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WASHINGTON, D. C.

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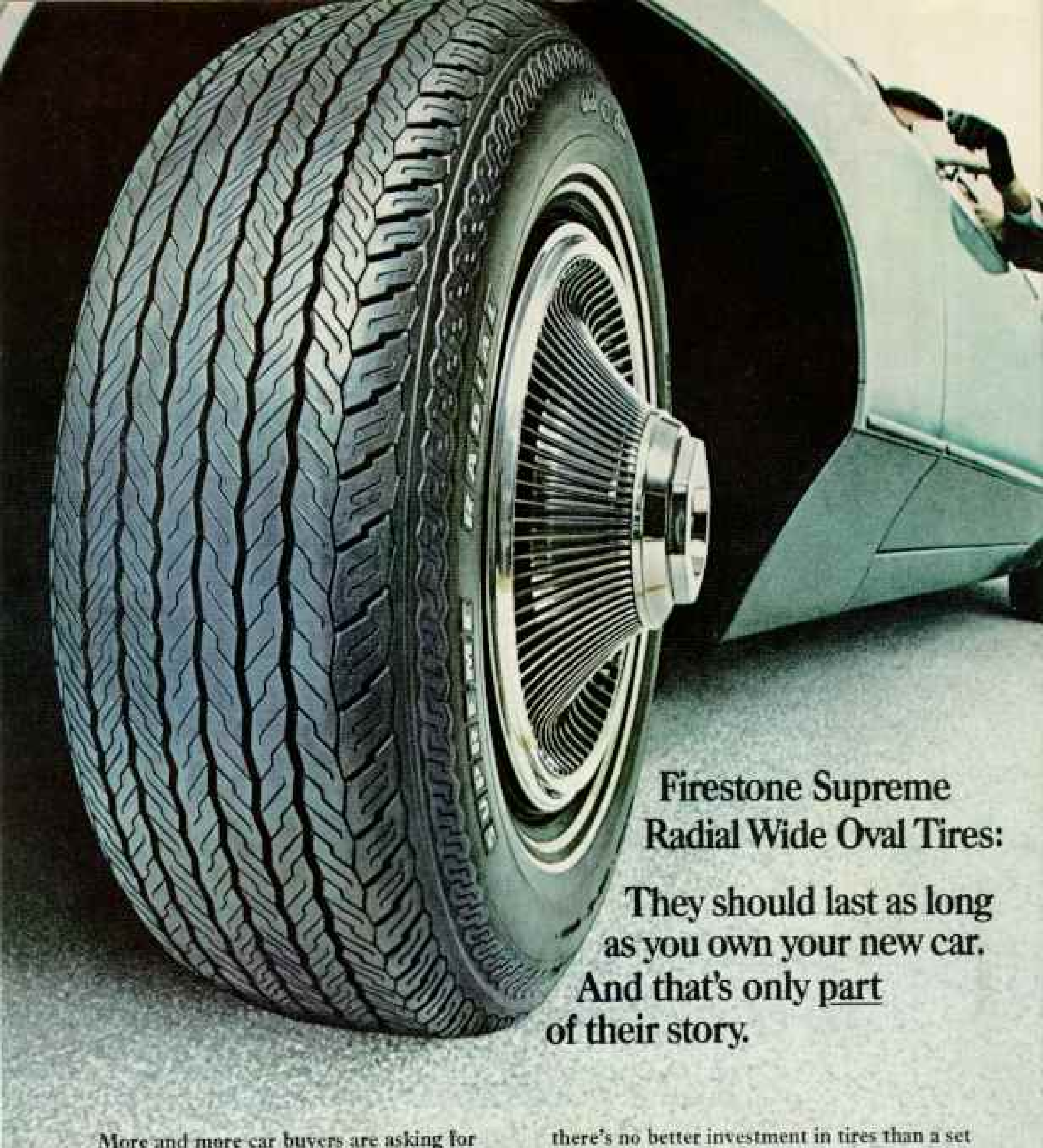

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They should last as long as you own your new car. And that's only part of their story.

More and more car buyers are asking for Firestone Supreme Radial tires on their new cars. You'll probably never need to buy another set of tires as long as you keep the car.

Supreme Radial tires are engineered to give you up to 120% more mileage than ordinary bias-ply tires—one of the many reasons why Supreme Radial tires make so much sense.

Security is another factor. Supreme Radial tires have two double belts under the tread for incredible impact resistance. And the radial construction creates superior handling, traction, cornering and stopping. It's comforting to know that Firestone also adds a puncture sealant inner-liner to the Supreme Radial tire to help prevent air loss even if you pick up a nail.

If you're considering a new car or plan on keeping your present one for a few more years there's no better investment in tires than a set of Firestone Supreme Radial Wide Oval tires.

Ask your Firestone Dealer or Store about the special Supreme Radial tire guarantee and personal registration—including free tire rotation and wheel balancing every 5,000 miles.

WIDE OVAL—Firestone TM Supreme

FREE! Firestone's Consumer Tire Guide. Get it at Firestone Dealers and Stores or write: Firestone, Akron, Ohio 44317

Firestone

The Mileage Specialist

The worm that turns—on!

PHOTOGRAPHS BY ROBERT F. SISSON AND JAMES E. RUSSELL (ABOVE) © N.G.S.

UNCOVERING A TREASURE in nature's secret storehouse can be as exciting as a gold strike—and just as rewarding. Take the railroad worm, a Latin American beetle larva that lights up like a tiny train. Rarely seen and little studied, this nocturnal creature captured the interest of amateur entomologist Darwin L. Tiemann (lower right). Awarded a National Geographic Society grant, he flew to São José dos Campos, Brazil, and during half a year of night-time prowling reaped a stunning reward: 280 living specimens.

The task of photographing the remarkable little creature, with its red headlights and greenish-yellow "windows," was assigned to the GEOGRAPHIC's specialist in such difficult nature photography, Robert F. Sisson (left, in upper picture). With Dr. Leonard Carmichael, Chairman of the Society's Committee for Research and Exploration, and Assistant Illustrations Editor Mary S. Griswold, who coordinates photographic coverage of the Society's research projects, he examines a shipment of 30 just received by air from Brazil.

To see how the plain brown larva lights up, turn to the Sisson photographs for Mr. Tiemann's article beginning on page 56, especially the foldout on pages 57-8.

You can enable your friends to enjoy such features in the GEOGRAPHIC. Nominate them for membership below.

It's working.

Reynolds reclamation plan for aluminum cans and other aluminum scrap.

In Los Angeles alone, Reynolds test program got people to redeem over 1,000,000 aluminum cans per month. Now we're working on sixteen more states.

Answers to the hard problems—such as litter and solid waste disposal—don't come easy. But, with effort and persistence, they do come.

Reynolds has working proof of this with its anti-litter, aluminum can recycling program. Starting in Miami over three years ago, we've developed approaches that are now about to be put to work in 16 states.

They'll be pulling used aluminum cans and other discarded aluminum products off the scrap heap and back to our reclamation plants. They'll be helping to clean up our streets and conserve our nation's resources at the same time.

Los Angeles gets involved.

We know these programs work. One plan, with a Reynolds promotion drive behind it, has Los Angeles citizens bringing more than *a million cans a month* into our plant there. It has not only made Los Angeles people more aware of their litter problem, it has *involved* them, stimulated them into doing something about it.

Now we're expanding our Miami effort to cover all of Florida. We'll be launching our campaign in New York City, and will move into northern New Jersey, Houston, San Francisco, and the Pacific Northwest.

In addition, we are working with Adolph Coors Brewing Company of Colorado to help reclaim their used alu-

minum beer cans. We'll be taking their cans from Arizona, Colorado, New Mexico, Wyoming, Utah, Nevada, Kansas, Oklahoma, Texas, and California.

Used aluminum is valuable.

What makes the program work is the basic value of aluminum itself. Scrap aluminum is worth $200 a ton, because it can be melted down and reused so readily. Scrap steel, by comparison, brings only $20 a ton; paper, $16 a ton.

So used aluminum cans are worth picking up, worth saving and taking to a reclamation plant. Reynolds is able to offer ½¢ per can, and to suggest that Boy Scouts, hospital charity groups, and other organizations—and individuals—raise funds by collecting and returning aluminum scrap.

They're taking our suggestions. One million cans that don't show up in Los Angeles garbage heaps every month prove that.

Letters for anti-litter.

Our anti-litter efforts have brought us much applause from Boy Scout officials, Congressmen, Keep America Clean groups, civic leaders, and many others. But our chief satisfaction is in being able to help with this most difficult and important problem. We intend to keep at it, and to work even harder. Reynolds Metals Company, P.O. Box 2346-LRR, Richmond, Virginia 23218.

REYNOLDS
where new ideas take shape in
ALUMINUM

Individuals and organizations bring all-aluminum cans to the Reynolds reclamation center.

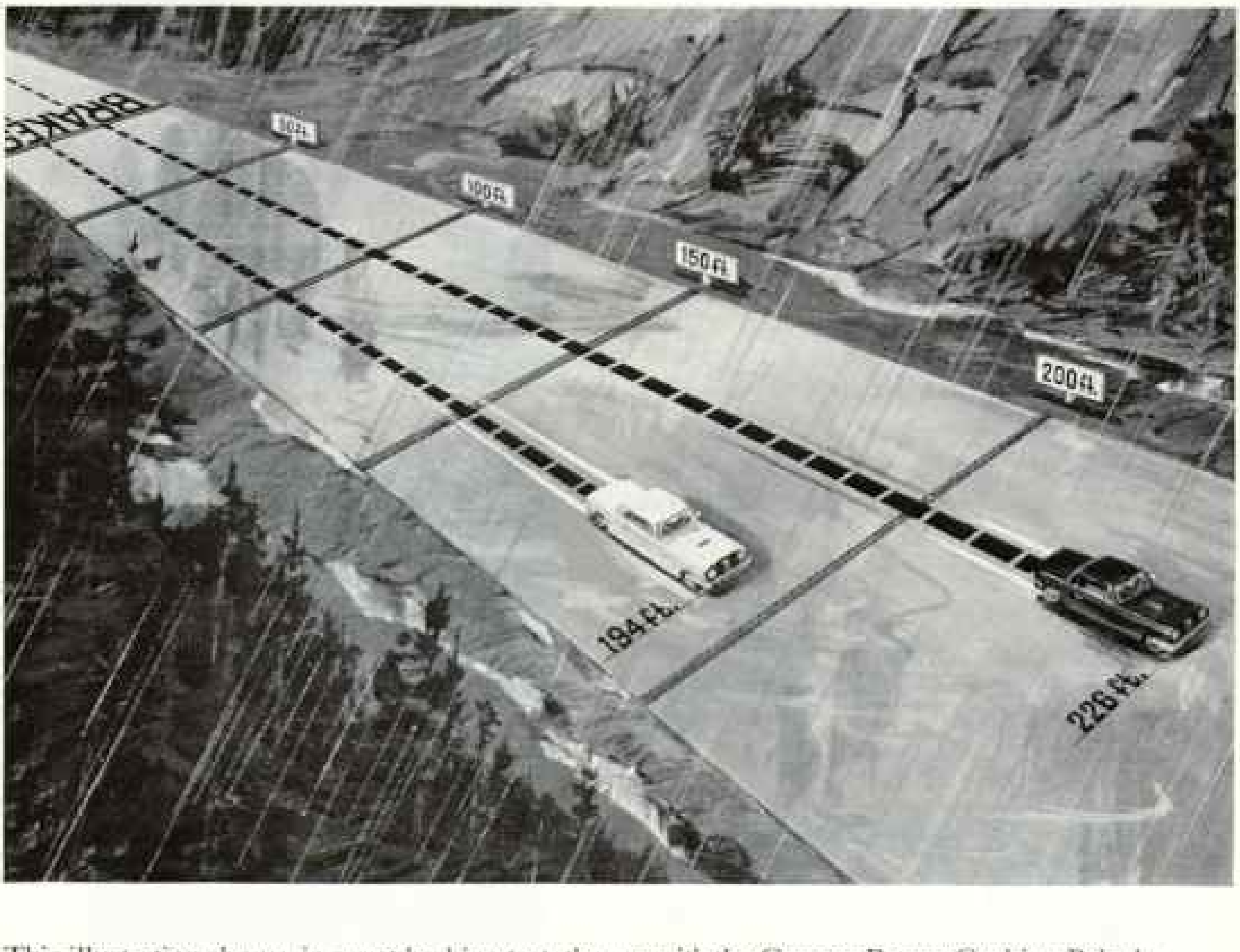
Used cans pass through a magnetic separator and are then shredded.

After shipment to reclamation plants, the shredded aluminum is melted and cast into secondary ingots.

Ingots then move into other Reynolds plants to be formed into sheet, plate or other mill products.

The recycled aluminum re-enters the economy in a variety of attractive, durable new products.

Buy Goodyear for traction. they're on so



This illustration shows, in a wet-braking test, the car with the Custom Power Cushion Polyglas tires stopping almost two full car lengths shorter than the car with the conventional bias-ply tires.

Polyglas tires You'll see why many 1970 cars.

You're looking at the results of a wet-braking test. Goodyear tested the stopping ability of conventional two-ply Power Cushion tires against the stopping ability of Custom Power Cushion Polyglas tires—the ones that are standard or optional equipment on so many 1970 car models.

The two cars, identical except for the tires, were braked from 45 mph to 0 on a wet macadam track. The average stopping distance for the car with bias-ply tires was 226 feet. The car with the Polyglas tires had an average stopping distance of 194 feet.

So, the difference was 32 feet, almost two full car lengths—and sometimes that can make *all* the difference.

Less squirm means more stopping ability.

The tread grooves of conventional bias-ply tires (like those tested here) squirm and squeeze together as they meet the road, resulting in loss of traction. But in Polyglas tires the fiberglass belts which surround the strong polyester cord body hold tread grooves open, resulting in less squirm, more traction and better stopping ability.

Extra mileage, too.

At our Texas Proving Grounds, Polyglas tires were run for 40 million test miles as engineers kept improving their long-wearing qualities. And motorists have discovered their extra-mileage capability while rolling up billions of miles on cars all across the United States.

If you want to get the benefit of all this testing and experience, make sure you get Polyglas tires and nothing else. Look for the name on the sidewall and remember: If it doesn't say Goodyear, it can't be Polyglas.

"Polyglas" U.S. Reg.#859,703

Polyglas is a registered Goodyear trademark.
Only Goodyear makes Polyglas tires.

GOODYEAR

Polyglas, Custom Power Cushion, Custom Wide Tread

T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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You climb in your car and drive off, at 5-10 miles an hour, through landscape that looks like it belongs on another planet.

You discover you're playing hide-and-seek with the animals. It's a game of endless variety, full of fantastic surprises.

Ten, twenty, or a hundred impalas come bounding gracefully across the road.

You turn a hairpin bend and surprise a giraffe nibbling at the tender tips of a tree. Or a small herd of elephants lumbering into the bush.

Your guide knows every hide-away. With his help you penetrate the disguises of camouflage.

He points out a cheetah fleeting through the underbrush. Or a lilac breasted roller — whose wings flash like jewels in flight.

You see zebras, lions, wildebeests, water buffalos, baboons, monkeys, hippos. And all sorts of antelopes with strange names — steenboks, gemsboks, klipspringers.

It's possibly the most exciting ride of your life.

And while you're out there, you have the comforts of home — surrounded by the wild.

In this, South Africa is almost unique. Because it doesn't simply consist of bush or desert or jungle, such as you find in vast parts of the continent. It consists of contrasts.

Against the primitive background, you get the attraction of South Africa's great modern cities — Johannesburg, Durban, Cape Town.

Prices for shopping in these places, for instance, are unbelievably low. Only 75 cents for a bottle of vintage wine. Or two dollars for

A ride on

a fantastic Zulu axe.

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Practically everybody speaks English.

The fastest, easiest way to go is with South African Airways. A Boeing 707 Stratojet will whisk you down from New York via the most direct route.

To get the most out of your stay, see your travel agent. And let him tell you about the wild sights in South Africa.

A lot of them are not in the bush.

SAA

SOUTH AFRICAN AIRWAYS 655 Fifth Avenue, New York, N. Y. 10017

Come with us.
A little off the beaten track.

the wild side.

The rubber

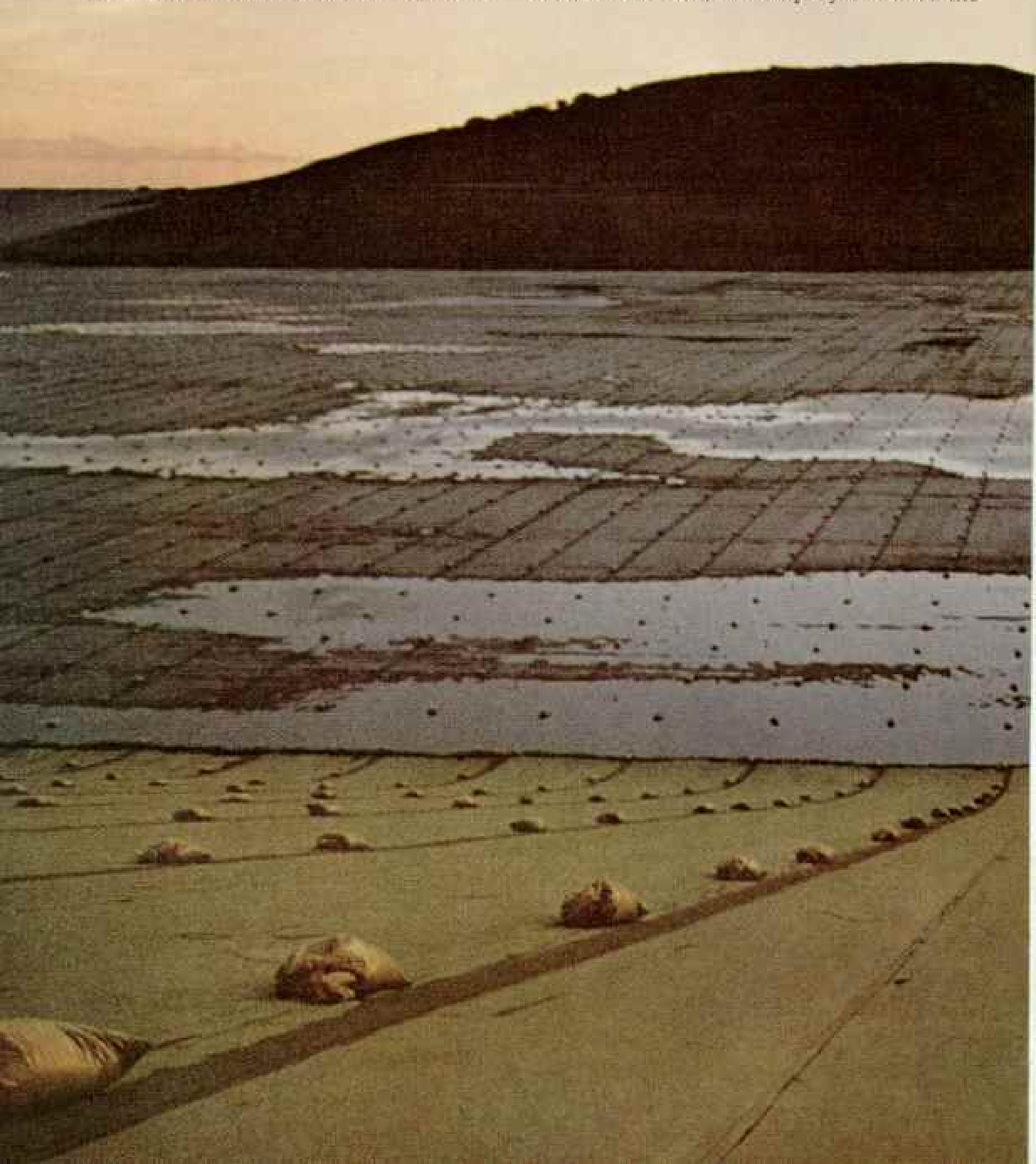
You are looking at more than five million square feet of Butyl rubber. Rubber made from oil by Enjay Chemical Company, a Jersey affiliate.

When Jersey's scientists invented Butyl rubber more than thirty years ago, they never dreamed their invention would be used to line a reservoir. But already several hundred reservoirs have been lined this way. This one happens to be the biggest in the world.

You'll find it on the Hawaiian island of Molokai, where they have a water problem. It rains in the mountains. But, down where the pineapples grow, it doesn't rain enough. So they have to pipe the rain from the mountains and store it. Hence this mighty hole.

To give you some idea of scale, the area covered by the nylon-reinforced Butyl could hold a hundred football fields.

Mr. David Wisdom, president of Wisdom Rubber Industries, the company that lined the



reservoir.

reservoir, said that Butyl rubber was chosen by the state of Hawaii for good reasons. Compared with concrete it is inexpensive. Roughly a tenth the cost. Yet, as a water barrier, there's nothing to beat it.

Installation is remarkably speedy. Seventy workers were trained in two weeks. They then lined the entire reservoir in seventy-four days. And Butyl is as tough as blazes. So tough that Mr. Wisdom has guaranteed his reservoir against deterioration for twenty years.

The effect of the reservoir on Molokai's economy will be considerable. It will irrigate some 18,000 acres of land, most of which will grow pineapples. But there is also a truck farming experiment in the area that may well turn Molokai into the breadbasket of the state.

Our scientists are proud that one of their inventions is being put to such good use.

Standard Oil Company
(New Jersey)

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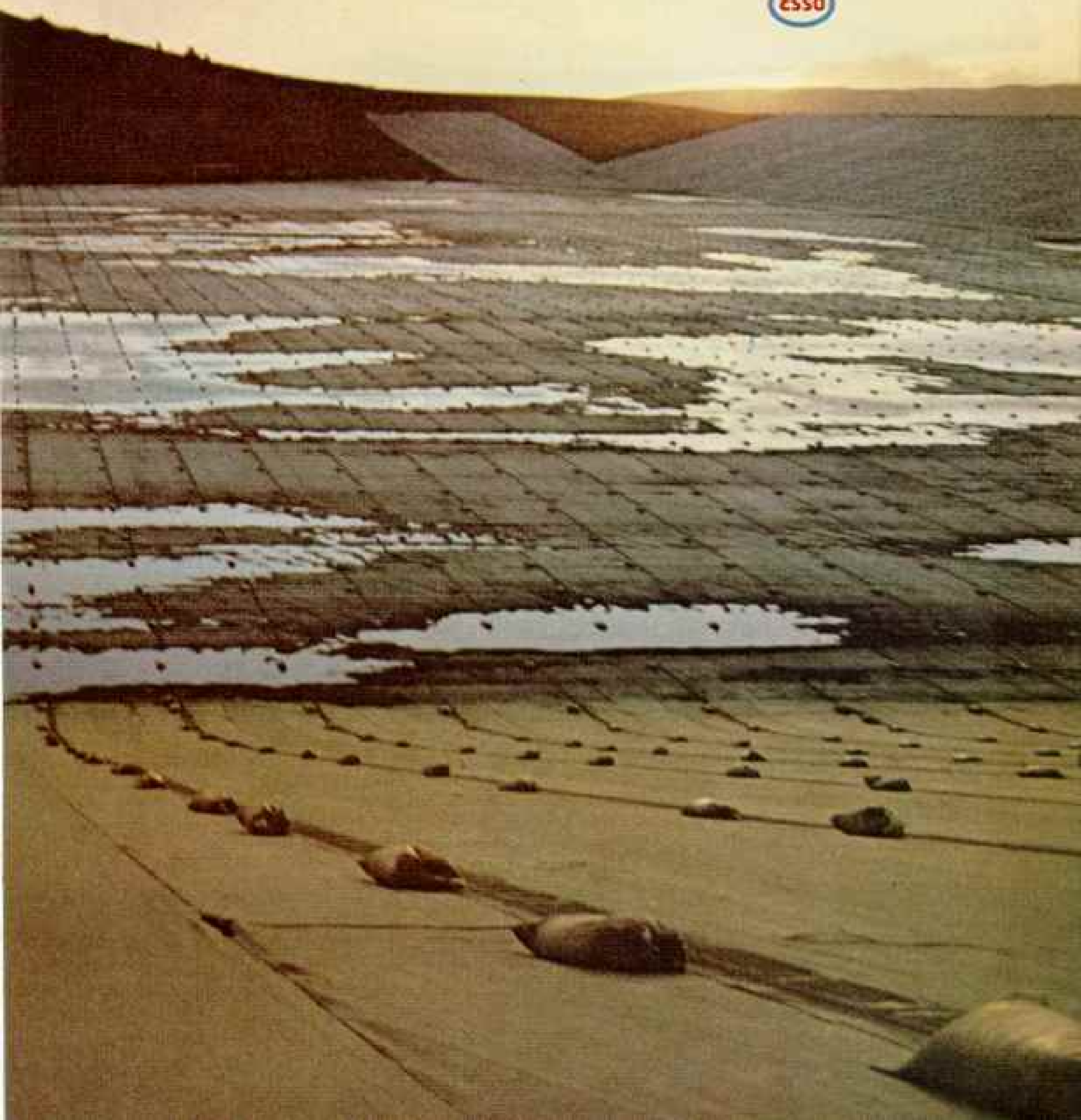
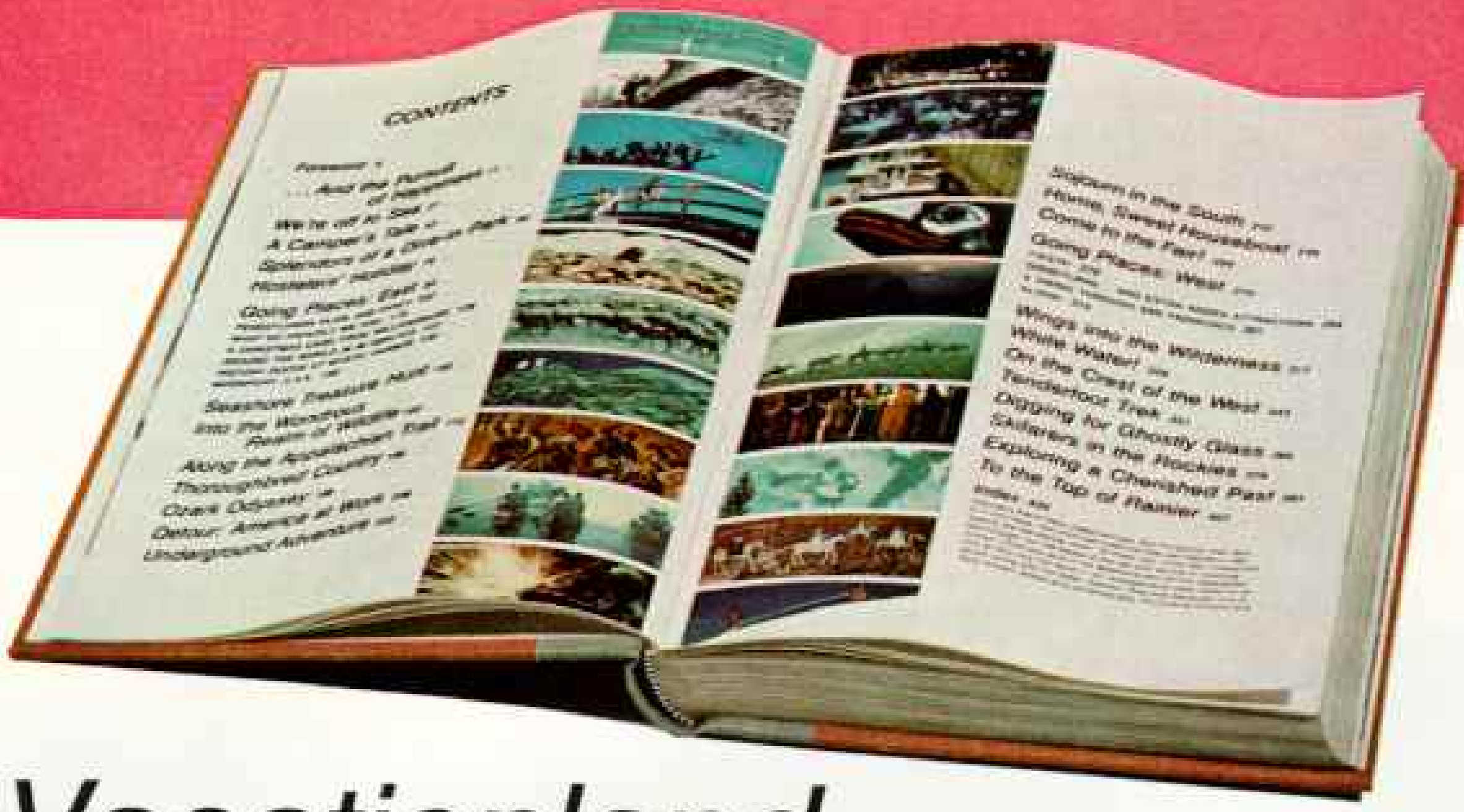


What will you *do* on your next vacation?



Vacationland

How would you like to vacation in a ghost town, on a ranch, a farm, or an Indian reservation? To put on scuba gear for the first time and discover an underwater paradise? To explore a winter wonderland in a snowmobile? To houseboat on the Mississippi, or hurtle down wild-river rapids in a raft? Well, you'll do all this—and much, much more—in VACATIONLAND U.S.A. And, while discovering yourself, you'll discover your country—its great centers of industry, science, and government, its festivals and fairs, its cosmopolitan cities. Never before has National Geographic published a book as personally rewarding as this one . . . a book you and your family will use together for many years to come. Use the form below to order your first-edition copy today.

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NORTHWEST ORIENT 747

747s anyone?

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Daily in June. Twice daily starting July 1.

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(Taipei and Hong Kong planned for September 15.)

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CHEVY'S NEW LITTLE CAR: IF YOU LIKE THE 1971, YOU'LL LIKE THE 1975.

If you've been with us for the past few weeks, you know we're ready with our own little car, the Vega 2300. Almost.

But first, there are a few things we've been meaning to talk to you about.

No shiny new ashtray knobs.

Before we tell you anything about the car itself, we think you should know that once it comes out, it's going to stay out. We don't plan to change it for at least four years.

We've got it just the way we want it, and we think you'll like it.

Of course, there is the possibility that we'll find ways to improve Vega from a functional standpoint. If we do, we will. We'll make you a promise, though: no change for the sake of change.

So, when you see the 1971 Vega, you'll be getting a preview of Vegas to come. That's how confident we are. Here's why.

Little, but big.

To be perfectly honest, we're pretty proud. Our little car is unlike any other little car.

For one thing, it is indeed little: it's on a tight 97-inch wheelbase, and it's built for four passengers. Yet it feels bigger, because there's as much room per passenger as there is in many big cars.

There are other things that make our Vega a lot of little car, like its zippy performance, its quiet ride, and even its taut, smooth handling. In fact, our little car is more than just maneuverable—it's plain old fun.

Naturally, all of these things are ads in themselves, so stay tuned to this magazine.

Little, but little.

Although our little car feels and acts like a much bigger car, there are times when its littleness really shines.

Like when you pull into a gas station. We aren't ready with final figures yet, but we can say this much: Vega will get gas mileage in the same neighborhood as the best of the economy cars. And that's a pretty good neighborhood.

Our little Vega will also seem very little when you go to buy it: prices will be very close to ordinary little cars'.

GM

MARK OF EXCELLENCE

VEGA

CHEVROLET

July 1970

NATIONAL GEOGRAPHIC

North Through History Aboard *White Mist*

By MELVILLE BELL GROSVENOR, LL.D., Sc.D.
Editor-in-Chief and Chairman of the Board, National Geographic Society

Photographs by
EDWIN STUART GROSVENOR

TWO STORM ANCHORS firmly set, *White Mist* lay to the north wind whistling across Tadoussac harbor. Seeing the ship safe for the night, I lashed the riding light to the forestay and dropped below.

Now should have come that golden hour when shipmates gather in the cabin to relive the adventures of the day. But not a word was heard; not a hand reached for coffee steaming on the stove.

Coming after a month of easy inland sailing, the last eight hours of rough going had depressed morale. We were spray-soaked, chilled, and, I must confess, a bit scared.

In the 40-nautical-mile run down the St. Lawrence from Malbaie in thick fog, a pulp boat had nearly cut us down. Tossed in violent currents and blinded, we had a near-collision with a giant light tower perched atop Prince Shoal (page 35).

As climax, a northerly gale funneled suddenly out of the Saguenay River and dealt the 46-foot yawl the worst knockdown I had seen her take. Solid river water poured into her cockpit; some of us nearly went over the side.

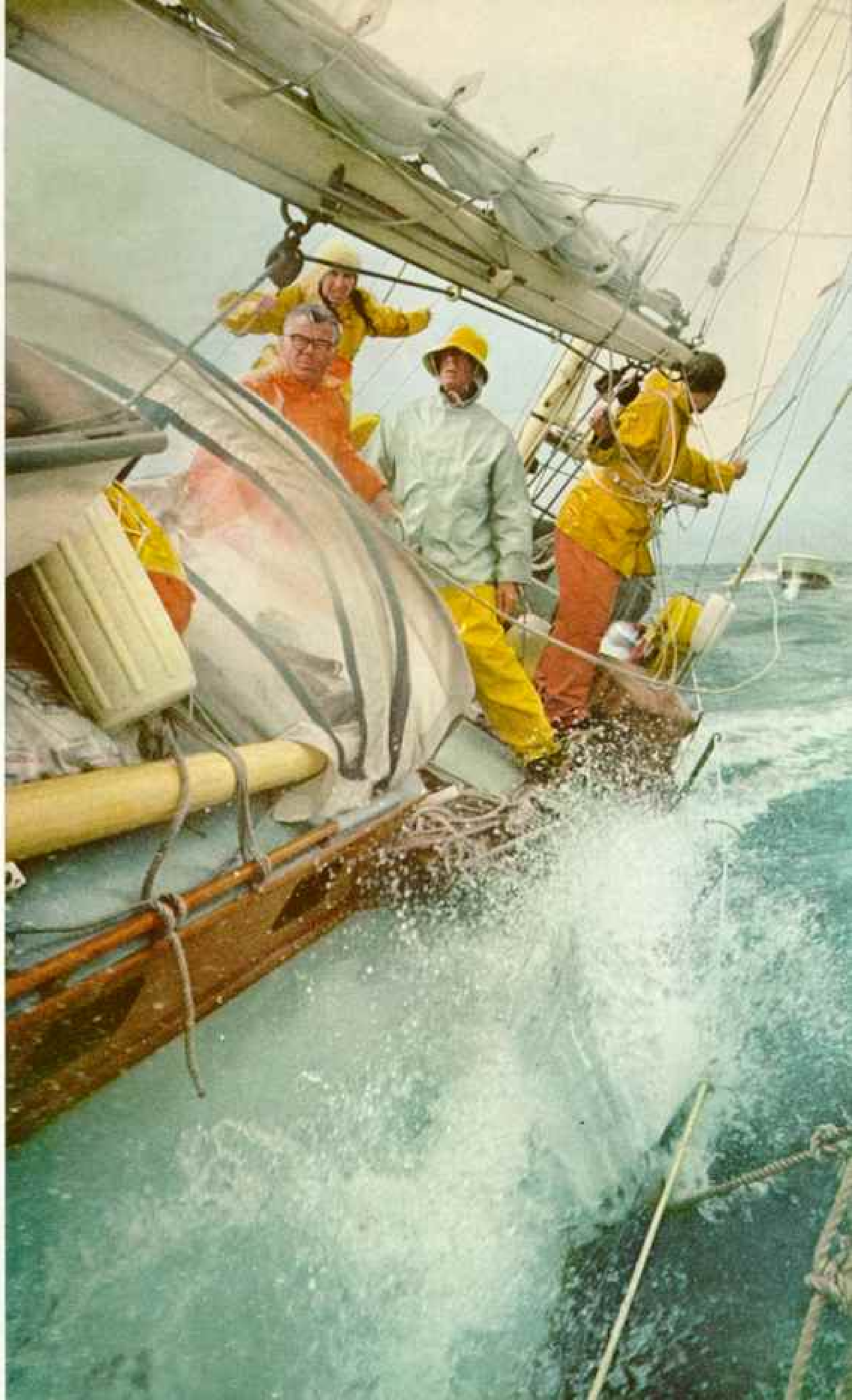
"Here we are with an able ship and a good crew, yet we nearly lose her in a darned river," I fussed. "Another day like this, and I'll be tempted to turn around."

Anne Grosvenor put the cruise back on even keel, and this was most surprising, for my wife likes her sailing placid.

"You're forgetting we planned this as a

(Continued on page 7)

Driving hard on the wind, *White Mist* (foldout, next page) romps south from Newfoundland after threading history-rich waterways of the United States and Canada. The author—in light-blue oilskin jacket at the helm—chose for guides such lively ghosts as explorers Henry Hudson, Samuel de Champlain, and Jacques Cartier.



Manhattan to starboard, *White Mist* heads up the Hudson past domed Grant's Tomb and spired Riverside Church. The skipper signed up several crews to give as many volunteers as possible—25 in all—a chance to savor this cruise into history. Here, from left: the author, Mrs. Grosvenor, daughter Sara, Nat Kenney, Jim Watson, and Nikki Phillips.

AQUACHROME BY JOHN SHIELDS © N.G.S.

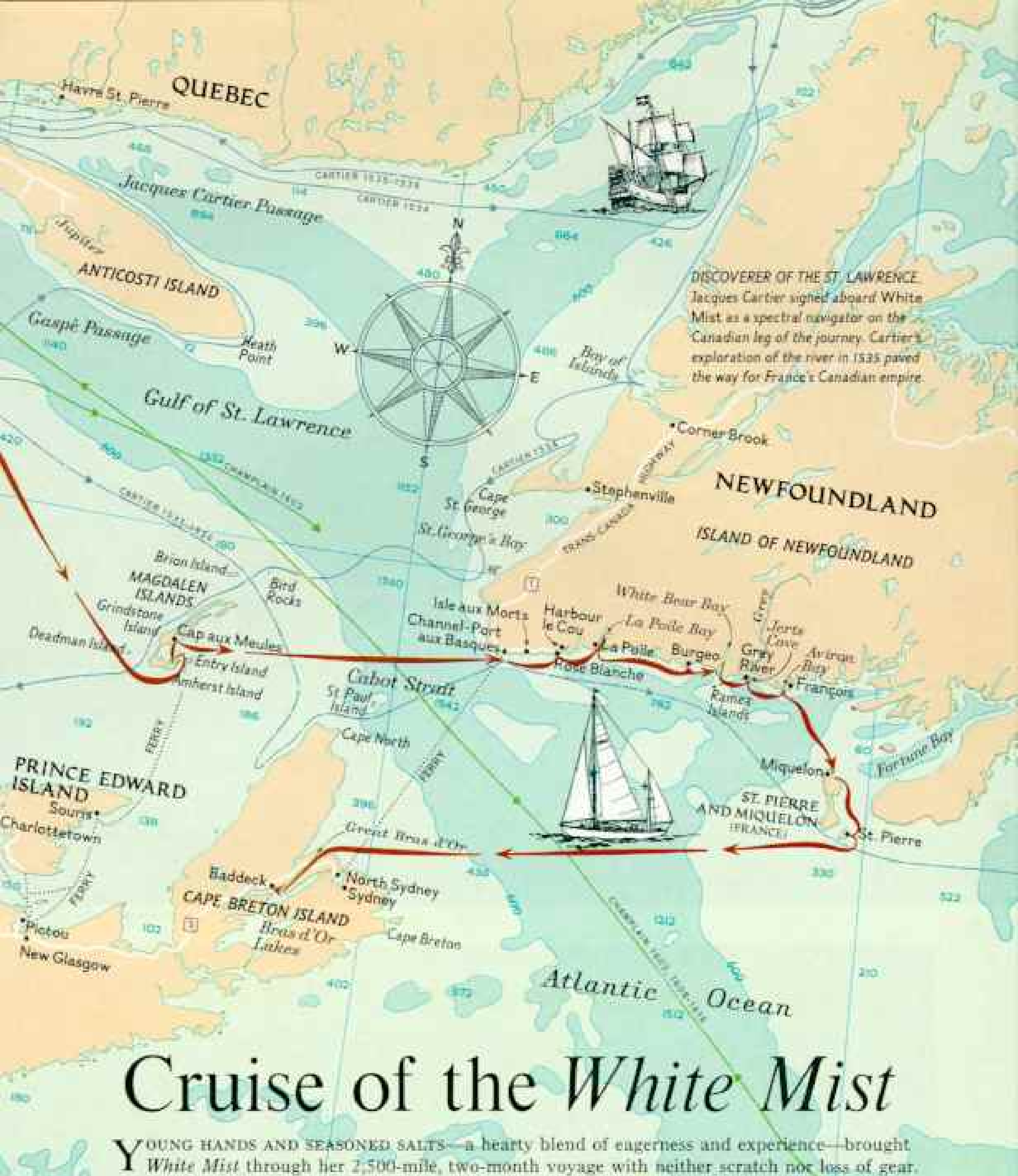
EXPLORING FOR THE DUTCH, Englishman Henry Hudson probed the river that bears his name in 1609—300 years before White Mist *sailed in his wake. Seeking a passage to the Orient, Hudson turned back in disappointment when he reached rapids above present-day Albany. Italian explorer Giovanni da Verrazano had first sighted the entrance to the river in 1524.*

FATHER OF FRENCH CANADA, Samuel de Champlain showed White Mist *the way from the lake he discovered and named for himself to today's busy port of Montreal and to Quebec, a city he founded in 1608.*

In 1609 Champlain and Henry Hudson—unknown to each other—came within two months and 85 miles of crossing paths in the wild immensity of the New World.

