in the lazuli bunting of the West (Plate IV).

Anyone examining the color plate and lacking familiarity with the birds themselves would say that, although the female buntings are much alike, the males are almost as different as any birds could be. This is true so far as coloring goes, for even the blue of the lazuli bunting is much paler, and the chestnut and white on the under parts and the two white wing bars find no counterpart in the indigo bunting.

The song of the lazuli bunting, though divided into short phrases, is less clear than that of the indigo, and the phrases are not so regularly of only two notes in length.

The lazuli's nest is similar to the indigo's in situation and construction, and the eggs are the same color.

### Beautiful Bunting

(*Passerina versicolor pulchra*)

Just as the lazuli bunting replaces the indigo bunting in the West, so the beautiful bunting replaces the lazuli along our southern border and southward into Mexico (Plate IV). Mesquite thickets of southeastern California and Baja California furnish the shelter into which this variegated little finch can disappear at the approach of an enemy or from the top branches of which he can pour forth his wiry song with much enthusiasm. In the brushy areas along the lower Rio Grande of Texas there is an allied race called the varied bunting (*Passerina v. versicolor*).

### Painted Bunting

(*Passerina ciris*)

Winter visitors in southern Florida who feed the cardinals, mockingbirds, and ground doves are occasionally surprised to see a flash of intense blue and golden green against a flaming-red background when a

painted bunting joins the troop of merry revelers (Plate V). The bird seems an apparition from another land.

Like the cardinal, the male painted bunting or "nonpareil," as it is sometimes called, retains its bright colors even in its winter plumage. While the majority move southward into Mexico, or Central America, or Cuba for the winter, a goodly number always remain in southern Florida, feeding on seeds of grasses and weeds and ready to partake of the chick feed or bread crumbs that thoughtful friends provide.

About the middle of April they are joined by others from farther south and the migration northward starts; for though the painted bunting is distinctly a bird of the southern United States, nesting south of an indefinite line connecting southern North Carolina and southern Kansas, it does not nest south of central Florida in the region of New Smyrna. There I have found them myself in May and I understand they are still nesting in July. At least two and possibly three broods may be reared each season.

Despite their bright colors and distinctive song during the nesting season, even the males are relatively inconspicuous, for they do most of their singing amid the leaves of the treetops. Their song suggests that of the indigo bunting, but lacks something of its energy and rhythm. It has been compared more with the singing of some of the warblers, such as the Canada or the magnolia warbler.

Like the indigo bunting, the painted bunting prefers thickets and weedy places along the edges of woods or the borders of towns. The nest is similar also, usually in a bush or sometimes in a low tree, but the bluish-white eggs have numerous speckles of chestnut or rufous brown.

### Sharpe's Seedeater

(*Sporophila moreletii sharpei*)

Wherever one travels in the arid tropics of the New World from Mexico to Paraguay, one finds some species of seedeater, an abundant roadside bird living on the seeds of weeds and grasses. In general, seedeaters are decidedly smaller than the average sparrow and are never streaked, though of somber black, white, and brown plumage, similar to the Sharpe's seedeater illustrated by Major Brooks (Plate V).

This is one of eight species found north of Panama. It is the only one, however,

which enters the United States and then only for a relatively few miles along the lower Rio Grande in southeastern Texas, especially in the region of Brownsville.

### Evening Grosbeak

(*Hesperiphona vespertina*)

The most striking things about this unusual bird are its fearlessness and the irregularity of its appearance about civilization (Plate V). It passes the breeding season largely in the pine forests from northern Michigan to western Alberta and (the western and Mexican varieties) in the mountains from central British Columbia southward to New Mexico, Arizona, and Mexico.

Its summer habits have been relatively little observed, but, ordinarily, it apparently nests during June on the horizontal branches of spruces, more or less in scattered colonies. In the vicinity of Winnipeg, Manitoba, however, two nests were found in shade trees in the town of Selkirk and others in river-bottom willows. The nests were loosely constructed of twigs and rootlets and the eggs were pale greenish blue, rather heavily marked with gray, olive green, and brown.

At irregular intervals, sometimes years apart, the birds move eastward and southward from their breeding grounds and appear sometimes in large flocks in New England and the Middle Atlantic States, even as far south as Washington, D. C. At such times they are friendly birds and may tarry for weeks where they find abundant food. At certain places in New England where food is always made available for them, they now seem to be annual winter visitors.

Their natural food is the seeds of various ashes and maples, the pits of chokecherries and dogwoods, weed seed, and the seeds of conifers. They will often peck through frozen apples for the seeds, apparently not caring for the pulp. At feeding stations they seem to prefer sunflower seeds and, in summer at least, have a fondness for salt.

A flock that found my feeding station in February came regularly every day until the first of May. One could almost set a watch by the birds' first appearance at 6:30 each morning. Their chirping call notes, which always announced their arrival, made them sound like glorified house sparrows. Their songs, about the middle of April when they finally began to take an interest in other things than eating, were equally disappointing.

The birds are rather swift in flight, but on the ground or in trees they appear sluggish and pass a great deal of time sitting quietly. They are particularly fond of the seeds of the box elder and often come back to the same tree day after day until the seeds are all gone, neglecting similar trees in the vicinity.

Young evening grosbeaks, when they leave their nests, all resemble their mother, but before winter the males have acquired their yellow body feathers, though they retain their juvenile wings and tails until the following fall. Old birds molt but once a year after the nesting season.

The evening grosbeak is more closely related to the European and Asiatic hawfinches than to our own cardinals or rose-breasted grosbeaks. Hawfinches are less brilliantly marked, however. They resemble more the female evening grosbeak, but are browner on the back.

The pleasing name is based upon the mistaken notion of the original collector that the bird dwelt in dark woods and came out only at evening to sing.

### Dickcissel

(*Spiza americana*)

This is a bird of the Mississippi Valley, found in summer from southern Texas and Mississippi northward to Minnesota and North Dakota (Plate V).

Before 1880 it was apparently more or less common in the Middle Atlantic States, but now is of very rare occurrence east of the Alleghenies. No good reason for its disappearance in the East has yet been discovered. In the Mississippi Valley it is apparently subject to cycles of abundance and scarcity in many localities. The bird gets its name from its curious little song: *dick-dick—cissel-cissel-cissel*. The first two notes are given with such energy that they can be heard a long way, but the ending is much weaker.

To find the dickcissel, Dr. Thomas Roberts says, "One should search first the clover fields, then the alfalfa fields, upland grasslands, grainfields, weed-grown pastures, and, lastly, open brushlands with scattered small trees." In clover fields it usually nests on or near the ground; in brushlands, sometimes as much as six feet from the ground. The nest is rather bulky, of coarse grasses and leaves, lined with finer grasses or hairs, and the four or five eggs are pale blue with no spots.



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SOME FINCHES ARE SPLASHED WITH WINE-COLOR AND FILLED WITH SONG

Few birds have richer melodies than that of the eastern purple finch, here engaged with his mate in gulping mountain-ash berries. Sometimes the impassioned minstrel mounts skyward, singing ecstatically. Cassin's purple finch, top, dwells on western mountain slopes. House finches, the male wearing a red crown and cravat, right, are numerous in California and have a habit of raiding orchards. Into the northern United States in winter roam those boreal nomads, the Canadian pine grosbeaks (bottom), whistling melodiously. The male is tinged with red.



BIRD BEAUTIES OF THE Tanager AND FINCH FAMILIES



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STOUT-HEARTED, THEY WREST FOOD FROM THISTLES OR CONIFERS IN SNOWY WASTES

The gay little eastern goldfinches, bits of bright summer sunshine, swing along in liling flight and utter ecstatic canarylike love songs. They have earned the nickname of "thistle birds" by gleaning thistle seeds or down for nest-lining. Through northern fir forests and meadows wander flocks of pine siskins, upper right; the more gaily garbed common redpolls (right center pair); and the rarer, more northerly hoary redpoll, clinging just below. Gray-crowned rosy finches (lower left pair) live on wind-blown seeds and insects in western mountains.

It is sometimes called the "little meadow-lark" because of its association with that common species and its resemblance in having a yellow breast bearing a black crescent. It is called merely "dick" in Illinois, where it is one of the commonest summer birds and its song is one of the most familiar roadside sounds.

Dickcissels gather in large flocks in August, sometimes associating with bobolinks or redwings, and winter in Central America and northern South America. They return in equally large groups the following April, but these break up into pairs and the couples scatter.

### Purple Finch

(*Carpodacus purpureus*)

Originally a wild forest bird, the purple finch has, of recent years, adapted itself to the ways of man and frequently nests in the ornamental spruces and pines of our gardens (Plate VI).

Especially has it become a familiar patron of bird lunch counters, where its appetite for sunflower seeds and its habit of congregating in large flocks sometimes taxes the hospitality of even the most enthusiastic bird lover. But the attractive rose-red color of the adult males and their rollicking songs more than make up for their gourmand appetites and their quarrelsome dispositions.

Like many other members of their group, the purple finches are erratic in their migrations and may disappear for years from a locality where they have been unusually abundant.

In summer this finch ordinarily restricts itself to the northern United States and Canada, as far west as northwest British Columbia. The race known as the California purple finch extends its range to the Pacific coast and southward in the mountains to Baja California. In winter the purple finches are scattered more or less throughout the United States wherever they can find abundant food, even as far south as Florida and Texas.

About the first of May they repair to their nesting grounds, but even before that the songs of the males have redoubled and are often given with so much energy and enthusiasm that the bird is carried right up into the air with his continuous bubbling warble. At such times his song often ends abruptly with a clearly enunciated *pho-be*, given almost exactly like a real

phoebe's call. Except for this ending, the warbling of the purple finch is very similar to that of the warbling vireo, but somewhat more full-voiced and without the characteristic rising inflection at the end of the latter's song.

The courtship performance, often amusing, has been described as "the dance of the straw." It is comparable to the wildest Indian maneuvers. It begins with the male picking up a straw and ends, after an elaborate display, with his falling over as if dead until a peck from the female rouses him.

At the conclusion of one of these displays, which usually take place on the ground, the male I was watching struck a pose, with his head thrown back, his chest up, and his tail braced against the ground. Thereupon, the female hopped on to his chest, bent over, and clasped bills with him in a most intriguing manner, dashing away the next moment to lead him a merry chase through the trees.

The nest, made largely of rootlets and weed stems, often has a lining of hair or woolly material. The three to five eggs are bluish with a wreath of brown spots about the larger end.

Young purple finches resemble their mother for more than a year and, in their streaked brown plumage, might be confused with some of the sparrows. Young males, in female plumage, sing well their first spring.

To most people the name purple finch seems a misnomer, for, although there is a slight bluish cast to the rose-red breast, it is far from our usual conception of purple.

### Cassin's Purple Finch

(*Carpodacus cassini*)

Similar to the purple finch but larger, with paler breast and rump, is this dweller in the Cascades and high Sierras, and other mountains from British Columbia to Baja California and east to Colorado (Plate VI).

In all its habits it seems to be like the other species, nesting rather high in the spruces, traveling in small flocks, and singing a loud, warbling song, although this is usually somewhat louder and more varied. In winter it visits the lowlands, where it is often with other finches.

### House Finch

(*Carpodacus mexicanus*)

From central Texas and western Kansas to Oregon and California this is one of

the most abundant birds, being nearly as numerous and friendly as the robin, or even the house sparrow, in the East (Plate VI).

Certainly, the house finch, or linnet, as it is familiarly called, is a more desirable neighbor than the house sparrow, for, although it occasionally feeds on cherries or other small fruits, it has a compensatingly delightful song and pleasing colors.

As can be seen in the plate, the chief color differences between the house finch and the purple finch are the lighter under parts and heavier streaking of the house finch and its more restricted red areas.

Except during the nesting season, these "California linnets" are found in flocks, sometimes of large size, feeding about weed patches. When alarmed, they fly up and away instead of dodging for cover like most sparrows. They often circle high in the air and apparently make off for distant parts. At this season the flocks are naturally made up largely of dull-colored birds, because, in addition to the females, there are included all the young of the year and the immature males of the preceding year. The latter do not get their red markings the first year. Because of the curious veiling of the color (see text, page 507), the old males likewise appear duller than they will in the spring.

The nesting season begins in April, when the flocks break up into pairs, and the singing, which is heard off and on all winter, is redoubled.

The courtship and display are similar to those described for the purple finch. Once nesting starts, the males are very attentive to the females, remaining close in flight as well as when foraging. After incubation begins, they select perches close to the nests.

Because of the pleasing song, attractive plumage, and friendly ways of these linnets, many people put up nesting shelves for them about the porch or in the garden. These should be completely open on at least one side, instead of being the conventional type of birdhouse with a small opening.

#### Pine Grosbeak

(*Pinicola enucleator*)

The pine grosbeak is one of the birds we share with the Old World, for it is found in coniferous forests throughout the northern parts of the Northern Hemisphere (Plate VI).

There is no more difference between the Old World birds and those of the New than is noticeable between the individuals inhabiting the different parts of the boreal forest in North America. Whether our birds came originally from Asia or theirs from North America is difficult to decide.

In western mountains, where these grosbeaks live at high altitudes just below timber line, they apparently seldom venture to the lowlands.

In eastern North America, however, and especially in New England, one occasionally has opportunity to see pine grosbeaks without climbing mountains or traveling nearly to Hudson Bay. Occasionally their food supply in the far North seems to fail, and the birds move southward during the winter.

On their nesting grounds their favorite food seems to be the seeds of spruce and hemlock, but when they move south in winter they also feed on sumac and berries of mountain-ash, wild grapes, and Virginia creeper.

The flocks are not usually large, and in one comprising a dozen birds there are likely to be not more than two or three of the rosy-red adult males. It takes at least two years, possibly longer, for the immature bird to acquire bright plumage.

