VOLUME CIX NUMBER FOUR

THE NATIONAL GEOGRAPHIC MAGAZINE

APRIL, 1956

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PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
WASHINGTON, D. C.

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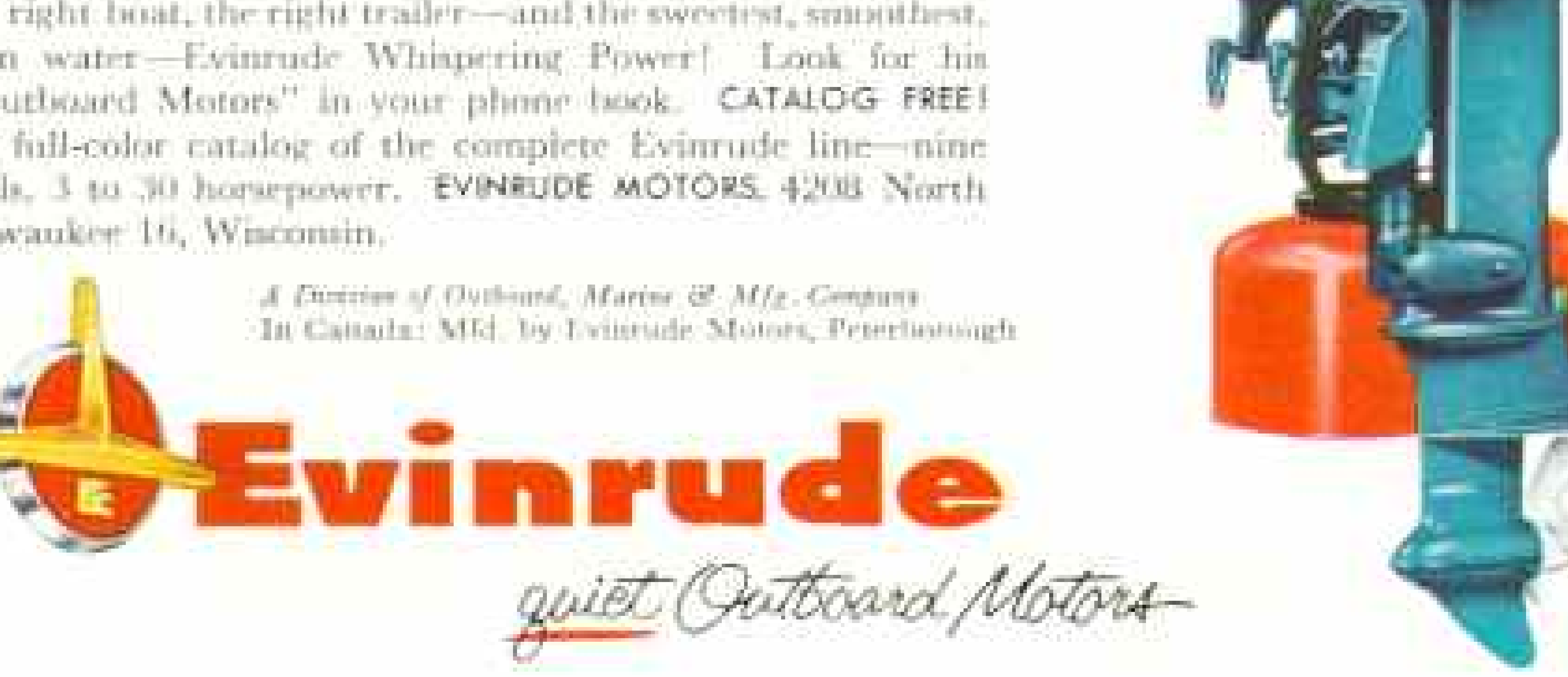

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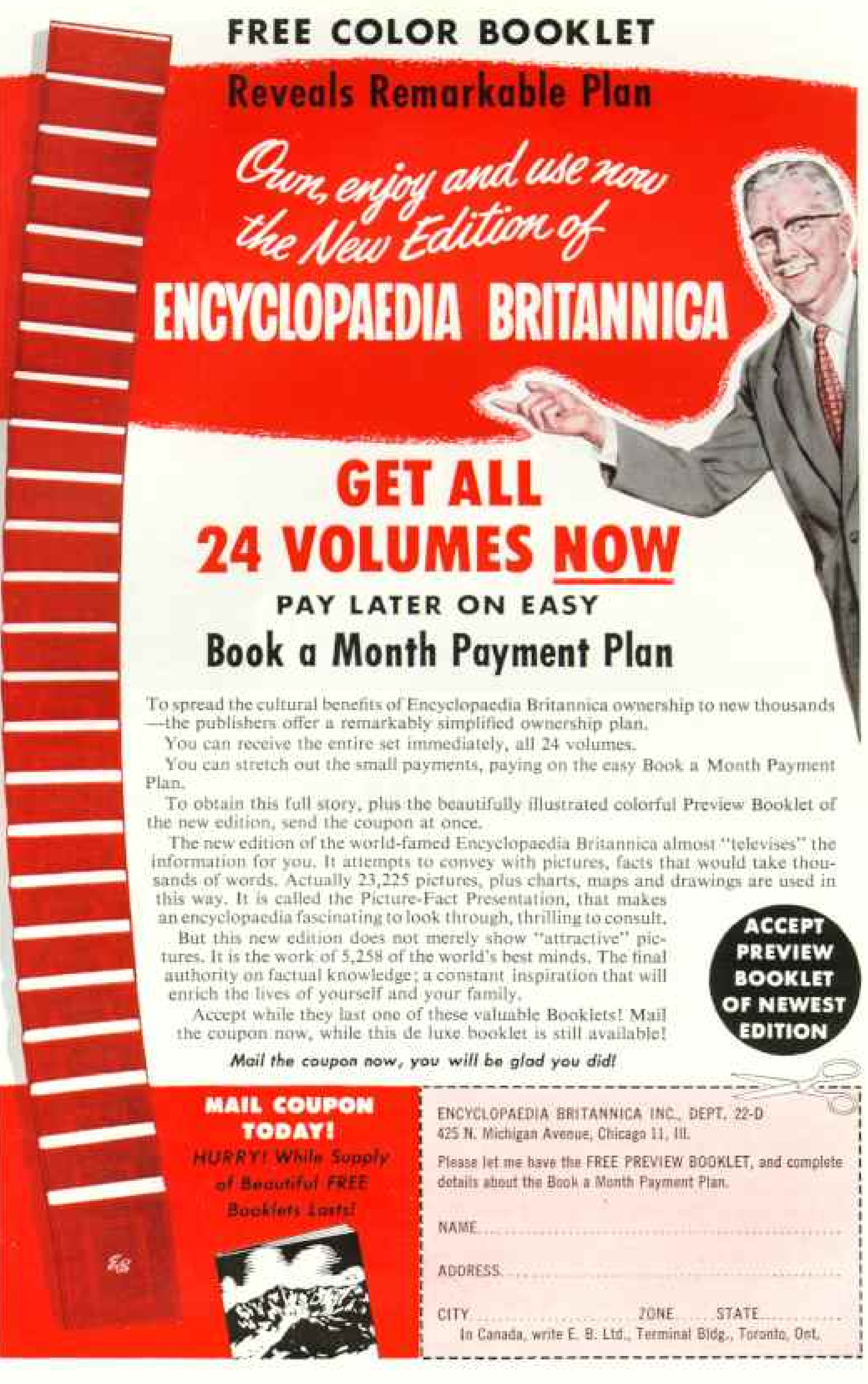
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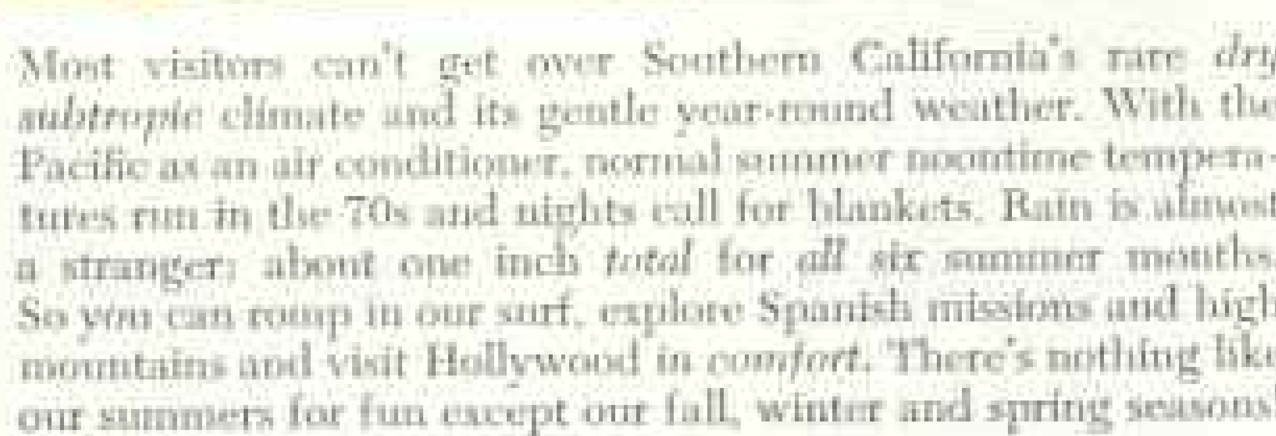

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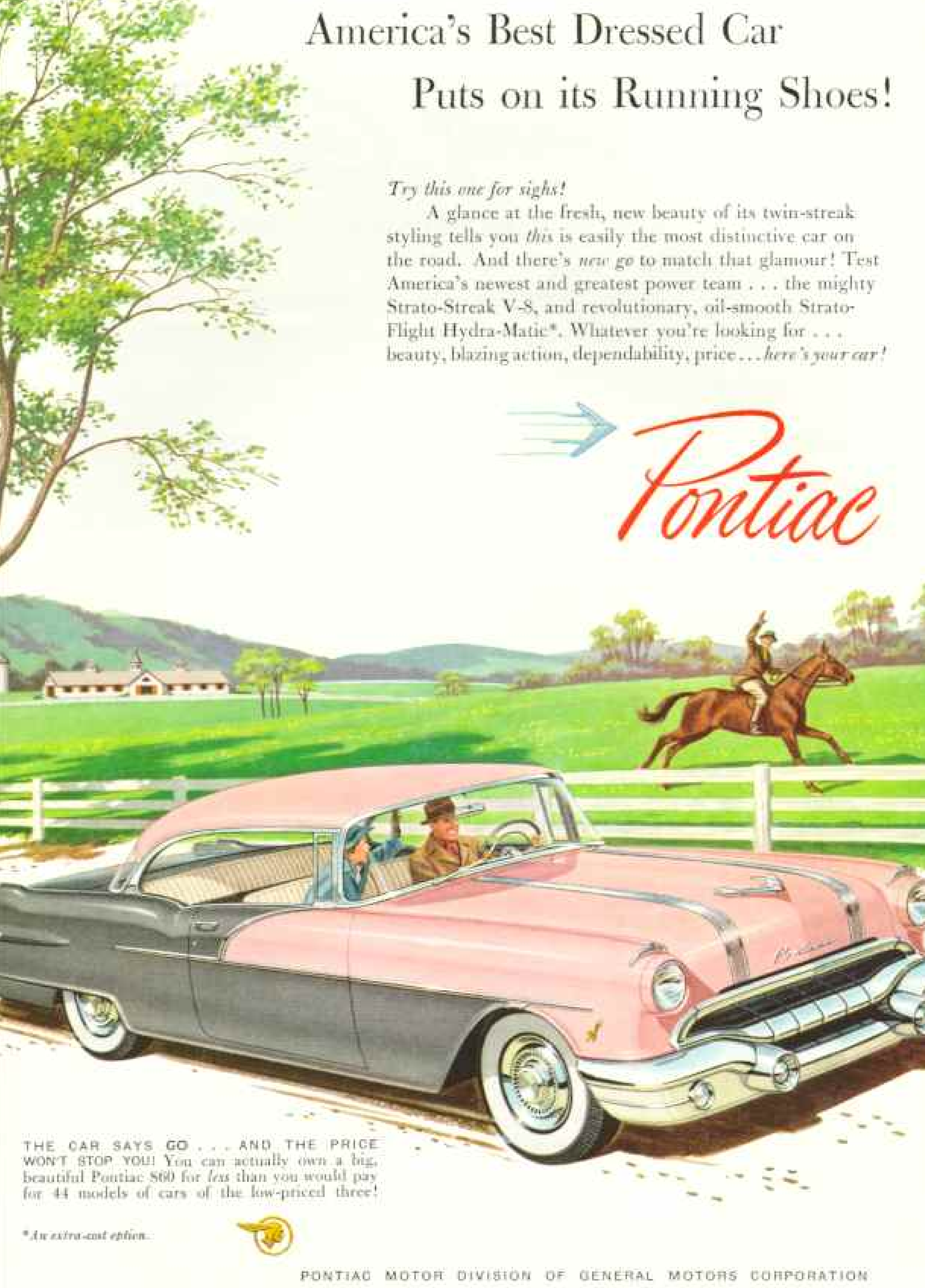
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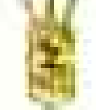

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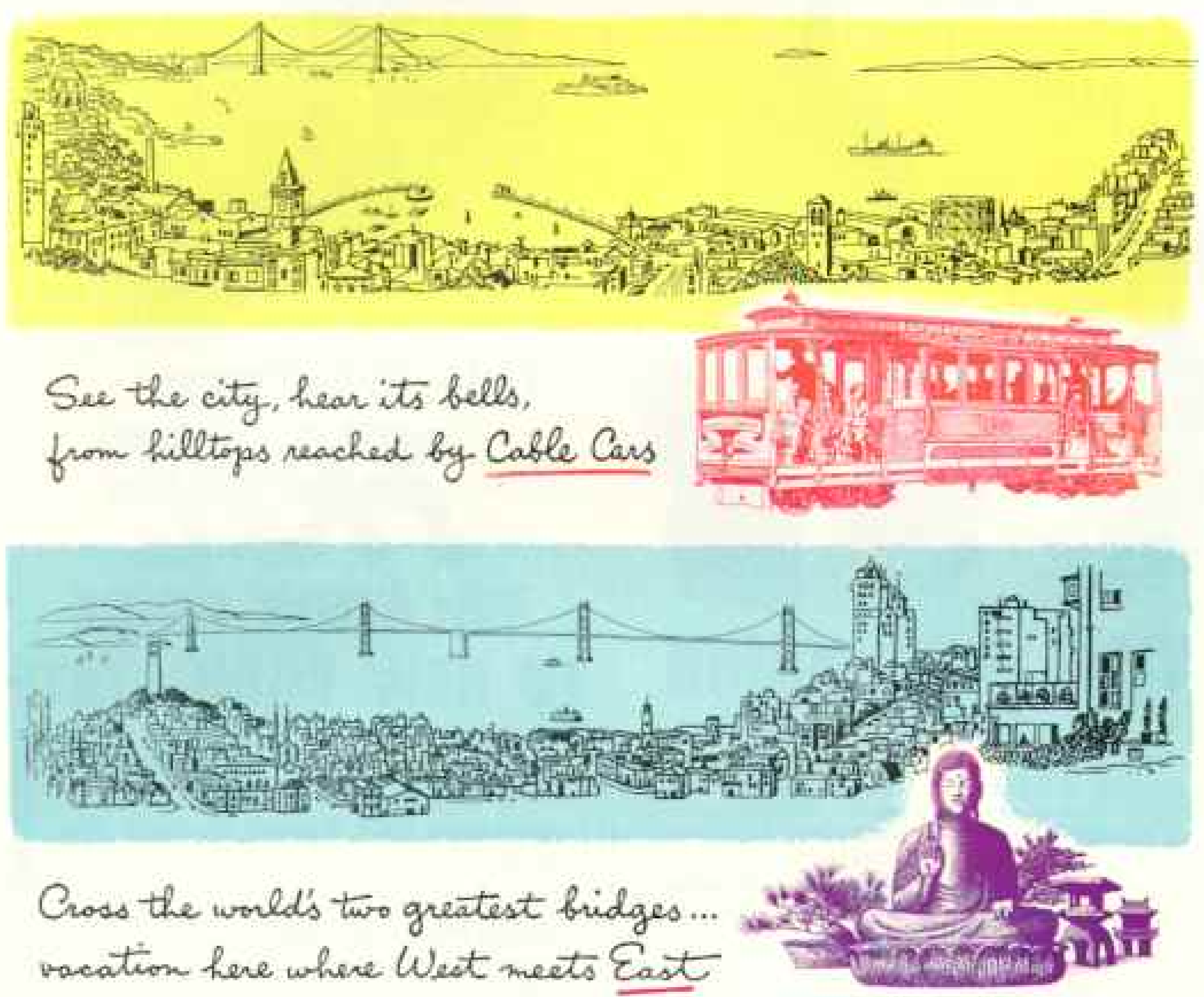

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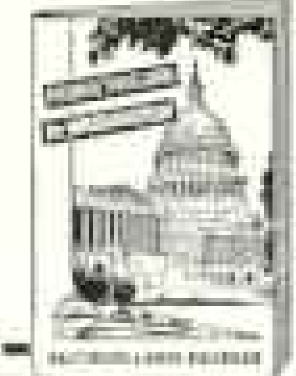

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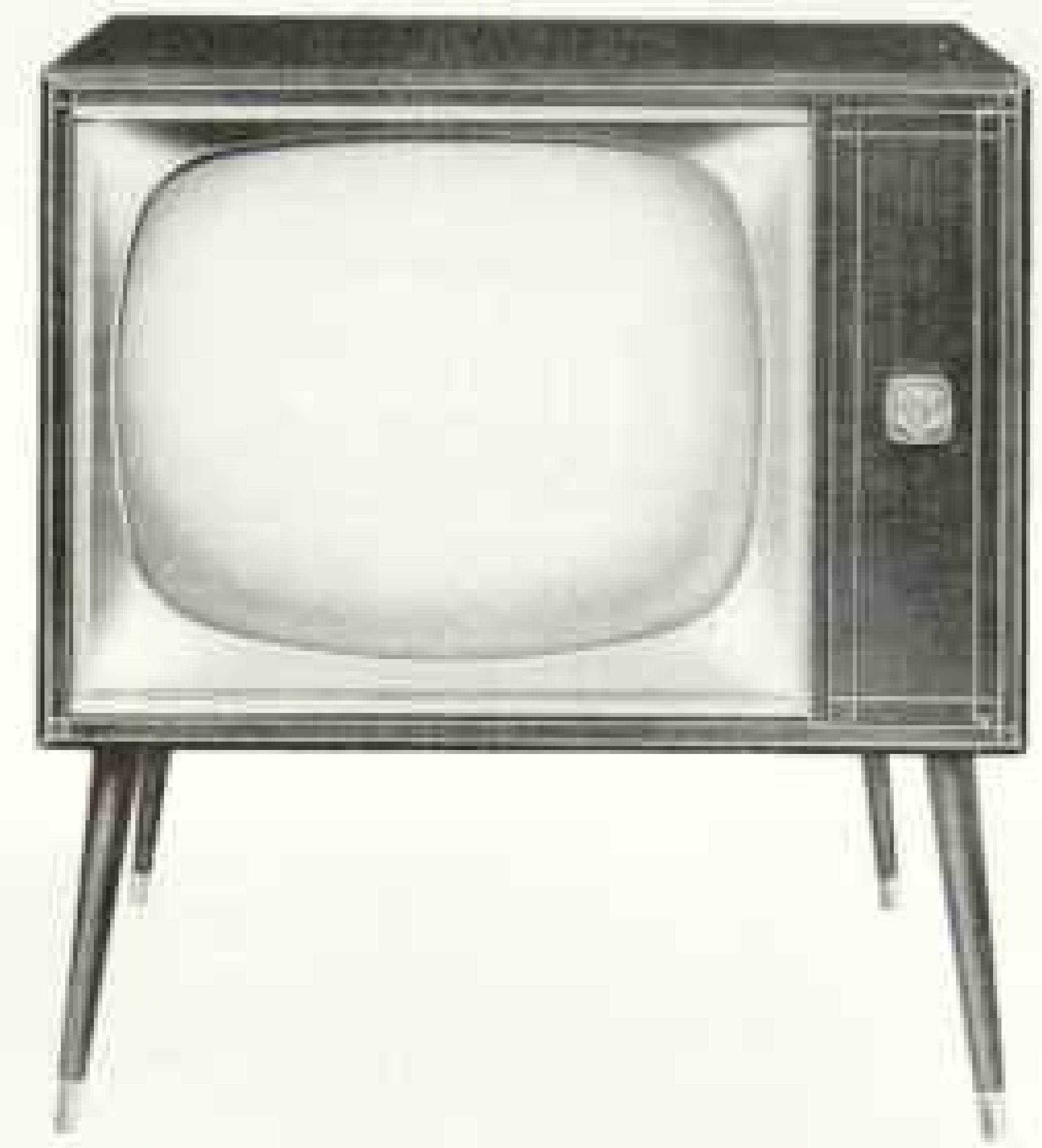

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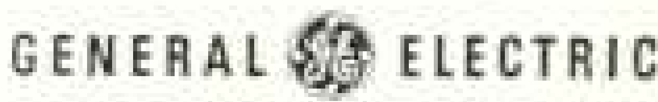

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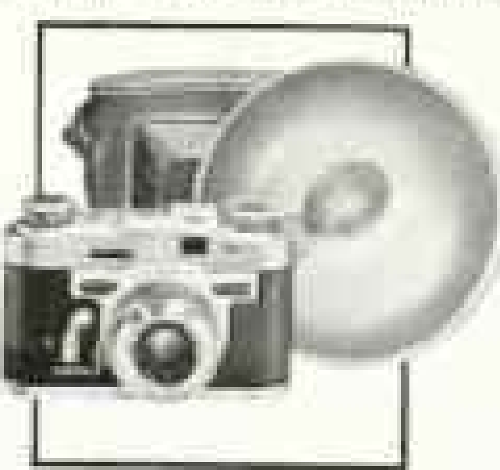

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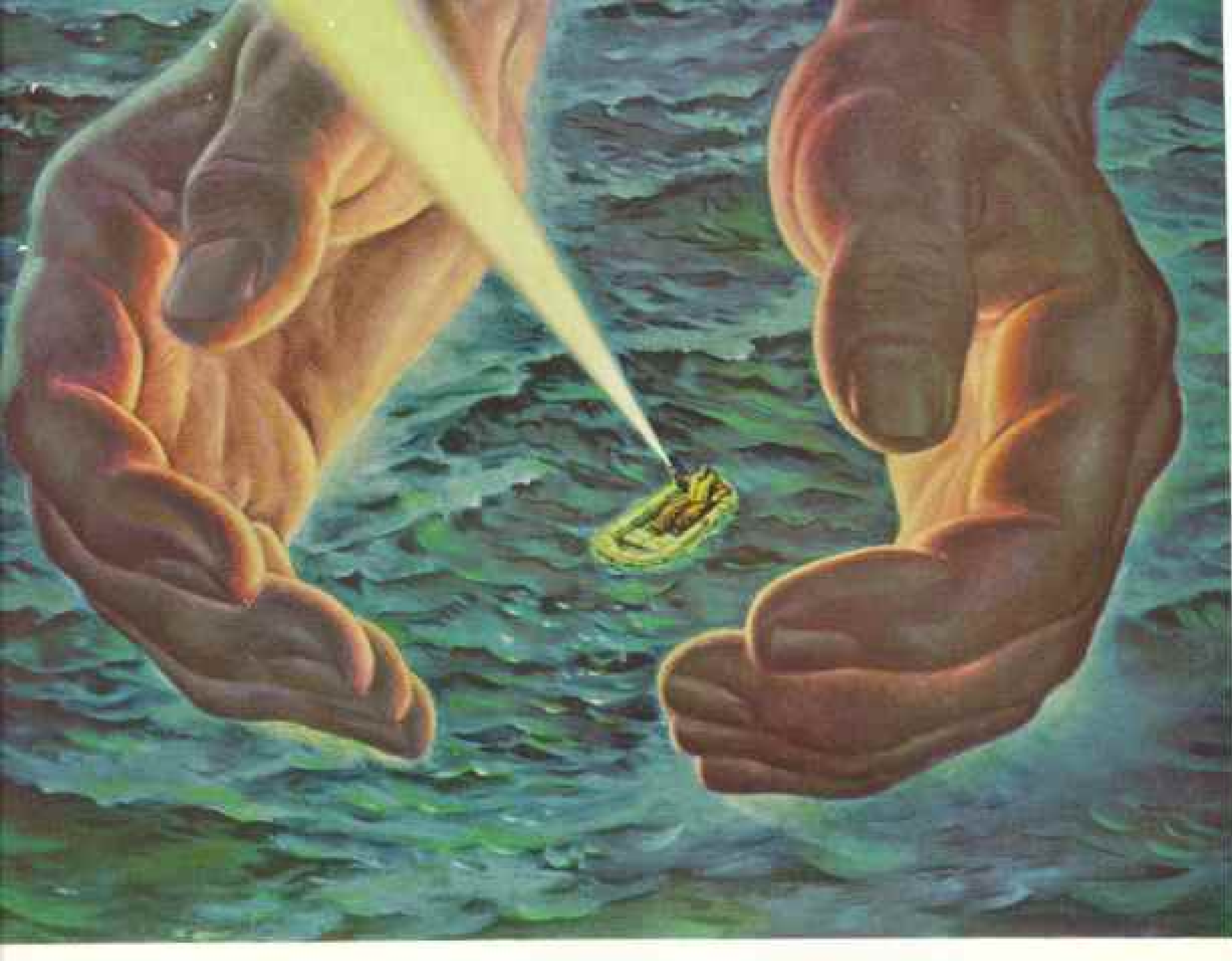

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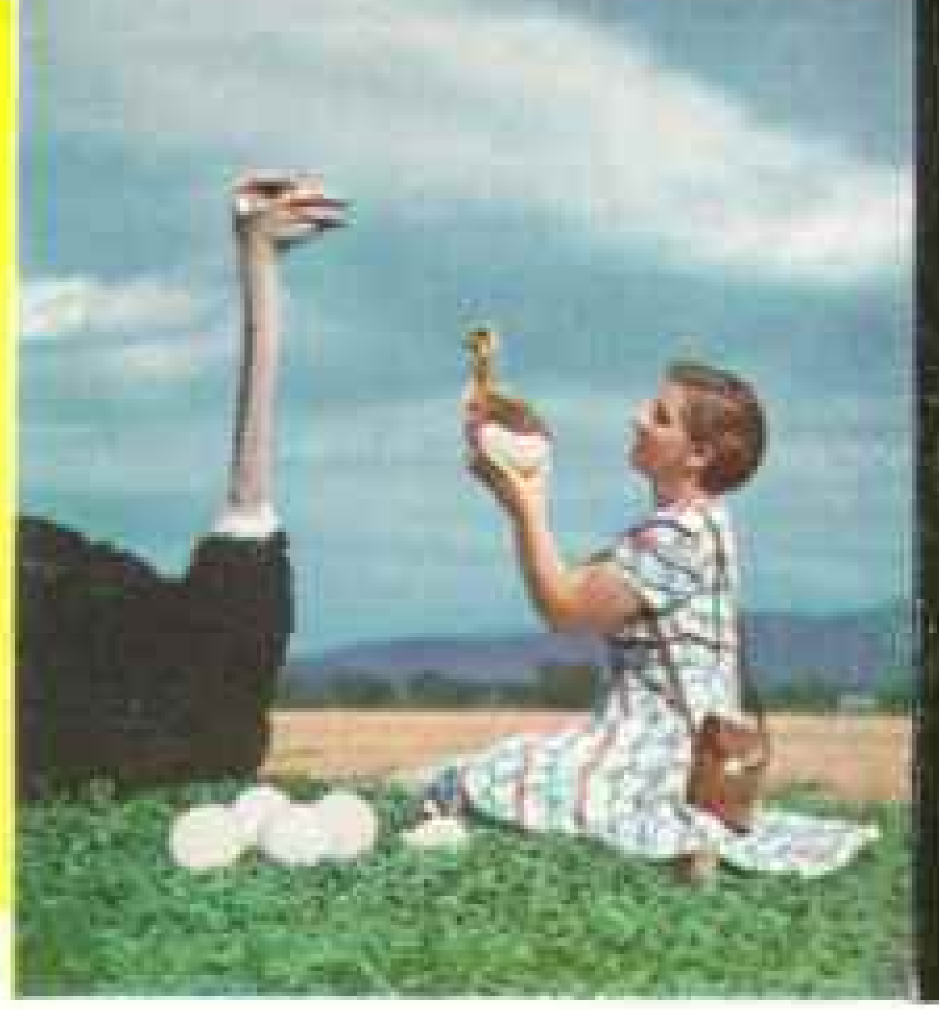

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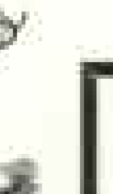

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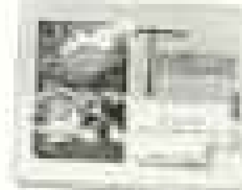

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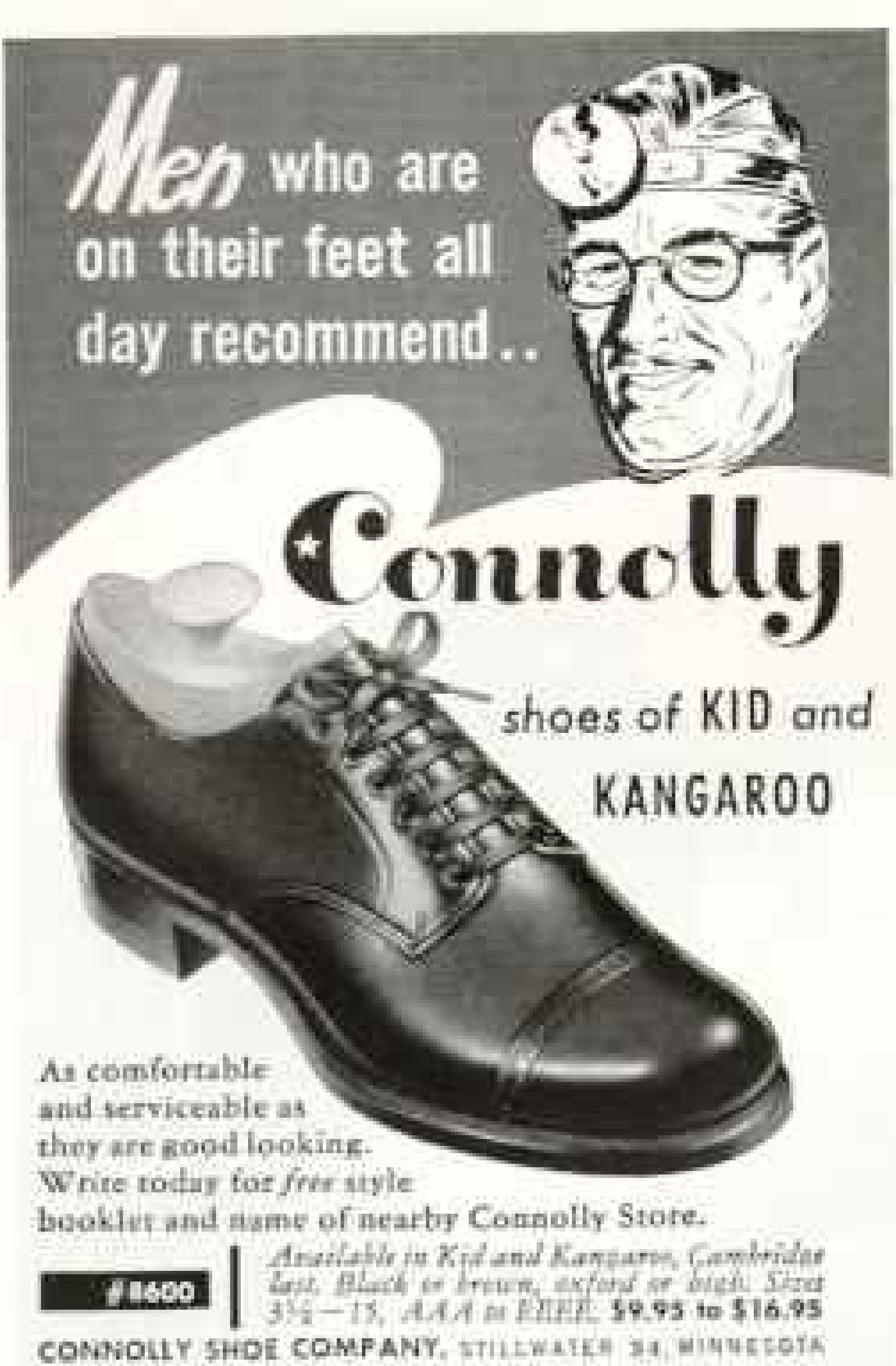

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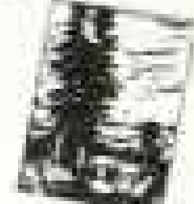

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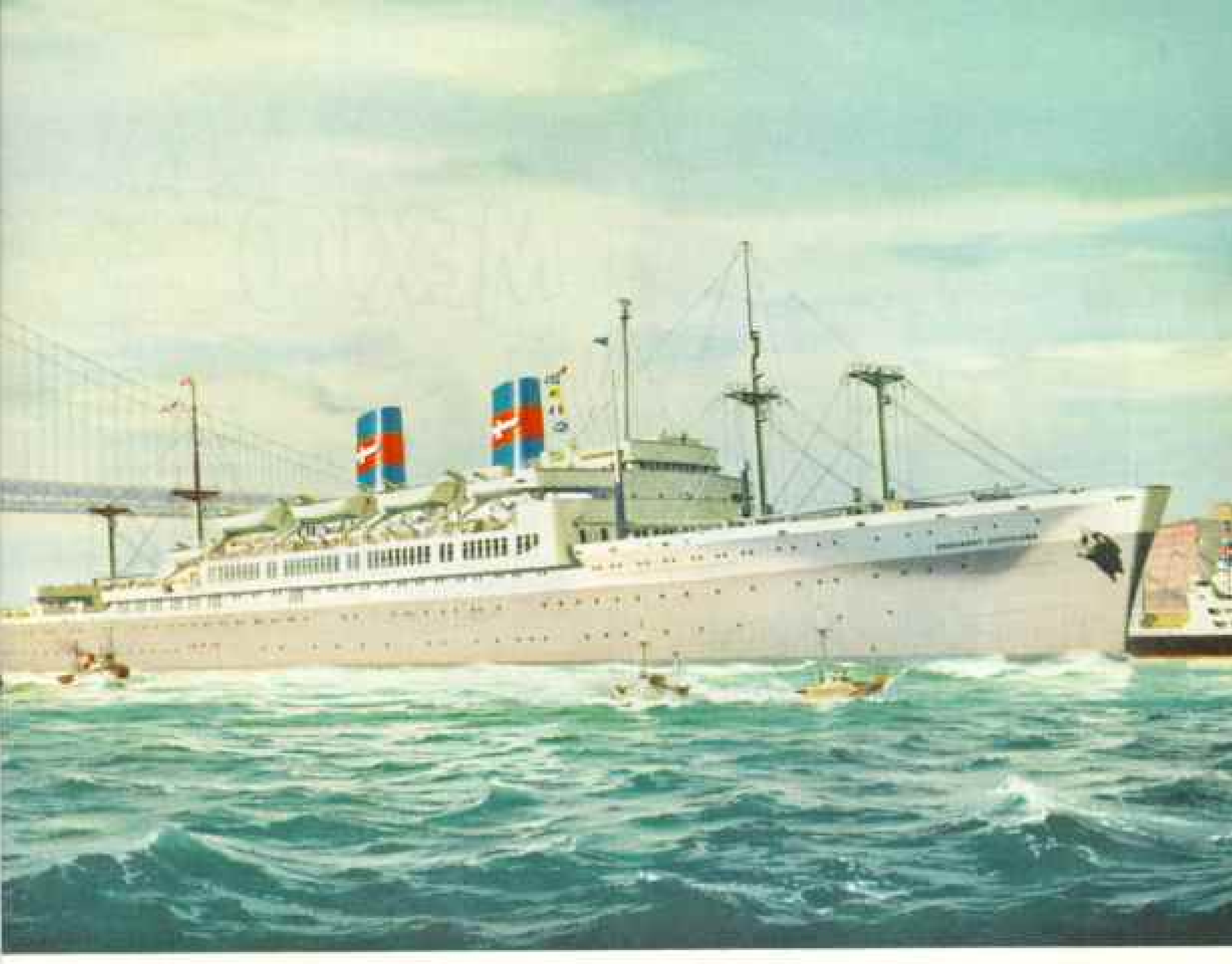

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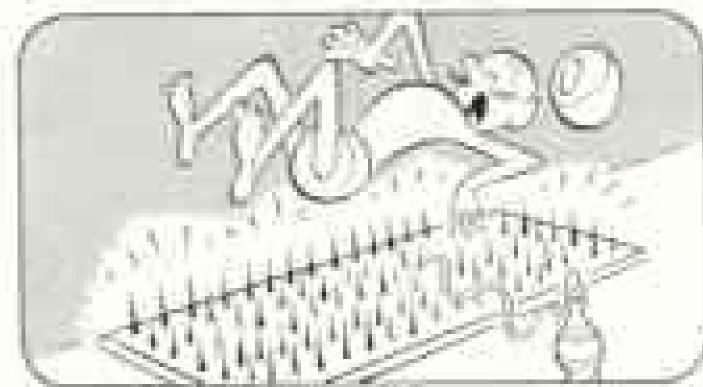

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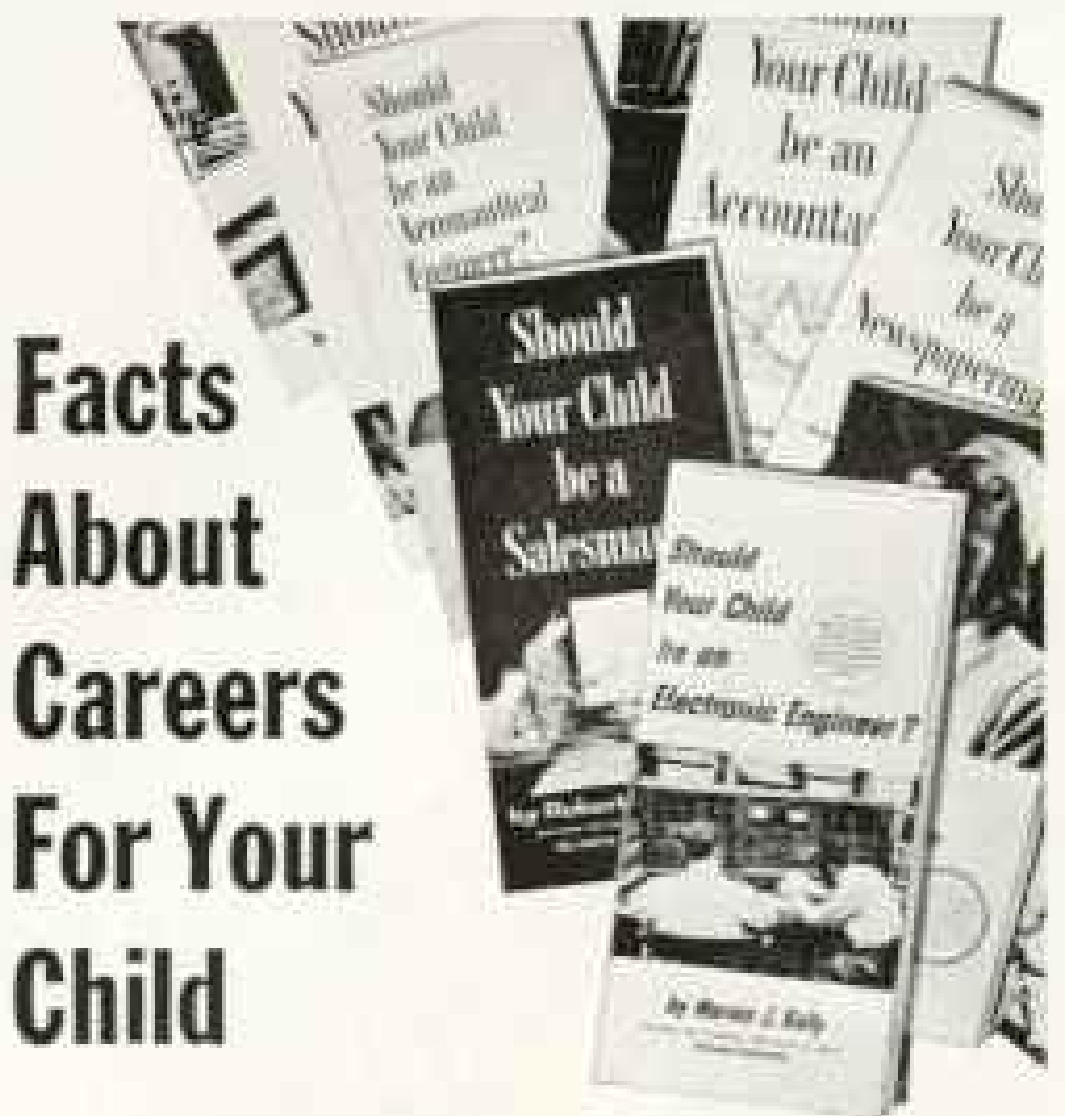

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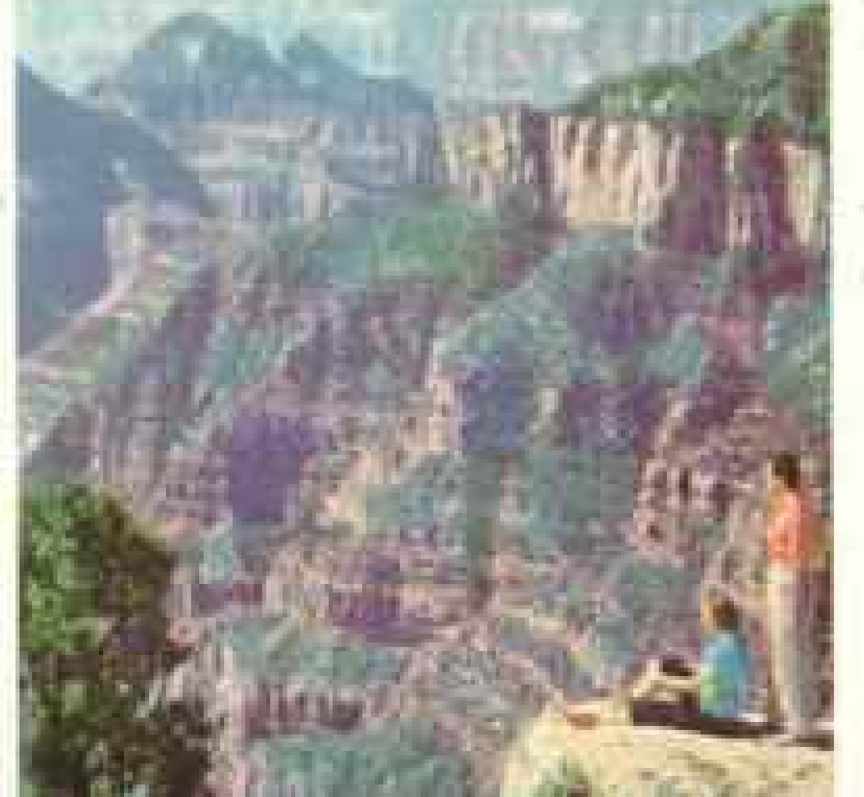

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Are we gaining in the fight on CANCER?

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Are there any new "sure cures" for CANCER?

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5. Persistent indigestion or difficulty in swallowing.
6. Persistent hoarseness or cough.
7. Any change in normal bowel habits.

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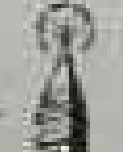

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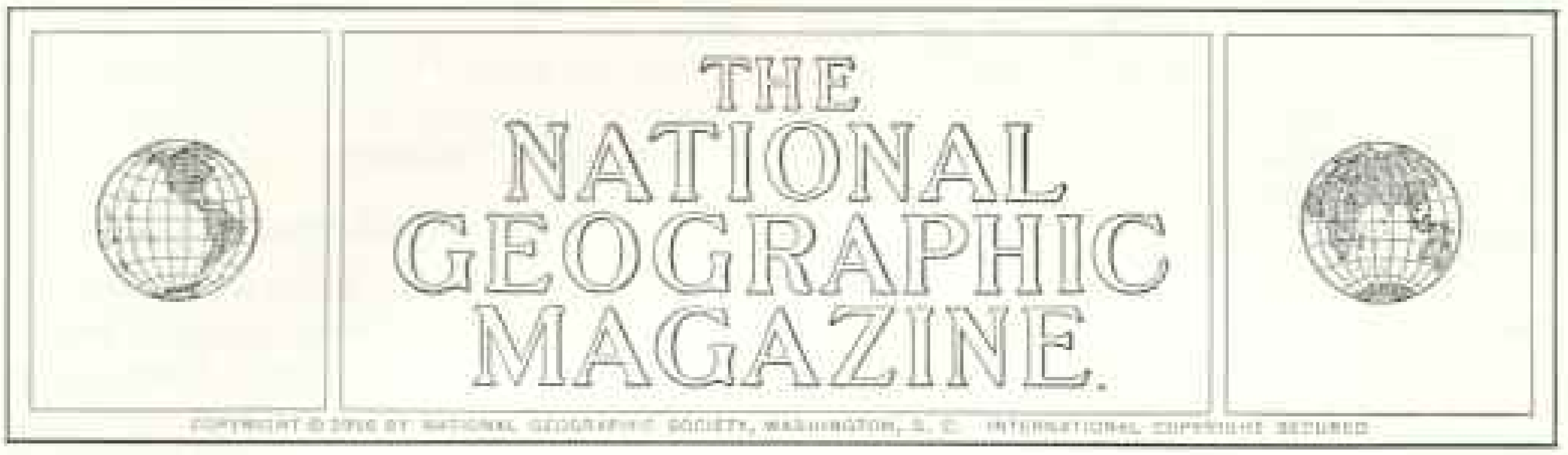

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History Keeps House in Virginia

BY HOWELL WALKER

National Geographic Magazine Staff

FOURTEEN years before the Pilgrims landed at Plymouth Rock, three little English ships set sail for that "part of America commonly called Virginia." This meant anywhere between North Carolina and northern Maine. Ultimately, fate in the form of an angry gale brought the fleet to Chesapeake Bay.

The ill wind blew a world of good, though, for men like Capt. John Smith stayed to make homes and history in the wilderness.

Inside the mouth of the big bay the colonists first sought safe anchorage. They probed an inlet later named Lynnhaven.

Had the inlet been a fathom deeper, the Norfolk area instead of Jamestown Island might have claimed the birthplace of Virginia and the Nation.

"Faire Meddowes" Greeted Explorers

"We entered [Lynnhaven] and found it very shoald water, not for any Boats to swim," reported one of Captain Smith's company on that April day in 1607. Ashore were "faire meddowes and goodly tall Trees, with such Fresh-waters running through the woods, as I was almost ravished at the first sight thereof."

And "we got good store of Mussels and Oysters, which lay on the ground as thicke as stones. Wee opened some, and found in many of them Pearles. We eat some of the Oysters ... very large and delicate in taste."

Leaving empty shells of countless bivalves behind, the colonists ventured 70 miles up the James—"one of the famousest Rivers that ever was found by any Christian"—and established Jamestown, the first permanent English settlement in the New World (see the 10-color map, "Round About the Nation's Capital," a supplement to this issue).

So Lynnhaven, the bay that pioneer fame passed over, is better known today for bivalves than bygones. Nevertheless, beside its quiet waters stand some of the earliest dwellings erected by white men in this country.

Thoroughgood Home Is State's Oldest

Here, in fact, I saw the oldest of the 200 colonial homes that open their gates each spring to 22,000 or more visitors in a Statewide program sponsored by the Garden Club of Virginia and known as Historic Garden Week. Proceeds from admission fees restore gardens and grounds associated with Virginians who were, in effect, architects of the Nation.

Such an architect was "good Adam Thoroughgood," who in 1621 came over from England as an indentured servant but quickly attained prominence in the Colony. He was an able surveyor, a successful planter, and a vigorous Indian fighter. His small but sturdy brick house on Lynnhaven Bay shows how gentlemen farmers of Virginia built their homes in the 17th century.

The Thoroughgood place left me chimney-conscious and aware of the ways of brickwork. Three of the massive walls are laid in English bond, the fourth in Flemish. A pyramided chimney, 11 feet wide at the base, buttresses the south end of the one-and-a-half-story building. At the opposite end another chimney appears to grow out of the steep-pitched slate roof.

I pushed away shrubbery near a corner to read an inscription: "The house of Capt. Adam Thoroughgood. Built by him between

1636 and 1640. Believed to be the oldest dwelling now standing in Virginia."

When I stepped across its threshold, I strode back three centuries into the intimate world of the Thoroughgoods. Heart-pine paneling, beveled by the hand of man and time, wainscots the rooms where Adam and Sarah raised their family.

Colonial homes rarely had closets. But someone—perhaps old Adam himself—put a cubbyhole or two in the thick walls to hold precious things like books and bottles. On the other hand, three modern stoves abreast could fit easily into the kitchen fireplace where all Thoroughgood fare was prepared.

Now the Adam Thoroughgood House Foundation is completely restoring interior details to their early 17th-century style.

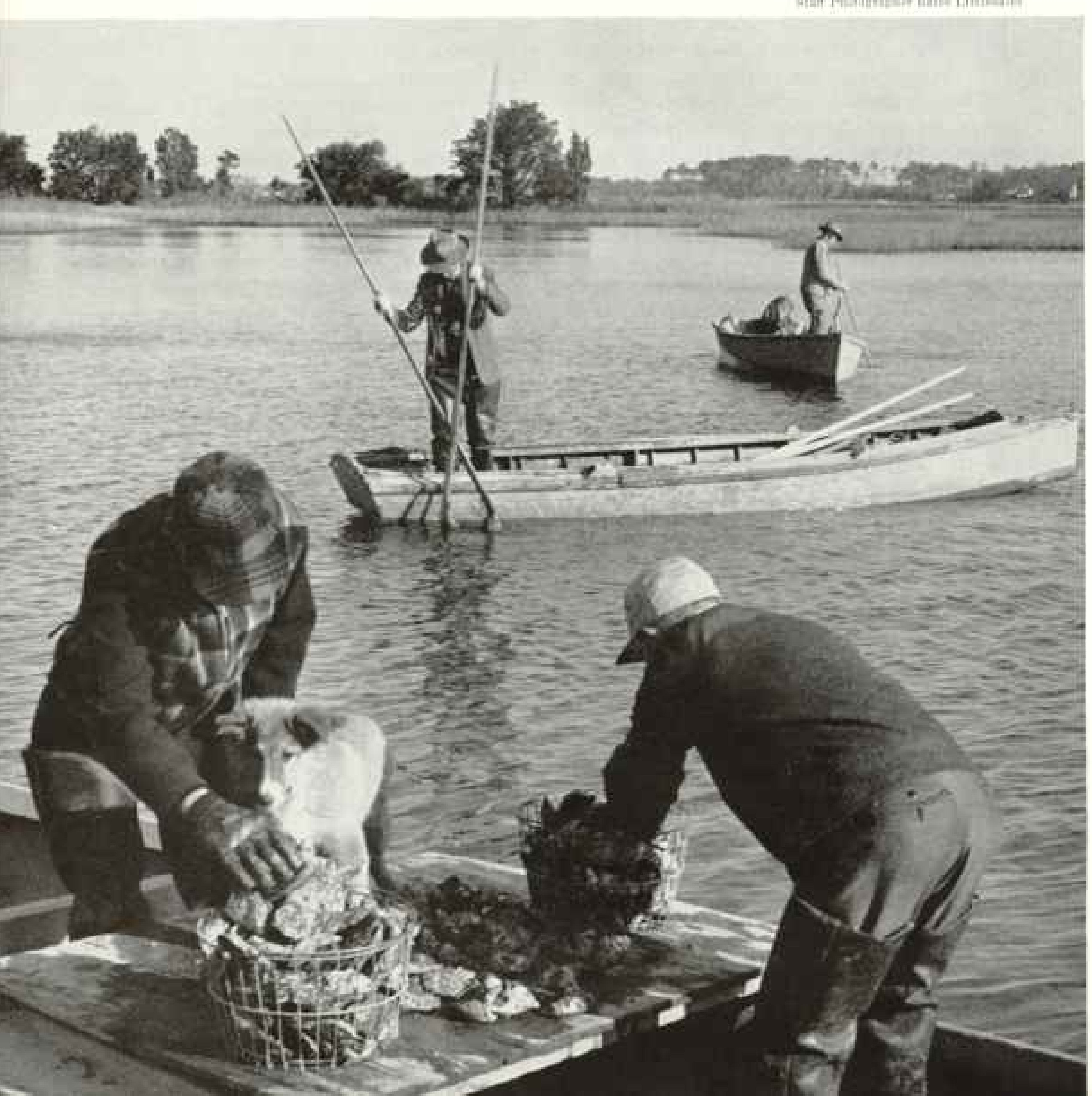
Virginia "As God First Made It"

To be in Virginia in spring is to sense what prompted Capt. John Smith to say: "Heaven and earth never agreed better to frame a place for mans habitation . . . Here are mountaines, hils, plaines, valleyes, rivers, and brookes, all running most pleasantly into a faire Bay, compassed but for the mouth with fruitfull and delightsome land."