REAM ARCHIVES, PHILADELPHIA

"River that flows two ways," the Algonquian Indians called the Hudson, whose waters as far north as Troy pulse to the rhythms of the Atlantic. Ebb tides, backed by the stream's current, slow upstream voyaging, as both *White Mist* and Hudson's *Half Moon* discovered. When the white-winged *Half Moon* sailed up the river, Indians canoed out with gifts. "Very loving people," remarked voyage chronicler Robert Juet. "But," he added, "we durst not trust them." Mutual suspicion escalated into brief but furious clashes at several points along Hudson's route.



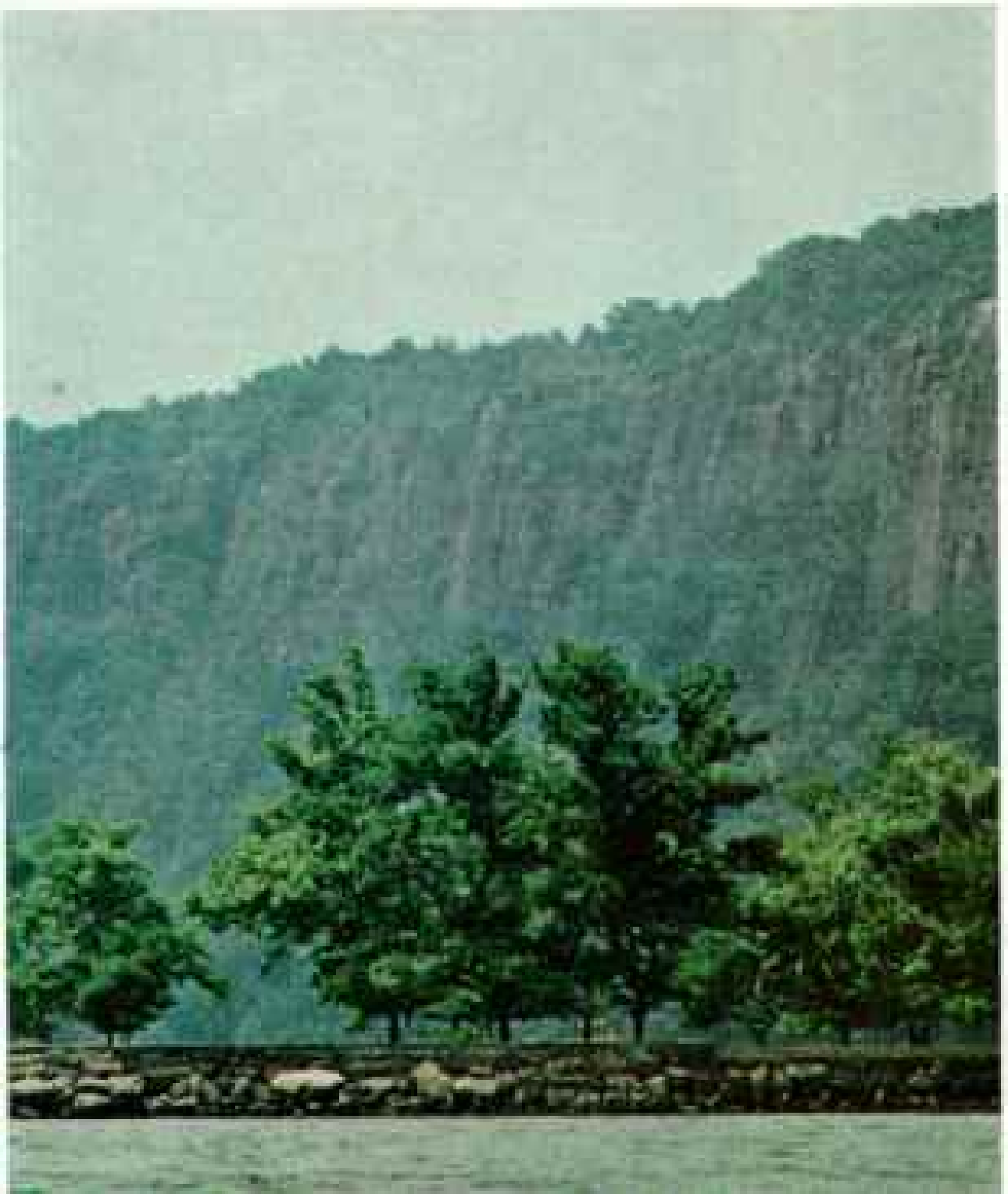
DISCOVERER OF THE ST. LAWRENCE. Jacques Cartier sighted aboard White Mist as a spectral navigator on the Canadian leg of the journey. Cartier's exploration of the river in 1535 paved the way for France's Canadian empire.

Cruise of the *White Mist*

YOUNG HANDS AND SEASONED SALTS—a hearty blend of eagerness and experience—brought *White Mist* through her 2,500-mile, two-month voyage with neither scratch nor loss of gear. "Everyone participated to the full," says the author. "We hounded old explorers, refought famous battles, and stopped off wherever history seemed to wave a hand at us. Fun? You bet. But, let me tell you, there were times . . . driving rains, sledge-hammer winds, fogs dark and damp as the inside of an oyster . . . and excitement enough to make my heart jump when I think of it."

EYEWITNESS PAINTING BY BRITISH OFFICER THOMAS DAVIES, FROM SHORE

COLLECTION, NEW YORK PUBLIC LIBRARY; RESEARCHING BY EDWIN STUART GRISWOLD © N.G.S.



In orderly swarms, British soldiers scale the New Jersey Palisades prior to a dawn attack on American-held Fort Lee in November 1776. So surprised were the Continentals manning the fort that they fled with camp kettles still steaming.

The 46-foot yawl *White Mist* (lower) heads upstream from the George Washington Bridge, route of thousands of commuters who twice a day sweep past the site of the Revolutionary War debacle. Thanks to such benefactors as John D. Rockefeller, Jr., a 12-mile stretch of the Palisades remains unmarred by development.

voyage back into history," she said, plunking the coffee mugs down. "We came here to follow the great explorers. We must accept some of their discomforts, even their perils.

"And what did they tell us about the mouth of the Saguenay?" she continued, reaching for books in *White Mist*'s carefully assembled library. "Here's Jacques Cartier, discoverer of Canada. His journal mentions the 'swift and dangerous' tide, and a 'bottom . . . strewn with large boulders like casks and puncheons.'

"Now Samuel de Champlain: 'Here sometimes violent winds rise and bring on great cold.' And if you want something more modern, listen to what happened to the Prince of Wales, later King Edward VII, coming here on a royal visit in 1860. In a fog, currents pushed his Royal Navy frigate *Hero* on that same shoal we 'explored' today.

"So I say the day was a huge success. Cheer up! And give me galley room to make dinner."

Inland Cruise for an Ocean Racer

I turn the pages of *White Mist*'s logbook back to the first days of last summer's cruise.

We were sailing from Chesapeake Bay to New York, initial leg of an unusual voyage for our ocean-going yawl. Using rivers, lakes, and canals to go north, she would take us via Montreal and Newfoundland to Baddeck, Nova Scotia (map, pages 3-5).

Now, early on a June day, she coasted New Jersey's Highlands of Navesink.

"Here's the perfect point of departure for a voyage like ours," I remarked to helmsman Jim Watson, my grandson. "Early navigators used these highlands, the only tall cliffs along this coast, as a landmark. You can be sure we're crossing the wake of history's great seafarers this very moment."

"Who do you suppose was first?" asked Jim. "A Viking? A Portuguese or Breton?"

Nobody really knows, for those early sailors left no journals. Some scholars say John Cabot, Venetian mariner working for Henry VII of England, sailed here only six years after Columbus reached the New World.

Then, seeking the Northwest Passage to Asia, came Giovanni da Verrazano in 1524. And Henry Hudson in 1609, on his way to discover the great river he explored farther than present-day Albany, New York's capital.

Sailing northward, we coasted close to the shores of Sandy Hook, proposed for inclusion in a new Gateway National Recreation Area. From the bow came whistles and shouts. The teen-age lookouts, Jim and his brother Bob, scanning the beaches, had spotted some bikinis. So I returned abruptly to 1969, and concentrated on steering *White Mist* around Sandy Hook into Lower New York Bay.

How the scene has changed since Verrazano and Hudson came this way! Where these doughty captains watched thin smokes of Indian fires, we saw factories and refineries belching yellow clouds. Clean blue Atlantic waters turned murky with pollution.

Old-time sailors heard only the cries of gulls as they sailed through The Narrows. *White Mist*'s crew listened to the rumble of rolling wheels and racing motors high above on the great Verrazano-Narrows Bridge soaring between Staten Island and Brooklyn. How many commuters, I wondered, knew for whom the bridge was named or the part The Narrows have played in history.

Most vessels come to New York by way of this strait; day or night, traffic never ceases. I have sailed through it perhaps forty times in many different craft, each time thinking of

the thousands of sailing vessels, from Verrazano's little caravel to 19th-century clipper ships, that have breasted its currents. It has been a sally port for American soldiers and sailors of a dozen conflicts, the sea highway for cargoes of infinite worth carried by innumerable freighters, tankers, and ocean liners.

New Crew for the Hudson River

We stopped overnight at the 79th Street marina in the heart of New York City to put *White Mist*'s "Atlantic crew" ashore with their gear and let the "Hudson crew" come aboard. The yawl carries no paid hands, and since amateurs cannot leave homes and offices for long periods, I must change crews frequently. There are so many sailors in my family and among my associates, however, that filling the complement is never a problem.

Of the 25 who served aboard for last summer's voyage, only two besides the skipper made the entire two-month cruise. One was my 17-year-old son Edwin. I signed him on as chief photographer, for he had earned his spurs on our St. Pierre cruise in 1966 and at the coronation of the King of Tonga.* The other was Nat Kenney, a Geographic colleague who has sailed with me in *White Mist* many times.

Many of the crew, girls as well as boys, were still in school or college. It is a fine thing to ship young people on a cruise like ours. In the tight quarters aboard, the generation gap lessens—to everyone's benefit. For

*See, in National Geographic: "*White Mist* Cruises to Wreck-haunted St. Pierre and Miquelon," September 1967, and "South Seas' Tonga Hails a King," March 1968, both by Melville Bell Grosvenor.

Life along the way

TRAVELERS seeking shades of the past along banks of the Hudson and Richelieu Rivers quickly find themselves distracted by the vivid scenes of today. *White Mist*'s crew encountered fleeting friendships at every pause on the voyage.

Orbiting youngsters (left) swing until momentum

carries them high above the Hudson, then try to knock each other off—a game punctuated by wild yelps of laughter and occasional thumps or splashes.

Beauty and a smile win crew member Nikki Phillips (center) salad greens for the galley from an amiable farmer near Coeymans, New York.

Fast-pedaling youth (above) cycles along a canal towpath beside rapids of Quebec's Richelieu River, challenging *White Mist* to a race.

the young, there is no better way to learn history than by reliving it, and the hard work of a sailboat is good for them.

On a warm June morning we topped off our tanks and pointed *White Mist* north. According to Robert Juet, who kept *Half Moon*'s journal of exploration, Hudson set off from Manhattan in "faire weather." So did we, and treated traffic on the George Washington Bridge to the fine sight of a ship slipping upriver under sail (pages 6-7).

The first few days up the broad Hudson were easy going, though often through water so foul with pollution we hated to see it touch *White Mist*'s hull. These were days of shakedown for the new crew, and gave my wife Anne a chance to slide into her role—"official cruise historian"—as we sailed past landmarks associated with George Washington and the Revolution, with Rip Van Winkle and the Headless Horseman of Sleepy Hollow.

And rarely, until we reached Albany with Henry Hudson, was Juet's journal long on the shelf. On the lower river we saw little

"Key to America," George Washington called West Point, where the United States Military Academy surveys the Hudson 45 miles north of New York City. The river, deep and narrow here, squeezes between the point and Constitution Island, a recreation area for the cadets.

Links of the Great Chain (right), each weighing more than a hundred pounds, spanned the narrow neck of water during the Revolution, blocking British warships. Huge log rafts buoyed the iron barrier. Benedict Arnold, commanding the fort, allowed the chain to fall into disrepair as part of his plan to surrender the garrison. Last-minute discovery of his double-dealing saved West Point—and perhaps the Nation's independence.

Staircase of water: Federal Lock at Troy, bypassing rapids tumbling over Troy Dam, background, raises *White Mist* to a higher level—the first of 12 such locks en route to Lake Champlain. Young hands skylark on the foredeck. Alongside rides the Boston Whaler, a handy scout, shuttle, and photographer's platform.

he would recognize, for scores of grimy factories today march along the waterfront.

An exception were the lofty stone cliffs called the Palisades, on the west bank just north of New York City. They furnish proof that natural beauty can be preserved if something is done in time.

We crept close beneath these sheer heights. Twelve miles are in parkland managed jointly by New York and New Jersey. For three hours we saw no buildings and only a few people along the Palisades Interstate Parkway.

The late John D. Rockefeller, Jr., was one of the conservation-minded citizens who bought the Palisades and presented them to the public. His sons Governor Nelson Rockefeller and Laurance S. Rockefeller, chairman of the first Hudson River Valley Commission, now play leading roles in a drive to make the rest of the historic valley as attractive as the Palisades.

Giant Chain Blocked British Fleet

Early on we tested the mettle of our teenage crew. We tied up for the night at West Point, and a summer squall rolled down on us. Wind moaned in *White Mist*'s rigging, thunder growled on the peaks, lightning showed us the United States Military Academy's battlements glistening in the rain.

The storm continued as it grew late; we sat snug and dry in the yawl's tight cabin. Finally Anne said, "It's time to turn in, but we have a problem. Nine people for seven bunks. Are you boys going to bed down on the floor?"

"We're going to sleep on deck, of course," said Ed, and the grandsons agreed.

"In this deluge?"

For reply, the boys pulled on their oilskins and went topside. With two plastic tarpaulins, they rigged a big tent over the cockpit.

"Hand us up our sleeping bags, please," they shouted and soon, oblivious of the storm, they were fast asleep under the ramparts of West Point. Thus they passed every night of this voyage except at sea.

The next morning we climbed a steeply winding path to visit the academy itself. We saw its chapel and museum and gaped at the huge links of a chain George Washington placed across the Hudson during the Revolution (preceding page). Its purpose was to block the British fleet working its way north from Manhattan to cut the Colonies in two.

We accepted a surprise invitation to coffee with Maj. Gen. Samuel W. Koster, Jr., then superintendent of the academy. Later, at his suggestion, we took an Army launch across the river to Constitution Island, a part of West Point I had never seen before. Wandering the island's sun-dappled woods, we found crumbling fortifications built to keep the

British from cutting the river-blocking chain.

Two devout sisters, the Misses Susan and Anna Warner, lived on the island for many years. On summer Sunday afternoons they held Bible classes for cadets in their orchard.

Mrs. William Lewis, head of the Constitution Island Association, showed us through the simple old 19th-century Warner house, where Anna wrote the words to the hymn "Jesus Loves Me." I noticed a stack of old straw mats, which the sisters provided, academy tradition says, to guard the cadets' white dress trousers from grass stains.

As the gift of Anna Warner, the surviving sister, and Mrs. Russell Sage, the island was deeded to the Nation in 1908. It is used as a picnic place for cadets and their dates—unofficially off-limits to officers.

Most of the way upriver, as I have said, we were hard on the trail of Henry Hudson.* But at a place called Coeymans, just south of Albany, we hit it harder than we wanted to. Putting in to fill our fuel tanks, we cut too close to a pencil-like bar that protects the harbor. *White Mist* stuck fast, and reversing the diesel failed to budge her. The Hudson is

*See "Henry Hudson's River," by Willard Price, NATIONAL GEOGRAPHIC, March 1962.

From model to reality

PROGRESS MARCHES to the beat of pile drivers at Albany, New York's capital, where the South Mall project rises on the west bank of the Hudson (right). This aerial view, looking north to the 19th-century capitol, shows construction in late 1969. Scheduled for completion in 1974, the showplace (see scale model, looking south, lower) will encompass state government skyscrapers, a landscaped mall, bowl-shaped meeting center, museum and library, and four underground levels for shops and parking, plus a housing development.

Governor Nelson Rockefeller (below, right) talks over plans with architect Wallace K. Harrison.

EXTERIORS (OPPOSITE LEFT) BY EDWIN STUART GROSVENOR; INTERIORS BY ROBERT W. MADDEN © N.G.S.

tidal even this far north, and the ebb raced past like a millstream. Something had to be done quickly, or we'd be high and dry on our beam ends for the next 10 hours.

Behind the yawl throughout our voyage we towed a 12½-foot fiberglass boat, a Boston Whaler, with an outboard motor (page 13). With this Ed now carried an anchor into deep water. The rest of us ran up the genoa and backed it to the wind. The crew, ladies and all, crawled out on the boom and I swung them over the water, thus heeling the ship and lessening her draft.

Then a hard gust caught the genoa, swinging the bow around. I gave the engine full ahead. With a shudder, *White Mist* broke free, the crew yelping from the boom end.

Studying Juet's journal, Nat Kenney found an interesting coincidence: *Half Moon*, having reached Albany and sent a boat "eight or nine leagues" farther upriver, turned around, "went downe two leagues to a shoald that had two channels"—and also ran aground.

"Looks like we got stuck where Hudson did," concluded Nat.

Henry Hudson sailed back south, having convinced himself that this was only a river, not the Northwest Passage to the riches of Cathay. *White Mist*, however, continued north, and at Troy we entered our first lock. From here to Lake Champlain, our proud ocean voyager for the first time in her life would be only a powerboat. In deference to low bridges, her masts would have to come out.

The U. S. Army Corps of Engineers runs the Troy lock; the others in the Champlain

High mast, low bridge

"WHEW! I could have reached down and touched the masthead!" exclaimed the 17-year-old chief photographer, after sweating out *White Mist*'s passage beneath a bridge south of Troy. Standing on the span to direct the maneuver via walkie-talkie, he captured this view of the mast creeping toward a scant clearance—and one of his own bare feet. Rising tide could have blocked the way minutes later. Even the Cruising Club of America burgee had to be removed from the masthead.

Fixed 15-foot bridges ahead required *White Mist* to twice unstep, or take out, and twice restep her masts—a half-day job each time, even with the services of hired cranes.

"Bring it closer! Still closer!" shouts a dock foreman at Port Henry (right), guiding the mainmast through the deck and into its step, as a crane jockeys the nearly one ton of spar and rigging.

Crew members performed all other tasks. Navigator John O. Brotherhood dangles atop the mizzenmast (above) as he reconnects the radiotelephone antenna at Montreal, site of the final restepping.

PHOTOCHROME BY JOHN SHIELDS © NATIONAL GEOGRAPHIC SOCIETY

Canal system are run by New York State. Like any blue-water sailor in close quarters, I felt uneasy as the marine traffic light turned green and we nosed slowly into the canyon-like compartment.

But I needn't have worried. As the huge gate closed behind us and water boiled in to float us to the level of the canal ahead, the crew sprang into action. Swiftly they lowered rub boards and fenders to protect our white hull from the slimy walls. Then they stood to the lines, taking them in as the yawl rose.

The lock's upper gate opened. We started the engine and went on to Cohoes, where the Matton Shipyard would help unstep the masts. As we made fast to our berth, a crane lumbered to a halt alongside. The operator leaned out of his cab.

"What's that big stick weigh?" he asked.

"Nearly a ton," I said. "Can you handle it?"

The craneman grinned. "Just make sure you unhook it from your keel. I wouldn't want to set that nice boat out on the bank!"

First the craneman lifted out the little mizzenmast and laid it on deck. Then he pulled his levers, and the mainmast came out as though it were a matchstick.

Battlefield Monument Honors a Leg

With masts and booms safely lashed in cradles, *White Mist* set off again up an ever-narrowing Hudson. Transit of four locks took time. Dusk was upon us when we reached Schuylerville and the fields of Saratoga, where in 1777 "Gentleman Johnny" Burgoyne surrendered to the Americans.

The British plan had been to split the Colonies along the line of the Hudson Valley. When Burgoyne surrendered, the plan failed, and the Continentals went on to eventual final victory at Yorktown. Saratoga, historians say, was the turning point of the Revolution.

Hero of the battle was Benedict Arnold, who was wounded in the leg. Because of his later treason, the field monument honors only the wound: It bears a carved left boot marked with a single epaulet—nothing more.

As far as Schuylerville we had followed the natural bed of the Hudson. Leaving the village, we began bypassing increasingly shallow rapids through short man-made canals. Locks obstruct the flow in these ditches, and all manner of refuse collects in them.

Now *White Mist* passed through some of the most sickening stretches of polluted water I have ever seen (pages 20-21). I was told it was worse a few years ago, before New York State instituted a barrage of legal actions against offenders. Yet we still saw many dead fish floating belly up in filth.

At Fort Edward we locked into the Champlain Canal and settled down to "ditch crawling," with nothing to do but steer and enjoy the pastoral scenery. It was like motoring slowly down a quiet but watery country lane.

The crew youngsters teased children into racing us along the banks on bicycles. They struck up conversations with farmers in their fields and people in summer cottages. They mystified distant animals with barks, bleats, and bellows amplified tenfold by the ship's loud-hailer, or bullhorn.

These stentorian sounds roused a huge bull while Ed was crossing a pasture with three cameras and a walkie-talkie hanging about his neck. Seeing no other living thing, the bull charged our chief photographer.

Ed set out for the nearest fence; on our radio we could hear his anguished gasps. "Oh help me, somebody!" he pleaded. "There's a monster bull after me." As he rolled to safety over the barbed wire, we heard the sound of ripping trousers and frustrated snorts.

The canal ends and Lake Champlain begins at Whitehall, known in Revolutionary times as Skenesboro. Here Benedict Arnold, an unusual combination of soldier and sailor, built the fleet with which, at Valcour Island, he delayed the British advance from Canada while the Americans made ready at Saratoga.

Fort Ti Guards a Strategic Narrows

We tied up for the night at Whitehall. Cutting through the foothills of the Adirondacks next morning, we powered past old Fort Ticonderoga without stopping. For this I had a sailorman's reason: *White Mist* would pay her respects to this historic shrine clothed in wind-filled sails. But you can't carry sail without a mast, so we went on to the nearest place I could find a crane—the Velez shipyard at Port Henry—rigged the yawl, and returned to Ticonderoga in the evening.

The fort overlooks a narrows in the lake. From Indian times until the 19th century, whoever controlled the strategic bluff controlled the main inland water route between the Hudson and the St. Lawrence.

In consequence many battles have been fought here. The best known was the daring

capture of the fort by Ethan Allen's Green Mountain Boys during the Revolution.

But the earliest recorded clash was of special interest to *White Mist* and her crew. The year was 1609, and the victor none other than Samuel de Champlain, whose trail we now crossed for the first time.

Explorer's Gun Routs the Iroquois

Although Jacques Cartier discovered Canada, Champlain was the first European to explore beyond waterways navigable by ocean-going ships. He wandered far into the St. Lawrence hinterlands, and in so doing, discovered Lake Champlain, which he named for himself.

Montagnais Indians, Algonquian tribesmen from the St. Lawrence, guided him to its sparkling waters by canoe in return for his help in fighting their ancient enemies, the Iroquois. The war party set off from the St. Lawrence up the traditional path of battle and commerce, the Richelieu River.

Ticonderoga was the southernmost point reached by Champlain. Near the spot where he landed, we now tied our Whaler. The fort's director, Col. Edward P. Hamilton, met us.

"Champlain and the Montagnais found the Iroquois awaiting battle 'within arrow range,'" he told us. "Champlain killed three chiefs with his arquebus. The Iroquois, who had never seen firearms before, fled."

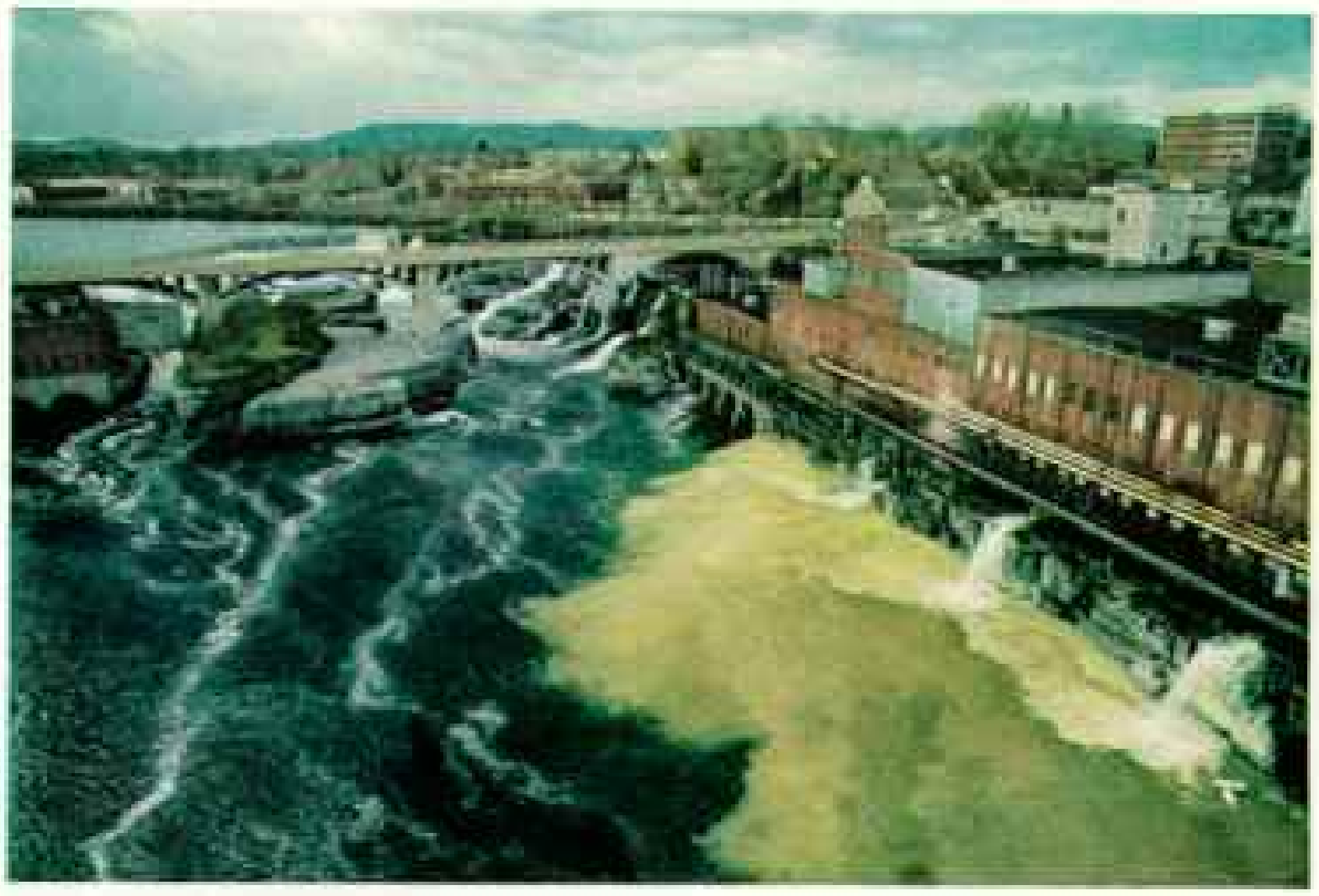
The Iroquois never forgot. For more than a century they ravaged the St. Lawrence settlements, and, in the wars between the Canadian French and the British masters of New England, fought on the English side.

The French built the first fort at Ticonderoga. Its successor was British, and it was this one, restored from the original plans, that we now approached. A single family, the Pells, has owned Ticonderoga since 1820 and accomplished the magnificent restoration. The shrine is now operated by the nonprofit Fort Ticonderoga Association, headed by John H. G. Pell.

We passed through the thick stone walls by the only entrance, a low arch that is almost a

KODACHROME BY EDWIN STUART GROSVENOR © N.G.S.

"Brown Bess" speaks again: Under the eye of Chief Park Historian William E. Meuse, the author fires a British musket at Saratoga National Historical Park, site of a pivotal American victory in 1777. Though inaccurate, Brown Bess smoothbore flintlocks could be reloaded quickly—about four times a minute. Close-ranked infantrymen firing such guns in volleys could lay down a murderous hail of lead at ranges under a hundred yards.



Filth afloat

IN A PICTURE worth ten thousand angry words, scum-coated wood ducklings paddle through Fort Edward Lock in pollution-clogged Champlain Canal. At nearby Glens Falls (left), a riverside plant flushes the chemical waste of paper-making into the Hudson.

Pollution left a greasy "bathtub ring" around *White Mist*'s hull—a stain she carried with her for much of the voyage.

tunnel. If ever we walked in the footsteps of heroes of old, we did so here. The boys called our attention to a bronze plaque listing some: Washington, Arnold, Burgoyne, Benjamin Franklin, Horatio Gates, "Mad Anthony" Wayne, Thaddeus Kosciuszko, Lord Jeffrey Amherst. And at the end, this sentence:

"You who tread in their footsteps, remember their glory."

Passing into the Place d'Armes, we entered a barracks-museum crammed with relics, many dug up during the restoration—weapons, pottery, hardware, regimental buttons. We saw Ethan Allen's own blunderbuss and a tattered Revolutionary battle flag with 13 stars.

Cannon, some of them original, stud the fort walls. Colonel Hamilton keeps a saluting battery in shooting order, and during the summer months fires four times daily for visitors, who number nearly 200,000 a year.

The hour for the cannonade approached. At this moment *White Mist* stood in for the fort to pick us up.

"Hey, there's a target!" I overheard the colonel say. "Drop a gun wad on our friend's sailboat and win a case of beer!"

The cannon roared (next page). An astonished Nat Kenney, skipper pro tem, jibed *White Mist* all standing and fled into the lake. Trailing a shower of sparks, the paper wads fell far short.

We had glorious sailing in 110-mile-long Champlain. Each day the wind came biz and strong out of the south. *White Mist* wore her

EKTACHROMES BY EDWIN STUART GROSVENOR © N.G.S.

Ticonderoga salutes *White Mist*

CANNONEERS manning a Revolutionary War gun fire a smoking paper wad as the yawl skims pollution-slicked Lake Champlain below the battlements of historic Fort Ticonderoga. In 1775 the stronghold's British garrison surrendered to Ethan Allen's Green Mountain Boys during an amazingly successful dawn raid. British Gen. "Gentleman Johnny" Burgoyne retook the fortress in 1777, a few months before his own downfall at Saratoga. The Revolution over, Fort Ti lost its strategic importance and fell to ruin. In 1908 the Pell family—owners of the property since 1820—launched a massive and meticulous reconstruction.

Framed in a "bull's-eye" windowpane (above)—an antique oddity of the glassmaker's art—a guide in Continental Army uniform conducts visitors on a tour of the storied grounds.

blue-and-white spinnaker for hours on end.

New crewman Bob L'Hommedieu, a summer resident of the Vermont lakeshore, took us into Otter Creek. So narrow the yawl had to enter under power, the stream nonetheless held an entire U. S. fleet in the War of 1812.

Its commander, Thomas Macdonough, assembled his ships and built new ones at Vergennes, far up the dark waterway. Fearing the British might bottle him up, he fortified Otter Creek's mouth and also, Vermonters told us, secretly dug an escape canal across a marsh to Kellog Bay. However, his dugway was never needed; when the British ships appeared and met gunfire from shore, they soon withdrew.

A few months later, the American men-of-war towed out of the creek, their yards trimmed fore-and-aft to clear the overhanging trees. Once in the lake, they swept it clear of the enemy in a battle off Plattsburgh.

Sailing on northward, we paused to visit a unique village at Shelburne, Vermont. Mr. and Mrs. J. Watson Webb, who established the Shelburne Museum in 1947, scoured the countryside for authentic houses, barns, stores, and churches. They disassembled them, brought them to the site, and put them back together to form a typical New England town of the 18th and 19th centuries.*

When we returned to *White Mist* in the Shelburne Harbor Marina, we were invited to join a search for yet another kind of antique. A uniformed officer introduced himself as Trooper Walter J. Hornberger, assistant diving officer of the New York State Police.

*See "From Sword to Scythe in Champlain Country," by Ethel A. Starbird, GEOGRAPHIC, August 1967.

Thread of water (left) recalls the triumph of U. S. naval forces on Lake Champlain in the War of 1812. To bypass the British fleet, which attempted to bottle him up in Otter Creek, U. S. commander Thomas Macdonough cut this tiny canal from the creek through a swamp to the lake, local tradition says. By way of it, his small boats could sneak out and surprise the British. Actually, the blockading ships sailed away after a brief cannonade from land. A few months later Macdonough's main fleet moved into the lake and won a decisive naval victory off Plattsburgh in September 1814. *White Mist* crew member Bob L'Hommedieu and his son explore Macdonough's Dugway, today well hidden by trees at both ends.

Waterlogged splinter of history: Flanked by veteran frogmen Frank Scalli, left, and Walt Hornberger, the author in wet suit and diving gloves brings up a shipwreck fragment from the chill depths of Lake Champlain off Schuyler Island. Hoping it might be part of a Revolutionary War vessel, he lashed it aboard *White Mist* for later examination by experts.

AUTOCHROMES (LEFT) BY ARNOLD R. MANCHESTER AND (ABOVE) BY JOHN SHIELDS;
EKTACHROME BY EDWIN STUART GROSVENOR © N.G.S.

Old but not historic, came the final verdict on the Schuyler Island shipwreck (right). Reported Smithsonian naval historian Mendel Peterson: "I'd say you've sent us a rotted rib from a 130-year-old coal barge."

Nevertheless, Revolutionary relics may await divers. In 1776 two American gundalows, the *Providence* and *New York*, were scuttled near here after the Battle of Valcour Island. Another, the *Philadelphia*, raised in 1935 at the site of the battle, now rests in the Smithsonian.

With him was Frank Scalli, chief test diver for U. S. Divers, manufacturer of the Aqua-Lung brand of scuba gear. Frank had brought a truckload of diving equipment and the ingredients for dinner, a crate of lobsters, from his home at Gloucester, Massachusetts.

Divers Probe a Mysterious Wreck

"We have a surprise for you," said Trooper Hornberger. "A wreck has been discovered off Schuyler Island across the lake. It might be one of Benedict Arnold's gunboats, scuttled after the Battle of Valcour Island. I'm here to invite you to run over in *White Mist*. Perhaps you'd like to dive with us."

With visions of finding historic cannon, I accepted the invitation, and we sailed over to Schuyler next morning. With us were Capt. David Mize of the Air Force and his friend Jim Hays, Plattsburgh scuba divers who had found the wreck.

"After the Valcour engagement in 1776," the captain told us, "Arnold's ships were badly damaged. He retreated to Schuyler Island, where he found the gundalows *Providence* and *New York* so badly hurt they were scuttled. A while ago we went out to look for them, and found this wreck. It might be one of them."

We anchored the yawl northwest of the island. The lake water was icy. With my scuba gear I donned a wet suit to keep warm.

Swimming to the bottom, Walt, Frank, and I found a mass of slimy timbers. While a swarm of small fishes crowded near, I tugged at what appeared to be a ship's rib, longer than I am tall. It yielded, and I swam it in triumph to the surface (preceding page).

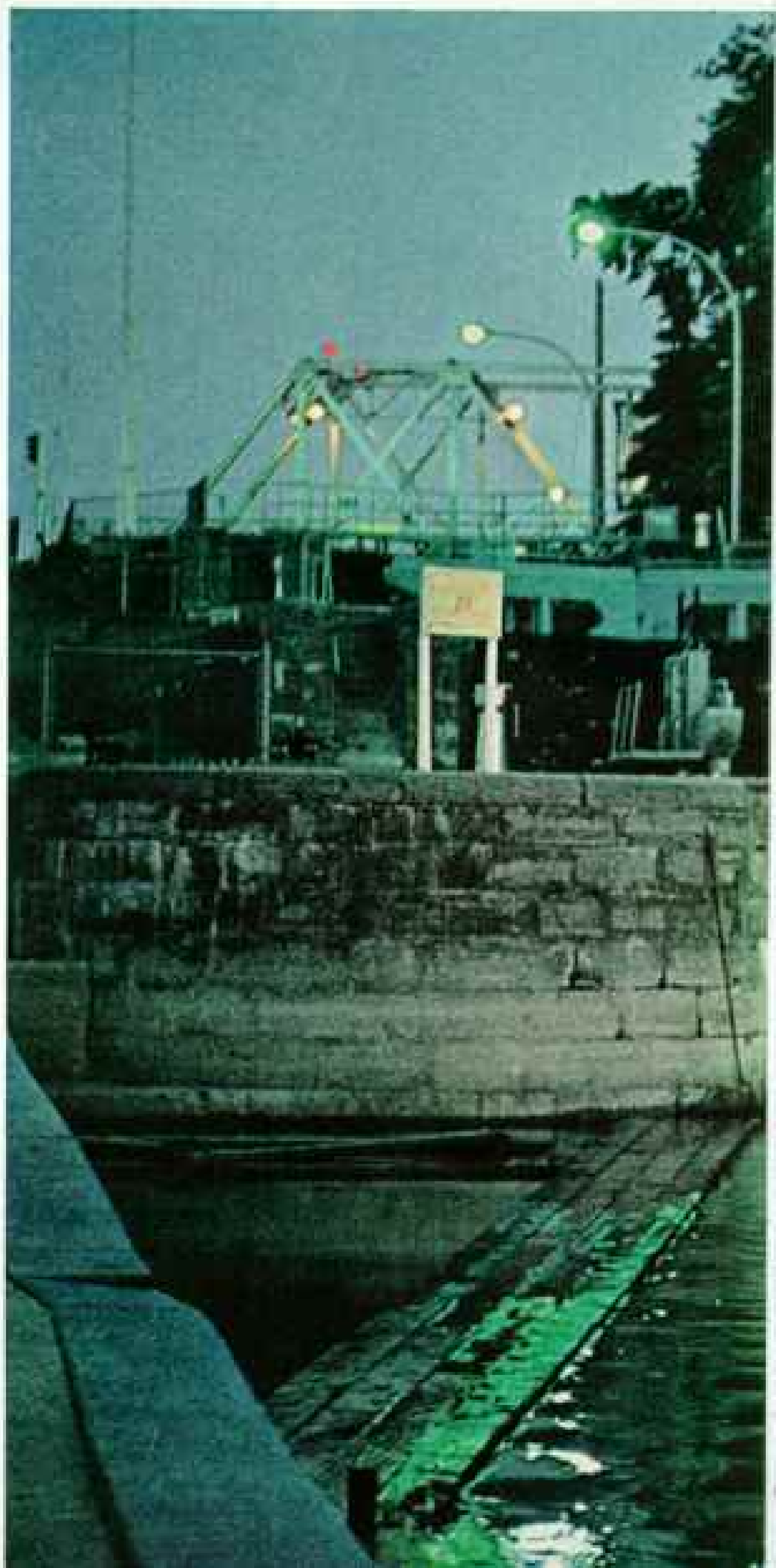
Bristling with huge rusty nails, the ugly thing rested on *White Mist*'s stern all the way to Gaspé. Thence it went by car to the Smithsonian Institution in Washington.