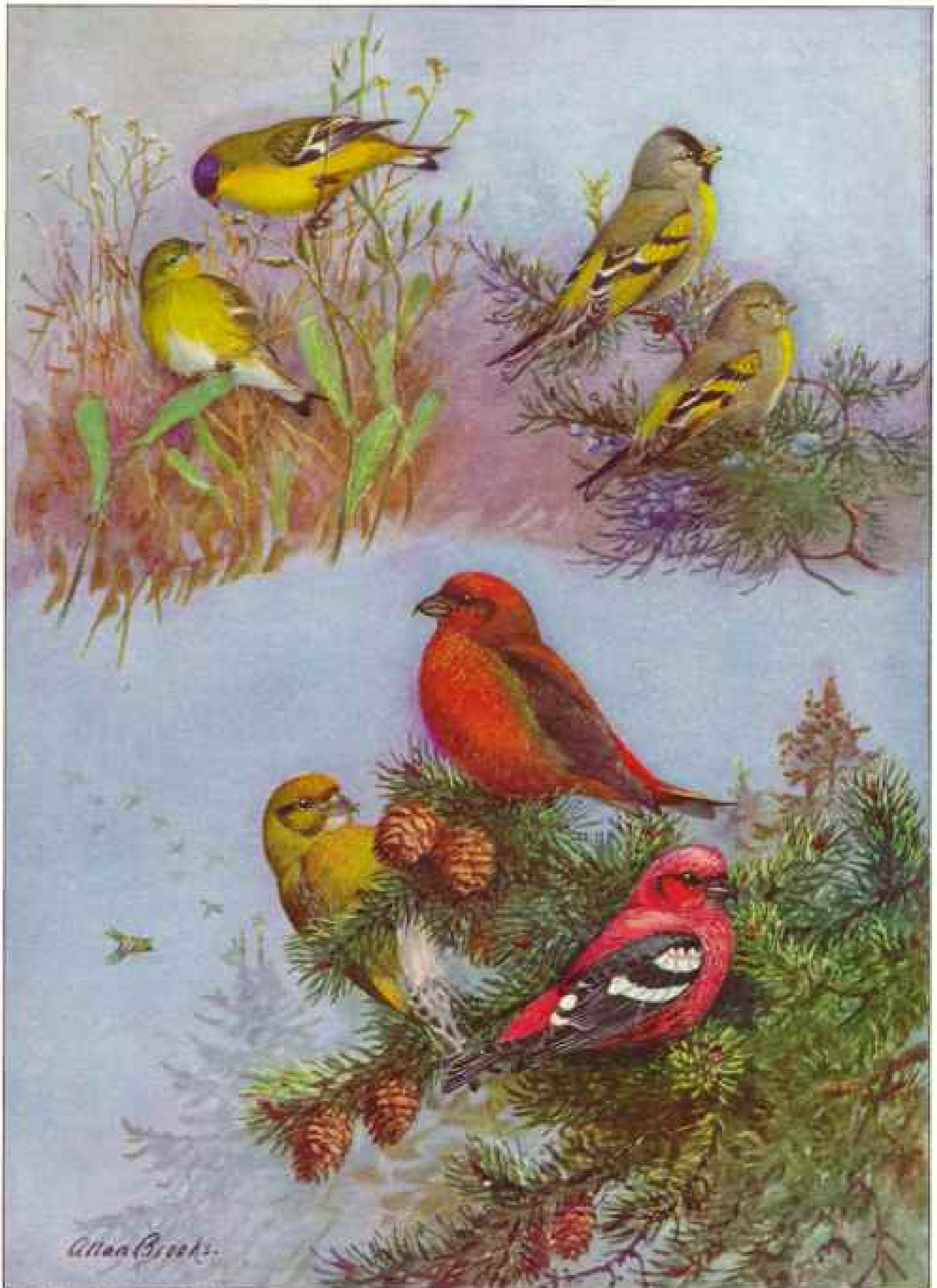
#### Goldfinch

(*Spinus tristis*)

From my study window as I write these lines, I look out upon a hemlock tree full of little hanging cones. Busily working on these cones is a flock of a dozen small birds and the snow beneath is covered with the scales they have removed to get at the seeds.

I have just looked the flock over with my binoculars in the hope of finding some siskins or redpolls, but I find they are all goldfinches. How different they are from the brilliant yellow and black birds that frequented my garden during the summer and went bounding over the maples during July and August (Plate VII).

Of course, they look much like the summer females, only they are browner, and one can scarcely distinguish the sexes, except that the males have somewhat blacker wings, with more prominent white markings. None of the birds is streaked, however, a fact which eliminates entirely the possibility of identifying them as siskins or redpolls, which feed in similar flocks.



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NATURE TWISTED THE CROSSBILL'S BEAK FOR A SPECIAL PURPOSE

The bill, with its curiously crossed tips, looks malformed, but actually it makes a perfect tool for opening the cones of evergreen trees and exposing the seeds on which these northern and eastern wood wanderers (lower trio) largely feed. The white-winged crossbill at the bottom is less prevalent than the pair of red crossbills with him. Green-backed goldfinches (upper left pair) are common in weed-grown fields of California and east to Colorado. The Lawrence's goldfinches (upper right pair) inhabit the Southwest from New Mexico to California.



Goldfinches are found in summer throughout most of the United States, except the Gulf States, and southern Canada. In the Rocky Mountain region there is a variety called the pale goldfinch, and, on the Pacific coast, another, the willow goldfinch. They are all essentially alike, however, and are more or less resident throughout their ranges, though they do a great deal of roaming. In winter some move southward to the Gulf or into Mexico.

During winter they travel in flocks, often of considerable size, being equally at home in the hemlocks and birches of the woodlands and the weeds of the wind-blown fields. At this season they are as different in habits as in coloration, for they seem restless and timid and seldom permit close approach. During summer, they are confident little creatures, feeding on thistles and dandelions by the roadside, or on sunflowers, cosmos, and bachelor-buttons in our gardens. For some reason they are also fond of beet leaves, biting little pieces from the margins.

There are relatively few goldfinches in the Northern States in winter, but during April they move northward in large flocks, the males now wearing spotted yellow and gray plumage. In early May the seeds of the elms attract them and our shade trees resound with the twittering from hundreds of throats. Nesting, however, is postponed until July and August, when abundant fresh seeds are assured for the young, for, unlike most seed-eating birds which feed their young on insects, the goldfinches feed theirs from the beginning upon seeds, particularly those of the thistle.

Goldfinches never seem as pugnacious toward others of their kind as are many other birds when nesting. Perhaps their type of food is so abundant that there is little competition for territories. They travel around in pairs for some time before nesting starts, but about the first of July the male alone joyously cuts great circles over some tree where soon the nest will be built. At times, he hovers overhead on rather slowly beating wings, giving vent to his feelings in a canarylike song, but generally he keeps time with his undulating flight by a happy *per-chic-o-ree* call.

The nest, built largely of thistledown and vegetable fibers, is placed high in a bush or the outer branches of trees, especially maples, from ten to thirty feet from the ground. Occasionally, however, nests are

found on thistles or cornstalks. The four to six eggs are bluish white and normally are unspotted (see illustration, page 509).

The female alone incubates and is fed on the nest by the male. He regurgitates the seeds which he has cracked and swallowed while she flutters her wings like a young bird.

### Pine Siskin

(*Spinus pinus*)

Here again we share a bird with the Old World, for, although ornithologists put the European siskin, or tarin, in a separate species, the two birds look almost exactly alike. Indeed, many believe that the siskins represent the ancestral stock from which the redpolls, goldfinches, crossbills, and even the buntings have been derived. Certainly their heavy streaking suggests the plumage of most young sparrows, irrespective of their adult plumage (Plate VII).

Our siskins are found during summer throughout the southern half of the coniferous forests, in the mountains to North Carolina in the East and to southern California in the West. During winter they roam erratically over most of the United States and northern Mexico.

Passing through the northern United States, often in large numbers, during April, they are sometimes overtaken by the mating urge before they reach their normal breeding grounds; so they settle down and rear families considerably south of where they are usually expected. Such an invasion of siskins occurred on the Cornell University campus in 1925, where they never nested before or since.

In behavior siskins are much like winter goldfinches, and the little patches of yellow in the wings and base of the tail might be confusing were it not for the almost black streaks that enliven their plumage both above and below. They are usually much more friendly than the goldfinches and will permit approach within a few feet.

At feeding stations they often respond to kindness by perching all over their host. A remarkable case of this response is described in *Bird Lore* by E. R. Davis. A large flock of siskins which fed at his window learned to come in and awaken him by pulling his hair or tweaking his ear, and reposed the utmost confidence in him. They likewise showed in their responses an intelligence not ordinarily attributed to birds.



Photograph by A. A. Allen.

**A WHITE-WINGED CROSSBILL MUST EAT SUET WITH HIS TONGUE**

His curious beak with its twisted tips was designed for opening ever-green cones (see text, page 531, and Color Plate VIII). With such unfamiliar food as this, the best he could do was to clamp his open bill into it and lap tiny crumbs.

The nest is usually placed near the end of a branch of a hemlock or other coniferous tree ten to fifty feet from the ground. It is made of rootlets and lined with hair, feathers, or plant down. The eggs are pale greenish blue speckled with brown. The female builds the nest and incubates the eggs, and the male feeds her on the nest by regurgitation.

The siskin's song is a rather weak warble interrupted by hissing notes suggestive somewhat of a leaky valve on a radiator. The call notes, which are given when the birds take wing, have the same beady or grinding quality.

**The Redpolls**

(*Acanthis linaria* and *Acanthis hornemanni*)

So similar are all the redpolls in habits and appearance that they may well be discussed together. Two species with five varieties for North America have been described. Both are found in the Old World as well as the New, pass the summer in the Arctic northward from timber line, and wander southward to the northern United States and northern Europe in winter.

It is difficult to distinguish the two species in the field and they are often associated in the same erratic flock during the winter (Plate VII).

Usually the hoary redpoll (*Acanthis hornemanni exilipes*) appears much whiter and less heavily streaked than the common redpoll (*Acanthis linaria linaria*) and its white lower back is without streaks, but females of the hoary species often seem as dark as the males of the common redpoll.

In the summer of 1934 we found both species nesting almost side by side and in about equal abundance at timber line on Hudson Bay. Some of the nests were in spruces and some in willows from two to ten feet from the ground. While none of the hoary redpolls' nests were in willows, I do not believe they are always restricted to spruces. They are reported as even nesting on the ground.

The nests were made of spruce twigs and plant fibers and always lined with ptarmigan feathers. About their homes the birds were rather tame, just as they often are in winter when found feeding on birch or alder catkins or on pigweed along road-

sides. The eggs were bluish or greenish white specked with brown.

As with goldfinches and siskins, the females, closely attended by the males, build the nests and incubate the eggs. Similarly, the males feed the incubating females, as they later feed the young by regurgitation.

In Europe redpolls are often kept as cage birds and, while they become very affectionate and have sweet little goldfinchlike songs, they lose their red color after the first molt and never regain it.

### Gray-Crowned Rosy Finch

(*Leucosticte tephrocotis tephrocotis*)

Rosy finches are birds of the mountain tops and glaciers, making their summer home above timber line and coming down to lower levels in winter only when forced to do so by lack of food. Six varieties, belonging to four species, have been described from North America, and at least one from northeastern Asia, but their plumage and affinities seem somewhat variable.

The best known is the gray-crowned rosy finch, which appears in summer on mountain tops from Alaska to northwestern Montana and in winter descends to the lower levels as far south as Utah and Colorado (Plate VII).

They are friendly little birds and entirely terrestrial, picking up benumbed insects at the edge of snow in summer and weed seed during winter. Few people see them in their summer haunts and until recent years their eggs were almost unknown, since it was nearly impossible to get to their nesting grounds in May. The nest is described as a cup of grasses or moss in a niche in a cliff or under a boulder of a rock slide. The four or five eggs are pure white.

### The Crossbills

Here is a case of extreme specialization which has apparently been successful. One unfamiliar with the habits of crossbills and noting the curiously crossed mandibles for the first time is likely to think them a malformation and feel sorry for the bird that must make its living with such a handicap (Plate VIII).

Nor does one's sympathy grow less upon seeing one of these birds trying to eat ordinary food. A white-winged crossbill, for example, came to the hemlock tree near my bird feeding station and, after watching the chickadees, nuthatches, and woodpeckers eating suet, thought he would like

some of it. He had no trouble hanging on to the suet that was fastened to the side of an upright log, but when he tried to use his beak to detach a piece, he found that the peculiar crossed tips of his bill obstructed his purpose (see illustration, opposite page).

I sat in a blind about three feet from the bird, and could see exactly what he was doing. Finally, he clamped his wide-open bill into the suet and I could see his hard, pointed, scooplake tongue scraping little crumbs of suet into his mouth.

It was a rather clumsy performance at best and I felt sorry for him. I cut off a twig of hemlock with several cones and fastened it over the suet. This was quite a different story. I was interested to see how he could get at the seeds, because the scales of the cones were tightly shut. With one snip of his bill he cut off one of the cones, turned it upside down between his feet and, opening his bill until the tips just met, he slipped this instrument under the edge of one of the scales. As he opened his bill still further, I could see there was sufficient lateral motion to pry up the scale, whereupon his little tongue scooped out the two seeds underneath as neatly as could be desired. On the heavier cones of pine and spruce the crossbills hang upside down and perform the same feat without snipping them off.

Here, then, was the secret of their great success in populating the coniferous world with crossbills. They had been able to take advantage of an almost continuous food supply closed to most other birds. We find today that crossbills, in spite of what seems a deformity, have been able so to increase that they are found practically all over the Northern Hemisphere wherever there are coniferous trees. In the red crossbill (*Loxia curvirostra pusilla*), minor variations in size of bill, length of wing, or intensity of red have naturally developed, so that in North America alone we recognize five varieties; the common crossbill of Europe is a somewhat larger race than ours in North America.