Boatmen in Historic Lynnhaven Bay Grapple for Oysters with Tongs

Virginia's first permanent settlers, the Jamestown colonists, probed this inlet in 1607. They found the water too shallow for ships, but noted that it yielded oysters "very large and delicate in taste" (page 441).

Staff Photographer Bates Littlehales



Staff Photographer Willard R. Culver

Sturdy Chimneys Buttress Thoroughgood House, Believed Virginia's Oldest

Adam Thoroughgood, who emigrated from England in 1621 as an indentured servant, built his home on Lynnhaven Bay in 1636-40. He was personally responsible for bringing 105 settlers to the New World. The British Crown rewarded him with 5,350 acres of land. Older houses in the State have disintegrated.

Where Captain Smith saw a "plaine wildernes as God first made it," I smelled fresh-plowed earth, rich and moist and redolent of promise. We both knew the same early-morning cool of the forest, the calls of nest-building cardinals, and the robin's lilt; we knew the sun's midday warmth and the evening's deepening stillness. We knew Virginia in spring.

What a place indeed for man's habitation! Merely to pass through is a memorable experience. Much better still to visit the colonial homes and plantations—a personal privilege for anyone. Here, at its original source, American hospitality lives on with natural grace.

Moving about the Old Dominion brought back chapters of the country's history I but mistily remembered from school. The past fairly sprang to life when, for example, I heard that Captain Smith's party made an exploratory landing within a baseball throw of where I sat in the Keeling house.

A generation or so before Williamsburg became capital of the Colony, Adam Keeling made his home beside Lynnhaven Bay and, some say, married his neighborhood sweetheart, a Thoroughgood girl. The houses of

A Trooper's Saber Nicked the Banister at Carter's Grove

On the way to assist General Cornwallis during the siege of Yorktown, Lt. Col. Banastre Tarleton and his troops occupied Carter's Grove, a noble Georgian home beside the James River. To alert his sleeping companions for a sudden departure, the colonel rode a horse up the wide staircase. His mount left hoofprints in the steps, and the walnut banister still bears scars from his saber (page 450).

Carter's Grove was built in the 18th century. The young visitors came from near-by Williamsburg.

Staff Photographer Bates Littlehales

both families look somewhat alike, being of similar size and design.

The present owners of the Keeling place, retired Admiral and Mrs. Leon J. Manees, searched two years to find the home that exactly suits their bucolic life. Even with a map and printed directions I got pleasantly lost in Princess Anne County, trying to hit the right back road to the secluded property.

"Perhaps it would be more accurate to call us the custodians, not the owners, of this house," said the admiral when I got there. "After all, it's been here nearly 300 years, and we hope it'll stay another 300. Personally, we'd like to think that, if the house could talk, it would say the Maneeses treated it kindly," and he ran his hand fondly over the smooth paneling of the living room.

I followed the admiral up a narrow staircase to two bedrooms under low, sloping ceilings. He pointed a toe at holes gnawed in the pine flooring.

"I've asked my wife to have new boards put in, but she'd rather keep the original," said Admiral Manees. "Someday she'll drop her watch through one of these cracks."

All in all, mice, men, and time have been kind to the house. Keelings lived here 200 years; for most of another century several unrelated families have in turn called it home.

Land Owned by Pocahontas's Husband

In the historic wake of the country's first settlers I skirted Norfolk, moved up the James River, and stopped opposite Jamestown, where John Rolfe, husband of Pocahontas and father of the American tobacco industry, long ago owned some land. Here now mellows an unpretentious dwelling of warm rose brick and gray weathered shingles. Records in the Surry County Courthouse show the building dates from 1652.

Mrs. Thomas Spratley welcomed me to the Rolfe property. At the outset she explained that the dwelling was not erected in expansive colonial days but in pioneering times, when families often cooked and ate by the same fire.

As in the Thoroughgood and Keeling homes, a central hall running the width of the building separates parlor from kitchen—the only rooms on the first floor of the one-and-a-half-story house. Upstairs I saw two bedrooms, and in the basement I walked on cool earth packed hard by the feet of time. Here were huge beams held in place by wooden pegs.

"Much of the woodwork—paneling, floors, doors, stairway, molding—is original," said Mrs. Spratley. "One of the families to stay

Howell Walker, National Geographic Staff

Drawings Illustrate John Smith's Adventures with the Indians in "Ould Virginia"

The Misses Evelyn Collins Hill and Elizabeth Gregory Hill, who live at Sea Breeze Farm on Lynnhaven Bay, display a volume entitled *The True Travels, Adventures and Observations of Captaine John Smith . . . beginning about the yeare 1593 and continued to this present 1629.*

here cut a hole for a stovepipe in the panel above the living-room fireplace; otherwise, little damage was done."

Where did the window glass come from? Mrs. Spratley could not say. Jamestown had a glass factory, but it didn't make the windowpanes for this house. The bricks? Probably burned on the property.

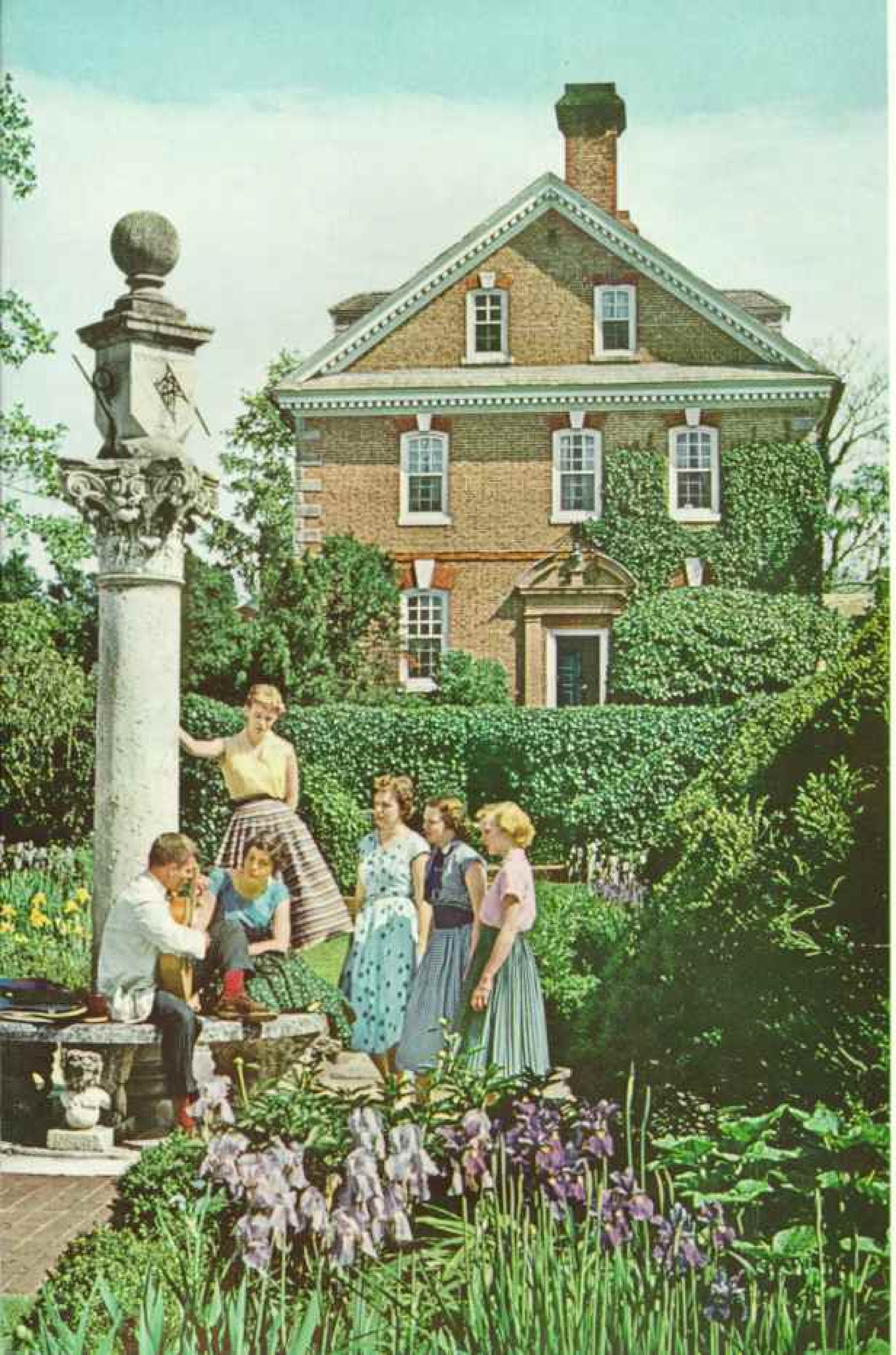
We walked around the garden behind the house. Now and then Mrs. Spratley stooped to pinch bits of mint, lavender, rosemary, and other herbs for me to smell. Butterflies amid the apple blossoms sometimes dislodged a fragile petal. The fragrant earth everywhere was springing to life.

Not far away Capt. John Smith built a fort in 1609 as protection against both Indians and Spaniards. To see its breastworks, now barely discernible, I followed a dusty road around a wide field cultivated by a noisy tractor. I found a quiet creek, marsh grass, and a wooded bluff at the site of one of the oldest English forts on this continent.

Mosquitoes Rout Jamestown Settlers

Colonists could scarcely have picked a worse spot than Jamestown, across the river. The low, flat island was marshy and malarial, and wide open to Indian attack. These dangers and discomforts, plus disastrous fires, at length forced the unhappy community to move the capital of Virginia in 1699 to the more salubrious location of Williamsburg, six miles inland.*

* See, in the National Geographic Magazine: "Williamsburg: Its College and Its Cinderella City," by Beverley M. Bowie, October, 1954, and "Restoration of Williamsburg," by Dr. W. A. R. Goodwin, April, 1937.



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↑ **Seven Gables Preserves Its Original Kitchen**

The oldest house in Accomac, on Virginia's Eastern Shore, took shape in 1786 around the brick chimney and fireplace. For generations meals were prepared in this cozy nook.

An original hand-hewn beam still holds pots and pans. Preserved foods are stored in the old-fashioned Dutch oven beyond the antique doll.

Today the kitchen serves Mr. and Mrs. E. Almer Ames, Jr., who have installed modern appliances since they bought Seven Gables in 1940.

← **Nelson House Combines Beauty and History**

Page 446: Virginia's most famous Revolutionary home has stood at Yorktown since 1741. William Nelson erected the Georgian mansion for his son, Thomas, an American general and later governor of the State.

During the siege of 1781 Lord Cornwallis set up headquarters in the house. To dislodge the enemy, General Nelson resolutely directed a cannonade against his own home.

→ Projectiles still lie embedded in the mansion's brick walls.

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Kodachromes by Staff Photographers Volkmar Wentzel (left) and Bates Littlehales

In the mid-1700's colonial life reached a golden peak. Handsome Georgian mansions rose around the elegant Governor's Palace and on wealthy plantations in the vicinity. At vast profit to the Colony and themselves, men raised tobacco and exported it to England. As the plant flourished, they smoked their clay pipes and dreamed....

Cannon Balls Lodge in Nelson House Walls

With prosperity the spirit of American independence began to flower, spreading like wind-blown pollen through the Colonies. It burst into full bloom at Yorktown, a dozen miles from Williamsburg, on October 19, 1781, when George III's colonial yoke went up in a memorable blend of cannon and tobacco smoke.

In the final days of the Yorktown siege Lord Cornwallis, commanding the British forces, made headquarters in the Nelson House. American and French guns were pounding the town hard, but, in deference to the owner, not firing on the prominent brick mansion of Thomas Nelson. So this American general ordered a cannonade directed against his own home.

I saw two cannon balls embedded in the east wall of the house which, since 1741, has solidly defied time and three wars. Still it stands, "broad, substantial, masculine"—and still a family home. It belonged to the Nelsons until the early 1900's, when it was sold to Capt. and Mrs. George Preston Blow (pages 446-7).

History and architecture make this one of Virginia's most noted homes. From Nelson House Lord Cornwallis wrote to Gen. George Washington, "I propose a cessation of hostilities...." Forty-three years later Lafayette was gaily entertained on a sentimental visit to the finest Georgian mansion in all Yorktown. The dwelling served as a hospital for Union forces during the War Between the States. A patriotic landmark, certainly, but not a cold shrine or hollow monument.

"This house," said Mrs. Blow, "wants to be lived in."

And that, I found, is pretty true of most colonial homes in Virginia. Since slaves, and indeed domestics in general, have gone out of fashion, keeping house in mansions of such generous dimensions as Nelson House has its drawbacks. But with Jeffersonian ingenuity homeowners find ways of solving their anachronistic problems.

In colonial times, if a house had running water, it was usually in the form of a slave hurrying with a bucket. Not even at Monticello did Mr. Jefferson, master of gadgets and connoisseur of comforts, design anything like present-day plumbing. Today the oldest homes have inconspicuously installed heating plants, electricity, and bathrooms. They live on as dwellings, not as museums.

Intended for a town dwelling, Nelson House stands near the center of Yorktown. But in the early days urban and country homes differed little. In fact, Virginia had no towns to speak of. Williamsburg, capital and social center, was no more than a village.

Life was fundamentally rural, with the emphasis on tobacco. Self-sufficient plantations managed well with slave labor. They did their own spinning and weaving, made shoes, manufactured harnesses, and built wagons; every estate had its blacksmith, its brewery, and a flour mill.

Ships Brought Luxuries to the Front Door

What the Colony could not produce in the way of luxuries arrived from England, Holland, or the West Indies. Ships unloaded finery and furniture, china, silverware, vintage wines, and spices at the very river-front doors. Then the sea captains took orders for the next shipments and sailed away with cargoes of tobacco, grain, and lumber.

Thus the Colony developed around its plantations instead of around villages. For reasons of transport the planters settled along the principal rivers—Potomac, Rappahannock, York, and James. Virginia grew up beside these tidal waters.*

* See "Virginia—A Commonwealth That Has Come Back," by William Joseph Showalter, NATIONAL GEOGRAPHIC MAGAZINE, April, 1929.

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Mirror in Monacan's Hall Reflects a Brilliant Restoration →

Named for the Monacan Indians, this 200-year-old home stands on one of their old-time townsites 12 miles west of Richmond.

Until the Civil War, Monacan thrived as a plantation, supporting more than 100 persons. In 1935 it stood abandoned and deteriorating. Mr. and Mrs. Collins Denny, Jr. (seen in the looking glass), bought the place in 1944 and restored it a few years later. Today Monacan is the seat of 1,200 acres given over to crops, pasture, and woodland.

The older half is frame; the brick portion dates from 1830. Stairways from the two sections meet at the landing.

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Staff Photographers Robert F. Sisson and Donald McBain

Today the State is shaped like a triangle with apex pointing north. Tidewater forms the eastern side, mountains the western, and the straight border between Virginia and North Carolina makes the base. At heart the land remains largely pastoral.

Many of the oldest and most elegant dwellings stand in the Tidewater region. The mountainous west contains the grandest scenery. Between lie pleasantly rolling farmlands and the hunt-racing country. Areas along the State's southern boundary combine something of each.

Hoofprints Sear Carter's Grove Stairs

Less than 10 miles west of Yorktown, Carter's Grove overlooks a big bend in the James River. In 1781 Lt. Col. Banastre Tarleton's troops, en route to reinforce Cornwallis, came to the plantation in search of billets. The officers took over the massive brick mansion for themselves.

Tarleton rode his horse up the central stairway to arouse the men for a sudden departure.

Espaliered Branches of a Pear Tree Spread Across the Bricks of Warwick

Garden Week ladies walk under maple and hackberry trees on the lawn of one of the oldest homes on Virginia's Eastern Shore. Warwick, standing about a mile south of Quinby, was built around 1670. Porches were added later. Today the Richard Holleriths make it their home.

↓Park Hall's huge iron key and upside-down lock intrigue grandsons of Mr. and Mrs. E. M. T. Addison, the owners. This 18th-century house stands at Eastville, in the Eastern Shore county of Northampton.

Staff Photographer Bates Littlehales

One can still see the hoofprints in the steps. Even more evident, saber scars mar the exquisitely carved walnut banister (page 444). Could it be that Banastre Tarleton resented his wooden name?

Belles Said "No" to Budding Statesmen

Now Mrs. Archibald McCrea lives at Carter's Grove with ghosts and guests. Whether or not Tarleton rides again some night, she has apparently forgiven him; his portrait hangs on a living-room wall. What's more, she is resigned to the damage he did the stairway. But the others....

Ghosts, Mrs. McCrea?

"Sometimes in the evening when we are sitting quietly, we can hear footsteps on the brick walks," said Mrs. McCrea. "A guest may ask, 'Who's that?' And I'll say casually that it might be George Washington, or perhaps Thomas Jefferson, returning to the scene where both were refused in marriage." *

In the "Refusal Room," Mrs. McCrea told me, George Washington proposed to Mary Cary, who turned him down. Later, she went on, Thomas Jefferson met with similar disappointment in the same drawing room when Becky Burwell said "No."

Guests? Mrs. McCrea once invited every Episcopal bishop in the United States to tea. In honor of that occasion she nearly changed the name of her place to "House of Bishops." Although not open officially during Garden Week, Carter's Grove receives its share of visitors throughout the year.

Mrs. McCrea asked an architect over from Williamsburg to explain the house to me.

* See "Stately Homes of Old Virginia," by Albert W. Atwood, NATIONAL GEOGRAPHIC MAGAZINE, June, 1953.

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Colonial Purton Served as a Model for Restoration Work at Williamsburg

No one knows who built this Gloucester County mansion, for fire consumed the records. Inside and out the house is a prime example of 18th-century architecture and craftsmanship. Today it belongs to Mr. and Mrs. Stanley Lloyd of London, England, and Virginia. They raise Aberdeen Angus cattle on Purton's rich pastures. Mrs. Lloyd appears at the door, discussing with a workman the best way to wash the face of brick marked by removal of a porch. A crumbled ruin on another part of the estate is known as Old Purton.

© Staff Photographer Volkmar Wentzel

Small Pilgrims Roam the Estate →

Purton's open door reveals the wide York River. Above: Girls pick flowers beside the garden gate, an import from Spain. Purton occupies the legendary headquarters of Chief Powhatan, father of Pocahontas.

"Carter's Grove is a Virginia-type house, shaped by the nature of the country and materials available," said the architect. "Of course Mrs. McCrea has made some changes, but only to attain the normal comforts of present-day living. After all, the house was built about 1732."

Other sources indicate that Carter's Grove was erected in the early 1750's. It is idle to quibble over exact construction dates; they are often difficult to prove. Logically, the architect judges the period by materials, craftsmanship, and style. Zealously, often in vain, the historian digs for written evidence.

How could the planters build so elegantly?

First, they were largely men of money and ambition. They or their fathers had come to the New World to better their lot. They found fertile land, plenty of good clay for bricks, and more than enough timber close at hand. Labor cost almost nothing. Finally, it was the era of great architects, like Christopher Wren, whose influence is even yet felt and respected.

Founding Fathers Set Architectural Style

Colonial owners and builders kept abreast of the times with illustrated books and plans. They imported artisans, but for the most part produced their own architects. The Colony developed its styles through men like Washington and Jefferson and scores of others who managed their plantations with intelligence and imagination.

Into their buildings went the colonial character, something as intimate and local as red clay. Virginia's historic homes can tell us much about the Old Dominion.

"What Am I Offered for This Lovely Old Blown-glass Compote?" Cries the Auctioneer

Owners of Wilton hold a sale beside a onetime slave house on their 17th-century estate in Middlesex County.

Howell Walker, National Geographic Staff

Howell Walker, National Geographic Staff

Miss Eleanor Perrin, in Goshen's Drawing Room, Plays a Tune on Musical Goblets

Twenty-four glasses three to five inches in diameter fill the chest. When rubbed with wet fingers, the rims produce musical tones. Glasspiel and hydrodaktylopsychicharmonica are two of many names for this antique instrument. Goshen has remained in the Perrin family since 1824 (pages 462 and 470).

To build Carter's Grove, for instance, timber was felled in the surrounding forests; bricks were made on the spot; oyster shells supplied lime for mortar. Smiths at the site hammered out nails and hinges as needed. Extensive pine paneling, the magnificent stairway, and other hand-carved woodwork throughout the house make it one of the most handsome residences in the Nation.

In the impressive central hall I saw two huge allegorical paintings in the voluptuous style of Rubens. They picture Peace and Plenty. The latter shows several cherubim, one of them airborne, and a seated lady with a lion at her feet.

"Is it a family portrait?" a visitor once asked.

"Why, of course," replied Mrs. McCrea. "Those are my daughters with me."

"What's the lion doing in there?"

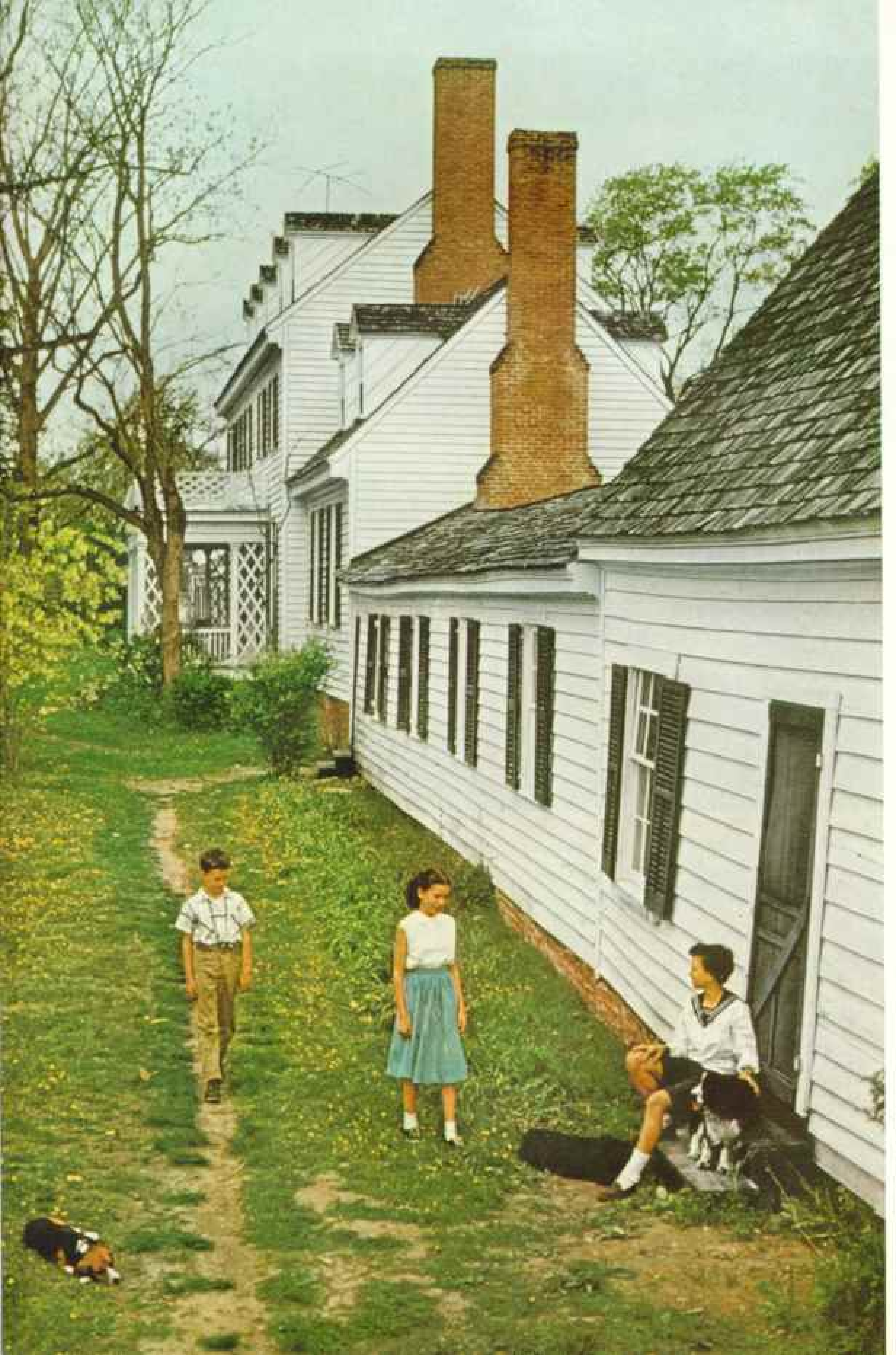
"Oh, that's my husband."

President Tyler's House Spans 300 Feet

When I approached Sherwood Forest, another plantation farther up the James, I noticed a man moving fallen limbs beside the driveway. He turned out to be Mr. J. Alfred Tyler, owner of the property and grandson of the tenth United States President.

Within the 12-acre yard around his home, hurricane Hazel in 1954 had leveled 75 trees, some of them planted by the former President.

"In a way it helped us," Tyler philosophized. "The grove needed thinning out."



President Tyler retired in 1845 from the White House to Sherwood Forest, so named because the Virginian, a self-styled political outlaw, likened himself to Robin Hood.

The ex-President doubled the size of the original dwelling, built in 1780, and ended up with a residence 300 feet long (opposite). Outbuildings include an 18th-century wine house constructed of snugly dovetailed logs.

Tyler's Reward for Annexing Texas

Mrs. Tyler showed me a blackened silver pitcher. The ladies of Brazoria County, Texas, presented it to President Tyler for having annexed their State to the Union. Though badly burned, the pitcher somehow survived the devastating fire in Richmond where it was stored during the Civil War.

Of the first 10 Presidents of the United States, six were born in Virginia, and two of these Virginians came from Charles City County. William Henry Harrison, of Berkeley, and John Tyler lived within 10 miles of each other. Both ran on the same election ticket. Harrison, the ninth President, died after only a month in office; as Vice President, Tyler succeeded him.

"My grandfather was playing marbles with his sons at home in Williamsburg when he became President of the United States," Alfred Tyler told me.

Friendly neighbors of the Tylers, Mr. and Mrs. Henry Bahnsen, live in a modest brick house at Upper Weyanoke. The dwelling, with rifle-slot windows in its thick walls, was built as a stronghold against savages. Because of Indian massacres in the first half of the 17th century, such frontier garrisons were constructed along the James River.

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← John Tyler's Home Stretches 300 Feet. What Modern Rambler Can Compare?

In 1845 the tenth President retired from the White House to Sherwood Forest, on the James River. He doubled the size of the original dwelling and then connected the detached kitchen and laundry (extreme right) to the main house by a closed-in colonnade. Adding a corresponding west wing for a ballroom and office, Tyler made the building one of the longest residences in the United States.

Today J. Alfred Tyler, the President's grandson, lives here with his wife and three children, James (left), Mary, and Emily.

Once a 1,500-acre plantation with 500 acres in production, the Tyler estate now cultivates one-eighth of its 1,000 acres.

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Howell Walker, National Geographic Staff

Thanks to the Bahnsens, Upper Weyanoke has survived. It is probably the oldest dwelling on the James River, and one of the least known. Far more elaborate estates in the vicinity, like Berkeley and Westover, attract most Garden Week visitors. Perhaps that is why I like the little garrison-home.

I like its setting, too. Upper Weyanoke (from the Indian for Land of Sassafras) sits pleasantly close to the water on its own peninsula, once the hunting ground of the Weyanoke tribe.

Sassafras trees still flourish here, but when my hosts strolled with me around their garden, I couldn't see sassafras for the other trees; 200-year-old boxwood growing 35 feet high, magnolias and figs, crape myrtle, gardenias, camellias, and poet's laurel stole the show.

Westover Produced Beautiful Byrds

So much has been written about Westover, on the James River, that I hesitated to enter the storied realm. But it proved irresistible. Westover stands for everything grand and majestic in the golden age of Virginia.

A descriptive folder handed me at the tall wrought-iron gates recommended that I walk across the lawn instead of following the path, to get a better first view of the house and setting. "Notice especially the row of large tulip poplars," it advised, "believed to be about 200 years old, and the oldest of them all (about 400 years old) at the far end of the lawn. Near the first tree on the river's edge is the exit to Westover's secret passage"—an escape tunnel kept in readiness in case of Indian attack.

Back in 1729, Col. William Byrd II of Virginia wrote: "In a year or 2 I intend to set about building a very good house."

The result was Westover, Virginia's most splendid example of Georgian stateliness. This three-story brick mansion stands as a monument to one man's genius and a young lady's grief.

Colonel Byrd had a daughter, Evelyn, whom he idolized. Schooled in England, she was presented at Court when 16 years old. King George I, touched by her loveliness, punned: "Are there any other as beautiful Byrds in the forests of America?" And, not to be outdone, William Pitt said he "no longer wondered why young gentlemen were so fond of going to Virginia to study ornithology . . . such beautiful Byrds were there."

Yet fair Evelyn's beauty led but to sorrow.

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Staff Photographer Bates Littlehales

Daffodils at Toddsbury Flash a Golden Signal of Spring

Begun by Thomas Todd about 1650, this Gloucester County home still shelters a Todd descendant, Mrs. Gordon Bolitho (left), together with her husband (right). North River shows through the ancient elms and oaks.

An English nobleman became deeply enamored of her, and she returned his love. Father Byrd didn't like the suitor, though, so he hurried his daughter back to Virginia.

In the garden and in the great mansion Evelyn sighed her lonely life away. She was buried seven years before her father.

Lengthy inscriptions upon his monumental tombstone tell the story and list the achievements of William Byrd II, "eminently fitted for the service and ornament of his country." The final sentence states: "To all this were added a great elegancy of taste and life, the well-bred gentleman and polite companion, the splendid economist and prudent father of a family, with the constant enemy of all exhorbitant power and hearty friend to the liberties of his country."

A 1733 entry in Byrd's diary tells: "When we got home we laid the foundation of two large Citys. One . . . to be called Richmond, and the other . . . to be nam'd Petersburgh . . . The Truth of it is, these two places being the upper most Landing of James and Appamattux Rivers, are naturally intended for Marts, where the Traffick of the Outer Inhabitants must Center. Thus we did build not Castles only, but also Citys in the Air."

Two Wars Ravaged Richmond

When Richmond succeeded Williamsburg as the capital of Virginia in 1779, it had some 700 people. The Revolution left the town "a scene of much distress." And the War Between the States broke the city's back, but not quite its heart. The great fire of 1865 laid waste entire blocks throughout Richmond.

So today, with some exceptions, the finest and oldest homes stand on the metropolitan outskirts. A few remaining in the heart of the city have become museums. For example, a 17th-century stone dwelling—the oldest in Richmond—has been turned into a memorial to Edgar Allan Poe. Another urban home converted into a museum is the brick house occupied from 1788 to 1835 by Chief Justice John Marshall.

During the present century some colonial residences have been moved bodily from the outlying country to the edge of Richmond. Others in the general area carry on as plantations beside the James River.

Shirley, about 20 miles southeast of Richmond, is one of these. It has stayed in the same family since 1723; nine generations of Carters have kept it out of the real estate market; and C. Hill Carter, Jr., intends to keep Shirley a farm and a home (page 468).

He came out to welcome me as I walked toward the square three-story house of brick. His mother also appeared on the porch to greet me. Surprisingly, she recalled the Saturday nearly 20 years earlier when I visited Shirley with my grandfather, Harrison Howell Dodge.

As superintendent of Mount Vernon from 1885 to 1937, Mr. Dodge became well acquainted with the old homes and families of Virginia. These friends helped him locate furniture, books, maps, and portraits that had strayed from the first President's mansion.

Shirley Parlor Boasts Running Water

Mrs. Carter led the way into her home, built nine years before George Washington was born. Passing through the great hall with its high-flying staircase, we entered the dining room where silver older than the building itself gleamed on the sideboard.

By the parlor fireplace I noticed two brass faucets. Mrs. Carter explained that until about 1800 the family dined in this room; after meals the ladies of the house themselves washed the most valuable china. From the taps issued hot and cold water for the chore; it was piped from a tank above the detached kitchen. One pipe, hugging the inner chimney bricks, supplied hot water.

Virginia's early plantation system made for scattered homesteads, and the larger ones commonly stood miles apart. Tobacco, the chief crop, called for more and more land as the soil became exhausted with continuous cultivation. Planters settled where they could obtain the maximum acreage, because it paid in the end. Then isolation was natural, desirable.

(Continued on page 469)

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Printed Scenes on a Paper Bosporus → Decorate the Walls of Eyre Hall

The estate has remained in the same family since Thomas Eyre received the land from the British Crown in 1662. His grandson, Col. Littleton Eyre, constructed the house about 1750. It stands three miles south of Eastville on Virginia's Eastern Shore.

Mrs. Henry duPont Baldwin (née Margaret Eyre) is the Colonel's great-great-great-great-granddaughter. Helped by a small neighbor, she here arranges pink dogwood, purple iris, and other flowers.

John Sutton of London made the silver bowl in 1692. Joseph Dufour of Paris manufactured the scenic paper in 1816. The print is called "The Banks of the Bosporus."

© National Geographic Society Staff Photographer Bates Littlehales

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↑ **Sheep and Black-stockinged Lambs Trim Goshen's Lawn**

This colonial farmhouse stands in Gloucester County.

↓ **An Original Franklin Stove Warms Roaring Springs**

Canaletto-style view of old-time London hangs above the mantel.

© Kodachrome by Howell Walker, National Geographic Staff

Entries Speed Past the Madison House in the Annual Montpelier Hunt Races

Col. James Madison built the central portion of Montpelier about 1760. His son James, fourth President of the United States, spent much of his life in the Orange County mansion. Dolly Madison, socially gifted wife of the President, made the place noted for hospitality.

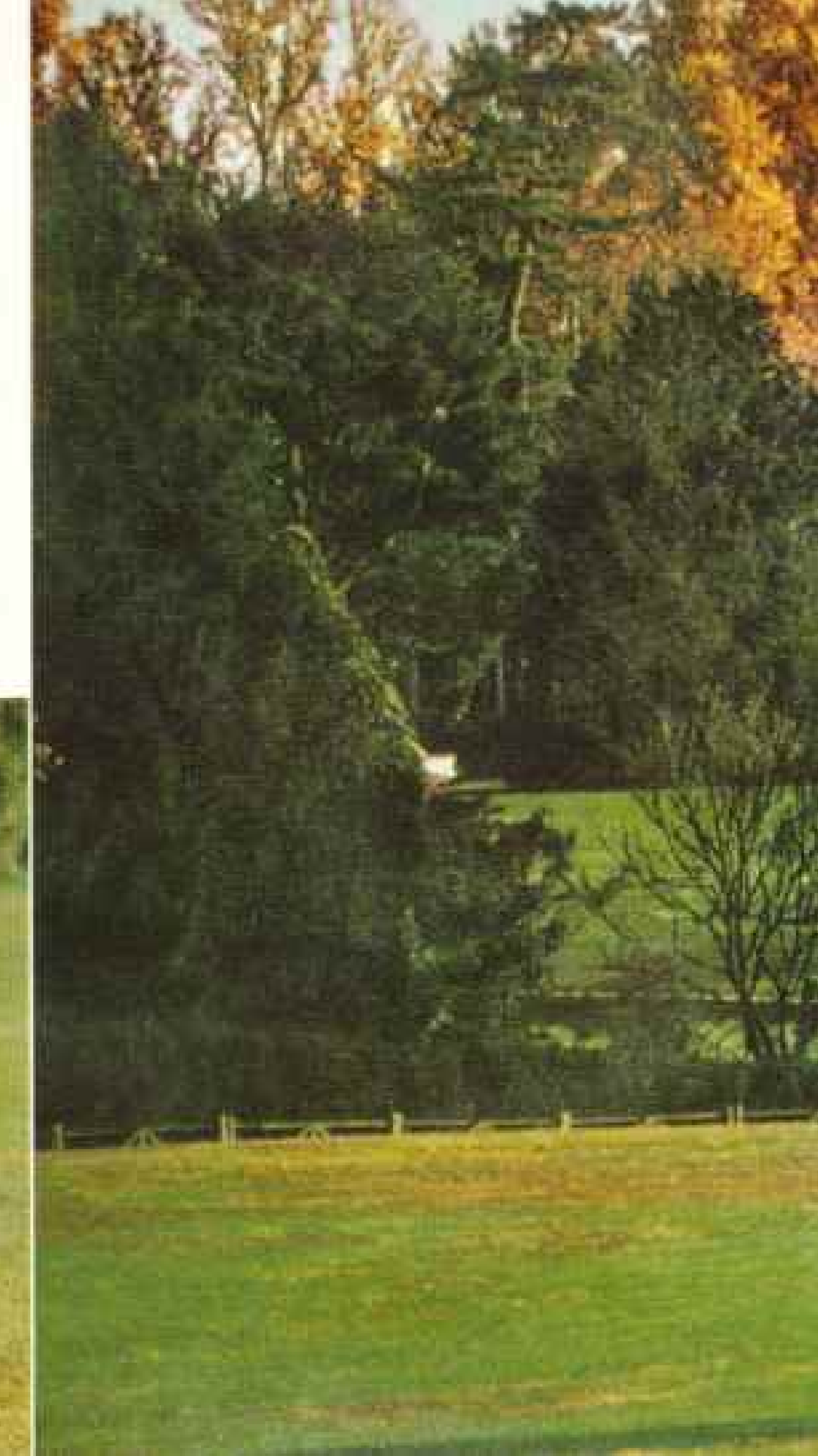
Mrs. Marion duPont Scott, who lives here now, continues the tradition. At last November's races she entertained approximately 5,000 horse fanciers, some of them from foreign shores.

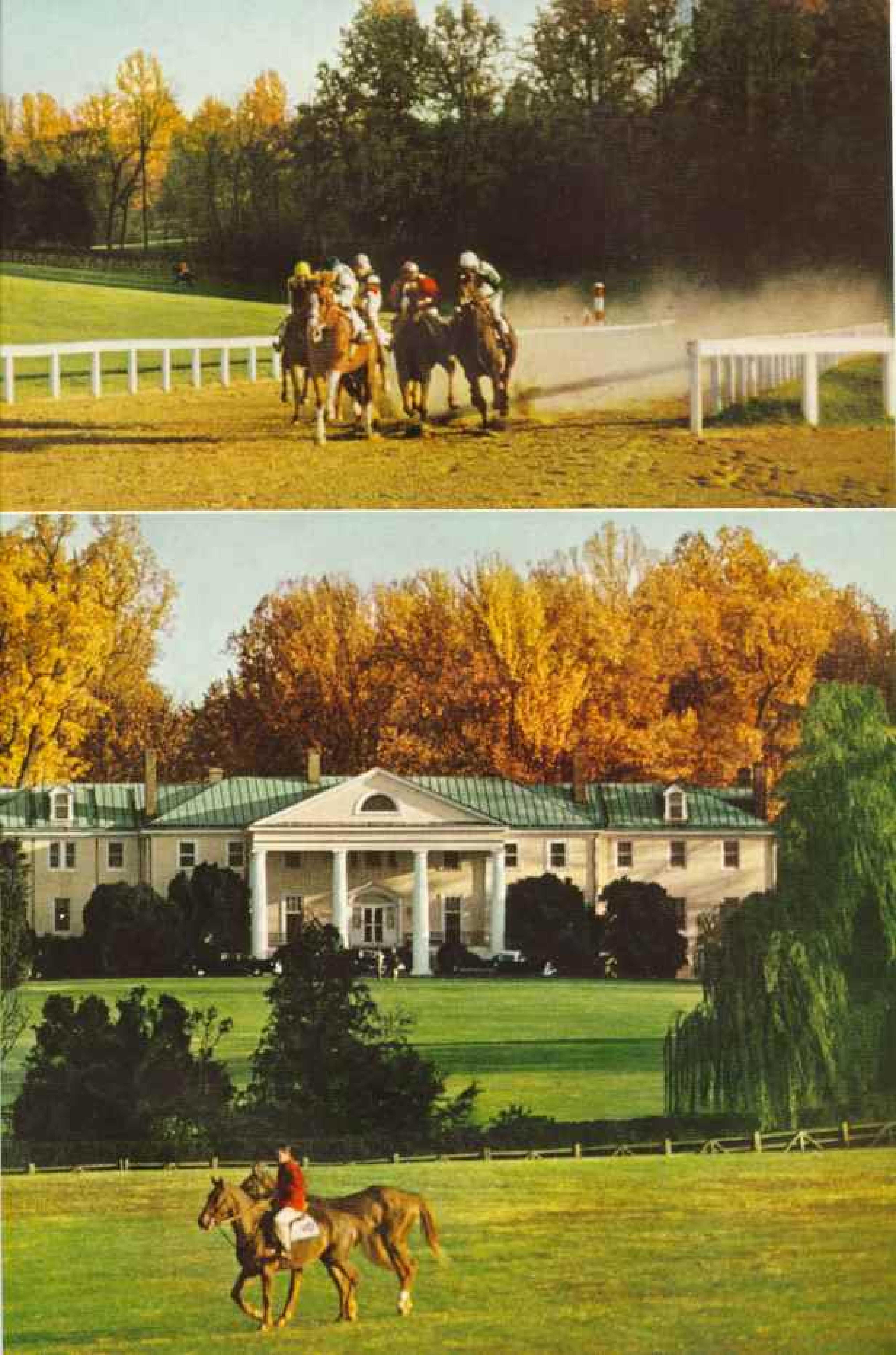
Above: "They're off!" in the Bellevue Plate, a flat race of about 1¼ miles. Yellow-capped jockey at left rode Brighty to victory by five lengths.

→A trainer leads Montpelier-bred Navy Fighter around to cool off from his third-place finish in the Bellevue Plate.

↓Green-blanketed Meot heads toward the paddock for the Montpelier Cup. She ran third.

© National Geographic Society
Staff Photographer Kathleen Revis





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Autumn Burnishes the Trees and Buffs the Fields of Oatlands, Near Leesburg

This Loudoun County property originally belonged to Councillor Robert Carter, one of Virginia's biggest landowners. His son George erected the stately home in 1802, using bricks burned on the estate.

Staff Photographer Kathleen Revis

Formal Gardens Are Restored to the Trim Lines of a Century and a Half Ago

Mr. and Mrs. William Corcoran Eustis, who acquired Oatlands in 1903, found the grounds neglected. They planted magnolias and hedges and laid out flower beds. Slaves occupied small brick houses beneath the large maple.

So it still seems to be on the Eastern Shore of Virginia, that slender 70-mile peninsula between lower Chesapeake Bay and the Atlantic.* The flat, fertile strip has an average width of eight miles and is divided into two counties: Accomack in the north, Northampton in the south.

Roller Skates Cheered Eyre Hall Bride

English rulers used to refer to "our faithful subjects in ye Colonie of Virginia and ye Kingdome of Accawmacke." Here indeed is a kingdom of rich earth and profitable waters —much truck farming and fat oysters. It is a pleasant land of broad fields and tall trees, clean salt air, sea gulls, and always more oysters.

Here is the long-established homestead, sometimes large, sometimes small. Here is where you see most often that delightful architectural hodgepodge called "big house, little house, colonnade, and kitchen," the result of adding to a home as necessity demanded.

Three miles south of Eastville I found Eyre Hall, named for Col. Littleton Eyre, who built the first part of the rambling frame house about the middle of the 18th century. The present owner is his great-great-great-great-granddaughter, Mrs. Henry duPont Baldwin (page 461).

One ancestor brought a 17-year-old bride from the gay city life of Baltimore to the loneliness of this rural Eastern Shore estate. She grew despondent and horribly homesick. To amuse the girl her husband gave her a pair of wooden roller skates. They did the trick. Merrily she rolled back and forth through the hall, perhaps to tunes from the Regency barrel organ still there.

For the pure pleasure of it, I traveled side roads without knowing where they might lead. Occasionally they ended abruptly at an inlet or among mountains of oyster shells; sometimes they wound for miles over level farming land; always they passed homesteads of the big house, little house, colonnade, and kitchen type. For me, it was joy just to be on the Eastern Shore.

An epitaph I came across in a family graveyard well described the simple but essential character of the Shore folk. It says only, "She made home happy."

What else need be said?

However much this peninsula cherishes its own home life, outsiders are graciously welcomed. Hospitality comes naturally. As a stranger here, I felt completely at home. In fact, I hated to leave.

Roaring Springs Silenced by Time

Back on the mainland of Virginia, similar bewitchment persisted in Gloucester County. Near the red brick courthouse I met Miss Emily Janney. She and her brother Samuel have inherited Roaring Springs, an early 18th-century frame homestead and farm (page 463).

It gets the name from a spring that must have roared at another time; I saw a placid pool in silent reflection beneath tall trees.

"When my father first came here, ironweed all but obscured the house," said Miss Emily, "and the lawn out there between the big elms was plowed up for corn.

"The dining room was so far gone with rat holes and burns and things that Daddy had to cover the floor with boards he ripped out of the barn; that's why it's a couple of inches higher than the hall floor. Mind you don't trip."

She called my attention to the capital on the right supporting column of the dining room mantel; it was worn to a nub, almost flush with the column.

"Daddy usually rested his feet there," she explained.

I made my way to Goshen, another pre-Revolution plantation in Gloucester County. Walking past sheep grazing on the lawn, I

Page 468

← Nine Generations of Carters Have Trod the Hanging Stairway at Shirley

An intriguing feature of this James River plantation homestead is a three-story staircase without visible support.

Here C. Hill Carter, Jr., master of Shirley, leans on the carved walnut balustrade. His sister, Mrs. J. Madison Macon IV, stands on steps worn thin by the feet of generations. Their mother, Mrs. Charles Hill Carter, appears above. An ancestor on canvas watches from the wall.

Another forebear, Anne Hill Carter, married Light-Horse Harry Lee at Shirley in 1793. One of their children, Robert E. Lee, became Commander in Chief of the Confederate Army.

Shirley has always operated as a plantation. The present generation raises crops and livestock on 800 acres. Several outbuildings are as old or older than the main house, which was built in 1723 (page 460).

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Staff Photographers Robert F. Sisson and Donald McBain

* See "Delmarva—Gift of the Sea," by Catherine Bell Palmer, NATIONAL GEOGRAPHIC MAGAZINE, September, 1950.

knocked at the front door of the white frame house (page 462). A second-story window went up, and a lady leaned out to say she'd be right down.

From a near-by smokehouse came the wonderful smell I'll always associate with rural Virginia. It's a nostalgic aroma easily recognized but hard to describe—a piquant blend of hickory smoke and succulent ham.

Musical Glasses Sing at Goshen

Miss Eleanor Perrin and her niece, Miss Eleanor Mackubin, invited me into their home. Among the furniture in the living room stood a chestlike piece that Miss Perrin called a harmonicon.

They cleared pictures, bric-a-brac, odds and ends off the lid of this chest, which opened to reveal 24 drinking glasses from three to five inches in diameter (page 455).

Miss Perrin wet her fingers and ran them smoothly around the rims of the tumblers. In gently ringing, soft, sweet tones the glasses responded with *Ach, Du Lieber Augustin.*

From the Institute of Early American History and Culture in Williamsburg, Miss Mackubin received a letter saying: "It appears that an Irishman, Richard Puckeridge, toured England in the year 1744 with an instrument similar to yours. No sooner did Franklin see a copy of it than he worked out a way to mechanize it, and his 'improved' instrument [is] the first invention in American musical instrument making . . .

"The original name was Glasspiel. The word Harmonica appears in English first in 1762 and seems to have been applied to Franklin's instrument. He called it Armonica . . . an ad for a performance in New York called it a Hydrodaktylopsychicharmonica!"

Miss Mackubin said that the hydrodaktylopsychicharmonica was inherited from her great-great-grandmother, Mrs. John Tabb.

Gloucester County is the home of the Todds and the Tabbs. Toddsbury, the "mother home," is one of the oldest continuously lived-in houses in the United States (page 458). The two families intermarried, living here

for generation after generation. The present owner, Mrs. Gordon Bolitho, is a descendant of Capt. Thomas Todd, who built the dwelling about 1650.

Slipper Heel Trips Bride-to-be

In neighboring Mathews County I heard more of the Tabbs when I visited Auburn, a Tabb-built mansion. Here in the 1840's lived Mary Eliza Tabb, a bride-to-be. The day she ran down the graceful stairway to greet her bridesmaids, a slipper heel caught in her hoopskirt. She fell to the bottom, struck her head against a table, and died.

"A Duncan Phyfe table, mind you," added a relative.

From Mathews County I went north across the Piankatank River into Middlesex County

Mounted Hunters Chase a Stag Around Elkington's Papered Walls

Original French scenic paper in this Eastern Shore home depicts the complete story of a hunt. Beginning with the waiting mounts and hounds (above sofa), the hunt continues until the stag escapes.

Mrs. George Willis III, daughter of Quinton G. Nottingham, the owner, opens the door for her husband, who carries in firewood.

↓An illuminating picture of the modesty of bygone generations: The hunt's only spill was placed in an obscure corner so that prying eyes could not see milady's exposed ankles as she tumbles heels over head.

Staff Photographer Bates Littlehales

Staff Photographer Willard R. Culver

Twin Stairways, One for Gentlemen, the Other for Ladies, Balance the Hall at Clifton

"King" Carter, the foremost real estate agent of colonial days, built this Northumberland County house as a hunting lodge. Staircases led to men's and women's bedrooms in opposite wings. Mrs. Lou Palmer Strong (left) and her sister, Miss Agnes Palmer, live here as have their forebears since 1800. Floor rugs are Navajo-made.

and stopped at Wilton. This house appears convincingly aged—mossy hand-split shingles on a gambrel roof, mellow bricks in Flemish bond, wavy windowpanes, and heavily weathered woodwork. I found it weirdly inviting, though not open to Garden Week visitors.