"An interesting example of wood impregnated with bituminous dust," Smithsonian expert Mendel Peterson later reported. "Judging from a nail with faceted head and chisel point, I'd say you've sent us a rotted rib from a 130-year-old coal barge."

We set the spinnaker and romped with a fair wind into the Richelieu River, dropping the big sail when we came abreast of the Canadian port of entry just north of Rouses Point. With no more than a quick glance at the ship's papers, a customs officer cleared us.

To this day the Richelieu-Champlain-Hudson route remains an important marine artery, though limited by narrow locks and six- or seven-foot depths. There are also low bridges, so at St. Jean, where the Canal de Chambly begins, a crane plucked out our masts for the second time.

Again we enjoyed a quiet journey through pleasant countryside. Occasionally the ditch wound around hillsides, like an aqueduct.



Shorn of spars and canvas, *White Mist* motors out of the last lock of Canal de Chambly into the Richelieu River. Hull bumpers and careful helmsmanship took her through 22 such locks unscathed. Ahead now lies the St. Lawrence, which will carry the ocean-going yawl back to the big waters she was built for (foldout map, pages 3-5).

Below we could see the rapids foaming over huge boulders, and I thought of Champlain's party lugging canoes around them.

At close of day we entered a staircase of interconnected locks that would drop us 74 feet to the Richelieu's Bassin de Chambly (below). The setting sun turned its waters far below to sparkling gold.

"What would happen if you pulled the wrong levers and opened all the gates at once?" Nikki Phillips, of Washington, D. C., nervously asked a lockkeeper.

"You'd think you were going over Niagara Falls in a barrel," said the man. "But don't worry. I'm always careful with boats when they have pretty girls aboard."

We anchored for the night in the basin and ran next morning for the St. Lawrence. Reaching the "River of Canada" and turning upstream, we logged yet another historic milestone.* For the first time, the cruise historian advised us, we were in the wake of Jacques Cartier. On his second voyage, in 1535, the French mariner explored as far as Montreal, then head of navigation.

The St. Lawrence's fast current slowed *White Mist* to a crawl. It took us 12 hours to make the last 40 miles, and we did not reach our berth at Port Ste. Hélène marina until after dark. We tied up in the lee of daring

*See "The St. Lawrence, River Key to Canada," by Howard La Fay, NATIONAL GEOGRAPHIC, May 1967.

PAINTING BY JOHN STUART SWEARINGEN © N.G.S.

structures of concrete, steel, and glass, for Île Ste. Hélène is the site of Expo 67, Canada's successful world exposition, still going strong three years after its opening.* It is now called "Man and His World."

For the two days of our stay, we enjoyed forgotten luxuries. We soaked in hot showers and let restaurants ashore do our cooking and dishwashing. A huge crane in the marina restepped our masts for the last time. Shackling the rigging into place, we worked to the music of bands at La Ronde, the "fun" section of Man and His World.

Mayor of Montreal Takes the Wheel

The "St. Lawrence crew" came aboard—Tom Beers, a National Geographic Vice President, and navigator John O. Brotherhood of Hartford, Connecticut, with his wife and daughter. A note arrived from an old friend.

"Welcome to Montreal. I propose an exchange," wrote Mayor Jean Drapeau. "I'll be your guide to my city if you'll let me sail *White Mist*."

The mayor more than kept his part of the bargain. From the slopes of Mount Royal, the city's most conspicuous landmark, to its vibrant heart, he arranged a tour such as few visitors ever receive. Rolling smoothly along modern freeways, we viewed a skyscraper-studded metropolis against the glorious background of the Laurentian Mountains.

Modern as it is, Montreal has taken pains not to bury its past. Its Old Quarter survives; one may journey from a French city of the 17th century to a counterpart of New York or Paris simply by stepping across a street.

Reading Montreal's violent history, I sometimes wonder why it was not abandoned soon after its founding in 1642. The Iroquois raided it time after time. American troops occupied it during the Revolution while Benedict Arnold tried in vain to reduce Quebec. War, pestilence, riot—Montreal has survived them all to become a thriving giant of two and a half million people.

The mayor got his trick at the wheel of a *White Mist* flying a huge borrowed Montreal city flag. As we returned to the marina, attendants came out in a powerboat to guide us to

*See "Canada Marks Her First Century," by Melville Bell Grosvenor, and "Montreal Greets the World," by Jules B. Billard, both in NATIONAL GEOGRAPHIC, May 1967, with accompanying map of Eastern Canada.

"Just think, much of this was swamp before Expo 67!" exulted Montreal's dynamic Mayor Jean Drapeau about his city's burgeoning riverfront. The mayor takes *White Mist*'s wheel on a tour of busy port waters. White-frocked Mrs. Drapeau and son Michel, right, join the crew's regulars. Pueblo-like apartments of Habitat (above), an Expo 67 landmark, perch above the river. Other exhibits of Canada's renowned fair, hosted by Montreal, remain open under the name "Man and His World."

our berth, and others waited ashore to take our lines. I told the mayor I had never seen a better marina.

"*Merci*," he said. "I had a committee of yachtsmen design it for yachtsmen. The people who now operate it are yachtsmen, too."

Crew Scales Quebec's Historic Cliff

With the swift St. Lawrence current now helping us, we sped down to Quebec, where the sea begins to make itself felt. We turned into Quebec Yacht Club's new harbor and tied to one of the floating piers that solve the problem of mooring in 15-foot tides.

Takis Veliotis, General Manager of Davie Shipbuilding Limited across the river at Lévis, was expecting us. Now he came to *White Mist* with a huge bouquet of red roses for Anne, an invitation for all of us to dine at his home that evening, and an answer to the first question our youngsters asked as they stepped ashore.

"Right over your heads, lads—that's the cliff the troops of the British Gen. James Wolfe climbed to surprise and take Quebec in 1759," he said. "Over there is the beachhead where they landed" (below).

Mr. Veliotis had scarcely identified the historic cliff before *White Mist*'s young people were climbing it. When they returned, "John-O" Brotherhood's daughter Logan reported:

"It's steep, but there's a good path. I wonder if the briars bothered the British soldiers. We're all scratched up."

James Cook, later to win fame as Pacific Ocean explorer, played a leading part in this victory. When the British fleet started up the reef-strewn St. Lawrence, they had no charts, for the French kept their maps military secrets. Cook and his men surveyed and sounded

ARCHIVES OF CANADA; KATACHROME (OPPOSITE)

City extraordinaire

HISTORY imparts a rich flavor to Quebec City, capital of Canada's *La Belle Province*. Here *White Mist* moored beneath the clifftop Plains of Abraham, where British troops led by Gen. James Wolfe vanquished the city's French defenders in 1759. The epochal clash, in which both Wolfe and the French Marquis de Montcalm fell fatally wounded, made the British uneasy masters of French Canada.

A contemporary print (below, left) depicts successive stages of the battle: Wolfe's red-coated forces land in small boats, scale the cliffs at night, and exchange murderous volleys of musket fire with the surprised foe on the Plains of Abraham.

Gallic and gracious, Quebec's Mayor Gilles Lamontagne, right, joins a tour of the riverfront in an air-cushioned hovercraft. Lilac dusk (below) envelops the back streets of historic Lower Town, while the hotel Château Frontenac, high above, crowns the city like a castle.

EDWIN STUART GRAVEVIOUS; RODACHROME BY JAMES L. STANFIELD © N.G.S.

ahead in longboats, and then made charts on his ship. With these, the invading fleet navigated safely to Quebec.

As in Montreal, we got a friendly welcome from the mayor; M. Gilles Lamontagne invited us to dinner and then took us on a walking tour of the old city, reminiscent of Montmartre in Paris. Chimney pots clustered on slanting tile roofs above serpentine streets. The tracery of wrought-iron gates framed glimpses of peaceful courtyards.

Nothing remains, however, of Champlain's original settlement, built in 1608 at the foot of the cliffs. Neither are there traces of the buildings in which Jacques Cartier passed the bitter winter of 1535-6, when scurvy killed 25 of his men and Indians kept the Frenchmen in constant alarm.

At midnight we wandered by the old Ursuline Convent, where an order of French nuns has lived since 1644. The Marquis de Montcalm, loser on the Plains of Abraham, lies buried in one of the building's walls.

"He and Wolfe were both killed in the battle," the mayor said. "You can be sure the firing was furious to get the two top generals."

North Wind Carries Arctic Cold

Below Île d'Orléans the river broadens steadily down to the Gulf of St. Lawrence. The look of the shore changes. Spruce on the Laurentians' slopes grows denser. Farms and villages stand farther apart. From Montreal to the Gaspé Peninsula, thousands speak French predominantly; some live in farmhouses like those of Normandy and Brittany.

The weather offered fresh challenges. Strong winds whistled out of the north, chill with the breath of Arctic ice and the Labrador barrens. Often we ran into fog and rain.

"Strong norther," reads the ship's log for a typical lower river passage. "Tucked a reef in the mainsail. *White Mist* eating it up on a close reach with the lee rail buried. The morning watch look like bears in their woolly sweaters and oilskins."

One bad night we had to copy Captain Cook. Beating for Île aux Coudres in half a gale and driving rain, we found ourselves far from its shelter when night fell. Recalling the *St. Lawrence River Pilot*'s warning of violent currents in the roadstead, I sent Nat and Bob Watson ahead in the Whaler to find an anchorage with good holding ground.

They buoyed a safe spot and came back aboard wet and cold. Bob rummaged in the library and came up with a very special chart book, reproductions of Cook's originals.

"If you don't trust the modern charts, you could have used these and saved Nat and me a chilling," growled Bob. "Just look! Cook's soundings are the same as ours."

Close Call in a Thick Fog

We passed a night off Pointe au Pic, in the place called Malbaie—"Bad Bay"—or Murray Bay. We lay anchored bow and stern so we could slip our cables and run to safety in the event of a sudden storm. All night the big ships grumbled by in the river, and their wakes kept *White Mist* rolling without cease.

Dawn found us clutched in the clammy grip of a fog so thick it was barely possible to see the ship's bow from the stern. We stood in the center of a cottony world all our own, aware of other living creatures only through the cries of unseen gulls and the nervous bellowings of shipping in the channel.

This was no river fog, but a real ocean pea-souper, redolent with the fragrance of kelp beds at low tide. The water in which we floated was salt as the Atlantic itself.

As we powered out into the river on compass and set sail, the lookouts broke out our fisherman's foghorn. The old-fashioned horn produces bellows audible for miles and keeps the man who pumps it warm with exercise.

All morning we passed ships we never saw, each time exchanging the signal—a single short blast on the horn—that meant we would pass each other port side to port side. Halfway through the afternoon a ship thus signaled from closer than usual.

Answering, we altered slightly to starboard to keep well clear. Soon a fair-size pulp-log carrier loomed out of the fog. She came on fast with a bone in her teeth, but on a course to pass with room to spare. I turned to make sure the Whaler ran true in our wake.

"Port! Hard to port!" lookouts John-O

At one with the wind, *White Mist* flies down the lower St. Lawrence. Built in 1950 for deep-water racing, she has proven herself in eight Newport-Bermuda races. In 1953, skippered by her former owner, the late G. W. Blunt White, she was first to finish the 1,150-mile Buenos Aires-Rio de Janeiro Race.

KODACHROME BY EDWIN STUART GRISWOLD © N.G.S.

Brotherhood and Tom Beers shouted together.

"You mean starboard?" I shouted back.

"No, port! Port! Quick!"

I spun the wheel hard as I could. Then I looked up. We were barely clearing the stern of the freighter. She had turned directly across our bow!

We passed so close I could hear her diesel clattering. Her wake hit us like a tidal wave. But we were safe, thanks to the Navy training of Tom and John-O, veterans of World War II sea watches.

Guided by the radio beam from its tall lighthouse, we ran on for Prince Shoal. Soon we picked up the roar of the tower's diaphone, sounding at 20-second intervals.

Now, as I look back on what followed, I know that the old mariners were not exaggerating when they described the maelstrom of tide- and current-ridden seas at the juncture of Saguenay and St. Lawrence.

The ebb tide swept us downriver faster than we knew. An unseen crosscurrent set us toward the shoal. When the 83-foot light tower (right) burst from the fog like a great sailing ship under spinnaker, we were headed directly for it at better than 10 knots.

For the second time that day I frantically wrestled the wheel. Again we missed disaster by a matter of feet.

Saguenay Squall Brings a Knockdown

Now we entered the mouth of the river, and for half an hour *White Mist* sailed on without incident. Our heartbeats went back to normal. Then a full northerly gale funneled suddenly out of Saguenay's gorge, scattering the fog in racing shreds. I turned to Tom Beers to order the mainsail doused.

But as I opened my mouth to speak, a violent williwaw, or white squall, laid the ship flat on her beam ends. This was the terrible knockdown mentioned at the outset of this yarn. Water filled the cockpit, and from the cabin came the sound of crashing dishes and my wife's voice, raised in alarm.

I luffed *White Mist* back to an even keel. Tom and the watch brought the main down on the run and fisted it into a furl. We went on under jib and mizzen, looking for a good anchorage in front of the red-roofed Hotel Tadoussac on its green hillside.

We let two storm anchors go in 40 feet of water as the north wind howled. I remember thinking, as the yawl settled to her lines, that if the sea gods would see us safely through the night, I'd return to the St. Lawrence next day.

Candy-striped lighthouse, built in 1964, guards treacherous Prince Shoal off the entrance to the Saguenay River. Wicked currents, powerful winds, and ripsaw shoals make this stretch a sailor's nightmare. In thick fog, swirling waters nearly carried *White Mist* into the light tower's base.

Pod of beluga whales, kin to porpoises, sport in the cliff-girt Saguenay. Man-shy, they dived at *White Mist's* approach. Tasseled by a slender cascade, this wall of rock plunges 600 feet below the water, creating a submarine gorge for the deep-diving white whales.

EXTACHROME (BELOW) AND KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

But Anne, as I mentioned earlier, changed my mind with a quotation from Champlain. Morning found us headed for our second encounter with the Saguenay.

Whales Play in the River Deeps

Angling southeastward in a canyon, the Saguenay slices the Quebec hinterland for 95 miles from its rising in Lac St. Jean (map, page 4). For steamers, it is navigable as far up as Chicoutimi, port for an area producing much paper and aluminum.

For sailing vessels big or small, as the explorers quickly learned, this is not a hospitable river. Winds and waves ricochet from its sheer cliffs and bounce off in all directions. Ebb tides to seven knots have been recorded. And should a sailor seek anchorage, he might find 600 feet of water close to shore and occasionally more than 900 feet in midstream.

The norther still howled full strength as we cleared Tadoussac at dawn. We set only tiny mizzen and boom jib. With lee rail down and icy spray driving across the decks, *White Mist* roared across the river mouth.

"Breaking rocks close to those cliffs," warned Tom Beers. "No!" he corrected himself quickly. "It's a school of belugas."

Known in French Canada as *marsouins blancs*—white porpoises—these small white whales show up at Tadoussac every summer. Both Cartier and Champlain mentioned them.

KODACHROME (ABOVE) BY MELVILLE BELL GROSVENOR; EKTACHROME (BELOW) AND KODACHROME BY EDWIN STUART GROSVENOR © N.G.S.

Timeless tempo

WHERE St. Lawrence waters meet Atlantic tides, life for generations has moved to the same steady rhythms. Picturesque towns like Isle aux Morts in southern Newfoundland (above) cling to sparsely settled shores, dramatizing the immensity of land, sky, and water.

The good earth yields peat moss (right) to French-speaking farmers on Île aux Coudres. Near Rivière au Renard (left), a father and son load one last cartful of beach gravel before dark.

A school of perhaps 75 were strung out single file for miles at the base of the western palisades. They seemed to be moving in small family groups—papa, mama, baby, youngsters—all slowly diving, broaching, blowing, and playing as they fed (pages 34-5).

We settled into the thrash upriver against steadily rising wind and sea. I wanted to get as far as Île St. Barthélemy by nightfall, for there we planned a special celebration.

The dial in the cockpit showed seven and a half knots, and we believed ourselves making good progress. But each tack across the stream and back brought us to nearly the same point on the cliffside—what we gained to windward we lost to the current. Finally we dropped our sails in favor of the diesel. Keeping close to shore where the current was weakest, we reached the island at dusk.

The water was too deep for safe anchoring, so we made fast to a spruce on shore. *White Mist* spent the night tethered like a cart horse, with a stern anchor to the one tiny shallow spot holding her in place.

The boys had planned to celebrate the Fourth of July at Malbaie, but the night had been rainy. So after dinner we switched on every ship's light and festooned the island spit with sparklers, Roman candles, rockets, and fountains. At Ed's signal from a clifftop, the boys set everything off at once (pages 52-3).

It was a great display, and I wondered what

EYES PEELED FOR DANGER, *the skipper, Logan Brotherhood, left, and Bob Watson keep sharp lookout as* White Mist *slices fog near the mouth of the St. Lawrence. Earlier, in a similar pea-souper, a pulp-log freighter suddenly loomed out of the swirling mists and came within a few heart-stopping feet of smashing the yawl to splinters.*

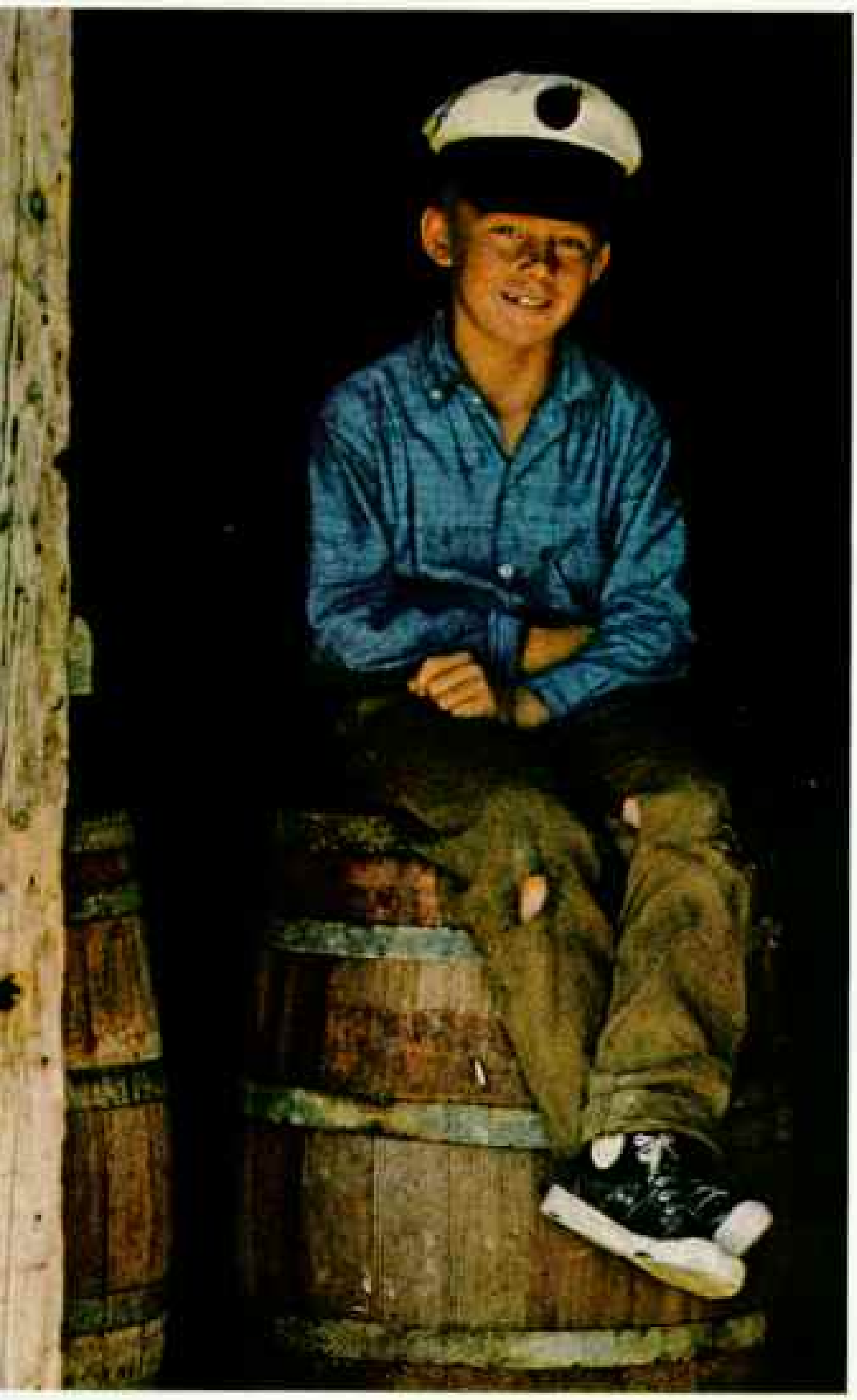
Salt-tanged Gaspé

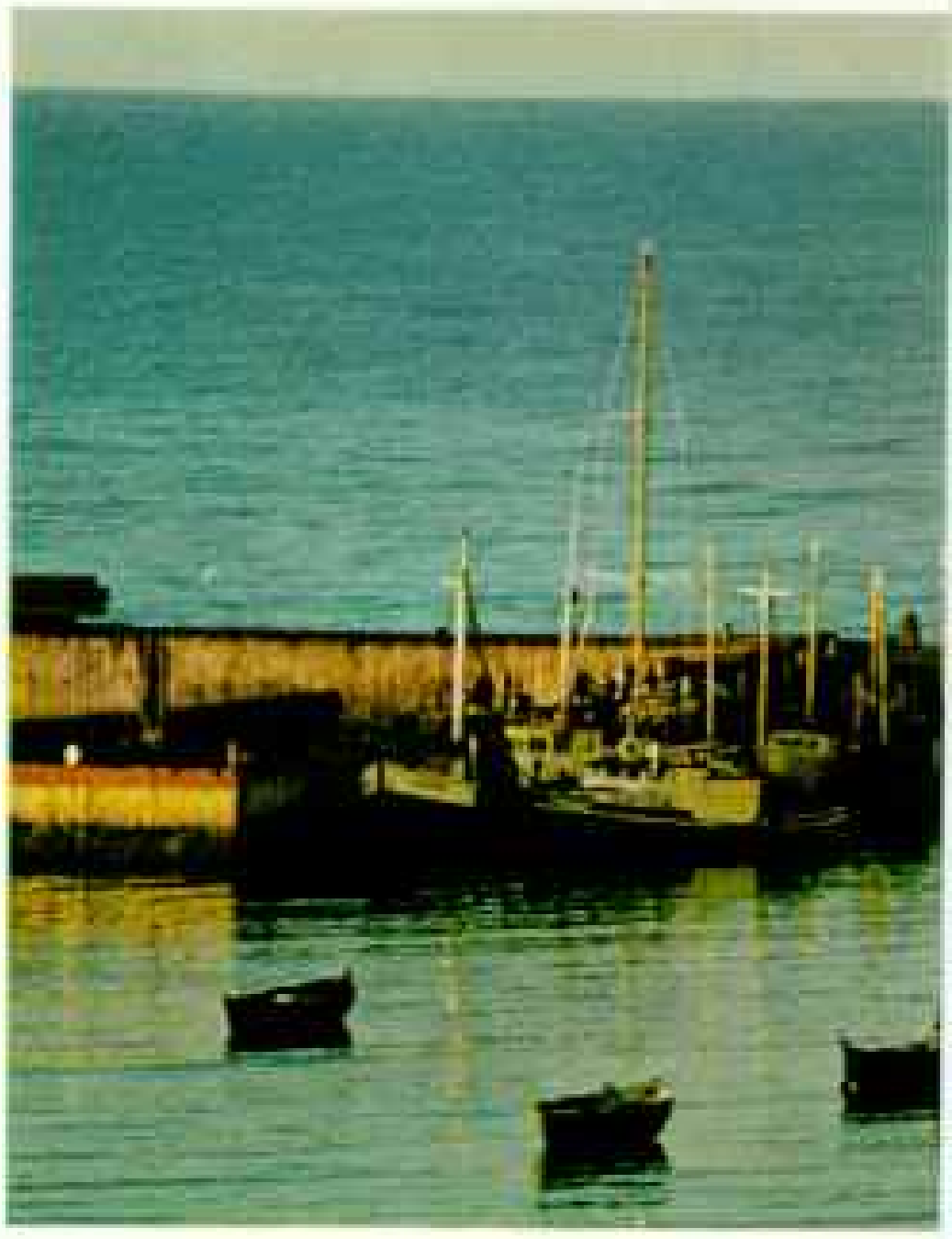
FRENCH has been spoken on the Gaspé Peninsula since July 24, 1534, when Jacques Cartier waded ashore to erect a 30-foot cross and declare these unknown regions the property of the king of France. "Canada was born here," local folk announce proudly. The peninsula, jutting like a stubby thumb into the Gulf of St. Lawrence, lures swarms of vacationists each summer to its thickly forested hills and fish-rich waters.

the countryside's *habitants* must be thinking. Few people, however, live along the wild lower reaches of the Saguenay. Champlain described it as "a country very disagreeable from whatever point of view; in short, it is a real desert without inhabitants."

The next day, with a 50-knot gale still whistling out of the north, we scudded back to Tadoussac in an hour and a half. I surprised the crew by booking them rooms in the huge red-roofed hotel.

I had my reasons. Big waters lay ahead—the wide lower St. Lawrence, the windy Gulf





Junior sea captain near the town of Percé relaxes from play and chores atop a wharfside packing barrel.

Tall mainmast betrays the presence of *White Mist* amid fishing vessels at Rivière au Renard's wharf.

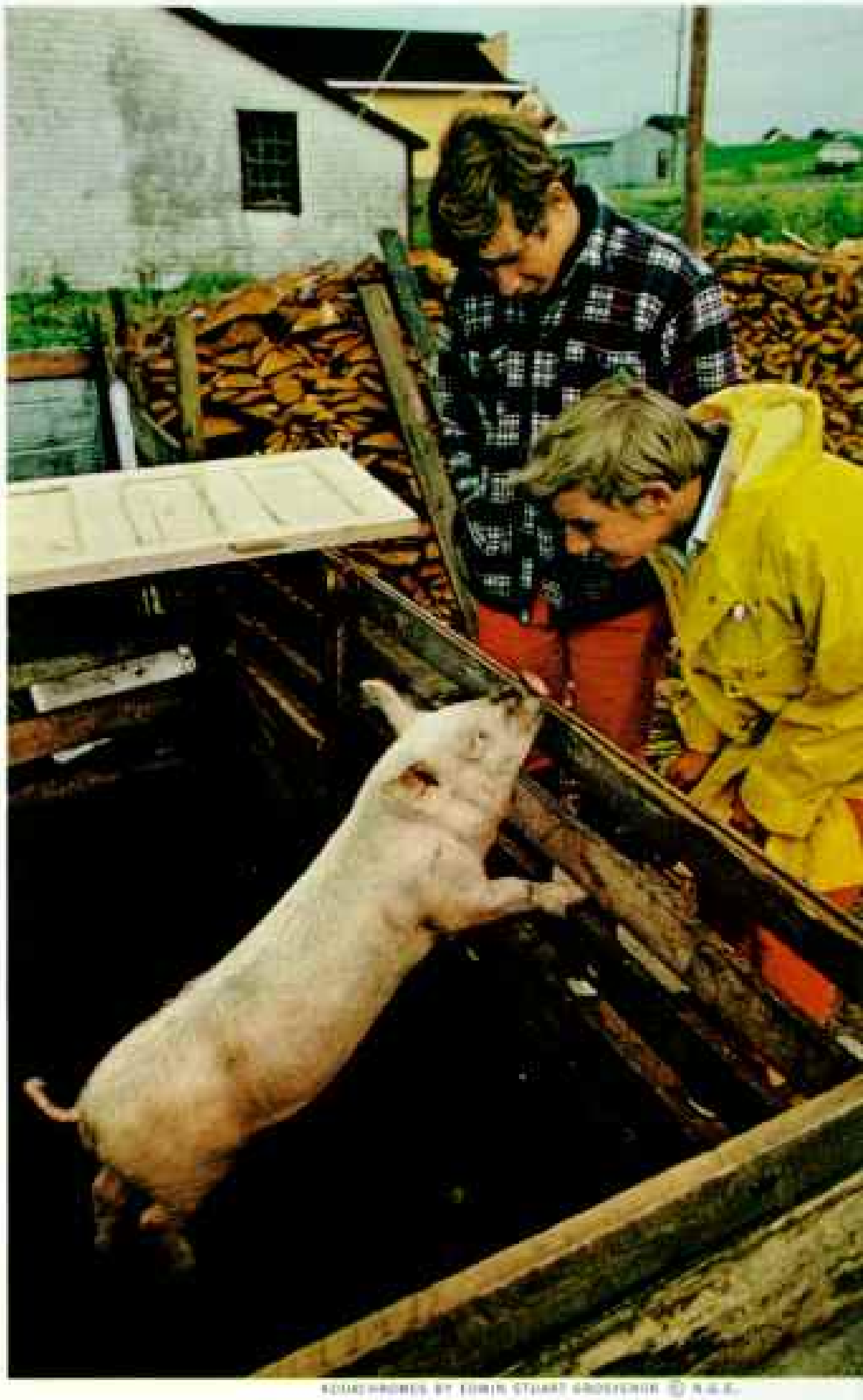
of St. Lawrence, and Cabot Strait, one of the roughest places on the Atlantic seaboard. To meet the challenge, I needed a rested, refreshed crew.

In the morning the norther's last gasp carried us swiftly to Rimouski, a prosperous south-bank manufacturing port. Cruise historian Anne left us. Grandson Jim returned aboard from a visit home.

I divided the crew into watches and posted a list in the cabin. Each watch would stand a three-hour trick with six hours off and keep the ship moving around the clock. In these wide waters, *White Mist* would make few passages she could complete in a day.

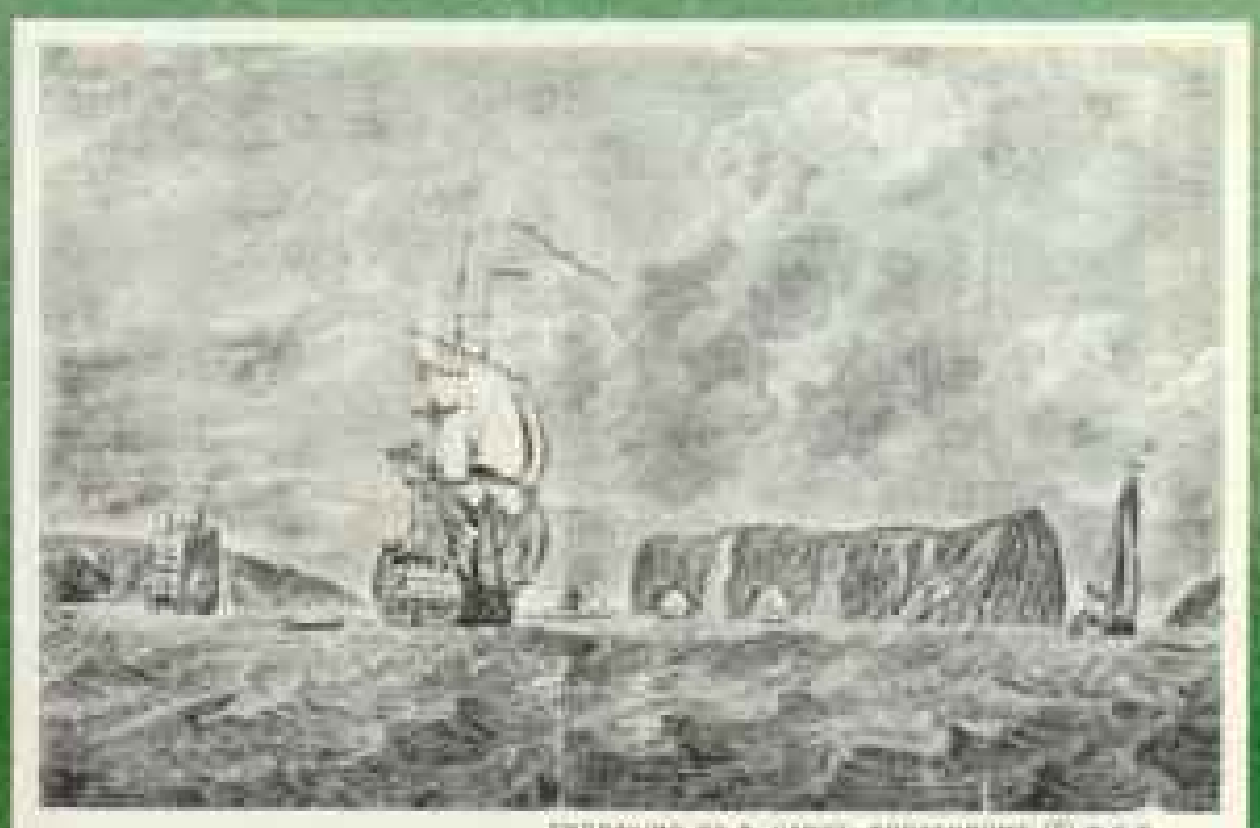
One of sailing's great rewards is the feeling of accomplishment a man has when he sees the sun rise from open sea after a stormy night. He knows that his and his mates' skill and strength alone have guided the ship safely through the dark hours, and he is rightfully proud of himself.

The wind had gone to the south as we left Rimouski in late afternoon; at nightfall it died to a whisper. We stowed the spinnaker and turned on the auxiliary engine. Under its



Cleaning cod, a Gallic youngster of Rivière au Renard learns rudiments of the fisherman's trade.

Friendly landlubber on a Gaspé Peninsula farm greets young tars Bob and Jim Watson of *White Mist*.



DRAWING BY P. GANEY, KODACHROME © N.G.S.

GIANT STONE HORSE held by a tether of sand, 288-foot-high Percé Rock grazes in the Gulf of St. Lawrence off the tip of Gaspé Peninsula.

Explorers in the 1600's reported as many as four arches in the base of the sea-sculptured formation. By 1760 only two remained, as seen in this print (inset), looking from the opposite side. The outer arch finally collapsed in 1845; its seaward column still stands at far right.

High tides daily flood the sandy link to the mainland village of Percé, upper left, often marooning unwitting vacationists who stroll out to Percé Rock at low water.

Green meadows in the sea

NUGGETS OF HOSPITALITY in the fog-swept Gulf of St. Lawrence, the Magdalen Islands gave *White Mist*'s voyagers a welcome pause from the chills and rigors of big-water sailing. French-speaking residents of Amherst Island (above)

urging, *White Mist* ran easily, her cutwater chuckling happily through the swells. Sea miles fell one by one into her foaming wake.

I sat alone on the bow but was not lonely, for many creatures of the wild waters come to visit a ship on night passage. Porpoises torpedoed past, leaving ghostly phosphorescent trails. Pale ghosts in the stern light's glow, gulls searched the wake for edibles we might throw over the side.

An orange blaze flickered on the eastern horizon. I leaped to my feet, sure it was a ship afire. But it was only the moon rising from the waves, and for the rest of the lovely night it was our bright companion.

Port Cartier Trades Ore for Grain

Bound for Sept Îles, we paid quick nonstop visits to Pointe aux Anglais and Port Cartier. The name of the former comes from a St. Lawrence tragedy.

In 1711, long before Wolfe's victory, a gale drove eight ships of a British fleet on the Pointe's vicious reefs. Nearly 900 soldiers lost their lives; beneath the dark waters yet lie cannon and the bones of ships.

Port Cartier stands as an example of what modern engineers can do. A few years ago a small logging town occupied the site. Then came a crew with explosives and giant machines, and, almost overnight, cut a deep harbor from solid rock. Now *White Mist* circled around in the port beside a complex of huge new buildings that serve a uniquely Canadian trade.

From the Great Lakes the slab-sided lakers, like those Takis Veliotis builds, come to Port Cartier via the St. Lawrence Seaway laden with grain. The new port's elevators suck out the grain for transfer to ocean-going ships. Glistening iron-ore concentrate brought in by the trainload from a Quebec mine 150 miles inland replaces it in the ships' holds for the run back to the Great Lakes' steel mills.

eagerly shared their tables and firesides with the visitors. The only note of animosity came from a spirited little Savannah sparrow (left), which hopped from fencepost to fencepost, stridently protesting the photographer's curiosity. Piling into a truck (below), the crew rested their sea legs and enjoyed a bumpy tour of the nearly treeless islands, connected by sandspits. From left, in the back of the pickup, "Teeny" Lemmerman, John Shields, Bob and Jim Watson, Nat Kenney, Stan Judge, and Dick Lemmerman.

We made sail next for Anticosti Island, where the river ends and the great Gulf of St. Lawrence begins. The day passed; the wind increased and backed to the east. By nightfall it came dead ahead, and *White Mist* struggled to windward, rail down.

The first night watch took the deck. I ordered all hands to keep safety harnesses hooked to something solid. A sudden squall, a buster wave, a swinging boom, can knock somebody over the side in a jiffy.

Racing in from the Atlantic, thick clouds blanketed the stars. Sheets of spray blinded the helmsman. The loom of Anticosti's West Point Light just before dawn was a welcome sight. We threaded the entrance to the only harbor, Port Menier, and tied up thankfully.

Cartier Found "Fish . . . Like Horses"

A pickup truck rattled to a stop on the wharf. "I'm Charlie McCormick," said its driver, the pelting rain rattling off his oilskins. "Batten everything down and load your crew into this good truck. You're about to enjoy some of the world's greatest fishing."

Consolidated-Bathurst Limited, a leading Canadian paper manufacturer, owns all Anticosti Island, a place of rugged beauty 140 miles long and, in places, more than 30 wide. When Cartier discovered it, he saw walruses nearby: ". . . fish in appearance like horses which go on land at night but in the day-time remain in the water. . . ."

Walruses long ago quit Anticosti, but deer in prodigious numbers and many bears still roam its spruce-balsam wilds. Their presence —and that of trout and salmon—led to Consolidated-Bathurst's unique management policy: The island is at the same time a source of pulp logs and a hunting and fishing preserve that more than pays its way.