Ordinarily, plenty of cones are available in the northern forests every year and throughout the year. During such times the crossbills do not migrate at all and may even start nesting in January. But once in a while, for some unknown reason, the spruces stop fruiting and the crossbills are robbed of their main support. Then they move southward into the northern United



Photograph by George Shiras, 3d

THESE HANDSOME VISITORS DROPPED IN FROM THE FAR NORTHWEST

Perhaps once in a lifetime an Atlantic coast bird lover may see such a flock of evening grosbeaks (see text, page 523). Here the birds feed in a mountain-ash tree at the summer camp, near Whitefish Lake, Michigan, of George Shiras, 3d, author of many articles in *THE GEOGRAPHIC* on the Wild Life of North America.

States in large numbers and feed upon whatever they can find.

They seem to have little fear of man and sometimes permit one to walk among them.

In these flocks the olive plumage of the female usually predominates, for the young wear this garb for two years and then the males change rather gradually. On their erratic wanderings the crossbills may associate with other finches and grosbeaks. The nests of the crossbills are in coniferous trees, fifteen to thirty feet from the ground.

The white-winged crossbill (*Loxia leucoptera*) is confined to the evergreen forests of Alaska and Canada and western Europe. A few birds are also sometimes found in summer in the higher Adirondacks of New York, the White Mountains of New Hampshire, and the spruce forests of Maine. With its pinkish-red color and conspicuous wing bars, it is quite easily distinguished from its brick-red cousin, but its habits are apparently the same.

The songs of both birds are similar to those of the goldfinch and the familiar canary.

### Green-Backed Goldfinch

(*Spinus psaltria hesperophilus*)

Californians have three goldfinches, or "wild canaries," to our one in the East. The western representative of our common goldfinch is called the willow goldfinch. It is similar to the eastern, but has shorter wings and tail. The other two are the green-backed and the Lawrence's (Plate VIII).

The habits of the two are not very different from those of our eastern bird, though their call notes are quite distinct. The green-backed is the commoner, frequenting weedy borders of fields. Pairs keep together much, even during winter.

Lawrence's goldfinch (*Spinus lawrencei*) is found in the hotter, drier portions of southern California, wandering in winter as far east as Arizona.

The song of this goldfinch is lower in pitch and somewhat rougher than the songs of the other species, and it has among its call notes a harsh *kee-yerr* that is quite different from any of the notes of the others. The black face and yellow and black wing bars are distinctive of the male throughout the year.



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## ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

TO carry out the purposes for which it was founded forty-seven years ago the National Geographic Society publishes this Magazine monthly. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

**ARTICLES** and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by addressed return envelope and postage.

**IMMEDIATELY** after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

**AT** an expense of over \$50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization wanting when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole, and contributed \$55,000 to Admiral Byrd's Antarctic Expedition.

**NOT** long ago The Society granted \$25,000, 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 of California were thereby saved for the American people.

THE Society's notable expeditions to New Mexico 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 researchers have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

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FROM BYRD HEADQUARTERS



© Byrd Expedition

Admiral Byrd—and Little America, showing the Admiral's hut and radio towers

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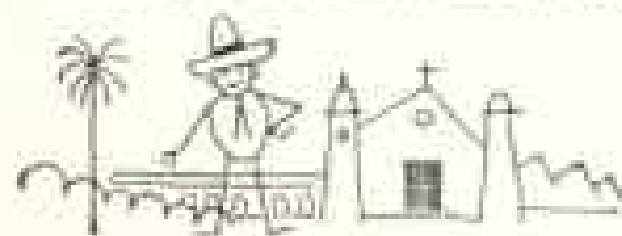
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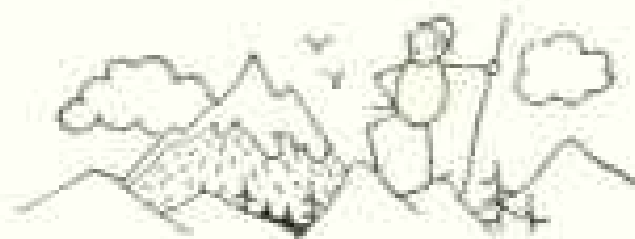
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It tells how a 2-week vacation (16 days counting the week-ends) will give you 11 or more days actually in Southern California, at a total expense no greater than for an ordinary close-to-home outing.



It pictures Southern California's exhilarating Pacific beaches, romantic pleasure-isles, gem-like lakes in snow-capped mountains, rainless days and cool nights, ancient Spanish Missions and nearby Old Mexico, Hollywood's gay night life, sports of every kind, orange groves, luxuriant gardens and the charm of cities like Pasadena, Long Beach, Beverly Hills, Santa Monica,



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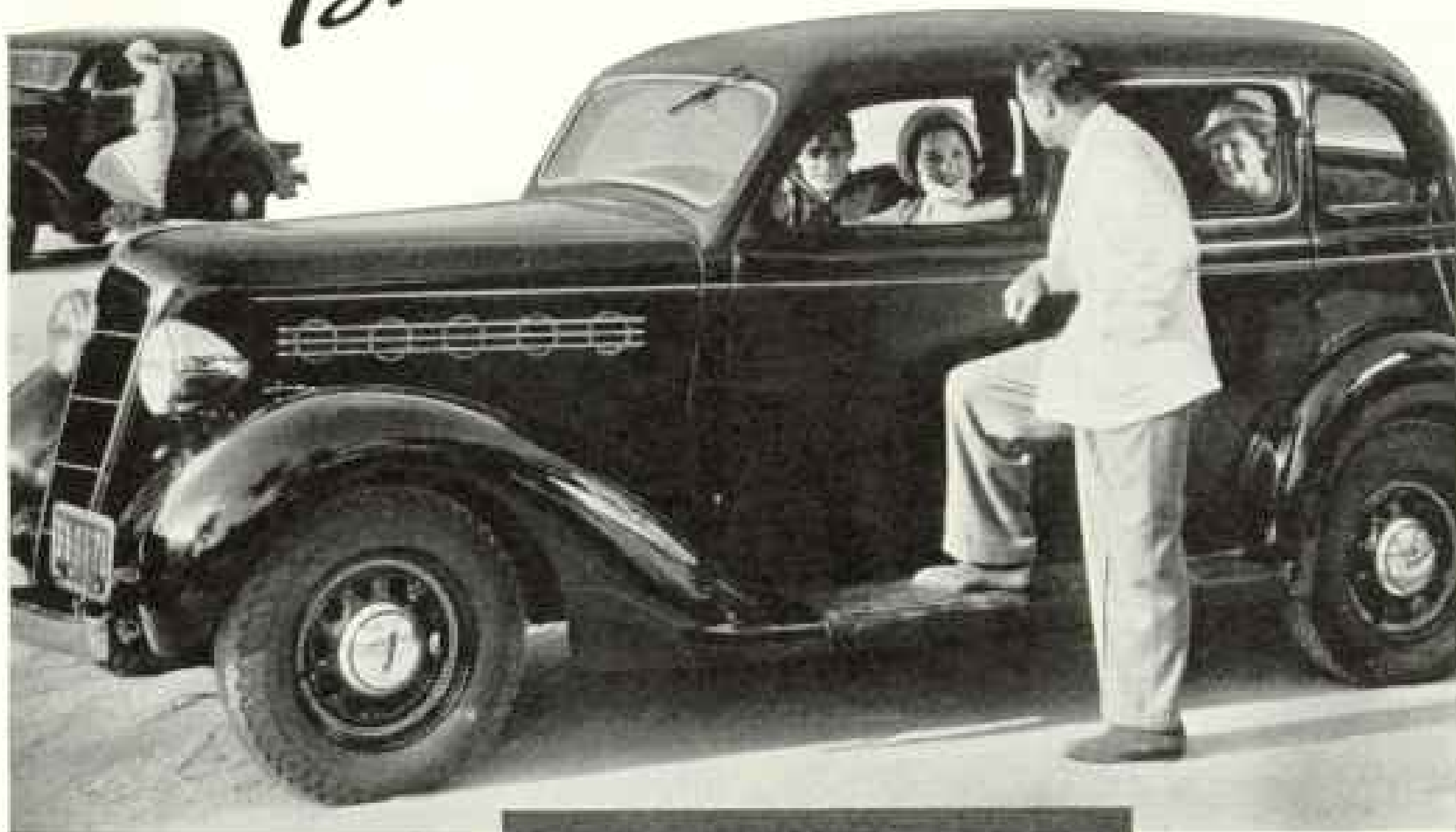
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NOTICE THE LENGTH of it . . . the sheer beauty of the body . . . the whole streamlined sweep of the car. All over America they're saying this 1935 Plymouth is the most beautiful of "All Three" leading low-priced cars. And isn't it big!

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As you look at "All Three," remember: Plymouth bodies are

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BEAUTY IS THE  
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LASTING SAFETY in this all-steel body

all-steel . . . and Plymouth is *still* the lowest-priced car with genuine Hydraulic Brakes. So, Plymouth is not only the smartest low-priced car . . . it is also the safest.

Ask any Dodge, De Soto or Chrysler dealer to let you drive this thrilling new Plymouth. The Official Chrysler Motors Commercial Credit Plan makes purchasing easy and satisfactory.

**PLYMOUTH** NOW ONLY **\$510**

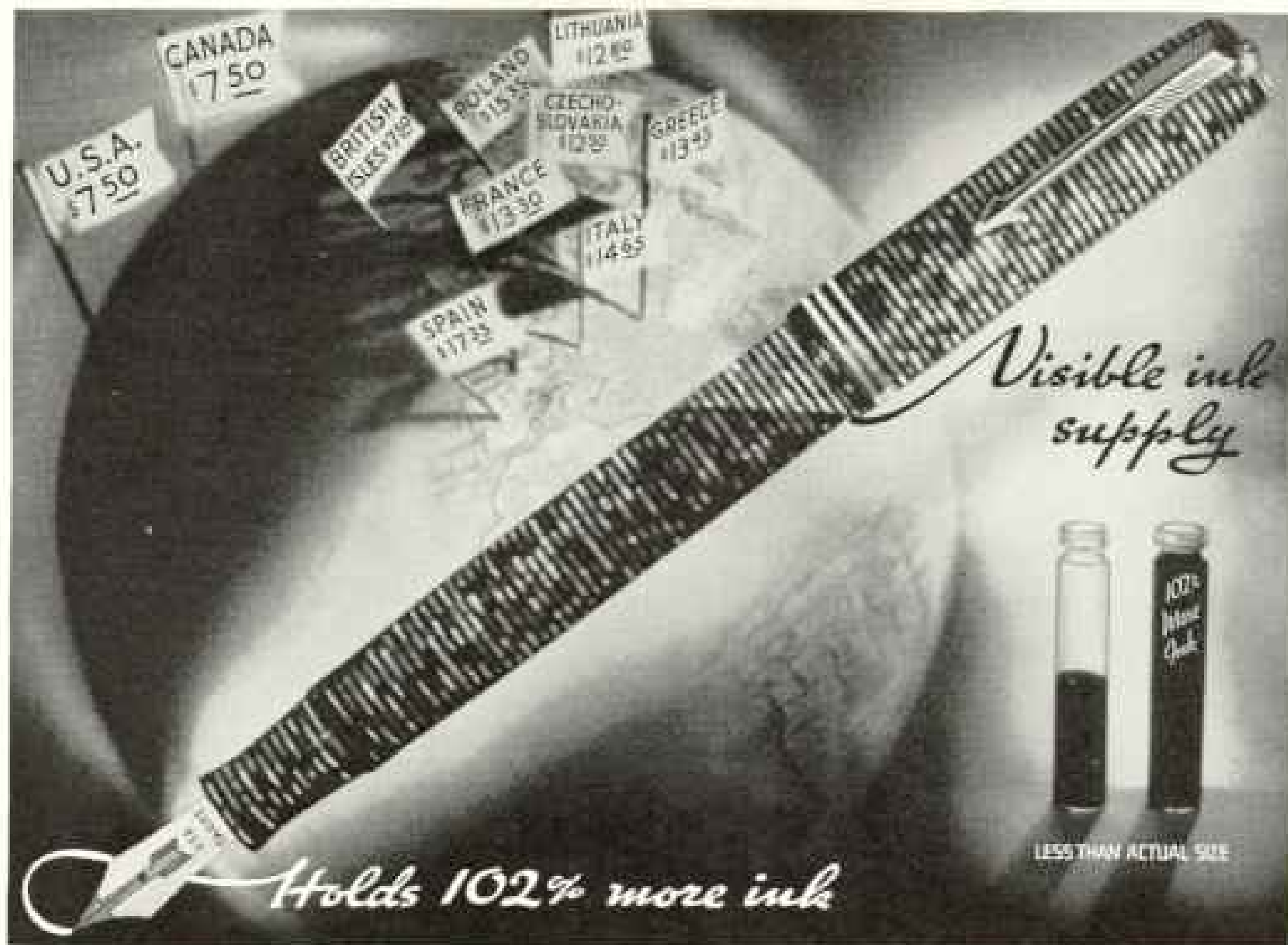
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*than we ask America*

# FOR THIS REVOLUTIONARY PEN



*Visible ink supply*

*Holds 102% more ink*

**Because It Holds 102% More Ink —**  
*shows when to refill—*  
*and its laminated Pearl*  
*beauty enthralls the world!*

Hear what Continentals are exclaiming of the Parker Vacumatic at American prices:—in Paris, "c'est à bon marché!"—in Rome, "È a buon prezzo!"—in Madrid, "es una ganga!"