Now living at Wilton, the Gerald L. Ballantyne family collects antiques and holds auctions (page 454). Seeing that mother and son were busy preparing for a sale on the lawn, I walked around the outside of the house.

The two sections of the T-shaped building were built a century apart. In the end wall of the newer wing I saw a brick inscribed "WC 1763": William Churchill made this addition to the original home, which dates from 1653.

Lincoln's Portrait in a Rebel Album

Mrs. Ballantyne approached and said, "There's something inside that may interest you. Won't you come in?"

On a table in the kitchen lay a bound volume of *Harper's New Monthly Magazine* opened to the July, 1878, number. Mrs. Ballantyne flicked over the pages until she came to a picture of the dining-room fireplace in her house. It helped illustrate an article entitled "Some Landmarks of Old Virginia."

We went into every room, upstairs and down. All were crowded with furniture, books, and art objects accumulated over years of assiduous collecting. Aside from contents, each room was an architectural delight. I could have spent hours, days in the house.

"Guess whose photograph is in this old album," said Mrs. Ballantyne.

I couldn't, so she revealed a picture of Abraham Lincoln.

"And to think it came out of a Virginia home!"

"King" Carter Built Clifton

In Northumberland County I visited Clifton, originally constructed as a hunting lodge by Robert Carter (opposite). This fabulous real estate speculator, called "King" because of his vast holdings on Northern Neck, the peninsula between the Rappahannock and Potomac Rivers, collected rent from settlers in six different counties. When Carter died in 1732, he was worth 1,000 slaves, 10,000 pounds, and about 333,000 acres.

In 1800 a family named Palmer bought Clifton from King Carter's daughter. Today two Palmer sisters occupy the house. They told me that when their father returned from the War Between the States, he found Clifton quite untouched by the Yankees. But because he felt sorry for a friend left homeless by a fire, he took an entire wing off the building and presented it to him.

Washington's Mother Born at Epping Forest

Near the town of Lancaster one chill April Sunday I enjoyed an open fire with Mr. and Mrs. James D. Jesse at their home, Epping Forest. She is a direct descendant of George Washington's mother, Mary Ball, who was probably born in the room where we sat.

A niece of Mary Washington lived in the neighborhood at Belle Isle, a brick mansion with rooms nearly 12 feet high. But the house had been neglected; handsome paneling was removed. Mr. and Mrs. Lee Boatwright rescued the place in 1940 and restored it beautifully. A onetime big-city lawyer, Mr. Boatwright has become a farmer.

"What sort of farming do you do?" I asked.

"Raise Aberdeen Angus cattle and oysters; but it's the oysters that pay off."

Moving up the Potomac River, I stopped at Gunston Hall, built by George Mason between 1755 and 1758 (page 474). Here Mason drew up the Virginia Declaration of Rights, which became the basis of the Federal Bill of Rights. The house is a masterpiece of architectural detail. What better surroundings in which to contemplate "*the Enjoyment of Life and Liberty, with the Means of acquiring and poſſeſſing Property, and purſuing and obtaining Happineſs and Safety*"?

The last private owners and occupants of Gunston Hall were Mr. and Mrs. Louis Hertle. Through their generosity the estate passed in 1949 to the Commonwealth of Virginia.

While in the area, I paid a sentimental visit to Mount Vernon, that superb example of an 18th-century plantation and the joy of George Washington's heart.* I sat on the sunlit veranda, tasting the young May morning and feeling the peace of the place. Abruptly, a woman's strident voice shattered the spell.

"Well, I guess we live a lot better today than they ever did," she said. I wonder.

Between George Washington and Alexandria existed a lifelong association. It was, in fact, his home town; as an apprentice, he helped survey its boundaries and streets. Here he received command of troops for the first

* See "Mount Vernon Lives On," by Lonnelle Aikman, NATIONAL GEOGRAPHIC MAGAZINE, November, 1953.

time; here he saluted his last military review.

And here I enjoyed a pleasant revelation. For years I had been unaware of Alexandria's cobbled lanes and "flounder" houses with high windowless walls.* Now to explore them is like rummaging in a fascinating old attic; to enter homes on Prince, Duke, King, Fairfax, Lee, and St. Asaph Streets is especially rewarding. Restoration has saved some dwellings; others have weathered well.

"Isn't it good I haven't had the money to alter this house?" said Mrs. Clarence Leadbeater of Alexandria, showing me the kitchen with its big fireplace and Dutch oven.

The Leadbeater House has stood on North

* See "Across the Potomac from Washington," by Albert W. Atwood, NATIONAL GEOGRAPHIC MAGAZINE, January, 1953.

↑ **Boxwood Borders the Garden Aisles at Gunston Hall**

In design, detail, and livability, few colonial homes can equal this exquisite brick dwelling (page 473).

Gunston Hall overlooks the Potomac five miles downriver from Mount Vernon. George Mason, friend and neighbor of George Washington, built the house between 1755 and 1758. Both men frequently exchanged prized plants from their gardens.

Gunston Hall's formal gardens were restored by the Garden Club of Virginia.

← **At This Modest Desk a Pen Let Freedom Ring**

In his study at Gunston Hall George Mason wrote Virginia's Declaration of Rights, which expressed the sentiments of an America that stood for the enjoyment of life and liberty. From it evolved the Bill of Rights, comprising the first 10 amendments to the Federal Constitution.

Staff Photographer J. Baylor Roberts

Washington Street since the early 1800's. Though I've often passed the front door, I did not consciously see it until 1955. Alexandrians say it was built by Anthony Cazenove, affectionately remembered as the last gentleman in town to wear knee breeches.

Dinosaurs Lived at Oak Hill

The place where I least expected to find dinosaur tracks was at Oak Hill in the vicinity of Leesburg. I saw them in stones quarried locally for the garden terraces and walks of this estate. They indicate the presence of three-quarter-ton reptiles in Virginia some 170,000,000 years ago.

Since 1948 Mr. and Mrs. Thomas N. DeLashmutt have owned Oak Hill. The august building was erected in the early 1820's as a country home for James Monroe, fifth United States President. While resting here in 1823, he formulated what became the Monroe Doctrine (page 478).

In the mansion I admired two exquisite white-marble mantels. General Lafayette sent them to Monroe from Europe in appreciation of hospitality received at Oak Hill in 1825 (page 480). Mrs. DeLashmutt pointed to where a Union trooper, with pistol butt, chipped souvenirs from one of the mantels.

A visit to Montpelier, imposing Orange County home of James Madison, recalled happier times between wars. It is not difficult to picture the gay life enjoyed at this estate by the retired fourth President of the United States, especially with such a popular and socially gifted wife as Dolly (she spelled it "Dolley") Madison, easily the country's most bountiful hostess. Those were the days when 90 guests sat down to lunch.

Madison personally saw to it that every dinner in his home was a formal ceremony, the dishes profuse but proper, the champagne rightly iced. To the pleasures of the dining room he gave thought and care, because he particularly liked entertaining at a table that brought good food and good company together.

A prodigious collector of books, Madison finally found himself crowded right out of his library by the mounting stacks.

But then he could go to the extensive garden, which, some say, Lafayette planned. Appropriately, the topiary boxwood and formal plots were manicured by a French gardener. With his own rheumatic hands, the slightly built Madison planted the mighty cedars of Lebanon now towering over the lawns.

Not far from the garden he loved, the master of Montpelier went to his last resting place in 1836. One hundred slaves stood by, solemnly weeping as the earth covered the "Father of the Constitution" who, ironically, was an opponent of slavery.

Slaves built Prestwould, a big stone house overlooking the Roanoke River, after victory in a three-day card game transferred the property to Sir Peyton Skipwith about 1750. It stayed in his family until 1914.

Hounds Welcome Author to Prestwould

Prestwould is not open to Garden Week visitors, but I could hardly omit it from my tour of Virginia homes. When I reached the plantation, which lies in Mecklenburg County two miles north of Clarksville, seven yelping hounds challenged me. I happen to be fond of dogs, and I think they sensed it. With the animals hanging from me like streamers on a Maypole, I struggled toward the house. Mr. Grover C. Kester, the owner, rescued me.

The mansion has six rooms on the main floor. I saw three, immense in every dimension. On one wall of the living room, rare early 19th-century paper depicts an English hunting scene with men in pink coats not the least faded. From the high ceiling of the same room hangs a punkah, a tremendous wedge-shaped fan geared to slave labor.

After admiring these features of another age, I turned and faced slam-bang into a television screen. And why not? After all, is this a home or a museum?

That question inevitably arises in a discussion of old Virginia houses. For an answer I turned to one that combines 18th-century grace with modern comfort and uses the original garden site. It is Kinloch, in the vicinity of Mr. Jefferson's Charlottesville.*

"Instead of living in a museum, I think it's more interesting to live in a house that reflects the history of our American culture," said Linton Massey, the owner of Kinloch.

Edgemont Shows Jefferson at His Best

Thomas Jefferson, a lawyer by profession, made a hobby of architecture. Besides his own Monticello, he designed other homes for friends in his native county of Albemarle.

An elegant example is Edgemont (page 483). Faultless proportions and porticoes on each of the four façades lend the building classic symmetry. At the west front the house appears to have but a single story; actually, the land drops away from the other three sides to reveal an entire lower floor.

So Edgemont seems to float above its terraces and deep-green boxwood like a white summer cloud. Graceful at a glance, exquisite in detail, this country dwelling shows Thomas Jefferson at his architectural best.

As a home it was continuously occupied from 1796 to 1922. Ostensibly, no one stayed here for the next 12 years; but moonshiners operated a still in the basement kitchen.

Even in its shabbiest state it attracted Mr. and Mrs. William Scott Snead. As soon as they could, they moved in. The present appearance of Edgemont is a tribute to them. The Sneads know, however, that architectural style and sound construction really saved the building. I think Mr. Jefferson would be very proud of Edgemont today.

Fifty-four Servants for Monticello

At Monticello I heard a visitor say, "If Jefferson installed a dumb-waiter for his wine, why not one for food, too?"

"Because he had 54 house servants," explained a guide.

On top of that, Thomas Jefferson had another household eight miles southwest of Lynchburg. To this retreat, called Poplar Forest, the great Virginian escaped from too many friends and the endless flow of irksome sycophants at Monticello.

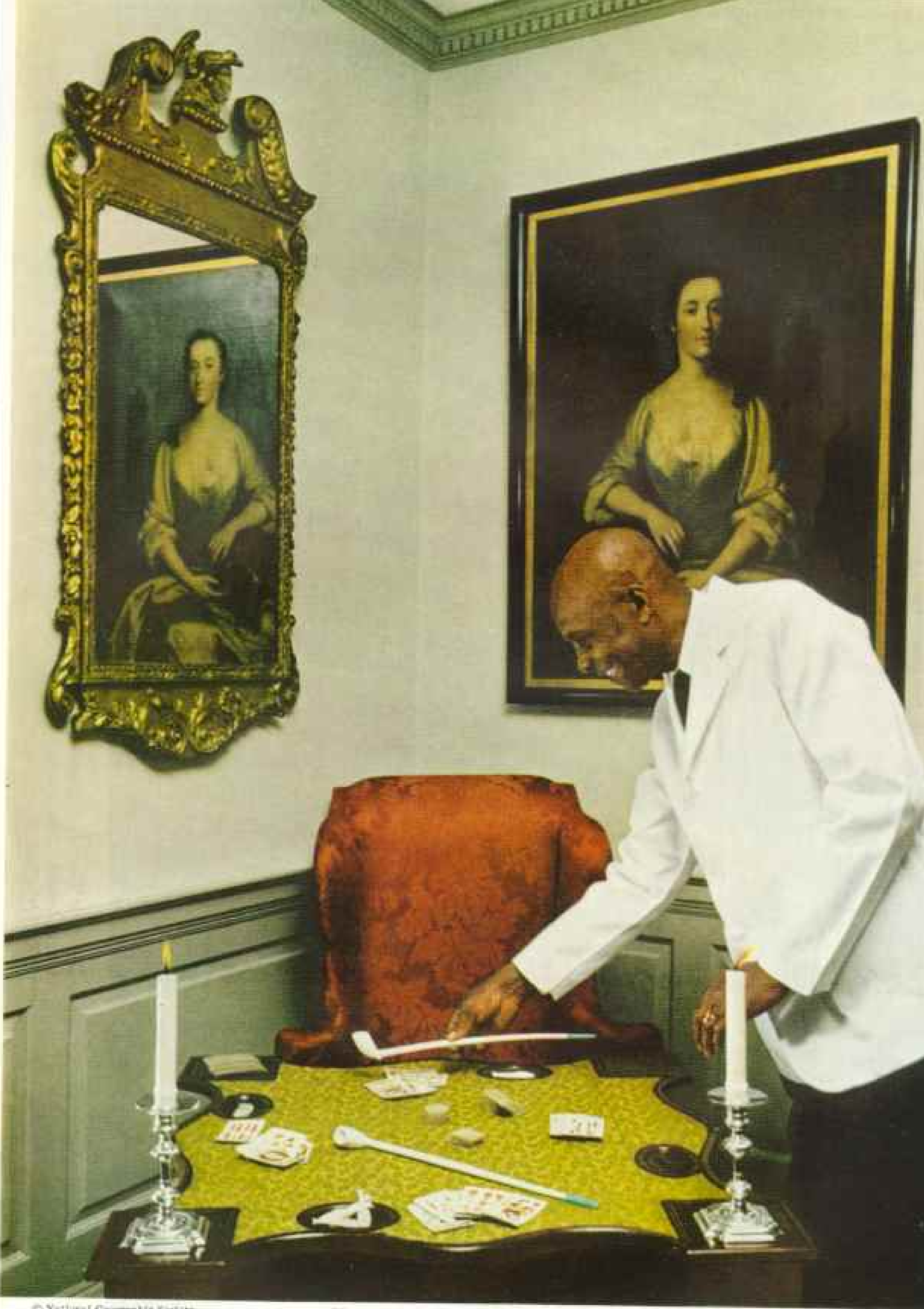
Though never free of financial worries in his last years, Jefferson managed to maintain his two properties until the end. After he died, however, his furniture, silver, pictures, even Monticello, were sold to pay his debts.

Some persons today feel that country estates and high costs cannot live together much longer. They say that the big house and all its aristocratic trappings have been on the way out for years, and now are doomed.

I cannot entirely agree. Virginia's colonial homes have weathered difficult decades in the past. They will be equal to whatever lies ahead, I think, because they stand for a chapter of this country's history every American is proud to remember.

In any case, I cannot imagine Virginia without its plantations; or Shirley without the Carters; or Carter's Grove without ghosts, guests, and Mrs. McCrea. Moreover, who would play that hydrodaktylopsychicharmonica if Goshen should become a museum?

* See "Mr. Jefferson's Charlottesville," by Anne Revis, NATIONAL GEOGRAPHIC MAGAZINE, May, 1950.



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Kodachrome by Staff Photographers Robert F. Sisson and Donald McBain

Alexandria: Cards and Clay Pipes Amuse Guests in Fairfax House's 18th-century Parlor

© National Geographic Society

Staff Photographer Willard R. Culver

↑ **Oak Hill Owes Its Classic Beauty to Designer Thomas Jefferson**

Here in 1823 owner James Monroe drafted his famous doctrine. Doric columns grace the south portico (page 480).

↓ **Chelsea's Paneled Walls Date from 1709. Lafayette Slept Here**

Col. and Mrs. Charles Reed and Mrs. Clinton Williams (center) enjoy tea in the King William County mansion.

© Kodachrome by Staff Photographers Robert F. Sisson and Donald McBain

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Staff Photographer Willard R. Culver

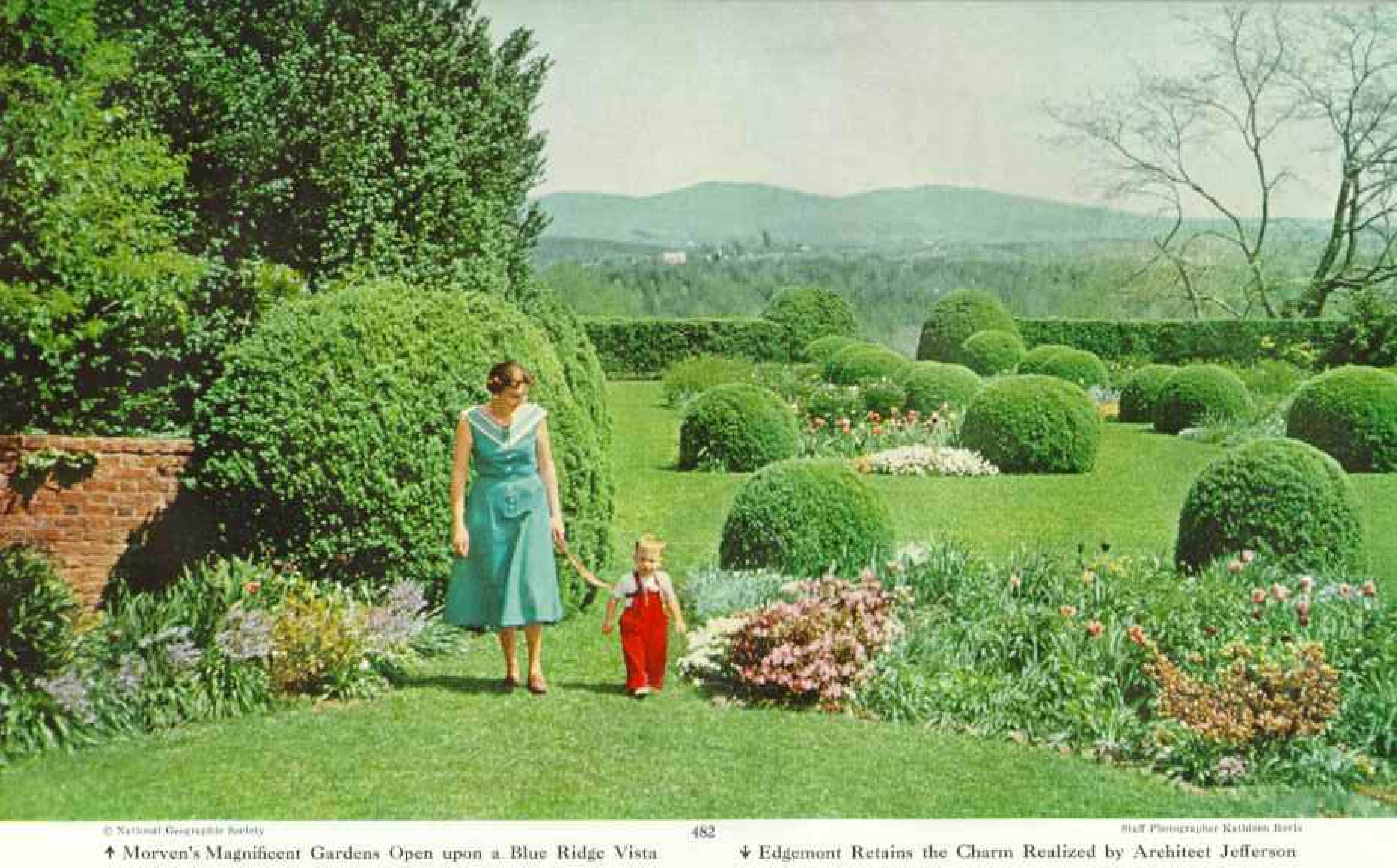
Lafayette, Oak Hill's Guest in 1825, Presented This Marble Mantel to His Hosts

Mr. and Mrs. Thomas N. DeLashmutt own the Loudoun County estate where James Monroe lived after leaving the White House. An Aubusson tapestry carpets the parlor. Tea service is Meissen china.

© Kodachrome by Staff Photographer Volkmar Wentzel

The Fifth President Converted Monroe House from Farm Home to Showplace

Today the house belongs to the University of Virginia. Prof. Wilbur Nelson (left), head of the University's geology department, and Mrs. Nelson have occupied it since 1945. These students call on a Sunday afternoon.



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Staff Photographer Kathleen Revis

↑ **Morven's Magnificent Gardens Open upon a Blue Ridge Vista**

Home of Mr. and Mrs. Whitney Stone, Morven is a neighbor of Monticello and Ash Lawn on "Presidents' Road" near Charlottesville.

↓ **Edgemont Retains the Charm Realized by Architect Jefferson**

Airy rooms look onto porticoes on four sides. Mr. and Mrs. William Scott Snead (left and center) own this Albemarle County house.

New National Geographic Map Highlights Washington Area History

EVENTS spanning three and a half centuries of history are etched against their geographical background in the National Geographic Society's latest 10-color map, Round About the Nation's Capital.

In fact, the descriptive notes on this map span 351 years—from the first permanent English settlement in the New World, at Jamestown in 1607, to 1958, the completion date for the Baltimore Harbor Tunnel. This underwater link will expedite automobile traffic between Washington and the North.

Drawn by The Society's cartographers and reproduced in a total edition of 2,186,000 copies, the new map goes to members throughout the world as a special supplement to their April NATIONAL GEOGRAPHIC MAGAZINE. To many it may prove an eloquent guide for a springtime pilgrimage, since it appears in the month when all roads lead to Washington for cherry-blossom time. With its aid others may follow Howell Walker on his rambles to historic homes where "History Keeps House in Virginia" (page 441). But for all it will offer an armchair trip through some of the most eventful scenes in the story of the United States.*

Within the area of this map the Union was born in 1776 and saved some "fourscore and seven years" later. Here were fought the climactic battles of both the Revolution and the Civil War, culminating in the surrenders at Yorktown and Appomattox. As haunting as the far-off notes of a bugle are such names as Brandywine, Germantown, Valley Forge ...Gettysburg, Antietam, Cold Harbor....

The hub of the map is Washington the city, and in a sense its central figure is Washington the man. More notes refer to George Washington than to any other individual—and no wonder: he was born here, at Wakefield, and died at Mount Vernon. In his eventful, energetic life as surveyor, soldier, statesman, and squire, he roamed over most of this region and in 1791, with the authorization of Congress, he personally chose the site of the Capital City. As a map note shows, more than a million persons last year trooped to his Mount Vernon home and tomb.

In this fact-packed map will be found the answer to at least one real catch question. Who was the "first President of the United States"? The answer: John Hanson of Maryland (under the Articles of Confederation).

Homes of Nine U. S. Presidents

Of the 34 Presidents of the United States under the Constitution, the map shows the homes of 9: in Virginia—George Washington (first), Thomas Jefferson (third), James Madison (fourth), James Monroe (fifth), William Henry Harrison (ninth), John Tyler (tenth), Zachary Taylor (twelfth), and Woodrow Wilson (twenty-eighth); and in Pennsylvania, James Buchanan (fifteenth).

Yet despite such notes redolent of the past, the map is thoroughly up to date. Motorists will find it of convenient scale—9.2 miles to the inch—with all the principal highways, expressways, and airports in red, main railways, tunnels, and passes in black.

Even on a map this is smiling country, especially in spring. From the long dark ridges of the Alleghenies the land slopes gently down to the tidal estuaries of the rivers, to Chesapeake Bay and the open sea.

The area mapped extends from Philadelphia, birthplace of the Nation, to North Carolina. It includes all of Delaware and Maryland as well as part of Pennsylvania, New Jersey, West Virginia, and North Carolina. But mostly it consists of Virginia.

Members, however, will look in vain for a note pointing out the birthplace of the composer of "Carry Me Back to Old Virginny." James A. Bland (1854-1911), Negro composer of this semi-classic, was born in Flushing, New York!

* Members may obtain additional copies of the map Round About the Nation's Capital (and of all standard maps published by The Society) by writing to the National Geographic Society, Washington 6, D. C. Prices, in the United States and elsewhere, 50¢ each on paper; $1 on fabric. **Indexes to place names, available for this and most other maps, 25¢ each.** All remittances payable in U. S. funds. Postpaid.

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← Flowers Blanket Lawn and Terraces; Rose Hill Is Famous for Its Gardens

Boxwoods, hollies, and magnolias create a setting of year-round green on the estate near Charlottesville. Early spring produces these masses of white candytuft, creeping phlox, and golden alyssum.

Mrs. James Gordon Smith owns the property, which includes a Georgian-style mansion (not shown). A guest house appears in the background.

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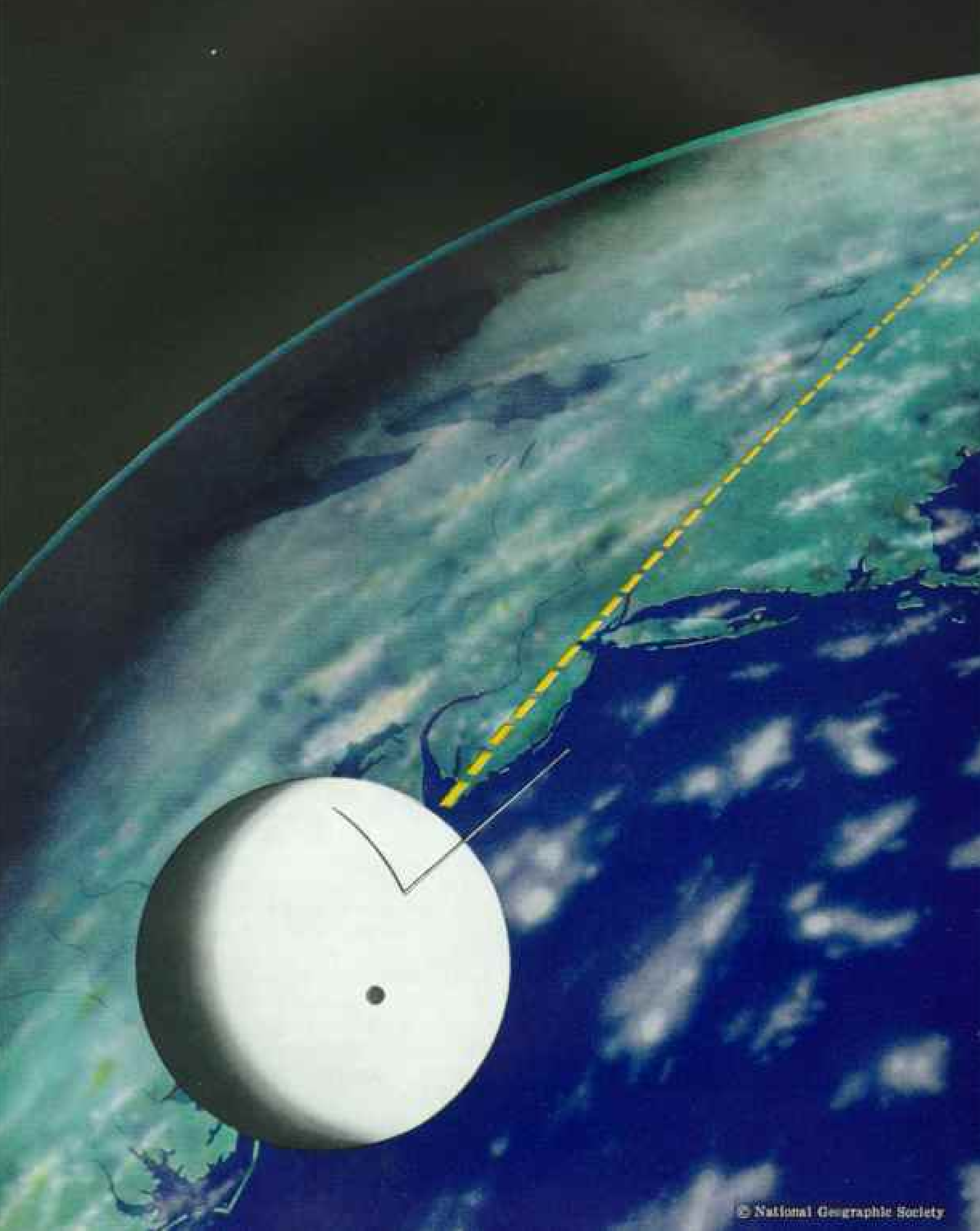
Staff Photographer Kathleen Revis

SPACE SATELLITES
TOOLS OF EARTH RESEARCH



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By Heinz Haber

With Paintings by William N. Palmstrom, National Geographic Staff

A HUGE sphere floats in space. Its soft outline forms a nearly perfect circle against the black backdrop of the universe with its spray of needle-sharp stars.

The sphere glows softly with color—subdued shades of green, gray, and orange—broken by broad patches and streamers of dazzling white. But mostly the sphere is blue. It has a transparent cast of blue all over, and wide areas of its surface are a dark inky blue, almost black. A glistening highlight in the blue lends a sweeping roundness.

This majestic sphere is the most beautiful planet of the solar system. It is Earth, the blue planet, the home of man (page 498).

Close to the earth a small object sweeps through space—an object elevated to the rank of a celestial body through man's technical ingenuity. Like the moon, it swings around the blue planet in a globe-circling orbit, for this tiny man-made object is an artificial satellite of the earth.

At present the satellite does not exist. However, within about two years it is expected to be coasting through space as the result of a great research project carried on intensively since July 29, 1955. History will record that date as the day the White House announced

Man-made Moon Coasts in Space: an Artist's Concept of the Future

Pages 486-7: What will a future satellite look like? Or the earth as viewed from space?

No man has been in space, of course, and detailed specifications for the artificial satellite have not been revealed at this writing. Yet dozens of questions had to be answered before staff artist William N. Palmstrom could paint the remarkable illustrations accompanying this article. To guide him, The Society obtained the help of two experts in the fields of astrophysics and rocketry (see note below). They advised the artist at each step.

Other prominent physicists checked the conclusions, even to the delicate earth shadings of blue, green, and brown as seen from great heights. Problems of perspective for the paintings were solved mathematically by Wellman Chamberlin, National Geographic cartographer. Other staff cartographers contributed painstaking research.

In this first painting, powerful rockets have borne an imagined satellite 300 miles high (page 492). The United States plans to launch several of the little space vehicles during the International Geophysical Year (1957-58).

Free of its rocket assembly, the satellite passes the eastern seaboard of the United States. Faster than the swiftest rifle bullet, it swings northeastward along the Atlantic Coast at more than 17,000 miles an hour. Whiplike antennas send radio signals to ground stations. Broken yellow line indicates this satellite's path in an orbit inclined 75° to the Equator (see diagram, page 505). Centrifugal force, balancing the pull of gravity, holds the sphere in its globe-girdling orbit.

The first satellites may have tiny windows through which ultraviolet or cosmic radiation will be measured. Four are equally spaced on this model. One shows as a black dot; three are out of sight.

Earth is portrayed as it would appear in clear weather at 6 a. m., eastern standard time, in late September. Night still darkens the mid-continent.

© National Geographic Society

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that the United States would build the first true space vehicle.

During the greater part of its repeated trips around the earth, the artificial satellite with its instrument payload will cruise through empty space—or, rather, it will travel through the fringe area of the atmosphere where the last traces of air become lost in the great void beyond. This is extremely interesting territory—in several ways.

First, the orbiting satellite will have an unobstructed view into the depths of space, the source of many kinds of rays and particle streams that bombard the earth: solar radiation in many forms, cosmic rays, and meteoric particles. They will reach the satellite without having suffered drastic changes or having been absorbed completely by passage through the air ocean, as is the case when we try to observe them from the ground. The importance of these cosmic factors in the physics of our planet has become increasingly clear during recent years.

Second, as the satellite sweeps across continents and oceans, the details of its motion will give us many clues concerning the upper atmosphere and the earth as a physical body.

Eventually, larger satellites could monitor the entire earth and the events taking place within its atmosphere. They would have a "space" view of the world.

Actually, the picture of the world has long been a familiar symbol to us all. For centuries people have drawn maps and fashioned globes. When you look at a map you picture yourself as being there, at a certain spot—America, Europe, the North Pole. When you spin a globe, you are making a trip around the world. But the mental picture of the earth as a planet in space is a new thing.

Viewpoints Change as Space Flight Dawns

This different look that our planet has assumed results, of course, from the exciting promise of space flight. During the last 5 to 10 years the public has been exposed to a deluge of information about interplanetary travel. It thrives as a favorite subject of popular-science writers, of newspaper and magazine editors, of book publishers, of television and motion-picture producers. The best illustrators have been enlisted to portray the colorful vistas of the space frontier.

Most of these treatments are pure fantasy, and they do not pretend to be more than tales of fiction and adventure. This kind of literature, though, has made people acutely aware

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Artist, Consultant, and Author →

Dr. Heinz Haber (opposite page, right), a distinguished astrophysicist and former research scientist for the U. S. Air Force, has taken sabbatical leave from the faculty of the University of California at Los Angeles to fill the post of scientific consultant for Walt Disney Productions. Dr. Haber's numerous writings on astrophysics and the problems of extraterrestrial flight include the book, *Man in Space*. His educational background lists degrees in astronomy and physics from the University of Berlin.

Both Dr. Haber and Dr. S. Fred Singer, University of Maryland physicist, acted as consultants in the preparation of the striking paintings by cartographic artist William N. Palmstrom. Dr. Singer, a member of the Technical Panels on Rockets and on Cosmic Rays of the United States National Committee for the International Geophysical Year, currently devotes much of his time to high-altitude rocket research for the Department of Defense.

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Kodachrome by Staff Photographers J. Baylor Roberts and Donald McBain

Three Minds Create a Painting: Artist and Experts Study a Satellite Model

Physicist Singer (center) and author Haber answered technical questions for artist Palmstrom. The rocket and satellite models, designed last winter by Dr. Singer, embody ideas current at the time. It is now known that antennas of the first satellites will be whiplike and that rockets will have no fins and be longer and thinner (page 492). Painting shows an earlier version of the scene on pages 486-7.

of the fact that man lives on a planet that is only one among several.

On the other hand, such stories have a tendency to becloud the issue, for they add much to the confusion that exists in the public mind about the true potential of space flight. They contaminate reality in a field where fact and fiction are already difficult to keep apart.

However, from our modern knowledge of rocket engineering and aeronautical and aeromedical research, there emerges today a fairly clear picture of the possibilities of space flight. Soon man will extend his reach beyond the boundaries of the film of air that envelops the earth. This extension is inevitable; modern man is committed to a course of scientific and technical progress.

As in all other areas of pure and applied science, progress in the fields of aviation and rocketry has been spectacular. Less than a generation ago space flight was no more than a gleam in the eyes of a few enthusiastic rocket engineers. Their small, makeshift rockets were able to struggle only a few hundred feet into the air (opposite page).

Wac Corporal Soars 250 Miles

In 1942 the V-2 made its first successful flight. Born of the desperate efforts of the German war machine, the rocket reached a height of almost 60 miles. After the war American engineers surpassed this height considerably with captured V-2 rockets and later with their own designs, such as the record-breaking Viking that rose to a peak of 158 miles. As this is written, a two-stage rocket (left) holds the altitude record for a man-made device, 250 miles.

During the postwar years the rocket engine also evolved as an aircraft power plant. Manned rocket airplanes have exceeded 90,000 feet, and they have flown 2½ times the

← Two-stage Rocket Roars Aloft for a World's Record

In 1949 United States scientists fired this assembly of a captured German V-2 and an American-built Wac Corporal. The huge V-2, acting as booster, fell away after its fuel gave out. Then the second-stage Corporal took over and attained an unprecedented altitude of 250 miles. It landed about 100 miles away.

Here the V-2, bearing the pencil-like second stage on its nose, takes off at White Sands Proving Ground, New Mexico.

Combinations of three rockets will carry the satellites into their orbits (page 492). U. S. Army, Official

speed of sound. Space, not the sky, has become the limit.

Yet, despite these advances, the conquest of space remained, until recently, only a promise. The last 10 years were a time of planning and programing and of discussions about the purposes and goals that lie ahead.*

Age of Space Takes Dramatic Turn

Then, with the announcement of the satellite program, the short history of space took a sudden and dramatic turn. Space flight changed from a mere dream to an active research project. Of course, neither humans nor animals will ride the satellite, and I certainly would not hazard a guess when man will challenge space as a passenger in an artificial moon. The problems are enormous, as we shall see.

Nevertheless, we shall soon witness our very first practical flight into space, with great promise for the future.

When I first heard that the satellite project had become a reality, my thoughts went back to 1949 when I, an astrophysicist, was assigned to the Air Force's new Department of Space Medicine at Randolph Air Force Base, Texas. At that time Maj. Gen. Harry G. Armstrong was commandant of the School of Aviation Medicine. As early as 1948 he clearly foresaw the exciting aviation develop-

* See "Fact Finding for Tomorrow's Planes," by Hugh L. Dryden, NATIONAL GEOGRAPHIC MAGAZINE, December, 1953.

Inventor Goddard Assembles His Liquid-fuel Rocket, Forerunner of the V-2

Dr. Robert H. Goddard, a New England physicist, pioneered in rocket experiments in the 1920's and '30's. Some fellow scientists recognized his genius, but the press often called him the "moon-rocket man" because of his interest in space flight. Germans used many of his conclusions in perfecting the V-2.

This skeletonlike rocket became the first to achieve flight with liquid fuel. Dr. Goddard fired it shortly after the picture was taken on March 16, 1926, near Auburn, Massachusetts. The epochal flight lasted 2.5 seconds; the rocket rose 41 feet and traveled 220 feet at a mile a minute.

Braced metal tubes supported the rocket at rest. Cone-capped cylinders at bottom held liquid oxygen and gasoline, which they fed to the rocket engine at top. Though linked only by slender tubes, fuel tanks and engine flew as a unit. An assistant started the flame with a blowtorch.

Later Dr. Goddard developed the Nell, a covered rocket with engine in the rear. In 1935 one Nell rose 7,500 feet above New Mexico; another reached a speed of 700 miles an hour.

As early as 1918 the inventor showed the military a recoilless rocket launcher. The Army did little about the novelty until World War II, when it brought forth the Goddard invention as the bazooka, first weapon to give the individual foot soldier a fighting chance against a tank.

During World War II Dr. Goddard served in the Navy's research laboratories near Annapolis, Maryland, helping to develop jet-assisted take-off and other rocket devices. He died in 1945, before the Army began testing German V-2's.

Some 200 patents left behind bear witness to Dr. Goddard's 30 years of trail-blazing research.

Esther C. Goddard

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Fuel Spent, a Pencil-like Booster Spawns Another in Predawn Sky Above Florida

Three finless rockets stacked atop one another will carry the satellite into space. Here, 40 miles up, the first stage is jettisoned above the Atlantic following the take-off from Patrick Air Force Missile Test Center on Cape Canaveral. Seen across south Florida, Cuba appears as a thin, bluish line. Stars are shown in exact positions.

Perspective projection by Wellman Chamberlin

Fire Gushes from the Second Stage as It Continues Climbing Toward the Stars

The pointed third stage, attached to its booster, will release the satellite from its nose after they enter the orbit. Lack of air drag will enable the sphere to coast at nearly five miles a second, with its discarded housing trailing along. Here the rockets reflect the sun's first rays. Glowing clusters spotlight Miami (top) and West Palm Beach.

ments that lay ahead. In 1950 he wrote:

"I believe that someday we will travel beyond the stratosphere. I have no reason to believe this except that I think—as General [William] Mitchell did—that we will continue to progress and travel farther and farther from the earth. With this in mind, a new department of the School of Aviation Medicine was created which we refer to as the Department of Space Medicine. . .

"For the past two years this laboratory has been devoting its efforts to determining theoretically the effects on the living organism of travel beyond the stratosphere."

"But Keep Your Feet on the Ground"

As our Department of Space Medicine made its first inquiries into this exciting new field of science, it became increasingly clear to us that space would soon become a serious business. But we realized, too, that we would have to be practical about our tasks. Space medicine was not a means of preparing man for a trip to the moon.

No, our goals were far more modest. We knew that the development of aviation would soon catch up to our term, "space medicine." And it did, for manned aircraft now fly at heights where the thin atmosphere threatens pilots with many of the hazards of actual space.*

Dr. Hubertus Strughold, the head of our department, once summed up our philosophy with the statement that we should always strive to "keep space flight down to earth." So the motto of our department became:

Raise your eyes to the stars—
But keep your feet on the ground!

This motto, selected more than seven years ago, might well serve as a heading for the first chapter of space flight, which is about to unfold before our eyes. The satellite program, like General Armstrong's action in organizing a Department of Space Medicine, shows sweeping vision, yet it is an attainable and conservative goal.

In many ways the project's purpose will be quite different from what the public expects. The artificial satellite will not be the beginning of a new-weapons development, and it will not be built because its creators are planning a trip to the moon. The satellite program has been initiated as a purely scientific research project designed for the enhancement of knowledge about our own planet.

These sober facts are substantiated by the nature of the project's initiation and execution. It grew out of resolutions adopted in 1954 by three international scientific bodies, notably the Comité Spécial de l'Année Géophysique Internationale, which recommended "that thought be given to the launching of small satellite vehicles" for research in the upper atmosphere. This special committee of the International Council of Scientific Unions is in charge of arrangements for the International Geophysical Year, July 1, 1957, to December 31, 1958, the great international study of the physical environment common to all mankind.†

The satellite program of the United States is a part of the Nation's participation in this greatest scientific project in history, in which some 42 countries are enrolled. It is being carried out under the direction of the U. S. National Committee for the International Geophysical Year, appointed by the National Academy of Sciences and headed by Dr. Joseph Kaplan, professor of physics at the University of California at Los Angeles.

Thus it is a civilian scientific program, although the three military services under the management of the Office of Naval Research will have the tremendous task of getting the satellite into its orbit. This Defense Department share of the effort is known as Project Vanguard. Its director is Dr. John P. Hagen of the Naval Research Laboratory.

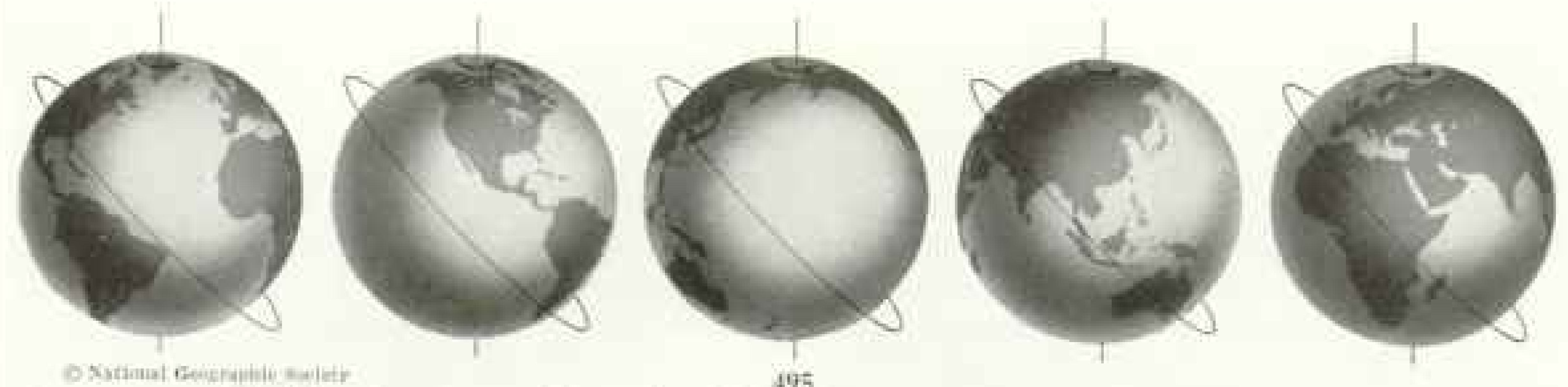
Satellite Belongs to All Men

Because of its connection with the IGY, the reality of space flight will have an extremely gratifying and encouraging beginning. Space and the atom are the two most exciting promises of modern science. Under the pressures of a world at war, the Atomic Age had an unfortunate start. As yet, fear casts a dark shadow that obscures the untold benefits the atom has in store for us. Space flight, fortunately, will be different. It begins under the auspices of a noble international effort to be carried out in a spirit of peaceful cooperation among scientists of all civilized nations.

With the satellite, there is no need for secrecy and its many unfortunate aspects. The very nature of the program highlights the

* See "Aviation Medicine on the Threshold of Space," by Allan C. Fisher, Jr., NATIONAL GEOGRAPHIC MAGAZINE, August, 1955.

† See "The International Geophysical Year: Man's Most Ambitious Study of His Environment," by Hugh L. Dryden, NATIONAL GEOGRAPHIC MAGAZINE, February, 1956.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Satellite Appears to Roam the Globe, Which Actually Rotates Beneath It

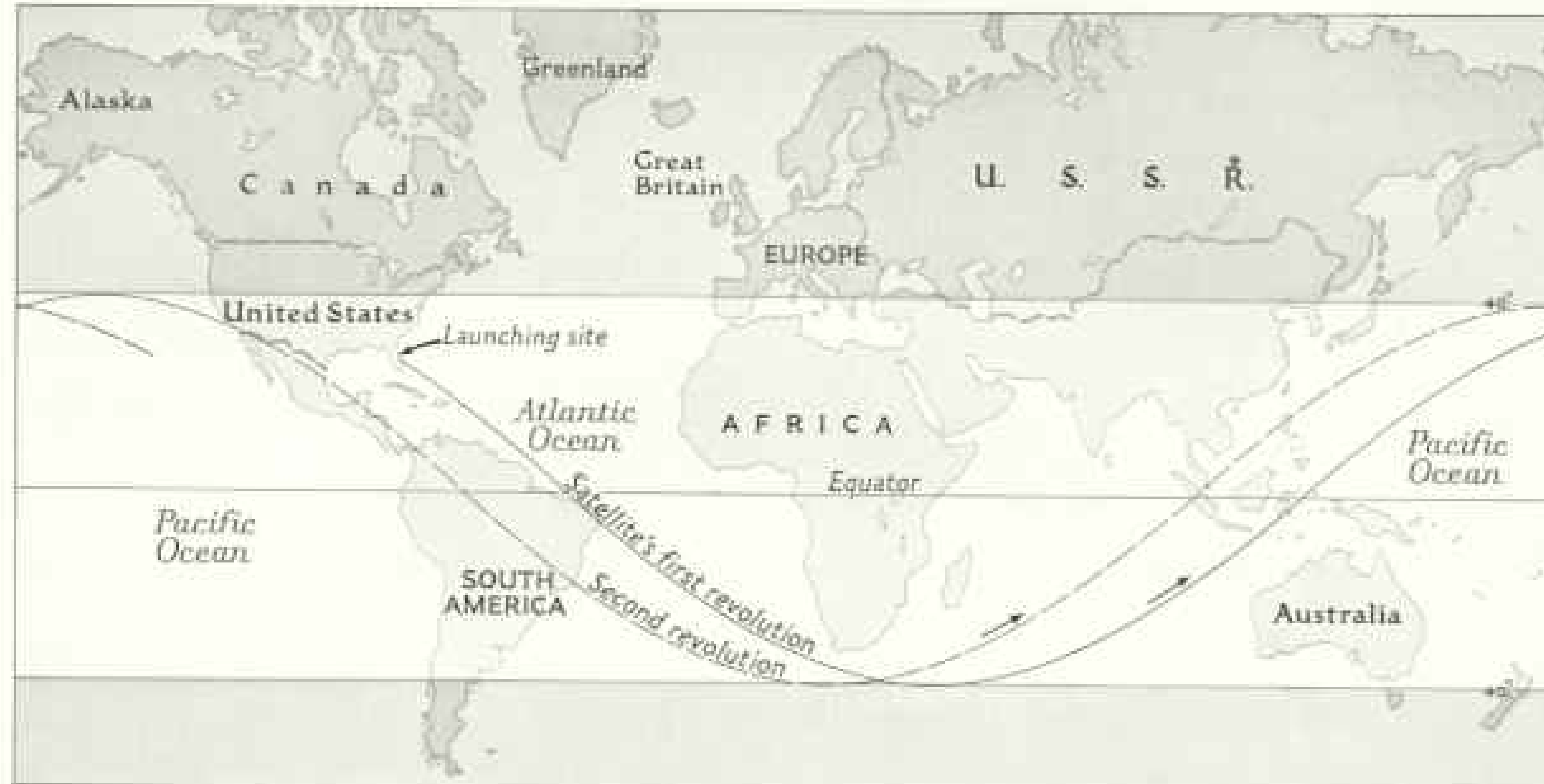
Any object in the grip of the air follows earth's rotation—approximately 1,000 miles an hour at the Equator. But a man-made satellite beyond the atmosphere, like the moon itself, will remain independent of earth's spin.

A satellite cruising at its ideal speed, 4.737 miles a second at 300 miles altitude, would circle the globe in about 90 minutes. Meanwhile the earth, rotating to the east, would quickly put successive areas into viewing distance of the new heavenly body.

These five globes show how a satellite's orbit will remain undeviating though the spinning world changes its face from the Americas to Africa.

First globe visualizes the satellite having risen into its orbit from Florida. Second figure shows a one-sixth spin by the world as against three revolutions by the satellite. By the time the earth rotates into phase 5 (right), the satellite will have completed 12 revolutions.

While the moon comes into view but once a day, the satellite rises and sets 15 times in 24 hours.

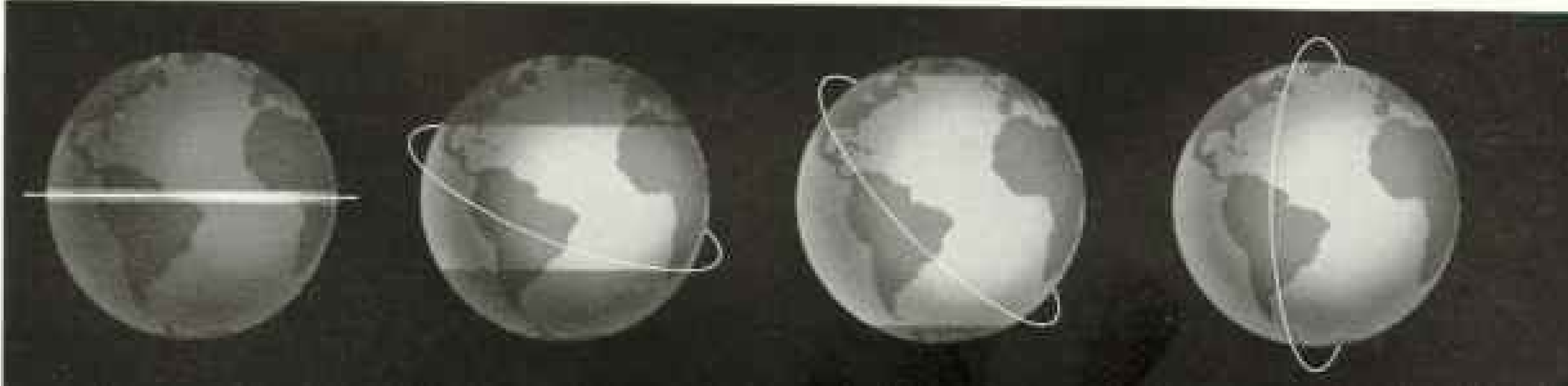


↑ **First Satellite, Repeatedly Crossing the Equator, Spans a 5,000-mile Belt**

This Mercator projection, which flattens the world against a sheet of paper, illustrates the announced course of the first IGY satellite—from 40 degrees north of the Equator to 40 degrees south. New York and San Francisco may catch glimpses; Chicago lies too far north. Africa and South America will have grandstand seats; only a part of the U.S.S.R. will be included. Measured at the Equator, earth moves 1,600 miles during one satellite revolution.