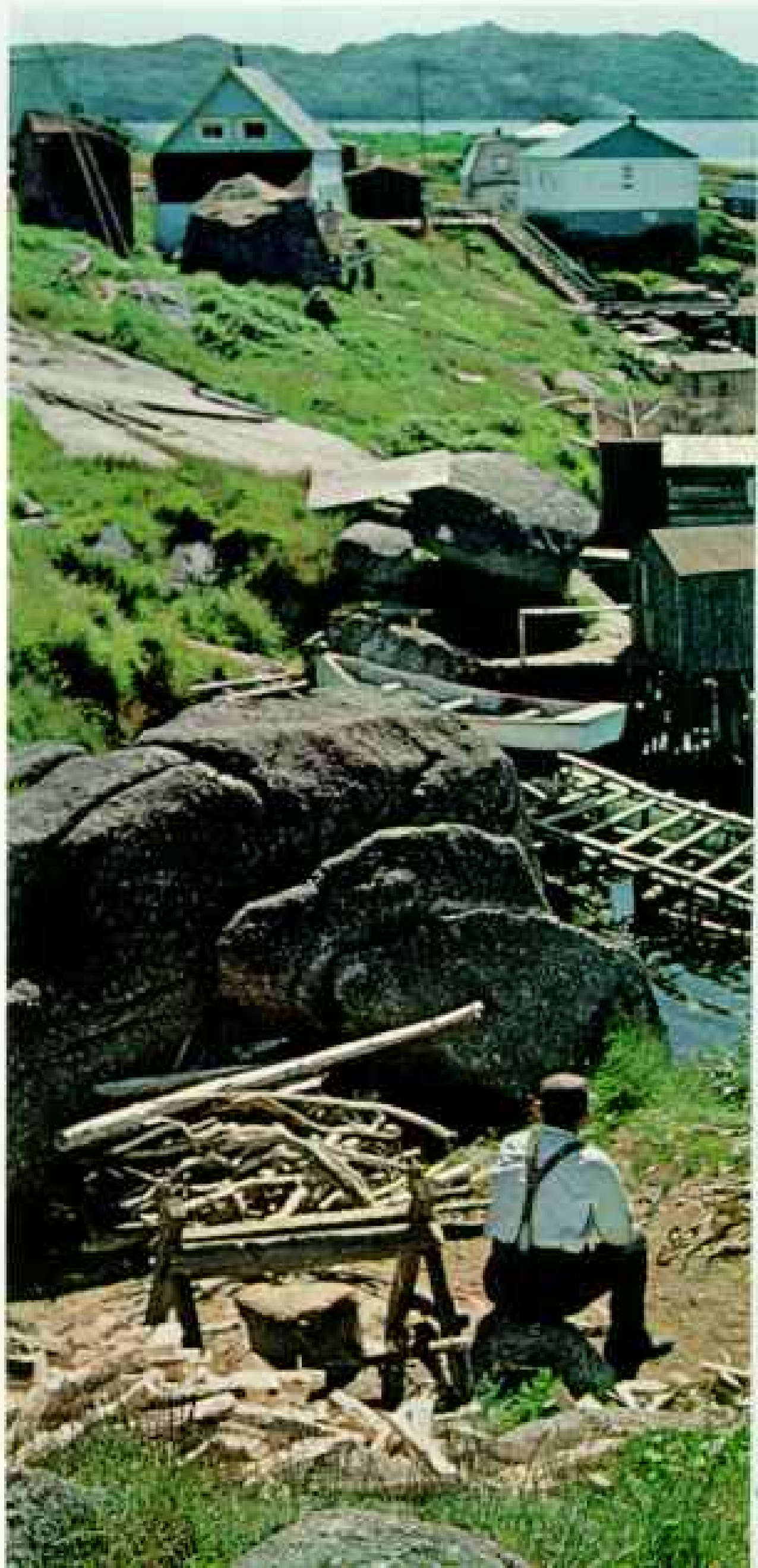
Heading inland over roads potholed by great logging trucks, Charlie drove full speed in the blinding rain, yet kept up a running commentary on island lore. "The French explorer Louis Jolliet was Anticosti's first owner," he shouted over his shoulder. "Louis XIV of France gave it to him as a reward for his discoveries along the Mississippi River."

Jolliet trapped beaver and ran a cod and halibut fishery. He died in 1700 and is buried on the island, according to local belief.

Henri Menier, the French chocolate king, bought Anticosti in 1895 for the hunting, fishing, and pulpwood. He ran it like a feudal barony, building a huge wooden chateau. The present owners, fearing fire, pulled it down.

We saw so many deer we lost count.

"The papermaker's friends," said Charlie. "Anticosti lies just north of the hardwood line;



A rock to be "yarry" of: Entering the Newfoundland port of La Poile, the skipper noted a rock ledge sloping suspiciously into the water—visible behind *White Mist*'s mizzenmast at upper right. The yawl circled wide and nosed in to the pier from the side nearest the camera. As she docked, crewmen sighted a submerged rock that she would have hit on her original course. "You can cut a notch in the beam," approved an onlooker. "Not every visitor is so yarry of our rock."

spruce and balsam flourish here, but spruce makes better pulp.

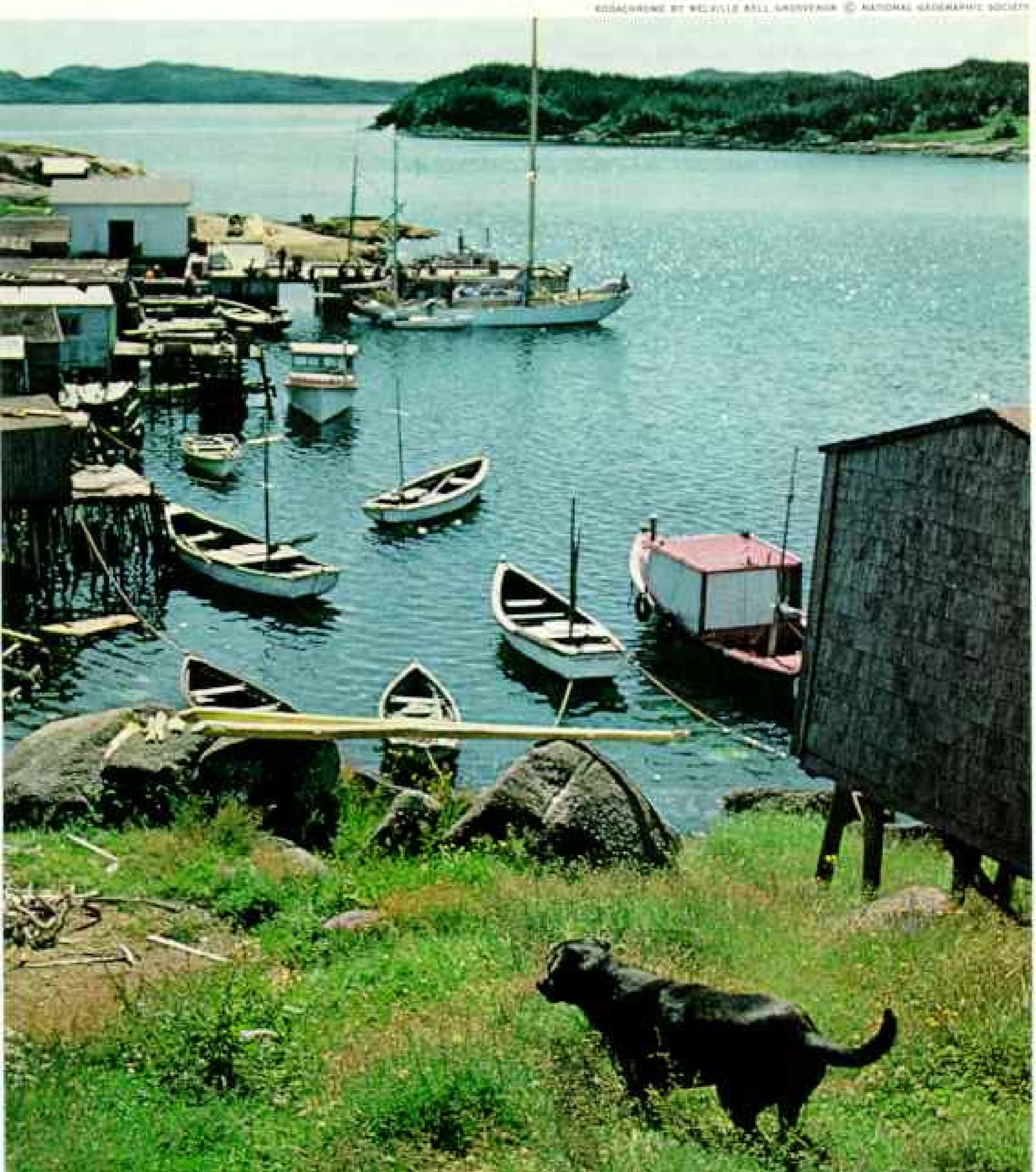
"When we cut the spruce, balsam tends to take over; it grows faster and crowds out the young spruce. Here's where the deer come in. They like young balsam, but not spruce. Result: Our forests remain mostly spruce."

We fished for salmon and for trout, once in a lake dimpled by great rainbows rising for a hatch of flies, and once at the mouth of a river rushing into the gulf. Everyone filled his creel.

Winging south in the sunny weather that followed the storm, we spent four days leisurely jogging seaward along the Gaspé Peninsula. French pioneers first settled this lovely countryside in the times of Cartier and Champlain; every coastal village—some of them nearly three centuries old—has its white Catholic church with prominent spire.

Near Gaspé village's present site Cartier set up a cross, gathered the local Indians around, and claimed all Canada for France.

"Canada, therefore, was born here, which makes Gaspé the most important place in the nation," firmly stated Town Manager Raymond Bernard. "The rest of the country doesn't agree with us, however. They won't even give us the replica of Cartier's ship *Grande Hermine*, built for Expo 67. Frankly, I think it is our duty to steal it."



Motivated by such fierce pride of place, even piracy has something appealing about it—especially to youth, I might add. The crew youngsters quickly volunteered their services should the raid take place!

Like busmen riding a bus on holiday, we made a one-day sailing round trip along the coast to Percé. Here the early mariners saw a great rock, joined to the mainland only at low tide, and noted that it was pierced with spectacular arched holes.

Once there were four of these arches. Now there is but one; erosion claimed the others (pages 42-3). On sunny weekends tourists hike out to Percé Rock. Sometimes incoming tides trap them, and boats must rescue them.

We made a rough Whaler landing through the surf, dropping a stern anchor as we ran in and checking the boat so that she never touched the strand when we stepped ashore. We found half a hundred baby herring gulls, too young to fly but old enough to snap at us with hooked beaks. Their parents dive-bombed down the sheer cliffs at our backs.

Sailors Watch as Men Walk on the Moon

The Brotherhood family left the ship at Gaspé. Crewman Stan Judge of Gorham, New Hampshire, temporarily took over navigation duties, with Ed operating the radio direction finder. At dawn next day they made a perfect landfall at the Magdalen Islands.

As we beat into the harbor on Amherst Island, waving figures on the shore resolved themselves into three new crew members. My daughter Helen—"Teeny"—mother of Jim and Bob, would take over *White Mist*'s galley, thus sparing the crew any more of my cooking. Her husband Dick Lemmerman, veteran ocean racer, would navigate, and my nephew Grosvenor Blair would help with deck duties.

Most of the Magdalens' people are French-Canadians. Television programs relayed from the mainland are usually in French. The night Astronauts Neil Armstrong and Buzz Aldrin made the first landing on the moon, we watched the event in a hotel at Cap aux Meules on Grindstone Island.

When the program had ended, I found the lady proprietor of the hotel sitting quietly in a corner, shaking her head in wonderment.

"*Mon Dieu*, it was miraculous, that landing!" she said. "But an equal miracle is the television! Here I am in my own home on an island, watching men walk on the moon."

We toured the Magdalens by road, for narrow sandspits connect the larger islands. There were now 10 of us, and we all piled into a pickup truck.

Men worked on the roofs of many houses we passed. Nat asked if there had been a bad storm to damage so many homes.

"Not at all," a man replied. "We work hard here. Every good day we go lobstering or fishing or working the crops we grow in the short summers. It happens the lobster season ended yesterday, the scallop fishing begins tomorrow, and God needs no assistance in the fields at the moment.

"*Alors*, today we fix our roofs. What could be more natural?"

What with television, an airfield, and reliable boat service, life is not so bleak in the Magdalens as it must have been a generation ago. Yet when winter comes, they are still almost as isolated as when Cartier first saw them. Great northeasters roar in from the Arctic. Surf thunders against the cliffs. The people look from warm kitchens at snows racing down the wind. But the wise islander does not fear such times, for he has fixed his roof between the lobster and scallop seasons.

Girls Afraid of Their Binicky Maws

On a July morning we cleared Grindstone for the south Newfoundland coast. Holding steady around the clock, the breeze wafted us to Channel-Port aux Basques by 7 a.m. the following day (map, page 5).

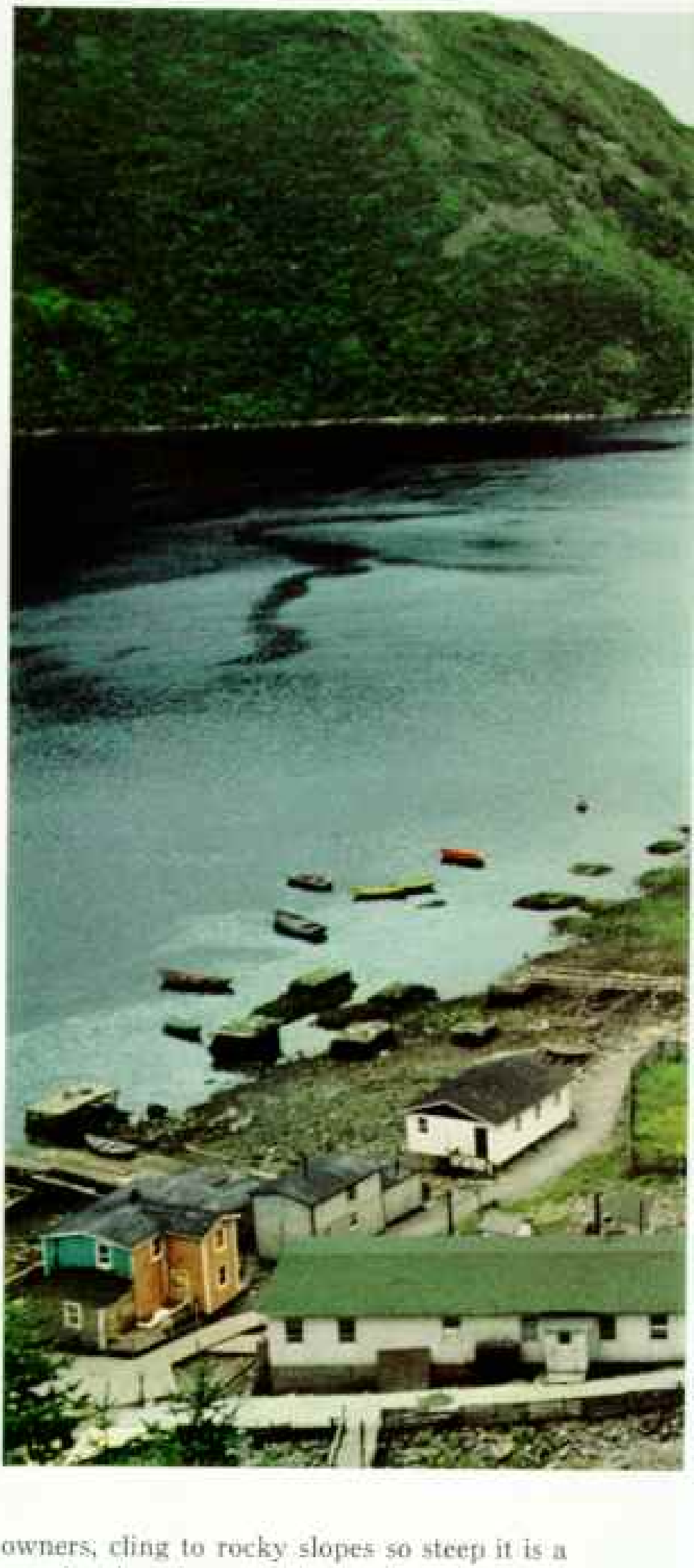
After breakfast, needing razor blades, I went ashore to the local pharmacy. I found the proprietor waiting, car keys in hand. He told me that his name was Bob McGrath.

"I heard *White Mist* was here," he said. "The stories of her cruises in my GEOGRAPHICS have given me a lot of pleasure.*

*See the author's "Safe Landing on Sable, Isle of 500 Shipwrecks," September 1965, as well as his account of *White Mist*'s voyage from Bermuda to St. Pierre and Miquelon, September 1967.

Faces fresh as a breeze from the sea, two lasses of southern Newfoundland light up an overcast day with their smiles. Bubbling with laughter at the photographer's interest, they chattered excitedly in a "Newfie" idiom outsiders can understand only with difficulty.

PHOTOGRAPH BY EDWIN STUART GROSVENOR © N.G.S.



Bottleneck entrance to Newfoundland's Grey River—threaded by *White Mist* at night with the aid of flashlights—widens into Jerts Cove, where the fishing village of Grey River fans out along a crescent shore. Development of tungsten deposits in the mountain behind the town may bring an end to the cove's isolation and a faster-paced life for local fisherfolk.

Let me repay you by showing you our town."

It was a brisk sunny day as we set forth, and he was inspired to sing:

As I rowed ashore from my schooner close by,
A girl on the beach I chanced to espy;
Her hair it was red and her bonnet was blue,
Her place of abode was Harbour le Cou.

"Harbour le Cou!" I said. "We're going there tomorrow."

He said, "Well, watch your step," and sang the rest of the song. The schoonerman, it appeared, went walking with the red-haired girl. Then she discovered he had a "missus and wee kiddies" back home. The sequel:

And then like a she-cat upon me she flew,
And I fled from the furies of Harbour le Cou.

When we landed at Harbour le Cou, a tiny fishing village at the end of the coast road from Channel-Port aux Basques, we found not one but several red-haired girls on the shore. The oldest was about ten.

"Hey, girl from Harbour le Cou, let's go walking," Jim Watson teased her.

"We've slinged," said she. "Our maws'll be binicky if they catch us trapsing."

An older boy translated:

"They sneaked out of school to see your boat. Their mothers will be angry if they find them wandering around."

Dwelling in isolation for nearly three centuries, Newfoundlanders of the south coast have a language and a body of folk music all their own. The speech and accents are strange to an outsider's ear. The songs, naturally enough, reflect the life of Newfoundland—the fishing, sealing, sailing, the hardships of the lumber camps.

Fiords Fit for Viking Longships

Coasting to the east, we called in at several fishing villages much like the home of the song's red-haired "she-cat." They lie as near the sea as possible, in the mouths of deep fiords that remind one of Norway. Their snug little houses, brightly painted by the fishermen-owners, cling to rocky slopes so steep it is a wonder they do not slide into the water.

Each night we anchored deep in some wild fiord. At dusk, beneath sheer lichened cliffs, it took but little imagination to picture *White Mist* as John Cabot's ship, sheltering from a storm at sea. Indeed, a Viking longship drawn up on the shore, its fierce crew gathered about driftwood fires, would have fitted the landscape perfectly.

There are 16 magnificent fiords on the

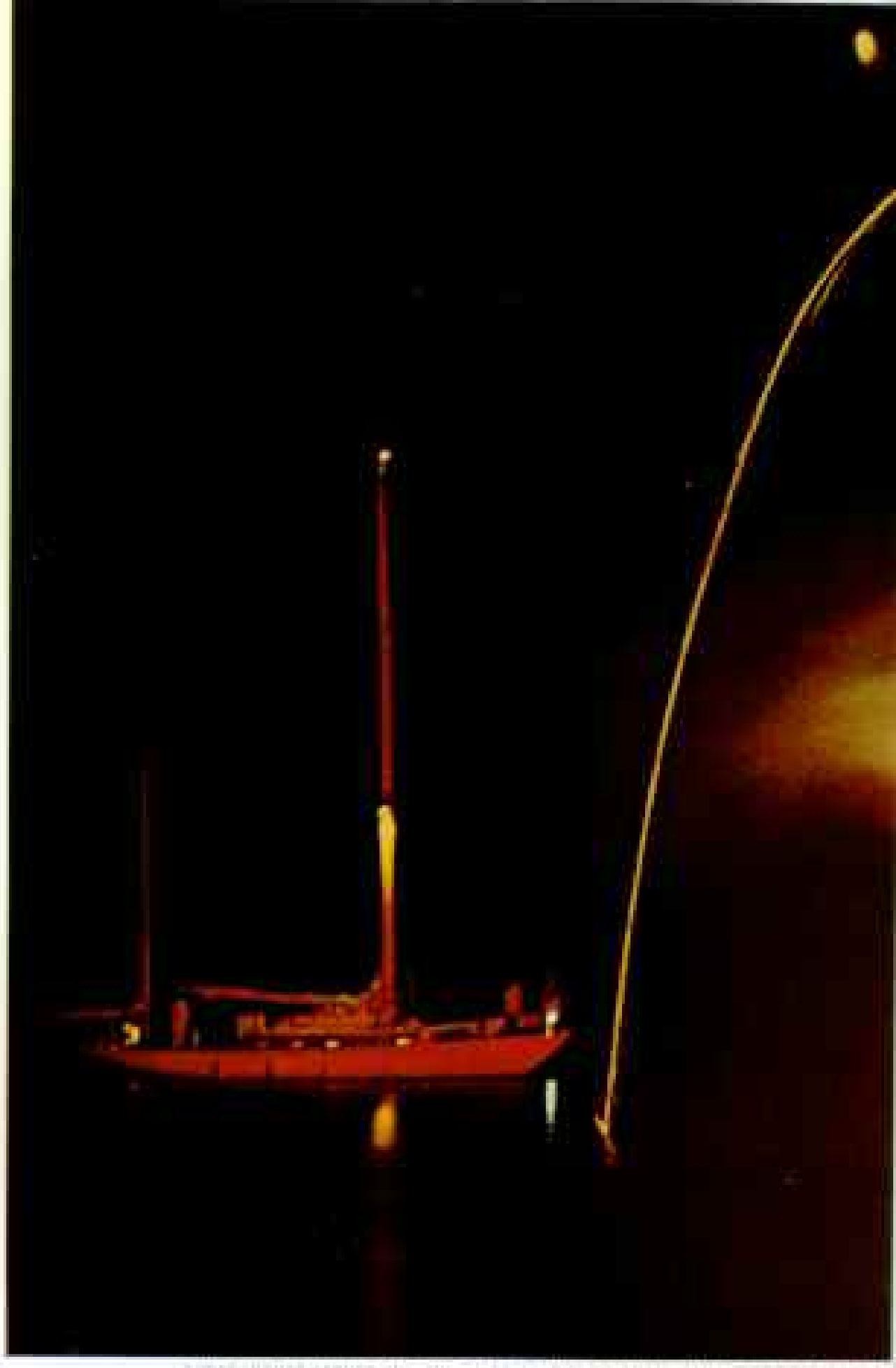
south Newfoundland coast. I have visited many on cruises out of Baddeck. The wildly beautiful Grey River is my favorite, and I saved it for the climax of the cruise.

While the yawl lay anchored in a mountain-girt basin at the head of navigation, the crew would go on one final fishing expedition. This would take two days, for the best of the river's fine salmon pools lie half a day's hard hike upstream.

The entrance to the Grey can be risky. When the tides are moving and the wind is south, its mouth becomes a racing maelstrom. Therefore I planned to come in at slack tide, and in daylight. But a call at the Ramea Islands off White Bear Bay took longer than expected, so that darkness caught us still at sea.

"What's more, the tide started out an hour ago," said Dick Lemmerman, taking bearings on the single white flasher that marks the Grey's mouth. "It might be a good idea to heave to outside until morning."

Photographer turns cook: Ed Grosvenor whips up a dinner batch of *crêpes Suzette*—glorified pancakes—on the galley griddle.



Fiery touch of home: Fourth of July fireworks, kept dry for this gala occasion, brighten the Saguenay River and the hearts of Yankees aboard *White Mist*. Not to be

PHOTOGRAPHS (ABOVE AND THIS PAGE BELOW) BY EDWIN STUART GROSVENOR; ALL

"Live from the moon:" Telecast of the Apollo 11 moonwalk on July 20, 1969, awes the crew while in the Magdalen Islands. Nikki Phillips (right) handles dock lines.

OTHERS, INCLUDING DATAGRAPHIC (LOWER RIGHT), BY MELVILLE BELL GROSVENOR © N.G.S.

outshone, the yawl wears her entire array of running, riding, and cabin lights. For safety, crew members set off the fireworks ashore rather than from the boat.

"Deck apes" frolic while Logan Brotherhood steers (above). Bob and Ed (below) display an hour's trout catch on Anticosti Island.

Button-shaped stones gave Button Bay, Vermont, its name. Anne Grosvenor and Bob L'Hommedieu gather enough for the girls in the crew to fashion necklaces.

But I had been here before and remembered the deep, narrow channel well. Under power, with flashlights to locate the rock walls, I could take *White Mist* in.

Pushing the throttle to full ahead, I drove her straight for that black rampart. With a tremendous thump, a wave burst over the stem and water poured along the decks. The ship shuddered and almost stopped. For a second I thought we had struck a rock.

"Keep driving her," Dick said quietly at my elbow. "That was only the meeting place of river current and ocean swell. Catch one of those graybeards and surf in on it."

And that was how we entered the Grey River, racing down the front of a curling wave while I fought the wheel to keep from broaching and ramming a cliff. We ran on into calm water, rounded a sharp bend, and steered for Jerts Cove (pages 50-51). Here the fishing village of Grey River may soon grow rich from tungsten deposits discovered in 1955.

Newfoundland Storm Lashes Sailors

With the diesel exhaust echoing off solid rock and the crew spotlighting the fiord's walls, we ran to the head of navigation. The Fathometer found us 12 feet of water and hard bottom. Securely bridled between two anchors, we passed a quiet night in the flickering glow of the northern lights.

Next day the fishermen hiked off upstream, following a river steadily narrowing to a shallow torrent. Nat Kenney and I stayed aboard as shipkeepers. The day waned. Towering thunderheads grumbled in the west. I tried the radio, but static drowned its signals. Switching off the set, we put two nice trout into the frying pan. A bilge compartment yielded a good bottle of white wine perfectly chilled by the cold river water. We ate with the cabin stove crackling.

As Nat poured the coffee, a violent blast of wind caught *White Mist* side-to and laid her nearly on her beam ends. The coffee flew into a lee bunk; the dishes would have gone too, except that our table is on gimbals and always stays level.

Struggling into oilskins as we went, Nat and I scrambled topside. Driving rain and hail blinded us; the tempest almost blew us into the night. A flash of lightning gave me a glimpse of the lee rail down to the water—this despite the fact that *White Mist* wore nothing but a Cruising Club burgee!

When an anchored ship falls out of the wind's eye in a storm, she is dragging. As fast as we could, Nat and I put down a third anchor. *White Mist* came abruptly to her feet and headed into the gale. She was safe!

Violent squalls lashed the river all night. Taut as bars of iron, the nylon anchor lines vibrated like bass drums, a sound I had never heard before in *White Mist*. But they held, and the light of a clear, cold dawn disclosed the rocky shore close under our lee.

Upriver meanwhile, the storm caught the fishermen on the trail.

"What a night!" Teeny reported when the crew straggled back. "We were soaked and half frozen. We found a cabin large enough for only half of us, but we all crowded in anyway. Jim had caught a big salmon before dark, so we fed well. But the firewood was wet, and the stove smoked.

"Next day the river was muddy and the fishing poor. The mosquitoes and black flies were so thick we choked on them. But it was a great trip. Why, I even had a wonderful bath in the river. When you're as cold as I was, 45-degree water feels just like a hot tub!"

History Lesson Ends at Baddeck

Picking a time of slack tide, we cleared the Grey in the morning and headed *White Mist* south, to call briefly at Miquelon and St. Pierre, island outposts of France. Then we set the spinnaker and romped over the blue sea.

Back at our summer home in Baddeck, Nova Scotia, Anne and I watched the crew jump ashore with their gear. They all looked tanned and fit, especially the youngsters.

"At least they'll go off to school and college strong and healthy," I said.

"More than that," said Anne. "Believe it or not, the last thing every one of them said went something like this: 'I bet I'll get top marks in history this year!' "

THE END

With a cargo of history, *White Mist* coasts past the sinuous 700-foot cataract at Newfoundland's Aviron Bay. From here she set sail for the French islands of St. Pierre and Miquelon, and thence to Baddeck, Nova Scotia, final port on her voyage back through time.

EXTACHROME BY MELVILLE BELL GROSVENOR © N.G.S.

Nature's Toy Train, the Railroad Worm

By DARWIN L. TIEMANN

Illustrations by National Geographic Photographer ROBERT F. SISSON

EXTACHROME © N.G.S.

"I'm a compulsive kicker-over of rocks," confesses the author, amateur entomologist and an engineering technician for the United States Navy at its China Lake, California, weapons center. A National Geographic Society research grant supported his study of the dazzling railroad worm, seen here in daytime drabness.

ITS HEAD GLOWS a fiery red, as if giving a warning to clear the track. Along its body, 22 spots of light—11 to a side—shine pale greenish-yellow, like windows of a passenger train hurtling through the night.

This incredible creature is nature's toy train—the larva of the beetle *Phrixothrix* of South and Central America, better known as the railroad worm (foldout, following pages).

Even in places where it abounds, few people have seen the railroad worm, for it's an easy train to miss. Female larvae seldom exceed two inches in length, males half that much. Moreover, this train runs only at night, and only part of the year. *Phrixothrix* passes most of its life hidden in the earth or under rocks and logs. And unlike its distant cousin the firefly, it does not make itself conspicuous by flashing signals to a prospective mate.*

Only when aroused—usually by actual contact with some other creature—does the railroad worm turn on its lights. The message conveyed to a predator by this sudden, eerie display may be: Leave me alone; I'm not good to eat. Or perhaps: Beware; I'll burn you if you touch me.

In fact, the railroad worm's head lamp glows about as intensely as the coal of a lighted cigarette, and the lanterns on its abdomen gleam like tiny embers.

I first saw the startling luminescence of the railroad worm in

*See in NATIONAL GEOGRAPHIC, "Wing-borne Lamps of the Summer Night," by Paul A. Zahl, July 1962.

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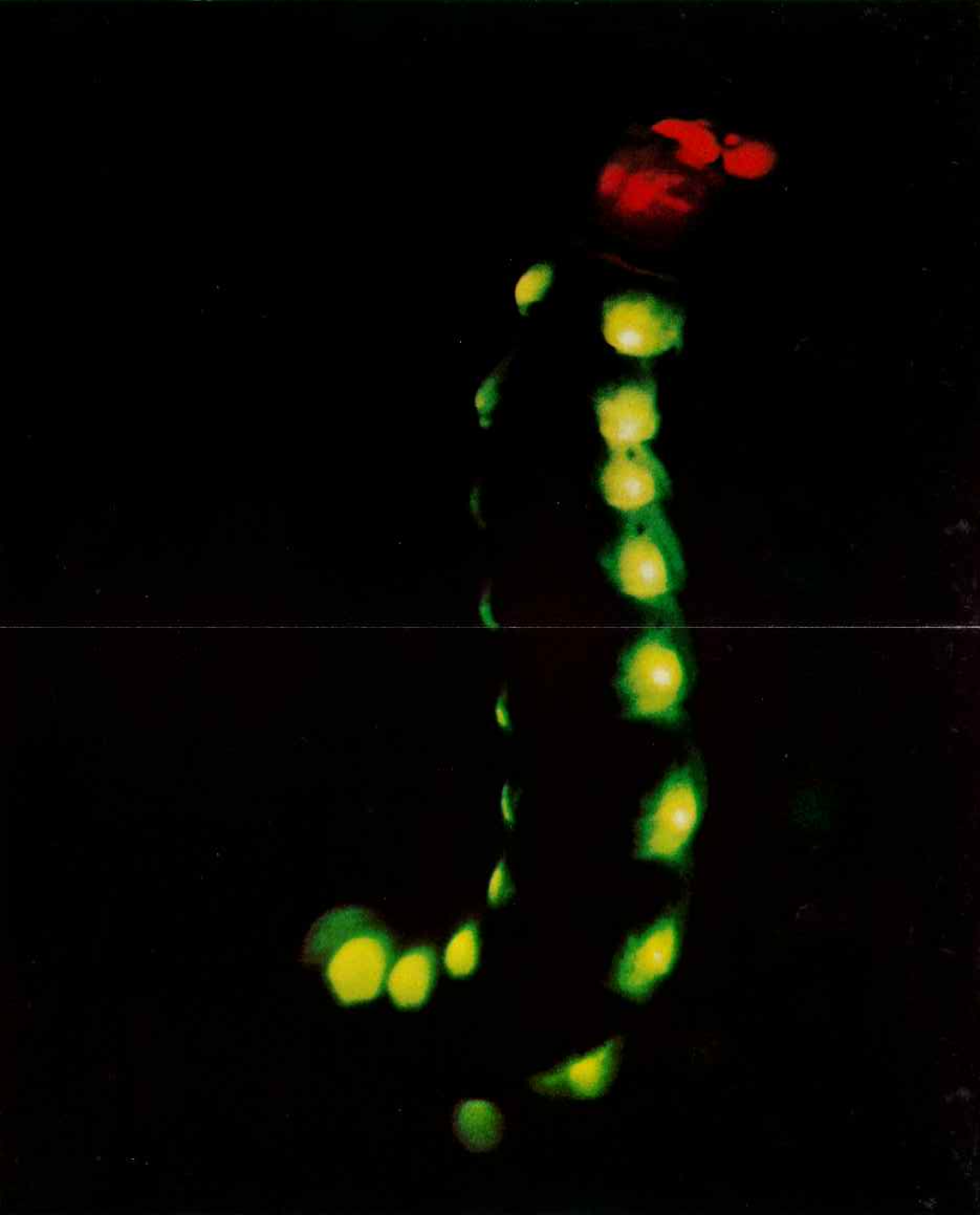


Brazil 10 years ago. At that time, few entomologists—either professionals or serious amateurs like myself—had studied it; only a few live specimens were known to have been brought to the United States for scientific observation. I was able to find just two larvae before my brief trip ended.

But last August, aided by a grant from the National Geographic Society, I returned to Brazil to spend nearly six months collecting railroad worms—a task at times as frustrating as it was fascinating. Not only did I want to observe these captives as they passed on through the life cycle, but I also hoped my specimens would produce progeny I could study at still greater length.

So little had been recorded of the life and habits of *Phrixothrix* that I could only guess at the most efficient collecting methods. Returning to the small city where I had found railroad worms in 1960—São José dos Campos, 175 miles west of Rio de Janeiro (map, below)—I first tried to find specimens by day.

I scattered 300 building tiles and concrete blocks in vacant lots and a grassy field, hoping railroad worms would crawl beneath them, seeking shelter at morning twilight. Under some tiles I buried open-topped cans; perhaps larvae would drop in and be trapped. But these techniques lured few specimens.

Ultimately, I did most of my collecting at night, roaming with a powerful light, hunting railroad worms while they hunted food—millipedes and the larvae of moths and other insects.

Occasionally, I saw a railroad worm glowing brightly in the dark. I remember one lit like a streamliner as it fled from a cricket. But most did not shine until I touched them, and even with my strong light I found it difficult to spot the dull luster of their small mahogany-colored bodies against the earth (pages 60-61).

I reasoned that my task would be easier if I could arouse my quarry to switch on its lights as I searched. So I bought firecrackers and tossed them into the grass. But when the smoke cleared, I saw no tiny red and greenish-yellow lights.

Later, I found that a firecracker tossed only three feet from a railroad worm brought forth not even a glimmer. I stamped my foot beside another—with the same disappointing result. I even tried fogging the grass with insect repellent to irritate the larvae into luminescence. No light appeared.

However, I eventually collected 280 railroad worms. Most were found, unlit, by patiently searching the grass and earth, night after night.

Two young Brazilians gave me valuable help. Soon after my arrival, I hired 17-year-old Isaac Cassemiro de Souza, who earned his living doing odd jobs. He took collecting so seriously that I came to regard him not as an employee but as a colleague.

Both Isaac and José Eugenio Lemes dos Santos, a high-school

Cheery streamliner, a railroad worm glows with enough light to have its picture taken (foldout at left). Eleven pairs of lanterns, chemically activated like those of the firefly, smolder along the larva's length, which resembles a lighted passenger train. Others on the head shine red. The creature turns on when alarmed, as if to warn or bluff intruders.

Until recently scientists had seen only a few specimens of *Phrixothrix*, which inhabits grasslands from Costa Rica to Argentina (right). The author's half year of sleuthing in the Brazilian town of São José dos Campos yielded a total of 280.

ENLARGEMENT (PRECEDING PAGE) © N.G.S.
EIGHT TIMES LIFE-SIZE

student who joined us when his classes let out, seemed to appreciate success in the hunt even more than the modest wage I paid. Isaac whistled constantly as we searched. From a distance I could judge his luck by his tune; the better the hunting, the livelier his whistle.

Phrixothrix means "with bristling hair," referring to the tiny hairs on the beetle's body. I was delighted to learn recently that the species, a new one to the scientific world, is being named in my honor.

The insects hatch from eggs laid underground and pass by far the greater part of their lives—perhaps a year or longer—as larvae. Many of my specimens transformed into pupae in captivity. Males remained in the pupal stage for 25 days, and females nine to ten days, before becoming adults. In all three stages they had the ability to luminesce.

Monogamous Males Take Fickle Mates

The male metamorphoses into a small winged beetle (page 65). Attracted to light, it is relatively easy to collect; specimens have been captured from Argentina to as far north as Costa Rica.

Of course females occur in the same range, but rarely have naturalists found them. The female spends most of her brief adulthood in an underground cell, perhaps going to the surface once to announce her readiness to mate. Never acquiring wings, the female outwardly resembles a larva as she emerges from the pupal stage —a characteristic of all known species in the Phengodidae family of beetles.

Males seem attracted to females not by luminous signals, as with fireflies, but by a faint scent. Males mate once; a female may mate with several males. But she will lay eggs only once—about three dozen pearly-white spheres, which soon turn reddish-brown (page 65).

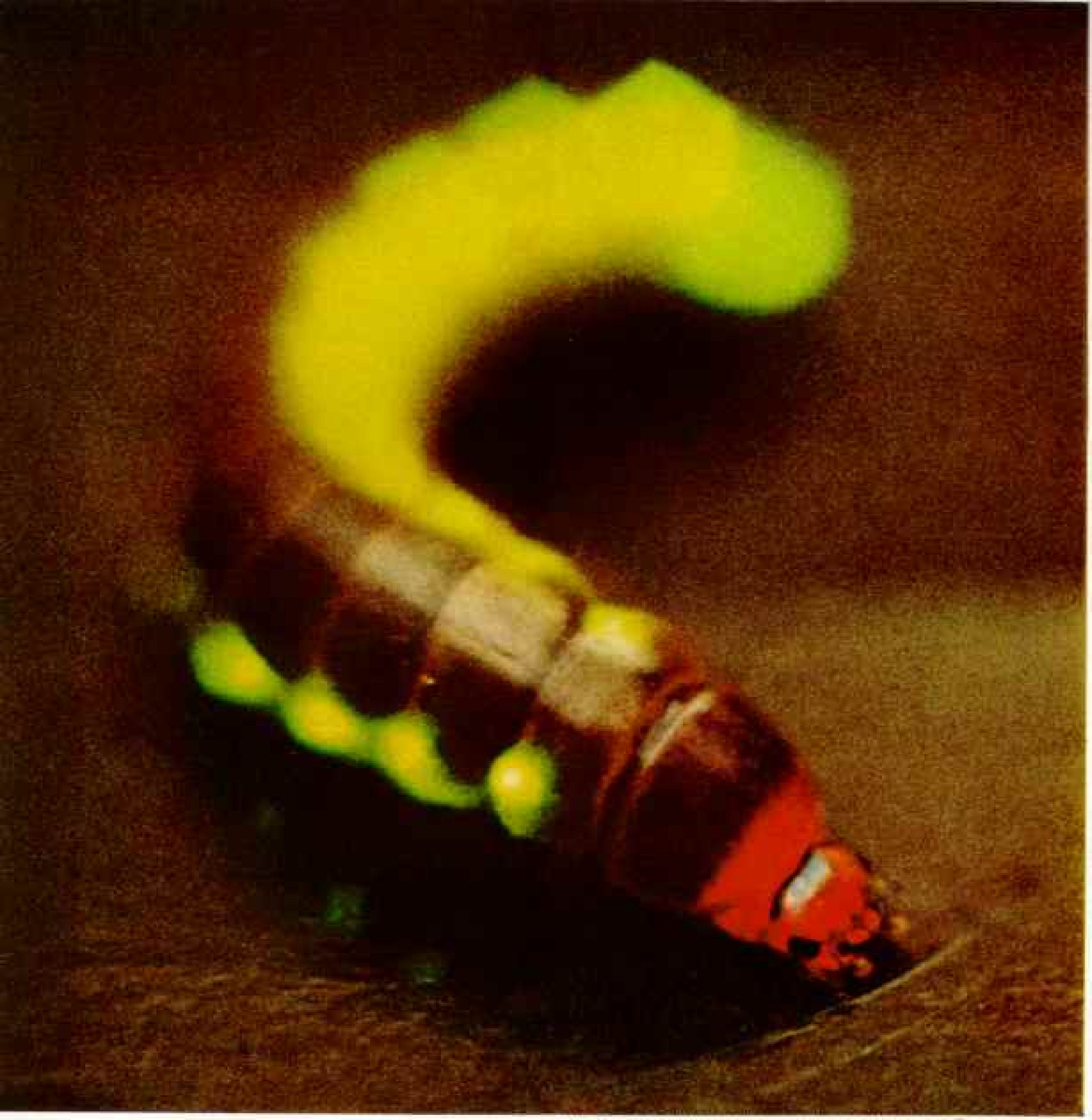
Adult male beetles emitted greenish-yellow light from the abdomen, but I could not detect the bright red of the head lamp. Mature females gave off both colors.