For, due to import duties and variations in money, Continental Europeans are paying\* from \$12.50 to \$17.35 for the same pen offered you at only \$7.50. Still they are buying literally thousands, because this marvelous invention writes 12,000 words without refilling and it never runs dry unless you let it. For

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This is why the wonderful Parker Vacumatic holds 102% more

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**VACUMATIC**

Junior, \$5  
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**7.50**

Pencils, \$2.50  
 and \$3.50




Try Our New Pen-Cleaning Ink—**FREE**

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*No Burning and Scraping with Dutch Boy... it costs less by the year and now the N. H. A. lets you pay for it by the month*

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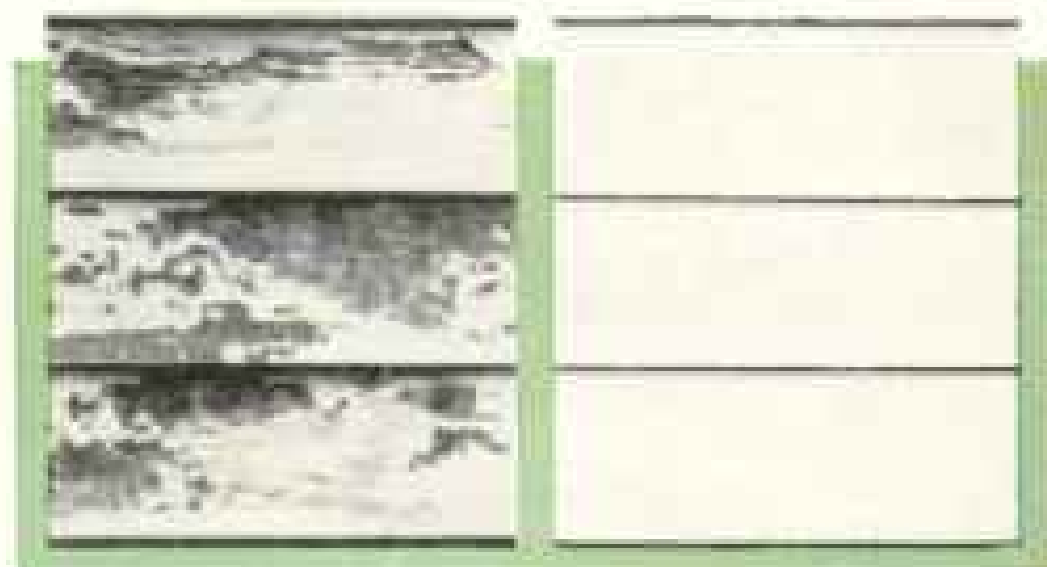
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*After 1 1/2 Years*

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*This paint is still good. Same type house as the "cheap" paint job, and located in same city. Cost, \$102... or \$34 a year. And no new priming coat will be needed at repaint time.*

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**DUTCH BOY WHITE-LEAD**

*Good Paint's Other Name*

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**Y**OUR Dentist's doorway leads to more than just repair of the teeth. It leads to prevention of many bodily ills. How often do you visit his office?

Your health and happiness in large measure depend upon work that only a Dentist can do. Eminent medical authorities assert that more than 85% of bodily ills have their inception in the mouth. Many of these diseases can be prevented by having a Dental Prophylactic Treatment every three months.

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The American Dental Association, through its committee of scientific analysts called the Council on Dental Therapeutics, makes careful laboratory tests of the many preparations offered its members for use at home

and at the chair. Only to those that pass these tests for safety and honesty of advertising do they award the "Seal of Acceptance."

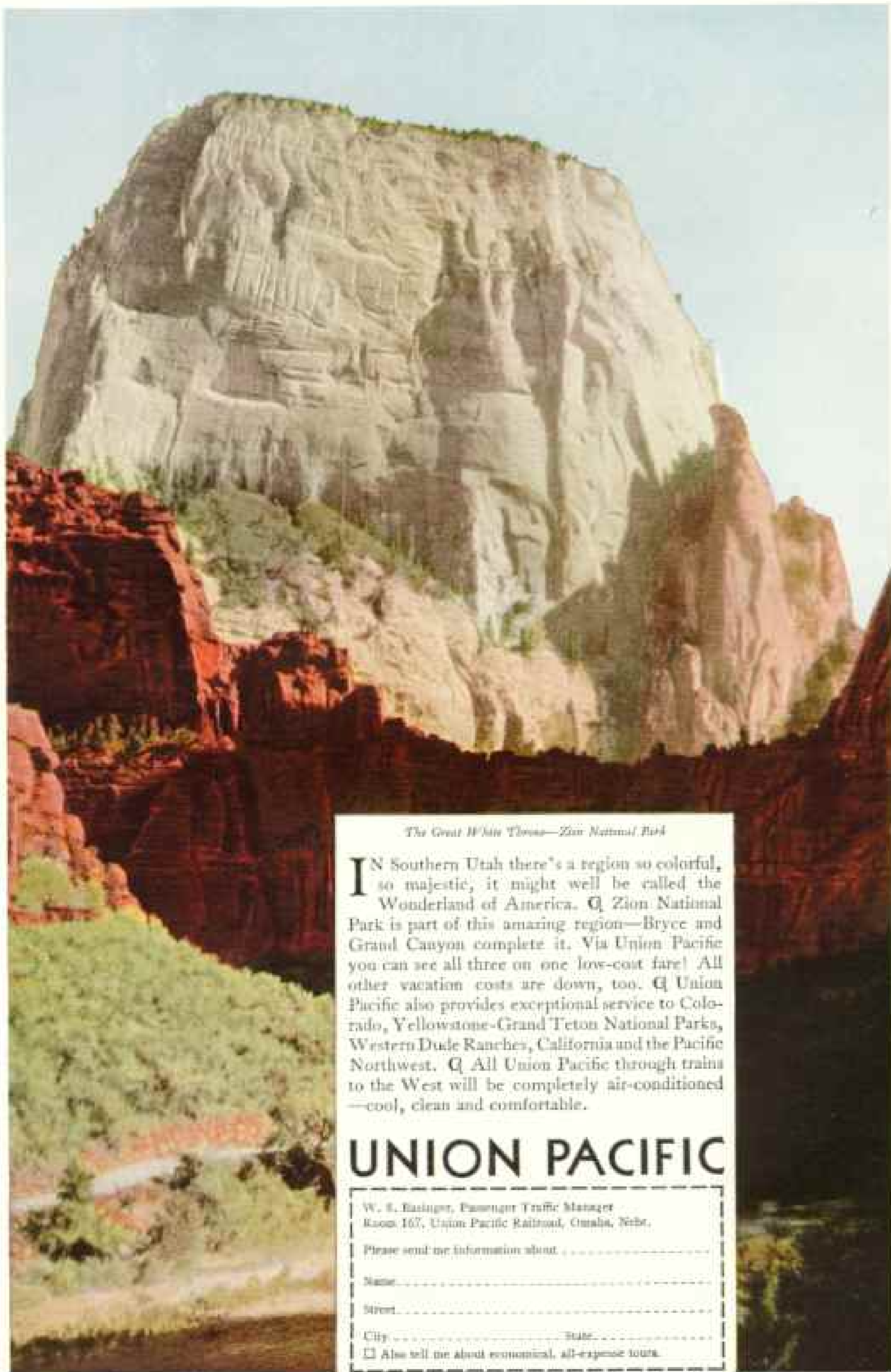
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You will find this seal of confidence on every tube of Iodent Tooth Paste—Iodent Number 1 for teeth easy to Bryten and Number 2 for teeth hard to Bryten.



It is logical that Iodent is chosen by many of these health-wise folks, because it is absolutely safe, unusually effective, and delightfully flavored.

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**I**N Southern Utah there's a region so colorful, so majestic, it might well be called the Wonderland of America. **Q** Zion National Park is part of this amazing region—Bryce and Grand Canyon complete it. **Via Union Pacific** you can see all three on *one low-cost fare!* All other vacation costs are down, too. **Q** Union Pacific also provides exceptional service to Colorado, Yellowstone-Grand Teton National Parks, Western Dude Ranches, California and the Pacific Northwest. **Q** All Union Pacific through trains to the West will be completely air-conditioned—cool, clean and comfortable.

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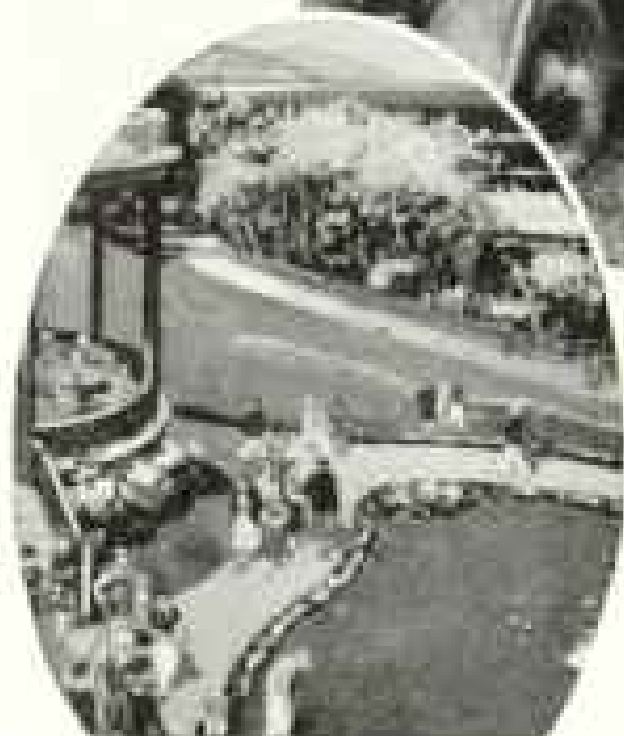
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Holiday land in Canada is as near as the boundary—it is as far as you care to travel. Whether you have only a few hurried days or whether long weeks of luxurious relief from strain lie before you, the vacation land of Canada is yours. And everywhere you go are friendly people who know your ways—helpful tourist bureaus—comfortable places to stop.

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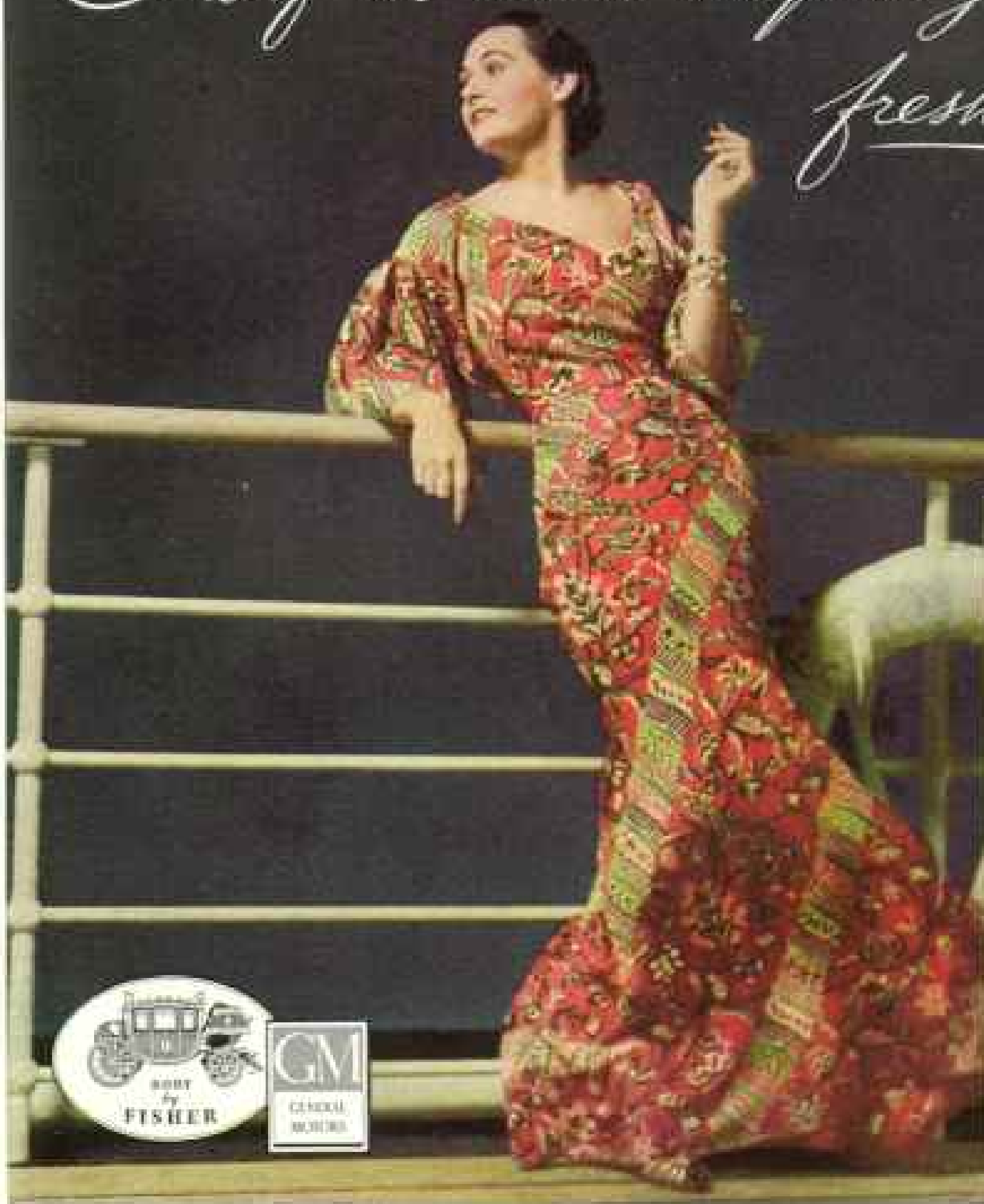
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*No Red Tape at the International Border*