↓ **Others May Follow the Equator or Cross the Poles**

Globe No. 1 shows an equatorial launching, which takes fullest advantage of the 1,000-mile-an-hour spin at earth's middle. But this view will satisfy only the relatively few living in the cloudy mid-tropics. Second and third orbits span 60 and 120 degrees of latitude, respectively. Pole-to-Pole satellite (No. 4) sacrifices the launching advantage but covers the world. Near the magnetic poles it gathers data on auroras and cosmic-ray intensities.



Cosmic rays from outer space

Rays from the sun

Orbit of satellite

Satellite

300 miles

X rays

Ultraviolet rays

Visible spectrum

Infrared rays

Exosphere

250

Wac Corporal rocket 250 miles

High-frequency radio waves

200

Ionosphere

150

F layers

100

Aurora

Meteors

E layer

50

Radio waves

Noctilucent clouds

D layer

Chemosphere

Night

Twilight

Day

20

Ozone layer

Stratosphere

X-IA 17 miles

10

Explorer II 13.7 miles

Mt. Everest 5.5 miles

Troposphere

gratifying fact that it belongs to the earth as a whole. We have a right to know about it, and therefore we have, in a way, also an obligation to inform ourselves about this important beginning of the age of space.

First, of course, there is the task of launching the artificial satellite into an orbit of proper size and shape. The nature of the orbit must be determined by the laws of celestial mechanics, which were discovered about 300 years ago by Johannes Kepler and Sir Isaac Newton. And yet for centuries man has been no more than a passive observer of these rules under which Nature assigns to planets and moons their position and motion. Now, however, for the first time we are going to make active use of Kepler's and Newton's laws by actually designing the celestial orbit that our artificial moons will follow.

How does one establish an artificial moon? It will be done by lifting a body to a height of several hundred miles above the ground and then ejecting it into space in a direction closely parallel to the earth's surface with a carefully determined speed (page 502).

If the satellite is to enter into a stable, permanent orbit that leads around the earth, the whole orbit must be located in space—beyond the realm of the earth's atmosphere—so that the coasting satellite does not suffer air drag. To achieve this the satellite must be sent on its way in the proper direction and with a sufficiently great speed.

Take the natural moon, for example. The moon travels along its almost circular orbit around the earth with a speed of nearly two-thirds of a mile a second. All during its trip the moon is subject to the earth's gravity. But this inward pulling force is exactly balanced by the outward pull of centrifugal force inherent in the movement of the moon around the earth (page 503).

If the moon's orbit were closer to the earth than it actually is, the force of gravity acting on the moon would be greater. To achieve a stable orbit at the smaller distance, the moon would have to move faster. This would then make centrifugal force greater, too, and it could again balance the increased force of gravity existing at the smaller distance from the earth. For each distance there exists a certain orbital speed a moon must have so that it can stay in its path.

Satellite Must Outspeed Moon

The first artificial satellite, it has been disclosed, will be launched into its orbit at a height of about 300 miles at a speed of 17,000 to 18,000 miles an hour.

At this distance terrestrial gravity is many times greater than at the distance of the moon, and, consequently, the orbital speed of the satellite will also have to be greater than that of the natural moon. The artificial satellite must travel around the earth at a speed of about five miles a second, faster than the fastest rifle bullet.

To lift a body to a height of several hundred miles and thrust it into space with a speed of some five miles a second is a task of formidable proportions. The realization of the satellite project hinges on the solution of this problem. The previous record performance of rocketry must be tremendously

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Page 496

← Our Canopy of Air Shields Earth from Deadly Rays and Cosmic Missiles

For comparison with the satellite's 300-mile altitude, this diagram shows four of man's highest ventures: Mount Everest, the National Geographic-Army Air Corps stratosphere balloon *Explorer II*, the U. S. Air Force's rocket plane Bell X-1A, and the pilotless Wac Corporal.

Earth is constantly bombarded by meteors, cosmic rays, and many forms of solar radiation, some of it lethal. The upper atmosphere absorbs much of this barrage and in the process undergoes changes that affect physical conditions of our planet.

Here we see our atmospheric filter in cross section. Visible sun rays (spectrum at right) reach earth. Other solar radiation—infrared, ultraviolet, and X rays, as shown by gray shadings—dwindles gradually. Most meteors burn up in the ionosphere; primary cosmic rays penetrate much closer.

Ninety-nine percent of our air mass lies below 20 miles, in the troposphere and stratosphere. The remainder lies in the chemosphere, where atoms undergo chemical changes; in the ionosphere, where particles are ionized, or electrically charged; and in the exosphere, where the last vestiges of atmospheric gases gradually thin out into space.

In the upper regions, radiation alters molecules and atoms in many strange ways. For example, it turns oxygen into deadly concentrations of ozone (irregular band, lower) and forms luminous auroras (lower left center).

Ionization is strongest in the ionosphere. Horizontal shadings indicate the relative number of ionized atoms in the D, E, and F layers. Noctilucent (night-luminous) clouds, observed at sunset or sunrise near the top of the chemosphere, may be particles of ice or dust.

The instrument-packed satellite will give new clues concerning radiation effects. Its transmitter will radio the information back to earth, as indicated by the oblique zigzag line. Since both the F and E layers of the ionosphere reflect standard broadcast waves, only a high-frequency transmitter can be used.

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increased. Engineers agree that this can be done only by using multistage rockets.

This is not the place to discuss the technical details of the multistage principle of rocketry. It may suffice to say that very high rocket speeds can be achieved only by stacking two, three, or even four rockets on top of one another.

Small Payload Requires Huge Boosters

Definite plans for a three-stage rocket to launch the IGY satellite have now been made known. The first satellite itself will be a sphere 30 inches or less in diameter and approximately 21.5 pounds in weight including its instrumentation. But even this moderate payload in the last stage requires a formidable first booster. One can speculate that it will be somewhat larger than the Viking rocket that rose to 158 miles.

The first rocket will carry the whole assembly to a height of some 40 miles within two minutes, having reached a speed of 3,000 to 4,000 miles an hour. The second rocket will step up the speed to around 11,000 miles an hour. After it burns out at about 130 miles it will coast upward to an altitude of approximately 300 miles. The empty second stage will then be jettisoned as the third stage imparts to the satellite an orbital speed of about 5 miles a second.

We now know that the first-stage rocket will be much longer and thinner than the Viking—more like a pencil than like a cigar —and that it will have no fins (see page 493 compared to page 489). Fins naturally add weight and give no stabilizing effect at the

Storm Clouds Veil North America —a View from 4,000 Miles in Space →

Our first small satellites will give researchers new information concerning the cosmic factors that affect weather. Artificial moons of the future may carry TV cameras, keeping an eye on the weather and possibly giving us the knowledge for its eventual control.

This imagined scene shows a typical weather-breeding day in late September. Vast cloud masses, twisted by cyclonic air flow, cover the midwestern United States, Hudson Bay, and the Canadian northeast. Cumulus clouds, borne by trade winds, stream westward across the Atlantic and Pacific. A hurricane east of the Yucatan Peninsula spins like a pinwheel and begins moving toward the mainland. The rayed ball of light on the sea southeast of Florida is the sun's reflection.

Two U. S. Weather Bureau scientists, Dr. Harry Wexler and Dr. Sigmund Fritz, assisted the artist with the painting.

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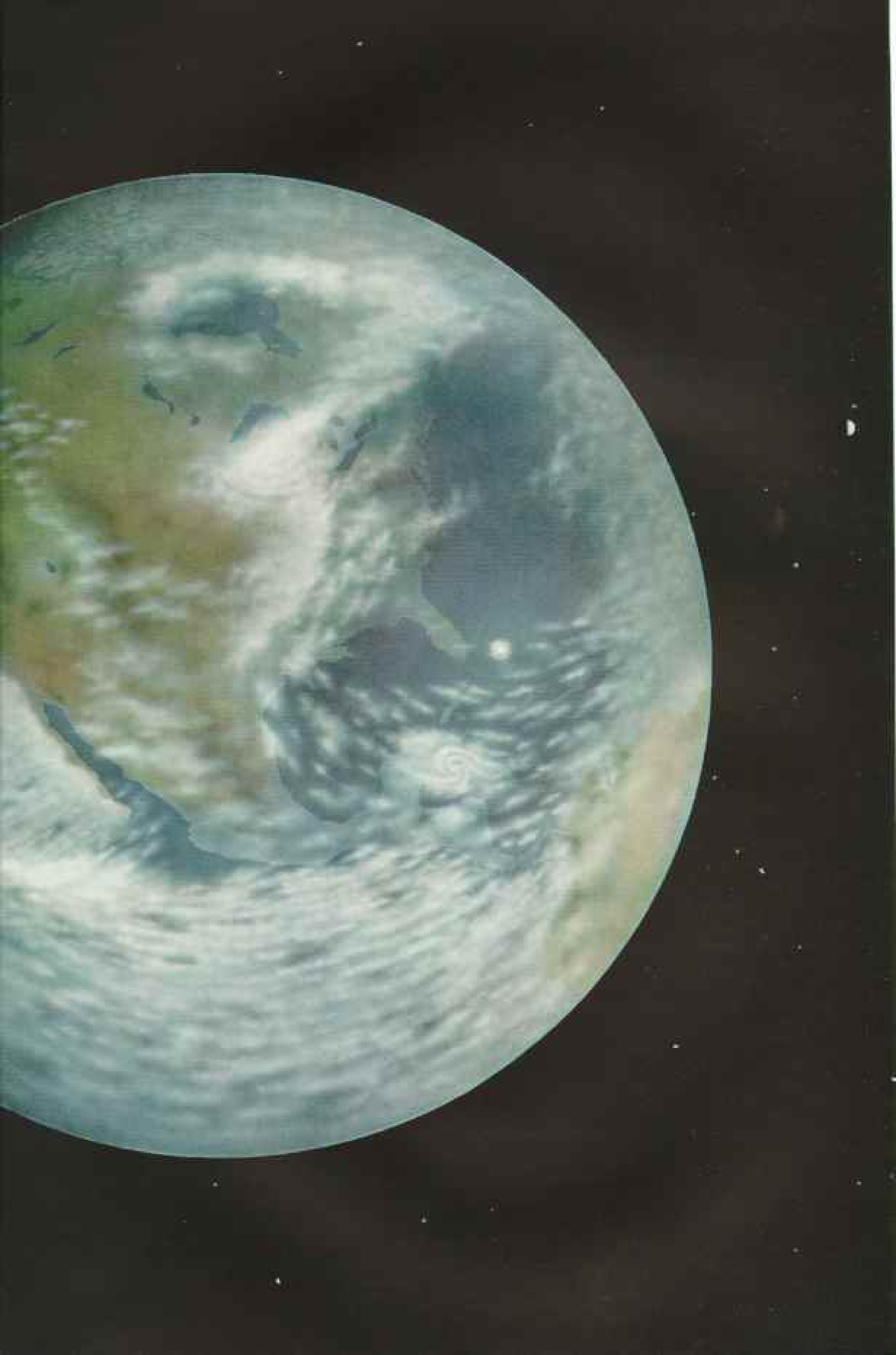
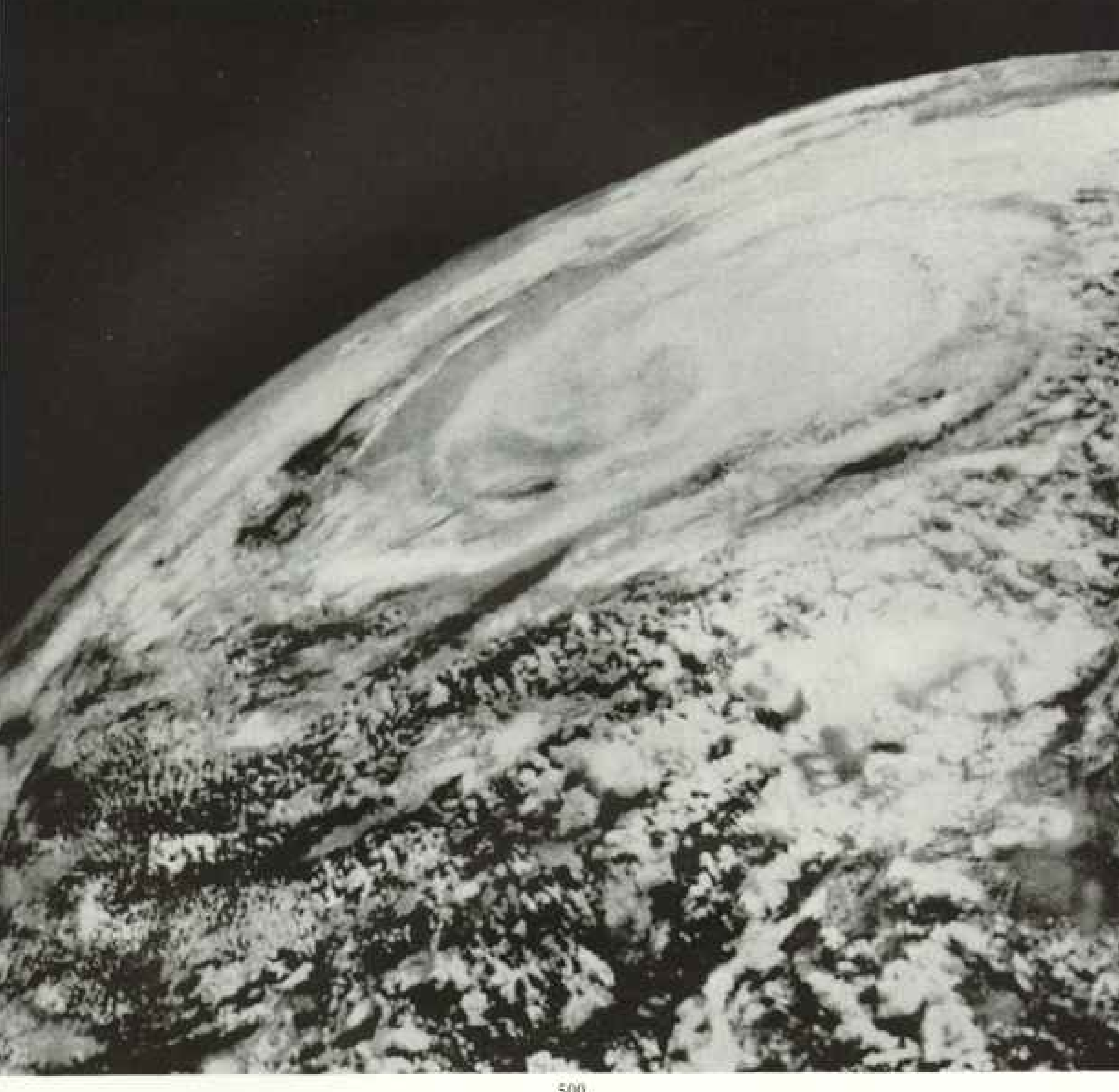




time of launching because the rocket is moving slowly, nor near the end of its flight because then it is in the thin outer fringe of the atmosphere.

Rocket Motor Turns in Mount

Thus another method of controlling the rocket has been decided upon as a result of years of experimenting with the Viking by NRL and Glenn L. Martin Co. engineers: stabilization by the direction of thrust of the rocket motor. The motor will be mounted in gimbals which will permit it to turn and direct its thrust as required. The position of the motor and hence the direction of its thrust will be controlled by a gyroscope. The second-stage and third-stage rockets also will be finless.

Different propellants will power each of the three rocket stages. The first will employ liquid oxygen and a mixture of ethyl alcohol, gasoline, and silicone oil. Power for the second stage will come from the reaction of nitric acid with unsymmetrical dimethyl-hydrazine. The final stage, carrying the 30-inch sphere in its nose, will be driven by a solid fuel.

The multistage rocket bearing our satellite will rise vertically and first gain altitude, piercing the denser layers of the atmosphere along the shortest route. The vehicle will be guided around in a smooth arc to direct the last stage with the satellite payload into a course parallel to the earth's surface. Now in its proper orbit, the satellite will be gently separated from the rocket's last stage. This will be done by a spring mechanism or small explosive charge.

Naval Research Laboratory scientists expect the first satellite to follow a slightly

Whirlpool Clouds of a Tropic Storm Are Caught by Rocket-borne Cameras

U. S. Navy flyers on October 2, 1954, noted a storm west of Cuba. Viewing it as an incipient hurricane, they tracked it across the Gulf of Mexico. Finally it grew diffused, evading surface observers, airplanes, and weather balloons.

On October 4 weathermen wrote off the disturbance as no longer dangerous. That very day it dropped six inches of rain on Brownsville, Texas. Later it unleashed a flash flood in Roswell, New Mexico, 680 miles to the northwest. Roswell got word in time, but Brownsville received no official warning because forecasters were looking up in the conventional way. This picture's ominous downward view would have alerted them.

Chance alone brought the picture to light. Fired 100 miles aloft from White Sands Proving Ground, New Mexico, a Navy Aerobee rocket bearing two motion-picture cameras looked across the State line into south Texas. Piecing together bits from a hundred movie frames, scientists made this composite picture and threw into full view the cyclonic clouds swirling at an altitude too high for earthbound observers to analyze.

"This gives us a look we haven't had before," one weatherman said. A space satellite would provide an even better vantage point (page 508).

U. S. Navy, Official

elliptical orbit centered several hundred miles from the earth's center. Thus the altitude will vary from about 200 to 800 miles (page 502). As will be shown, a truly circular orbit is virtually impossible to attain. In any event, the elliptical orbit will enable scientists to explore the border zone between atmosphere and space over a wide altitude range.

Perfect Circular Orbit Would Give Greatest Life Expectancy

Now that we are going to play our first active part in the celestial order of things, it becomes more intriguing than ever to look into the kinds of orbits possible for establishment of artificial satellites.

Let us assume that the point of ejection lies 300 miles above ground. Also, let us say that we intend to have the satellite revolve around the earth in a concentric circular orbit so that it will maintain a uniform height of 300 miles. Calculation shows that such an orbit will result if we guide the vehicle into a course parallel to the earth's surface with a speed of exactly 4.737 miles a second, or 17,053 miles an hour.

This speed would lead to a perfect circular orbit and, save for the unknown effect of air drag, the satellite would maintain its velocity, swinging around the globe once in every 94 minutes and 10 seconds.

A perfect orbit is an idealized mathematical case that will hardly ever come to pass. It would require that the satellite be sent on its way with the exact circular speed and aim. It is highly improbable that this great accuracy could be achieved in an actual launching operation; rather, the satellite will begin its free flight with a speed somewhat less, or greater, than the ideal value of 4.737 miles a second.

If, for example, the speed were only 4.6 miles a second, centrifugal force would be less, and gravity would quickly pull the satellite into an orbit closer to earth. The satellite would dive back into the denser layers of the atmosphere and meet its end as a flaming shower of debris.

This small reduction in speed, from 4.737 to 4.6 miles a second, would make it impossible to establish a stable orbit.

An increase in ejection speed would also

I
Initial speed 4.737 miles per second. Perfect orbit

II
Ejection angle off two degrees

III
Initial speed 4.6 miles per second. Satellite burns up

IV
Initial speed 5.0 miles per second

© National Geographic Society

↑ By Controlling Speed, Elevation, and Direction, Scientists Hope to Fix a Stable Orbit

To stay aloft at 300 miles, a satellite must coast at more than 17,000 miles an hour and its course must closely follow the earth's curvature. Even a slight deviation from speed and course may turn an artifical moon into a burning meteor.

Diagram of four possible orbits illustrates problems confronting scientists. I. Ideal circular orbit. The satellite travels at precisely the right speed at a constant altitude above earth. Under these conditions it would have its greatest life expectancy. However, such extreme accuracy is improbable, scientists say. II. Wrong angle. Fired at the correct speed, the satellite enters its orbit two degrees from horizontal, resulting in an elliptic orbit dipping within 150 miles of earth. Air drag first slows the satellite, then burns it up after a few revolutions. III. Course is correct; speed too slow. Lacking sufficient centrifugal force, the sphere quickly dips into the atmosphere and disintegrates. IV. Too fast. The orbit becomes a sweeping ellipse, its peak more than 1,400 miles above ground, its low point 300 miles. Effective observation is difficult.

Planners hope for something between these extremes. The first of a number of IGY satellites is expected to coast at heights between 200 and 800 miles.

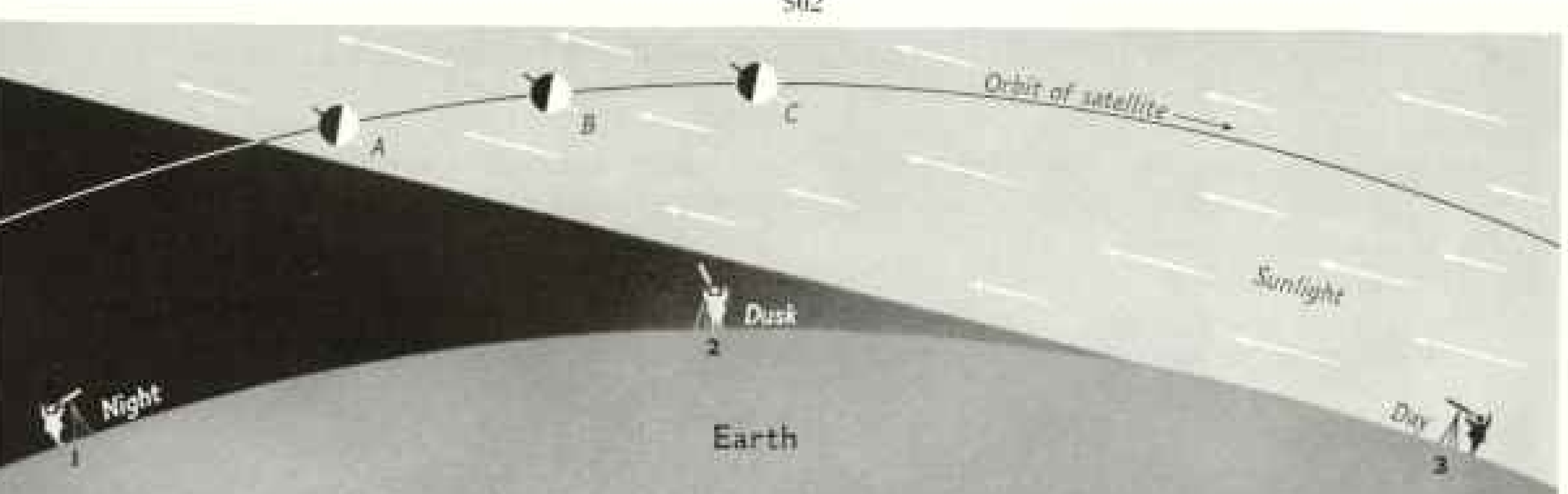
Distances between orbits and earth are drawn accurately to scale.

↓ Like the Moon, the Satellite Will Have Phases Caused by Light and Shadow

Diagram shows dawn breaking and imagines three widely separated observers having telescopes but no searchlights.

Observer No. 1, working at night, can see nothing because he faces the dark side of the man-made moon. No. 3 man looks in vain because bright daylight obscures the target, just as it dims the stars. Man at No. 2 post has the advantage of glare-free dusk, but he must work fast, for the satellite covers the distance A to C in three minutes.

Figure A offers a full but too-distant "moon." Figure C is close enough, but only half a moon. Position B, a compromise between distance and phase, provides the best view.



cause the orbit to change profoundly. If the satellite were ejected at 5 miles a second, its inertia would carry it away from the earth. Losing speed, it would coast along a sweeping elliptic arc that would rise gradually.

Halfway around the earth the satellite would pass through its peak, more than 1,400 miles above the ground. From then on, the satellite would coast along the downward leg of its elliptic orbit, pick up speed, and return to its starting point 300 miles above the ground. There its speed would again be 5 miles a second, and it would launch itself into the second round.

A starting speed of 5 miles a second would result in a stable orbit, with the satellite oscillating around the earth, losing and gaining speed as it rose and fell.

Directional Error Unavoidable

All these data are based on the condition that the satellite enters its orbit at a height of 300 miles while traveling in a course parallel to the earth's surface. Again, it will be quite difficult to realize this latter condition in an actual launching operation.

With gyroscopic control devices the direction of flight can be kept adjusted all during the phase of powered flight. But, of course, none of these control instruments works with absolute accuracy. There will be inevitable deviations from the ideal course, and it is interesting to consider what effects such unavoidable deviations will have on the resulting orbit.

Let us assume that the satellite is thrust into its orbit at a height of 300 miles with the ideal circular speed of 4.737 miles a second. However, its direction at this instant of release may be such that it forms an angle of elevation of two degrees with the horizontal. Then the satellite will rise slowly and gradually lose speed. It will coast to a peak of 450 miles in its elliptic orbit and coast down to a low point of 150 miles, which lies exactly opposite to the peak, on the other side of the earth. Immediately the satellite will rise again with virtually the same speed and angle of elevation as before.

If the satellite begins its free flight with an angle of two degrees downward, instead of upward, the orbit will be the same so far as size and shape are concerned. However, in this case the satellite first will coast down to its lowest point, 150 miles above the ground; then it will begin to rise and will pass through its peak point of 450 miles.

A two-degree deviation from the true horizontal course at the point of ejection isn't much of an error, and yet it transforms a concentric circular orbit into an ellipse, causing the satellite to swing up and down between the levels of 150 and 450 miles of altitude.

503 Andrew Poggenpohl, National Geographic Staff

Boy at Play Demonstrates Planetary Forces

Muscular tension on the string balances the centrifugal force of rotation, so the ball circles continuously instead of falling or flying away. Similarly, a planet or its satellite stays in its orbit as long as gravity, the pull of its "string," remains in balance with centrifugal force.

Two-degree Variation Means Failure

At first glance it looks as if we could afford an error of two degrees in our directional guidance at the point of ejection. The resulting elliptic orbit of the satellite would not be intercepted by the earth or even by the bulk of the atmosphere. The lowest point of the orbit still lies 150 miles above the ground. Nevertheless, it would not be a stable orbit. Along the lower section of the orbit the satellite would dive into layers of the atmosphere that would cause a very small amount of air drag.

The permanence of celestial orbits, like those of the planets and their moons, is possible

only because of the emptiness of space. The very few, forlorn atoms found in interplanetary space are far too rare to cause any drag, so the speed of the planets and moons is in no way affected. Our artificial satellite, however, will operate in the fringe area of the earth's atmosphere, and, up to a certain height, a body coasting at several miles a second would indeed suffer some drag.

Satellite Too Low Ends as Burning Meteor

If a satellite were established in a circular orbit at a height of 150 miles, it would coast through air that is many billion times thinner than air found at sea level. This is such a low density that we could almost call it a vacuum. And yet this thin air would cause a small, though perceptible, drag on our artificial moon. The drag would cause a small loss of energy on each revolution. As a result, gravity would gain the upper hand and the satellite would screw itself down to earth, losing altitude faster and faster.

In the denser layers of the atmosphere, friction from the air finally would become so violent that the satellite would be heated to incandescence and would disintegrate in this vaporizing heat like a flashing meteor.

On the basis of present air-density data, one of the satellite scientists has calculated that a sphere approximately 30 inches in diameter and 21.5 pounds in weight in a circular orbit at 150 miles could look forward to a life of perhaps a day or two. At greater heights the density of the air falls off rapidly, and the life expectancy of satellites increases. At 200 miles, the same source says, such a satellite might last a few weeks, and at 300 miles it would continue to circle for a much longer but undetermined time. Our natural moon, of course, 240,000 miles away, has been up there for billions of years.

However, these figures must be taken with a grain of salt. The calculations of air drag and their effects on satellites at these various heights are based on tentative data. Therefore, the life expectancies of satellites given here are only an approximation of what may actually happen.

As a matter of fact, the satellite itself is counted upon to give us our first direct information about the density of the atmosphere in the unprecedented altitudes at which it will operate. This information will be obtained by carefully observing the rate at which the satellite loses altitude because of air resistance. Such calculations can best be made with a sphere, and this consideration in part prompted the choice of a spherical shape for the first satellite.

Dr. Kaplan has listed in the following order the various types of information to be sought from the initial flights:

1. Density of the outer atmosphere.
2. Composition of the earth's crust, since variations in its mass may affect the orbit.
3. Geodetic determinations, including shape of the earth as indicated by the orbit, and precise determinations of latitude and longitude by synchronized observations of the satellite from various points on the earth's surface.
4. Temperatures inside and outside the satellite.
5. Meteoric impacts, to be determined by instruments for detecting meteoric particles striking the satellite.
6. Pressures within the satellite, to reveal penetration by meteoric particles.
7. Measurement of ultraviolet radiation.
8. Measurement of cosmic-ray intensities, including the low-energy particles masked from the earth by the atmosphere.

All data obtained by satellites will have to be relayed to the ground through a transmitter system, since it will be impossible to recover these satellites after they have been shot into space. Highly efficient telemetering systems have already been developed in connection with previous rocket work.

Instruments Make Up Half of Weight

Since the shell itself will weigh about half of the satellite's 21.5 pounds, all the instruments and telemetering equipment combined can weigh little more than 10 pounds. The scientists and engineers will be thinking in terms of ounces, not pounds, in shaving every possible bit of weight from the sphere that will be borne 300 miles up in the nose of rocket No. 3 (page 492).

Incidentally, the laws of celestial motion under conditions of very light air drag make clear what will happen to the third rocket stage that thrusts the satellite into its orbit. Earlier we said that a spring or a small explosive charge would separate the satellite from its carrier. This will happen as soon as the third stage reaches orbital speed and direction. However, the action of the releasing device, although gentle, will cause the payload and its rocket to travel in somewhat

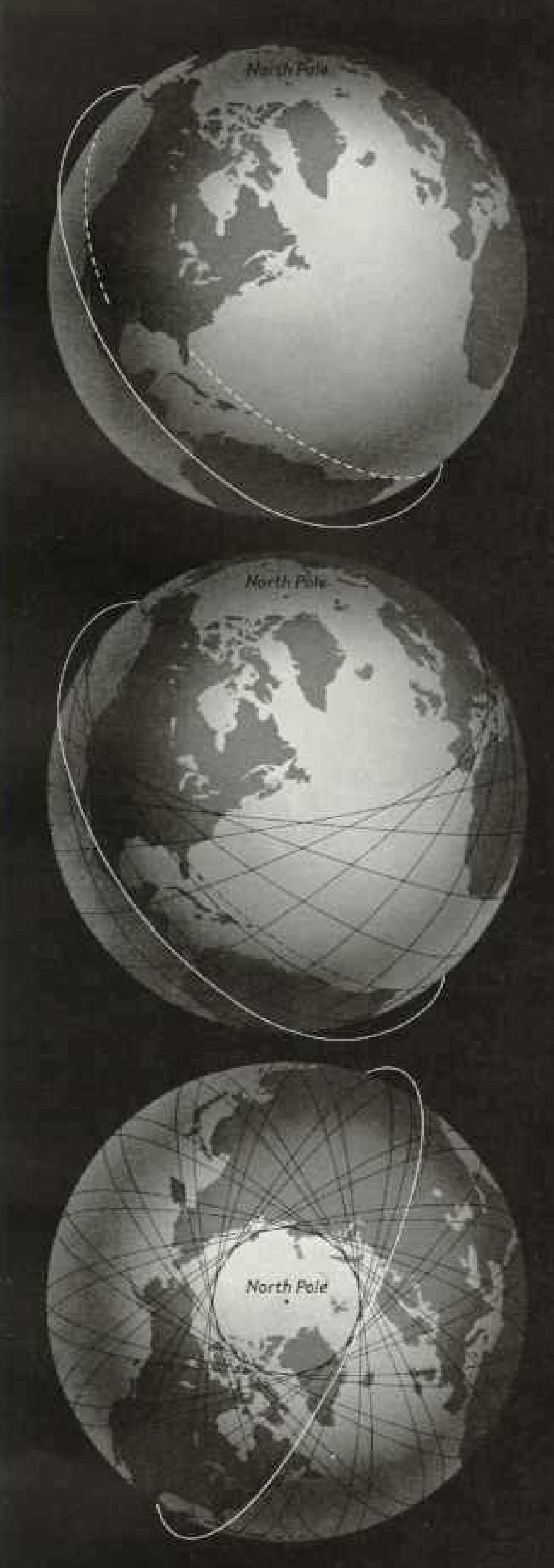
different directions and with slightly different speeds. Thus the orbits of the two objects will not be identical.

The empty third stage, presumably lighter for its volume than the satellite, will present more air drag area per pound of weight. Consequently, the third stage will be more vulnerable to air resistance. After a certain number of revolutions, it will be caught in the denser layers of air and will be destroyed sometime before the actual satellite meets the same fate.

Gravity Causes Orbit to Wobble

Besides air drag, there are a number of other factors that will have small effects upon the motion of the satellite. Gravity of the sun and moon will cause the orbit to wobble slowly. Also, there may be drag effects caused by meteoric dust. During its journeys through space the object is certain to collide with numerous micrometeors, and these tiny but continued blows may have some effect on the satellite's motion.

Earth itself will be responsible for many interesting effects. The planet is not a perfect sphere and does not have a uniform density throughout. Moreover, there are mountain ranges, ocean basins, and unevenly distributed masses in the earth's crust. All these differences of shape and mass distribution make themselves felt as small distor-



Satellite Paths Wrap the Globe Like String on a Ball

Upper: The man-made moon takes off from Florida at an angle of 40 degrees with the Equator. Solid white line shows its stationary orbit, dashed line its first revolution. Though the satellite has made a 360-degree spin, it has not spanned the globe, for earth's rotation in an hour and a half has shifted Florida 1,400 miles to the east.

Middle: Twenty-four hours more have passed, and the satellite has added 15.3 revolutions. White line again shows its undeviating orbit; black lines trace its imaginary shadow thrown on the rotating earth.

Lower: This diagram presumes the satellite has taken off at a 75-degree angle with the Equator (page 486). Looking down on the North Pole, we see the travel lines woven in 48 hours. The Arctic is neatly wrapped in a geometrical figure. This satellite crosses all densely populated areas.

© National Geographic Society

tions in the gravitational field of the earth. As the satellite travels through these slight ripples in the field of gravity, it will respond with small irregularities of motion.

In all, the satellite's orbit will display a complicated set of very small but significant changes and motions. It will be a first-rate mathematical puzzler to sort out all these effects and to account fully for the observed intricacies of the satellite's motion. But in these observations a wealth of information lies hidden that will make the satellite an invaluable source of knowledge.

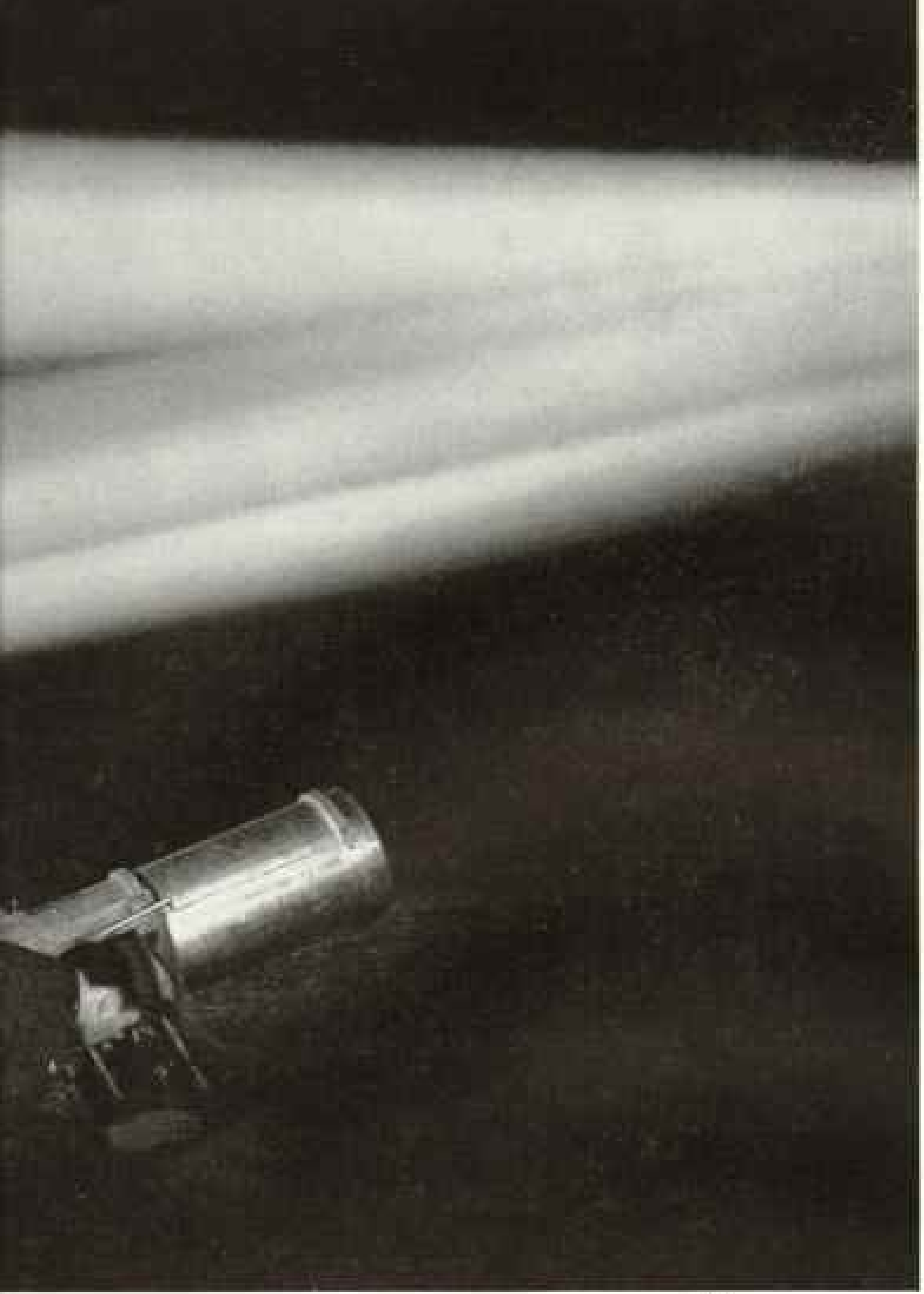
When the orbit data have been analyzed, we shall know much more about the true shape, size, and mass of our earth, about the distribution of masses in the earth's interior, and the fine, but highly interesting, distortions of the earth's field of gravity. Owing to its speed and closeness to the earth, the satellite will indicate all these factors, like the trembling needle of a supersensitive instrument.

To study the movement of the satellite around the earth, it will be necessary to track it closely. This will be done optically with transit instruments and astronomical telescopes as well as by radio tuned to the satellite's signals. Special cameras will be used for precise observations.

Tracking Poses Problems

Visual tracking will pose some problems, because such a small object at a distance of at least 200 miles will be hard to see. During the day the light of the sky will outshine the dim point of light. During the night, of course, the sphere will not be visible unless artificially illuminated. In clear weather, however, one may be able to see it with binoculars at dawn and sunset (page 502).

When the sun is below the horizon, the light of the sky is greatly reduced, while the satellite—hundreds of miles above the earth—will be fully illuminated by the sun and pro-



These Searchlights May Track Man's Elusive Moon

A small sphere at great height will be hard to see. It may be barely visible to the naked eye, but only for fleeting moments before dawn and after sunset. Sky brightness during the day will outshine the satellite's reflected light. At night, as the satellite passes through earth's shadow, observation will be difficult even with telescopes (page 502).

Scientists are considering an idea that may solve the viewing problem at night. Dr. John O'Keefe of the U. S. Army Map Service has suggested focusing batteries of powerful Army searchlights on the tiny object. If the sphere were equipped with retrodirective mirrors, the light would return to earth along the line of the incoming beam, and the satellite would appear in telescopes near the searchlights as a moderately bright star.

Army engineers, using four lights, here simulate satellite tracking at Fort Belvoir, Virginia. Each beam packs 800,000,000 candlepower. Technician at lower right adjusts a telescope.

National Geographic Photographer
B. Anthony Stewart

ject itself as a faint star against the dark background of space, barely visible to the naked eye. It will be very difficult to find, because the time of visibility is so short, and, as soon as the satellite dives into the earth's shadow, it will be blotted from sight.

Proper positioning of the orbit can bring a satellite into view of every nation in the world. However, if the satellite were launched from a point on the Equator in an exact easterly course, its orbit would simply circle the earth along the Equator and stay there. The satellite would then be accessible to observers only from a narrow strip around the earth's middle. There a comparatively few people would see it often. It will be more profitable to launch the satellite into an orbit that makes an angle with the Equator, so that it will be visible to more people (page 495).

The first satellites will be fired southeast from Patrick Air Force Missile Test Center at Cape Canaveral, on the east coast of Florida, at an angle of about 40 degrees from the Equator. Thus the sphere will revolve about the earth between the approximate latitudes of 40° N. and 40° S., affording opportunity for observation by scientists of many nations.

Launching Site Moves 1,400 Miles

During the satellite's roughly 90-minute passage through its orbit, the earth will have been rotating as shown in the diagrams at the top of page 495. So, when the satellite finishes its first revolution, its Florida launching site will have moved with the earth's rotation some 1,400 miles to the east.

Thus the satellite, in its stationary orbit, will sweep over successively changing territories as the globe spins beneath it. Its unending path, plotted on a globe, will resemble the harmonious web of a ball of twine (page 505). This continuous interplay between the satellite's motion and the rotation of the earth will greatly enhance the value of the

artificial moon as a tool of global research.

To assure success of the entire effort and to obtain as much information as possible, the IGY program calls for not one or two satellites but several, perhaps as many as a dozen. Instrumentation of successive ones will doubtless be altered and extended to attack as wide a range of research problems as possible. Much attention will focus on the sun, the mighty source of radiant energy that powers the forces of our atmosphere.

The sun emits radiations of many kinds, of which the long-wave visible light is only a part. Astrophysicists and geophysicists are very much interested in the sun's short-wave radiation, which extends from mild ultraviolet rays down to X rays. Most of these short-wave radiations are completely blocked by the earth's atmosphere. A measuring instrument in a satellite will have full access to these rays, and scientists are looking forward to analyzing complete data in this field.

The short-wave radiation from the sun is mainly responsible for two important phenomena in our atmosphere: the formation of the ozone layer extending between 15 and 35 miles high, and the formation of ionized layers between 50 and 250 miles, the so-called ionosphere (page 496).

Solar Radiation Causes Magnetic Storms

The sun is also the source of streams of electrically charged particles that cause magnetic storms as they approach the earth. Some even plunge into our envelope of air, adding to the electrification of the upper atmosphere and producing auroras.

During the months of the IGY the sun will be at a peak of its 11-year sunspot cycle, when great fluctuations occur in the sun's emission of short-wave radiation and solar particle streams. The satellite will come just in time to catch these most interesting phases of solar activity.

Cosmic rays will be another object of study. Nuclear physicists and astrophysicists will be eager to have these highly energetic atomic nuclei from space strike the satellite's counters before passage through miles of air. As yet, we don't have a complete picture of the original composition of this strange kind of radiation. A few years of satellite operation may afford physicists the answers to many tantalizing and important questions, including the origin of cosmic rays.*

With a satellite we shall be able also to explore the density of meteoric dust. In recent years it has become apparent that the visible meteors that flash across the dark sky every night stem from only a small part of the meteoric population of interplanetary space. The greater part of meteoric mass is in the form of microscopically small particles.

Data from Space for the Weatherman

All these projects sound rather academic. However, their final results will culminate in the advancement of fields of science that have great practical importance: meteorology and climatology.

It is believed that the ozone layer, for example, with its seasonal and local variations, has an influence on events in the lower atmosphere, the theater of weather and climate. Satellite measurements of solar short-wave radiation will be of great value in clarifying these delicate relationships, of which we now have only a poor understanding. It has even been suggested that a relationship exists between rainfall and the influx of meteoric dust from space. Clearly, man's coming advance into outer space is going to be a practical and worth-while undertaking.

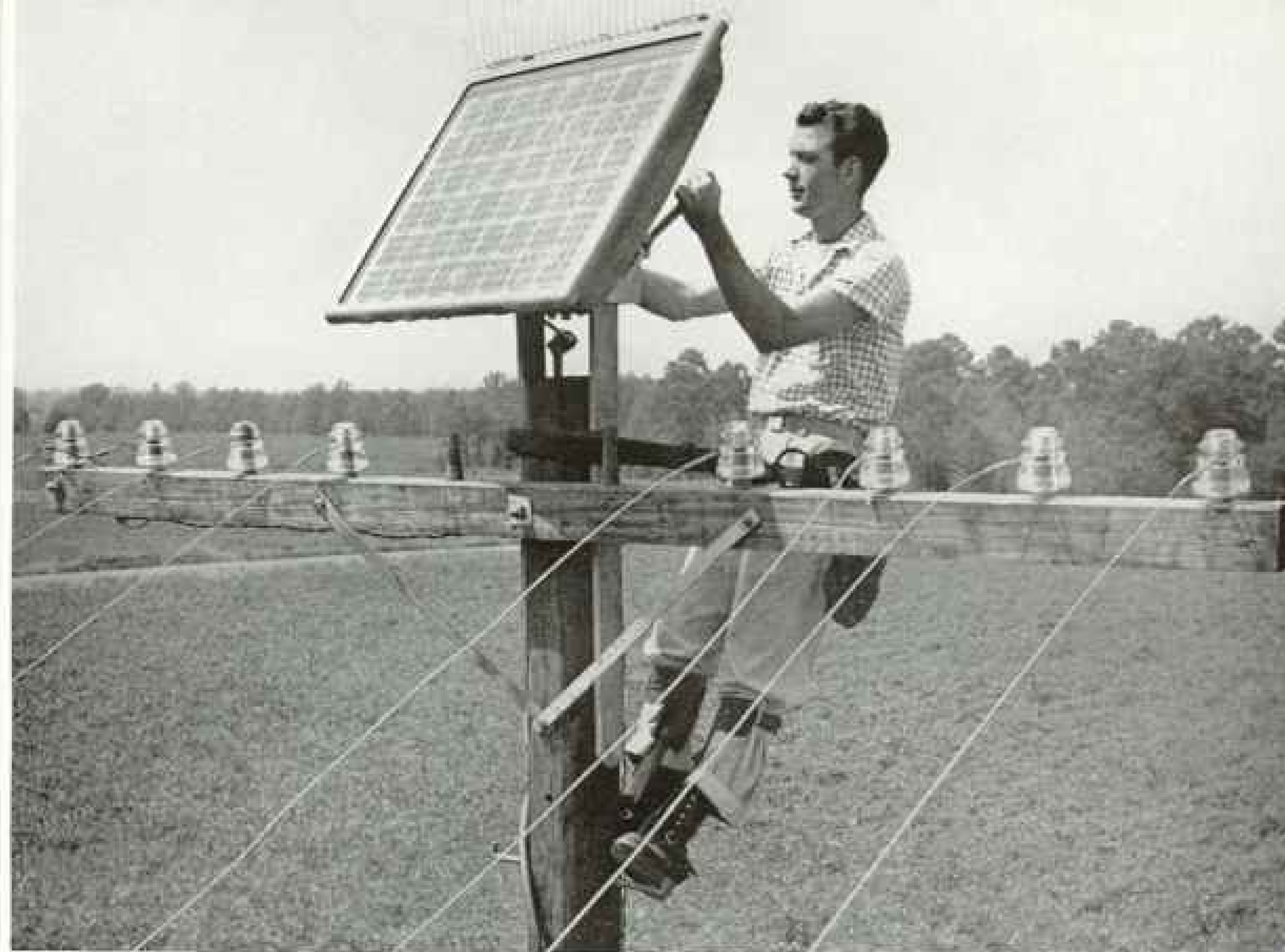
There can be no doubt that a later day will see larger satellites acting as even more efficient robots in the service of science. They will be able to carry heavier equipment into space—perhaps even television cameras with telephoto lenses that could beam their terrestrial vistas down to earth. Someday we will be able to watch our planet in our living rooms, when the TV signals from the satellite will be hooked up to our commercial channels.

A TV camera in space can help keep tabs on the weather on a global basis. Other instruments will measure the heat radiation of the atmosphere, of the ground, and of the ocean, and will follow the trails of hurricanes and cyclones. The satellite in space could then do the job of weather stations that do not yet exist.

Stations Concentrated in Populous Regions

As yet, regular weather observations are made only at a relatively few places over the world. They are concentrated in highly developed nations, while wide stretches of oceans, polar wastes, and thinly populated areas receive only spotty attention. It is easy

* See "Trailing Cosmic Rays in Canada's North," by Martin A. Pomerantz, National Geographic Magazine, January, 1953.



Bell Telephone Laboratories

Later Versions of This Solar Battery May Power Equipment in Satellites

Our first orbiting spheres will carry small conventional batteries for radio transmission. More advanced satellites may use sunlight for power. Bell Telephone Laboratories pioneered the technique with their solar battery, shown atop a telephone pole near Americus, Georgia, where it gathered energy enough to transmit the human voice. The rectangular frame contains 432 silicon cells cushioned in oil and covered with glass. These cells convert light into electricity. A lineman adjusts the frame toward the sun.

to see that a group of larger satellites would soon revolutionize the sciences of meteorology and climatology (page 498).

Whatever we do with our satellites, they will be remembered as man's first step beyond the confines of the earth's atmosphere. These bold devices will pave the way for a distant goal: manned space flight.

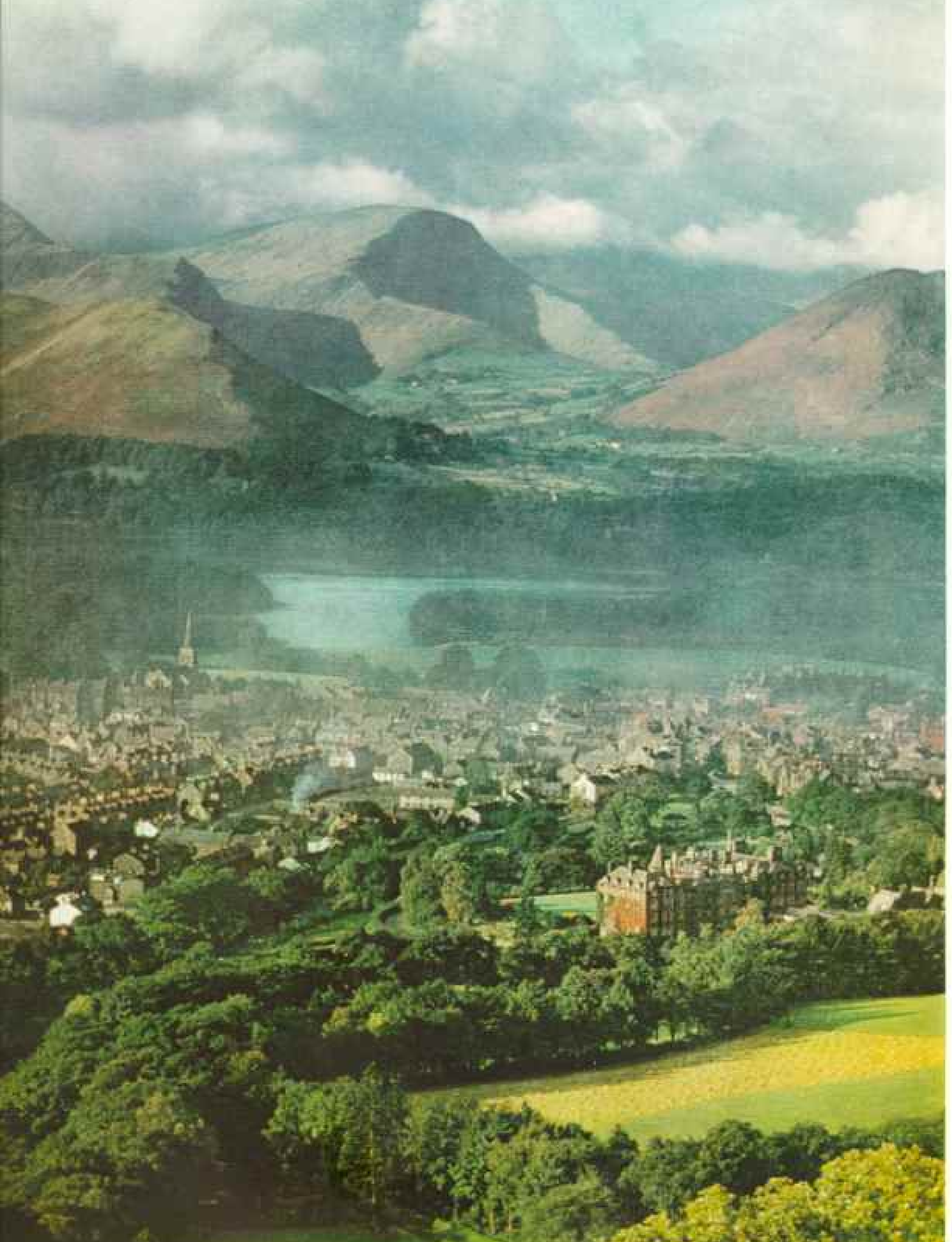
But serious problems must be solved first. For instance, a manned satellite might have to weigh almost as much in tons as our IGY "moon" will weigh in pounds. Imagine what rockets would be required to boost such a payload into space! Another tremendous problem will be that of bringing space travelers back to earth without burning them up by turning their vehicles into glowing meteors.