Bioluminescence in insects, fish, and other organisms has been studied by scientists for many years.* They believe that railroad worms produce light as fireflies do, by oxidizing a chemical called "luciferin." An enzyme, luciferase, must be present for the chemical reaction to yield a glow, just as enzymes serve as catalysts in the human body.

*For an explanation of firefly luminescence, see "Torchbearers of the Twilight," by Frederick G. Vosburgh, NATIONAL GEOGRAPHIC, May 1951. Dr. Paul A. Zahl described luminous marine organisms in "Sailing a Sea of Fire," July 1960, and light-emitting fish in "Fishing in the Whirlpool of Charybdis," November 1953.

Diner merges with dinner as a railroad worm (above) eats its way through a millipede twice its size. When confined together, the larvae sometimes eat each other.

Safari in a suburb: Prowling a vacant lot by day, the author trowels fruitlessly for specimens at São José dos Campos, Brazil. Hunts after dark fared better. Patiently searching with a light, he captured as many as three or four a night (below, about three times life-size). Surprised townsfolk, shown the creatures when agleam, would gasp a pleased "*bonito*—pretty."



ATTACHERN BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT F. SISSON © N.G.S.

Railroad worms usually turned on all their lamps when I first touched them. The glow began to diminish slowly after perhaps a minute, and eventually went out. Their nervous system, I learned, can switch individual lights on and off. I have seen them dim and brighten their side lights, extinguishing one or a pair while others shone intensely. And I watched one that repeatedly turned on the red, but not the greenish-yellow.

In captivity their behavior changed. Although the larvae had ignored exploding fireworks and stamping feet in their own world, they lit up readily in the unfamiliar environment of my hotel room. I could make a dozen stage a veritable festival of lights by tapping my fingers on the dresser, where I kept each in a plastic jar. (I had learned that when several are confined together in a small space, one sometimes attacks and even eats another —although I never saw evidence of this in their wild state.) Even the closing of a door across the room would turn their lights on.

Captive larvae lit up brilliantly as they attacked the millipedes that I offered as food. Curling about the victim's body, the railroad worm would bite into the midsection. It seems to secrete or, perhaps, regurgitate a dark fluid—it may be a poison or a stomach enzyme—as it sinks its sharp, scimitar-shaped

Aglow as they grow

LANTERNS BLAZE with eerie brilliance in a female portrayed in a double exposure (opposite)—once in darkness by her own light, and again under a weak bulb. Friction tape hobbles the railroad worm for this portrait.

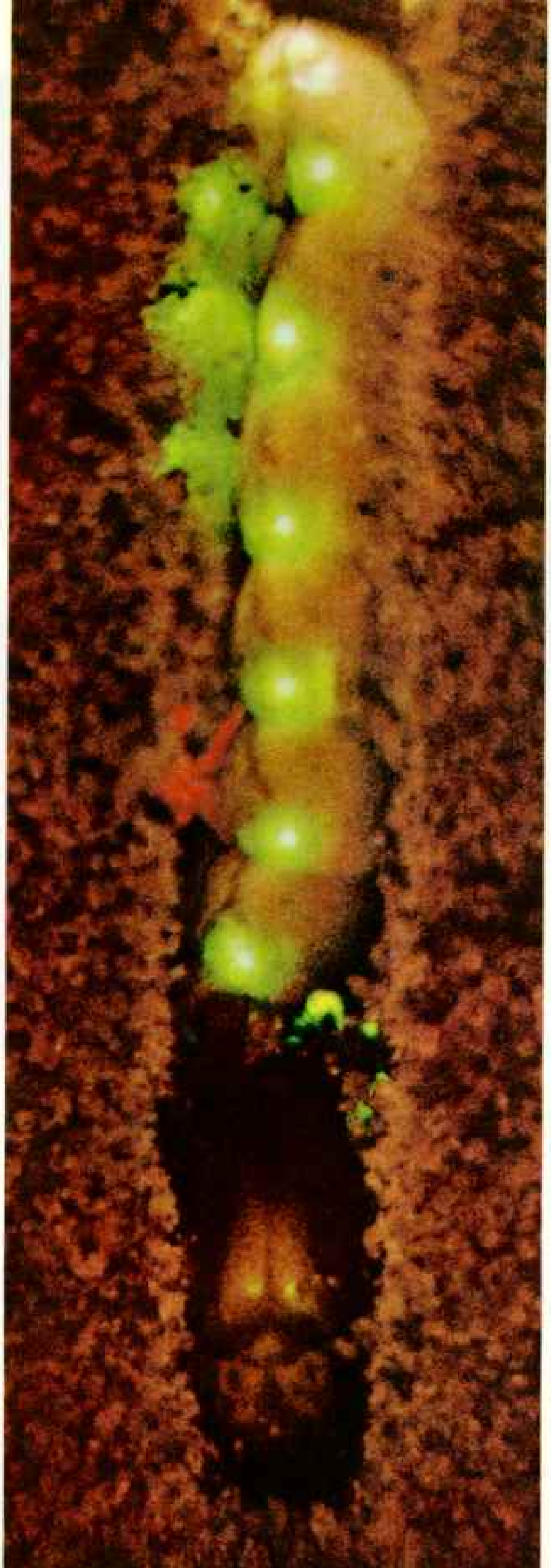
Ending their larval period, the predatory insects suddenly grow sluggish and enter pupation, the stage when they metamorphose into adults. A female pupa (above) curls beside a male less than half her size. Lights still work; an agitated female pupa shines at right, while a male pupa (upper right) glows beside his shucked larval skin. Soon both will cast off pupal skins and emerge as sexually mature adults. The female will appear little changed, but the male will emerge as a dashing winged beetle (page 65).

mandibles. The bitten area soon turns dark.

Adult male and female stage a pyrotechnic display as they mate, suggesting that luminescence is linked to romance as well as to alarm (next page). I believe they glow while mating—and also while attacking prey—to warn off predators while preoccupied.

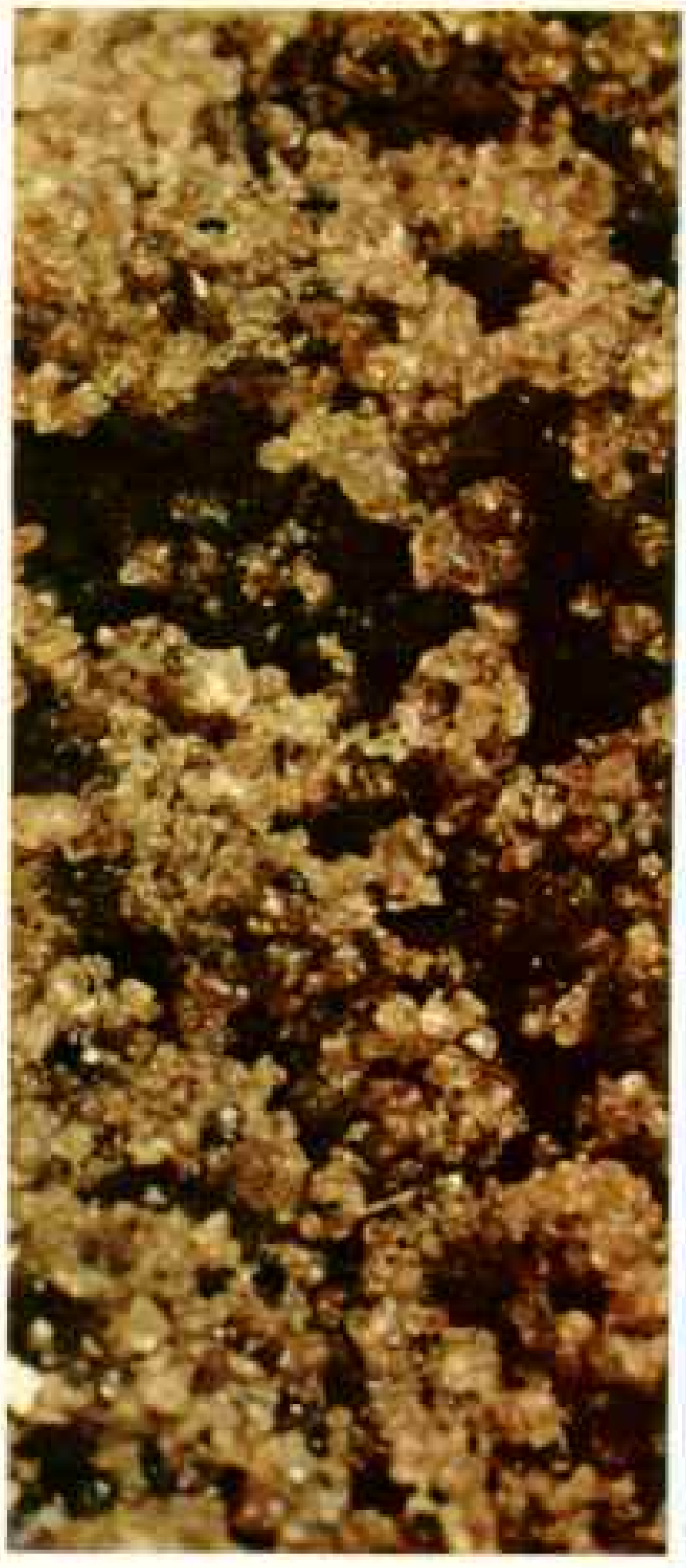
Many tried to bite me. Usually the skin of my hand was too tough for them, but one pricked me painfully—as if I had been jabbed with two pins—in the tender skin between my fingers. The brown secretion appeared around the tiny wounds. Since I did not want to injure the specimen, I left its mandibles in my skin for fully a minute before I could gently pry them loose. Although I washed my hand with antiseptic, an area near the bite remained inflamed for several days.

When the time came for me to leave Brazil, I began to fear that a new law might prevent me from taking railroad worms out of the country for further study. Fortunately, my investigations had made friends for me among naturalists at the University Museum of Zoology in nearby São Paulo, and they interceded in my behalf. The U. S. Department of Agriculture granted me an entry permit for my strange cargo and, together, we enplaned for the United States. Some of the mature females had mated before I left Brazil. As



Pyrotechnics of mating light a female, seen in her burrow inside a glass-walled box (left). A mature male, glowing faintly below, fertilizes her; he will die within a few days. The female's body bends double so that her red headlights show beside her abdomen. Two weeks later she will begin to lay a cluster of about three dozen eggs.

Mound of eggs—only half the creature's ultimate output—dwarfs an adult female, whose body curls like a protective nest around the clutch.



Matchmaking for science, the author transfers a squirming male into a female's plastic jar. Normally he confines each railroad worm to its own little "roundhouse."

EKTACHROME (OPPOSITE) AND KODACHROME © N.G.S.

Embattled adult male, a small beetle, grips the author's thumbnail with mandibles that can draw blood from tender skin. Paired, feathery antennae harbor sensory organs.

EKTACHROMES © NATIONAL GEOGRAPHIC SOCIETY

Like a switchman swinging a lantern, a railroad worm sways its head in this time exposure. Below, another travels at 3/4 of an inch a second. For the larger picture, Mr. Sisson first took an insect-illuminated time exposure that makes trailing lights resemble peas shucked from a pod. He then rephotographed his subject on the same frame in artificial light.

others emerged from the pupal stage on the long ride home—during which I kept my specimens in a picnic cooler beside my seat—I put male beetles into their containers. I hope to raise their progeny in a controlled environment in a room of my home at China Lake, California, so I can observe them and learn more about their life and habits.

I also gave some of my specimens to scientists studying bioluminescence—Dr. John Buck and Dr. Thomas Hopkins of the National Institutes of Health in Bethesda, Maryland, and Dr. Howard Seliger of the Johns Hopkins University in Baltimore.

While knowledge about luminescence is growing—chemists can now produce cold light from man-made chemicals—many of the riddles of light-making in living things are still unsolved. For example, why do some insects emit one color and some another, using light-making systems that are essentially identical? Common American fireflies glow orangy, bluish-green, and greenish-yellow; the click beetles of tropical and subtropical America produce both green and orange; but the red of *Phrixothrix* is unique!

Biochemists believe the color is determined by the composition of the enzyme in the cells of the light organ. Differences in enzymes apparently cause the railroad worm's headlight to glow red and the abdominal lights to shine greenish-yellow.

As they try to solve the mysteries posed by the railroad worm, biologists and biochemists have their eyes on an even more impressive goal. "Knowing more about how such organs produce their light," Dr. Hopkins suggests, "will, we hope, reveal some basic mechanisms by which living cells of all creatures carry out their complex functions." THE END 67

Luxembourg, the Quiet Fortress

By ROBERT LESLIE CONLY
Senior Assistant Editor

Photographs by TED H. FUNK

I HAD NOT BEEN in the Grand Duchy of Luxembourg one day before I heard the joke. An American couple, touring Europe by car, were driving from Frankfurt to Paris. On their way they passed a border checkpoint.

The wife: "What country is this we're coming to?"

The husband: "I don't know. Let's look at the map."

The wife: "Never mind. We just left it."

This is an exaggeration, but only a slight one. It is not difficult, driving east and west, to cross Luxembourg in half an hour. The country is, in a lumpy sort of way, pear-shaped, and at its widest bulge the pear measures only 35 miles across. North to south it's a little longer—51 miles. It is customary in writing about European countries to compare the large ones with Texas, small

Like a grizzled warrior, thousand-year-old Vianden Castle symbolizes the history of Luxembourg, a land that has felt the march of invaders from Caesar's legions to Hitler's panzers. Fiefdoms battled one another until the beautiful and diplomatic Countess Ermesinde united them in the 13th century. Even so, Luxembourgers often bore the yoke of conquerors. Weary of foreign domination, they forged the motto: "We wish to remain what we are."

Wine on the vine: Harvester gathers grapes along the Moselle River.

ones with Rhode Island. Well, if you put 100 Rhode Islands into Texas, there would still be ample room for 140 Luxembourgs.

More precisely, the country has an area of 999 square miles. This immediately leads visitors to ask an obvious question, and I was no exception:

"Couldn't you somehow get just one more mile—make it an even 1,000?"

The Luxembourger I asked had a joke about that, too.

"We did get another mile once," he told me, "But the people who lived on it couldn't speak the language, so we gave it back."

The language? It is not French, and it is not proper German, though the people speak those, too. It is a dialect called *Letzeburgesch*. The 343,000 citizens of Luxembourg speak it most of the time, though it is not ordinarily used as a written language. Foreigners do not understand it, and this fact is more important than it might seem, for it is one of the reasons why this odd, small country exists, staunchly independent, in the heart of Europe (inset map, page 72).

There are other reasons, and they extend as far back into history as you care to go. I cared to go back about 2,000 years, and so I did one

EKTACHROME (RIGHT) AND KODACHROME © N.G.S.

Lord of the flues, a dour chimney sweep in traditional top hat and with brushes on his back awaits a bus with his apprentice in Luxembourg City. Though he is regarded as a good-luck sign, his own fortunes sag as gas increasingly replaces coal for heating.

Charity drive on the hoof: Bandsmen in peasant dress parade through downtown Luxembourg with a flock of sheep. As they march, they collect gifts to support their band program on the opening day of *Schueberfo'er*, a late-summer trade fair dating from the 14th century. Luxembourg's wine festivals, religious rites, and folk pageants attract almost a million visitors a year.

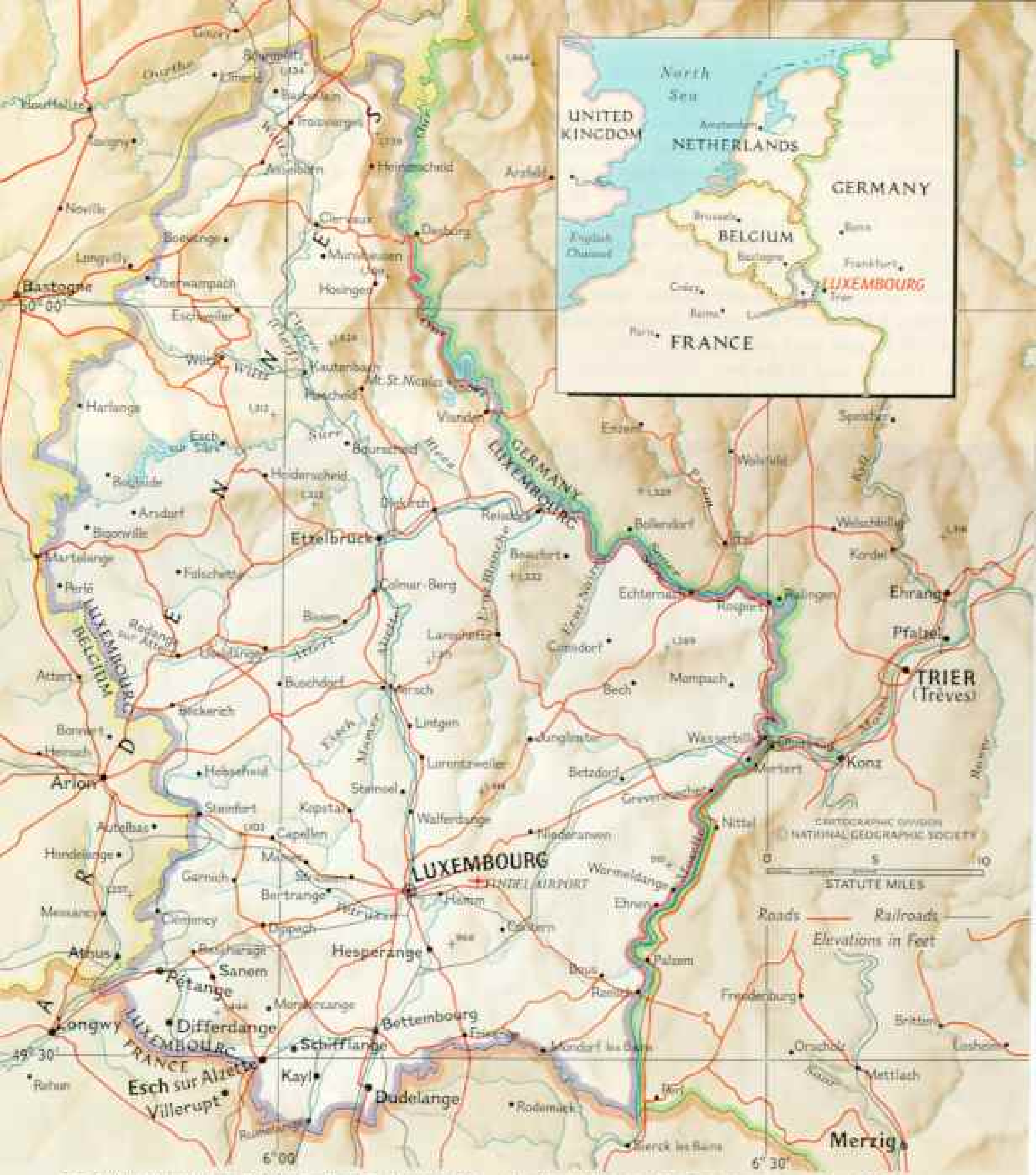
afternoon in a modern automobile with a man named Marcel Schroeder.

Mr. Schroeder is a businessman by profession, and a photographer and historian by avocation. We start our expedition from his office in Luxembourg City, capital of the Grand Duchy. The office is in a stone building so grand and turreted that many visitors take it for the royal palace, but it is not; it is the headquarters of the ARBED Steel Company, Luxembourg's biggest industry and the third largest steel producer in Europe.

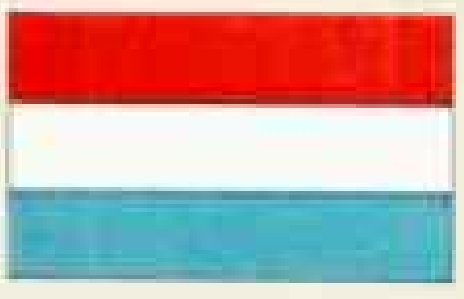
On our way to the past, which is about five miles away, I get a small guided tour of the capital, a city of 77,000. Our car turns onto the Avenue de la Liberté, four lanes wide, lined with shops, restaurants, office buildings, hotels, even a few night clubs. This is the main street in the "new" part of town.

Side Streets Have a Medieval Look

But as we drive along the modern avenue, I look up the side streets. Even though this section of the city has grown up since 1900, the scene is oddly medieval. "The people here are conservative," explains Mr. Schroeder. So even the relatively recent houses are tall and narrow, crowned with steep gabled roofs



WALLED TOWNS and lofty castles cling to the riverbanks and loom from the crags of Luxembourg, giving the mountainous land a medieval charm. Along the southern border iron-rich earth gives it prosperity; the tiny nation is among leading steel producers, with an annual output worth $600,000,000.



Luxembourg, often invaded since Roman times, holds proudly to independence and to its own language, a dialect of French and German. In the 14th and 15th centuries four of its monarchs ruled the Holy Roman Empire, an area nearly 400 times that of Luxembourg. In the 17th century it held one of Europe's strongest fortresses, a cause of conflict with ambitious neighbors. The citadel was razed under terms of an 1867 treaty that guaranteed Luxembourg's sovereignty.

GOVERNMENT: Constitutional monarchy, formally known as the Grand Duchy of Luxembourg. **AREA:** 999 square miles. **POPULATION:** 343,000, mixed Gallo-Germanic stock. **LANGUAGE:** *Letzeburgesch*; also French and German. **RELIGION:** Roman Catholic. **ECONOMY:** Almost half of work force in industry, an eighth in farming. **MAJOR CITIES:** Luxembourg City (pop. 77,000, capital), Esch, mining, steel. **CLIMATE:** Cool summers, average July high 74° F., average winter low 29°.

and conical turrets like the hats of witches.

We cross a bridge, the Pont Adolphe, turn right again and enter the "old" city, parts of which are in fact medieval. We drive down cobblestone streets so narrow our fender paint is in danger. Mr. Schroeder stops at an old stone house with pillars in front. "Built in the 15th century," he says. There is a cafe in the ground floor now, called Enner de Steiler—Letzeburgesch for "Under the Pillars."

We cross another bridge, past a city gate called Three Towers. "Built in 1051," says Mr. Schroeder. This, and other crumbling fortifications and walls we see, recall the days —the centuries—when Luxembourg City was a vast military stronghold. (Today the country has an army of 600 men.)

Romans Left a Durable Road

But these ruins were all too new for Mr. Schroeder, so we drove on, and as we did I learned something else about the city—you can't go anywhere in downtown Luxembourg without crossing a bridge. This is because the place is most confusingly carved up by the deep, cliff-sided valleys of two winding rivers, the Pétrusse and the Alzette (pages 76-7). There are more than 60 bridges in the town, and we must have crossed 10 before we emerged on level ground, a low plateau called the Weimershof, a mile or two east of the city.

Here the houses gave way to fields, and the road deteriorated to a muddy track—but not for long. We made a sharp turn, and were back on a hard surface, a narrow one, made of stone blocks smoothly fitted together. It led across the fields as straight as a ruler.

"The Romans built this road," said Mr. Schroeder, "probably in the first century B.C. It led from Reims to Trier, which became the most important Roman imperial city in northern Europe. On the way it ran through what is now Luxembourg City. It's under the Grande Rue, our main shopping street. Near the road the Romans built a fort, a *castellum*, on a rock in downtown Luxembourg. Eventually, a town sprang up around the site."

We drove along the Roman road for about a mile, and then our way was blocked. A modern dual highway, under construction, cut across in front of us, and the ancient stones were piled with drainage tiles, sewer pipes, steel rods, and other building materials. I wondered if the new road would still be in such good condition after 1,900 years.

When Julius Caesar led his legions through here in 57 B.C., he found a Celtic tribe, the Treveri, living in what is now Luxembourg. They fought bitterly against the Romans, and even after they were defeated, Caesar wrote, "never submitted to commands except under compulsion of an army."

The significant fact, however, is that Caesar came through here not with any particular interest in the Treveri, but on his way to the Rhine, to Germany. Later he came again, bound for England. The area (it cannot be called Luxembourg until 1,000 years

Hereditary monarch, Grand Duke Jean of Luxembourg stands beside Grand Duchess Josephine Charlotte—the sister of Belgium's King Baudouin—in the library of their home, the Château de Berg, near Colmar-Berg. Head of the House of Nassau, Jean reigns over, but does not govern, his nation. Power is vested in a parliament, prime minister and cabinet, and courts and tribunals.

Rubble of war (below) litters Echternach during the Battle of the Bulge; Maj. Gen. Manton S. Eddy, XIIth Corps Commander, and his bodyguard, Sgt. John Hylas (nearer camera), seek cover from Nazi shells. Germany's last-ditch offensive in the winter of 1944-5 destroyed 60,000 Luxembourg homes. The U.S. First and Third Armies crushed the assault, after holding fast at the key road center of Bastogne, just over the border in Belgium (map, page 72).

In a cemetery at Hamm, more than 5,000 U. S. soldiers lie buried, including the Third Army's flamboyant Gen. George S. Patton, Jr., victim of a postwar automobile accident.

Peaceful invasion: European-based U. S. troops (left) parade in Ettelbrück on "Remembrance Day," commemorating the final retreat of Nazi armies in January 1945. Luxembourgers celebrate in late June, when they have better weather and more visitors to take part.

Two who remember American liberation display the Stars and Stripes, draped in unorthodox fashion, beside their own flag in Ettelbrück, a city that fell to the Germans in heavy fighting during "the Bulge." The Third Reich exploited the country, imprisoning 16,000 people and drafting young men to fight on the dreaded eastern front.

U. S. ARMY; EKTACHROME (OPPOSITE) AND KODACHROME BY TED W. FUNK © N.G.S.

afterward) is what historians call a "marchland," a small border area caught between giants, endlessly invaded and trampled on from both sides.

Most Americans, if they know about Luxembourg at all, recall the terrible fighting that took place there in World War II. There was one battle in particular that raged through the wooded mountains of the north, a battle called "the Bulge." I was to see the sad traces of it, still remembered, still visible, before I left the country.

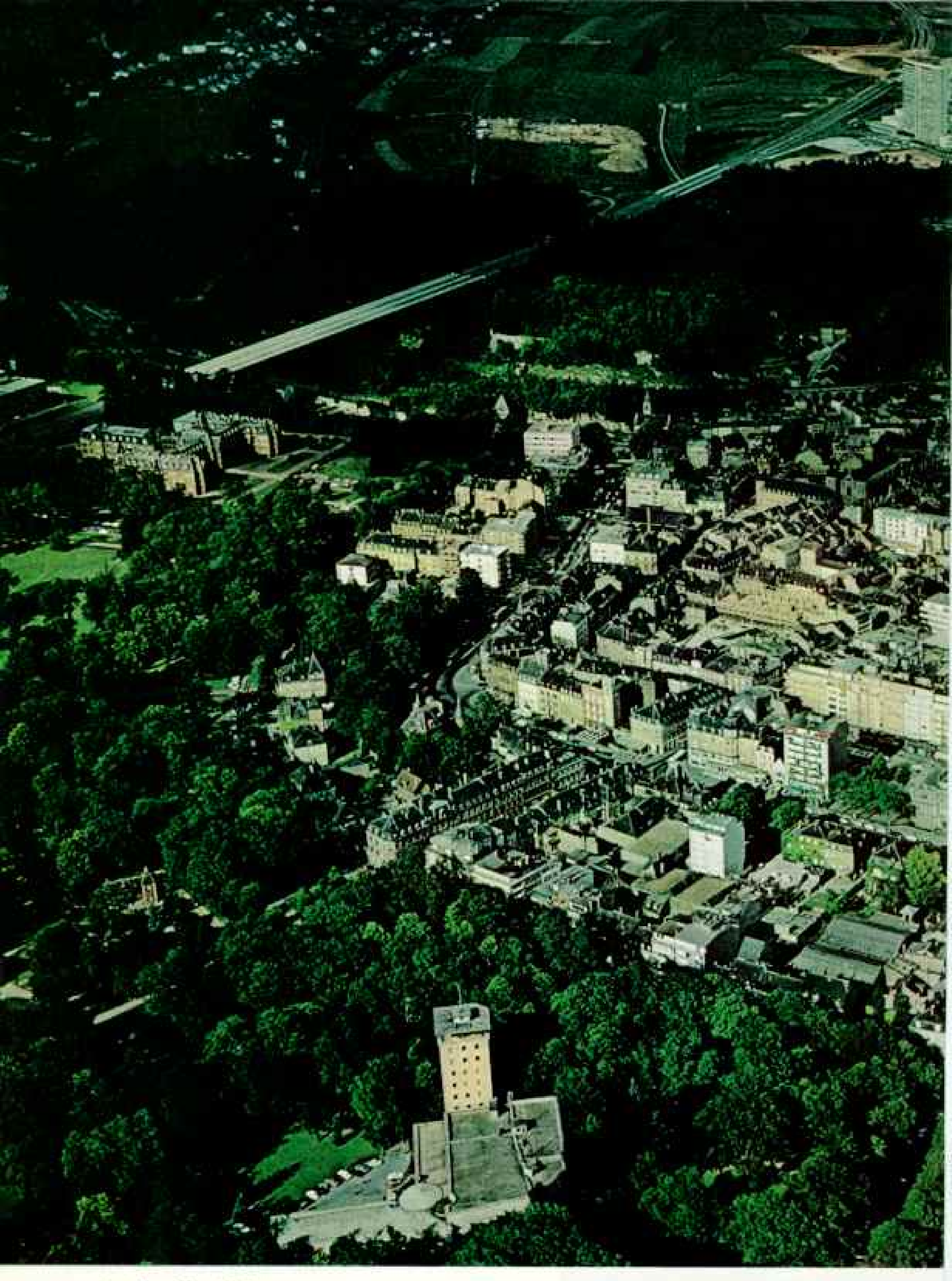
The perilous existence shows in the brooding castles that stand on the rocky hilltops, with moats and drawbridges that could be raised to provide at least temporary refuge from the latest wave of invaders. It shows, too, in the tenacious resistance to change by people who have seen too much of it.

There is even a national motto: "We wish to remain what we are." It is a political statement, a protest against foreign domination. But it is more than that; it is an attitude reflected in many aspects of Luxembourg life. It shows most of all, I think, in the looks of the place.

Back Roads Offer the Best Scenery

I thought Luxembourg City looked medieval, but that was before I saw the rest of the country. One day soon after I arrived, I set out in a rented car, heading north, toward the hills and the forest called the Ardennes.

On this first trip I learned a lesson. In Luxembourg it is best, when possible, to drive by the back roads. They are narrow and winding, but always well marked, so I never got lost. More important, they make the trip last longer and thus provide more time to look at the scenery.



Cradle of the little nation, the capital grew up around a castle named Lucilinburhuc—commonly translated as small fortress; time has destroyed the castle and changed the word to Luxembourg. Twisting side streets and steep, turreted roofs give the city of 77,000 a medieval flavor. A lone skyscraper

in the distance, the 22-story European Center, houses offices of the European Economic Community and other international organizations. Pont Adolphe at lower right, one of the city's dozens of bridges spanning the winding Alzette and Pétrusse Rivers, connects the sunlit old section with the new town.

The scenery: It was raining when I started, but in half an hour the clouds rolled away, the sun came out, and the autumn leaves, shiny and wet, were green, purple, brown, gold, and yellow. The over-all effect was unexpected, since I knew from reading that the mountains of the Ardennes are not particularly lofty—the highest is 1,834 feet. Yet the vistas were magnificent, and the mountains looked far higher and more rugged than they should.

There is a reason for this. The northern and western two-thirds of Luxembourg consists of high, convoluted plateaus of rock, and these plateaus are interlaced with wandering rivers, small and not so small: the Blees, Sûre, Our, Eisch, Clerve, Wiltz, Woltz, Alzette—which is a lot of rivers for a 35-by-51-mile country. By reason of the fast runoff and the nature of the rock, the streams have carved themselves steep valleys 500, 600, or even 1,000 feet deep.

Castles Tower Above Walled Towns

Combine this geology with a heavy coating of forest—and add a local habit. Along the rivers the people of Luxembourg have built little villages, ranging in population from a few hundred to a thousand or so; some of them date from the Middle Ages, and they are walled. Inside the walls are steep-roofed houses and the small, high-steepled church. And atop the cliff, with round towers and battlements, stands the castle.

The effect was hypnotic, even though I had been forewarned. An American photographer I met in Luxembourg City told me: "The whole place could have been dreamed up by the Grimm brothers, or maybe Walt Disney." He was exactly right.

My destination on this drive was Vianden, a town of 1,500 nestling in the Ardennes along the curving steep banks of the Our River. Victor Hugo lived here during part of his long political exile from France—his house is preserved as a museum—and wrote about the "splendid landscape which one day all Europe will visit." The town's charter was granted by Count Philip of Vianden in 1308, but the place was mentioned in documents as long ago as A.D. 698.

The counts of Vianden built up a feudal domain that eventually included 136 villages. Along with it, starting in the ninth century, they built an enormous castle, the biggest in Luxembourg, one of the most forbiddingstructures I have ever walked through (pages 68-9).

To see it, I had an appointment with Jean Milmeister, a Vianden schoolmaster, writer, and historian. I met him in a little inn called the Heintz, which adjoins and was once part of a Trinitarian abbey built in the 1300's.

In its pleasant dining room we ate lunch, and Mr. Milmeister talked of counts and castles. Vianden's rulers fought in the Crusades; they reached their peak in the 13th century; one of them, Count Henry I, married the daughter of the Emperor of Byzantium.

Exporting sound

TEEN IDOL Tony Prince signals his engineer as he spins rock records over popular and profitable Radio Luxembourg. Foreign firms sponsor the broadcasts on the privately owned station, which boasts a wide audience throughout Europe, a continent served largely by government networks.

Curiously, the vibrant music of the young emanates from a nation of conservatives. The British-born disc jockey's haircut and mod button—"Love is lovely, war is ugly"—and the high hemline displayed by a Belgian model in a Luxembourg boutique (right) represent trends that have come only lately to the Grand Duchy.

Secluded in tendernesa, newlyweds share a moment of privacy during their reception at the Hotel Heintz in Vianden.

This couple plans to live in Luxembourg City, welcome news in a country that suffers a youth shortage, the result of a low birth rate. Luxembourg's lack of universities intensifies the problem, requiring students to study in other countries.

The last census revealed that almost a sixth of Luxembourg's citizens are more than 60 years old, one of the highest proportions of elderly people in the world.

A land of devout churchgoers, Luxembourg is 95 percent Roman Catholic, but a government living allowance is paid not only to priests but also to the one Protestant pastor and the one rabbi.

Having assimilated such background along with a grilled local trout and a glass of bright, dry Luxembourg Moselle wine, I drove with Mr. Milmeister up a narrow lane, through a gate, and through another gate. We had just crossed the moat, which has been filled in. Three more gates and we were inside the castle walls, in a courtyard where knights had once jousted.

"This gate," remarked Mr. Milmeister pleasantly as we passed through one of them, "was fitted with a sluice overhead so that boiling pitch could be poured down on the heads of attackers." They were brutal in the Middle Ages, I thought, and then I remembered napalm and kept my thought to myself.

The castle looks just as a castle should. There are gloomy dungeons in the basement and a vaulted wine cellar so dark we had to grope our way through it. There is an odd two-story chapel; in the lower level the townspeople and servants could hear the

Mass—but not see it—through a hole in the ceiling; in the upper level the lords and ladies knelt before the altar, a little closer to heaven. The most impressive room is the Rittersaal—Knights' Hall—where, on ceremonial occasions, 500 men in their shiniest iron clothing could assemble before a huge fireplace.

"Exercise in Futility" Yields a Profit

Medieval Luxembourgers used their steep-sided mountains to build castles on, but up the Our River a mile or so from Vianden modern engineers have found a more practical use for one of them. I went to see it one misty morning with the engineer in charge, Mr. Louis Wehenkel. We drove to the top of Mount St. Nicolas, 900 feet above the river, where a series of dikes and dams enclosed a large artificial lake.

The fog was so thick I could hardly see the water, but I knew that right now it was running briskly—about 6,000,000 gallons a minute—out two holes in the bottom. By the end of the day the lake would be nearly empty. But tonight, starting at 11 p.m., it would fill up again. When full, it holds 1.5 billion gallons.

Then Mr. Wehenkel and I went under the mountain to see the reason for all this sloshing of water. Here the Société Electrique de l'Our has dug out of the solid rock a cave 1,038 feet long. In the cave, whirring noisily side by side, stood nine giant hydroelectric generators. Nearby stood the water pumps, powered by electricity.

Here, in brief, is what happens: The company pumps water at night from the Our River through two big pipes (each about 20 feet in diameter) up 900 feet to the top of Mount St. Nicolas. In the morning, when the reservoir is full, it pulls out the plug and lets the water rush back down, generating electricity as it comes. Of course it takes more electricity to pump the water up than it can possibly generate on the way down, so this would seem to be—to put it mildly—an exercise in utter futility. But it isn't, as Mr. Wehenkel explained.

"We pump the water up at night, generally from 11 p.m. to 6 a.m., when factories are closed, people are in bed, and demand is low. For the power we use then, we pay about 1½ German pfennigs (3/8 of a cent) per kilowatt-hour. When we sell it next day, at peak demand, we get 6 pfennigs." Why German pfennigs? Because the power produced here is sold in industrial West Germany.

More and bigger pumping stations like this one may someday be built, but at the moment the Société Electrique's lake is, in effect, the world's biggest storage battery.

In another mountainous area in the eastern corner of Luxembourg there is a place of bizarre rock formations, caves, cliffs, pinnacles, and echoing gorges that travel writers and tourist brochures have named "Little Switzerland." Among the rocks stands the town of Echternach. Its normal population is about 3,500, but each spring it swells by fivefold. Some of the newcomers are tourists, but many are not: They are pilgrims.