One of the nicest ways to get  
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Over your head  
put the solid  
steel protection  
of the  
**"TURRET TOP"**  
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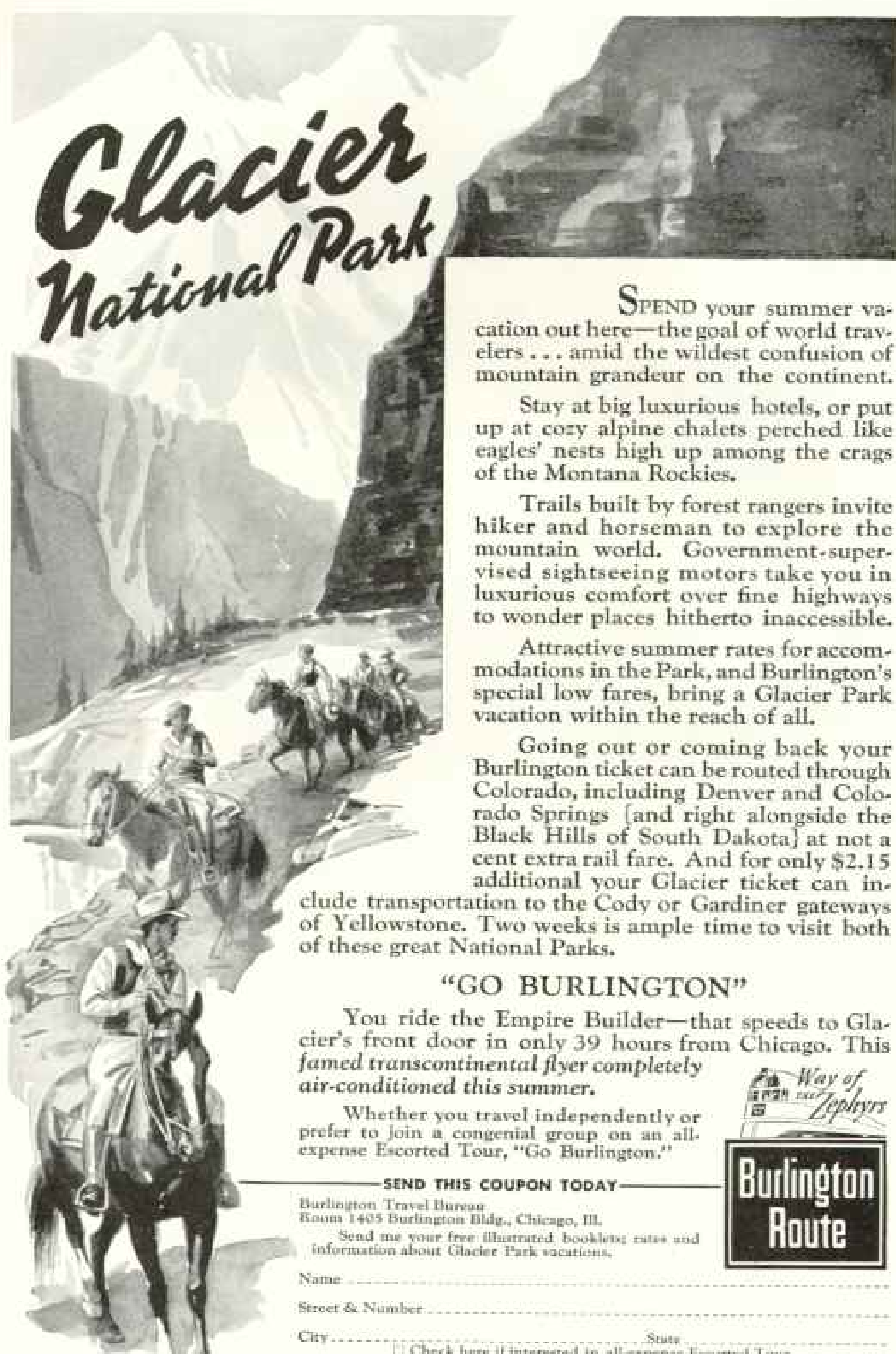


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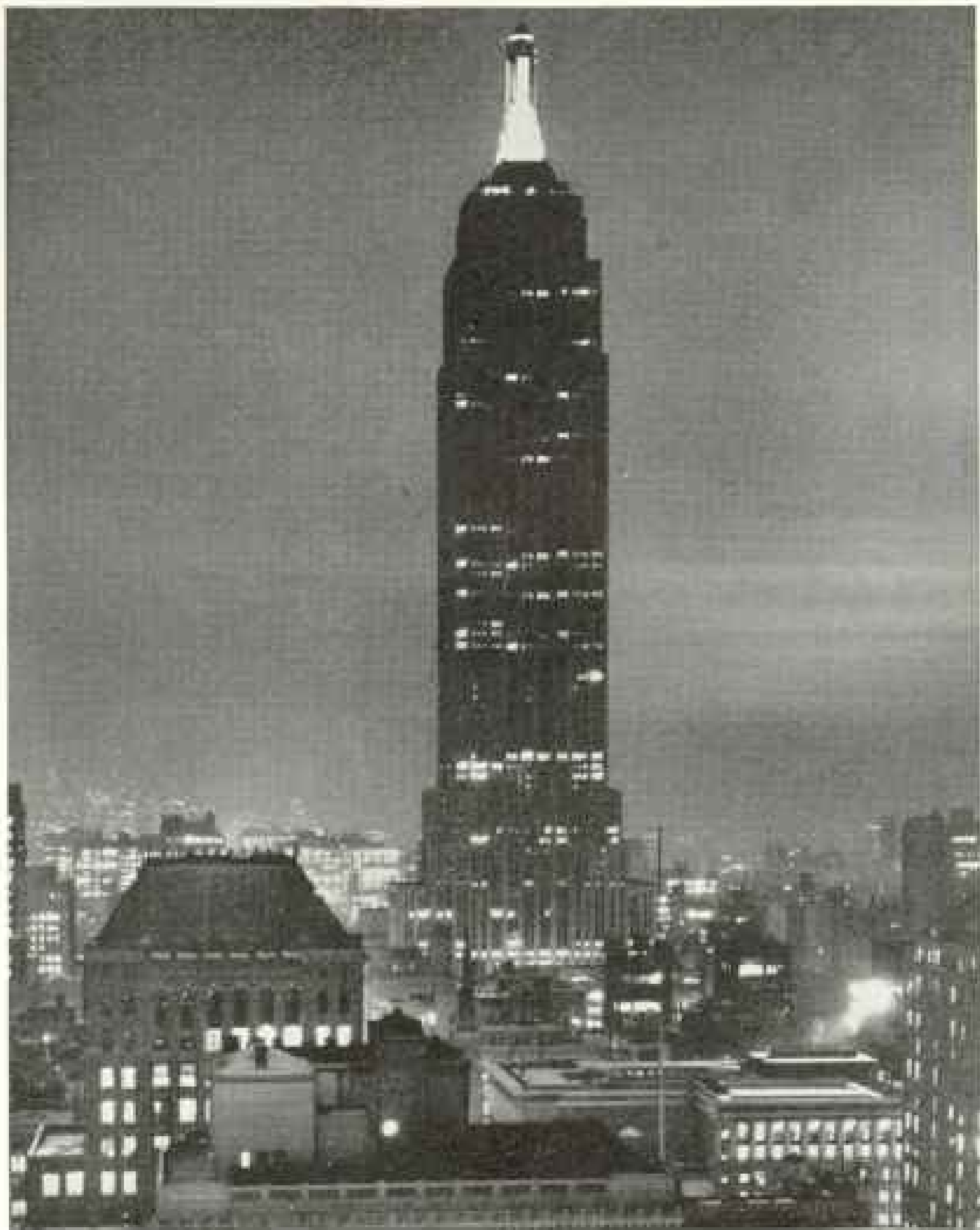
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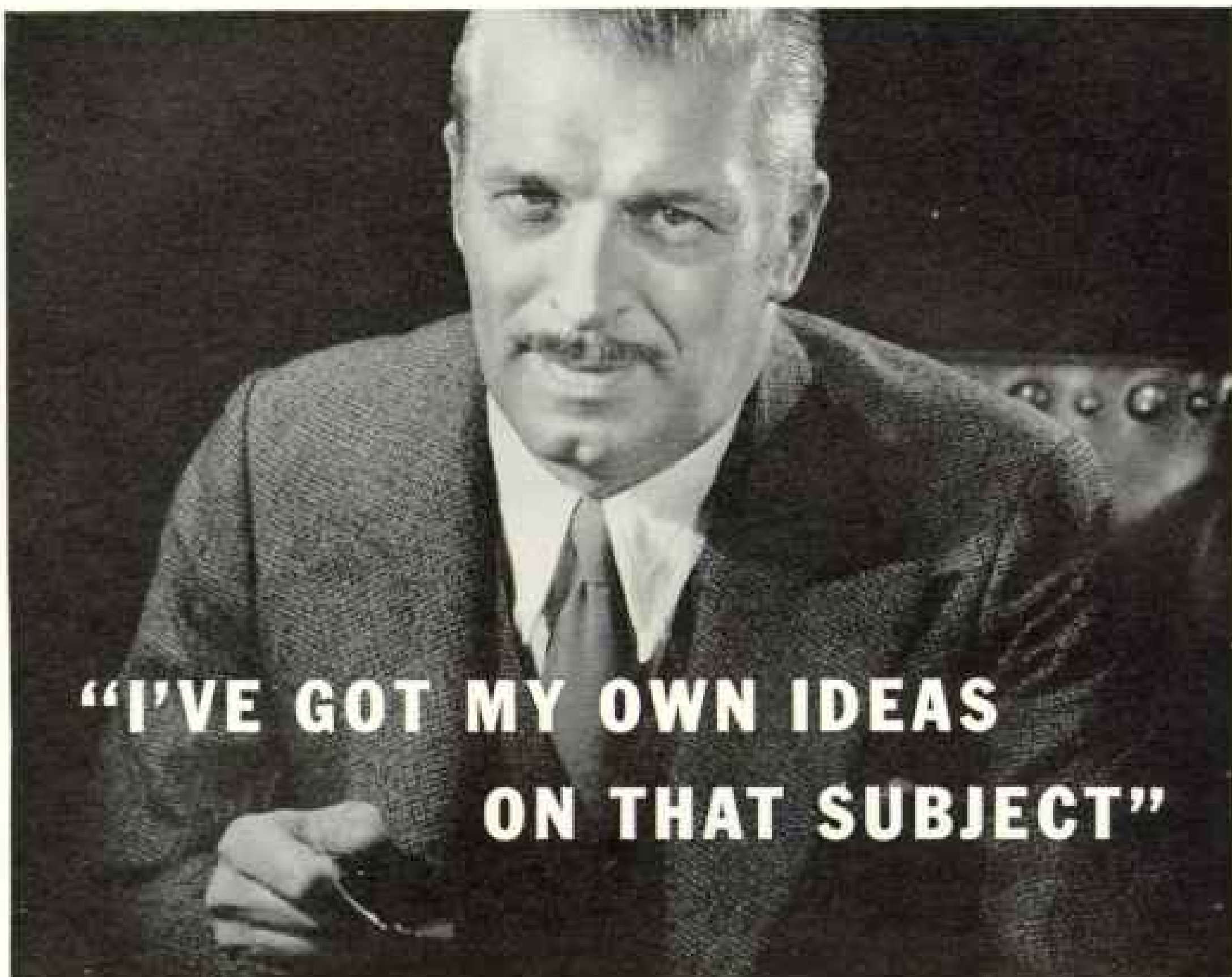
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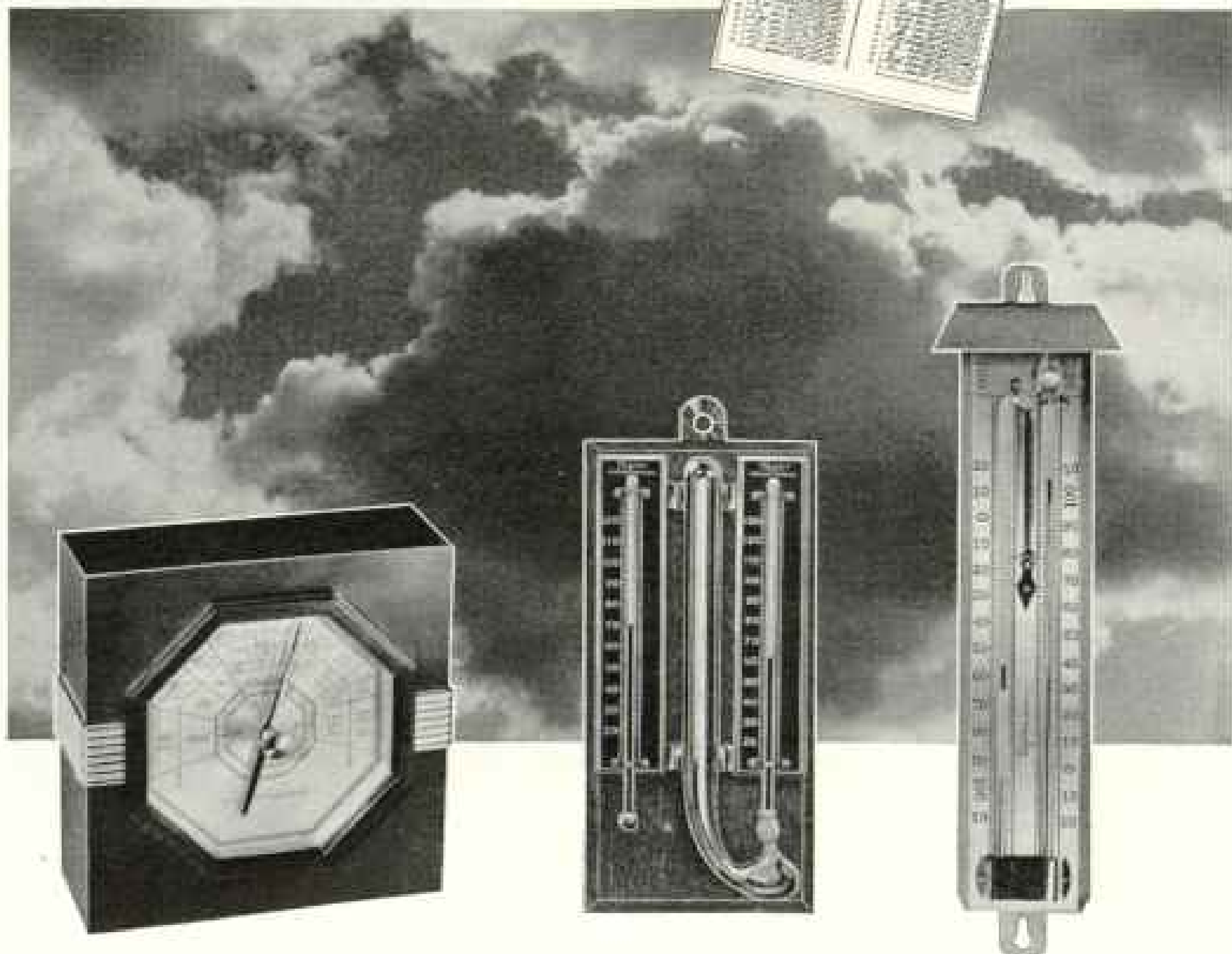