And these are purely technical difficulties. There is man himself. The human problems of space flight are going to be formidable. Manned satellites will require large-scale operations in a complete vacuum. They will require human beings to live under conditions of weightlessness. They will, in short, severely tax the endurance of man's body and mind.

Animals Will Precede Man into Space

In the important research area of space medicine, future satellites will be indispensable tools of experimentation. They will carry small animals into space first, just as animals and not men have made the pioneer rides in existing research rockets. But no one is equipped to tell at this time when man himself will venture into space.

Yet, whether we live to see it or not, we are now going ahead to prepare for this day. Like the modest satellites we have on our drawing boards, a big manned satellite will find its primary use as a research tool for advancement of the earth sciences. For a long time to come, our own planet will remain the prime goal of space flight.



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"Mountains and Vales and Waters All Imbued with Beauty"—Robert Southey

Thus the poet described this scene, and, doing so, defined the whole of England's Lake District. In misty Keswick, a market town since the days of Edward I, Southey lived for 40 years. Wordsworth and Coleridge sampled the quiet charm of the neighboring countryside, as did Shelley, Keats, and Tennyson. In this view, Derwent Water spreads its silvery mirror beneath mountains named Cat Bells, Robinson, and Rowling End.

Lake District, Poets' Corner of England

Literary Landmarks Amid the Dales and Fells of "Wordsworthshire" Draw Hikers and Climbers to a Favorite British Park

BY H. V. MORTON

With Illustrations by David S. Boyer, National Geographic Staff

A DAY of savage rain was struggling into afternoon as I drove to Grasmere, in the heart of England's Lake District. I had seen nothing but sullen mountains decapitated by mist, gray sheets of water, and dripping woodland.

The road, bounded by stone walls that were museums of ferns and moss, was enlivened by hundreds of hikers who plodded hunchbacked beneath the weight of enormous packs. Sometimes a young girl's face, seen for a moment through the windscreen—a face glistening with raindrops and framed in a plastic hood of red or green—would linger in the memory like a verse by Wordsworth. Where had she come from? Why was she battling wind and rain and carrying upon her slender shoulders a burden that would make a guardsman swoon?

Honor Bound Not to Hitchhike

This, I thought, is what visitors mean when they say we English take our pleasures sadly. Yet there was nothing sad about these hikers except, perhaps, their saturated silhouettes.

In the course of that appalling day not one of the hundreds I met asked for a lift. These young people had left their offices, their factories, their schools and universities to walk in Lakeland. And walk they would, wet or dry. To have hitchhiked would have been breaking faith, for all who use the country's Youth Hostels are honor bound to reach them under their own power.

When I arrived at Grasmere, the rain, as if exhausted, fell into a thin drizzle. But even in the rain the village is lovely. On summer mornings you may lean over the old stone bridge by the gray tower of Grasmere Church and see trout lying in the Rothay, whose glass-green waters wash the churchyard wall.

I thought it would be pleasant to stay in the hotel beside the church. They were unable to give me Woodrow Wilson's old room, the hotelkeeper told me, but I might have the one next to it.

"Wilson visited Lakeland several times," she said. "The first time was in 1896, before he became president of Princeton University. There are people who can still remember how he used to tramp and bicycle about the countryside."

Poet's Grave Draws Lakeland Visitors

Now, standing at the window of a huge 19th-century bedroom and looking across a lawn to the churchyard yews, I saw a sight that must have been as familiar to the man who became the 28th President of the United States as it was to me. Through a gap in the shrubbery a row of earnest young faces gazed solemnly down upon something hidden from me. When one row moved away, another immediately took its place.

Sometimes they were Boy Scout faces, and sometimes faces from a girls' school. When a coach drew up, its occupants would pile out and immediately provide other rows of heads. On fine days, I was to find, the gap is never without its faces.

And what did all these people gaze at so earnestly? It was, of course, the weathered headstone marking the grave of William Wordsworth.

In the village I found the street thronged with visitors. Children, wearing mackintoshes over Sunday clothes, carried bunches of flowers entwined with lake rushes. Beneath a tree the village band carefully shielded its instruments from the rain. Choirboys in surplices and with starched pie-frills at their necks stood crowded in the vestry door.

Rush Bearing Dates to Saxon Days

I had arrived, I learned, at the one time in the year when Grasmere keeps an appointment with the Saxon past. This was the day of the annual rush bearing.

The custom goes back to a time when the floors of churches, castles, and halls were strewn with rushes. In summertime, when the plants are at their best, these floor coverings were changed. The occasion was, to all

↑ *"...Windermere, Like a Vast River, Stretching in the Sun"* →

William Wordsworth wrote these lines about England's largest lake in *The Prelude*, a poetic memorial to his youth. In his prose *Guide to the Lakes*, the poet counsels the visitor: "One bright unruffled evening must, if possible, be set apart for the splendour, the stillness, and solemnity of a three hours' voyage upon ... the Lake."

← This holiday crowd takes Wordsworth's advice. Passengers step ashore at Ambleside after the trip from Bowness.

Above: The steamboat traverses the northern half of Windermere's 10½-mile length in some 30 minutes. Half a million sightseers a year make the lake voyage.

Nothing since Wordsworth's time has changed the splendor of the low, forest-spread hills that line the indented shore. Valleys still come to the water dressed as neat as parks, and clouds yet wreathe Fairfield, on the horizon. Dunmail Raise, the gap at left, lies on the border between Westmorland and Cumberland.

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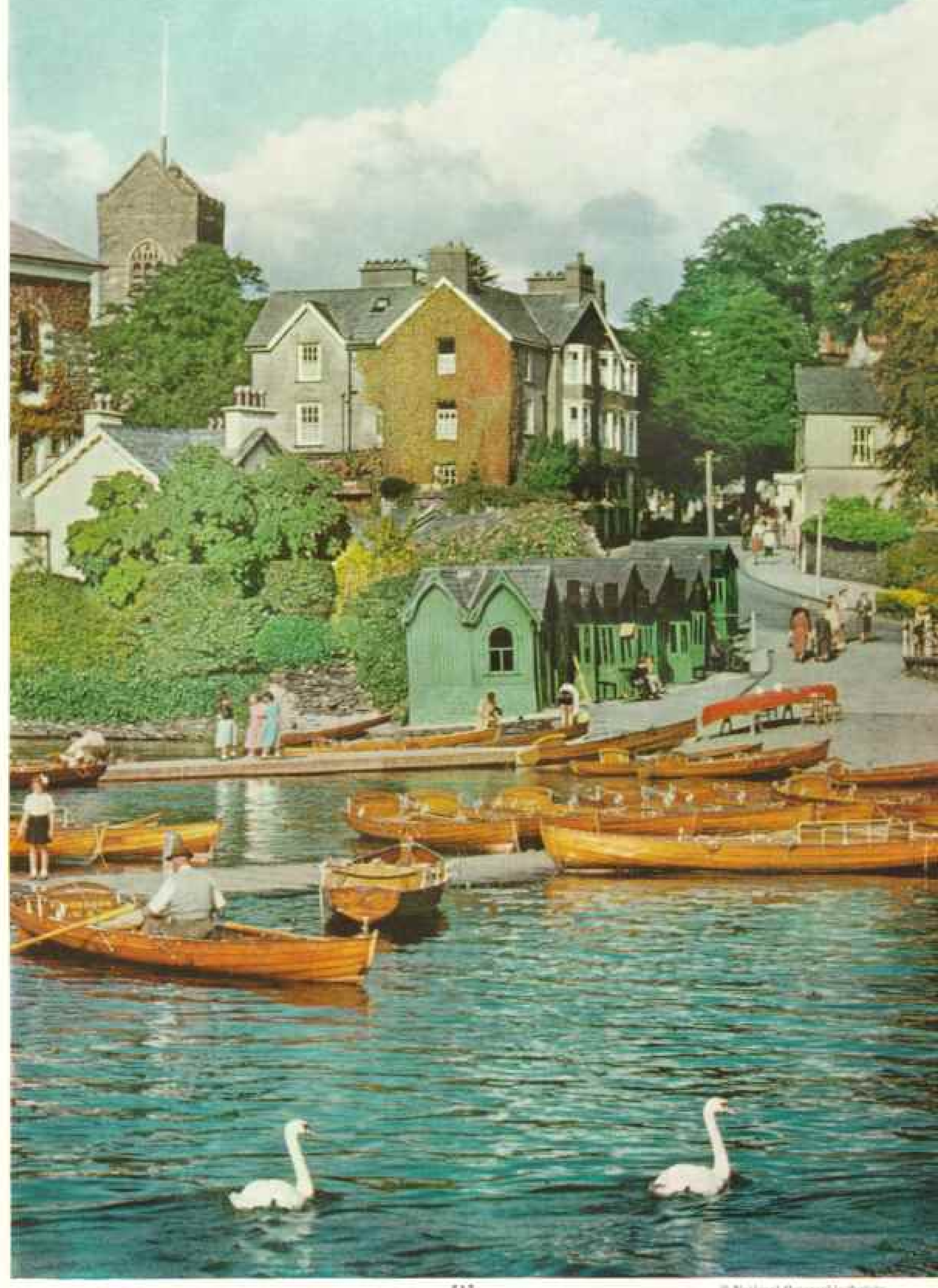

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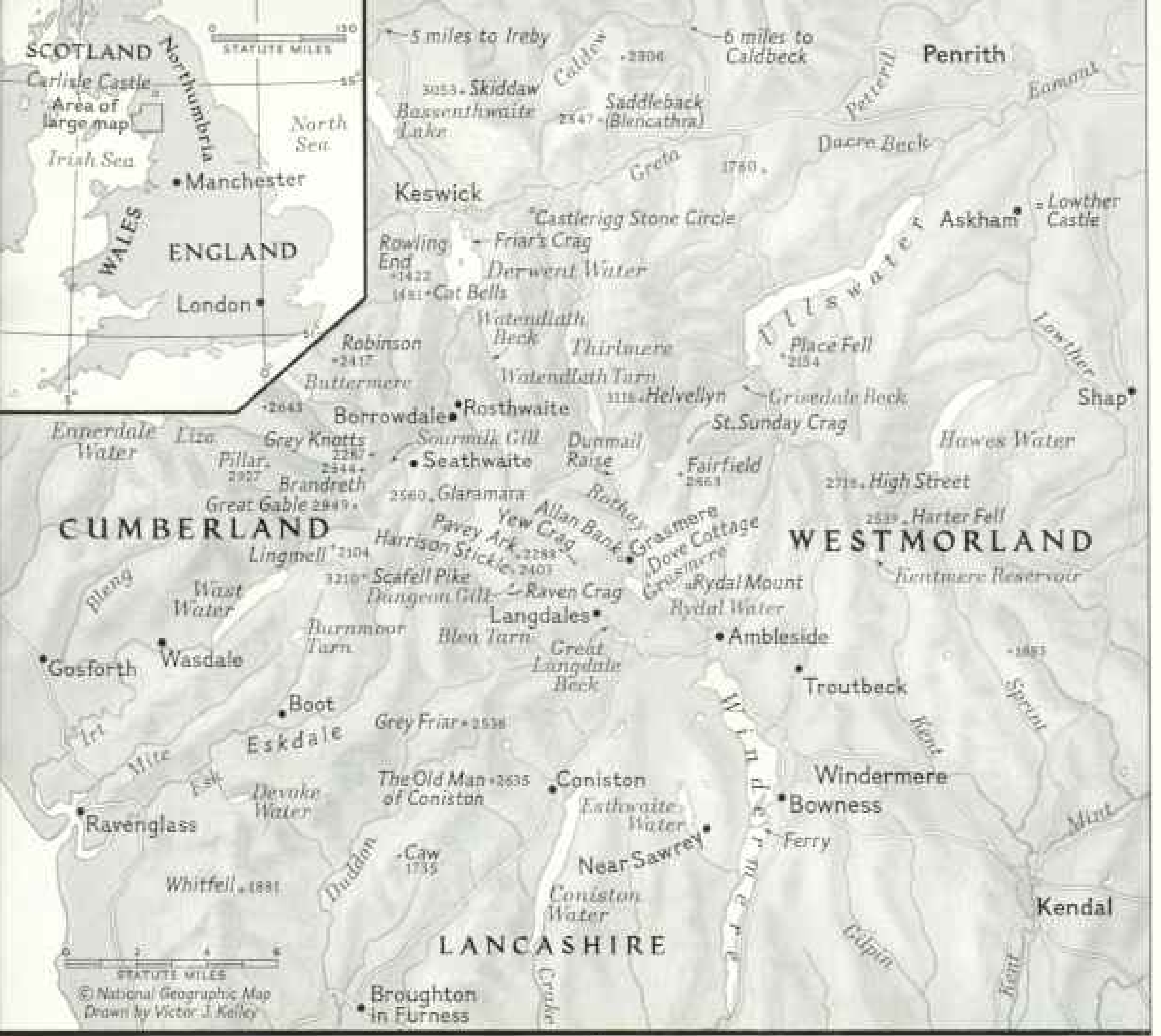
"'Tis Pleasant Near the Tranquil Lake to Stray Where . . . the Swan Uplifts His Chest"

One window of St. Martin's Church (left) in Bowness bears the stars and stripes of the Washington family arms. Wordsworth mentioned the swans of Windermere in *An Evening Walk*.



Watery Tarns and Meres, Lofty Fells and Pikes Dress the English Lake District

Here an antique nomenclature survives. *Beck* is a stream, *force* a waterfall, *wyke* a bay, and *holme* an island. *Knott* is a rocky knob and *stickle* a sharp peak. Sheep follow *trods* and graze rounded *howes*.

hygienically minded Saxons, a day of joy and gladness.

Though Grasmere's parishioners no longer use rushes to keep their feet warm, the old ceremony still takes place.

"Early in the morning of rush-bearing day," the schoolmaster's wife told me, "we go down to Grasmere Lake to cut the rushes. When we have strewn the church floor, we make our 'bearings,' which are flowers and rushes shaped over wooden forms that have been handed down for generations.

"One represents Moses in the Bulrushes; another is David's Harp. But the most famous of all is the Hand of St. Oswald, King of Northumbria and for centuries the patron saint of Grasmere's church."

A choirboy passed, carrying a standard made of lake reeds in the form of a human hand. Spelled out in rushes was the date of the saint's death, A.D. 642, and the words, "May this hand never perish."

Gingerbread Ends a Festive Day

As we were talking, the clouds parted and the sun peeped forth. Church bells began to ring, the village band played a traditional tune called "The Rush-bearers' March," and the procession wound its way slowly through the village.

Choirboys led the way, the first carrying a cross of golden flowers. Then came the bearings. The men's choir followed, and the clergy. Six young maids in dresses of white and green held a sheet strewn with flowers and rushes. Then came the band and finally

"D' Ye Ken John Peel ...with His Hounds and His Horn"

Foxhounds and hunting men of the Lake District live with the ghost of John Peel, the immortal of the hunt who inspired a song still caroled around the world. Steep, wild fells yet echo the sound of horns like his.

One magazine of Peel's day observed, "He seems to have come into this world only to send foxes out of it." At the age of 9, legend says, Peel was attending every hunt in Lakeland, relentlessly tracking foxes as much as 50 miles a day. And, in a country too rough for horses, he was traveling on foot!

Here John Richardson, dressed for the Blencathra Hunt, shows his Fell foxhounds at the Vale of Rydal Sheep Dog Trials in Ambleside. His one wiry Lakeland terrier represents a breed developed by farmers to flush lamb-killing foxes from dens. Huntsmen use the dog for the same purpose after hounds have run the predator to ground.

↓ Three youthful hikers tour the Lake District. Stacking knapsacks against a tree, they wait out a rainstorm.

© National Geographic Society

the villagers and their guests. A tall elderly man among the visitors was pointed out as the Reverend C. W. Wordsworth, great-grandson of the poet.

We all managed to crowd into the little church, where the floor was inches deep with lake rushes. The old building, with its beamed roof like that of a barn, remains much as it was in Wordsworth's day. How strange it seemed to sit in this venerable structure at a service that recalled an Anglo-Saxon king who lived 13 centuries ago!

The ceremony ended with a hymn to St. Oswald. Then we trooped out into the afternoon sunlight, and the children ran off to eat the gingerbread with which the festive day concludes.

After church I had the pleasure of meeting Wordsworth's great-grandson, and marveled at how some families go onward stamped like coins with clearly defined personal characteristics. Had he been dressed in the clothes of 1820, Mr. Wordsworth would have been the double of the poet (page 544).

I went to bed that night with the feeling that I had taken a good clean plunge into Lakeland. When I awakened the sky had cleared, the day was smiling to the hilltops, and the thrushes were singing.

Grandeur, Not History, Marks Lakeland

The English Lake District is a small mountainous area about 35 miles square, lying in the three northern counties of Lancashire, Westmorland, and Cumberland. The largest of its 16 lakes, Windermere, is some 10 miles long and a mile wide (pages 512-513). Around them all are mountains that give an

unforgettable impression of lofty majesty, though the highest, Scafell Pike, rises only 3,210 feet (map, page 514).

A characteristic feature of Lakeland is that one is never conscious of its smallness. It is as if Nature, before creating the Rockies and the Great Lakes, had designed a scale model that should contain a hint of all their splendor. Nowhere has more variety been packed into so small a space.*

The climate of the area is notorious. Seathwaite in Borrowdale has the reputation of being the wettest place in England. But 10 minutes in the lake country will prove that rain has never kept visitors from going there. Indeed, abundant rain is recognized as a natural, and not unhealthful, feature of a holiday in the Lake District.

Another peculiarity is that Lakeland, compared with the rest of England, has little history. The district's chief contribution to the regal matters of the English past is Catherine Parr, the sixth and last queen of Henry VIII. She was a Westmorland girl, born at Kendal.

Maynard Owen Williams (above)

← Sparkling Derwent Water Laps the Foot of Wooded Friar's Crag

One of the most frequented spots in the Lake District is this low "crag," a small promontory. Entire busloads of "trippers" leave their seats and walk out to the point. From it they glimpse towering Grisedale Pike and Witch's Hand, the scarred terrain on the hillside below.

Boys on the lake row a rented boat; the coxswain steers with the ropes over his shoulder.

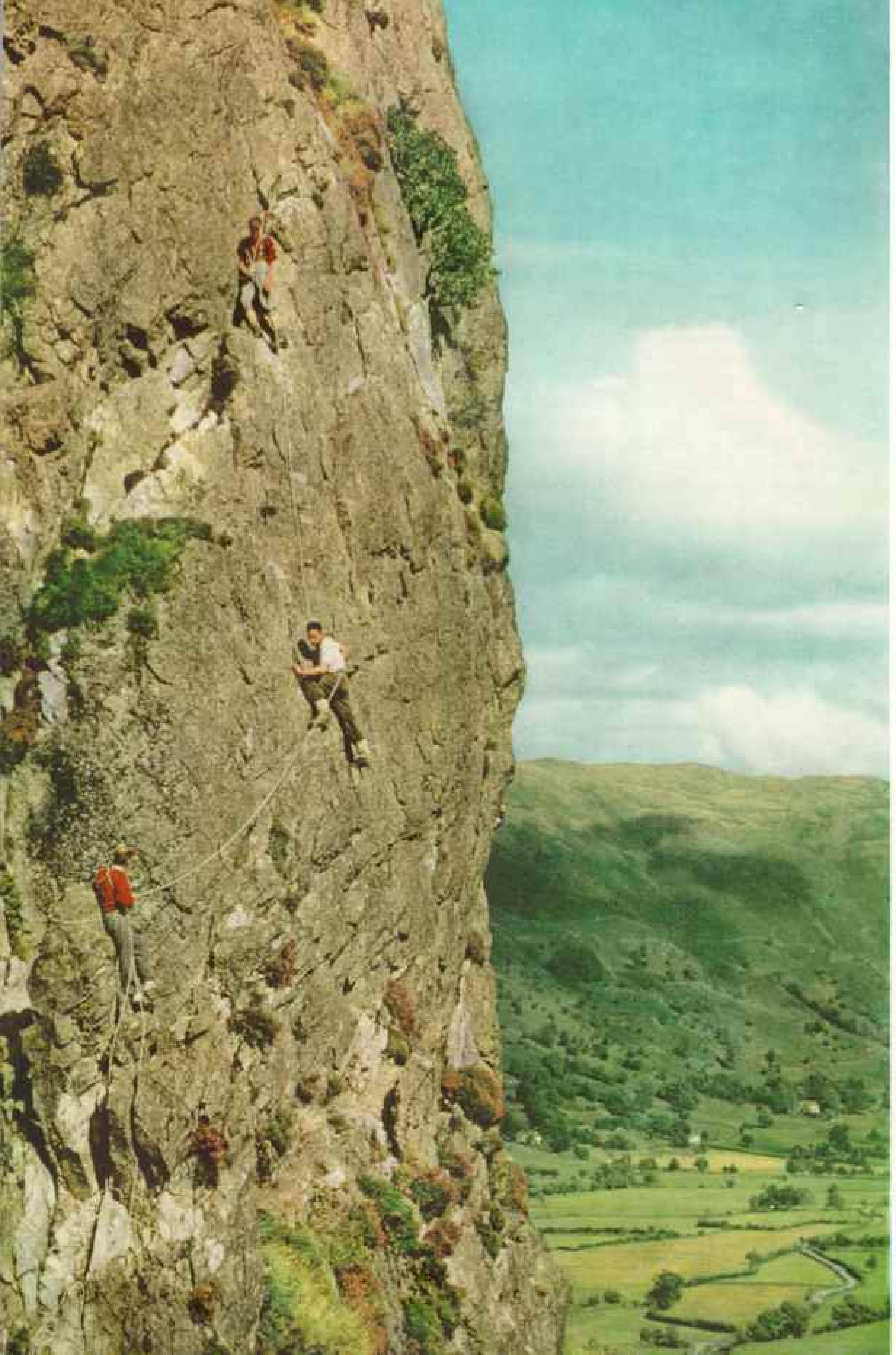
"The first thing which I remember as an event in life," wrote the critic John Ruskin, "was being taken by my nurse to the brow of Friar's Crag on Derwentwater."

Ruskin's view, shown above, looks into a valley mouth called the Jaws of Borrowdale.

On the other hand, few places in England are more packed with literary associations. Since the 18th century the lakes have cast a spell over English writers.

In 1799 William Wordsworth decided to seek refuge in Lakeland from what he considered to be the ugliness of an industrialized and revolutionary world. The tall, rawboned young man with the York-

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Informal Salute to the English Lakes," by Maynard Owen Williams, April, 1936; and "Through the English Lake District Afoot and Awheel," by Ralph A. Graves, May, 1929.



shire accent—who else would make "thoughts" rhyme with "notes"?—explored on foot every inch of the country. Its sights, sounds, and colors, along with its humble cottages, are reflected in his verse.

Americans Visited "Wordsworthshire"

And there were others who celebrated Lakeland's glories. Robert Southey lived at Keswick (page 510), and that charming but unhappy genius, Coleridge, gravitated between there and London. De Quincey took over Wordsworth's cottage at Grasmere (page 538); Harriet Martineau lived near Ambleside; Ruskin settled at Coniston. Emerson and many other distinguished Americans visited "Wordsworthshire." The diaries and autobiographies of the period are full of references to it.

Five years ago the Lake District was designated the second of England's national parks, and some of the administrative functions formerly vested in the councils of Lancashire, Westmorland, and Cumberland passed to a body known as the Lake District Planning Board.

For generations the inhabitants of the Lake District—farmers, cottagers, retired people, and those engaged in the tourist business—have opposed without official aid the encroachment of such signs of modern living as telegraph poles, electric pylons, advertising, and filling stations. In these feelings they now find themselves heartily supported by the Lake District Planning Board, whose duty it is to preserve the beauties of the lake country without interfering more than is necessary with the life and beauty of a well-populated district.

And, of course, there is advertising. Here the board has exercised its power by causing advertisements to be toned down or removed.

When the board's keen sense of esthetics brings it into conflict with other government departments, a battle of giants may take place. Perhaps the greatest problem of all centers around electricity. Some parts of Lakeland still go to bed by candlelight, and it will be several years before farmers in remote dales and fells receive light and power. The immediate problem is how to lay underground cables without loading the extra costs upon the consumer. It has been officially recorded that "large poles and pylons carrying overhead electricity wires are out of keeping with the delicate quality of the Lake District landscape."

In short, the Planning Board makes it clear that as long as it keeps its vigil, the glories of the English lake country will remain inviolate.

Cottage Preserved as Poet Knew It

There is a cottage at Grasmere that might have been designed by an 18th-century landscape painter in collaboration with Walt Disney. Its windows are diamond-paned, and roses climb the roughcast walls to peep into bedroom windows. Thousands of sightseers visit it every year, and honeymoon couples stand hand in hand before it, thinking that life in such a spot would be ideal, "with the sun in the morning and the moon at night." To make the picture almost too perfect, its name is Dove Cottage.

Here on a frosty December night in 1799 the post chaise deposited William and Dorothy Wordsworth. He was 29; his sister was two years younger. They were poor, unknown, and in love with nature.

Wordsworth wrote many of his early, and some think his best, poems at Dove Cottage. Though Grasmere boasts two lordlier Wordsworth residences, and Rydal Mount, the house in which the poet lived when he was world-famous, is only a short distance away, it is only the cottage that most visitors wish to see.

Caretaker Links Past with Present

Mrs. Emily Kirkbride, who lives in a little shop over the way, has been showing visitors around Dove Cottage for 45 years. She knows so much about the Wordsworths that one imagines she must have been hovering around ever since the poet and his sister arrived. And she is, in a sense, a link with the past.

Page 518

← **Several Everest Climbers Began Their Training on Langdale Pikes**

Lake District peaks are not high. Scafell Pike, the loftiest, attains only 3,210 feet. But, as Wordsworth wrote, "Their forms are endlessly diversified, sweeping easily or boldly in simple majesty, abrupt and precipitous, or soft and elegant."

In this natural gymnasium some summits yield to novice climbers; others challenge veterans. These men cling like flies to the sheer face of Raven Crag. The center man tests a foothold for his move up, while companions above and below belay the rope. The valley of Great Langdale falls away beneath them. Stone Age man quarried rock for axes close by.

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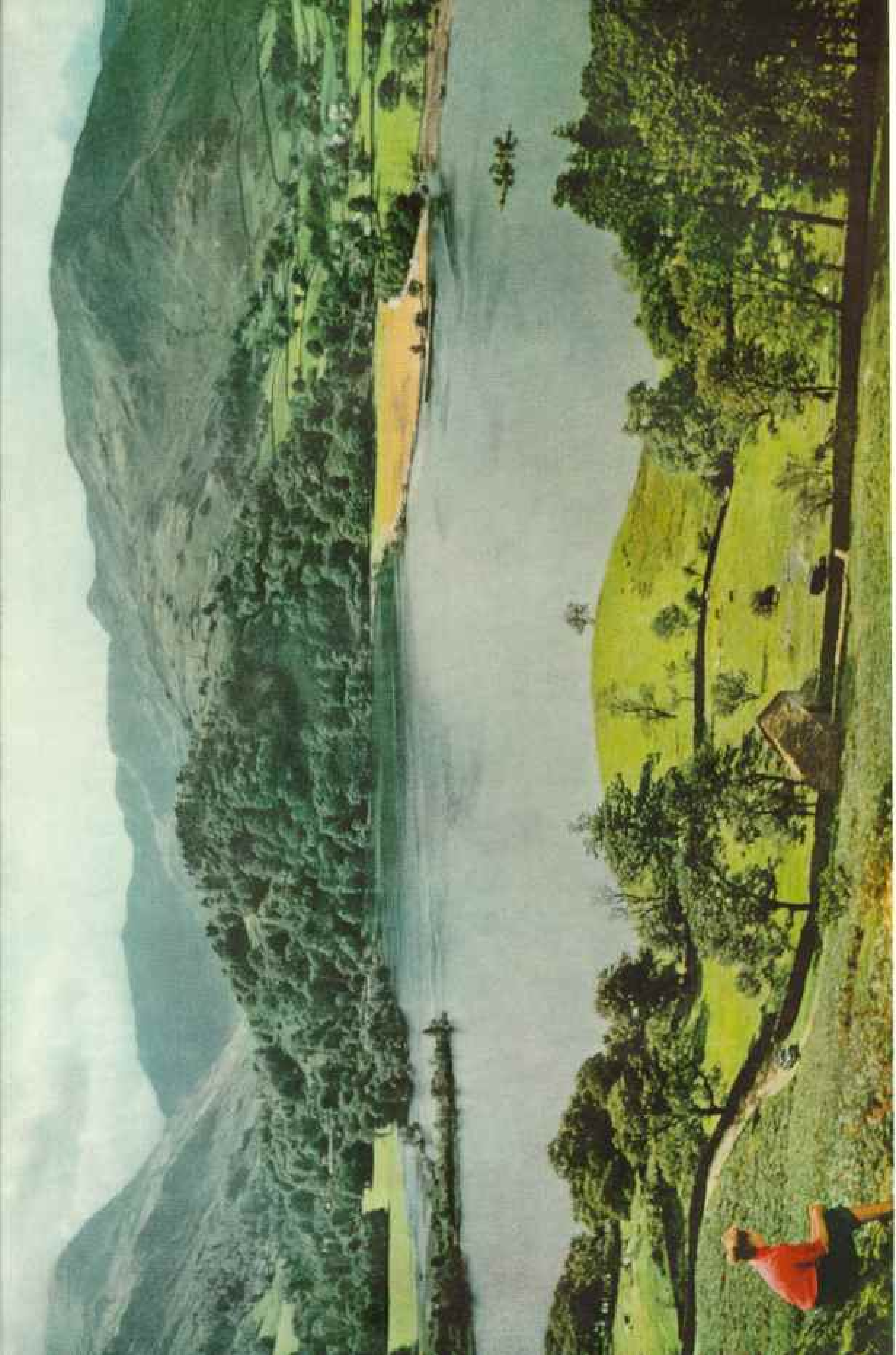

↑ **Ullswater: "*Majestic in Its Calmness*"—Thomas Gray**

Here Wordsworth "wandered lonely as a cloud" and "saw a crowd, a host, of golden daffodils." In this view no flowers show, but the setting remains: St. Sunday Crag (left) above Grisedale Valley.

↓ **Gray's "*Unsuspected Paradise,*" Where "*All Is Peace*"**

Rhododendrons color the vale of Grasmere, where Wordsworth composed much of his poetry. He lived first at Dove Cottage (page 538) and then at Allan Bank, the house dimly seen on the hill at right.

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She inherited the post of guide from her grandmother, who could remember, as a young woman, seeing the Wordsworths walking about the village.

With Mr. Wordsworth I climbed the dark, narrow stairs to the sitting room above, where my companion's great-grandfather had written so many of his poems, where Coleridge had visited, and where, in later years, De Quincey wrote.

William Fortunate with His Womenfolk

In a window seat we talked not of William Wordsworth but of his wonderful sister, Dorothy. Has any other literary man had such a helpmeet? She discussed every poem with him, she copied them out in a fair hand, she walked with him wherever he went, and adored him even in his most depressed moments. Her life was devoted to him, and his fame has obscured the fact that she was herself a splendid writer.

Unlike many poets, Wordsworth was fortunate with his womenfolk. His wife, Mary Hutchinson, must have been an exceptional character to have accepted the mental affinity of her husband with his clever sister. Dorothy even accompanied her brother on his honeymoon.

Mr. Wordsworth and I went down into the little garden that rises at the back of the cottage, where William raised peas when he was not "composing." The syringa that the Wordsworths planted is still there. Mrs. Kirkbride came out with a crowd of visitors and began to whistle. Chaffinches fluttered down from the surrounding trees and fed from her hand (page 538).

Bird Leaves Cottage for Tea

"It all began with a bird called Gertie," she explained, "which had a crumpled foot. The postmaster tamed her, and Gertie taught her young to answer a whistle. These are perhaps Gertie's great-great-grandchildren."

One bird leaves Dove Cottage on Thursdays, a young bystander assured me, and temporarily transfers its begging to the hotel where the coach crowds have tea!

At various times I have studied Windermere (page 533), Derwent Water, Coniston Water, Thirlmere (page 537), and Ullswater (page 520)—indeed, all the greater lakes—and I am unable to say which I consider the most beautiful. At moments I have thought Derwent Water more exquisite than Windermere; then, hours or days later, I would reverse my opinion. Finally I have faced the fact that one cannot weigh and analyze something as incalculable as a mood.

All of them fulfill what I consider to be the first essential of a lake: delightfully narrow and compact, they are easily seen at a glance. One is enchanted by the fretted line of the lakeside, the secluded bays and inlets, the wooded slopes that march down to the water's edge, and the islands that so often break the surface. These English lakes are mirrors in which are repeated all the changing beauty of the year and the movements of the sky.

I remember standing one day at Bowness ferry when the clouds were low and Windermere was drenched in that kind of melancholy that is best expressed by solemn music. When I next passed that way, the sun was shining and the whole landscape sang with joy. The calm blue water stretched northward toward the mountains around Ambleside, and on its surface, as perfectly matched as a split apple, I saw the reflection of the shoulders and summits that culminate in Helvellyn (pages 536 and 538).

Moody Mirror of Changing Weather

I have seen Derwent Water sheeted in a gray shroud of mist, cold and terrible, lying in a stillness so awesome that I was grateful for the movement of a waterfowl as it skimmed the surface and vanished into the mist. I have seen it, too, on a morning when not a ripple broke the great sheet of water, when the lake lay spellbound in a mighty hush that reflected the glory of the hills and the sky.

Dorothy Wordsworth, faced by such a Lakeland vista, wrote in her diary, "...my heart was almost melted away."

Perhaps only the walkers and the mountaineers know the true beauty of Lakeland.

Page 523

"Like a Fair Sister of the Sky, Unruffled Doth the Blue Lake Lie" →

Wordsworth, author of this passage, spent his last 37 years in a house overlooking Rydal Water, one of the smallest of the lakes. Thomas De Quincey and Samuel Taylor Coleridge's son, Hartley, also a poet, lived in Nab Cottage near by.

These hikers rest among hay pikes. Cloth squares shed rain. Wind bends the rushes in waves like the ripples on the lake.

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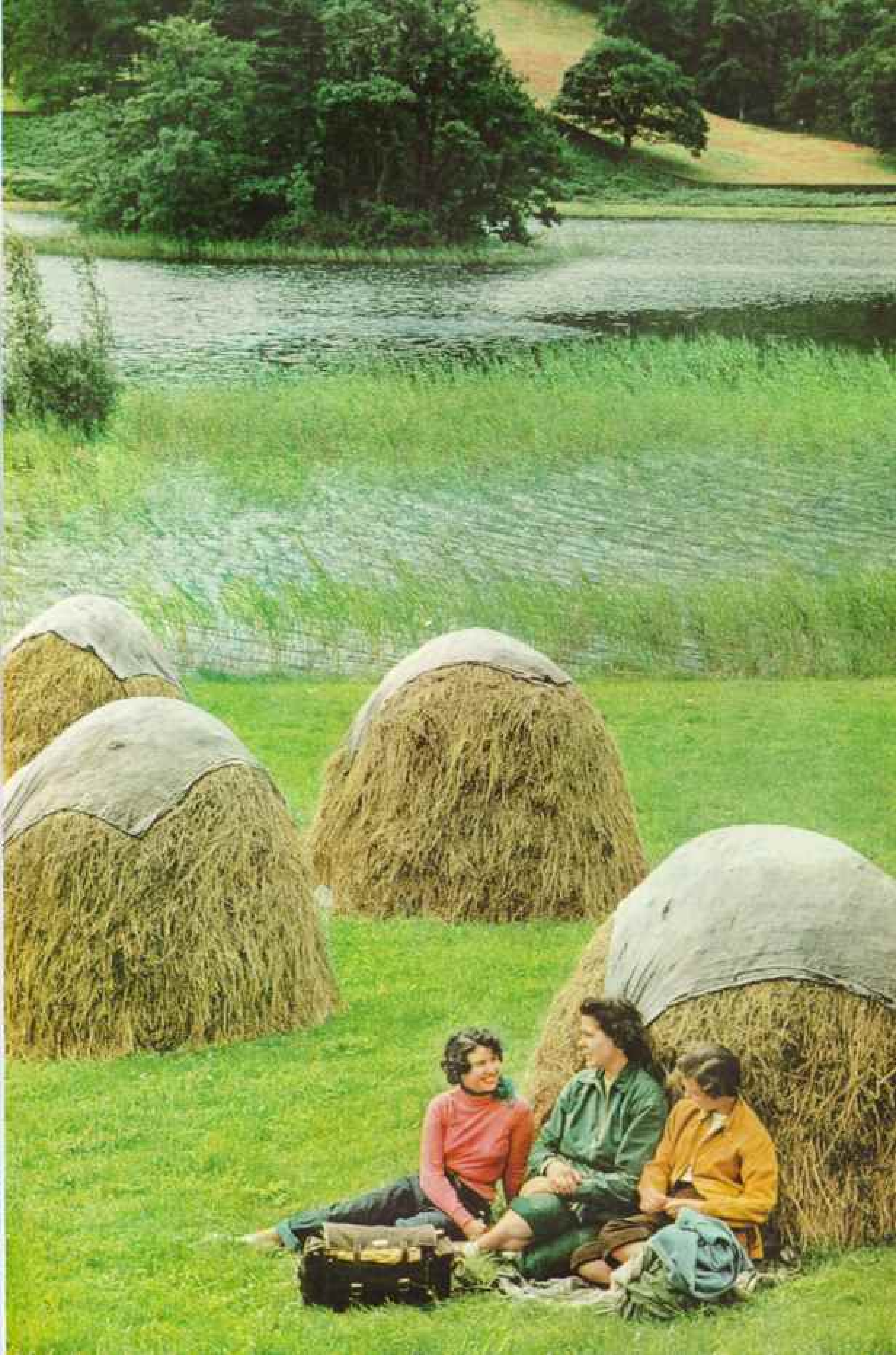

Sanderson & Dixon

Owners Release Entries. Off Go the Hounds, Chasing a Man-laid Scent near Ambleside

Testing nose, speed, and stamina, this eight-mile race takes the measure of a dog. At top speed and in full cry, trail hounds follow a scent made by an aniseed-soaked rag dragged across fells, dales, and stone walls (page 545). Dogs are bred lean for the sport. Owners reward finishers with food to encourage speed. To prevent substitution of fresh dogs in mid-race, officials put identifying marks on starters.

Having earned their view by strenuous hours on the fells, they slip the packs from their backs and look downward from the summit of a mountain to the smooth hills folded against one another to the sky, and to a blue lake in a green valley.

I recall such a view of Hawes Water from the pony track below Harter Fell. Far below lay a spoonful of blue cupped in a great panorama of hills. The clouds raced across the distant fells, sweeping them with changing color, and I realized what Wordsworth wished to convey when he wrote of "the compound hues of a dove's neck."

Distant Glitter of the Irish Sea

I remember a stormy day on the shoulders of Great Gable, when I looked westward across Wast Water. Suddenly the sun came through. Some hills lay in sunlight, others in shadow, and I felt that I was alone with elemental forces, as if I were the last man on earth. Then the lower mists blew away, and through them I saw the green and checkered little valley of Wasdale, with its fields divided by stone walls into a hundred queer shapes. Beyond, across miles of low country, shone a distant glitter of the Irish Sea.

I remember in particular one night by the little lake of Rydal Water (page 523). Clouds were scudding across the sky; then in an instant the full moon came through a rift and lay all gold and shimmering on the water, as if it had fallen from the sky. A pale light washed the banks, and the dark reeds at the lakeside might have been the spears of a hidden army.

It seemed that at any moment the surface of the lake might be broken by an arm grasping the sword Excalibur, and that out from a shadowy headland might come the three queens in their mourning barge.

Rescue Students Test Nerves on High

Lakeland's Outward Bound Mountain School trains boys to be men (page 532). Members of this patrol cultivate character as much as muscle and skill. "Rescuer" and "rescued," trusting lives to ropes held by comrades above, descend an 80-foot cliff on Great Gable.

Hill Top, a Shrine to Childhood; Peter Rabbit's Creator Lived Here

In this Near Sawrey farmhouse Beatrix Potter wrote the adventures of Squirrel Nutkin, Mrs. Tittlemouse, and other characters (page 528). In her works the spinning wheels, dishes, and carpets belonged to her animal friends.

Children examine the storyteller's books and original water colors.

to take the dying King Arthur to Avalon.

Strangely, many artists, including Turner and Constable, have painted in the lake country, but few great landscapes have resulted. I believe that the most successful impressions are color photographs of the unusual quality of those illustrating this article, taken by my friend, National Geographic staffman David S. Boyer. Wordsworth would have been fascinated by these illustrations, which have caught and held the flying moment.

Two-week Holiday for $19.60

Travelers invariably remark on the great variety of holidaymakers they meet in the Lake District. Here are cyclists and caravanners; and campers exposing their domesticity in a damp field, the girls washing nylons, the men shaving with a mirror in a cleft stick—all the complications of the simple life. And here are walkers of every age and nationality. I once encountered a band of men and women from Algeria, of all places!

Some walkers are tough and experienced; one feels that they are experts in first aid and blisters. Others are touchingly inexperienced, like the three pretty maids I met sheltering under an oak near Bowness (page 515). Their bare legs in white shorts, visible through plastic capes, seemed hardly capable of carrying them over the mountains. Neither did their young shoulders look strong enough for the bulky packs that lay at their feet.

Two were cadet nurses, the third was a hairdresser. When I spoke to them, they shyly offered me a biscuit and a drink of tea from a Thermos.

They were staying at the Youth Hostels, and were delightfully frank about their finances. A bed in a hostel costs 28 cents, they told me; breakfast is the same. Supper costs 31 cents, and a packed lunch about half as much. They had allowed themselves $1.40 a day for everything and thought they had been lavish. The two-week holiday would cost each of them $19.60!

Hostels are to be found everywhere in Lakeland, in towns, villages, and on the fells, spaced generally a day's march apart. Some are country mansions, some are hotels that have gone out of business. Others are farmhouses or even enlarged huts (page 528). All are distinguished by the magic letters YHA (Youth Hostels Association), which shine like

the windows of home in the eyes of the often damp wayfarers.*

When the walkers begin to arrive at a hostel in the late afternoon or evening, each must produce his membership card and sign the register. Any member is likely to be chosen by the warden to sweep or serve as mess orderly. In all the hostels I visited after suppertime I saw a quiet, domestic scene; the girls sewing, knitting, or writing postcards; the boys reading or poring over their maps. Nearly every girl brought in her pack a neat cotton frock or a blouse and skirt into which she had changed before supper.

* See "Europe Via the Hostel Route," by Joseph Nettis, National Geographic Magazine, July, 1955.

Rarely did I find a group of hikers with sufficient energy at the end of the day to join in games or any other activity. They were drugged by the mountain air. But at Keswick, in a romantic hostel lying like a ship in dock on the banks of the Greta, I did discover a dancing warden! As I was talking to him in the bright little general store that many hostels possess, two girls turned on a gramophone and began to dance.

The warden sang out to his wife, "It's a Canadian barn dance, and they don't know how to do it. Come on!" And hand in hand they pranced onto the floor and led a column of guests around the room.

One might imagine that with Wordsworth at Grasmere, Ruskin at Coniston, Southey at Keswick, and Sir Hugh Walpole as a candidate in the "Herries" country, Lakeland would not have room for another literary shrine. But in the last few years a cottage has sprung into fame that, to the surprise of everyone, threatens to rival the popularity of Dove Cottage itself. This is Hill Top Farm, in the village of Near Sawrey, where Beatrix Potter wrote many of her children's books (page 526).

Nursery Classics Born in Lakeland

Several generations have now been brought up on the adventures of Peter Rabbit, Squirrel Nutkin, Mr. Jeremy Fisher, and Mrs. Tittlemouse. So far as I know, there is nothing to indicate to the uninitiated how much these

nursery classics owe to Lakeland. But once you know the secret and have visited Near Sawrey, you realize that Squirrel, Tom Kitten, Pigling Bland, Mrs. Tiggy-Winkle, and the rest are true Lakelanders. Their background of farmyard kitchens, oak dressers, and grandfather clocks is Lakeland scenery copied faithfully from life.

Hill Top is the perfect literary shrine: a house left with all its contents just as it was when the author died. The cottage is worth seeing for itself as a typical northwest farmhouse, and to Beatrix Potter fans it is a joy and delight. Children run here and there, recognizing the staircase where Tabitha Twitchit mewed, the old oak dresser that Anna Maria passed with her plate of dough; and the clock from *The Tailor of Gloucester*. Upstairs is a dolls' house; in one of its tiny rooms youthful enthusiasts can recognize the "two red lobsters, and a ham, a fish, a pudding, and some pears and oranges," of *The Tale of Two Bad Mice*.

Beatrix Potter was a terrific stickler for accuracy. The secret of her art is contained in a note written when she was composing *The Tale of Pigling Bland*: "... I spent a very wet hour," she observed, "inside the pig-sty drawing the pig." *

Coniston Water Soothes a Critic

I suppose no greater compliment was ever paid the lakes than John Ruskin's decision to live by Coniston Water, three and a half miles from Near Sawrey. Here was no poor poet or farmer but a famous pontiff of esthetics, who, with a private fortune and a great

* See "The Preservation of England's Historic and Scenic Treasures," by Eric Underwood, NATIONAL GEOGRAPHIC MAGAZINE, April, 1945.

Hikers Enjoy a Bit of Sun As They Await the Hostel Keeper

These eager young sightseers prefer the leisure and economy of the rugged path to motorized comfort. Carrying 30-pound knapsacks day after day, they stroll contentedly from camp to camp.

At 5 o'clock the warden throws open the onetime shepherd's hut, whose door bears the symbol of the Youth Hostels Association. While he cooks dinner, the guests dust and sweep.

→This German boy, who wears Youth Hostel badges of several countries, camped out in good weather. Trudging through mountains, he carried a 100-pound pack, including provisions for three days. An English vocabulary of about 50 words served him adequately. Studying a map, he rests beside a milestone between Ambleside and Keswick.

reputation, might have lived anywhere in the world. Even Lakeland, which turns a bleak eye on "off-comers," must have been slightly flattered.

At Coniston I found a huge gaunt house above the lake asleep in its shrubberies and dreaming of the past. Ruskin came here in 1871, when he was 52; fame was an old story to him. For years artists had believed that an attack by the critic could ruin them. *Punch* expressed the fear in these lines, put into the mouth of an academician:

> I takes and paints,
> Hears no complaints,
> And sells before I'm dry;
> Till savage Ruskin
> He sticks his tusk in,
> Then nobody will buy.

The exquisite aspect of Coniston Water that Ruskin saw from his windows may have soothed him, for he carried on more as a social reformer than as a castigator of artists. The view is really magnificent, extending across the lake to the green banks where fields rise to the swelling curve of Coniston Fells, whose highest point is called The Old Man of Coniston.

Steps Unfold When Door Is Opened

When I was there, the only other visitors were young art students from London, who passed whispering through the empty house where Ruskin once kept five maidservants and a valet. There are rooms full of Ruskin's beautifully precise water-color sketches, and the room, upstairs, in which he died at the age of 80.

In the coach house outside, I saw his traveling carriage. When I opened the door, a pair of steps automatically unfolded and descended toward me.

I stepped into the carriage. It was beautifully sprung and as comfortable as a modern car. The little padded drawing room must

Raincoats in Grasmere Indicate Showers, Almost a Daily Event

It is June, and the tourist rush is on. Sightseers in their little English-made cars roam the narrow, winding streets, most of them looking for the grave of Wordsworth in St. Oswald's churchyard (page 511). Teahouses spread cakes, bread, and rum butter. Inns, curio shops, and bookstores flourish with the season.

When winter comes around, Grasmere will be its quiet self again.

Vine-covered houses are built of local stone. The Lake District Planning Board, which preserves Grasmere's dignity against the assault of commercialism, sees that new houses go up in the traditional style.

ORDNANCE MAPS
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have been a speedy model, light as a feather, swinging like a hammock, and with a black basketwork rack on top for luggage. It took Ruskin but a week to reach London in his carriage, sitting bolt upright!

High Fells Attract Rock-climbers

There are many Lakelands: the Lakeland of the literary pilgrim, of the cyclist and hiker, of the artist and the poet—and, of course, of the down-to-earth farmer who earns his living in the dales and on the fells. But, so far, I have said nothing of the Lakeland of the rock-climber.

You may come across climbers anywhere on the high fells, clinging like flies to the face of some overhanging pinnacle (page 518). The average climber looks like a paratrooper, with a coil of rope over one shoulder, an ice ax in his hand, his socks outside the ends of his waterproof trousers, and his boots studded with spikes.

I went into an inn parlor in Langdales that was crowded with men sitting on barrels with beer mugs in their hands; they looked for all the world like a pirate crew. One of the most sinister turned out to be a gentle teacher of typography from Kent; his savage-looking friend was an oculist.

Many of these tough commandos were going back to the mildest of city jobs. It was difficult to imagine some of them neatly dressed in an office. But it does not require any knowledge of psychiatry to appreciate the importance to the ego of a week end of danger, initiative, comradeship, and adventure. I liked the way they laughed off their achievements on the fells, and I thought them the elite of Lakeland.

Mountain School Teaches Citizenship

One day I went into the recesses of Eskdale Valley, in the southwest of the Lake District, in the hope of seeing the Outward Bound Mountain School in action. Mr. Eric Shipton, the Himalayan climber and an architect of the Everest victory of 1953, was then serving as school warden.

It is wrong to believe, he told me, that the school trains young men to be mountaineers. That is not its object at all. The Outward Bound Trust, which maintains sea as well as mountain schools, was founded to teach lads to cope with the hazards of life and to become good citizens.

"We eliminate personal distinction," said Mr. Shipton. "Our hero is not the bold or outstanding boy. We work in teams, called patrols, and credit goes to the patrol rather than to the individual."