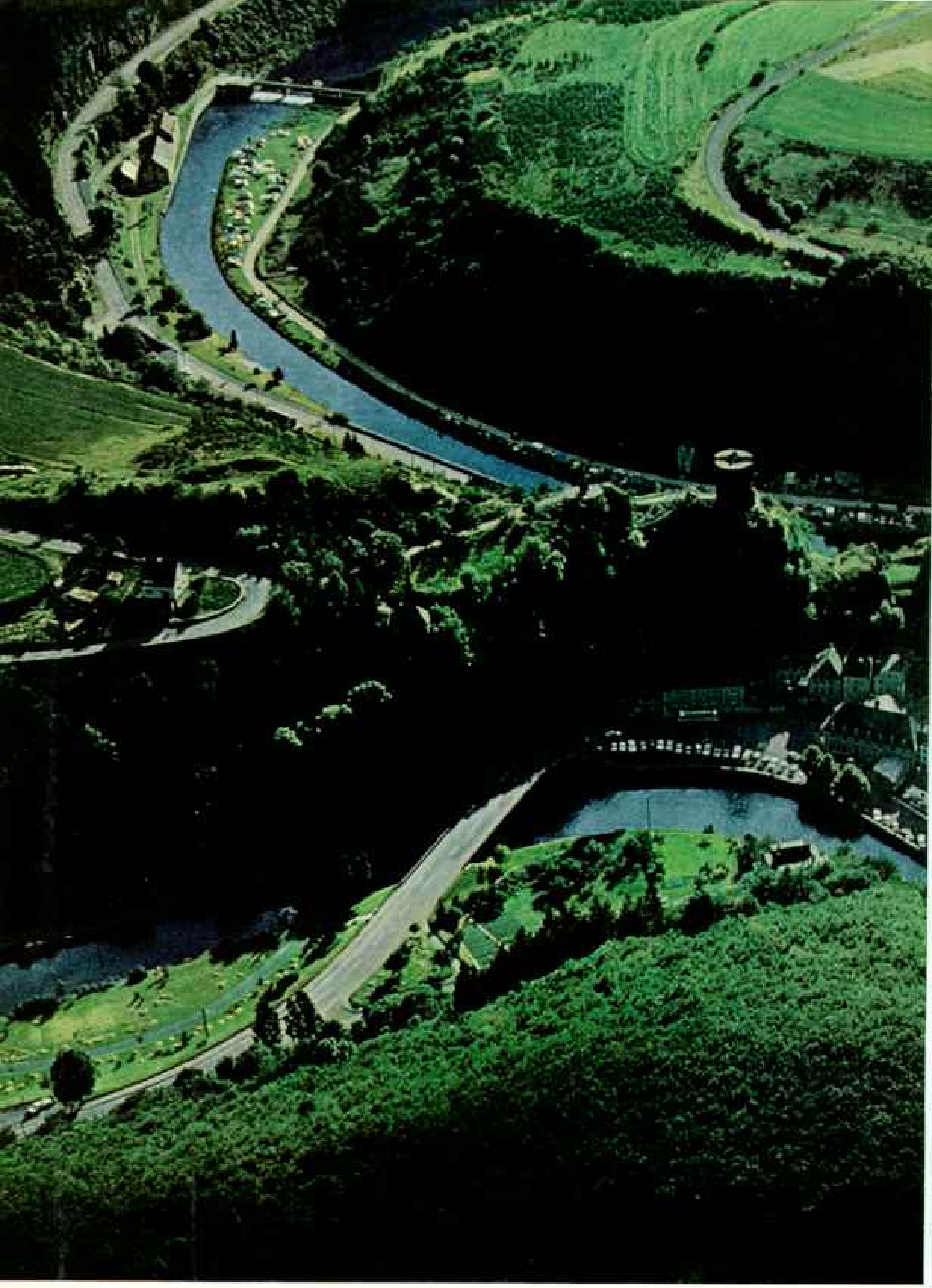
The reason for the pilgrimage dates back to A.D. 698, when a holy man arrived in Luxembourg. His name was Willibrord; he had sailed from Ireland to preach Christianity to the heathen of northern Europe. He went to Echternach, and he is still there today, in a plain marble coffin in the small crypt of a church built in 800, part of a Benedictine abbey Willibrord founded.

Stories of Miracles Draw Throngs

So many miraculous cures have been attributed to St. Willibrord that believers by thousands still come to his grave at Whitsuntide and walk through town in a strange, zigzag procession, moving first to one side, then to the other, holding handkerchiefs by the corners (pages 88-9). Their odd dance dates from the Middle Ages, and nobody can remember just what it signifies.

Almost three centuries after Willibrord, the name Luxembourg first appears. It is written clearly on a legal document, dated April 963, which you may see in the archives of the old Roman city of Trier. It records a real-estate deal between the monks of the Abbey of St. Maximin in Trier, and one Count Sigefrid of Ardenne. According to this document, Sigefrid purchased "a castle which is called Lucilinburhuc" overlooking the Alzette River. The Lucilinburhuc over the years has changed to Luxembourg. The word is popularly translated as "small fortress," and the land was part of what has become Luxembourg City.

So Sigefrid is generally credited as the founder of the House of Luxembourg, and, in a sense, of the nation as well, though it never became more than a county, a fief in the Holy Roman Empire, during the next four



Moat dug by nature, the Sûre River wreathes idyllic Esch and mirrors the summer sun. Rocky promontories and deep-cut gorges, which made the town

KODACHROME BY FRED H. FUNK © NATIONAL GEOGRAPHIC SOCIETY

a medieval stronghold, now attract hikers and climbers. Slate-roofed houses huddling around the castle create a fairy-tale setting, one of many in this scenic land.

centuries. His "small fortress" stood on a great stone promontory, known today as the Bock, which juts like the prow of a battleship into the valley of the Alzette.

I went to see the Bock, and the remains of the almost incredibly large fortress that grew out of the small fortress, one morning with Mr. Jean-Pierre Koltz, a Luxembourg engineer who has been studying it and its history for most of his lifetime. It stands on the edge of the old part of Luxembourg City (page 90).

Mr. Koltz is a ferocious authority on every stone in the old fort and every battle in its stormy history. He carries a heavy walking stick which he converts like magic into a cannon, a rifle, a missing wall, gate, bridge, or a drawing tool to trace ancient battle lines on the floor. He raps on a stone battlement and sends its date of construction echoing through the dark fortress as if down the corridors of time.

We looked at the site of Sigefrid's original castle, a rectangular hole in the solid rock. Only his well, 145 feet deep, and a few walls remain—partially restored by the Government of Luxembourg in 1963 to celebrate its 1,000th anniversary. When Sigefrid owned it, it would have been perhaps five stories tall, a modest place as castles go.

Eventually, with more walls, towers, battlements, drawbridges, gates, and rings of outer bastions, it grew to be one of the mightiest fortresses in Europe; it has been called the Gibraltar of the north. But that was not until several centuries after Sigefrid.

John the Blind Lived Boldly

During these centuries Sigefrid's dynasty thrived. The House of Luxembourg produced a brilliant succession of kings and princes, as well as four Holy Roman Emperors. But of all Sigefrid's descendants, the most audacious was John the Blind.

Count of Luxembourg and King of Bohemia, John was a rake and a hellion. He liked dice, horses, women, travel, high living—but most of all he liked fighting. He sought out battles all over Europe, from Lithuania to Italy to Paris. When he lacked a real war—rarely, in those days—he organized jousts involving hundreds of knights and nobles. This all cost money, and John recklessly mortgaged or sold castles and cities to raise it.

He ruined one eye fighting in Lithuania, lost the other to a surgeon in Montpellier. Then, in 1346, he heard of a great struggle pending between the French and English forces in northern France. "Do you think," he asked his friends, "I am so blind that I cannot find my way to France?"

That was the battle of Crécy, the famous fight in which the clanging knighthood of the continent was matched against skilled English archers with longbows under Edward III and his son, the "Black Prince" of Wales. John, who could see neither bows nor arrows, found his way to the front by having his

Green pearls, grapes spill from a picker's basket in the Moselle Valley, where terraced vineyards have stepped the river banks since Roman colonists planted the first vines. Latin poets Ausonius and Fortunatus praised the light, dry wines of the north. Ausonius' poem *Mosella* extols the beauty of "the pleasant stream . . . whose hills are overgrown with Bacchus' fragrant vines."

horse tethered to those of several trusted henchmen and ordering them forward.

It was his last battle, and he died in the front line. A popular legend holds that his valor so impressed the young Black Prince that he adopted the Luxembourger's insignia as his own. The Prince of Wales today uses the emblems ascribed to John: three feathers and the simple phrase *Ich dien*—I serve.

John is buried in the Roman Catholic cathedral in Luxembourg City in a grandiose multicolored tomb, and he is still the country's most popular national hero.

Mr. Koltz has been telling me not only about John the Blind, but of subsequent owners of the fortress as well, and as he talks, we enter the Bock itself, which is not so solid a rock as it looks. It is, in fact, riddled with tunnels, large and small. The big ones, called casemates, are roomy corridors designed to accommodate cannon of the 18th and 19th centuries. The halls wind around the stony insides of the fort, with embrasures cut like windows so that the guns could be aimed out at the surrounding countryside.

"Built by the Austrians," Mr. Koltz tells me, aiming his cannon-walking-stick out one of the embrasures. "They held the fortress from 1714 to 1795, and in 1734 they imported some Tyrolean miners to dig these tunnels. There are 16 miles of them altogether."

The smaller tunnels are not confined to the Bock, but wind deep down under the city, a means of communication and supply when it was under siege. Most of them are closed off (though maintained as air-raid shelters), but a few are open to tourists; you can buy a ticket for 10 francs (20 cents).

Fortress Had a Succession of Tenants

I learned that, besides the Austrians, the Bock had been occupied, between 1443 and 1867, by the Burgundians, the Spanish, the French, and the Prussians—and that is an oversimplification. The French, for instance, were here under Louis XIV, whose great military engineer, Marshal Vauban, built the most important fortifications. They came again during the Revolution (1795), and again under Napoleon.

Each successive occupying force added its bit to the fortifications, until at its peak the "small fortress" had grown to enclose 450 acres; it had inner walls, outer walls, and 24 massive stone forts.

Eventually it became apparent to Luxembourg citizens that their mighty fortress, far from being an asset, was in fact a nightmarish liability. For while none of the great European powers had much interest in seizing or ruling the duchy itself (it was, up until the late 1800's, a rather impoverished country), neither could any great power stand to let a rival occupy its fort. It had become a major factor in controlling western Europe.

Finally, in 1867, the problem was solved in London at a meeting of European powers—

Torrent of potatoes from a mechanical digger fills a bin in Heiderscheid. Production of potatoes helps bolster an agricultural economy that employs 12 percent of the national work force of 138,000. But the farm-labor pool decreases with a shift to industry. Those who stay on the farm absorb the land left vacant, and modern machinery handles the increased acreage.

Great Britain, France, Prussia, Austria, Italy, Russia, Belgium, and the Netherlands. Luxembourg's sovereignty was reaffirmed and her neutrality guaranteed; Prussia—the tenant at the moment—took her 7,000-man garrison home, and demolition of the fortress began. Only a few crumbling towers, a couple of gates, and the tunnels would survive.

Another Kind of Rock Wins Fame

The tunnels. If you knew exactly which one to pick out of the maze, and groped your way through it for an hour or so, you would come up in the basement of the most amazing place in Luxembourg, and the most famous. The site where it stands once held one of the city's ring of forts—hence the connecting tunnel. But the fusillades it fires now are entirely electronic, and a lot more cheerful than the booming of cannon.

This is Radio Luxembourg, the noisiest, brassiest radio station in all Europe, and a strangely incongruous phenomenon to find thriving in so quiet a country. It broadcasts in 11 different languages, on AM, FM, shortwave, long wave, and medium wave. Its main transmitter, 600,000 watts strong, carries its cheerful voice throughout Europe and North Africa, and deep into the Communist bloc. Its English-language disc jockeys call it "Radio-Lucky-Luxembourg"; its staple is rock music.

It was not always so cheerful. During the dark years of World War II, the Nazis seized Radio Luxembourg and used it for propaganda. One of its best remembered and most hated programs was that of a renegade English-language broadcaster named William Joyce, better known as Lord Haw Haw. His commentaries were among the most vicious poured out by the Nazi war machine. After the war Joyce was arrested, taken to London, convicted of treason, and hanged.

By the nature of things, Radio Luxembourg is the country's most famous industry—but far more important to its economy, its biggest employer, and the basis for its prosperity, is steel.

The steel industry began to have an impact in the 1880's. Before that Luxembourg depended on a faltering agrarian economy; it was poor, and Luxembourgers were emigrating in large numbers each year. Thousands moved to the United States, where they settled principally in the Middle West; there are still active Luxembourg-American societies in and around Chicago.

Smug porker ogles passers-by at a market, while owner and buyers haggle over price. Hams from the Ardennes region are widely popular on gourmet tables. Luxembourg, often impoverished by the tides of war, now produces three-fourths of its own food.

Her smile as bright as her apron, a vegetable vendor awaits customers at an open-air market in Luxembourg City. She deals with her countrymen in Letzeburgesch; the distinctive tongue has long been a binding force for the nation, though French is the official language. Despite powerful neighbors, Luxembourg—in the words of elder statesman Joseph Bech (page 96)—"maintains, as if by a miracle, its national and political individuality and independence."

Strange gait of the faithful: On a rainy Whit-Tuesday in late spring, thousands in Echternach honor St. Willibrord, an Anglo-Saxon monk who brought Christianity to northern Europe's heathen. In a dance of unknown origin, pilgrims traditionally

Steel changed all that. The Grand Duchy now has one of the world's highest living standards; emigration is negligible, and unemployment nonexistent. ARBED, the giant cartel that runs the mines and mills, employs 23,000 people in Luxembourg, a sixth of the total labor force.

ARBED—the letters symbolize a merger of several smaller companies—has its plants in the southern part of the country, along the French border, because that's where the ore is. I drove to see them one day with two ARBED officials, one my friend Mr. Schroeder of the Roman road, the other a young economist named Joseph Kinsch. The main works are in Esch sur Alzette, the Grand Duchy's second biggest city, population 28,000.

Iron and steel operations do not tend to be pretty. Around Esch huge clouds of red and black smoke puffed from furnaces to foul

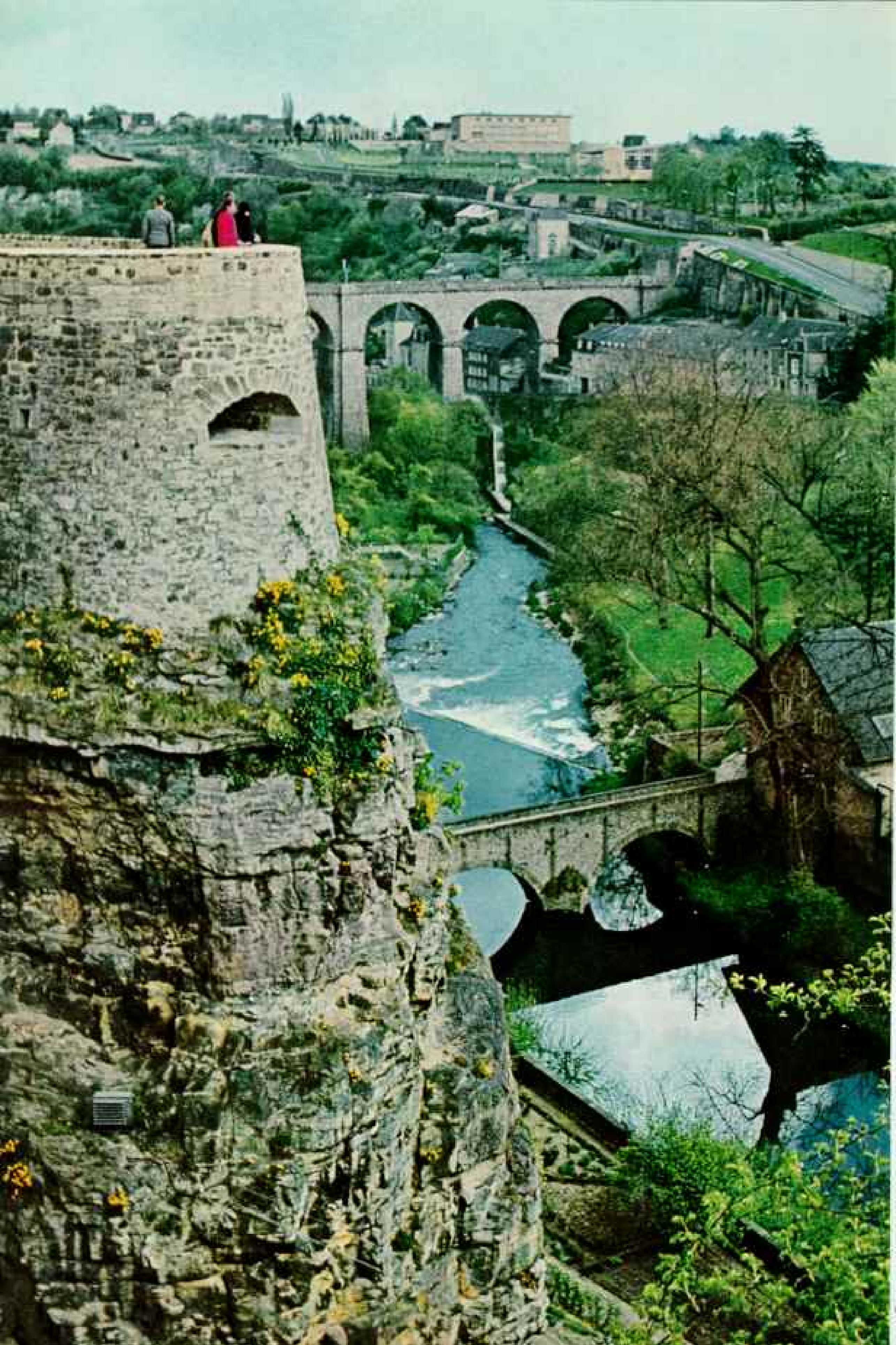
EKTACHROME © NATIONAL GEOGRAPHIC SOCIETY

hopped three steps forward and two back; modern marchers have modified the walk into zigzagging a few steps to the right and a few to the left. Roman Catholics come from all over Europe for the event. A long exposure gives the figures an ethereal blur.

the air, and outside of town I looked at a scene of desolation: a great red-brown man-made hill of jumbled waste earth and rock, stripped away to get at the ore; miles of treeless, grassless open-pit mines; rumbling steel-tracked digging machines.

Out of the smoke, dirt, and noise comes prosperity: 5,500,000 tons of steel a year, a gross annual production worth $600,000,000. When I visited ARBED, it was trying to increase prosperity even more through modernization.

I saw an example of this at one of the converters, a sooty furnace with a maw that could swallow 130 tons of pig iron in a gulp. In the middle of the noisy building I found a dust-proof, soundproof, glass-walled office, and in the office stood an IBM computer that quietly ran the whole operation—from analyzing the content of pig iron and quality of steel to calculating salaries of employees.



When I got there, a visiting group of Swiss engineering students were just leaving, and they were laughing loudly.

I asked Mr. Kinsch, "What's the joke?"

"I will show you," he said. "You see, the computer is foolproof. It does not make mistakes, but sometimes the operators do, and ask it senseless questions. When that happened, we had programmed it to reply. . . ." He showed me a piece of paper the computer had typed. It said:

PAY ATTENTION YOUNG MAN. YOU ARE WASTING THE COMPANY'S PAPER. WE WILL REMEMBER THIS IN THE NEXT ADJUSTMENT OF YOUR SALARY.

Mr. Kinsch added: "That is, it *used* to say that. But some of the operators didn't think it was very funny, so we reprogrammed it. Now it just types 'IDIOT.' They like that better. It's more friendly."

Fewer Country Cousins Stay on the Farm

I got into a conversation with Mr. Kinsch, the steel man, about farming, the country's main occupation before steel came in.

"Would you like to visit a farm?" he asked. "I have a cousin who is married to a farmer." He added, "Everybody in Luxembourg has a cousin on a farm. We are still countrypeople."

I accepted Mr. Kinsch's invitation, and before I went did some research. Luxembourg's agriculture is in a state of flux. It is the country's number 6 industry, after manufacturing, commerce, government services, transport, and construction. It produces 6 percent of the gross national product, employing 12 percent of the labor. Farms cover 335,000 acres, on which live 61,000 milk cows, 130,000 beef cattle, and 103,000 pigs. Ten years ago the average farm was 35 acres. Now it is 50 acres. Ten years from now it may be 75 acres.

So the farms are expanding. It takes capital, produced by a combination of personal thrift and government help. Joseph Kinsch's cousin's husband is a modern farmer—not only expanding but converting. His name is Emile Houtmann, and he lives near the village of Buschdorf. With him and his wife I wandered over their 105 acres on a chilly fall afternoon. I picked my way through the mud and manure of the barnyard, inspected their three tractors, and admired their 100 head of cattle, most of them white charollais, raised for beef.

"The farm was my grandfather's, then my father's," Mr. Houtmann told me. "It was a small operation, producing vegetables and milk—what I call poly-farming. We began the change-over to beef in 1962, but it has been a slow process. It takes time to build a herd. As it grows, I will need more land, but it is available."

As Mr. Houtmann expands, some of his neighbors on smaller farms will discover (or their sons will discover) that they can make more money with less work by taking a job in industry. They will then want to sell or lease. Mr. Houtmann already leases 17 acres.

Mrs. Houtmann showed me through their 9½-room house—joined to the barn, so that the white T-shaped building formed an imposing mansion. ("But we would not build it that way today," she said.) The house was, like all the Luxembourg houses I saw, spotless, comfortable, and modern on the inside, with a big freezer and an automatic dishwasher in the kitchen.

"Moonshining" Legal in Luxembourg

Such conveniences cost money; yet the farm, in its transitional period, could not be very profitable. In any case Mr. Kinsch had tipped me in advance that Mr. Houtmann had another source of income to tide him over. It would be called, in the rural hills of the United States, "moonshining."

I asked him about it. "Ah, my still," he said. "It is small, and old, but you may see it."

He led me to a separate room in a corner of the barn. The still was bathtub-size, with a copper coil. In it Mr. Houtmann makes 4,000 liters (about 4,200 quarts) of liquor a year from assorted fruits and grain.

There is even a "revenooer." Though Mr. Houtmann's moonshining is legal (there are

Landlocked Gibraltar: Battlements atop the Bock, a 150-foot natural stone wall, offer a panoramic view of Luxembourg City and the Alzette Valley. In the Middle Ages the fortifications protected the House of Luxembourg, a dynasty that gave Europe four Holy Roman Emperors. The castle grew into a vast network of walls and tunnels, creating one of Europe's great fortresses at a strategic crossroads of the continent. Then for 400 years warring powers, who otherwise might have left the tiny duchy at peace, battled for control of the bastion. Finally in 1867 a conference of major powers guaranteed the nation's sovereignty and ordered the fort demolished.

EXCAVATIONS BY MARCEL SCHROEDER © N.G.S.

many such one-family stills licensed in Luxembourg), it is closely supervised, and the tax man may—and does—drop in at any hour of the day or night.

Later, in Mr. Houtmann's living room, I tried a sip of his produce. Strong, throat-catching, faintly fruity, it tasted like home-made applejack I have had on a farm in Appalachia—from a moonlit still that looks remarkably like Mr. Houtmann's.

U. S. Factories Help Economy

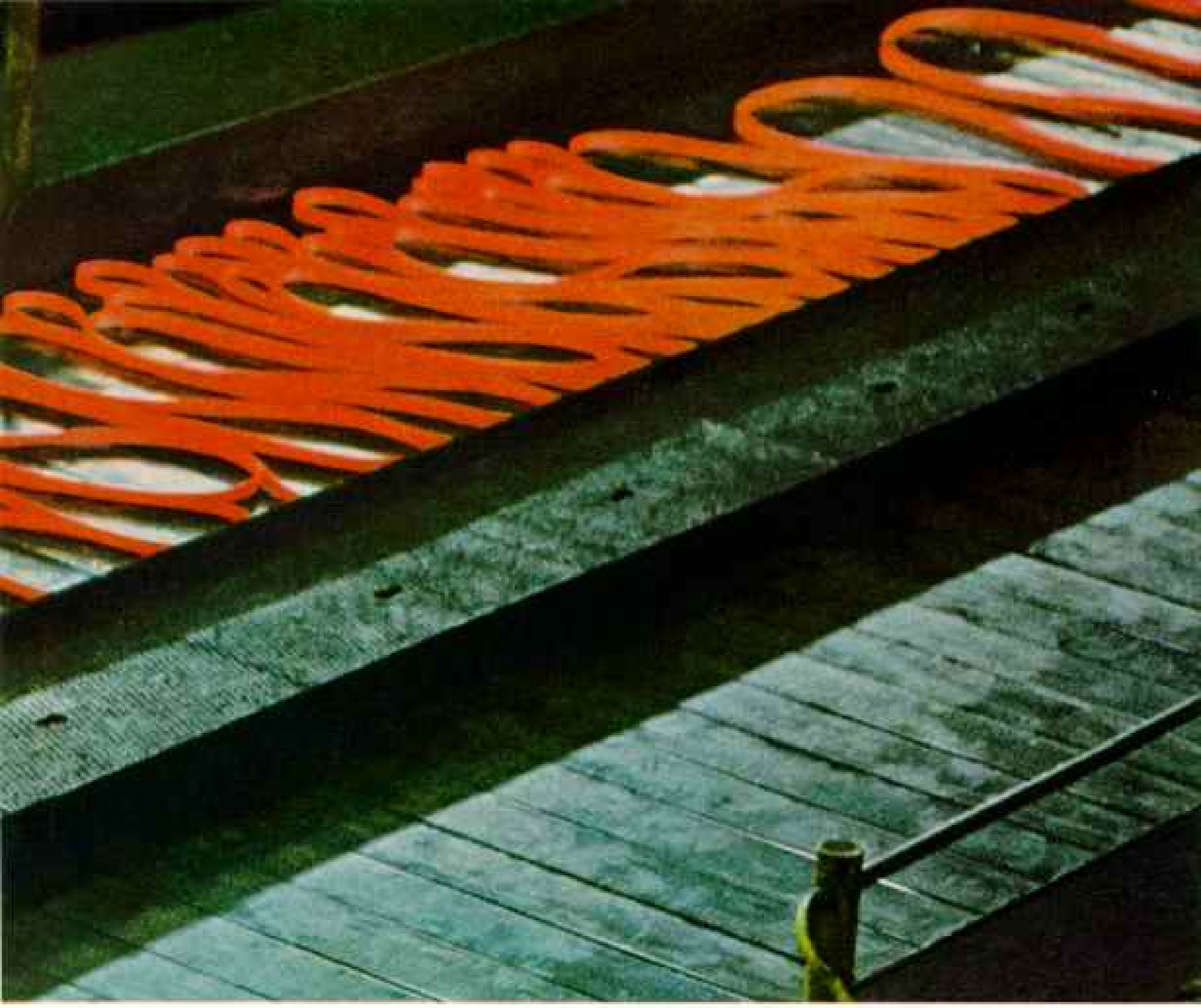
Farming, wine production along the Moselle, and one-family distilleries like the Houtmanns' help to diversify an economy too dependent on a single industry. Yet the dependence on steel is still heavy, and in recent years an effort has been made to diversify further. By offering tax benefits, a central European location, and a stable industrial climate (not a serious strike in 40 years), the government has induced foreign investors, including some American companies, to build factories in

Steel: A nation's lifeline

WORKER WITH TONGS tows a ribbon of red-hot steel in the Belval mill at Esch sur Alzette, center of Luxembourg's most important industry. The metal has looped after emerging from rollers that flattened it into a uniform strip. The band, straightened and drawn into wire, finds a worldwide market, as do sheets, plates, and beams.

Blazing breath of a converter (right) blows air through molten pig iron to burn away unwanted elements.

Iron deposits boosted the Grand Duchy to economic independence in the 19th century, offsetting an emigration drain. ARBED, three companies consolidated into Europe's third largest steel-producing firm, today employs a sixth of the nation's work force. Computers regulate many processes since a modernization program began in 1967.



Luxembourg. Monsanto (opposite), Du Pont, and Goodyear are among the bigger ones.

Yet, as with steel, most of the output of the new plants must be exported, and many consumer items imported. This situation is summarized in a complaint I heard a dozen times: "We are too small." It means that although Luxembourg clings to political independence, it must rely economically and culturally on a larger community.

It is not surprising, therefore, to learn that Luxembourgers have been active in internationalist organizations since the 19th century. They still are. Just across the Alzette River from the old part of Luxembourg City stands the country's only skyscraper, a 22-story ultramodern steel-and-glass tower, part of a complex of buildings opened in 1966 and still growing. It is called the European Center, and it houses offices of the European Economic Community (Common Market), the European Parliament's Secretariat, and the European Coal and Steel Community; eventually it will also have employees of Euratom, the European Court of Justice, and the European Investments Bank, all of which now occupy offices in the Old City (pages 76-7).

Dream Envisions a New Europe

Here farsighted men from six nations—Belgium, France, West Germany, Italy, Luxembourg, and the Netherlands—forge one by one the rules and institutions designed to abolish trade barriers and stimulate the free flow of goods, people, and money across their international borders. They work for, and have come close to achieving, among their member nations, something very much like an economic "United States of Europe."

The men who pioneered this idea—among them Winston Churchill, Konrad Adenauer, Robert Schuman, Jean Monnet, Joseph Bech—dreamed of a political unity to accompany, or perhaps to grow out of, the economic union. Luxembourgers have as much reason as any Europeans to hope that it does appear. Twice in recent history they have seen the international agreements that guaranteed their borders crumble beneath the boots of marching armies.* The first time was in 1914, when the Kaiser's legions came through on their way to France; Luxembourg was occupied for four years during World War I.

*See "Luxembourg, Survivor of Invasions," by Sydney Clark, NATIONAL GEOGRAPHIC, June 1948.

The second time came in 1940, when Hitler's Wehrmacht roared in, driving the government into exile, turning the Grand Ducal palace into a Nazi officers' club. The Nazis declared Luxembourg a part of "Greater Germany"; they seized the steel factories and drafted the young men into the German army.

Plain White Cross Marks Patton's Grave

I drove one cold and rainy day to a place called Hamm, a suburb about three miles from Luxembourg City. Here, on a grassy meadow sloping down to a dark forest, stand row on row of small white marble markers, each at the grave of an American soldier who died in Luxembourg in World War II. Most are plain Latin crosses; some are stars—the Star of David. One cross, exactly like the rest but standing slightly apart, is for Gen. George S. Patton, Jr., who commanded the Third Army that fought through here. He died, ironically, not in the battle, but in an automobile accident in Germany seven months after the fighting stopped in Europe.

Another day I drove to see another American soldier's monument, not in a cemetery but standing alone in the forest of Ardennes. The forest is outside the little village of Eschweiler, population about 200, near the Belgian border of the Grand Duchy.

Here in November 1944 arrived a company of soldiers of the U. S. First Army, 28th (Keystone) Division. They had battled their way across France from Normandy through some of the fiercest fighting of the war. They had suffered heavy casualties, and though they did not know it, the worst still lay ahead.

But when the 28th reached Eschweiler, the Germans had pulled out; there was a lull in the fighting; the American soldiers rested gratefully in the little town. Among them was a private named George Ottmar Mergenthaler, age 24, the only son of a well-to-do family in Rye, New York. (His grandfather, Ottmar Mergenthaler, was the inventor of the Linotype machine.)

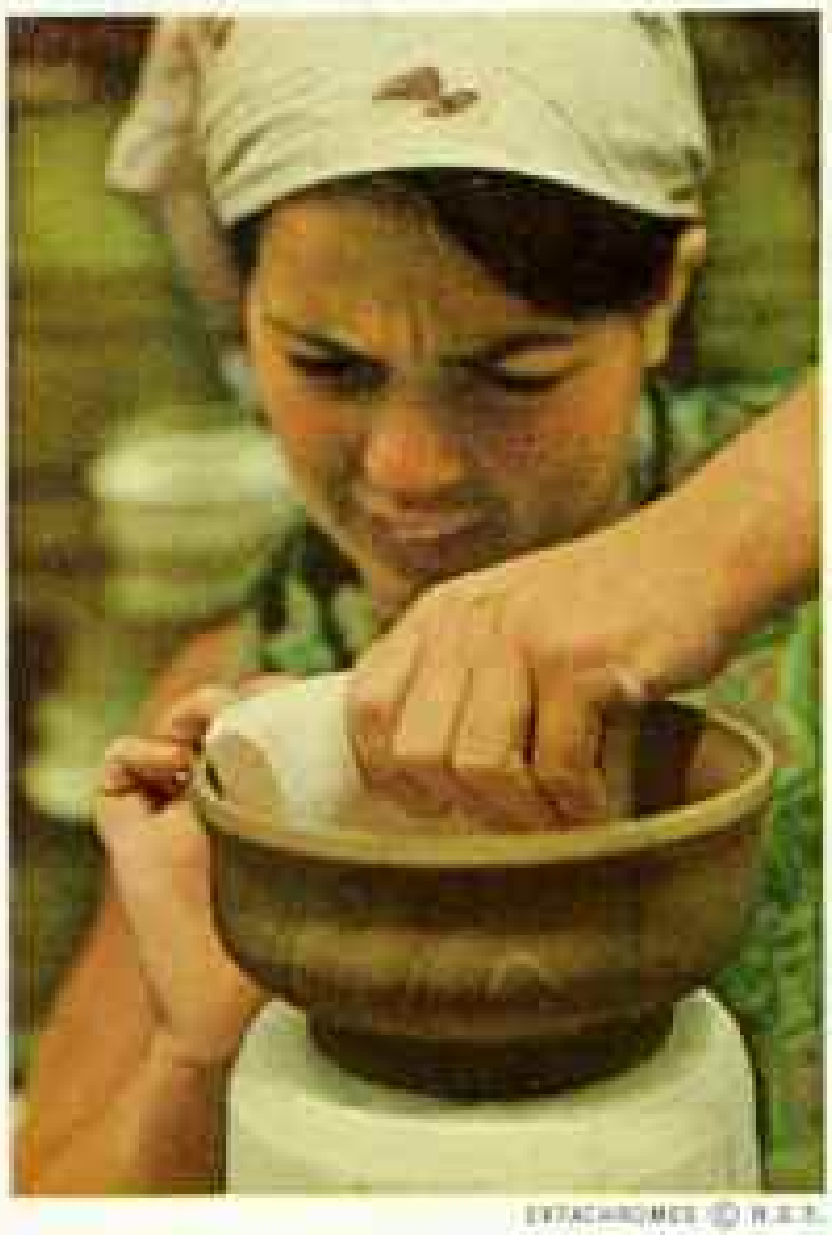
George Mergenthaler was tall, dark-haired, and friendly; he had graduated from Princeton only a year earlier. He was a Roman Catholic and, as luck would have it, he was quartered at the house of the parish priest, Father Antoine Bodson. The two soon struck up a friendship. As Father Bodson wrote later to Private Mergenthaler's parents:

"On November 18th 1944, George came to

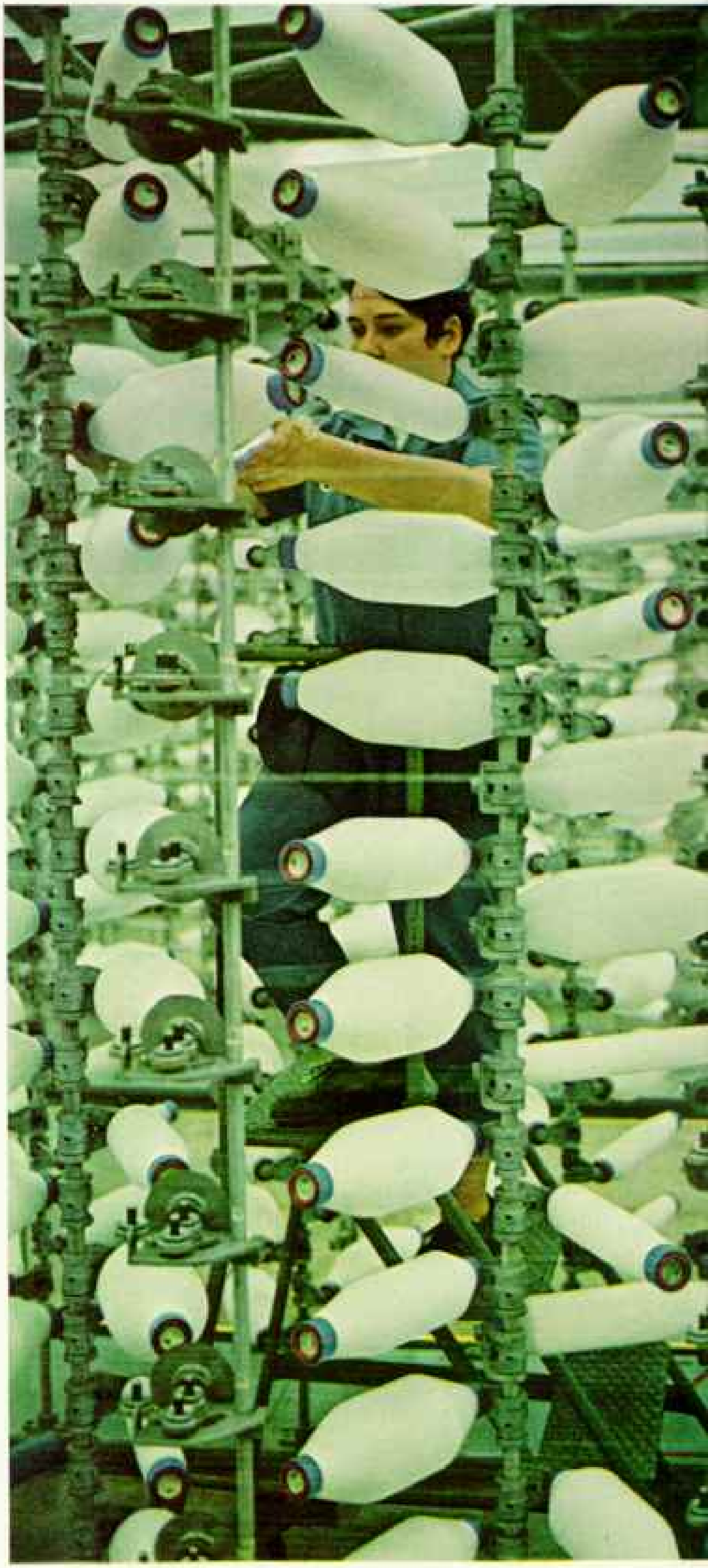
Twirling bobbins of nylon surround an employee at the Monsanto factory in Echternach. The American-owned plant, attracted to Luxembourg by central location, tax benefits, and a stable labor force, exports thread to buyers as far away as Australia.

With no unemployment, the Grand Duchy imports some 26,000 foreign workers to fill vacant jobs.

Skilled hands give the final touch to a piece of pottery in the Villeroy and Boch ceramics factory at Luxembourg City. Founded in 1767, the plant is now largely mechanized.



EXTACHROMES © N.G.S.



live with me. He was highly astonished to find me speaking english, but so was I to find him speaking somewhat german and french . . . I arranged his room as comfortable as possible. He felt in my house like at home. . . .

"Every night we sat together, listening to the broadcasting, news, music etc. . . . When there arrived a package from over Seas, he did'nt open it until I was present. So we spent five weeks together."

One of the packages "from over Seas" held Christmas presents from home, among them a handsome vest which George wore under his uniform jacket. It is cold in the Ardennes in winter.

Through Father Bodson, George got to know the people of Eschweiler, and apparently they liked him uncommonly well. When I went to Eschweiler I talked about this to a white-haired man named Joseph Harpes; he had been the village schoolmaster when George was there. (Father Bodson I could not see; he no longer lived in Luxembourg.)

"He was outstanding," Mr. Harpes said. "He was interested in everything we did. He talked to people; he was curious. He was an intellectual, and he was always friendly."

"We'll Drive Them Back"

On the 16th of December, there was a rumble of guns from the east; the Germans were coming back. It was the beginning of the bloody counteroffensive that was to be known as the Battle of the Bulge.