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**CANADA'S  
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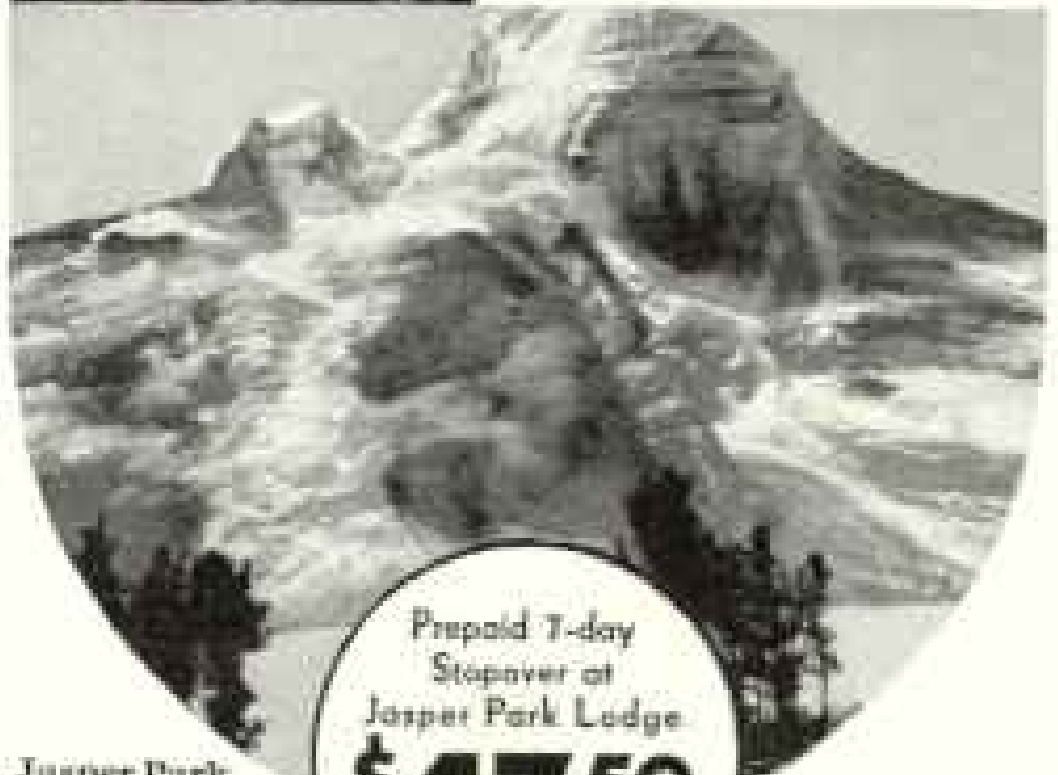
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*Rates slightly higher June 10 to July 8*

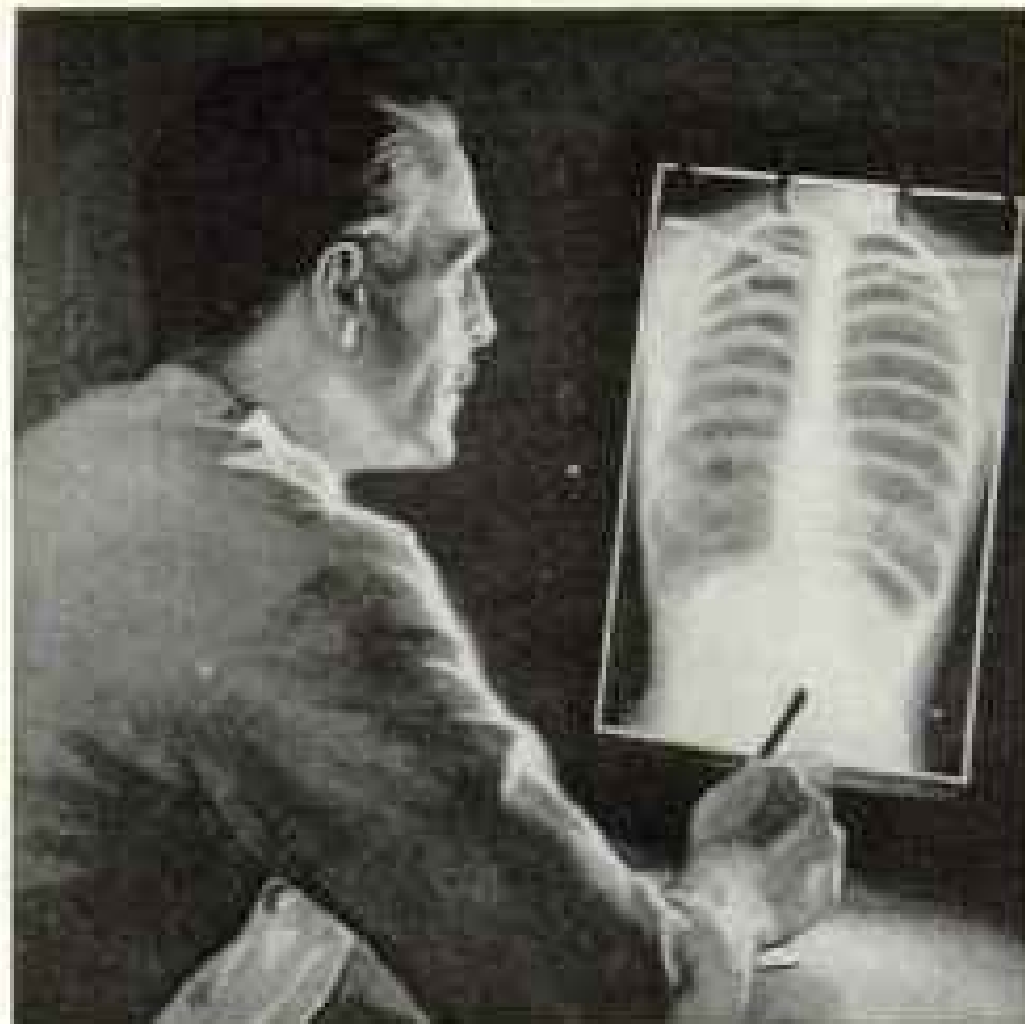


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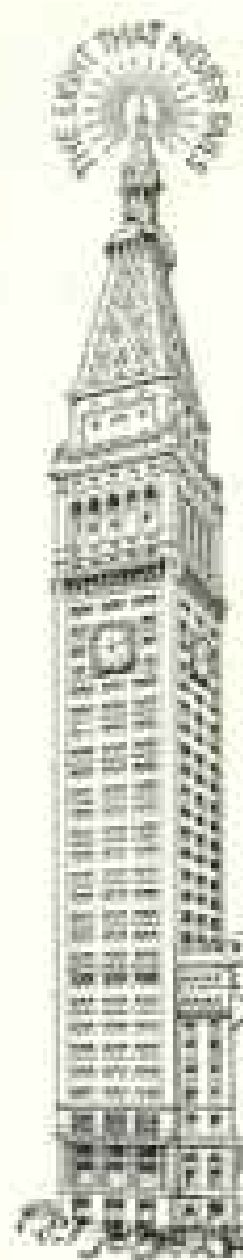
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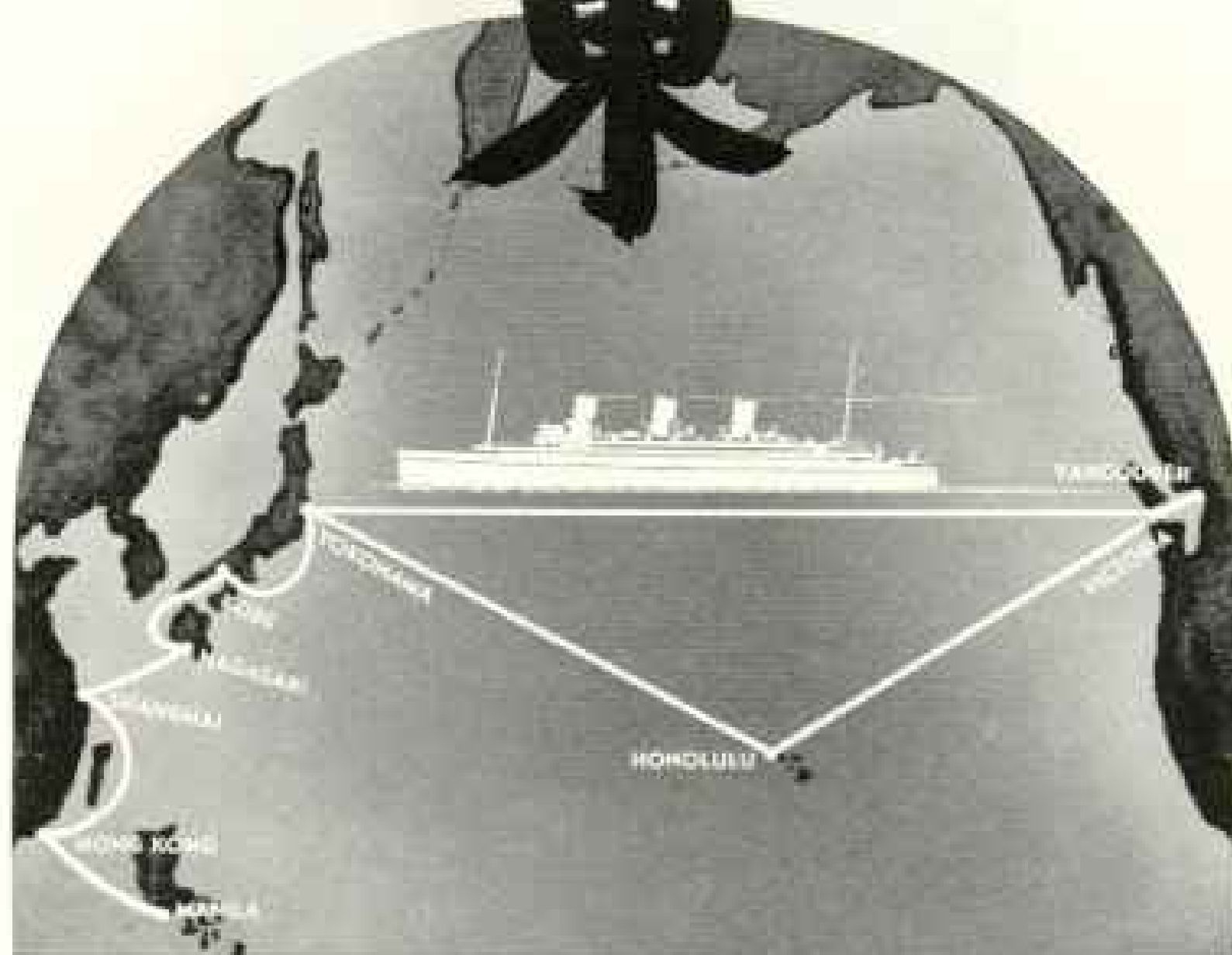


# 速

"Far East"