The mountain school seemed to me rather like a commando course designed and conducted by psychologists. All the instructors are mountaineers, explorers, or men who have led adventurous lives. Every physical test has a spiritual purpose.

"Your course is said to be pretty tough," I commented.

"Yes, but not beyond the capacity of the boys. We have had many a weakly looking lad whose spirit has triumphed over everything."

After my visit I often met Outward Bound patrols on the high fells. Sometimes new boys from the mills and factories of the north appeared, looking pathetic and bedraggled in the wind and rain. Three weeks later the same boys were scarcely recognizable as they stood confidently on the perpendicular face of Kern Knotts on Great Gable, lowering an "injured" comrade on a roped stretcher (page 525).

Muddy "Scramble" in John Peel Country

Like bonnie Annie Laurie, John Peel "with his coat so gray" (not "gay," as many sing it) owes his immortality to a song. I have heard it sung on cheerful occasions in all parts of the world and thought I would like to see the Cumberland countryside, along the northern edge of Lakeland, that Peel awakened so often with the sound of his hunting horn (page 515).

On my way to Caldbeck, where John Peel was born and is buried, I entered a bleak landscape of wild and forbidding mountains and moorland. Suddenly, miles from anywhere, I saw about a hundred motorcars parked in a field; the slopes of the adjacent hill were dotted with groups of excited people. A "scramble" was taking place—a motorcycle race along mountain tracks hardly accessible to a goat!

As I made my way up the hill, I heard loud explosions and the racing of engines. Then I saw about a dozen young men wearing crash helmets and clothed in mud from head to foot. As the starter blew his whistle, the blackened riders shot off again on their motorcycles, skidded downhill, avoiding boulders by a miracle, turned, and began to backfire their

(Continued on page 541)

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Windermere's Calm Face Is Furrowed by Motorboats Cruising Home After a Race

Sir Henry Segrave died on this lake in 1930 while trying to better his speed record. Donald Campbell, on near-by Ullswater last July, broke the 200-mile-an-hour "water barrier" in his jet-powered *Bluebird*.

Sheep Wander "*Like Sleep-walkers*" above Watendlath Tarn, Walpole's "*Other End of the World*"

In *Judith Paris* and *The Fortress*, Hugh Walpole chronicles the story of Judith Herries, who experienced her happiest days in this serene valley. Forced to live away from Watendlath, Judith remembered it with aching longing. "The little valley . . . the long green field . . . the round scoop of the Tarn, black or silver or blue, the amphitheatre of the hills, the sheep nosing at the turf. . . ."

Walpole selected the house at center as a home for his heroine: An "odd dumpy shape . . . a queer little place indeed, crouched into the soil as though it feared a blow."

These Herdwick sheep yield coarse wool for carpets and lanolin for cosmetics. Some people claim the breed originated with animals transported in the Spanish Armada. Others say Norsemen introduced them. "Little stone walls" that run "into the edge of the sky" set the grazing plots apart.

Judith's beloved mountains stand out on the horizon: Glaramara (left), cloud-capped Great Gable, Brandreth, and Grey Knotts.

© National Geographic Society

← *"Most Lovely of All, the Eternal Running Streams . . . So Friendly"*

Page 534: A timeless stone bridge crosses Watendlath Beck, long a rendezvous of children and ducks.

Downstream the water tumbles into a circular basin known as the Devil's Punchbowl. "An odd spot of turmoil above the quiet silence of the long meadow," wrote Walpole.

→ Under the oak beams of her 15th-century kitchen, Mrs. William Tyson makes cakes for visitors to Judith Herries's old home (upper). Walpole included the Tyson forebears in his historical novels.

Carriage lanterns hang above the fireplace. Painting includes the bridge and beck scene on the opposite page.

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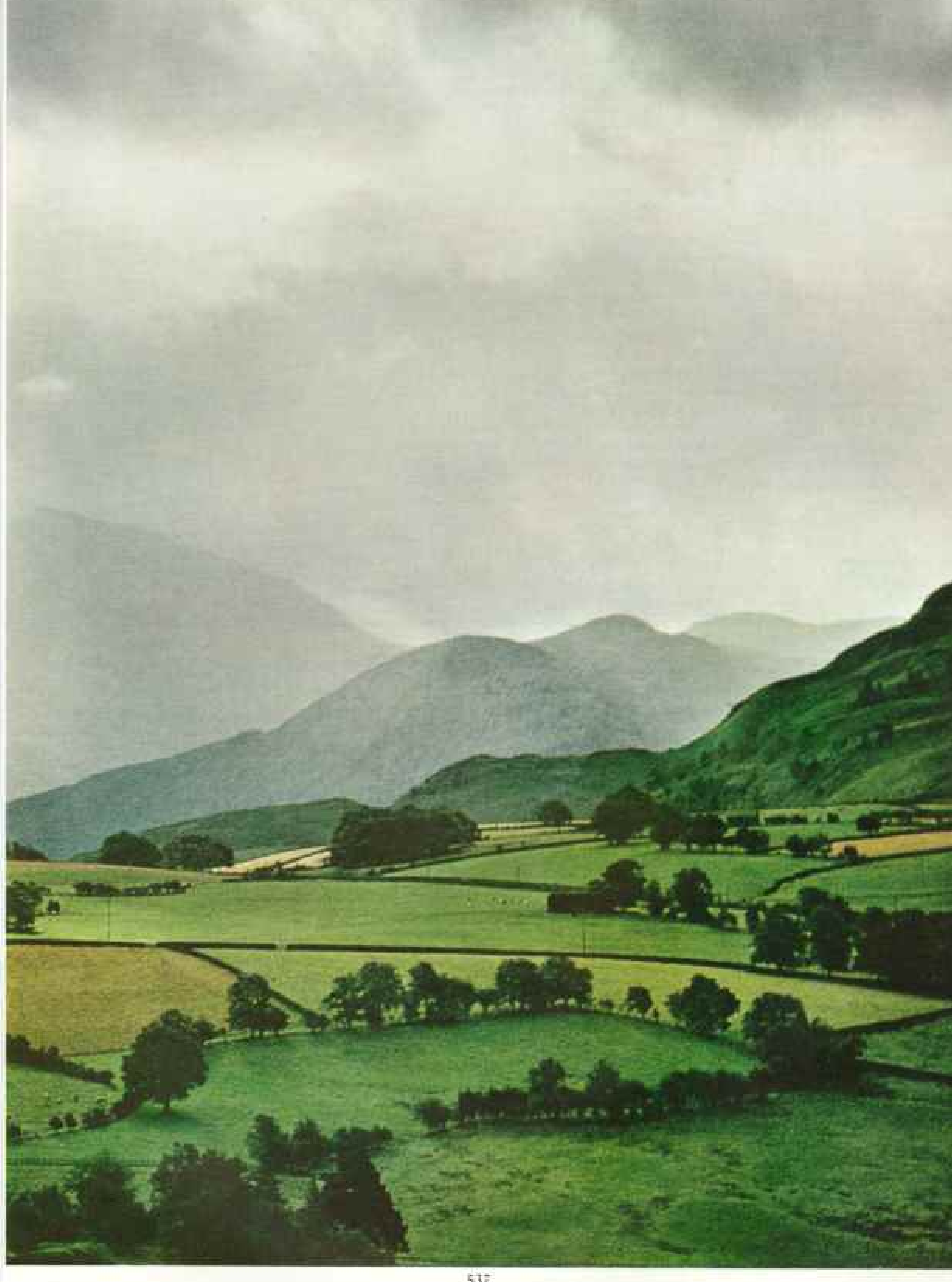
"Thou Hast Clomb Aloft, and Gazed, from the Watch-towers of Helvellyn; Awed, Delighted . . .

Wordsworth dedicated this Poem of the Imagination to a friend on "her first ascent to the summit of Helvellyn" (center). Keats sang of his contemporary: "He . . . on Helvellyn's summit . . . catches his freshness from Archangel's wing." When Scott climbed the peak's "dark brow . . . lakes and mountains . . . gleamed misty and wide."



...Lo! the Dwindled Woods and Meadows; What a Vast Abyss Is There!"—William Wordsworth

"The clouds, the solemn shadows, and the glistenings—heavenly fair!" Thus the poet saw beauty even in the notoriously wet Lakeland weather. Here the sun finds a hole in the clouds and spotlights pastures near Keswick (page 510). Thirlmere, a reservoir for the city of Manchester, lies hidden at the foot of Helvellyn.

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↑ *"...Like a Dismal Cirque of Druid Stones, upon a Forlorn Moor,"* Wrote John Keats

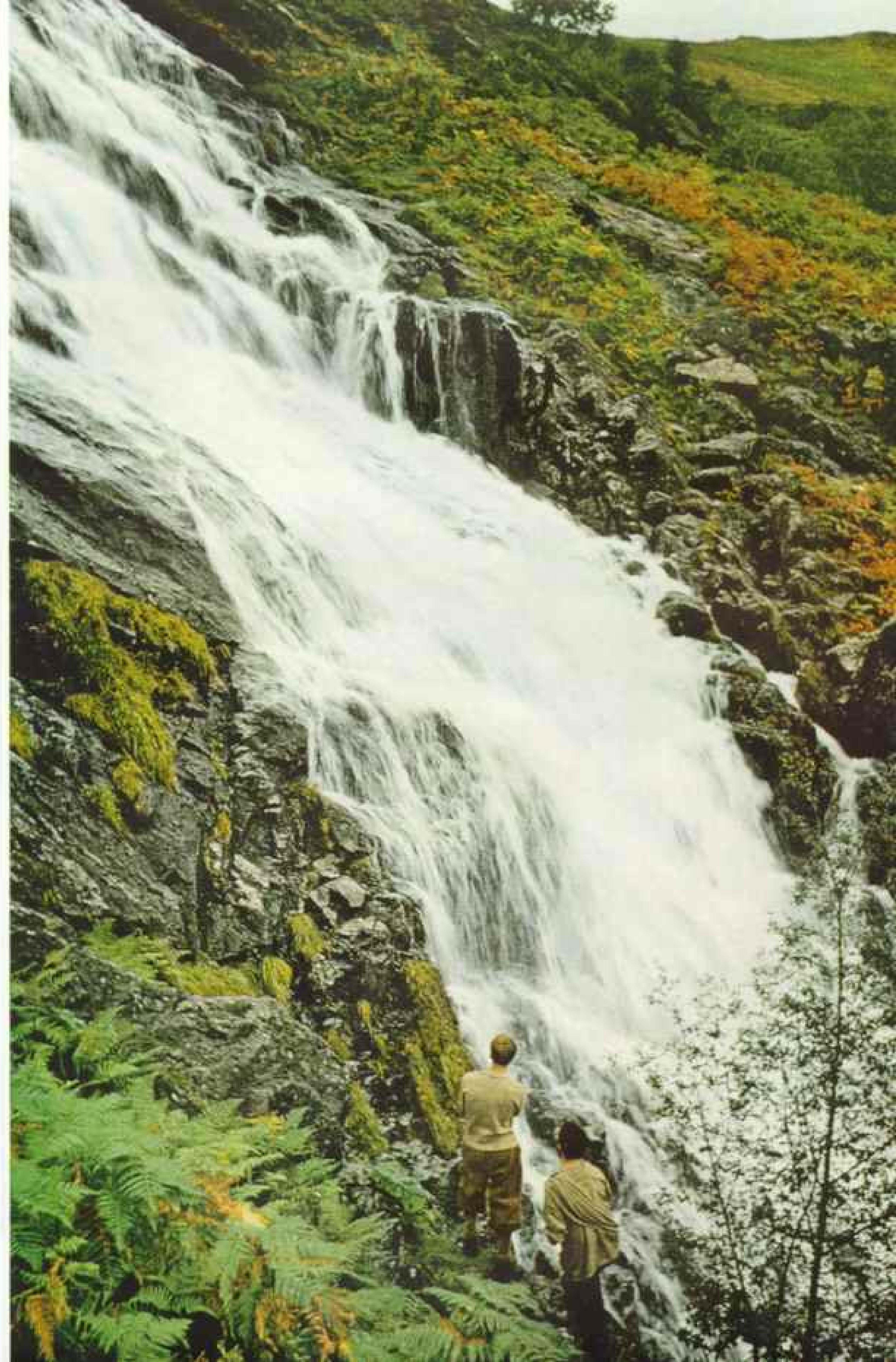
Many have attributed Castlerigg Stone Circle to the Druids. Actually the 38 stones, surrounding an inner ring of 10, compose a Bronze Age relic erected long before those ancient Nature worshipers set up their open-air temples. The crude monuments appear to have been shrines rather than grave markers.

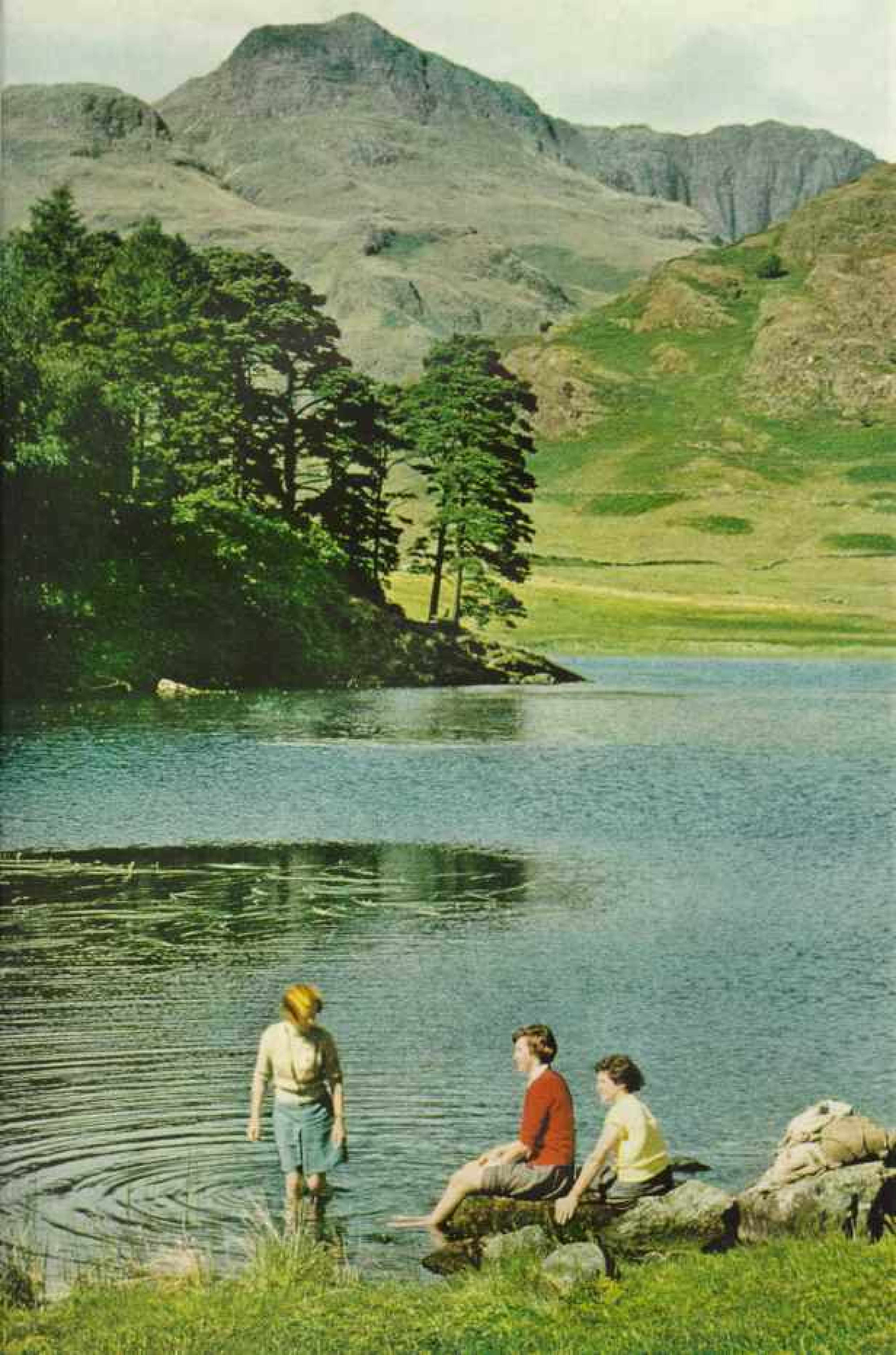
Helvellyn looms on the skyline (page 536).

"...Walking Down by Sour Milk Ghyll ... When the Water Is Whiter Than Snow" →

Page 539: Hikers repeat the action of a character from Walpole's *The Fortress*. The cascade, one of several with the same name, flows near Borrowdale. Wordsworth seems to have coined his own spelling of "gill," a deep rocky cleft containing a stream.

↓ A chaffinch lights on the hand of the caretaker of Dove Cottage, home of Wordsworth and De Quincey.





way uphill until they disappeared over the crest. At last a solitary rider, then another, then a third, wobbled from the skyline to come skidding and slithering to the winning post. It was a scene that would have turned a matador pale.

The interesting thought to me was that several of the roughriders were shepherds. What would Wordsworth have said to that!

Song Draws Pilgrims to Remote Grave

It was unnecessary to ask the way to John Peel's grave in Caldbeck, for feet have worn a path across the grass straight to it. What a strange thought it is that people have come from all parts of the world to this remote village of stone cottages and an old church, drawn there simply by the enchantment of a song.

Peel might never have been remembered but for this famous song, which was written almost by accident. One winter night in 1832 he and a friend, John Woodcock Graves, were sitting by the fire recalling great runs with Peel's pack of hounds. Graves's daughter came in and asked her father to tell her the words of a song someone was singing in another part of the house.

Graves decided to write new words to it and, taking up pen and paper, composed "D'ye Ken John Peel?" He sang it to Peel, who listened with tears running down his face. Graves, with no idea that he had composed an immortal ballad, cried jokingly, "By Jove, Peel, you'll be sung of when we're both run to earth!"

A guidebook assured me that John Peel's famous horn was to be seen at the Sun Inn a few miles away, so off I went through interminable lanes and a tangle of crossroads to Ireby. The inn has changed hands, but the horn is still in the village, in the possession of a young garage keeper, the son of one of Peel's great-granddaughters.

Page 540

← Blea Tarn Still Glitters in the Sun, as It Did When Wordsworth Saw It

In *The Excursion* the poet relates his meeting with the Solitary, a character who lived beside the lake. Describing the valley, he wrote: "Urn-like it was in shape, deep as an urn; with rocks encompassed. . . ."

Stone walls march across the distant pastures. Harrison Stickle, one of Langdale Pikes' "lofty brethren," towers in the center. Gap on left is Dungeon Gill, the poet's "black and frightful rent." Pavey Ark escarpment fills the horizon on the right.

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In addition to the horn, he has a riding crop, a pair of stirrup irons, and a horse's bit that belonged to Peel. I suggested that the young man might bequeath the relics to the Border Regiment, whose march is "D'ye Ken John Peel," for preservation in Carlisle Castle.

It seems that goodness and generosity do not confer immortality, for poor Robert Southey is among the least appreciated of the Lake Poets, and few ever visit his home. Greta Hall, at Keswick, is an attractive white Regency house where Southey once maintained not only his own family but that of the fascinating, feckless Coleridge. It is now, I believe, a school dormitory. At any rate, it was locked when I went there, and I could see nothing in the rooms but piles of mattresses.

Museum Preserves Lock of Poet's Hair

The Keswick Museum near by is full of improbable objects: a lock of Wordsworth's soft, white hair; Southey's clogs and gloves and a flute played by him; and the court dress worn by Ruskin. There are also manuscripts and memories of a more recent Lakeland author, Sir Hugh Walpole, who wrote the "Herries" novels near Keswick.

Among the letters is one from Lawrence of Arabia, in which he tries to dissuade Walpole from subscribing to *The Seven Pillars of Wisdom*. Lawrence describes his massive history of the Arab revolt as "part ponderous, part hysterical, too long and very amateurish"; a little later he calls it "that beastly book." This, I thought to myself, is the candid language a writer should use only with his wife. But Lawrence was a bachelor and had no one to save him from himself!

I discovered two schools of thought about Walpole. Some believe that his Lakeland novels will become immortal and that the countryside he described in them will be visited by admirers; others take the opposite view.

But the vogue has already started; I was told of two farmhouses in Watendlath, near Derwent Water, both of which had advertised themselves as the home of Judith Paris. Charming Mrs. William Tyson, baking cakes in the old kitchen of one of them, told me that Walpole had stayed there for a week when he was thinking out the plot of *Judith Paris* (page 535). Wiping her hands on her apron, she hurried off and came back with a letter from Walpole thanking the Tysons for their

"Soop!" Cries the Curlers' Captain, and Sweepers Clear an Icy Lane

Curling, a favorite Scottish sport, slips across the border into Lakeland when ponds freeze.

Shedding overcoats, members of these teams gather on a man-made pool near Keswick. Not unlike shuffleboard players, they aim the stones at a target marked on the ice. To get a curve, a player twists the handle. To ensure speed and distance, his teammates vigorously sweep the ice in front of the moving disk, acting on the order "Soop!" shouted by their skipper (hands at mouth, left). To create drag, they withhold their brooms.

This view shows Skiddaw "with his nightcap on," as Lakelanders say. Third highest mountain in England, it rises 3,053 feet.

© J. Hardman

kindness. The farm over the way, she told me, had withdrawn its advertising, and the Tyson farm claims the uncontested honor of being the home of someone who never existed!

Jugged Hare Heralds Autumn

Now I became aware that the rowanberries were no longer green but crimson. The bracken was turning gold, despite the wetness of the year, and the little cone-shaped hayricks, so like those of Scotland, stood in the emerald fields, each wearing a waterproof cap. Apples were ripening, dahlias and Michaelmas daisies brightened the cottage gardens, and upon the menu of one hotel jugged hare arrived with red currant jelly.

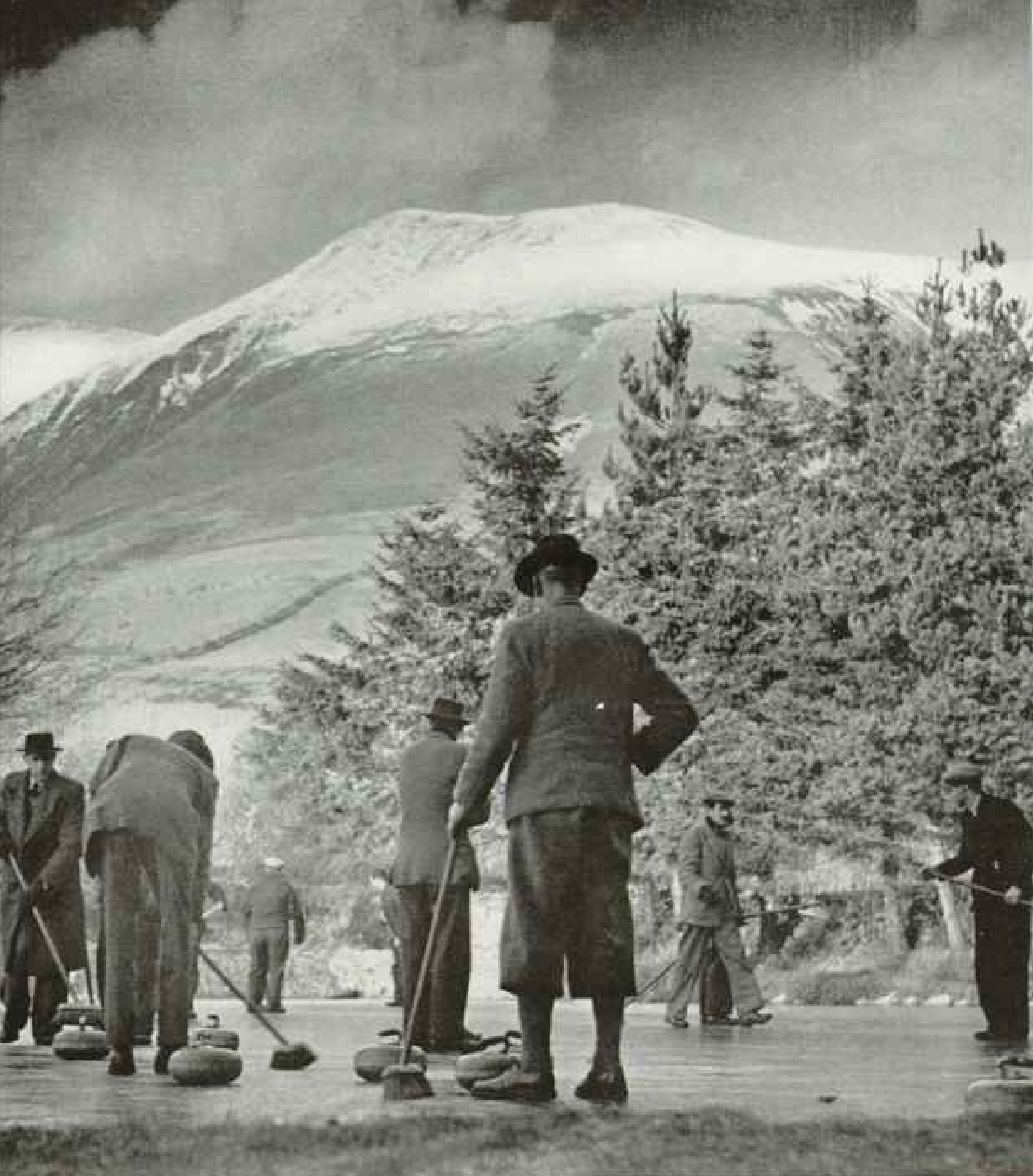
In this ripe, autumnal moment posters appeared in town and village advertising the forthcoming Grasmere Sports. This is one of the great events of the Lakeland year. Farmers and shepherds pour into the village. Wrestlers famed throughout the counties appear with their trainers and supporters. Runners arrive with half their villages to cheer them on, and for days the excitement rises as tents and marquees go up on the turf.

I returned to Grasmere and found the hotel preparing for an invasion. My friend Charles the waiter, a character out of Dickens, was busier than ever, dashing pink and dictatorial from kitchen to dining room, chatting with the "regulars" but contemptuous of casuals who, in his opinion, never knew what they wanted and then grumbled when they got it.

His asides were always memorable. Once, handing me a menu, he pointed to the words *poulet rôti* and remarked: "The French may be very good at cooking, sir, but I don't like their terms. Roast chicken! They call it 'pulley rottey,' which is a lot of nonsense!"

Rain Proves Weathermen Wrong Again

On the great morning the weather experts, who had been saying it was always fine for the Grasmere Sports, were again wrong. It was, if possible, rainier than usual. The athletes, stripped to their singlets and shorts, raced, cycled, and pole-jumped wetly, while



thousands of spectators sat beneath umbrellas and waterproof sheets, and a brass band played "The Gondoliers."

My memories of the Grasmere Sports are of wet feet and of rain dripping down my neck, of the sweet smell of churned-up turf, of pork pie and a slice of gingerbread eaten in a damp marquee, of giant wrestlers in tights hugging one another like grizzly bears, and of undaunted spectators in gum boots sitting beneath umbrellas and enjoying every moment of it. This is, of course, the lesson of Lakeland: one never lets weather interfere with anything.

Now and again, of course, one may be surprised. In a day or two the sun shone. I glanced from my window in the morning, astonished by the transition. The day, like a sobbing beauty who dries her eyes at the sight of a diamond wrist watch, was all smiles. Thrushes were singing, the sky was blue, and I could see the fells to the very summits.

Poet Wordsworth (Plaque) and Great-grandson (Right) Seem Profiles of the Same Face

Dove Cottage in Grasmere preserves Wordsworth's tattered suitcase. "Lettering is the poet's own work," says the sign. Author H. V. Morton interviews the Reverend C. W. Wordsworth (pages 516 and 522).

"It's a grand day for the sheep-dog trials," everyone was saying. And indeed you might have thought, to see Lakeland on that sunny morning, that there was not an umbrella or a mackintosh in the three counties.

The trials were held in a grassy valley ringed by hills. Huntsmen stood about in pink coats, surrounded by foxhounds. A van would draw up, and out would pour eager little white-and-tan beagles with twinkling tails. And everywhere shepherds leaned upon their sticks and crooks, some in their blue-serge Sunday suits and others in breeches and thick woolen stockings.

Lakeland Sheep Dogs Steal the Show

But the heroes of the day were the little Lakeland sheep dogs. These small black-and-white collies were always at their masters' heels, ready to obey a lifted finger or a whisper.

The trials are a wonderful example of co-operation and sympathy between man and animal. The shepherd stands beside a pen made of hurdles, and his dog crouches beside him. A few hundred yards away four sheep are cropping the grass.*

The shepherd tells his dog to fetch them, and the little animal streaks off like a fox until he is pulled up sharply by a whistle from his master. He drops as if shot and lies panting, his eyes on the sheep.

Placing his little finger in a corner of his mouth, the shepherd then signals to his dog. Sometimes his whistles send the animal to the left, sometimes to the right. Often the dog wriggles forward on his stomach through the tall grass. The object, at this stage, is not to alarm and split the sheep. A miscalculation may easily send them dashing off in all directions.

At last, when the shepherd thinks he has maneuvered his dog into the right position, he gives the whistle to lift, or gather, the sheep. On the way the dog must drive them

* See "Sheep Dog Trials in Llangollen," by Sara Bloch, NATIONAL GEOGRAPHIC MAGAZINE, April, 1940.

through three sets of hurdles and then finally pen them.

I commented to a shepherd on the amazing intelligence of these little animals. The whistles are identical to a stranger's ear, but the dogs can distinguish their masters' directions from all others.

Stay-at-home Heeds Master's Whistle

The shepherd told me of an acquaintance who entered a young dog for the Vale of Rydal Sheep Dog Trials. At home in Yorkshire his family switched the radio on, for the trials were being broadcast. An old dog, the mother of the one that had been entered, was asleep in the room. Suddenly she heard her master's whistle from the loudspeaker and, leaping up, jumped clear through the window in a frantic attempt to answer his call.

I was fascinated by the typically Lakeland spectacle of Cumberland wrestling. The combatants, who wear white woolen tights, vests, and spangled trunks—the costumes of old-time acrobats—engaged first in an almost affectionate embrace, a kind of Cumberland version of one French general greeting another.

Then they got to grips. Each wrestler passed his right arm under his opponent's left arm and grasped his own hand behind his opponent's back. Now they were firmly locked together; the man who first touched ground with any part of his anatomy except his feet would be vanquished.

Then a group of young men lined up for the fell race. They shot across the sports ground and leaped a stone wall like a pack of hounds. We watched them pouring up through the bracken and over boulders until they were little colored dots moving up the vast bulk of the fell. Then they came pouring back, and in a matter of minutes the winner was panting before us.

Hounds Follow Man-made Trail

Those who have ever painfully climbed a mountain and then cast themselves down, exhausted, upon the summit, must regard these fell runners with awe. Even the mountain, I thought, looked a bit startled.

There was much excitement when the hound trail was run. Some time before, a man had laid an eight-mile scent over the fells, trailing a rag soaked in aniseed and turpentine. Now the owners of some 40 eager hounds struggled with their animals at the starting point and let them go when the flag fell. Off raced the hounds in full cry up through the bracken and over the skyline (page 524).

For half an hour nothing happened. Then suddenly, far off and invisible to all save Lakeland eyes, there was a movement in the bracken, then a flicker of running hounds. One hound led the pack; the others streamed behind him, tails up and noses to the ground. What astonished me was that the owners could distinguish their own hounds at that fantastic distance. I could hear them shouting, "Cracker's in front!" "Now Ringwood's coming up!" "Here comes Nimrod!"

On that perfect afternoon, as the sun shone upon green grass and golden hillsides, with the smell of bruised turf in the autumn air, the hounds and the beagles slowly circling the judges' ring, and the shepherds and their dogs as lonely in a crowd as if on the highest fell, I thought myself as near to the heart of Lakeland as I had ever been.

An old farmer from the Lowther country attached himself to me when he learned that I shared his admiration for the late Lord Lonsdale, called "Lordy" by everyone in the lake country. That grand old sportsman—red-faced, immaculately dressed in gray frock coat and gray topper, a rose always in his buttonhole—had for years presided over the sport like an 18th-century nobleman.

A Gradely Chap Was Lordy

Settling himself in a chair and grasping a mug of beer in one hand, the grizzled farmer delivered himself of a eulogy on the object of our admiration.

"He was a gradely chap, was Lordy," the old man said. "Whinever ye met him, ye were sure of a welcum, an' if ye went up ta Loother Castle ye'd allus find somat i' yer car when ye left—a salmon or a breeace o' grooce i' seeason, ur mappen a bunch o' flooers. But ye niver went away empty hand't.

"Aye, he was a gradely chap, an' his manners wadn't hev disgreesed a king. The' du say 'at ivvery neet he wad stand donned up fer't dinner, waitin at t'fut o't steers i' t'castle fer her ladyship. When she com doon, he wad bow an' offer her his hand, an' the' wad gang off inta t'dining room tagidder."

And so, with the voice and broad accent of Lakeland in my ears, I went back to lean over the bridge where the trout lazed in the glass-green Rothay, and where, in a corner of the churchyard, lies the poet whose love for this countryside has encircled the earth.

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Women of Ifalik Atoll Weave Flower Garlands for the Adornment of Their Men

Author Marston Bates and two fellow scientists spent a summer studying the Ifalikians and their speck of coral in the western Pacific. They found 260 Micronesians scarcely touched by alien civilization. Island men regularly wear wreaths of fragrant frangipani, hibiscus, and spider lilies.

↓ Gavileisei, a navigator and canoe builder, proved a talented craftsman at any job he undertook.

Ifalik, Lonely Paradise of the South Seas

A Trio of Scientists Finds Ancestral Ways Holding Their Own Among Contented Islanders of a Remote Pacific Atoll

By Marston Bates, Ph.D.

With Illustrations from Photographs by the Author

THE beginning of the Ifalik expedition, so far as I was concerned, came by way of a telephone call. It was Dr. Alexander Spoehr, talking from Chicago. Alex had recently resigned as Curator of Oceanic Ethnology at the Chicago Natural History Museum to take the directorship of the Bishop Museum in Honolulu. He and I share the view that palm trees make a much more attractive landscape than snow, and my envy of his shift from Chicago to Honolulu had been obvious.

This time Alex had a concrete proposition.

"How would you like to spend next summer on a Pacific atoll?" he asked.

Ifalik Provides Ideal "Laboratory"

An official letter of invitation came a few days later from the Pacific Science Board of the National Academy of Sciences. The site selected for the study—the fourth in a series of intensive atoll studies financed by the Geography Branch of the Office of Naval Research—was Ifalik, in the western Carolines. Three scientists were to spend the summer there, analyzing the relationships between man and his environment in a relatively simple situation, uncomplicated by the gadgets and specializations of modern civilization.*

At Ifalik that environment consists of a circular reef with small patches of coral rock and sand, situated in the vast reaches of the tropical Pacific (map, page 550). Somehow, despite successive administration by Germany, Japan, and, finally, the United States under a United Nations trusteeship, the kindly people of Ifalik have held firmly to their ancestral ways. The atoll promised to be an ideal laboratory for such a study.

We made up a well-rounded trio. Edwin G. Burrows of the University of Connecticut is an anthropologist. With a colleague, he had spent six months on Ifalik in 1947-48 and was familiar with the people and their language. Donald P. Abbott of Stanford University knows about the life of the sea, which is so important to man on a tiny Pacific island. I am on the faculty of the University of Michigan and would study the plants, insects, and tropical climate—in short, the ecology of the land itself.

The three of us stopped for a few days in Honolulu to talk over plans and then flew on to Guam, where we were busy for a week with final preparations. The Coast Guard had arranged to take us from Guam to Ifalik on the converted Army cargo ship *Nettle*. We sailed at noon on Saturday, June 20.

It was a marvelous feeling to be sailing a tropical sea; to relax, to wash worries and busyness from the mind; to lean over the rail and watch the bow cutting cleanly through the sapphire water; to do nothing, to feel no need to do anything. I shed my shoes and shirt, not to wear them again until September.

We were free! We were off to Ifalik, to an atoll, a coral reef, a lagoon, a fragment of Micronesia, a summer in paradise!

A Flaw Appears in Paradise

We arrived at dawn on Monday. Don noted the first impression in his journal:

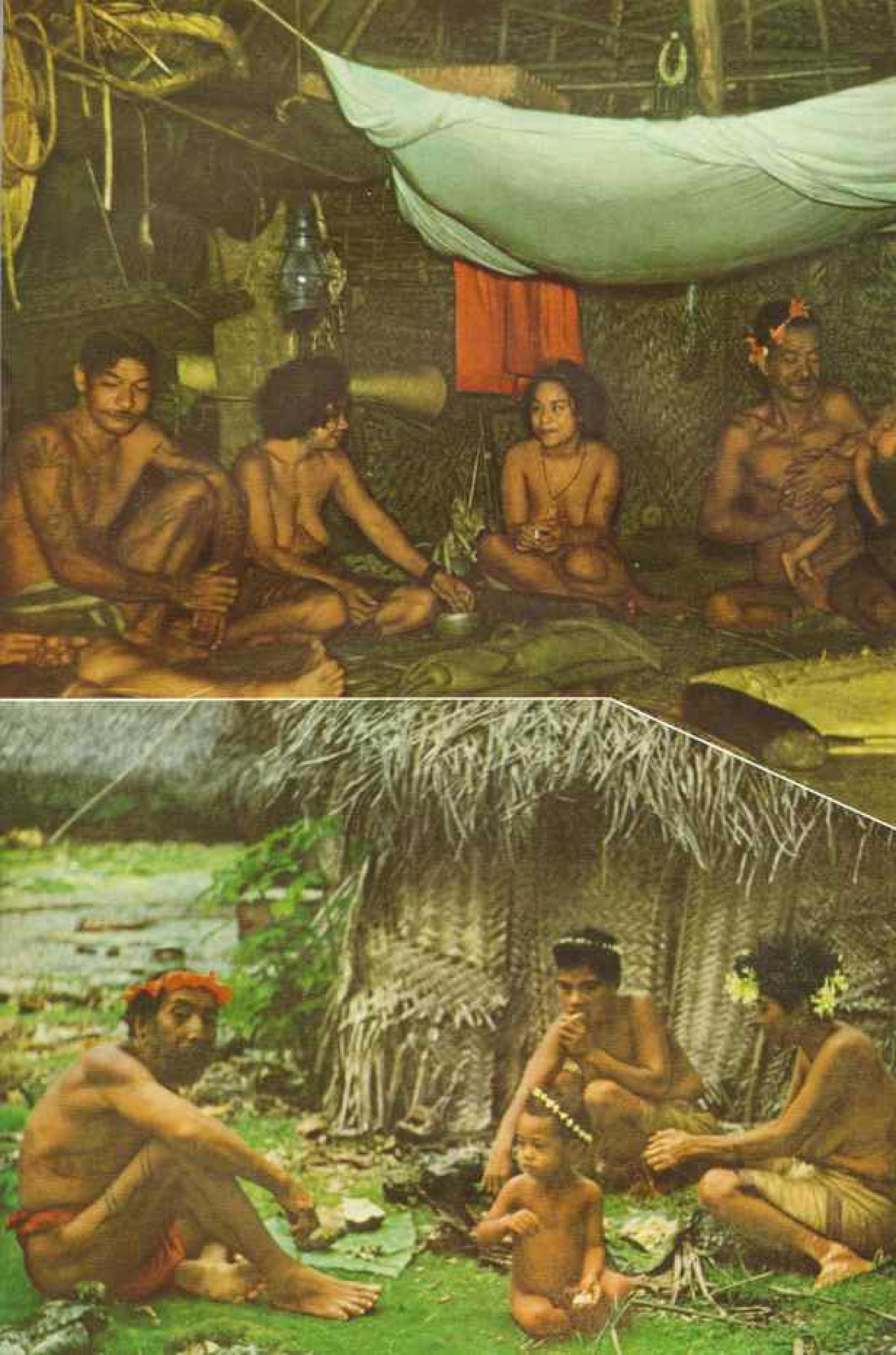
"Looked out of the port on awakening... and there was Ifalik—reef, lagoon, islets, and all, everything a remote South Sea atoll should have—impossibly attractive and looking at us with the love light in her eyes."

That first love light, however, was clearly a product of faith. The weather was cool, the sky overcast, and there was a strong surf running. There was no sign of human life.

The atoll's first messengers were flies, hordes of them, that settled everywhere on the ship. We hardly noticed them in the excitement, but later, when we were able to make some appraisal of the flaws in paradise, the flies won first place.

Presently an old man appeared, paddling a canoe through the heavy swell. We threw him a line, and he came scrambling over the

* See "Pacific Wards of Uncle Sam," by W. Robert Moore, National Geographic Magazine, July, 1948.



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Ifalikians Take Life Easy; They Dine When They Feel Like It

Eating is of supreme importance to the people of the atoll. They talk about food incessantly, and their word for happiness means "my belly is good." Coconut, breadfruit, taro, and fish are staples; pig and chicken, rarities.

Early in the morning each person takes his toddy, an unfermented sap gathered from the stalks of coconut flowers. Otherwise the Ifalikian has no fixed time for meals. Food is offered to visitors at any hour.

Above: This woman eats from a coconut-leaf basket. Decked for a dance, she wears white rooster plumes and a *lava-lava* of banana-trunk fiber.

←Page 548: Ifalik houses are covered with coconut thatch and coconut-mat siding (page 564). Mats are the only furniture. Mosquito net, kerosene lantern, and household possessions hang from rafters.

Lower: Food is usually eaten out of doors.

↓Fearing shortage, women soak mashed breadfruit in the lagoon, then bury it in leaf-lined pits. Sealed with coconut leaves, it keeps for several years. Fermentation, like that in sauerkraut, produces a penetrating odor that the author found offensive, but the natives did not seem to mind. They in turn objected to the smell of mild American cheese.

Kodachrome (opposite lower) by Donald P. Abbott

Billions of Corals Gave Their Skeletons to Form Ifalik's Three-fifths Square Mile

Once controlled by Germany and later by Japan, this Caroline Islands atoll changed hands after each world war. Today it is part of the United States Pacific Trust Territory under the United Nations. Atoll's high point rises only 20 feet above the sea.

side, all smiles. Ted Burrows unlimbered the native words he had stored from 1948, and the old man responded volubly.

Then a larger canoe appeared. In it sat Fagolier, the paramount chief, and Totogoeitin, better known as Tom, who had served as interpreter for Burrows and his colleague Melford Spiro during their earlier study. Soon canoes surrounded the ship, and islanders climbed to the decks.

Tom Talk Spans the Language Barrier

With Tom aboard, the line of communication was established. In his youth Tom had somehow escaped from Ifalik and roamed the Pacific, working on ships from Singapore to Honolulu and living for six years in Manila. In the course of these wanderings he had learned a sort of English—not pidgin but a special Tom variety of the language. Ted and Tom understood each other easily. I was never able to make much of Tom's speech, but I could talk to Ted, Ted to Tom, and Tom to the islanders.

By this time the sky had cleared. Our ship's launch crossed the smooth, incredibly clear water of the lagoon and dodged among coral heads to ground on a beach of white sand. We waded ashore on Ifalik island and passed abruptly from blazing sun into the cool half-shade of an immaculate grove of coconut palms.

We found afterward that the grove actually is maintained as if it were a park. Periodically, when fallen palm leaves and other trash have littered the ground, the atoll's five chiefs decide that it is time to clean up. Early on the appointed day Toroman, the No. 4 chief, goes to the shore and blows a series of blasts on a conch shell. The people of the island come together and sweep the ground of the palm grove along the lagoon, piling and burning all the trash. The various households bring food, and after the morning of work there is a big communal feast.

The men's house on Ifalik island, which serves as a meeting place for the chiefs and principal males, is a big, high-gabled thatched structure among the coconut palms some 40 yards from the lagoon. When Don and I walked up to it that first day, Ted and the five chiefs were sitting on the grass outside, deep in arrangements for our residence.

The 1947-48 party had lived in tents. But

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Men's Life Centers on the Canoe House→

Women keep busy in the taro patches, in the cooksheds, and at their looms, but the men have few responsibilities unless a communal project, such as fishing or roof repair, is under way (pages 564, 566). They are free to spend hours at a time at the canoe houses, where they talk and gossip. Like women knitting, they make rope endlessly by twisting coconut fibers between palm and thigh.

Upper: Children walk past one of the atoll's nine canoe houses.

Lower: Men rest after carrying a small house across a narrow channel between the two main islands. Ifalikians abhor sitting on bare ground. If a mat is not available, an unhusked coconut serves as a stool.

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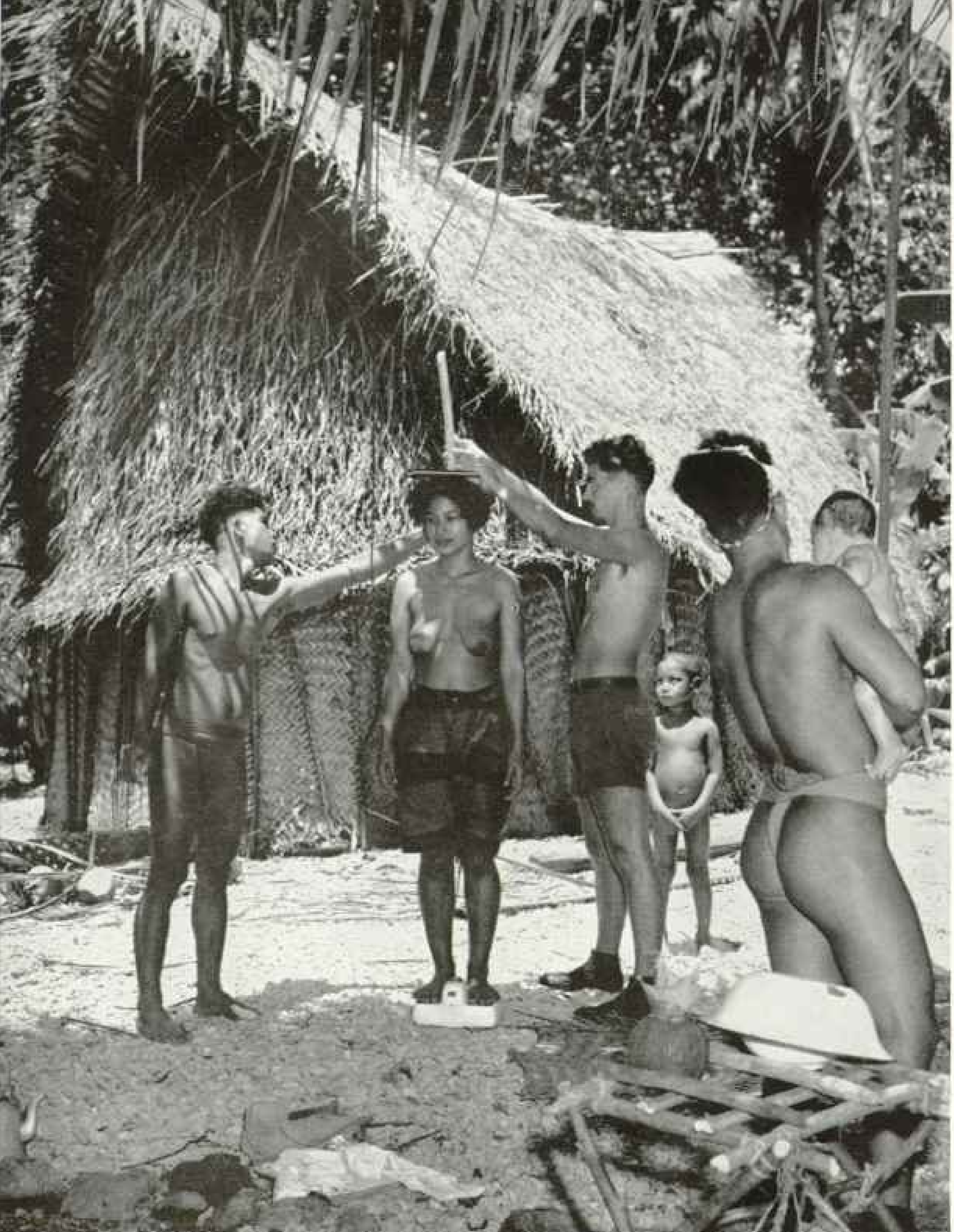
Kodachrome by Donald P. Abbott (above)



Bathroom Scales Tell Weight, a Notched Pole Gives Height for a Census Check

Dr. Donald P. Abbott of Stanford University takes physical measurements of an Ifalikian family. Biggest man on the atoll weighed 182 pounds, and the tallest just missed qualifying as a six-footer (page 558).

→ Islanders seized eagerly on the chance to learn English in exchange for lessons in their own language. Here by lantern light Dr. Abbott uses printed cards to teach the names of the colors.

the thatched houses of the island were more comfortable, and this time the chiefs turned the men's house over to us. And a very satisfactory home it made.

We slept aboard the *Nettle* that night. Next morning the captain, with marvelous skill, maneuvered his ship through the coral heads of the pass into the lagoon.

The day was spent unloading our gear, an appalling amount of it. Ted and I were staying until mid-September, but Don planned to stay two months more. The ship that was to take us off would bring four more scientists who would carry out special investigations during this later period. Thus, although there were only three of us, we had food and equipment for what would eventually become a seven-man expedition.

We said goodbye to the *Nettle* without a qualm. We were saying goodbye to the Western World for the summer, and it seemed good riddance.

Sunny Islets Breed Sense of Peace

The Navy had provided us with a radio for emergency use, and we had walkie-talkies to communicate with planes overhead. There was a plan that airplanes on weather patrol would occasionally circle to be sure everything was all right.

But these arrangements for contact seemed remote and unimportant—at most a vague reassurance for some improbable catastrophe. How could there be a catastrophe on a sunny atoll like this, among delightful people who already seemed not Micronesians but close friends?

Our first project was a census. Ted had all sorts of special anthropological interests—marriages, kinships, households, and comparisons with the census that he and Spiro had carried out five years before.