On December 18 the townspeople of Eschweiler were evacuated. George Mergenthaler went to Mass that morning in the small white parish church; then he said goodbye to Father Bodson and his other friends. Some of them were crying. He tried to reassure them.

"It's not so bad," he said. "We'll drive them back." Then the fighting moved southwest, and he took his rifle to a foxhole on the road to Bastogne, Belgium (map, page 72), where the German tanks were moving up.

Six Nazi divisions were hurled against the Keystone Division the first day of the counteroffensive; eventually 350,000 Germans swarmed into the bulge they had made in the American lines; U. S. losses were 19,000 killed. But the Wehrmacht was contained, driven back, and by January 28 the bulge had been wiped out.

When Eschweiler's citizens came back in February, they found their little village shelled and looted; Father Bodson looked at his church with dismay. One wall was gone, the stained-glass windows were shattered, the seats wrecked, the organ ruined.

Villagers Remember an American Friend

The people did not know what had become of their friend George. They speculated that he might have escaped, might have been captured. But on March 24 some of the villagers found a crude grave near the edge of a meadow outside the town. It was marked by a wooden cross, from which hung a GI's helmet. Father Bodson wrote:

"I walked to the place, removed some stones from the grave and . . . finally I recognized the beautiful vest you had sent to George for Christmas. So I was sure to have George before me. Can you understand, that I felt sorry and wept.

"On March 26th at 6 p.m. while our 3 bells were ringing, I buried George in the cemetery of Eschweiler. All my parishioners were present praying."

Twenty-five years later the parishioners have not forgotten George. With Mr. Harpes I walked to the place in the woods where his body was found; it is marked with a gray stone slab and a simple headstone. There were fresh flowers on the slab. The spot was probably his foxhole, for it overlooks the road to Bastogne.

Then I went to the parish church, the church of St. Mauritius. It is rebuilt now, with new stained glass in the windows and a new organ, partly with money given by George's parents. Behind the altar there is a very large, very bright mural, painted by a local artist. It looks, at first, like a Biblical cook-out: Christ sits in the middle of a throng, surrounded by baskets full of loaves and fishes. Beside him, bigger than life-size, dressed in flowing robes, stands George Mergenthaler. He has no halo, but he looks at home among the Apostles and the saints. THE END

"Mr. Europe": Joseph Bech, 83, relaxing at his home, a restored mill near Diekirch, exemplifies Luxembourg's role in promoting international unity. Prime Minister for 15 years, he was a Vice President of the League of Nations Assembly and helped found the United Nations and the European Economic Community, cooperative organizations that favor the little country's survival.

The Hutterites, Plain People of the West

ARTICLE AND
PHOTOGRAPHS BY
WILLIAM ALBERT ALLARD

WE SADDLED UP before the first orange hint of sunrise on a bitterly cold Montana morning. Steam rose from the muzzles of the skittish horses, and in the corral the trampled ground was hard with frost.

With collars turned up, we rode toward the mountains, our soft-stepping horses breaking through ice-crusted rain puddles in the trail. It was cold enough for December, but the air was sharp with the smell of sweet clover and wild hay and the countless perfumes of a blossoming earth, each an exquisite reminder that spring had come to the range.

My companions were eight young Hutterite men, led by bearded Eli Walter, cattle boss of the Spring Creek Hutterite Colony near Lewistown. We were moving out on a three-day roundup of 1,500 head of cattle, including 500 calves that needed branding.

The range is part of the colony's 14,000-acre ranch that spreads out along the edge of the South Moccasin Mountains in the heart of the Judith River Basin (map, page 106).

Distinguished by their German dialect and Old World clothing, the Hutterites are one of three surviving Anabaptist groups in North America that originated in Europe during the 16th-century Protestant Reformation. The other two are the Mennonites and the Old Order Amish.

The Hutterites believe they can best honor God by living communally, observing strict religious practices which include devout

EASTMAN KODAK © NATIONAL GEOGRAPHIC SOCIETY

pacifism. They are large-scale farmers and ranchers and raise large families. To live and work their way requires room and a friendly atmosphere—things that have not always been easy for them to find.

Heading up toward the high coulees, we were treated to a vision of open splendor—a world away from the high-strung urban giants of today with their rumbling tunnels and eight-lane speedways.

A delicate sheen of frost rested like a piece

Shepherd of a devoted flock, preacher Paul Walter leads evening prayer at the Spring Creek, Montana, Hutterite colony. In a schoolroom that now serves as sanctuary, the congregation sits according to age and sex—youngest in front, females to the right. The Hutterites share all worldly goods, and members of each settlement live together as one family. Fleeing persecution in central Europe and Russia, the pacifist sect sought asylum in the United States in the 1870's.

of fine white lace upon the meadows and foothills. High above us on the mountain peaks was snow that would survive the hottest of summer days ahead. And above it all that unbelievably limitless western sky—its deep blue vastness warmed now by the first sun of morning.

I'd wandered through this country before, and with each return it seemed more apparent that perhaps this was the way man was supposed to live. In a place where he could breathe deeply and drink from clear streams and rivers. In a place wide enough for eagles.

IT WAS A SEARCH for such a place and for freedom to live in their traditional ways that brought the ancestors of my Hutterite friends from Europe to the western prairies of America in the 1870's.

Today, all Hutterites live in the United States and Canada. None remain in the lands of their 16th-century origin—Moravia, Slovakia, and Transylvania—or in the Russian Ukraine where they spent their last years on European soil. The largest true communal group in the Western World, the approximately 20,000 Hutterites on this continent have survived their four centuries of history by adapting to changing environments, both technological and political. Theirs is a history of struggle and persecution.

When I first drove into Spring Creek Colony hoping to meet Paul Walter, the robust, white-bearded preacher (page 98), I wondered how similar the Hutterites would be to the Old Order Amish I'd photographed several years earlier in Pennsylvania's Lancaster County.* Although not communal, the Amish do wear "plain" clothes and the married men are bearded.

I knocked at Paul Walter's door, and as I waited I could see women wearing long dark dresses and head scarfs and men dressed all in black walking toward a long building that I learned later was the main dining room. Hutterites have no cooking facilities in their homes. All eat in the same room, the men on one side, the women on the other.

"Come in and sit awhile," the preacher said after I introduced myself. "Would you like a glass of our wine?"

I enjoyed the first taste of one of the many varieties of Hutterite wine I would sample during my visits. The first was a cherry blend—sweet but warming on the chilly night. Later there would be dandelion, rhubarb, and others.

"We are allowed to drink in moderation," Paul said. "We make our own wine and each family receives about half a gallon a month for use at home. And on Sunday a glass of wine is served to each adult at the dinner table. We drink beer, too, but mostly wine."

The manner of distribution, like so many

*The author's photographs illustrated "Amish Folk: Plainest of Pennsylvania's Plain People," by Richard Gehman, NATIONAL GEOGRAPHIC, August 1965.

Just like the big boys! Four-year-old Danny Walter twirls a lasso at Surprise Creek. Some 20,000 Hutterites now living in the United States and Canada share fewer than 20 surnames; many—including Walter—date from the founding of the sect.

Grimace of sympathy contorts the face of a Hutterite lad helping with the branding at Surprise Creek Colony near Stanford, Montana. Patterning life after the early Christian church, each member does what work he can and receives what he needs.

"And I will send grass in thy fields for thy cattle. . . ." DEUT. 11:15

In the rolling rangeland of Surprise Creek ranch, bearded colony boss Joe Stahl and his son rope an ailing Hereford to give it an antibiotic. The 14,000-acre spread supports some 300 beef cattle, as well as dairy cows, ducks, geese, and 1,300 sheep. It also grows vegetables and other necessities, making Surprise Creek—like all Hutterite colonies—virtually self-sufficient. Only a few staples and hard-to-make items are purchased.

of the Hutterite ways, may vary slightly from one colony to another.

"We have nine families here at Spring Creek," preacher Paul said in his heavy German accent. "Altogether, about sixty souls . . . but, of course, we think of it as one big family. And as you will see, so many of our names are alike. My son Paul, the field manager, has a son named Paul, and you will find many Hutterite families with the last name of Walter, Hofer, or Stahl. It can get confusing.

"Our colony," he continued, "is like a spiritual ark. Here, no one is in need. Everyone

ROADSHOWERS UNCLUDING FOLLOWING PAGES) © NATIONAL GEOGRAPHIC SOCIETY

end of the 16th century they numbered about 20,000. But their pacifism and disinterest in politics had begun to create pressures that would soon threaten their existence.

As nonparticipants, the Hutterites were victimized by the armies of both sides in the war between Austria and Turkey in 1593. They were plundered, taken captive, and some were executed. By 1622 all Hutterites had been driven from Moravia.

For a time they were welcomed by neighboring Transylvania and Slovakia. Soon, however, the Jesuits began demanding that they return to the Roman Catholic Church. Elders were imprisoned, and many did return. The remainder went to Wallachia in 1767, only to be caught in the middle of a Russo-Turkish War the following year. Then in 1770 an invitation from the Government of Russia was accepted by 123 Hutterites to pioneer the farmlands of the Ukraine.

FOR A HUNDRED YEARS Russia offered religious freedom, land, and exemption from military service. But in 1874 the Hutterites were deprived of military exemption and once again felt forced to pack up and leave. The entire population, about 800, decided to try again—this time in America.

"They came to South Dakota," Paul told me. "But they were ineligible for homesteading privileges because as a group they needed large areas, and so about half of them abandoned colony life to homestead family farms."

The remaining faithful founded three colonies from 1874 to 1877. Those three colonies, carved out of the frontier lands, spawned the some 200 colonies that exist today in the Dakotas, Montana, Minnesota, Washington, and the Canadian provinces of Alberta, Saskatchewan, and Manitoba (map, page 106).

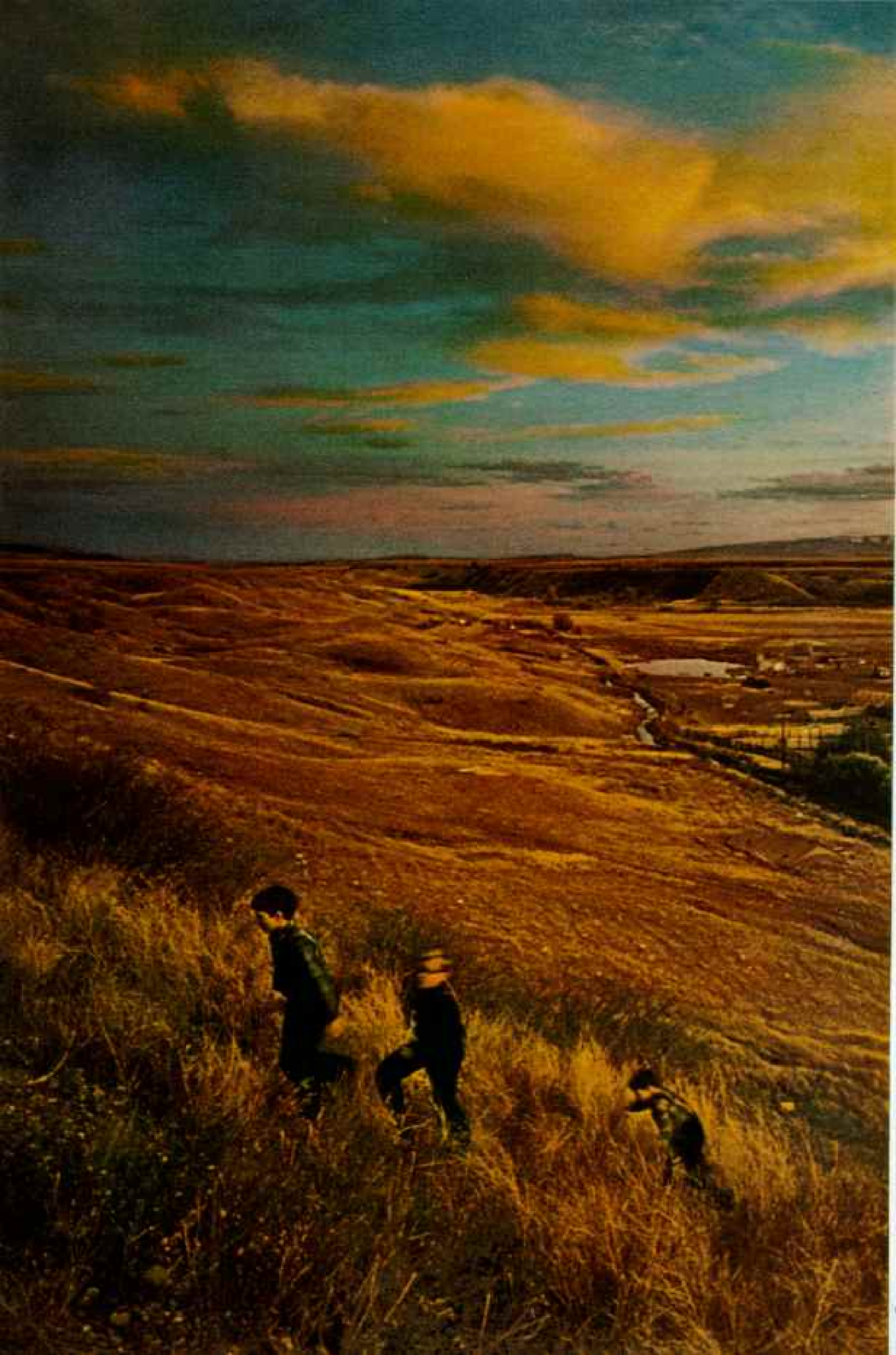
"From those first colonies in America," said

helps in the work according to ability. We believe in glorifying God through hard work and a simple life. Our ways are based on the Book of Acts, chapter 2, verses 44 and 45: *'And all that believed were together, and had all things common; And sold their possessions and goods, and parted them to all men, as every man had need.'"*

From Paul I learned that the first Hutterite colony, or *Bruderhof*, was established in Austerlitz, Moravia, in 1528, its members taking their name from Jacob Hutter, an early leader who was burned at the stake in 1536. By the

Wide enough for elbows and ideals, the Montana countryside spreads around Spring Creek (following pages). Hutterite multifamily dwellings, communal dining room, and farm buildings cluster near the stream that gives the colony its name.

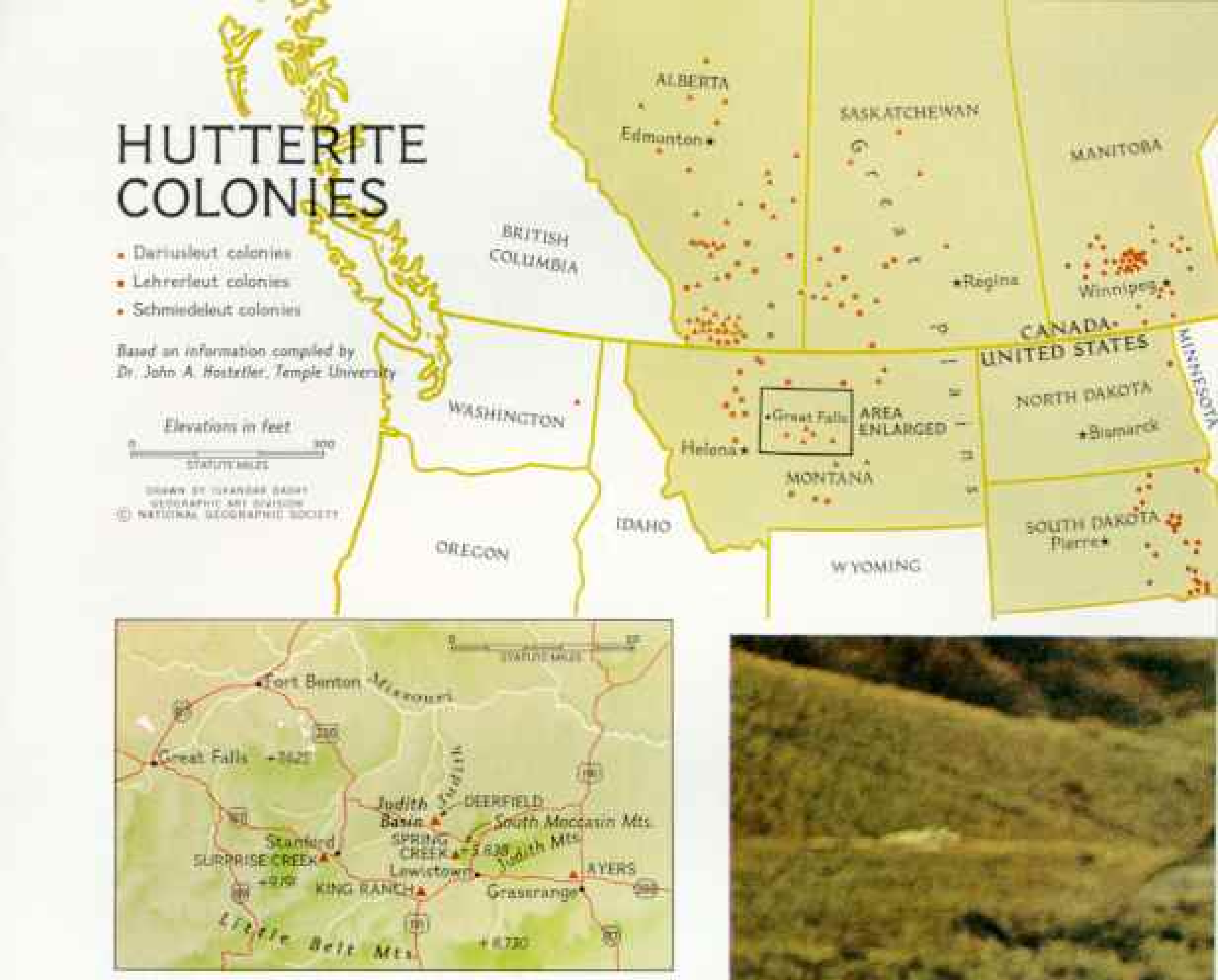
Although the Hutterites seek no converts, their large families, averaging 10 to 12, eventually create a group too big for the land. Then the colony "branches out," sending part of its population to a new location.



HUTTERITE COLONIES

- Dariusleut colonies
- Lehrerleut colonies
- Schmiedeleut colonies

Based on information compiled by Dr. John A. Hostetler, Temple University



Earthly realm of the Hutterites, the Great Plains of the United States and Canada bloom for these diligent farmers. Divisions of the sect called Schmiedeleut, Dariusleut, and Lehrerleut established the three original colonies in South Dakota. (The first parts of the names refer to the founders; *leut* means "people.") The original groups have now grown into some 200. The greater population in Canada reflects the mass migration during World War I because of harassment and jailing in the United States as conscientious objectors. After World War II new colonies again sprouted south of the border.

Simple in dress, serene of countenance, Hutterite women pause in their labors to enjoy the late-afternoon sun. Miniatures of their mothers, young girls cover their heads and wear long dresses. Like the men, the women are assigned tasks for the week: Some garden, others cook, bake bread, or make soap. They also keep the family apartments tidy and sew for husband and children.

Paul, "we now have three types of people—or *leut* as we call ourselves [from the German *leute*]. Today Hutterites are either Dariusleut, Lehrerleut, or Schmiedeleut. These group names were taken from the first leaders in America, but we are all very much the same. In Montana you will find Dariusleut and Lehrerleut. In the Dakotas there are only Schmiedeleut, and in Canada there are all three.

"We are Dariusleut Hutterites at Spring Creek," he continued. "Many of our people went to Canada during the first war and came back after the second one."

As Paul spoke, I recalled reading about the problems that befell Hutterites in the United States during World War I. As conscientious objectors, they suffered some of the same humiliations they had experienced centuries earlier in Europe. Neighbors, overly zealous in their patriotism, raided the cattle herds and sheep flocks because the Hutterites refused to buy Liberty Bonds. Some of their young men were jailed. Two of them died while imprisoned at Fort Leavenworth, Kansas. Confronted with the old tribulation of a government unwilling to accept their ways, they began a mass migration to Canada.

From the end of World War I until the end of World War II, only a few colonies remained in the United States. Starting in 1945, groups

of Hutterites began to return, following the enactment of legislation favorable to conscientious objectors. Now there are about 70 colonies in the United States and almost twice that many in Canada.

"Yes, we have had some hard times," Paul said without bitterness. "But we grow stronger all the time. You must see our gardens—they are wonderful. We have cleared and irrigated much of our land. We have 30 acres of gardens where we grow corn and tomatoes, radishes, carrots, potatoes, cabbage . . . everything. But you must see for yourself. They are wonderful!"

On many return visits I would indeed see Paul working in his gardens, sitting a little paunchy but regally upon his tractor, a battered black derby on his head, turning the earth that would sprout food to deck the tables and fill the huge vegetable cellar.

Hutterites buy very little food except flour, sugar, coffee, and fruit. They also purchase little in the way of clothing. Each colony buys yard goods wholesale and distributes the cloth to the woman of each household, who makes the clothes for her family. The trousers and jackets for the men and boys will be black and the shirts colored, or, for church and prayer meetings, white. The women's and girls' dresses and aprons will be long and patterned and the head scarfs dark with small polka dots. They buy shoes, although some colonies still make their own.

IN THEIR MANNER of dress, the Hutterites are similar to the Amish. Both follow fashions long out of date. In other ways of living, however, they differ greatly.

"Those Amish!" a Hutterite said to me, "they are so far behind the times!" What he meant, of course, was that the Old Order Amish refuse to use electricity in their homes and continue to drive horse-drawn buggies instead of cars. They have no telephones and are not allowed to use motor-driven farm equipment.

The Hutterites have most modern conveniences, although they are not allowed radios or television, and they usually drive station wagons rather than sedans. Electronic entertainment is believed to be an unnecessary and dangerous exposure to the outside world. Dancing, playing musical instruments, and smoking are also forbidden.

However, the Hutterites have not shunned the sophisticated mechanics of modern farming. At Spring Creek I was overwhelmed by the abundance of up-to-date equipment—tractors and Caterpillars, jeeps and pickup trucks. Most of it belonged to the colony; some was on loan from a sister colony in Alberta.

Hutterite colonies have no labor costs, for no one draws a wage. Thrift is pursued as a virtue. Thus a colony can invest in the expensive equipment necessary for a large-scale operation. On a colony such as Spring Creek there may be as much as $200,000 invested in machinery alone.

"By now you should know we save our money," smiling field manager Paul Walter, the preacher's son, said to me one day. "We bought the most modern tractor in the country once, back in the 50's. We had a 15-party-line telephone then, and somebody heard two neighbor ladies talking about our new tractor. One said, 'Did you see what the Hoots bought?' And the other lady said, 'Yes! And I hear they paid cold cash!' "

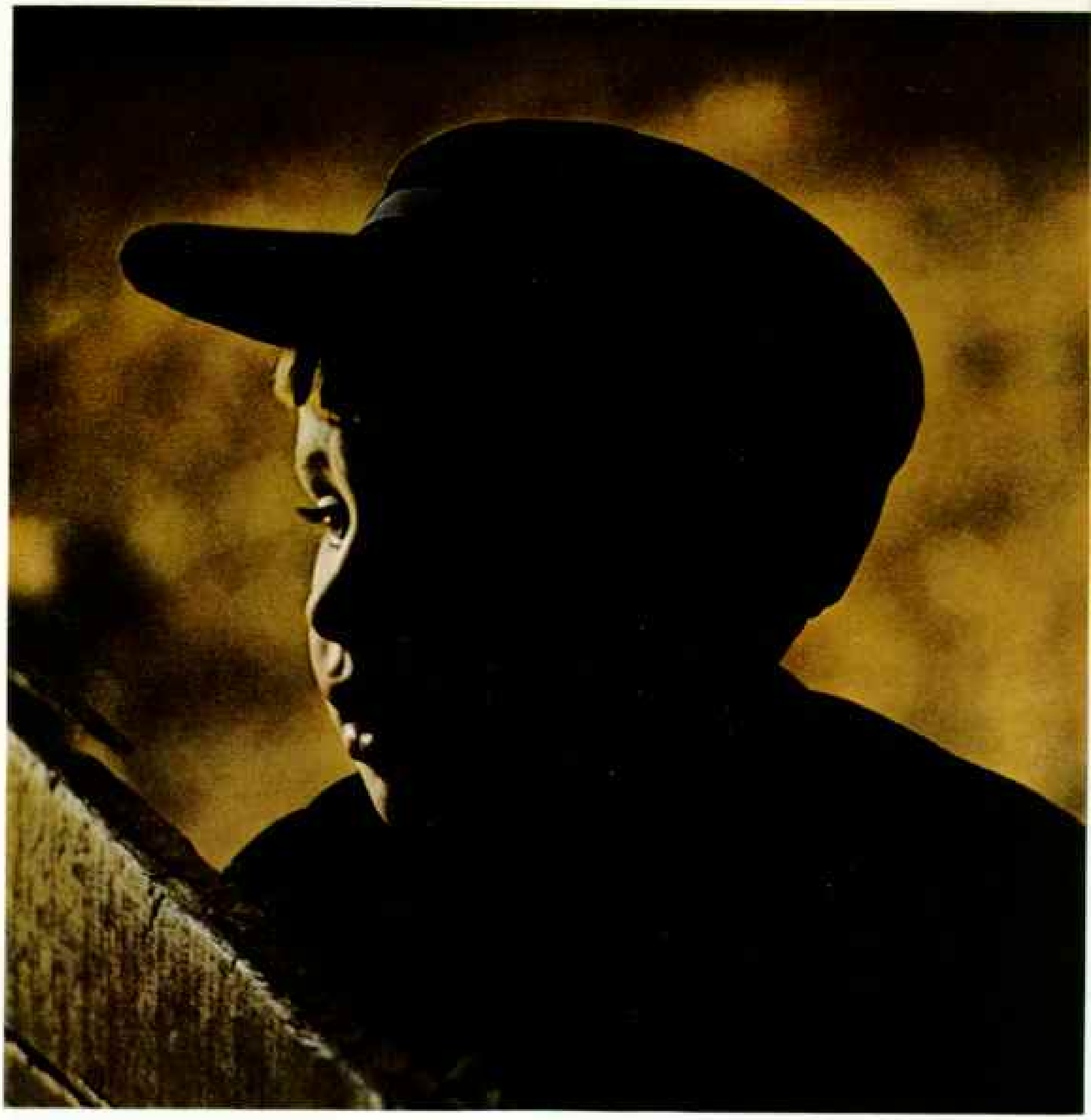
Paul laughed, "We didn't, of course. We paid for it on the installment plan, just like everybody else."

It's not unusual to enter the machine shed of a colony and find a bulldozer completely disassembled, stripped of treads and innards, with several men clambering about, confidently putting it all back together. Every Hutterite male learns a trade. One may be a top cowboy, while his brother excels as a mechanic.

All jobs, however menial, are looked upon as being important. The man tending the hogs is held in just as much esteem as the man responsible for buying the expensive breeding bulls and quarter horses. As field manager Paul said to me, "Everyone is of equal value

The three "R's" challenge young minds in Surprise Creek's one-room school. A teacher chosen by the colony's council instructs the youngsters, few go beyond the eighth grade. Students like Sam Hofer and Judy Stahl spend most of the day in class, attending "German" school before and after regular studies. A Hutterite man, learned in the Bible and the sect's traditions, teaches scripture, hymns, Hutterite history, and High German, the liturgical language. A German dialect serves for everyday speech.

EXTACHROME BY WILLIAM ALBERT ALLARD © NATIONAL GEOGRAPHIC SOCIETY



"Stand still, and consider the wondrous works of God." JOB 37:14

In the soft glow of lamplight, young David Hofer beholds the miracle of birth and the bounty of the Lord in the lambing pen at Surprise Creek.

Children are quickly taught responsibility and strict obedience to family, teacher, and elders. Yet teaching is done with a large measure of tenderness, patience, and gentle persuasion.

to the success of a colony. No man is better than another in our family. We must all work together if we are to survive."

Searching for the winding road that leads to Surprise Creek Colony near Stanford, Montana, I found the turn-off marked by a sign: Fresh Eggs Every Day—One Mile.

I often visited the 50 souls living at Surprise Creek. Their pastor, 60-year-old Eli Walter, a handsome man with white hair and beard, had been a preacher for 18 years. Like all Hutterite preachers, Eli had no formal training but had been elected by members of his colony. Other jobs of authority, such as colony boss, are also elective positions.

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Eli's living room was typical of Hutterite austerity: several chairs, a small table, and a little bookshelf. There were no pictures decorating the walls, which had been painted with glossy enamel for easy cleaning.

Often when we talked, his wife and most of their nine sons and daughters would gather in the room. At times I'd get lost in the conversation when, by habit, they slipped into the German they speak among themselves.

"You know it is forbidden for us to be photographed," Eli said sternly, eyeing my camera bag on my first visit. Like the Amish, Hutterites are taught that a photograph is a graven image. I discovered later that many Hutterites have photographs of themselves tucked away, pictures taken by outside friends. They are allowed to keep them, but are told not to admire their likenesses.

I told Eli I respected their beliefs. I asked, however, if I might be allowed to photograph their way of life without asking anyone to pose. Could I simply be around to observe as unobtrusively as possible?

"Well, I suppose you could," he said after much thought. "But why don't you just live our way? Maybe after you are here awhile, you will see that this is the only way to live."

In the many days I spent at Surprise Creek, I was seldom far out of the preacher's sight. Eli delighted in startling me at times.

"Hey, you!" he would shout, finding me in the kitchen photographing the women canning strawberries. "What are you doing! No pictures of the women!" There was often such sternness in his voice that I would wince and look quickly for the laughter in his eyes. It was always there.

A HUTTERITE PREACHER'S JOB is not an easy one. He must direct his people in a spiritual life far from the mainstream of the Space Age. He must represent authority and guidance to the young members who are always in danger of "seeing too much of the outside world."

One day I asked Eli's wife Susie if she was going to attend the county fair in Stanford. A plump and cheerful woman whose face seemed incapable of a frown, she answered as if revealing a deep secret.

"I'm 60 years old," she said softly. "And do you know, my eyes have never seen a merry-go-round."

"But will the children go?" I asked.

"Yes, I'm afraid they will," she said. "It's not as easy to keep them at home as when I was a child."

They did go, and two came home with trophies won in the relay horse race.

In some ways I represented the outside world that Eli and other preachers fear for the temptations it offers their young people. Besides my cameras and my car with its radio, perhaps most of all I represented independence to come and go as I pleased.

It was not an easy decision for the leaders of the colonies to permit me to work among them as a journalist. For allowing me to photograph some of the intimacies of their way of life, they could be harshly criticized by the elders of their sect.

Publicity, even when favorable, is not sought by the Hutterites. They will quietly accept criticism and prejudice from outsiders when the judgments lack even a tinge of truth. Harsh as it may be at times, outside criticism, rather than creating bitterness and discontent among the Hutterites, serves instead to draw them closer together. As Eli explained to me, "The stronger the pressures are upon us, the stronger we become. In your life you stand alone. In ours there are many to help lift up a fallen brother."

SOME OF THE PREJUDICES one hears in Hutterite country are perhaps understandable; most, however, are not—especially when voiced by people who live close to colonies and should know better.

It is understandable that some farmers and ranchers will resent the ability of a colony to come in as a corporation and buy vast chunks of land. Virtually free labor gives the Hutterites purchasing power beyond the reach of most individuals.

When a colony reaches a population of about 130, it is deemed necessary that it divide itself and start another colony elsewhere. This is called "branching out." When acreages remain the same, a growing colony may find its productivity suffering from having more people than jobs.

The new colony may be established within a few miles of its mother colony or far away, depending upon the availability of land. Although not wealthy, most colonies through efficient farming methods and thrift are able to afford the large areas of new land necessary for branching out.

With the Hutterite birth rate far above the North American average, some fears have been expressed in the past that they would eventually "overrun the land." In Alberta legislation has been passed restricting the amount of land Hutterites can buy without government permission.

Contrary to rumor, the Hutterites pay all the usual taxes asked of United States citizens, plus a corporation license tax.

Hutterite intermarriage is a subject of surprisingly vicious and unfounded prejudice at times. They do not marry their brothers and sisters as they have been accused of doing, nor do they hire outside men to father their children. These are not stories from the frontier years but rumors believed today by some people who live within a few miles of Hutterites, yet have never troubled to get to know their neighbors and the truth.

The boss of one colony told me of a visit they had once:

"They came in here around midnight. A whole car full of young fellas from the military base, and I guess they figured they were gonna bring in new blood. We're not supposed to own any guns, but we have a .270 around the place to keep the coyotes out of the sheep. Those guys sure left in a hurry."

The Hutterites do have an intermarriage problem. They may marry relatives as close as first cousins once removed, and in some areas they are left with no other choice.

"This is a serious problem," preacher Eli said. "A Lehrerleut man from Montana told me that if he looked for a bride in all the Lehrerleut colonies in Montana and Canada he would still have to take a cousin."

Some feel the answer must lie in intermarriage between the Dariusleut, Lehrerleut, and Schmiedeleut, a practice seldom found at this time. When I suggested this to a young Dariusleut girl, she blushed furiously and said, "Never! Why, they dress so funny! I'd just as soon not get married." The Lehrerleut wear more brightly colored clothes than the other two groups, and the women's scarfs have larger polka dots. Other than that, it is difficult to understand the girl's objection.

EVERY COLONY has a boss, and at Surprise Creek it is Joe Stahl (page 116). While preacher Eli provides for the spiritual alignment of his people, Joe's job is to get the colony work done efficiently and profitably. He assigns the various jobs to the men and sees that they get done.

Father of a dozen children, 51-year-old Joe has been a colony boss for 26 years. Since the establishing of Surprise Creek in 1963, Joe has supervised the 14,000-acre ranch, with its 1,300 sheep and 300 cattle.

A short, solidly built man with a neatly cropped beard and eyes that seem to look through you instead of at you, he impressed me on our first meeting as the kind of man to have on one's side if things got sticky.

"What are you—some kind of hippie?" he said to me after I introduced myself.

"No," I laughed. "I'm just a little overdue for a haircut."

He didn't laugh at all.

"Well," he said, looking me straight in the eyes, "how often you get a haircut is no business of mine. But if you're gonna be around here doing whatever you do . . . let's get one thing straight right now. We don't tell lies around here, we don't raise a lot of hell—all we do is try to mind our own business and get on with our work. If you've got anything else in mind, you'd better get back on the road. If not—let's go look at the sheep."

We looked at the sheep. Because they were lambing, they had to be watched day and night. Then we rode about the colony in a pickup truck. "The boss may not always be right—but he's always the boss," said Joe. We stopped to tell some boys that a fence needed fixing, and then drove on to check a cow that was having trouble bearing her calf. He seemed to be everywhere at once, and the men he ordered around respected his authority, knowing that anything he asked of them he was capable of doing himself. "This is no two-bit barbed-wire outfit," he'd tell me gruffly.

Despite his tough exterior, Joe is a popular speaker at the local high school, where he talks to the social-science class to give the students a better idea of what Hutterites are all about. Surprise Creek, like most colonies, welcomes students from neighboring schools on field trips.

I SPENT AN EVENING with a non-Hutterite neighbor of Joe's, Willie Schmitt, whose 4,000-acre spread adjoins the colony.

"I've got to admit when they first came here I had some apprehensions, along with a few of the other ranchers," Willie told me. "Some of us had our hearts set on that property, but couldn't afford it. We even talked about joining together to buy it. But they got it, and

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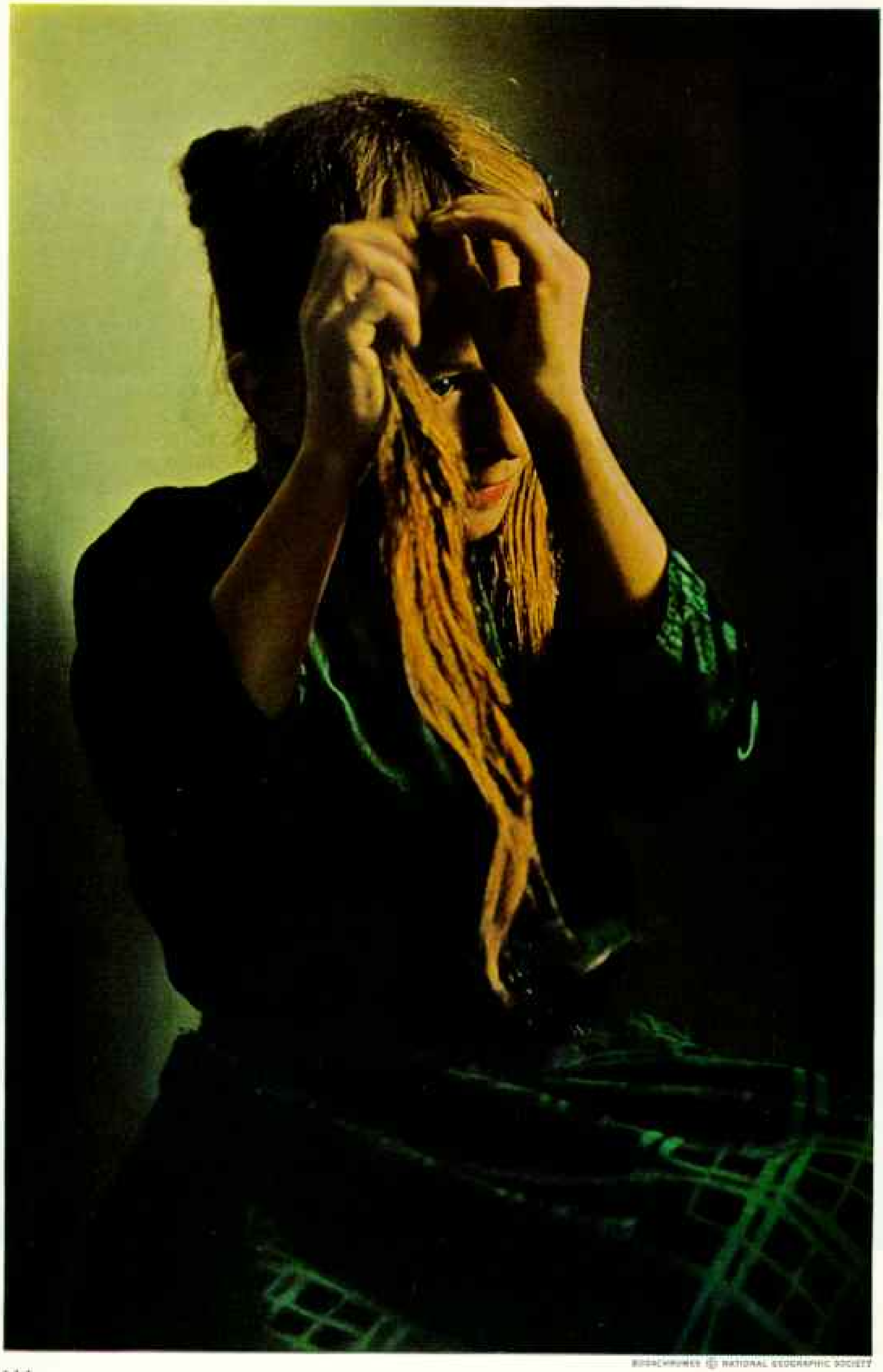
Careful steps and steady hands carry milk to calves, an after-school chore for Sam Hofer. Youngsters must have special permission to go into town, where they might be tempted by movies and other worldly pleasures. Should they transgress, a reprimand from their elders and confession before the congregation is the usual punishment.



they've been great neighbors to me and to everybody else around here.

"Lots of times I call Joe and tell him I'm in a bind—can he spare a man? I always get two or three. I'm 50 years old and getting too stiff to break horses, so I call Joe to see if he's got a boy who'd like to ride a colt for me. Well, those kids don't like anything better. And when I offer to pay Joe he always says 'give it to the boys.' They don't get much allowance, you know, and Joe works it out so different boys get a chance at the extra spending money. And during branding time, when everybody needs help, they'd be insulted if we didn't call."