—in Chinese

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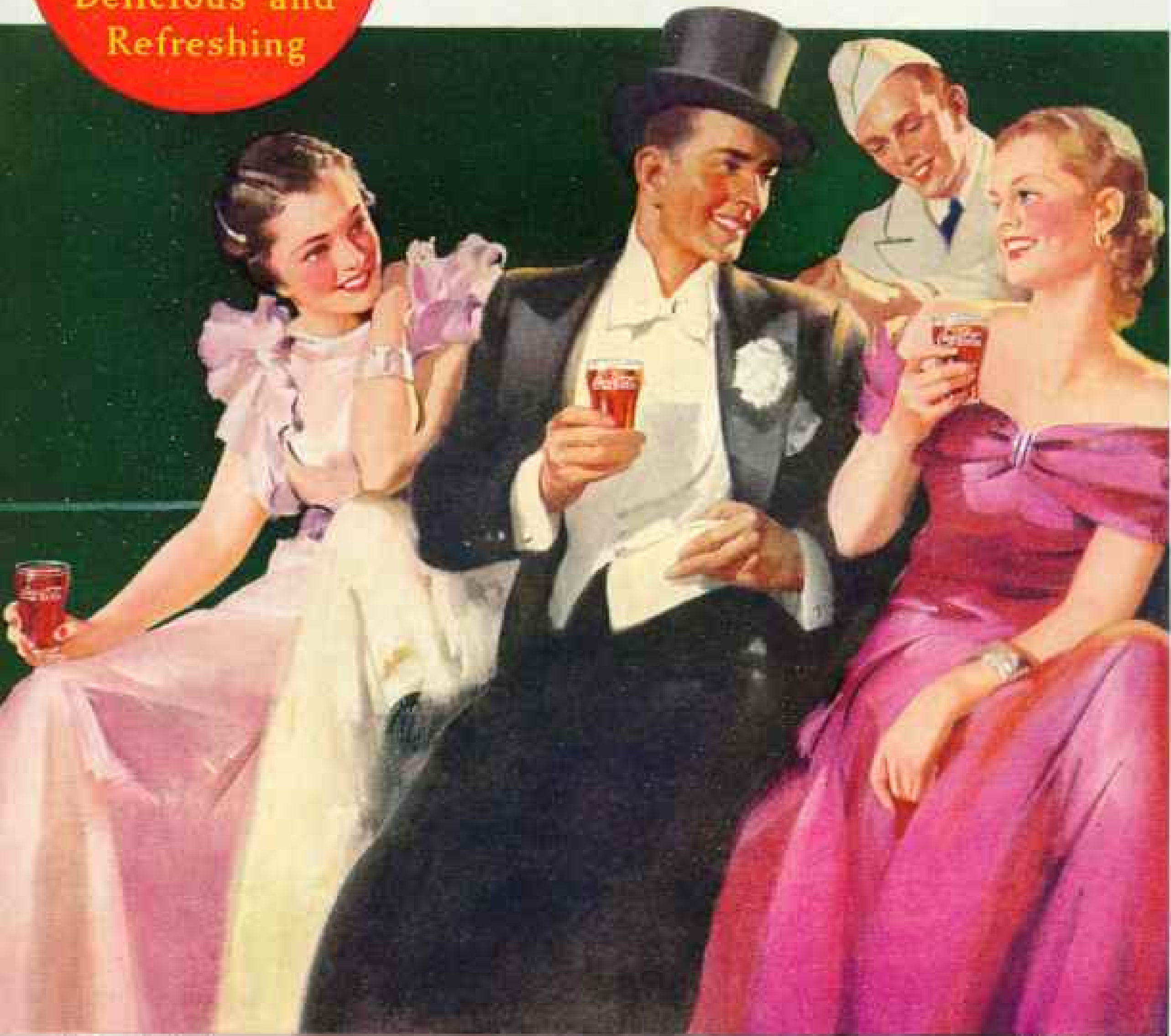
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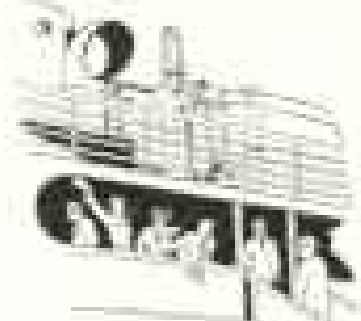


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\* The star denotes a steamship line whose advertising appears in this issue of THE GEOGRAPHIC. † Leave Boston. All others leave New York.

Leave NEW YORK				Leave BOSTON			
DATE	STEAMSHIP LINE	ROUTE (See list below)	SHIP	DATE	STEAMSHIP LINE	ROUTE (See list below)	SHIP
Apr. 10		Red "D"	Caracas	Apr. 28		United Fruit	10 Platani
Apr. 11		United Fruit	7 Quirigua	Apr. 29		United Fruit	8 Tolosa
Apr. 14		New York and Cuba Mail	11 Siboney	Apr. 29		United Fruit	27 Eastern Prince
Apr. 15		New York and Porto Rico	12 Coamo	Apr. 29		Holland America	1 Rotterdam
Apr. 16		Columbian	13 Columbia	Apr. 29		Red "D"	6 Lara
Apr. 18		*Dollar	24 President Taft	Apr. 29		Columbian	15 Pastores
Apr. 21		Furness West Indies	14 Fort St. George	Apr. 29		New York and Cuba Mail	11 Orizaba
Apr. 22		Hamburg-American	3 Bellanca	Apr. 29		Furness West Indies	14 Norona
Apr. 22		Panama Pacific	1 Columbia	Apr. 29		New York and Porto Rico	12 Coamo
Apr. 22		Holland America	2 Rotterdam	Apr. 29		United Fruit	7 Veragua
Apr. 23		Royal Dutch	15 Outlook	Apr. 29		*Dollar	24 President Wilson
Apr. 23		Holland America	1 Rotterdam	Apr. 29		*Grace	18 Santa Rosa
Apr. 23		Holland America	14 Rotterdam	Apr. 29		Munson	20 American Legion
Apr. 23		United Fruit	9 Muza	Apr. 29		New York and Cuba Mail	4 Oriente
Apr. 23		United Fruit	8 Calamates	Apr. 29		Standard Fruit	17 Anapala
Apr. 23		Cunard	2 Carinthia	Apr. 29		United Fruit	9 Muza
Apr. 23		Standard Fruit	17 Anapala	Apr. 29		United Fruit	8 Ulla
Apr. 23		*Grace	18 Santa Paula	Apr. 29		*Canadian National	21 Lady Drake
Apr. 23		*Grace	19 Santa Lucia	Apr. 29		Holland America	1 Rotterdam
Apr. 23		Munson	20 Pan America	May 1		Red "D"	6 Carabobo
Apr. 23		Cunard	1 George	May 2		Columbian	13 Columbia
Apr. 24		*Canadian National	21 Lady Hawkins	May 2		New York and Cuba Mail	11 Siboney
Apr. 24		Swedish American	3 Kungsholm	May 2		New York and Porto Rico	12 Birlingham
Apr. 25		Red "D"	6 Palma	May 2		United Fruit	7 Quirigua
Apr. 25		Southern Pacific	22 Dixie	May 2		*Dollar	24 President Van Buren
Apr. 25		Columbian	13 Haiti	May 2		American Caribbean	27 Ruyssell
Apr. 25		French	3 Lafayette	May 2		*Grace	20 Santa Rita
Apr. 25		New York and Cuba Mail	11 Algonquin	May 2		Munson	20 Munargo
Apr. 25		New York and Porto Rico	12 Birlingham	May 2		*Canadian National	24 Lady Somers
Apr. 25		United Fruit	7 Pien	May 2		Panama Pacific	4 Virginia
Apr. 25		*Dollar	24 President Monroe	May 2		New York and Cuba Mail	4 Oriente
Apr. 25		American Caribbean	25 Scamper	May 2		Standard Fruit	15 Gatun
Apr. 25		*Canadian National	24 Lady Rodney	May 2		United Fruit	14 Platani
Apr. 25		*Grace	18 Santa Ines	May 2		United Fruit	8 Calamates
Apr. 25		Panama Pacific	1 Columbia	May 2		*Furness Prince	27 Northern Prince
Apr. 25		*U. S. Lines	1 Manzanillo	May 2		Southern Pacific	22 Dixie
Apr. 25		Munson	20 Munargo	May 2		Red "D"	6 Caracas
Apr. 25		New York and Cuba Mail	4 Oriente	May 2		*Canadian National	21 Lady Nelson
Apr. 25		Eastern S. S.	1 Acadia	May 2		Columbian	13 Haiti
Apr. 25		Eastern S. S.	1 St. John	May 2		New York and Cuba Mail	11 Algonquin
Apr. 25		Holland America	24 Rotterdam	May 2		New York and Porto Rico	12 Coamo
Apr. 25		Cunard	2 Carinthia	May 2		United Fruit	7 Pien
Apr. 25		Hamburg-American	3 Bellanca	May 2		Furness West Indies	14 Fort St. George
Apr. 25		Panama Pacific	4 California	May 2		*Dollar	24 President Pierce
Apr. 25		Standard Fruit	15 Gatun				

**ROUTES**

1 Bermuda.	Rio de Janeiro, Montserrat, Guadeloupe, Dominica, Martinique, St. Lucia, Barbados, Trinidad, Demerara.	21 Bermuda, St. Kitts, Nevis, Antigua, Montserrat, Dominica, St. Lucia, Barbados, St. Vincent, Grenada, Trinidad, Demerara.
2 Nassau.		22 New Orleans.
3 Bermuda and Nassau.		23 St. Thomas, St. Croix, St. Kitts, Antigua, Guadeloupe, Martinique, St. Lucia, Barbados, Trinidad, Paramaribo, Demerara, Grenada, St. Vincent, Dominica.
4 Havana.	15 Port au Prince, Caracas, Puerto Cabello, La Guaira, Guanta, Puerto Riera, Pampatar, Okrapano, Trinidad, Demerara, Paramaribo.	24 Bermuda, Nassau, Kingston.
5 Nassau, Miami, Havana.	16 St. Thomas, La Guaira, Caracas.	25 Kingston, La Ceiba.
6 San Juan, La Guaira, Puerto Cabello, Caracas.	17 Santiago, Kingston, La Ceiba.	26 Bermuda, Port au Prince, Kingston.
7 Havana, Kingston, Cristobal, Port Limon.	18 Cartagena, Puerto Columbia, Panama Canal, La Libertad, San Juan, Mazatlan, Los Angeles, San Francisco.	27 Rio de Janeiro, Santos, Montevideo, Buenos Aires, Trinidad.
8 Kingston, Cristobal, Cartagena, Puerto Columbia, Santa Marta.	19 Kingston, Panama Canal, Buenaventura, Guaranil, Maravilla, Callao, Valparaiso, Havana.	28 Havana, Panama.
9 Puerto Castilla, Teja, Puerto Barrios, Puerto Cortes.	20 Bermuda, Rio de Janeiro, Santos, Montevideo, Buenos Aires.	29 Panama Canal, Callao, Valparaiso, Guayaquil.
10 Santiago, Puerto Barrios, Puerto Cortes.		
11 Havana, Progress, Vera Cruz, Mexico City.		
12 San Juan and Santo Domingo.		
13 Haiti, Jamaica, Colombia, Panama.		
14 St. Thomas, St. Croix, St. Martin, St.		

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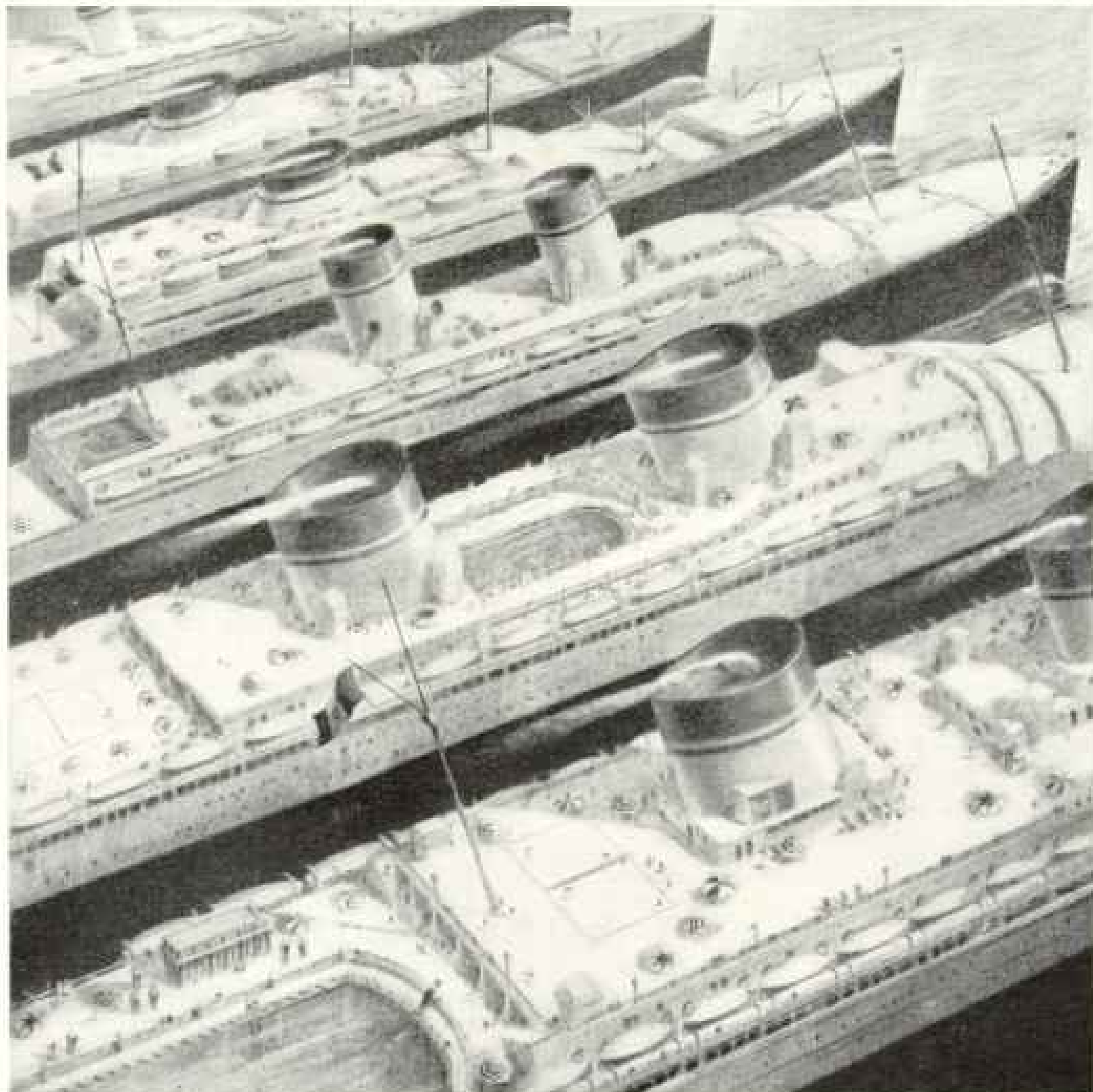
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Panama Pacific Line States Steamship Line *United States Lines	To England, Ireland and Germany. To England, France and Holland. New York and Boston to Amoy, Lisbon, Gibraltar and Mediterranean ports. From San Francisco and Los Angeles to Hawaii, Samoa, Fiji, New Zealand and Australia. From Seattle and Vancouver to Japan and China. From San Francisco and Los Angeles via Hawaii to Japan and China. Via Panama to San Diego, Los Angeles and San Francisco. From Portland, Oregon, to China and the Philippines. To England, Ireland, France, Germany.