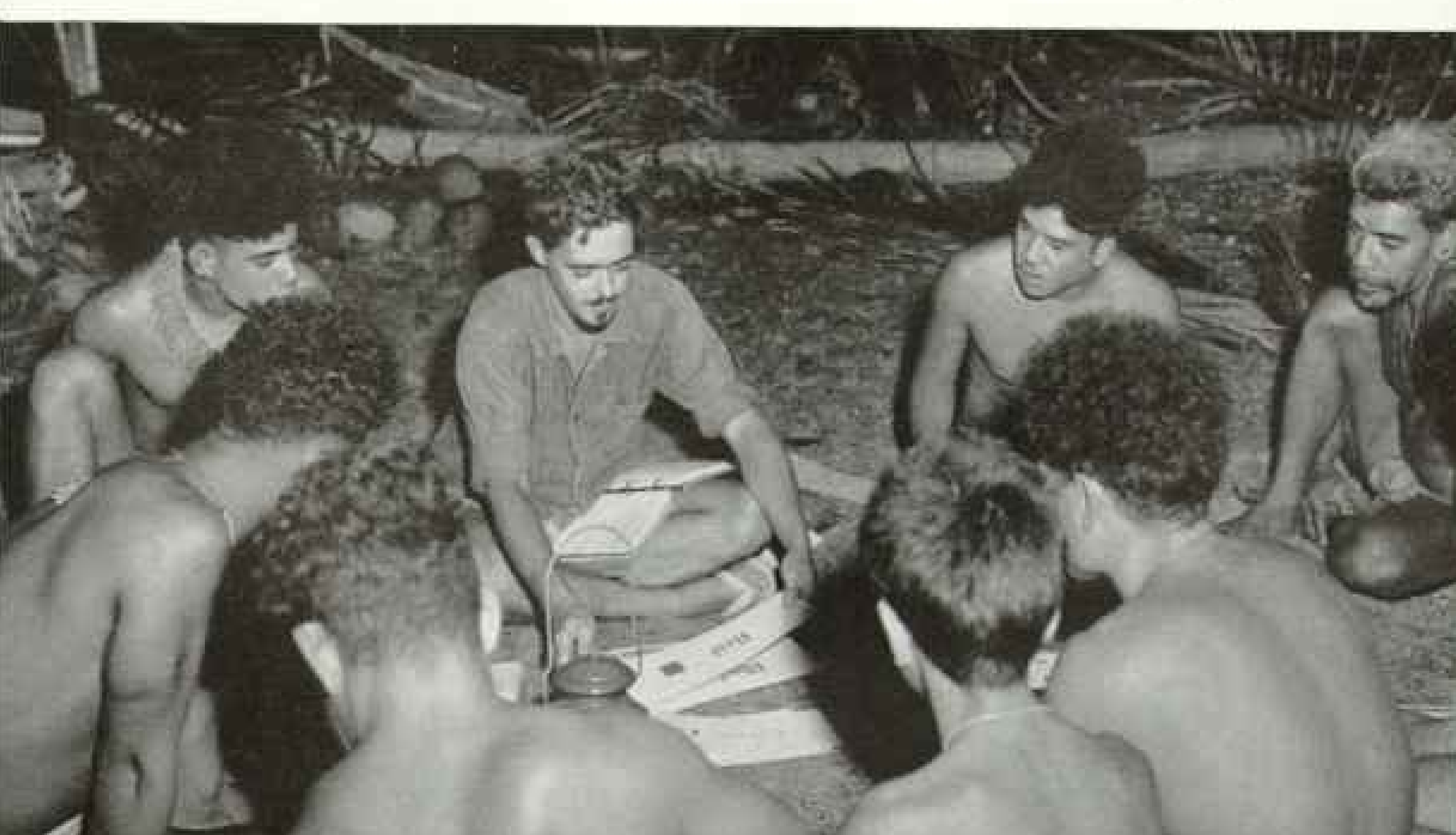
Don and I wanted to get a biological description of the population. We were not equipped for making fancy measurements, but we had bathroom scales and a pole to measure heights. Also, we hoped to get information about ages and family size.

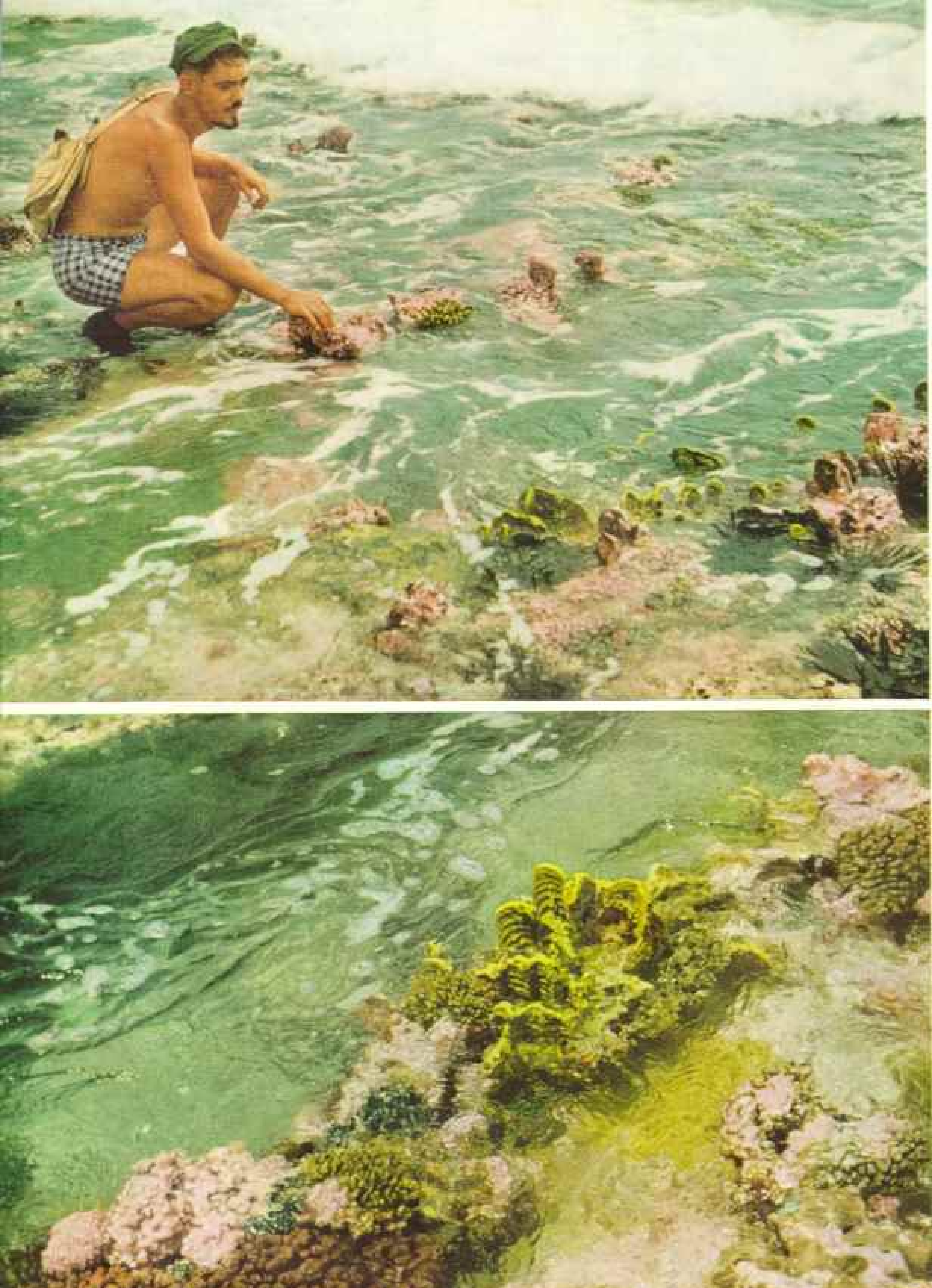
Typhoon Threatens Expedition

The next day it rained—and of course the rain gauge wasn't yet unpacked and set up. A stiff wind came up in the afternoon and kept increasing in force. Later Tom came by with Maroligar, the No. 2 chief. Tom pointed across the island to the east and said, "Maybe typhoon." Maroligar agreed and looked worried.

The wind continued, and in the evening a number of men gathered around our camp. Maroligar borrowed one of our big battery-powered lamps and learned how to operate it. He wanted a light so that, if the weather worsened, he could lead his people back to the highest part of the island. Even there it was only about 20 feet above sea level.

Typhoons are the greatest danger on these low islands. Even more important than the direct hazard to human life is the destruction of food, houses, and canoes. The people usu-





ally rope themselves together in a fallen breadfruit tree or some such place, but, if they survive, they face starvation afterward on an island swept clean of food.

Fortunately, typhoons are rare. Ifalik had been in the path of a major typhoon in 1907, when the area was under German control. The marks of that blow are still clear in many places: huge blocks of coral rolled up on the reef and a few coconut palms—the only survivors of the storm—standing much taller than the others.

Census Starts Despite Storm Warning

I comforted myself, going to sleep, with the thought that typhoons strike suddenly, after a period of still, oppressive heat, so that this slow buildup of wind could hardly be dangerous. True or not, it was reassuring.

The next day was cold, with the sky completely overcast. But the rain had let up, and we started out on our census. We made quite a party. Fagolier and Maroligar went along to give the highest possible sanction to the procedure. Tom acted as interpreter.

Ted and Tom would lead the way into a household area, going inside the house if it was drizzling or sitting on mats in the open during dry intervals. The available people of the household would gather about. These included the men, all the women except those temporarily quarantined in the isolated menstrual house, and all the children except those who took fright and ran away.

Ted would open his notebook and, in the course of interminable palavering among Tom, the chiefs, and the members of the household, get a list of names, together with clan affiliations, marital status, and other lore dear to the anthropological heart.

When the list was complete, Don would supervise the weighing and measuring, with Maroligar hovering helpfully about, explaining to each person where to put his feet on the scales, trying to persuade people to stand straight for height measurement, and coaxing the shier women and children into cooperation (page 552).

There was plenty of time to look around while Ted was taking notes. Mostly I prowled about with my cameras, snapping whatever caught my interest and passing out used flash bulbs to the delighted children.

Each family unit consists of a large sleeping house, a separate cookhouse, and sometimes various sheds. The main houses are well built, with big posts stuck in the ground, to which stringers and rafters are firmly lashed with stout coconut-fiber rope. The roofs are of coconut thatch.

Boxes Hang in Floorless Attic

The rafters are low, so that people do not stand up and walk about inside but sit or sprawl on the floor, which is kept clean and covered with plaited coconut mats. There are no windows or fixed doors, but each wall of a house is made of several mats that can be put up or taken down as desired. The family possessions are generally stored in bags and boxes slung by ropes from the rafters. The whole upper part of the house thus serves as a sort of floorless attic.

We managed to catalogue three households —26 people—that first morning. Then we gave up because of the worsening weather. By midafternoon the wind had reached gale force. Green coconut fronds were being torn from the trees, and the coconuts themselves were blowing off in large numbers.

We kept worried eyes on the barometer and on the wildly swaying palms. Men everywhere were battening down their house walls with matting and running stout ropes from the gables, making them fast to the bases of near-by palms. Maroligar hovered about with obvious concern for our comfort, making it clear that he thought we should move to one of the houses farther from the shore if things got worse.

Then suddenly, about 5 o'clock, our worry was disrupted by a wave of excitement. An airplane had been sighted circling the atoll. Don gathered up a walkie-talkie. We hadn't tested it, but there was no time now.

From the battery-powered radio receiver, tuned to the walkie-talkie wave length, I could

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← Marine Biologist Hunts Tiny Animals Hiding Among Coral Heads

Ifalik people make extensive use of coral. They cover house floors with the reef's wave-worn gravel and use coral pestles to mash taro and breadfruit. Burnt-coral lime makes pigment for decorating canoes; mixed with water and coconut-husk ashes, it putties up holes about the lashings in canoe hulls (page 568).

Upper: Dr. Abbott gathers marine specimens.

Lower: Where the sea pours back and forth across the atoll's protecting reef, small crustaceans flourish among the corals and algae. *Millepora*, a stinging hydrocoral, rises in erect fans (center).

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↑ **Low Tide Bares the Reef Ringing Ifalik's Lagoon**

Even at high tide waders venture freely through two or three feet of water to get from one islet to the other (upper right). Elsewhere passes in the atoll's circlet of coral permit canoes to leave the quiet lagoon and dare the open sea (left). Navigating by stars, Ifalik seamen hoist pandanus-leaf sails and strike out for islands a hundred miles away.

← **Spines Protect a Clawless Lobster**

Like other spiny lobsters, *Panulirus versicolor* depends for defense on a prickly shell rather than on nippers. When he forages on the reef at night, he runs the risk of winding up in an Ifalikian pot. (One-fourth natural size.)

Tiger Cowry Bears Spots, Not Stripes →

Page 557: Gleaming polka dots make *Cypraea tigris* one of the most widely collected of ornamental shells. In the upper view *Cypraea* has extended its mantle around the shell; when disturbed, the creature quickly draws it back inside. (Natural size.)

Far right: *Pseudoceros bedfordi*, a large flatworm, is a relative of tapeworms and liver flukes. Its undulating swimming movements reminded the author of veils swirled by women acrobats.

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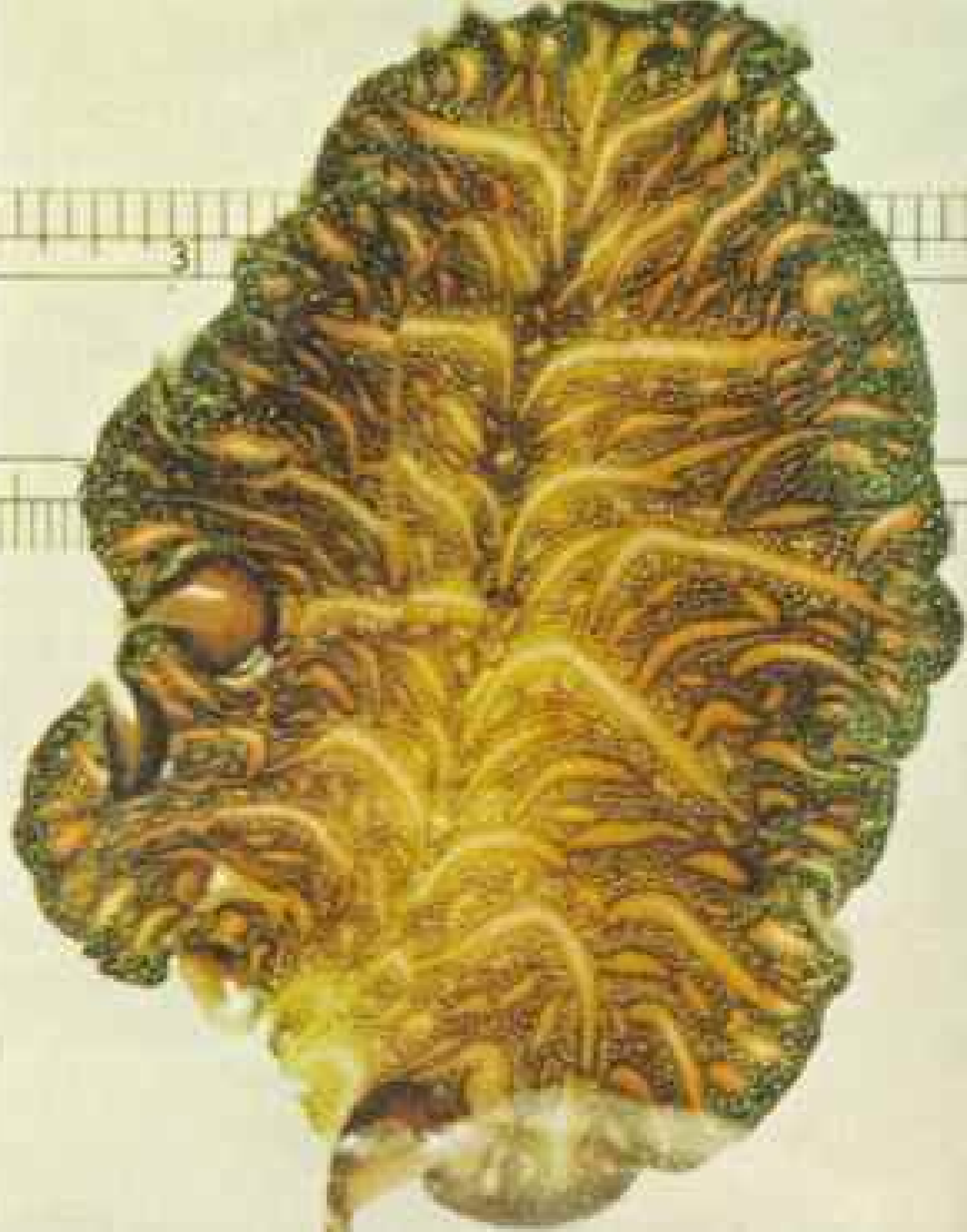

hear Don giving our position. The plane must have heard, because it turned and made a pass almost directly overhead. It was a weather observation plane from Guam. At the receiver set I could hear the whole conversation.

"Any damage there? Are you all right? Over."

"No damage. Nobody hurt. Is a typhoon coming? Over."

"Typhoon center already past now and moving northwest. Will report to Guam that you are all right."

The plane disappeared into the mist. Don lingered on the beach to make sure it would not circle again, and I kept my ear at the radio. Only static came through.

But we had heard enough. Western civilization had zoomed in from the sky to reassure us, and the relief was immense.

We relayed the information to the chiefs. Everyone was tremendously impressed with the whole business—the appearance of the plane, the conversation with the little boxes, the pickup of the conversation on the radio in camp. As a matter of fact, we were impressed too.

Island Women Outnumber Men

It took us four more days to complete the census—and we kept making small changes and corrections all summer. There were 260 people: 134 females and 126 males. The count five years earlier had shown 250, so the population was growing.

For the most part, the Ifalikians are not very large or very tall. The heaviest man on the atoll weighed in at 182 pounds, and the tallest was half an inch under six feet. They didn't look to us very different from Europeans, except in their sensible failure to cover themselves with a lot of clothing.

As I got to know the Ifalikians and they became separate personalities to me, I found myself constantly reminded of acquaintances back home. The wiry Toroman, with his quick, alert intelligence and keen interest in everything that was going on, was strikingly similar in physique and personality to an elderly banker I once knew. Tall, handsome Sepeman, grave and reliable, reminded me of an old college friend.

Fagolier, the paramount chief, interested me most of all. He possessed extraordinary calm, poise, dignity, assurance—all the qualities that should go with his position. He stopped by our camp daily to be sure we were all right and to see if anything was needed. Yet he never gave us the feeling that we were being bothered by too much attention.

One night Fagolier stopped by just as we were sitting down to dinner. He joined us with apparent pleasure. When we were finished, he went off with his plate and washed it, then started in to wash a pot! It was precisely the gesture of a thoughtful guest back home, pitching in to help with the dishes.

Author Joins in Dance Rehearsal

Fagolier was very much the chief. Other people bowed respectfully in his presence and deferred to his judgment. Yet I never saw him impose his will or take any action that could be called arrogant. When there was work to do, he was always in the middle of it, hauling on the fish net, cleaning the trash from the coconut grove, working with an adz on a canoe (pages 568 and 570).

During the first part of our stay there were dance rehearsals every night around big fires by the lagoon. We often watched. One night when Ted and Don were busy, I trailed along after Fagolier. When we got to the fire, it seemed obvious that the people expected me to dance. I should have felt foolish if my fellow Westerners had been looking, but in their absence I gladly took part.

The dance involved a series of gestures with both hands, and chants that varied from hums to shouts but didn't seem to have any words. Fagolier directed this with gestures that were translated into full-scale action by the men. He was acting as leader and co-ordinator, again quietly, skillfully, and economically.

Atoll Youngsters Mimic Adults

A tremendous amount of energy went into these rehearsals. I was reminded of the effort that goes into amateur dramatics among similar groups at home. Here, however, it was truly a community effort. Even the children had play rehearsals, for they constantly imitate adult activities.

I wondered whether the function of the dance is to provide a sense of community solidarity. Then I wondered whether I was wrong in looking for a function, for a purpose, in everything. Maybe the dance rehearsals correspond to going to the movies with us. Perhaps they are merely a way of pleasantly filling in the time.

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Donald P. Abbott (above)

↑ Giant Sea Cucumbers on Ifalik's Beach Suggest Sections of Nonskid Tires

Known as trepang and bêche-de-mer when dried, these unlikely looking cousins of the starfish are prized for soup in China and on some Pacific islands, but not on Ifalik. A slender fish makes its home in the water-filled gut of this species, *Thelenota ananas.*

↓ Yani Weighs His Day's Rations for the Benefit of Science

Contributing to a diet study, Yani listed all food used by his household for a month. Such record keeping was not easy, because the islanders eat so irregularly. These sea anemones, when stewed, faintly resemble oysters in flavor. Dr. Abbott takes notes.

I had wanted to get some idea of the economics of Ifalik, of the amount of effort required to get a living in this environment. The dance was one example of the problems involved. All the way through I found it difficult to distinguish between work and play, because the two seemed to be all mixed up. That, perhaps, is the ideal situation. Maybe the idea of work is part of the price we pay for civilization.

Tony, a young visitor from Ulithi Atoll, was an enthusiastic dancer. He was also very fond of English songs. He combined the two interests by working out new dance routines with the young men of Ifalik to songs like "Tramp, Tramp, Tramp, the Boys Are Marching." Obviously, the dances are not always built on traditional subjects.

The grand performance was held a month after our arrival, at midday (page 562). Everyone dressed up in his very best flowers and paint, and the line of men went through routines for nearly an hour. Then, after an intermission, the women carried out their performance.

There was no more dancing during our stay, except for the play dancing of the children. Does that wreck my theory of community solidarity?

Westerners and Natives Trade Lessons

The trust territory government had taken three young men to another atoll for a few months' training, which had included English. They had been able to make only a start on the language and were eager to learn more. Since we wanted to acquire what we could of the language of Ifalik, we arranged to trade lessons with them. Soon we had a class of about 20 gathered around the camp every evening (page 553).

This experience gave us a keen appreciation of the intelligence of the people. They learn rapidly and well. We could see no way in which their basic intelligence varied from our own. Any difference seemed to be a product of the dissimilar cultures into which we had been born.

One of the young men, Yaniseman, became closely associated with all our work—became, really, a collaborator. He seemed to understand what we were doing and why we were interested in doing it. He was a good observer, as people in so-called primitive cultures often are. But beyond that, in giving us information he distinguished clearly between what he had seen and what he had been told. This ability to separate direct and hearsay evidence is not common in my experience.

Yani was especially helpful in our study of the food habits of the people. He kept track of everything that was eaten in his own household for a month, weighing, counting, and measuring everything and reporting the results to us (page 559).

"Milk" Drips from Coconut Flowers

Ifalikians cook only one large meal a day, and this may be eaten in midmorning, noon, afternoon, or evening, varying from household to household and from day to day. I couldn't figure out what determined when a meal is cooked—perhaps the whim of the women, the time depending on when they feel like starting to cook. Of course, if the men have been out fishing all day, the big meal will be in the evening when they get back, with fresh fish as the main dish (page 549).

There is, in fact, little regularity about any aspect of life on Ifalik. The chief exception to this is the collection of *hachi*, or toddy, the unfermented sap from the cut stems of coconut flowers. Every morning and evening the young men make the rounds of their particular palm trees. This routine is strikingly similar in regularity and purpose to the twice-daily chore of milking at home. And the sweetish, nutritious sap takes the place of milk: served fresh, it is a main item of diet for the children.

Blossoms Vie with Food Crops

We arrived at the height of the breadfruit season, when this was the chief food. At least six quite distinct varieties are recognized, and there are several different ways of cooking.

When breadfruit is not in season, the chief sources of starch are the true taro, called *wot* (*Colocasia*), and the tarolike *pulach* (*Cyrtosperma*). Both are tubers of giant aroids, or elephant's-ears, that grow in swampy areas on the two inhabited islands. The different households each have rights to certain parts of the swamps. The gardens are kept up entirely by the women.

Looking at these gardens, I again found myself confused about the difference between work and play. The maintenance of the taro

(Continued on page 569)

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↑ Taro Swamp Provides Food for the Body and Blossoms to Gladden the Heart

As they garden, women gather flowers for offerings to the gods and gifts to their menfolk, or less frequently for their own adornment.

↓ Ifalik's Gaudy Males Avidly Use Flowers and Perfume

The author found the male custom of wearing garlands in the hair and ears delightful after he overcame his initial feeling of self-consciousness.

Dwarfed by Coconut and Papaya, the Men's Dance Line Claps and Chants

Lacking calendars and other formal methods of reckoning time, Ifalikians hold religious ceremonies at irregular intervals. One ritual honors Tilitr, the atoll's patron saint, who protects the people from evil and illness. Islanders believe that Tilitr reports back to Aluelap, the chief god, after the ceremony.

Here the entire community puts on a show for the visiting scientists. A month was spent in nightly rehearsals; they reminded the author of an American community preparing for an amateur theatrical.

The grand performance, given at midday, lasted little more than two hours. Men opened the dances; the women followed after an intermission during which everyone drank coconut milk.

Dance "steps," in the Western sense, are unknown; in fact, the ritual is often performed sitting down. Arms and hands express all the meaning; occasionally palms clap biceps. Hums and shouts of the performers seem not to involve words.

Like an orchestra conductor, a chief directs the dancing with gestures.

Ifalikians make some of their own shell ornaments, but import others from Eauripik Atoll, 100 miles to the southwest. Red turmeric root, prized for ornament and medicine, comes from Yap and the Truk Islands.

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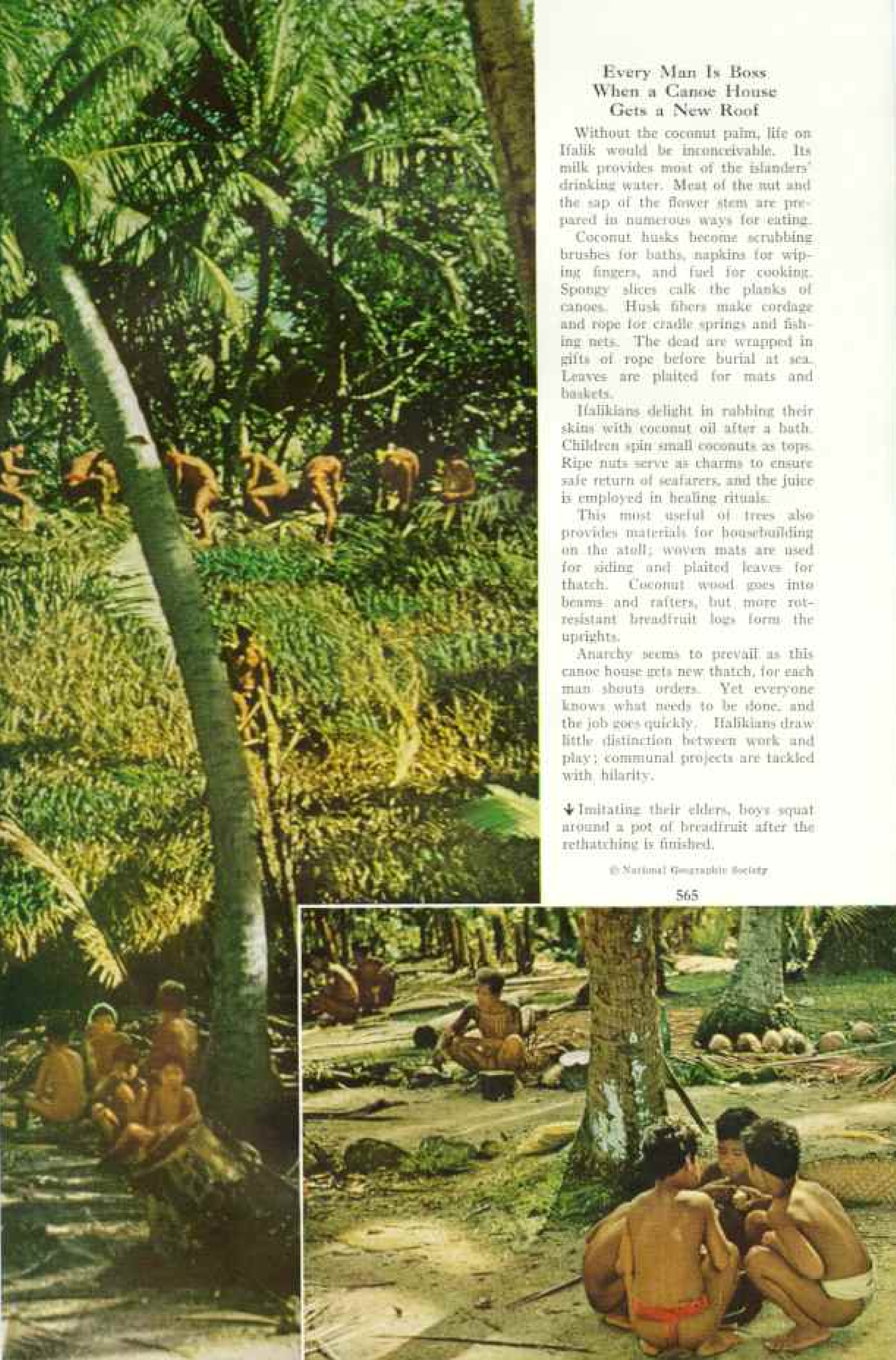
Small Fry Tag Along in the Community Dance

Basic ritual costume for both men and women is a green skirt made by splitting a coconut frond and tying half of it around the waist. Heads carry garlands of flowers and graceful white rooster feathers embedded in blocks of pith or cotton batting.

Blades of unopened coconut leaves—ivory-white and pale greenish-yellow—provide flat necklaces, anklets, and bracelets.

←Boy at far left wears a full-dress suit of coconut blades.

→Last child in line dresses fore and aft in tufts of dried fern leaves, the conventional attire for Ifalik girls of her age (page 551).



Every Man Is Boss When a Canoe House Gets a New Roof

Without the coconut palm, life on Ifalik would be inconceivable. Its milk provides most of the islanders' drinking water. Meat of the nut and the sap of the flower stem are prepared in numerous ways for eating.

Coconut husks become scrubbing brushes for baths, napkins for wiping fingers, and fuel for cooking. Spongy slices calk the planks of canoes. Husk fibers make cordage and rope for cradle springs and fishing nets. The dead are wrapped in gifts of rope before burial at sea. Leaves are plaited for mats and baskets.

Ifalikians delight in rubbing their skins with coconut oil after a bath. Children spin small coconuts as tops. Ripe nuts serve as charms to ensure safe return of seafarers, and the juice is employed in healing rituals.

This most useful of trees also provides materials for housebuilding on the atoll; woven mats are used for siding and plaited leaves for thatch. Coconut wood goes into beams and rafters, but more rot-resistant breadfruit logs form the uprights.

Anarchy seems to prevail as this canoe house gets new thatch, for each man shouts orders. Yet everyone knows what needs to be done, and the job goes quickly. Ifalikians draw little distinction between work and play; communal projects are tackled with hilarity.

↓ Imitating their elders, boys squat around a pot of breadfruit after the rethatching is finished.

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↑ Bronzed Fishermen Load Half a Mile of Net

Halikians welcome most sea animals as a source of food. However, they traditionally refuse to dine on shark and octopus, hoping that shark and octopus will not eat them.

Methods of fishing are varied. Anglers outside the lagoon troll for bonito; when a fish strikes, it is swung up from the water with a continuous motion so that it hits the fisherman's chest and falls off the barbless hook.

Fish are also hooked on lines carried over water by kites, and formerly were taken on double-pointed gorges attached to floating coconut shells.

Torchlight expeditions go after flying fish with nets. Weirs of coral blocks trap fish along shore when the tide goes out.

These scenes show a communal effort to seine a school of bonito within the lagoon.

Above: An old man's tattooed back displays a style abandoned by the younger generation. Designs were traced under his skin with soot-laden needles.

Page 567, upper: Men in outrigger canoes lay the net, then draw it toward shore when the quarry is encircled.

→ Fishermen wear Japanese-made goggles.

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Kodachromes by Donald P. Abbott

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Donald P. Abbott (above)

↑ Children Smile, Anticipating Candy Promised by the Photographer

Baby is king on Ifalik. Until a child is dethroned by a new brother or sister, he is pampered by every adult. Boys and girls are allowed to take part in grown-up activities at the earliest possible age. These youngsters play at weaving strips of coconut leaves.

↓ Coconut Cordage, Not Screws or Nails, Holds a Boat Together

Most valued possession on Ifalik is the canoe. Only a handful of men are skilled at making seagoing craft like this one. Here Fagolier, the paramount chief, hews a breadfruit plank. Half a century ago his adz blade would have been part of a giant clamshell.

is work, all right—pulling weeds, digging the crop, setting out young plants in the hot, muggy atmosphere of the swamp. It is work with a clear, basic economic purpose—the provision of food.

But along with the taro, especially around the margins of the swamps, the women grow a profusion of flowers: ginger, cannas, lilies, and hibiscus. And the flowers seem to be as important a part of the garden as the taro. When the women go out in the morning to dig up the tubers for food, they also gather flowers for making garlands (page 546).

The widespread use of flowers for ornament in Polynesia and Micronesia seems a basic—as well as a pleasant—aspect of these cultures. The flowers are not prized as beautiful things to look at in the gardens or to arrange in vases in the house. Most of them grow in inconspicuous spots, where the soil is most appropriate. The flower cult is entirely a matter of personal adornment: for garlands on the head, for single flowers stuck in hair or pierced ear lobes, or more rarely for flower necklaces.

Though women make the wreaths, the men are definitely the gaudier sex—the more addicted to flowers, paint, perfume, and other finery (page 561).

Scientists Wear Flowers in Hair

It didn't take us long to shed our prejudices. When, in our wanderings, we met people on the trails, they would often take off their garlands and offer them to us as a gesture of friendship.

I felt foolish at first with flowers in my hair. But Don would remark, "Say, Marston, those yellow four-o'clocks go very well with your dark skin."

I perked up at such comment and started looking critically at the others.

"Look, Don, that hibiscus wreath should be at a more rakish angle. Let me fix it."

Presently we forgot the rules and put up a mirror so that we could arrange our garlands properly before we started out.

Tachi, one of the boys who lived near us, cut his foot badly one day, and for a while I had a regular morning job dressing the wounds. In gratitude, Tachi brought me a beautiful cowrie-shell necklace. I put it on sheepishly, expecting to be kidded.

"What a fine necklace!" Ted said.

"Golly!" Don remarked wistfully. "I wish I had one."

So I wore it—but only every third day. Ted and Don wore it in turn on the other days.

The women, then, put time into raising flowers and weaving garlands with the same seriousness as they put time into growing and preparing vegetables. There is no struggle for existence here, no grim keeping up with the food supply; and the needs of the outer man seem as important as the needs of the inner man. Now, I kept asking myself, is one of these work and the other play? Or is there any essential difference?

Fish Take Place of Pigs and Chickens

The animal food of the people is largely fish, though Ifalik boasts a few pigs and chickens. We made a list of all the domestic animals as a part of our census: 5 dogs, 19 cats, 33 pigs, and 50 chickens. This isn't much of a showing for 260 people.

Fish there are, however, in untold variety, often gaudy to look at but also delicious to eat. The sea, as a source of food, is as important as the land.

Ifalik's 260 people have only three-fifths of a square mile of land surface, which gives a population density similar to that of Italy. Fortunately the Ifalikians have not only their land but also their lovely lagoon, which is a mile across, and the wide reef that completes the circle of their atoll.

Ifalikians practice many ways of fishing, from large communal operations on the reef or with seines in the lagoon to individual fishing with spear, throwing net, or line (pages 566 and 571).

Babies Bathed Three Times a Day

The lagoon is in constant use—and not only for fishing. Mothers take their babies down morning, noon, and afternoon to bathe them; children play in the water off and on through the day. Every adult male owns a small canoe, and the lagoon serves as a highway.

We too used the lagoon, gradually shifting from random swimming and marveling to a systematic program of observation. It was my first real experience with goggles which enable men to see clearly under water; I will never swim again without them.

In the lagoon, of course, unending marvels are to be seen. The tide falls about two feet; the marginal zone thus exposed is white coral sand, followed by a narrow band of

"turtle grass." The coral growth starts a little farther out and continues as far as one can see into the deepening lagoon, which has a maximum depth of 66 feet.

The corals grow in heads separated by areas of open water and white sandy bottom. The smaller are only a yard or two in diameter, the larger yards or more across. All are made up of a bewildering variety of plants and animals able to secrete lime supports.

Visitors Become Fish Watchers

I'll grant the fascination of bird watching. But given this coral reef, my vote goes for fish watching as the most absorbing of natural history pastimes. Around these coral heads swam fish in all the colors, patterns, and forms that the books describe. We soon forgot about swimming in the ordinary sense and spent our time watching.*

The fish were not at all shy; they accepted us from the beginning as a part of their environment and went right on grubbing for food, or playing tag, or practicing precision maneuvers, or just resting pleasantly in the warm water. As far as they were concerned, marine zoologists with goggles and breathing tubes were an ordinary part of the reef fauna, familiar and harmless.

We spent many hours on the reef and in the water, collecting, photographing, and mapping the distribution of the different kinds of reef organisms. For me, at least, the coral reef is rivaled only by the rain forest of the tropical continents. We never got over our wonderment at its marvels.

And so the summer passed all too swiftly. September 11 came; a trade ship of the trust territory was due to pick us up the next day. I went to bed with the hope that maybe they had forgotten. Maybe the schedule had been changed and we could have another day... another week...another month.

* See "On the Bottom of a South Sea Pearl Lagoon," by Roy Waldo Miner, NATIONAL GEOGRAPHIC MAGAZINE, September, 1938.

Chief Fagolier, Working Inside a Canoe House, Weaves a Coconut-fiber Seine

Huge Dip Nets Snare Fish Trying to Leap Free of the Seine

No such luck. I was awakened about 2 a.m. by a soft voice calling from outside—"Marston, Marston. Ship come."

I pulled myself out of bed and stumbled to the shore. There across the lagoon were the lights of the ship. The West had turned up on schedule to claim us.

The ship took us to the Truk Islands, a district headquarters of the trust territory government. There Ted and I glimpsed a people similar to those of Ifalik but with a long history of outside contact—with Spain, Germany, Japan, and now with the United States.

We had, of course, no time to study them. But we could see that their contact with the outside world had given them no real advantage. The contrast with Ifalik was thought-provoking.

Life on Ifalik has been little changed by contact with the West. Indeed, it is because the islanders are "unspoiled" that we had wanted to study them. As far as we could see, their life in most respects is beautifully adapted to their environment.

The authorities of the trust territory are keenly aware of this. They have before them a whole array of islands with different histories of Western influence. In those where the most contact has occurred, the process looks much like degeneration. The people have lost their old skills; they have even forgotten how to fish and are dependent on canned foods. They acquire imported diseases, of the mind as well as of the body, and, while happiness is difficult to measure, here too they seem to lose instead of gain.

Learning Process a Two-way Path

But change is inevitable. The Ifalikians want to take their place in the world, and I don't think we should protect them artificially, even if we could. I have enough confidence in them to believe that they can teach us as many things about living as we can teach them. Here perhaps is the key problem—how to make the learning process a selective one, so that Ifalik's handful of well-adjusted islanders won't lose their self-respect and values, their kindness and manners, and their ability to manage their sea and atoll as they acquire the modern world's gadgets and science.

New Life for India's Villagers

By Anthony and Georgette Dickey Chapelle

With Illustrations from Photographs by the Authors

"GO VISIT our aborigines. They're an example to all of us. See what's happening among the Muria Gond tribe in Bastar District, for instance. It will be a hard trip, to a place where visitors rarely go. But you will be welcome."

The speaker was an impeccably tailored Indian Government official sitting behind a document-strewn desk in New Delhi. We wanted to record with camera and typewriter the most heart-warming story of postwar Asia—India's gigantic Community Development Program—and had sought his advice on where to begin.

India's efforts to improve the lot of her villagers had become familiar in front-page headlines and teahouse talk from Bombay to Calcutta and beyond. To date, the Community Development campaign—Asia's biggest by a free people against the twin assaults of hunger and disease—has cost India's Government some $190,000,000. The United States has contributed more than $12,000,000 in technical assistance, furnishing advisors, supplies, training, and equipment. In addition, aid has come from other governments, some of them acting through the United Nations, and from private organizations such as the Ford Foundation.

Already, we had heard, new dams were rising, rural schools were up and buzzing, and whitewashed village health centers were operating in places where, until recently, no one had even known the names of such things.

Grainfields stood heavy with harvest, and deep wells gushed sparkling water.

By the end of 1955 the program touched the lives of some 60,000,000 villagers. Soon it will operate in one out of four Indian communities. The goal: to help every rural dweller on the subcontinent by 1961.

We wanted to find out at firsthand what such a huge project meant to individual farmers. How have their lives been changed by it? How do they take to new ways that alter patterns of life set many generations ago?

Conversation in a Bija Tree

The New Delhi official had not exaggerated the remoteness of Bastar. Eleven days of hard driving passed before we reached the district. And we had not been in Bastar a dozen hours before we found ourselves sitting on a *charpoy*, a rope-webbed bed, lashed in a creaking bija tree, waiting for a tiger.

Our hunt, however, was not the sort of welcome once arranged for high-ranking thrill seekers. It was not a sporting hunt at all, but a serious part of the governing of the new India.

This was explained to us on the spot by our host, a small and bespectacled official named Ronald Noronha. He was then Deputy Commissioner of Bastar District in Madhya Pradesh—one of India's largest States—and its chief magistrate and development officer.

Noronha modestly explained the relationship between tiger hunting and government:

"When I came here, early in 1949, the people weren't impressed with my job—or with me. I don't mean they were unfriendly. They're too well-bred for that. They simply didn't think I was very bright. They were willing to see that I didn't come to harm in their vast sal and teak forests, but they couldn't see how I had any usefulness in their lives."

In deference to the big cat we were expecting, Noronha spoke in a whisper.

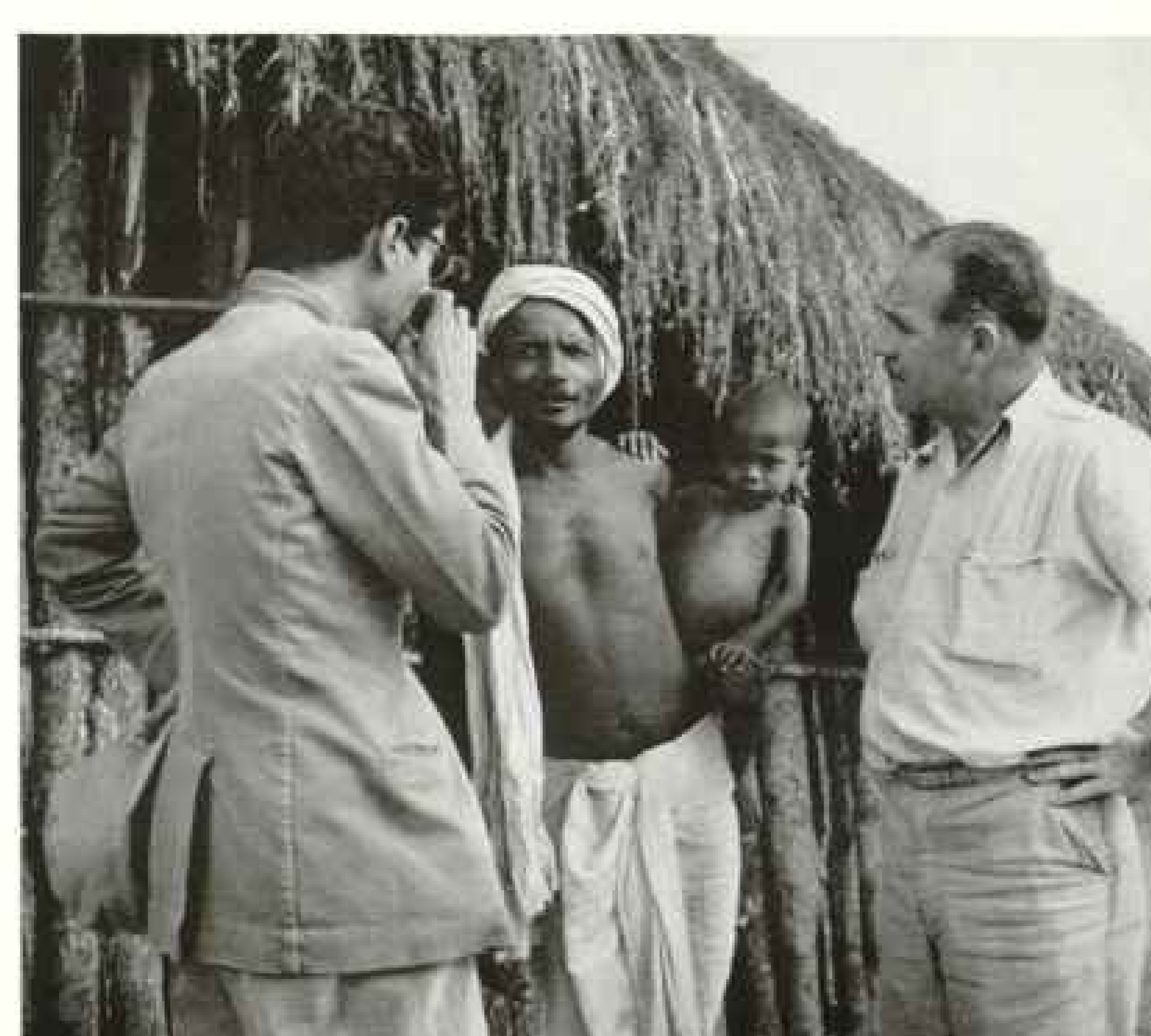
"Then a tiger killed three farmers near Kanker at the north edge of the plateau. Killings happen all the time, of course. Fifty people die every year to the beast between here and the lowlands. Nobody has a gun; they're too expensive. So, naturally, terror seized Kanker and the villages around it."

Tiger Shoot Wins Aborigines' Confidence

Noronha paused to listen for sounds of the beaters who were attempting to herd the animal our way. The jungle stillness held.

"Anyway, I finally shot the tiger from the ground—no tree platform at all. They liked that. It was the best way to let them know I could be useful.

"People for miles around heard all about it. They know now that I like to shoot from a bit low. That's why this platform is only 10 feet high. I've seen a tiger jump 22 feet after he was shot.



Villager Thanks His Benefactors

India in 1952 launched its Community Development Program to raise the standard of living among country people.

Today the program operates in some 100,000 villages. Thousands of field technicians point the way toward better health, new schools and roads, and more efficient farms.

Deputy Commissioner Ronald Noronha (left), an Indian career official, spearheaded the campaign in the Bastar District. U. S. agriculturist Frank Bell (right) lent technical assistance. Here they talk with the head of Ghodagaon village. A new school building rises behind them.

Opposite page: Rice harvester of Bhirlinga trudges homeward with 80 pounds balanced on his shoulder.

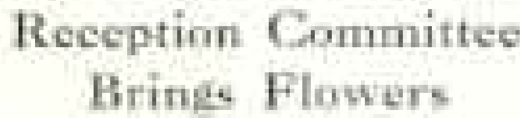
"Well, there were other tigers. I kept on shooting them—14 in all. It has been a charm to my real work, for the people have let me be useful in other ways, too."

At that point in our interview the beaters at last began to make the jungle hideous with their howling chorus. Ordinarily, no one could have hired them for a task like this. They were a hundred rice farmers of Jungani village, aborigines who had volunteered a precious day from rice harvesting only because a tiger had killed two of their bullocks at dawn. Now they were risking their lives to drive the big cat toward Noronha's dependable rifle, because cattle are costly and a tiger wounded by their spears all too often becomes a man-eater.

As it worked out, the occasion bagged Noronha's tale for us, but no tiger. The quarry doubled back twice through the line of beaters.

At dusk Noronha ordered the men out of the bush.

"You'd be fools to try again. Fools!" he insisted, climbing out of the tree. "This round belongs to the tiger. He's been a good fellow, not hurting anyone when all the time you were trying to push him around like a goat. We'll try another day."



Reception Committee Brings Flowers

The next morning we drove our Chevrolet carry-all within a mile of Bhirlinga village and parked where the road dipped under a huge mud puddle. A dozen men and boys, led by a *dhoti*-clad official, were waiting there for us.

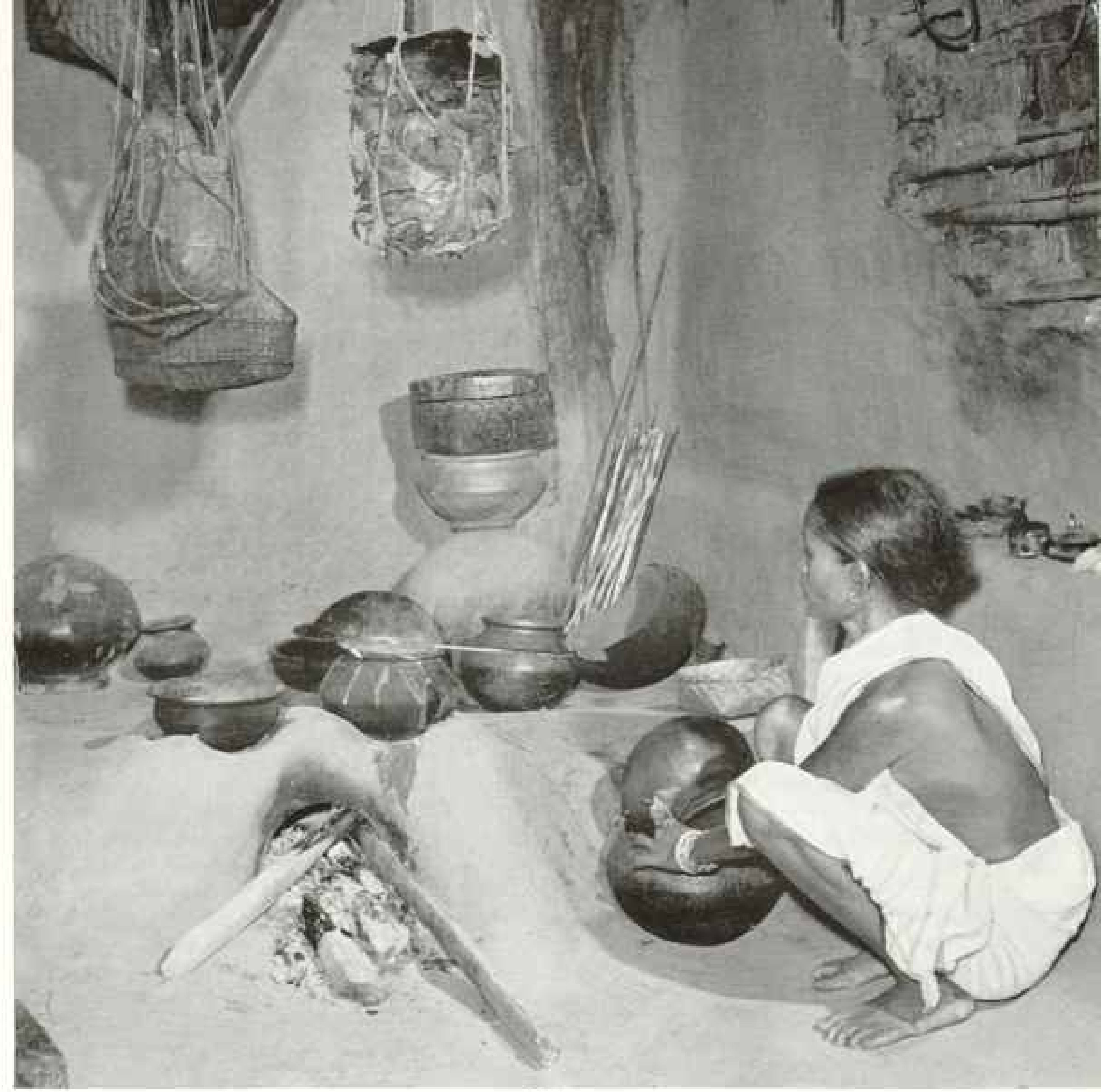
The welcoming committee smiled and gestured. Then, while Noronha spoke, they unloaded our bulky camera equipment

"Time to Get Up"

Seven-year-old Basanta smiles good morning at her aunt, Gangaiye (opposite). The child sleeps on a pallet spread upon the mud floor. Her head is shaven except at the back.

Gangaiye's sari is a 5-yard length of hand-woven cotton. Her bracelets are silver and colored glass.

Aunt and niece are Gonds, members of an aboriginal tribe that settled in the forests and hills of central India many centuries ago. Bhirlinga is their village.



575

Rice Boils atop a Dried-mud Stove; the Smoke Cures Fish in a Basket of Leaves

Adults refused to eat this meal; they feared their village goddess might be angered because nonbelievers saw the food being prepared (page 581). Here Gangaiye serves as cook in her family's home.

and silently apportioned it among themselves.

It seemed a long time before we reached the log bridge marking the edge of Bhirlinga. Then the parade of greeting began in earnest. Each family had sent a representative, and each had brought a flower wreath.

Blossoms Picked in Cool of Morning

The wreaths were made of tiny asterlike blooms with jungle lilies among them, all strung on cotton thread. The donors carefully hung them, one on top of another, over our heads. The ceremony made handshaking, the only greeting we could offer, seem stiff and cold indeed.

"The blooms must be picked before the sun grows warm," Noronha told us. "Now you know the people were thinking of you before you came."

This made it doubly difficult to dispose of the flowers, so we compromised by draping them around the mound of photographic equipment our hosts had built from our gear. Then we carefully and publicly pressed one lily in a leather wallet, a ceremony we were to repeat often.

Noronha held a conference with the villagers to tell them who we were—they knew only that we were his guests—and why we had come. A village official was detached

from the group to entertain us while the talk continued, and he smilingly offered us his "book of the village." Alternate pages had been neatly transcribed into English.

We learned from it that 266 people were living in Bhirlinga, in 77 households. They cultivated 435 acres of cleared jungle, the largest part in rice.

The village had no debts—and no credit. There were no bicycles, no phonographs, no radios. As of the previous year, there were eight persons who could read and write Halbi, the local tongue. The villagers had not yet used an improved rice seed, nor had they ever drunk really pure water.

We wondered, as we scanned the document, whether the villagers were learning as much about us. We were a mission of four Americans from the International Cooperation Administration: Frank Bell, an agriculturist from Ohio; Sol Resnick, an irrigation expert from Wisconsin; and we two from New York City.

We had come a distance incomprehensible in Halbi, which uses no numbers over 400. How could Noronha explain where the United States is—or even what it is? Moreover, we thought of our technical assistance program as being a somewhat sophisticated concept.

"Sharing Knowledge Is Useful"

Noronha's talk with the villagers seemed to be going well, but how could he answer the question we had heard so often on visits to far places: "But *why* are they here?"

We drew one of Noronha's aides from the group, lanky K. R. Naidu, who had moved inland from a coastal town with his family two years before to serve as district education officer.

"Are they curious about us?" We paraphrased our real doubts, trying to match Naidu's graciousness.

"Your car, your clothes—especially the lady's—and your cameras, of course," replied Naidu, puzzled.

"But our motives?"

"Oh, no. Those they understand perfectly. You see, this is a society of sharing; whatever a village or family has learned, it is eager to tell. Our people are excited that visitors are willing to listen and have come to help. They have always understood that sharing knowledge is useful."

Thus we heard, simply and directly from the people of Bhirlinga, a fine definition of the U. S. technical assistance program.

Noronha motioned us to follow him behind a low mud wall topped by a row of thorns. Such a wall guards every dwelling in the area from marauding jungle animals.

Inside the compound, marked on two sides by wide verandas, were several charpoys. The villagers motioned us to sit on them. Then the village leader's four sons brought cubes of cucumber and chunks of sugar cane in large, newly woven leaf cups. Smaller leaves with piles of salt and a paprikalike spice came next, to flavor the cucumber.

Guided Tour in Three Tongues

We began a tour of the community. Naidu, walking with us, translated in three languages—Halbi to the villagers, Hindi to our technicians, who were assembling a glossary of general terms, and English to the two of us. Behind us trailed a growing group of fascinated children.

One little girl, with bright eyes and a head shaven but for the back, was more enterprising than the rest. She led us into her family's yard with a guilty sidelong glance at an aged patriarch sitting serenely within the wall. His turban and dhoti fell in neat, soft folds, and his brown chest was bared to the sun. He did not rise, but reassured the child with a smile and gestured his welcome to us.

Naidu told us this was Grandfather Fagnu, a tribal elder who was said to have lived a hundred years. Our girl, his granddaughter, was 7-year-old Basanta (page 574). She put her hand on his withered shoulder and confided excitedly her adventure in bringing us here.

"Our people are indulgent with their children," Naidu interposed. "But no one is more so than a grandfather with his granddaughter. It is a custom that no one may interrupt the thoughts of an old man sunning himself, except his grandchildren."

The rest of the family soon presented themselves, and there is no word for them but

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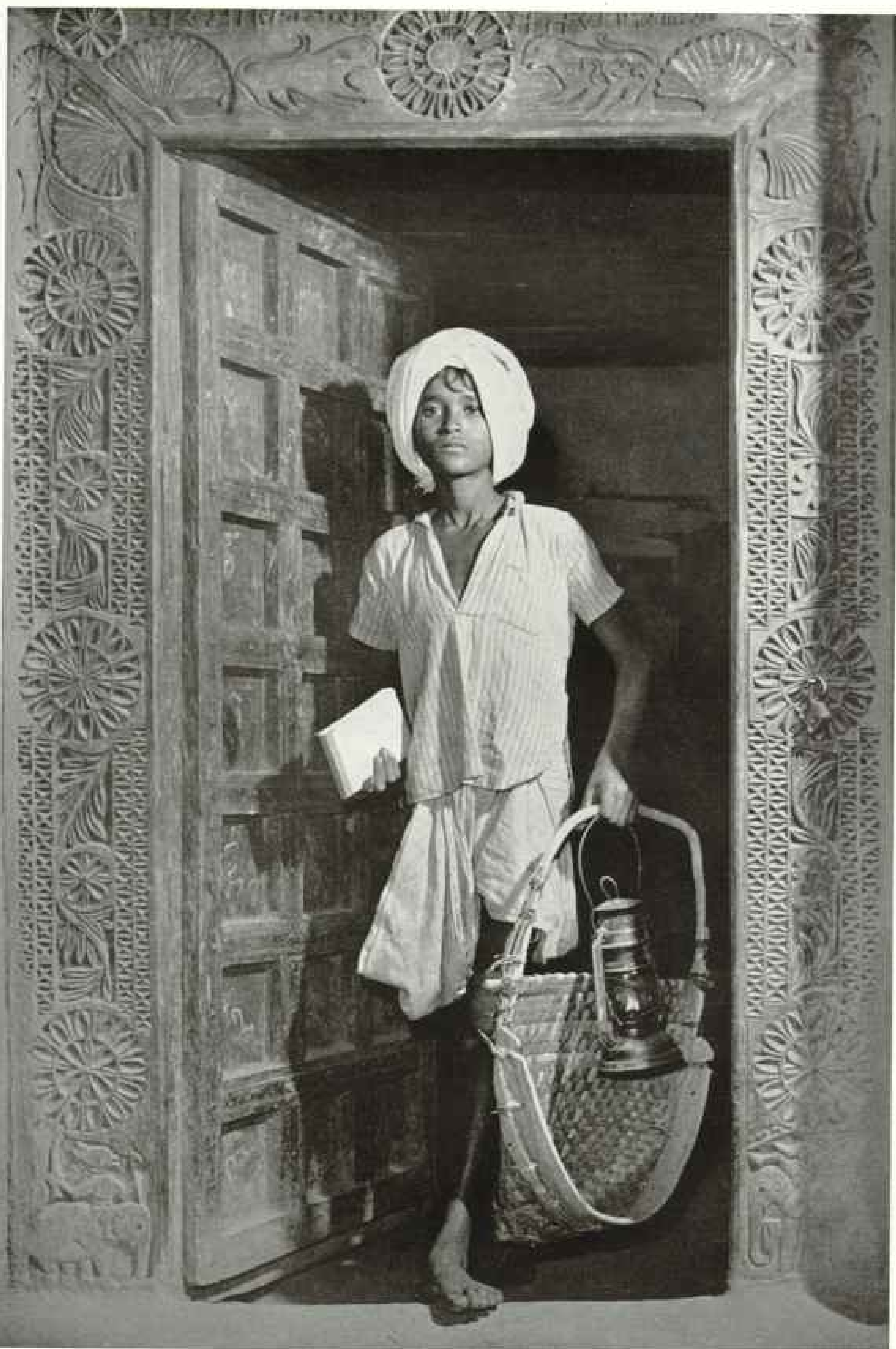
Samsingh Starts His Daily Grind, 12 Hours of Study and Toil →

The son of Chano heads for the secondary school in Bastar village, three miles from Bhirlinga. After classes he helps a neighboring farmer winnow his rice.

Twelve-year-old Samsingh carries a textbook in one hand; in the other, his winnowing basket and lantern for night work in the fields. Cotton turban, shirt, and draped *dhoti* comprise his year-round costume. Carved teakwood door is the most elaborate decoration in the family's four-room home.



handsome. There were Lachhni, the grandfather's spry sister; Punie, the mother; and Chano, the father; Gangaiye, the aunt; Devisingh, the uncle; and the two sons, Basanta's big brothers, Samsingh, 12, and Anantram, 16. Like most Muria tribesmen, they used no surname, but Naidu said they were spoken of as Chano's family.

Two Meals a Day, Sometimes Three

We talked with one after another to learn their daily routine. Our agriculturist began by asking Chano, head of the house, about the year's rice harvest.

Chano replied that we had walked through it to reach the village. It was the finest crop he had ever grown. This year there would be enough for everyone in his family to enjoy two meals every day all year, and sometimes three.

Noronha saw us raise our eyebrows.

"That's right," he interrupted. "One reason we wanted to help our people was their hunger. When I used to visit their villages, I often met men who apologized for offering me no food because they themselves had not eaten for three days. It was usually about this time of year—just before the harvest."

We asked how Chano's new wealth of rice had come about. Generally, people think

↑ Ghodagaon's New School Moves Outdoors in Fair Weather

Bastar District, which the authors visited, is part of Madhya Pradesh, a progressive State whose primary schools for aboriginal children have increased from 48 to 798 since 1948.

People of Ghodagaon constructed this school building, first in the village's history. India's Government supplies a teacher, books, and slates (page 583).

→Intent on learning the Hindi alphabet, a first-grader at Ghodagaon rivets her eyes on the instructor.

←Boys from outlying villages attend the Agricultural Middle School in Bastar village. When the institution opened, 30 pupils lived in this rough twig shelter; Bastar people donated 600 pounds of rice a month.

Today the school boasts 140 students, who live in a large, well-built hostel. Still doing all the cooking and housekeeping, they cultivate 14 acres and maintain a poultry farm and fishery. Last year they produced 8,962 pounds of rice per acre, an all-time high in this region. A Bastar school team, competing in New Delhi, won the All-India folk dancing championship.

of increased farm yields in terms of improved seed and plows, fertilizers, better transplantation, and farm machinery. But the answer, a reply we heard scores of times in the aborigine area, mentioned none of these.

Simple Changes Bring Grain Surplus

Chano had changed his growing methods in only two ways since the Community Development Program began. He plowed the rice stubble directly into the earth after harvesting, instead of waiting through the following year's monsoons. And he built earth borders for his fields, piling them a yard high before the rains came; these held the water in the paddy fields for the crucial four months' growing season. The result?

"We even have rice to sell, now," was the end of Chano's story.

The book of the village put it in cold figures. Average rice yield before the program started: 400 pounds to the acre. Average now: 900 pounds.

Wasn't there some resistance at first to changing the way of rice growing? The question puzzled Chano.

Naidu translated his answer this way: "But nobody ordered us to do anything, so

Aboriginal Villagers Build a Road to Accommodate the Photographers

Using only their hands and farm tools, the people of Retawand constructed two miles of road in five days. Work had been suspended during the rice harvest when the authors arrived, but the villagers willingly returned from the fields. "We'll build another few feet for you so you can see how we did it," their leader explained.

All roads are raised lest they be flooded by monsoon rains. For a foundation, workers roll rocks fairly long distances. Men with axes and hoes dig dirt for surfacing and pass it up the slopes in baskets. Children serve as water carriers.

why should we resist? Some of our leader's friends said several seasons ago that we should try raising part of our crop by the new way. We did, and it grew better. So of course we changed."

Again, halfway around the world, we had heard in a few simple sentences the whole philosophy of technical assistance.

New Plates for Each Meal

Now the sun was high; we wanted photographs of the eating of the rice. Basanta and the women of the household busied themselves weaving leaf bowls and plates, as they do before each meal. The leaves had been picked from flame-of-the-forest trees near by. Half a dozen children squatted around the kitchen to eat rice from them (page 588).

"When do the adults eat?" we asked.

"They would eat now, too. But today they have given up their meal," said Noronha evasively.

"But why?"

He answered our question with a smiling question of his own. "You are not, I take it, a believer in the Village Mother?"

We said we did not know of her. Noronha nodded.

"The villagers have assumed as much. They say the goddess may be angered because we unbelievers were present when the food was being prepared; hence they will not eat it. But, like themselves, they are sure the deity will be indulgent with hungry children. So the food we contaminated has been divided among the neighborhood youngsters."

Girls Sing as Rice Is Hulled

Our friendship with Chano's family grew day by day. We watched Chano and Devisingh carry the first of the newly cut rice on the ends of long shoulder poles.

We photographed Lachhni and Gangaiye hulling the rice in the compound, while teenage girls sang to the rhythm of their pounding wooden hammers.

And we trekked to an old well with the womenfolk, causing a riot of laughter when Basanta showed us how to carry child-sized pottery jugs of water on our heads.

We came early to hear Gangaiye's daily prayers beside the family shrine, a bush that grew on an earth dais beside the house.

One day we came late to meet Anantram. Naidu had brought him home from school in Bastar to demonstrate an accomplishment in our honor: he chalked his name and school class in English on the kitchen wall (page 587).

The schooling of the children of Bhir-

linga and scores of nearby villages had begun in earnest, firing the imagination of the whole aborigine area. With few exceptions, everyone attending was the first of the family to learn to read and write. Part of the excitement was because the youngsters were learning not their simple mother tongue but Hindi, India's official language. Within a generation they would be able to communicate with millions of other people from whom these tribes had always been isolated by language.

We asked what they would want to read first, these people so long set apart under circumstances where they had not even needed words like "book" and "newspaper."

"We want to read how other people grow better rice and live better," was Anantram's prompt reply.

Villagers Eager for Schooling

It would be difficult to imagine a more convincing report on the progress of education than the one Naidu wrote from memory for us one day, backing half a sheet of crumpled paper against Noronha's jeep hood. In his own neat handwriting (we have it before us

Laundry and Well: a Stagnant Pond

Contaminated water holes have long been a major cause of India's low life expectancy. Many villages have dug modern wells (opposite) and converted ponds to fish-breeding tanks (page 585).

Here a laundress beats clothes against a rock while another housewife starts home with a jar of drinking water.

Bastar's New Well Yields Pure Water

For generations villagers drank "water that brings sickness" from stagnant ponds.

Because United States technicians advised construction of covered wells like this one, the yield is sometimes known as "American water." Thirty feet deep, the brick and concrete shaft is conveniently situated in Bastar village.

now), it told this story:

In all of Bastar District, where more than 900,000 people live, there were but a handful of primary schools and only three secondary schools in January, 1948. Now the total of both kinds has risen to several hundred. Many have been built by the villagers themselves without cost to the Government; others have cost less than 500 rupees, the equivalent of about $100. The average cost of a school built without voluntary labor and cartage ran 10 times that figure.

The original inspiration had been the offer of the Government of India to provide a teacher wherever a building was constructed and a class assembled. Noronha and Naidu said they had brought these tidings to their people.

"We told them, too, that there was no magic in schools," Noronha said. "Only as long as the elders themselves encouraged the children to come and interested them in learning would the schools be successful."

Don't Turn Your Back on a Tiger

Noronha illustrated a belief he has about education for his people by telling us a story.

"On one of my early visits to an isolated village I met three boys on the trail. I knew the village must have a school of sorts, for two of the youngsters had their hair cut; the third, long-haired, apparently didn't attend. I stopped the boys and asked them to play a game with me. I would ask them a question and give a prize to the one who gave the right answer."

The question was this: If you saw a tiger staring at you at the next turn of the trail, what would you do?

Said the first boy, who went to school, "I'd run!"

"You're dead," Noronha had replied casually. "No human can run away from a tiger."

The second boy, also short-haired, said, "I'd climb a tree."

"You're dead, too. A tiger can jump faster than you can climb."

The long-haired boy had been hanging back. Now he said, "I'd just stand facing him, and after a while the tiger would go away."

Which, we learned to our surprise, is the right answer.

"A tiger generally sees you before you see him," Noronha explained. "He kills from behind. If a man happens to fall face up, the tiger won't eat him. So if you see a tiger standing there looking at you, he isn't going to kill you. If you don't startle him, he will go about his business.

"We don't propose to run schools that might take the jungle out of a boy," he said. "It's too important to his survival."

Twig Hostel Houses Students

Samsingh, Chano's younger son, went with us three miles to the larger village of Bastar for which the district is named; he wanted to show us his school (page 577).

It was not one of the primary schools about which we had heard so much, but an even prouder institution, a "middle school." Here the fifth to eighth grades were to be taught. Samsingh, his older brother Anantram, and 40 other aboriginal boys lucky enough to have been born in villages where primary schools had existed were beginning

their fifth-year studies here. They comprised the first local class to advance this far.

The villagers of Bastar, hurried because the planting season was upon them, had time to build only a hostel of woven twigs for these boys from outlying communities. They gave their own mud-walled community center (it, too, was a new structure built by volunteers) as the students' storeroom and study hall.

Community Action to the Rescue

When the boys moved into Bastar village, a new hazard to their education arose. On their monthly visits home they could not bring back food enough to last their growing-boy appetites until the next trip. So again community action saved the new school, and again the new rice yields were important. Six hundred pounds of rice a month were set aside by Bastar villagers to feed the students.

The boys themselves had made no small sacrifice for learning; 12 to 16 years old, they did all their own housekeeping in the twig hostel. They seemed surprised that we were impressed with its neatness and with the collection of spotless water and cooking pots (page 578).

These sons of jungle hunters explained that shirking housekeeping chores would be a bad example of slothfulness that future community leaders could not afford to set.

Now that we were in Bastar, Samsingh and Anantram guided us past two sites that foreshadowed the future of their own village.

Awed by Medicine's Miracles, Patients Squat Beside a Doctor in Bastar

To combat malaria, a scourge of India, health authorities sprayed entire villages with a mosquito-killing chemical. Cases dropped from 25 to 2 a day. Dr. B. K. Vaid, an Indian physician who administered the antimalaria campaign in Bastar village, conducted this daily clinic in a shed on the main square. Tribal people, wary at first, learned to trust him for all ailments. Some walked 20 miles or more from other villages.

They led us first to the village "tank," a stagnant pond with earthen walls. Such tree-lined reservoirs are found in almost every Indian village. They make artistic photographs—and are one of the major causes of the villagers' low life expectancy. For they are often the sole water source for the community in the dry season, when rice fields are not flooded.

Not so here, we were assured. Bastar village now has a better use for its tank.

Noronha recalled for us the kitchen in Chano's home.

"Do you remember the fish being smoked over the stove? Aside from pigs and poultry eaten on ceremonial occasions, fish are about the only source of protein on the aboriginal diet—unless someone is lucky hunting. But within two years, this disused water hole will provide better fish than anyone here now eats. It is the new village cooperative fish-breeding tank."

New Fish for Village Pond

Six months before, the village pond had been stocked with 28,000 fresh-water fish.

"They'll grow to six pounds each," Noronha pointed out. "Some will be distributed free, and the rest sold in the market to provide a continuing income for community improvement projects."

Samsingh was waiting patiently to show us the rest of the water-improvement picture. Now that the stagnant tank was a fishpond, how had cleaner water come to Bastar?

The new source was a broad well, a six-foot cylinder of brick set in a concrete circle in the heart of town. It was 30 feet deep. There was a pulley on a metal bar across the mouth (page 583).

A man and a woman were using the well. He and the woman chatted while she made a cup of leaves. Then the man filled her cup, and she drank thirstily.

"She wants you to know that the well means all the water they can drink, all year, without getting sick from it," Naidu explained.

In another community near by, to which clean water had come for the first time, we learned of an international compliment. The word for the contaminated supply that had been drunk for generations meant "the water that brings sickness." The clear liquid that came up from the new clean well, built with the guidance of a U. S. technician, was called "American water."

When we were there, Bhirlinga village enjoyed no such blessing, nor was there any control of irrigation water. But a new well had top priority for the coming year, and this excited our American water expert.

As we drove the carryall back toward Bhirlinga, Sol and Samsingh, with Naidu translating, were deep in technicalities that involved the water table (30 feet) and the annual rainfall (50 inches between June and September).

Suddenly Sol called for us to stop.

Earth Dam Saves Precious Water

We were on a raised part of the road beside a rice field. Perhaps a fourth of the crop was drowned with standing water; in it three women were doing family laundry. They hastily gathered up their wash and retreated toward the jungle as Sol and Samsingh, joined now by two of Noronha's aides, crossed the ditch toward the water.

"There's no need to waste that water," Sol was saying. "Look, an earth dike from here—" he began to pace and gesture—"to here would hold it back in the stream until it was needed, and moving a few shovelfuls of earth would release it at this point...." He went on while Samsingh watched, hero worship in his eyes, and the young development officials nodded.

Ten days later we passed the spot again. Farmers were industriously building the dam. A twig lattice marked the spot Sol had indicated, and earth was being banked against it. The men saw the insignia on our car and halted their work, smiling.

Sol cupped his chin in his hand and mused, "Gosh, I hope I figured that out right."

"I'm sure you did," was Noronha's answer, "and as soon as it works, I'll remind them who thought of it. You were so tactful about it that just now they are convinced it was their own idea."

Religion, Science Settle a Quarrel

He went on: "That's why technical cooperation is working here. Contact with people from outside their world doesn't necessarily spoil the aborigines; it's pressure that does it. If we stand by them as they come into the world gradually, if we help devise methods they can adopt with their resources, we've served our purpose."

What about the traditional quarrel between tribal religion and modern science? Among

the Muria the argument is meaningless. They believe, of course, that illness is the expression of a deity's displeasure. But if people dig a clean well and feel better for drinking the pure water, the logic is plain. The deities favor the clean well, just as, obviously, they favor the richer rice crops which help produce healthier people.

Doctors Welcomed to Bastar

In Bastar District this outlook has helped make possible a State antimalaria program with spectacular results. The Madhya Pradesh Government has sprayed dwellings in nearly 3,000 villages, Bhirlinga among them, with a mosquito-killing chemical. An Indian physician, Dr. B. K. Vaid, was sent to keep track of the incidence of malaria in the sprayed area. He held a public clinic, originally for that purpose only, two hours a day in Bastar village for more than a year.

The doctor showed us his early records: as many as 25 malaria cases daily, often during the rice harvest period when a lost man-day meant empty stomachs. By the time we got there the average was fewer than two cases a day.

But most important was the line of people waiting for Dr. Vaid each day outside his tin-roofed clinic shed on the village square. These were aborigines who only a few short years ago had never heard of a doctor. Now they were coming to him voluntarily for help, no matter what their hurts (page 584).

Some came 20 miles or more—but that, Noronha said, was another story.

Murmadia School Pupils Learn to Identify Jungle Flora by Sight, Feel, and Smell

Boys wear Gandhi caps, a washable cotton headgear named for the late Mohandas Gandhi.

Proud Scholar Demonstrates the Fruits of Learning

This 16-year-old boy was the first member of his family to read and write.

"Anantram, Hindi Middle," chalked on the kitchen wall of his home in Bhirlinga, denotes his name and grade in the Bastar Agricultural Middle School (page 581). There Anantram studies Hindi, India's official language, and English. His native tongue is Halbi, a mixture of several languages. Younger Basanta looks on admiringly.

"When I first arrived, I had a jeep and a motorcycle. There was only one jeepable road, the main one. I usually had to abandon the motorcycle at the first wide stream. I still can reach my people to the south only on foot, but now we have a program to build roads. Our best one cost the Government nothing. It is 15 miles long, linking seven villages, and it was built in five days by a thousand farmers with their own tools" (page 581).

It was Chano's family, later in the week, who showed us the road's importance. Unhulled rice in jungle villages was selling for about $1.50 for 83 pounds. Rice taken 12 miles in bullock carts on the new road to the only real town in the district, Jagdalpur (population about 15,000), brought twice as much.

Jagdalpur's weekly market, to which the family and their neighbors had gone only infrequently five years before, was bursting its seams with the area's new prosperity. Most families were going to market every week now.

The market itself is a level space about twice the size of a football field. No Christmas shoppers on New York's Fifth Avenue ever thronged more closely together than the people of Bastar District on market day.

"And these are the people," Noronha pointed out, "who, we once worried, had no incentive to grow more than they could eat because we thought there was nothing to trade in the area!"

Now we saw rice, fish, okra, peas, beans, cut cane, squash, and custard apples. There were water jugs, cooking pots, umbrellas, sandals, woven baskets, fish weirs, and hand tools. Merchants squatted by what they had to sell; when it was gone, they picked up their baskets and went to buy.

Clothier and Jeweler Reflect Prosperity

Finally there were the sure signs of economic plenty, the haberdasher and the jeweler. The outfitters sold dhotis and sport shirts of Western cut (Chano wore one of these). The Tiffany of Jagdalpur was riotous with color.

Youngsters Eat from Leaf Dishes

Bastar families once went hungry while waiting for rice to mature. Today's increased yield permits two or three meals a day. Basanta and her friend are too young to remember famine time.

Its main items were colored glass bangles and bracelets of many hues.

"You ought to get some of those, Mrs. Chapelle," Noronha advised as we visited the bangle merchants. "The villagers say your husband is not very generous with you. You must be rich or you could not travel so far—and yet you wear only one bangle." And he pointed to a metal wrist-watch strap.

Villagers Offer to Adopt Authors

The sun lowered over the market square, and with it our visit to the aborigine country drew to a close. Sol planned a six-weeks trip on foot to help the southern villagers improve their use of irrigation water. Frank expected to return soon, bringing improved rice seed. We were scheduled to leave late that day, and our final way of thanking Chano's family was to take them back to Bhirlinga in our carryall. It would be their first automobile ride.

We loaded them into the vehicle with their purchases of okra and dried beans. Little Basanta, eating beans as if they were candy, sat beside us and shyly offered a grimy handful. Just beyond her, Lachhni, the great-aunt, perched nervously on the edge of the seat.

Gentle Naidu, in the front seat, translated their excited comments. Lachhni nudged him; he hesitated a minute before repeating what she had insistently told him.

"You must understand that what she is saying is really a great compliment," Naidu said finally. "You see, expulsion from the tribe is the punishment our people fear most. Lachhni says if you should ever be expelled from your tribe, you both would be welcome here. The people will protect you and teach you how to live in the jungle."

Lachhni again half rose from the seat, holding awkwardly to the car, and spoke to Naidu. We had no time to reply.

"And she says, too, that the village council met last night and decided that, if you do return, they will betroth Basanta to Mr. Chapelle.

"You understand," Naidu plunged on, "that you would still be the No. 1 wife."

Then Naidu, sensing our hesitation, hastily added, "Of course, you understand, this is all a jo—well, I'm not really sure it *is* a joke!"

Aborigines Learn Western Handshake

Nor were we. But the whole family, avidly following the conversation, had seen we were taken aback. So they made that the biggest joke of all. Not even when the car began to move 20 times as fast as a bullock cart did they stop giggling and chuckling. Finally each in turn reached for our hand—they had learned our handshake, after all—to make us understand that they had not been unsympathetic in their laughter.

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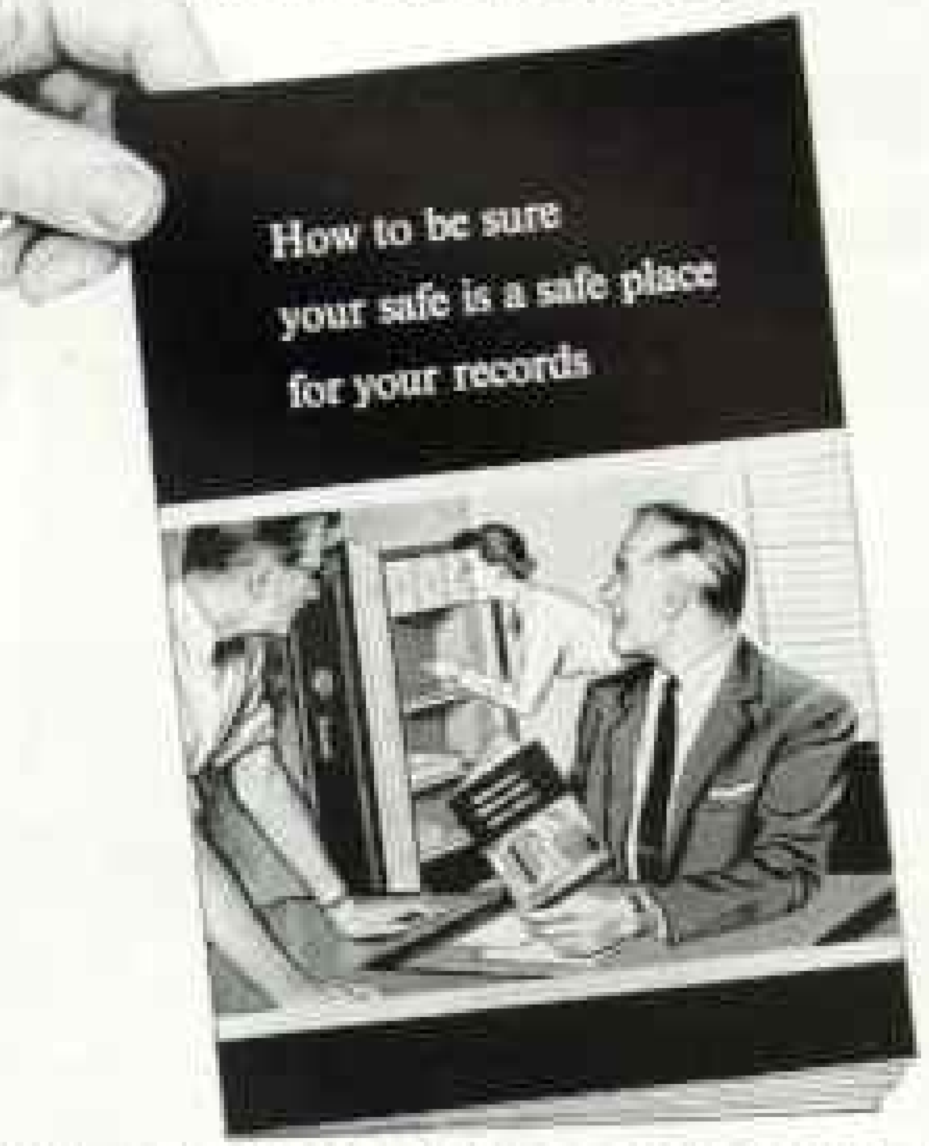

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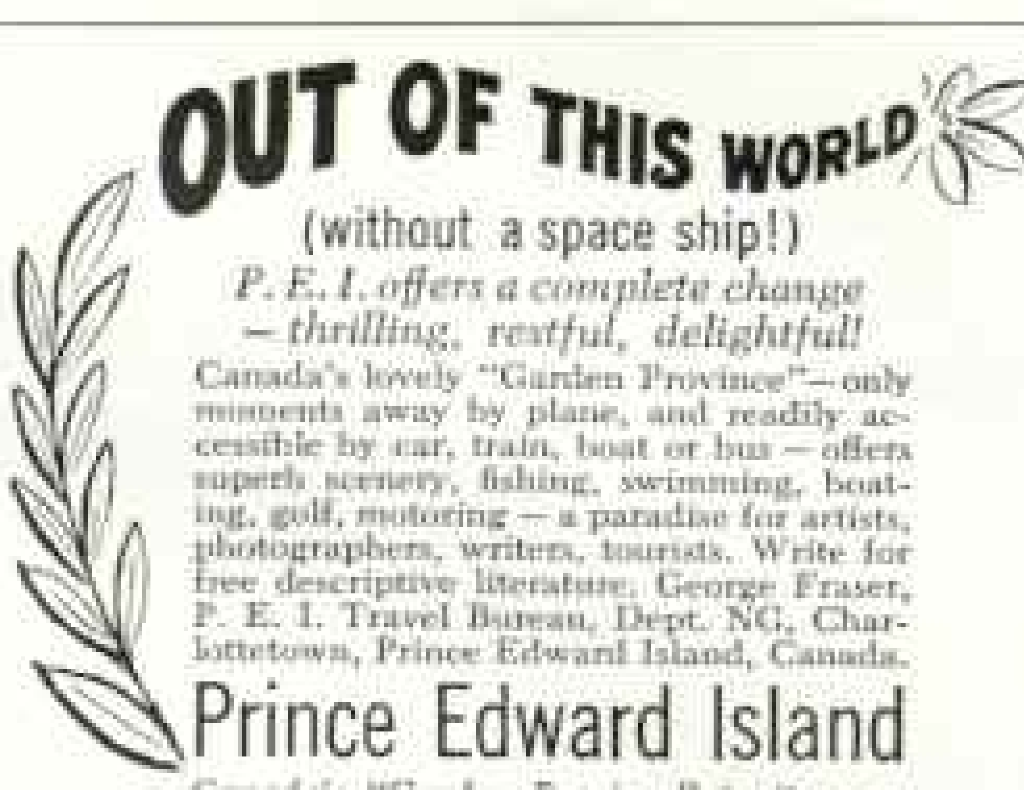

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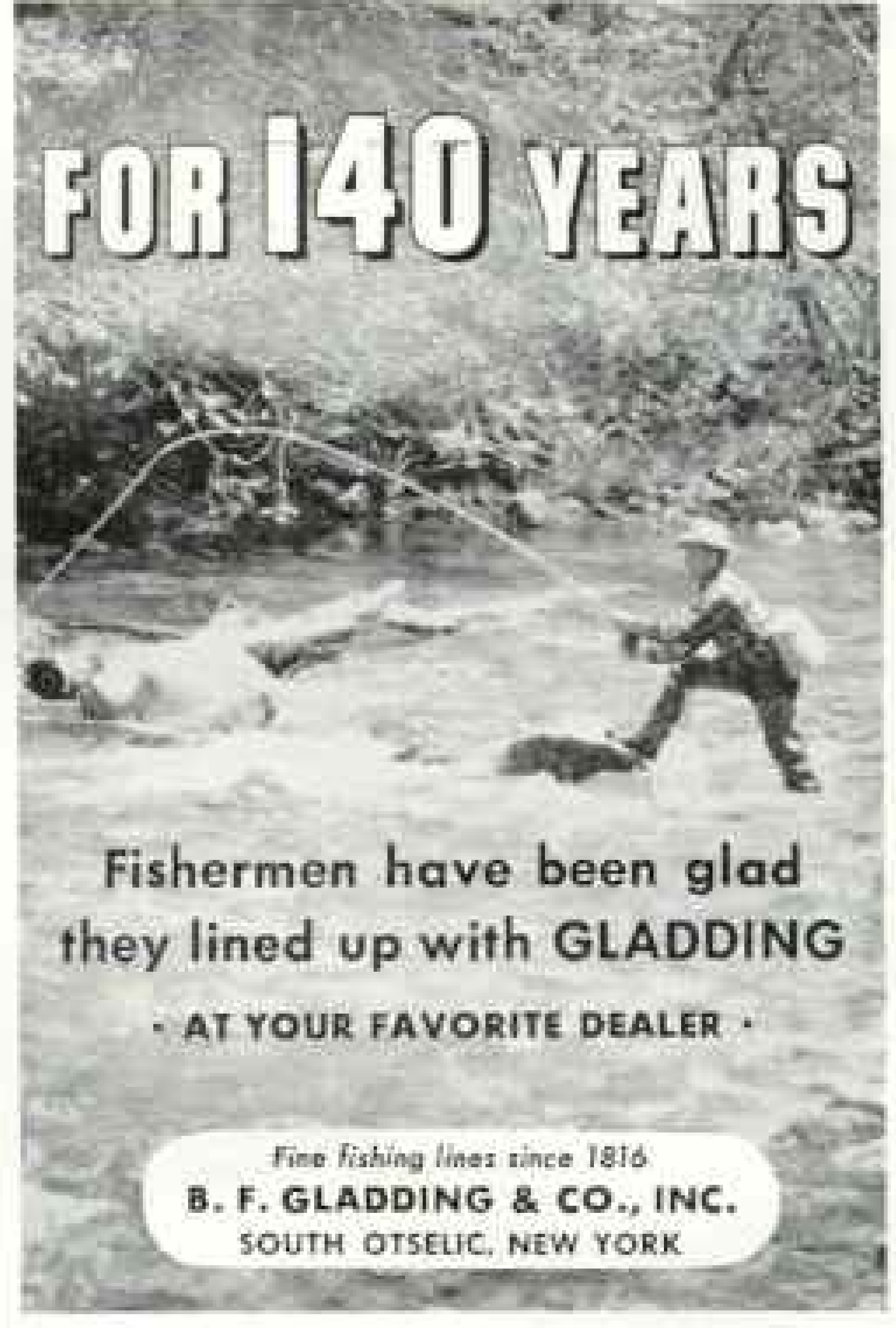

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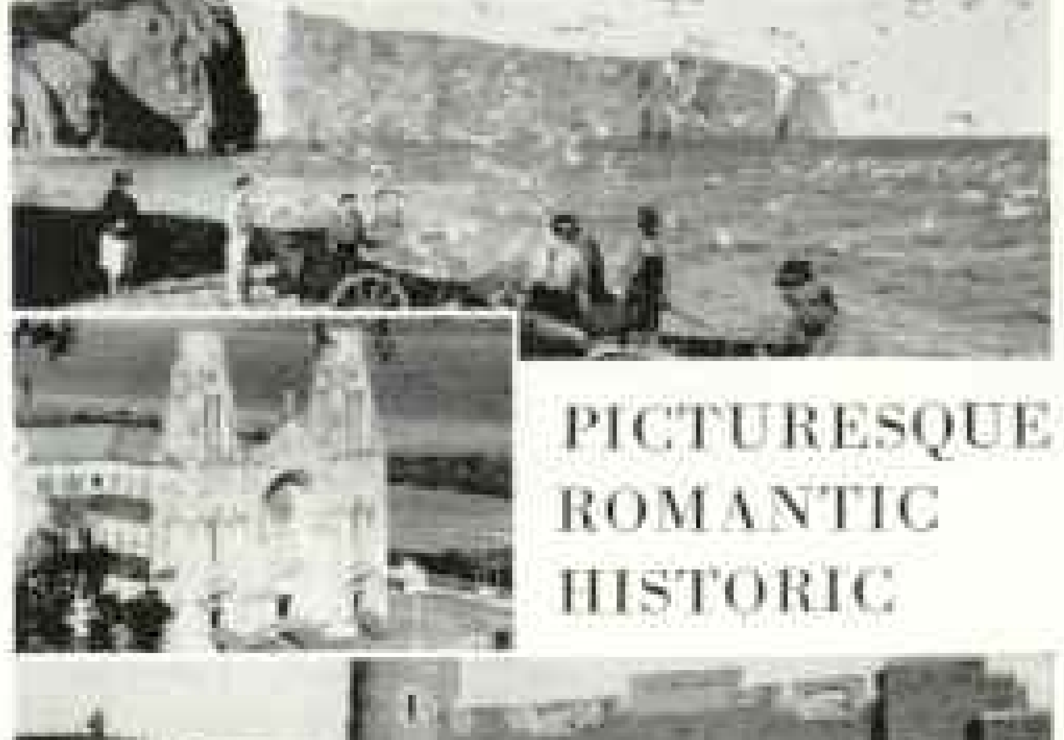

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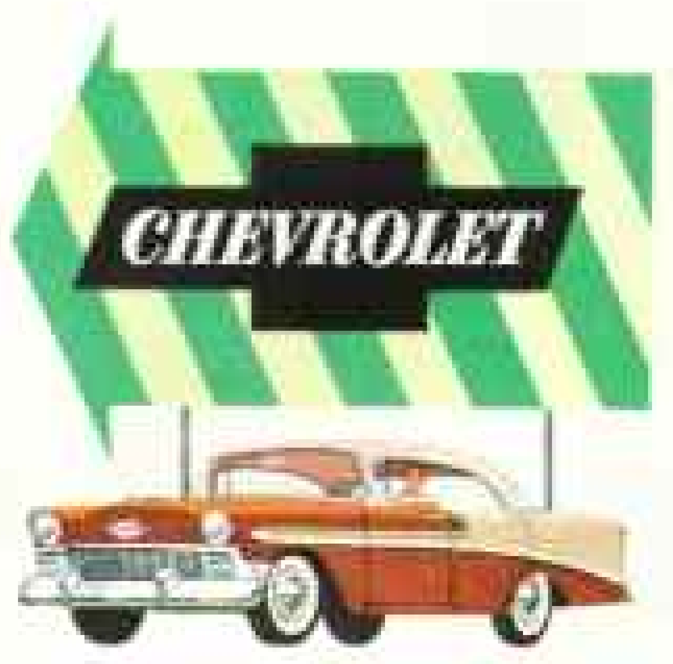

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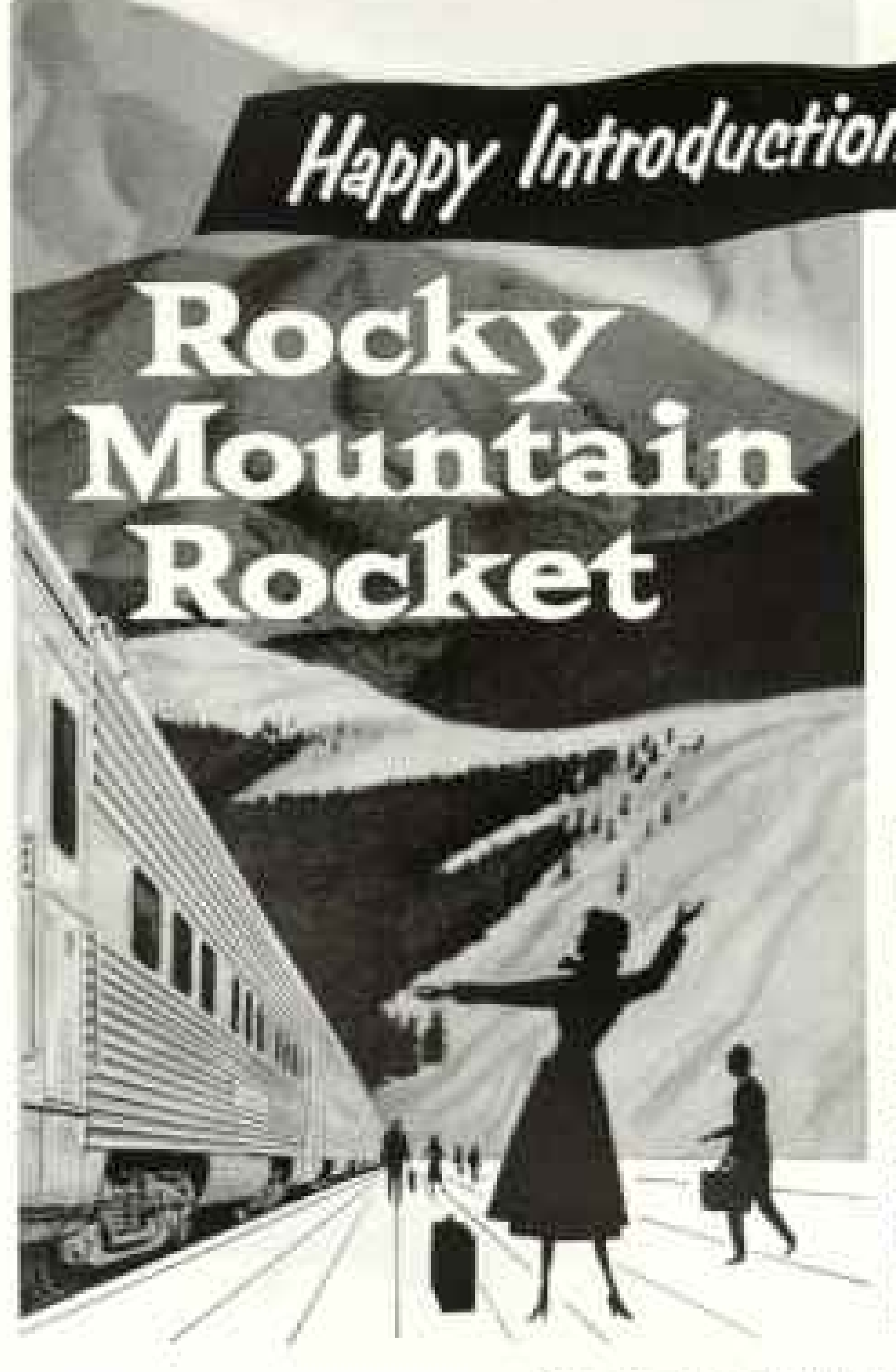

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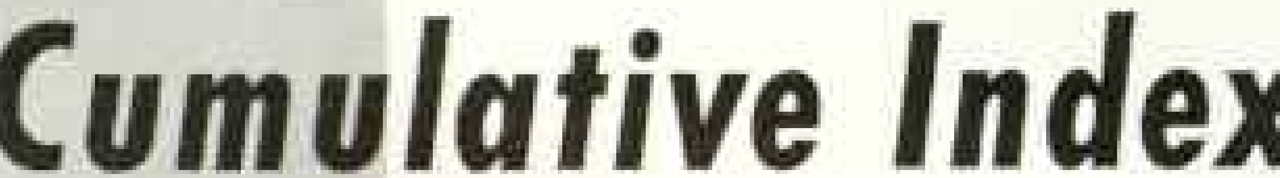

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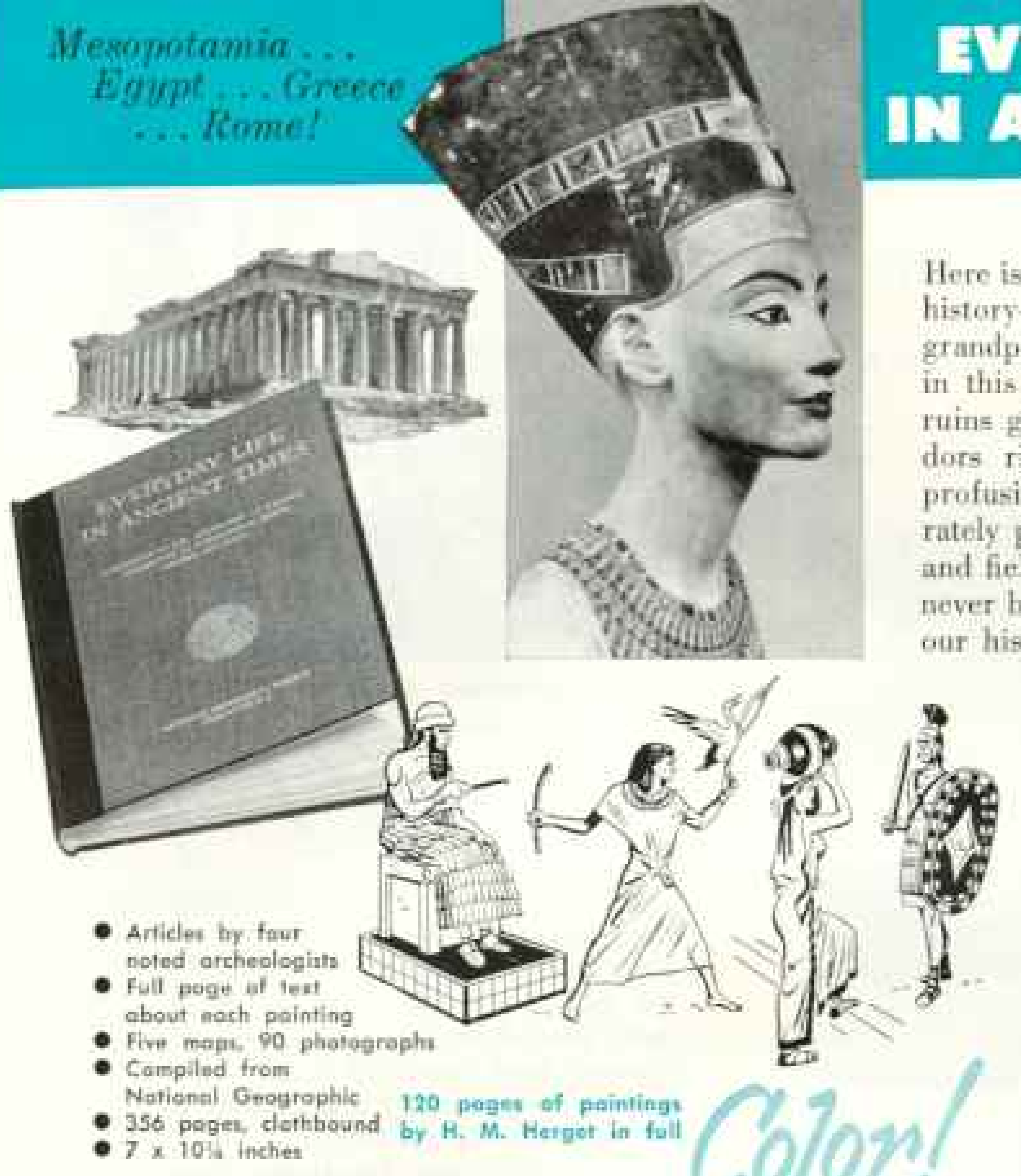

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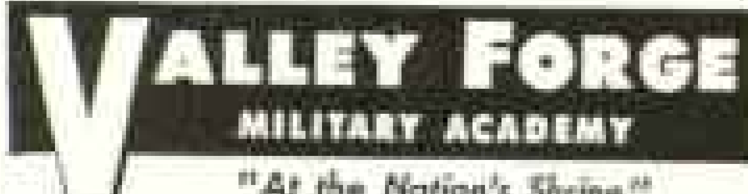

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INTERESTED VISITORS—Mrs. Beebe and her husband found many things of interest at the telephone company. "I was so impressed," she said, "that I went right home and wrote a piece for our local newspaper." It's so human and friendly that we are reprinting it here.

"We went to the Telephone Company's Open House," writes Evadne Scott Beebe in the Zion-Benton News, "and saw the electronic brain playing tick-tack-toe. My husband was enthralled with the performance but I was watching the deft, well-groomed hands of the woman at the machine. She wore a wedding ring and I wondered about her home and family.

"After we listened to her little speech we went to a man in a brown business suit who told us how telephone bills are made out. Then a clear-eyed young woman operated the machine for us. To be sure, it was an amazing gimmick, but not nearly so attractive as the girl who handled it so well.

"Outside we stopped by a truck with an 'earth auger' and other modern attachments. Explaining their uses was a big, brown, jovial lineman.

"While we listened to an account of how fast the auger could dig a hole, I was looking at the man and thinking that here was the typical lineman, strong, alert, capable and kindly, a person who, in times of disaster, becomes a kind of unsung hero.

"My husband said, 'This is what I want to see,' as we went into the equipment building. Here we saw switches and relays, ringing machines, countless colored wires in patterns like quilt blocks, and listened to technical explanations.

"That is, my husband listened. I watched the men as they talked so intelligently and wondered where they live, who cooks their meals and irons their shirts, what their problems are, and if they were ever in love."

Evadne Scott Beebe,
Zion-Benton (Ill.) News

There is, indeed, a lot of wonderful equipment in telephone service. But it takes more than 740,000 Bell System men and women to bring it into being and make it work. And because more people are making more use of their telephones, the number of employees is growing all the time.

"People," as Mrs. Beebe points out, "are the greatest invention yet" in the telephone business.

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