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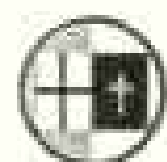


## LIDO DECK ROUTE TO EUROPE

**S**UMMER is still far away along the North Atlantic coast. According to last year's U. S. Weather Bureau reports, there were 4 northwest gales and 15 days of cold rain during April. Snow fell in New York on the 15th . . . and on the 29th, sailing date of the REX, the thermometer registered 34°! This year, as early as February, passengers on the Southern Route, only two days out of New York, were bathing in the great Lido deck pools. Choose the route of the sun for your spring crossing and meet summer in mid-ocean.

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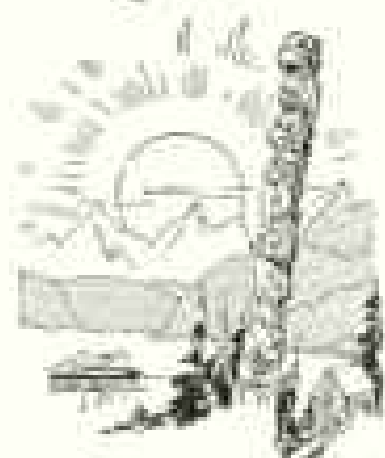


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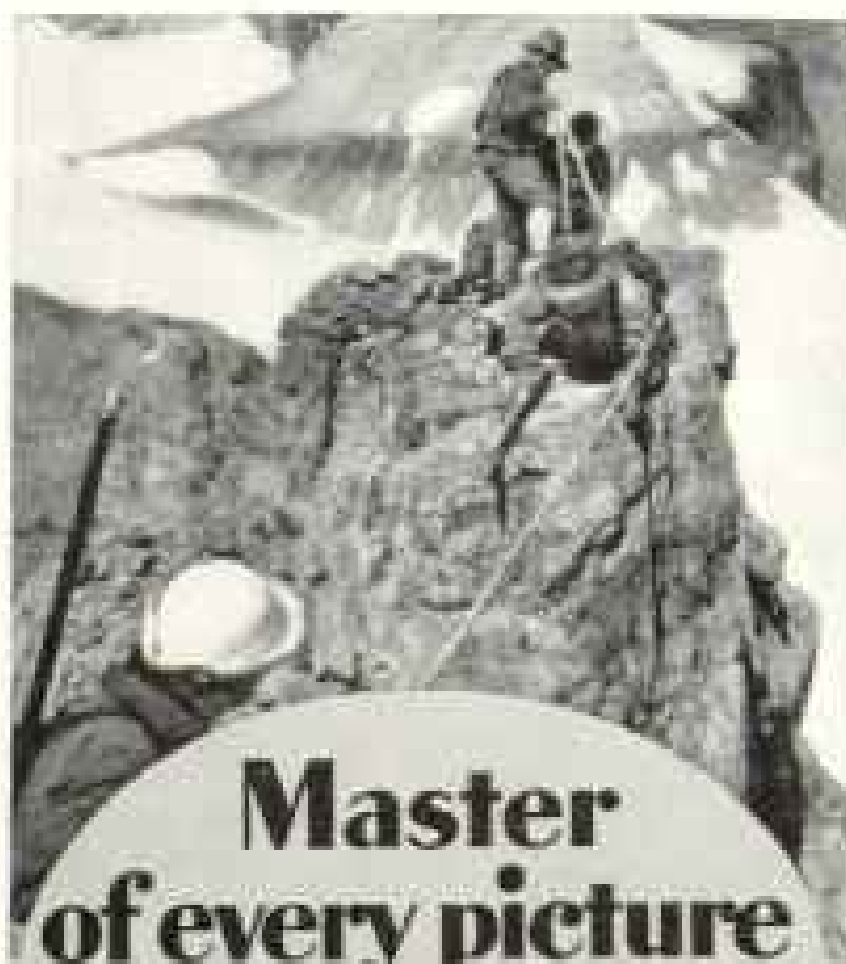
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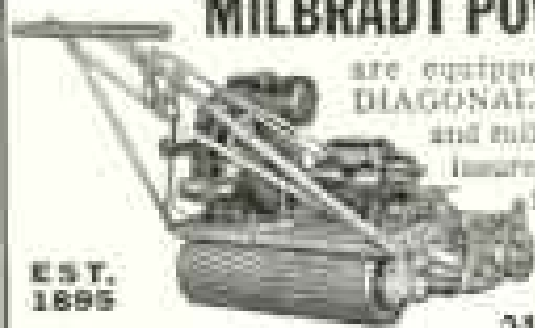
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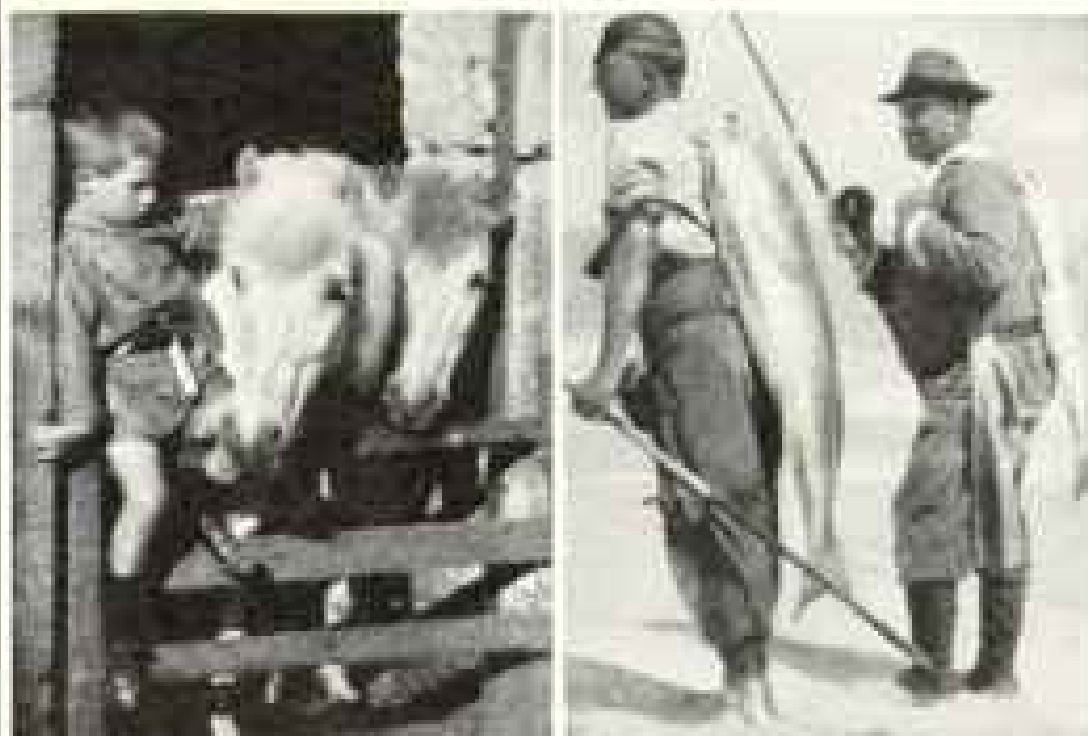
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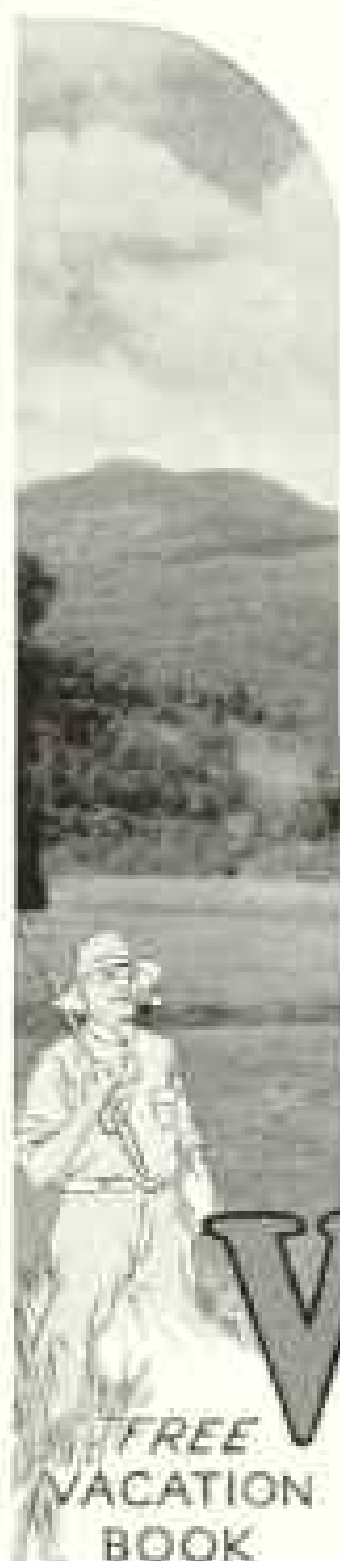
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# Chevrolet

for 1935



*The Master De Luxe Town Sedan*

## **ITS OUTER BEAUTY REFLECTS ITS INNER QUALITY**

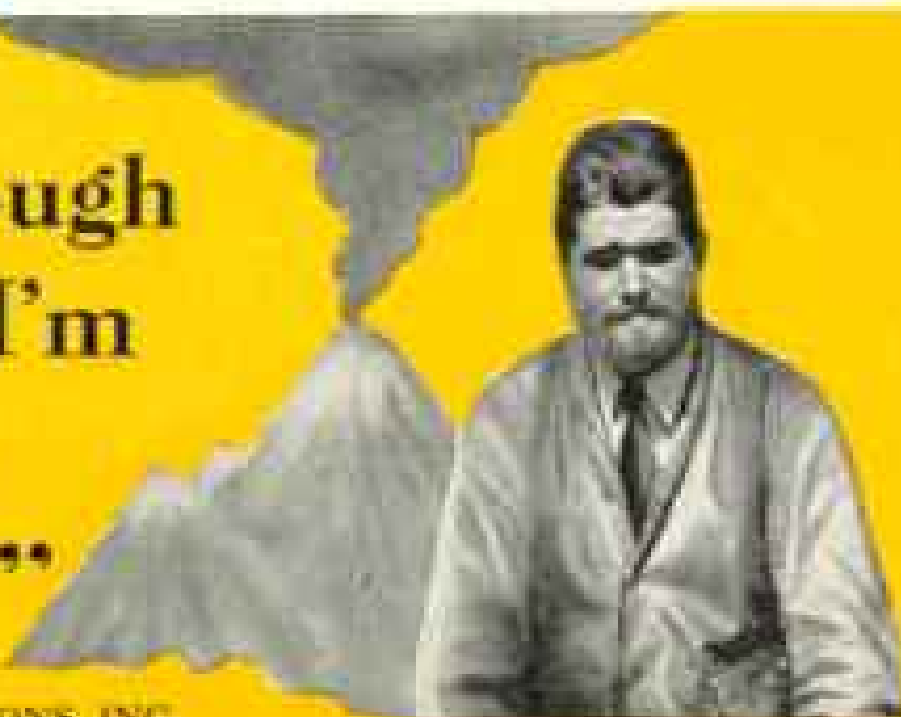
Chevrolet has given as much care to the manufacture of hidden parts as to the fashioning of the bodies for this aristocrat of low-priced cars. Careful selection of materials—precision engineering—and rigid inspections—assure sterling quality all the way through. When you buy a Master De Luxe Chevrolet, you may expect performance that equals its beauty . . . comfort and safety fully as advanced as its streamline styling. The prices are an added inducement to choose Chevrolet for quality at low cost.

**CHEVROLET MOTOR COMPANY, DETROIT, MICHIGAN**

*Compare Chevrolet's low delivered prices and easy G. M. A. C. terms. A General Motors Value*

"I don't mind flying through  
Smoking Craters, but I'm  
afraid of another  
*Blow-out*"

SAYS ROBERT SHIPPEE, PRESIDENT OF AERIAL EXPLORATIONS, INC.



HEAT CAUSES BLOW-OUTS—  
THE LIFE-SAVER GOLDEN PLY  
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THESE BLOW-OUTS



**FREE!** Handsome emblem with  
red crystal reflector to  
protect you if your tail light  
goes out. Go to your Goodrich  
dealer, join Silvertown Safety  
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Or send 10¢ (in cover packing  
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"I'VE had 'close ones' galore,"  
I says ROBERT SHIPPEE, "while  
mapping the 'Valley of Volca-  
noes' and plenty of excitement  
discovering the 'Lost Valley of  
the Colca' by plane. But I'd  
rather take chances in the air  
any day than have another blow-  
out. It was in '29—near Deal,  
New Jersey. Had just passed  
another machine when my left  
front tire blew. I smacked a  
bank and the motor came back  
through the dash—would have  
gotten me sure if I hadn't been  
thrown against the side of my  
car. Now my car is equipped  
with Goodrich Silvertowns."

To give motorists a *safer* tire  
—Goodrich developed the  
Golden Ply. This invention,  
found *only* in the new Goodrich  
Silvertown, resists the heat de-  
veloped *inside* the tire by to-  
day's high speeds. Heat blisters  
are *stopped* before they begin!  
High-speed blow-outs don't  
start. And for even greater safety,  
every Silvertown has a sure-  
footed tread, that gives you maxi-  
mum protection against danger-  
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set of Golden Ply Silvertowns  
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