NO MATTER what colony I was visiting, when the dinner bell rang there was always room for me at the table.

The main dining room, where meals are served, is referred to as "the kitchen." The women take turns cooking, as with other jobs, such as soapmaking and baking bread.

At the long wooden tables gleaming from many coats of varnish, everyone sits according to age, with the boss and the oldest man at one end. Very young children do not eat with the adults, but are fed earlier.

Before eating, heads are bowed and the boss, or in his absence the oldest baptized man, says grace:

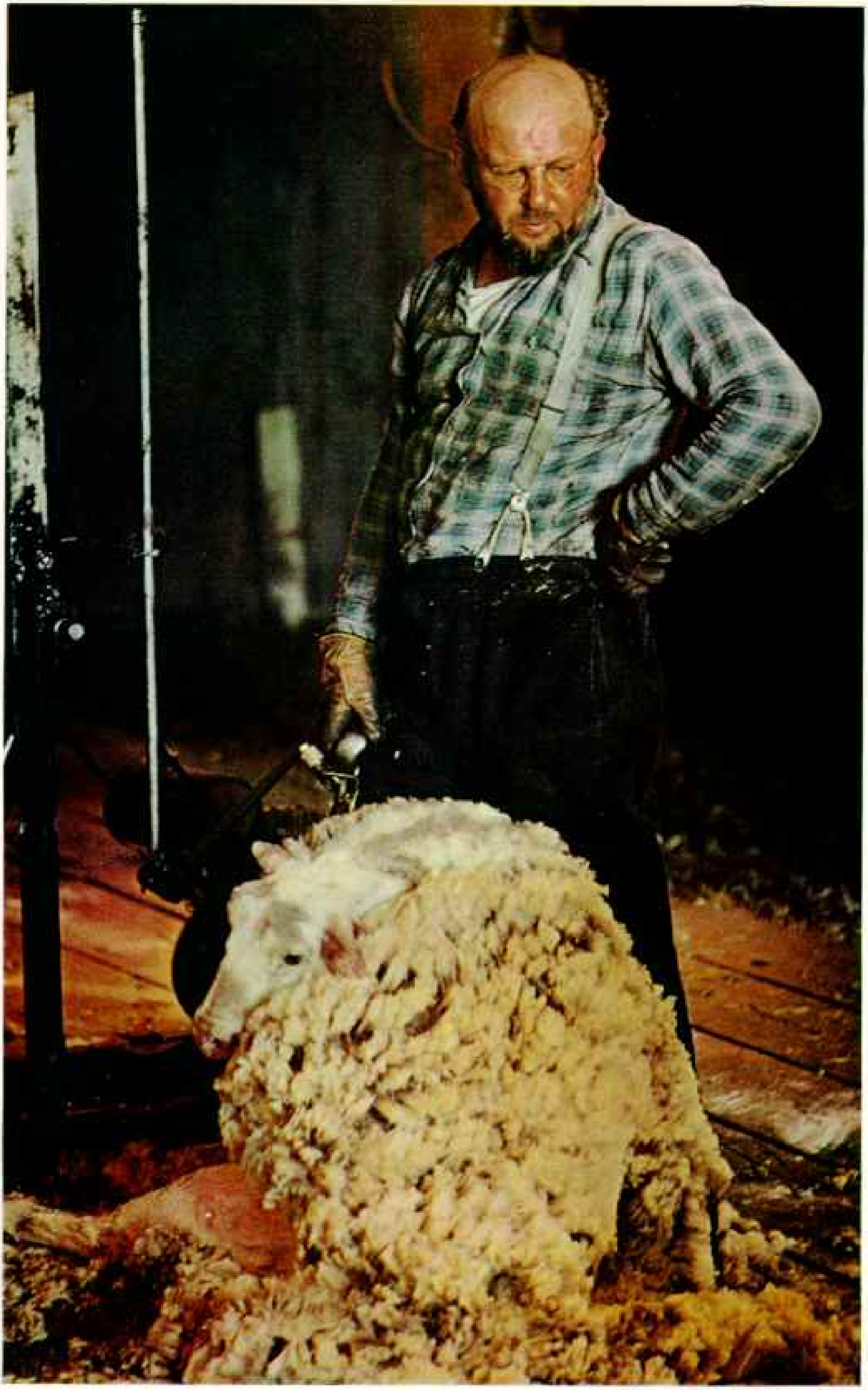
"Herr Gott, himmlisher Vater, segne uns diese Gaben, die wir empfangen werden von Deiner reichen, milden guten Hand, durch Jesum Christum. Amen."

"Lord God, Heavenly Father, bless us these gifts that we from Thy bountiful, kind hands will receive, through Jesus Christ. Amen."

The food, although not fancy, is plentiful and filling. There are meat and potatoes, several vegetables, fresh-baked bread, honey, and invariably noodle soup and fried eggs. On some days there may be a Hutterite specialty such as *schuttenkrapfen*, a dumpling made from cottage cheese wrapped in dough. In the

Latest style is more than four centuries old. This young girl braids her hair back and front as did her mother and generations before her. After finishing, she will don the traditional polka-dot head scarf.

Gardening on their knees, Surprise Creek women thin sprouting carrots, beets, and parsnips. When the snow flies, tables will still be heavy with vegetables; careful preserving of foods follows the teachings of Jacob Hutter, the 16th-century leader for whom the sect is named: "You should gather in when it is summer, so that in . . . dangerous time of winter you will have something to draw upon. . . ."



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fall, if the colony's men hunt, there may be meals of tender venison from deer fattened on the barley fields of summer. And as they would often remind me, "Sunday we're having duck or goose . . . be sure to get here in time for dinner."

THE STRENGTH and future of the Hutterites must rest with their children. They do not send out missionaries in search of converts. One preacher told me, "If I tried to bring in converts, I'd be excommunicated from the church. My job is to keep watch over my own flock—not to gather stray sheep. Converts to our way are very rare. You are *born* a Hutterite."

Although not baptized until their late teens or early twenties, Hutterite children become "young people" at age 15. This allows them to join the adults in work and to sit at the adult dinner table.

In Montana, Hutterite children attend school until age 16, the minimum age required by the state. In most cases they attend their own one-room schools, taught by state-licensed teachers hired by the colonies. The one-room schoolhouse is sometimes used as the colony's church (pages 98-9).

Along with what they call "English" school, the children are required to attend "German" school until they are 15. Each colony has a man who is the "German teacher," and it is his responsibility to teach the children the Hutterite hymns, Bible history, and how to read and write German.

A few Hutterite children finish high school through correspondence courses. I met one young Canadian Hutterite who was working his way through college in Montana because he felt the normal Hutterite education was far from satisfactory.

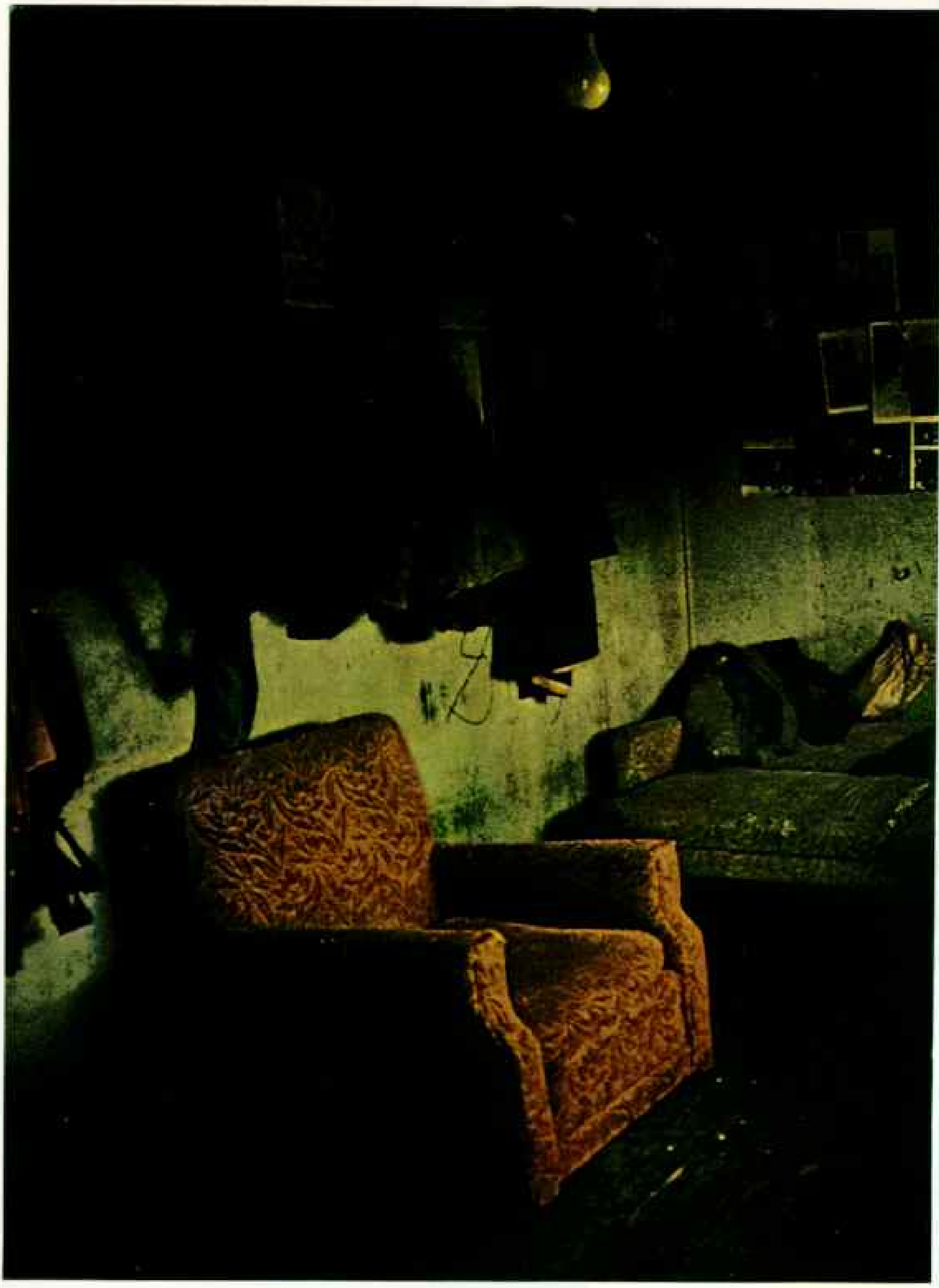
"Most Hutterite boys are happy if you just give them a horse," he told me. "But this isn't enough any more. How can everyone be a farmer? Soon there will not be enough land. We must broaden our scope. Today, the average Hutterite cannot even give you an explanation of his faith because he has little education and cannot express himself."

I often talked about the problem of education with John Stahl, preacher of Ayers *Colony near Cressmann,* Montana. John and his wife Anne are perhaps a bit more liberal then many Hutterites.

Anne Stahl completed high school through

Docile ewe waits for Joe Stahl to take his turn with the electric shears. The Hutterites eagerly accept the latest in mechanical conveniences, because they contribute to the colony's well-being. As colony boss at Surprise Creek, Joe assigns chores and sees that every man learns a trade.

Tender are the young to the newborn. A small boy comforting a bleating lamb will soon return to his home and fall asleep with this Hutterite prayer on his lips: *I am a little child; my heart is pure. In Jesus' name I go to sleep. The lovely angels will watch over me. Amen.*



Man with a lonely vigil, Ben Walter stands watch over the lambing pen in the nighthawker's shack. As the ewes bear their young, he will carry them into the barn, luring the mothers to follow. Responsibility,

KODACHROME BY WILLIAM ALBERT ALLARD © N.G.S.

security, and belief in their way of life keep young men like Ben in the colony. During their century in North America, fewer than 500 Hutterites have left for the outside world, and most of these have returned.

correspondence, even getting an "A plus" in preflight aeronautics. She laughed when she told me, "I had my choice of some extra courses, and it sounded interesting." Anne continued taking correspondence courses and now has 40 hours of college credits.

John served three years on the local school board and was president of the Parent-Teachers Association during a period in which his colony's children attended public school. The Hutterites' governing elders in Canada firmly believe that the colonies should run their own schools, and few now use public facilities.

"We have a problem of exposure," John said. "There is so much emphasized in public schools today that we don't need. Sports! Everything is sports! Basketball, football . . . all they care about is sports. I believe education is good—if that's what they would offer.

"And you hear so much about drugs in the schools . . . we have no problems like that in our schools. Our children dress differently and are teased by the others. But you know, you could go into town today and see a girl who forgot to put her dress on and nobody would notice that."

We talked also about the occasional Hutterite who decides to leave colony life.

"I knew a man who thought we had guards around our place to keep the people in," he said. "The man came down here once, I guess to see for himself. He asked me, 'Where are the guards?' I said, 'Well, you fool, you drove in here, didn't you? They certainly would have been up at the head of the road!' "

Most of those who leave return. Some within a few days and some after years of a different life. "If a boy tells me he wants to leave, I tell him to go ahead, give it a whirl," said John. "See if it's better on the outside."

ON A STORM-THREATENED summer afternoon I rode with two of John's brothers to round up some cows and calves. Martin Stahl, a tall, rangy man, is cattle boss of the colony. His brother George, called "Jingles," is in his late 20's and spent about seven years outside the colony, most of the time in the Navy.

As the sky darkened, the wind came up strong. Gusts of 40 to 50 miles an hour swallowed our voices as we frantically circled the herd, shouting and whistling, turning the wayward cows back into the drive. We finally got them into some timber in the hills above the colony. While we waited for the calves to find their mothers and settle down for the night, the storm passed and the sun came out warm and golden.

Jingles and I stretched out in the grass and talked about cities of the world we had both seen. I asked him why he decided to return to the colony after seven years away.

"I saw a lot of the world," he said. "And I met a lot of different kinds of people. But I found that this is the only way for me to live. The big cities, the way people fight and kill each other . . . that's not for me."

On another day I rode with two boys from a different colony. One, a youngster of 12 with hair the color of straw, talked of books he loved to read. Books called *Black Beauty* and *Call of the Wild* and *Cowboy Sam*. And a book called *The American History*. He seemed very happy with his books and with the sorrel pony that carried him along next to me.

The other boy was 17, the son of a preacher. Like Hutterite boys his age, he sometimes got caught smoking behind the corral, or coming out of the movie house in town when he was supposed to be checking the horses.

The Hutterites have their own way of disciplining their people, young and old. He probably had to kneel in front of the entire congregation in church and confess what he had done. And then he probably had to sit with the little children.

There had been no rain for weeks, and though we walked our horses, the sun brought sweat to their withers, and the 17-year-old told me that you can tell it's really dry when a single rider can kick up a dust trail.

We stopped at a stream, and the water we drank had come down from the mountains and it was cool and tasted of the earth. In the thick heat of midday we drank carelessly, splashing our faces until our shirt fronts hung wet and the falling droplets made pockmarks in the dust.

"Do you ever feel like going away?" I asked.

"What do you mean?" he said.

"You know—do you ever feel like leaving the colony?"

"No," he said. "I've never felt a temptation to leave here. It must be a pretty rough life on the outside, all alone, trying to make a living. Don't you think?"

We let the horses drink and then rode on.

"Yes," I told him. "It can be all of that."

Later that night a bunch of us sat in a dimly lighted bedroom, sipping cans of cold beer and singing songs about Montana cowboys. One of the women drew a harmonica from her apron pocket and played "Red River Valley." A 14-year-old girl brought out a guitar

EXTACHROME BY WILLIAM ALBERT ALLARD (C) N.G.S.

Dreams of romance fill the air: These young girls decorate mint candies for a wedding celebration at Spring Creek. After baptism—between the ages of 19 and 26—young people are free to marry, usually with a member of another colony. The groom first asks his parents, then his preacher, and finally the colony council. If they and their counterparts in the bride-to-be's colony agree, the marriage takes place.

she wasn't supposed to have, and while the preacher slept in his house a few yards away, she softly sang a country-western song about young love. The boys teased the girls, and the men laughed at their own jokes while wide-eyed children fell asleep, one by one, slumped in the arms of their parents.

There were many nights like that. Nights following days of hard work. Nights ending with a song, some gentle laughter, and a prayer of thanks.

To some, perhaps not very exciting. To the Hutterites, it is all that they ask.

As the time drew near for me to leave for my home in the East, rumors began about "a wedding at Surprise Creek in a couple of weeks." By tradition, Hutterite couples keep their marriage plans secret until just before the event.

"Who's getting married, and when?" I asked.

"Well . . . ," said those I asked, "maybe young Joe Stahl is going to marry Kathy Walter from Spring Creek . . . but it's not for sure yet. You better ask Joe."

"Hear you're getting married," I said to Joe.

"Could be," he said. "It's possible. You better ask the preacher."

I hailed Eli as he wheeled by on a small tractor. "Hey, Eli! I hear there's going to be a wedding."

"You know as much about it as I do," he said. "And I don't know anything about a wedding," and promptly drove away.

It seems impossible to pin anyone down to a definite wedding date until just a week or so before it's held. At that time the young man

asks his parents if he may marry and then asks permission of the preacher, who in turn asks the colony's council of baptized men. If consent is given, the boy's father visits the girl's preacher, if she is of another colony, bringing with him a letter from his preacher asking permission for the boy to marry the girl. Her preacher then asks his council if they will allow her to go. If the council consents, the father of the boy asks the father of the girl for his permission.

If he says yes, the marriage is on, and the wedding cake that by now has been baked will not go to waste. Usually, all goes well, but there have been times when permission has not been granted and the couple have never married.

A few nights before Joe and Kathy's wedding, a shivaree was held at Spring Creek. The dining room was filled with members of both colonies and friends and relatives from nearby colonies and some in Canada. Neighboring ranchers and their wives dropped in, and we all sat at the long tables while preacher Paul led the hymn singing. This went on for an hour or more, and then we stopped for sandwiches and glasses of cold keg beer.

As the evening grew late, the children were put to bed and the bride and groom went with most of the young people to one of the houses to sing more hymns.

Outside in the darkness, young couples walked about, holding hands. For many of them, this wedding was a chance for several days and nights of courting. For some, the opportunity to visit a faraway love might not come again until after harvest season, when the cold winds blow and the work load lessens and there is time for traveling.

ON SUNDAY MORNING we filed into church for the wedding.

Eli stood at his pulpit, a simple wooden desk covered with a white linen cloth. Behind him the pale green slate had been wiped clean of children's scrawls, and a pencil sharpener jutted out like a one-eyed observer. On a side wall hung a map case with the United States of America rolled up inside.

The words were spoken in German, quickly and softly in the crowded silence of the small room.

"The grace of God and the love of Jesus Christ be with us. Amen."

Everyone knelt in prayer. Young Joseph Stahl left his seat near the front and stood facing Eli. The groom's long frock coat was ceremonial and slightly faded—not quite as black as it must have been when his grandfather wore it more than fifty years ago. The white shirt collar tight across the back of his sunburned neck gave a solitary bright edge to his somber figure. He stood like a shadow of the past.

"The reason for our gathering, dear brothers and sisters, is for the praise of God, and also for those who have willed themselves to become betrothed."

Katherine Walter stepped from her place in the front of the room and stood at Joseph's side, her hand in his. She wore a plain dress of dark-blue satin. It had no lacy frills and swept down to just above her ankles. A dark-blue scarf framed her face, covering her blonde hair.

"We will take this great undertaking before us now, and will bring it to a close with the help of God."

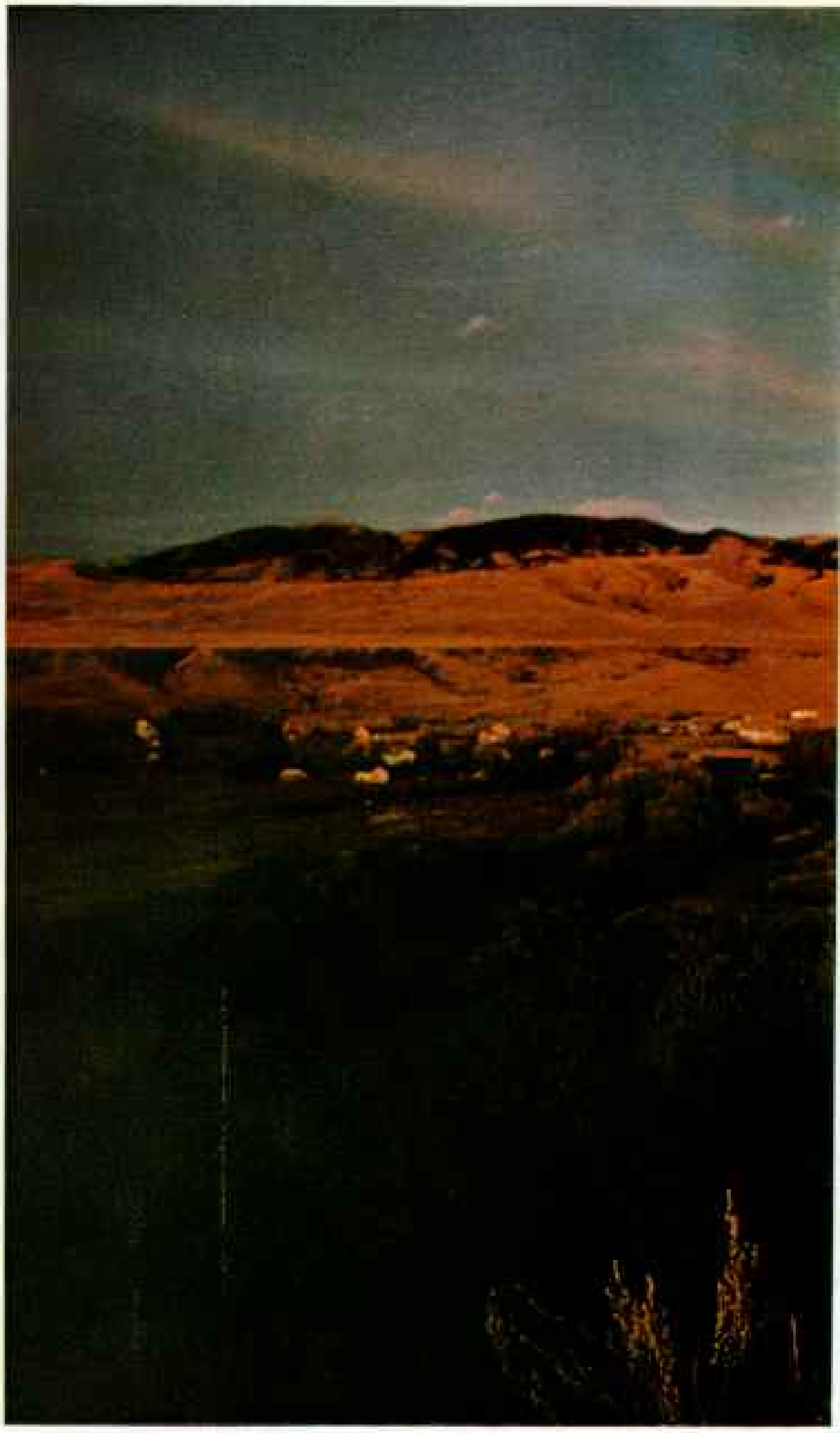
Now the service neared its end. Still kneeling on the hardwood floor, we raised clasped hands to shoulder height for a prayerful song. Then, in high, shrill voices, the full strength of Hutterite faith rolled out in a hymn four centuries old.

I was one of the few non-Hutterites in the room, and although these people were all my friends, I felt suddenly alone in the midst of another country—far removed from the one rolled up in the map case on the wall.

And so it was on a bright Sunday morning in central Montana that the Hutterite way of life received new strength and hope from a simple marriage in a one-room schoolhouse at a place called Surprise Creek.

On the way to the airport I stopped at Spring Creek to say goodbye to field manager

Henry Walter takes his bride, "a gift from God," before his father, preacher Paul Walter, and the congregation of Spring Creek. Stepping from their respective sides of the aisle—the groom in ceremonial frock coat made for the occasion, the bride in sober blue—the couple exchange their vows. A wedding feast follows, with joyous hymns and visiting between guests and colony members.



"Train up a child in the way he should go: and when he is old, he will not depart from it." PROVERBS 22:6

Hutterites' link to tomorrow, a boy pauses at day's end. He and his brothers and sisters will shape the destiny of the sect. Hostility to their way of life persists, yet understanding and tolerance increase. At last the Hutterites may have found their promised land.

Paul Walter. I'd spent many hours with Paul during my stay, and now it was time to go, and he brought out a gallon tin of honey for me to take home to my children.

It was getting to be dusk, and some of the children began to gather, making plans to chase a family of skunks out from under the kitchen after dark.

We stood, Paul and I, beneath the trees in his yard and talked of years long past, when his colony first came to Montana.

"In those early days," he smiled, "I took dirt from every critter in the street about my beard and the way I dressed. And, you know, there were lots of times I wanted to shave and wear different clothes and walk the streets without anybody barking at me. But of course I never did. Because it shows to the rest of the world what I am.

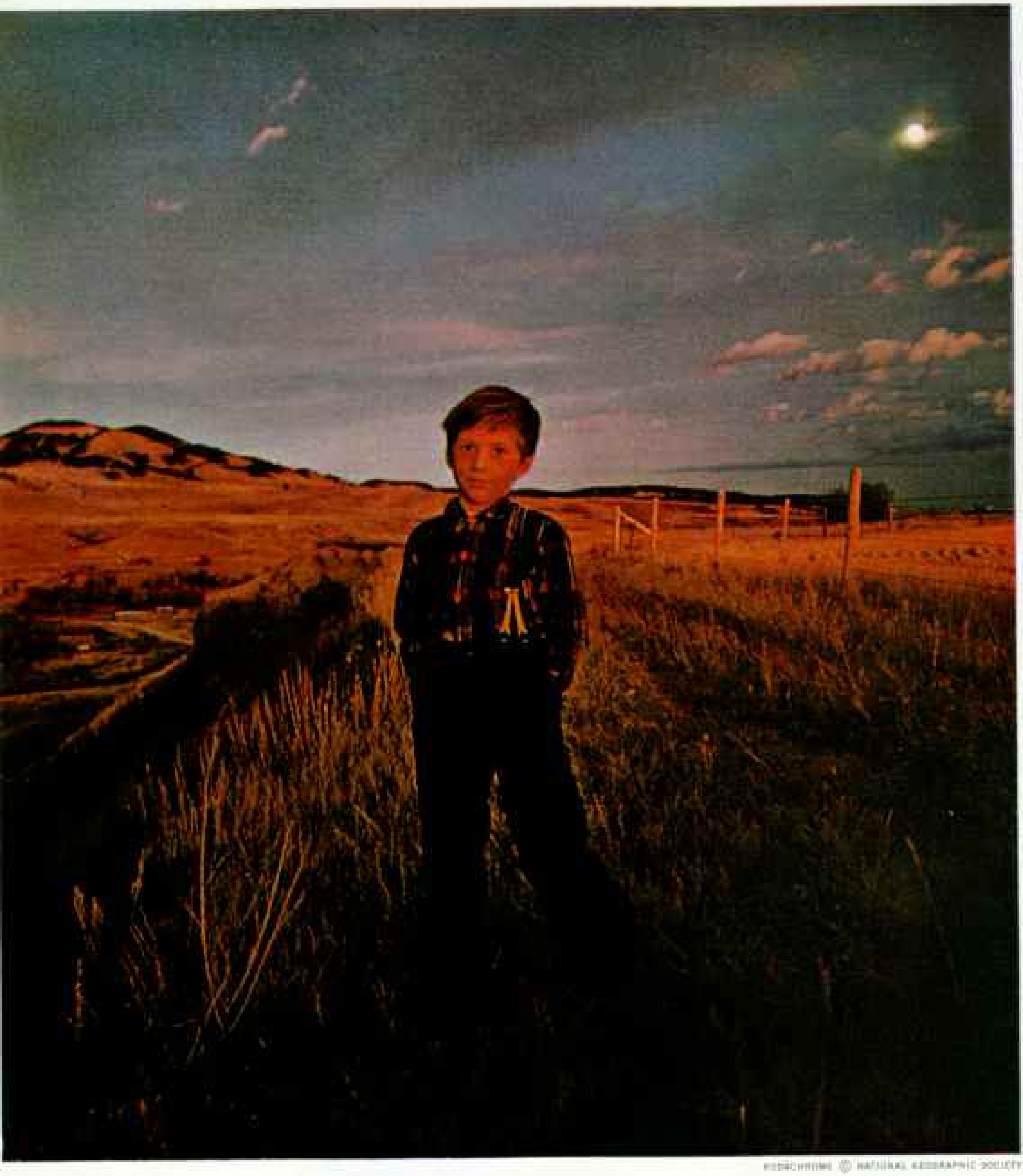
"And I am a Hutterite!"

When I left, it was dark. As I drove along the gravel road that wound its way out to the highway, I thought about the time Paul and I were riding through a field of wheat stubble in his truck and how we talked about hard times and not enough land and criticism of their way of living.

"Well," he had said to me, "if things ever get too tough, we'll just shake dust and go."

"What do you mean," I asked, "'shake dust?'"

"As the Lord told His Apostles," he answered. *"And whosoever shall not receive you, nor hear your words, when ye depart out*



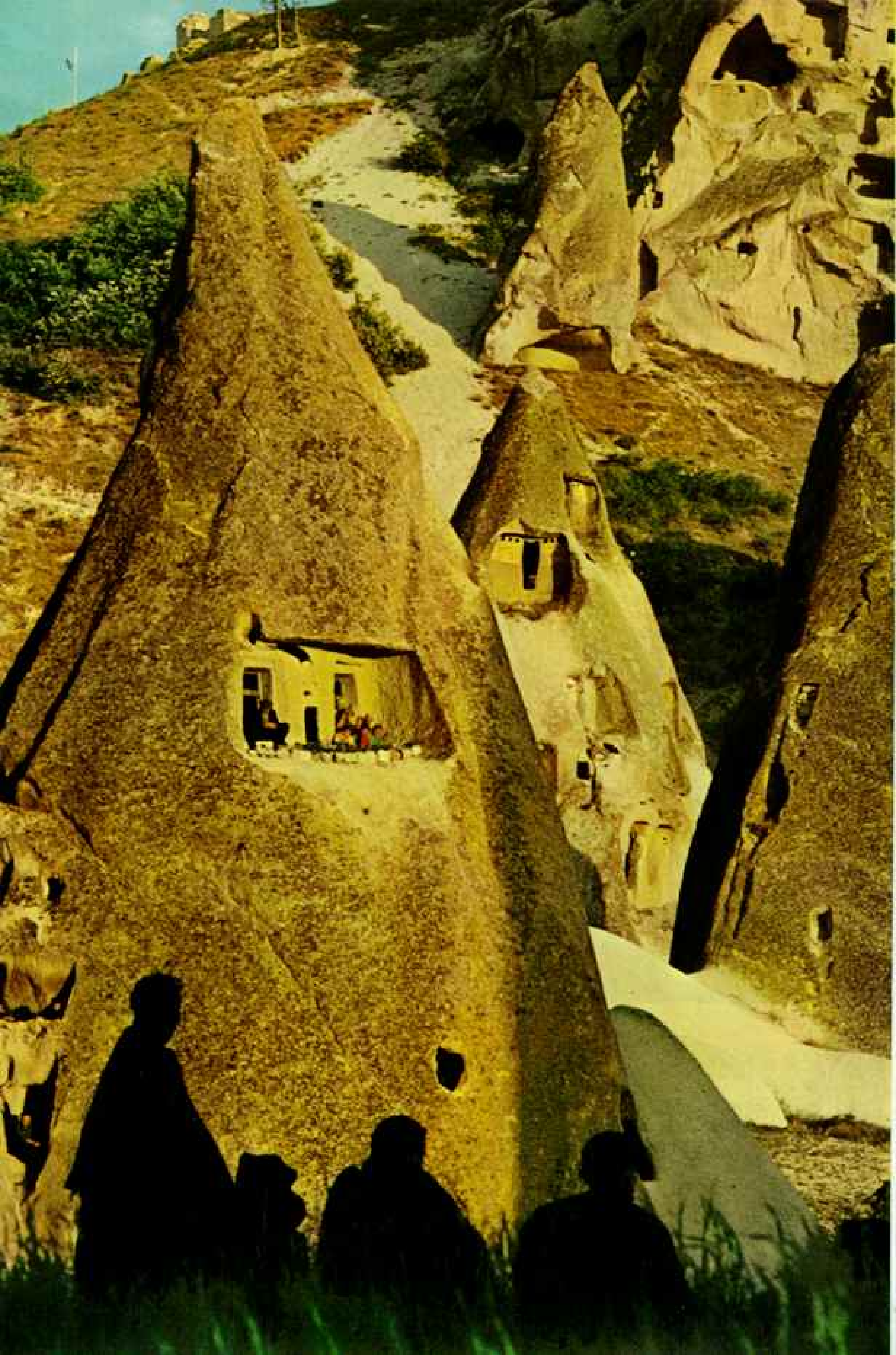
of that house or city, shake off the dust of your feet."

On the road to the highway I thought about that and about men like Willie Schmitt, who sometimes gets into a bind but can always get a hand from Joe Stahl's boys, who are "about as good neighbors as a man can find." And I remembered the rainy afternoon in Lyle's Bar in Stanford, when a cowboy told me about a branding he had been to where some Hutterites were helping out and how one of the rancher's men had said he "wasn't gonna work with no Hoots." "Fine," the rancher had said to him. "How much do I owe you? Because you're leaving."

I thought about men like Paul Walter, Joe Stahl, and Willie Schmitt, and the rancher. All men who lived and worked in the way they thought was right for them in country that seemed about big enough for everybody.

Perhaps, I thought, the dust has settled.

THE END



Keeping House in a Cappadocian Cave

Article and photographs by
JONATHAN S. BLAIR

Bizarre cones spike a hillside in central Turkey. Beginning in the fourth century, monks carved retreats in these volcanic pinnacles; today Anatolian farmers dwell in some of the ancient caves, and perpetuate the tradition by occasionally hacking new homes in the soft stone. From the balconied room of this lofty abode, reached only by a ladder on the opposite side, the family of Mehmet Kutluğ enjoys a superb view of the Göreme valley near the village of Üçhisar. They bought the cone in 1962 for the equivalent of $500. The author and his wife set up "cavekeeping" in a honeycomb not far away (pages 140-41).

ARLENE AND I stared up at the home we had chosen, wondering how old it was. Ten centuries? Twelve?

But this was not the time to worry about such academic questions. The blazing Turkish sun above us was merciless—and our cool, shady home was still beyond reach. We had no ladder!

I hoisted Arlene to my shoulders. From there, she scrambled up to disappear into the main cave, 12 feet above the valley floor.

Well, there might be a ladder for sale in the village of Ürgüp. As I started the hot, dusty four-mile trip, I could hear the debris of centuries rattling from the cave's mouth. My wife had already taken up "cavekeeping."

This part of ancient Cappadocia, a 50-square-mile section of conical countryside, lies near Turkey's rolling Anatolian plateau (map, page 133).* In the distance, Erciyeş Dağı rose nearly 13,000 feet, hazy white with snow. Before the memory of man, the mountain had poured out a flood of lava and ash that filled this valley. Winter rains, melting snows, and wind-borne sand had eroded the volcanic rock, sculpturing it into a multitude of magical shapes.

Rock chimneys and sharp pinnacles rose everywhere about me as I drove. Many of them were pocked with rock-hewn doors and windows—evidence of a departed population. Man's spirit and labor had been at work together with the elements.

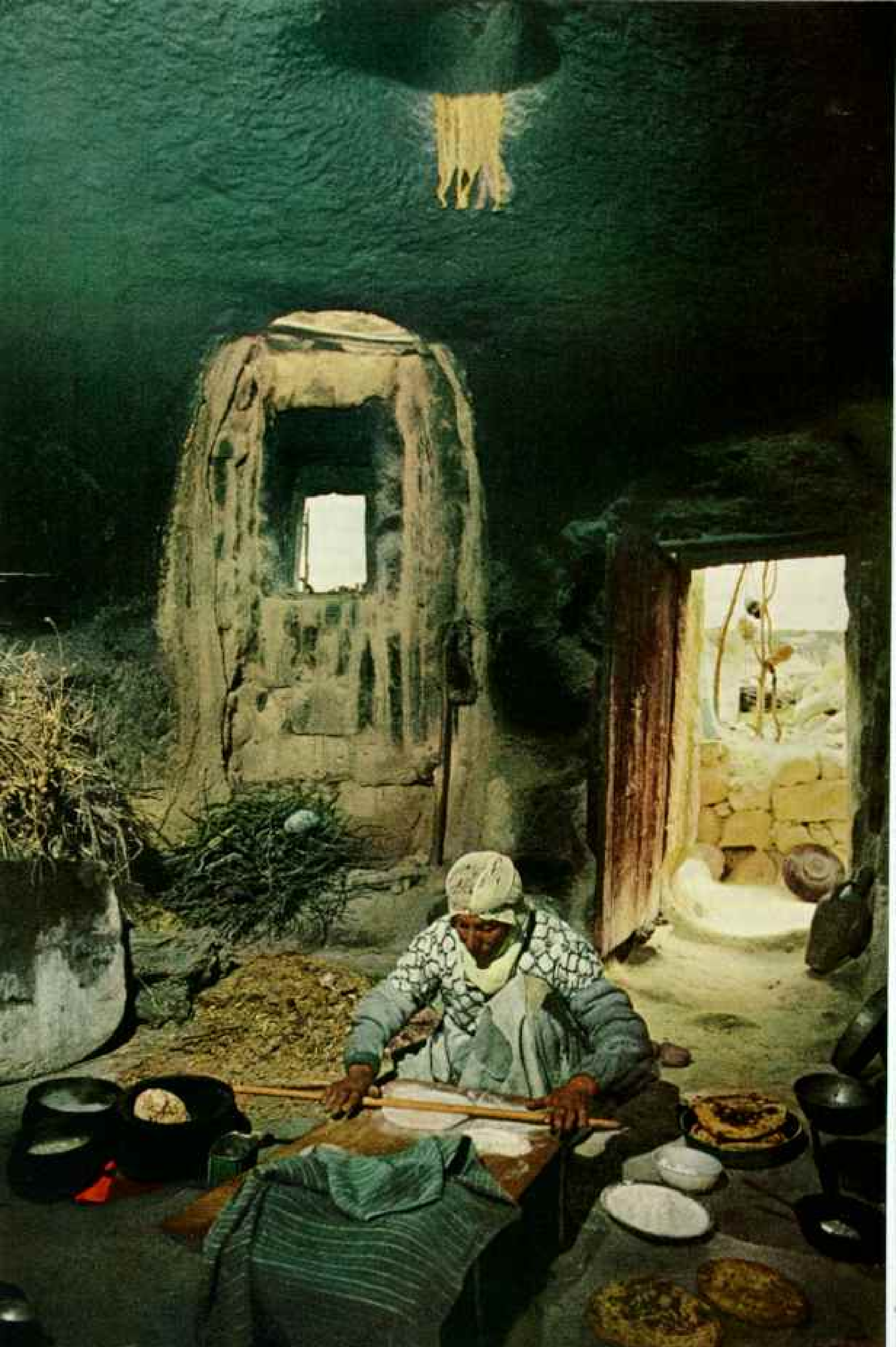
We had come here to learn more about the ancient Christians who had carved these caves. During the month ahead, we would try to live as they had lived.

Settlement Started as a Religious Retreat

Sixteen centuries ago, St. Basil the Great, Bishop of Caesarea (now the city of Kayseri), urged his followers to settle here. Perhaps he had seen the beginnings of monastic life in the Egyptian desert and was convinced that it was the most direct way to God. Cappadocia's tortured desolation was the nearest thing he could find to a desert in Asia Minor. Though there were no natural caves, the soft volcanic tuff could be hewn with primitive tools.

As the years passed, the simple monasteries of St. Basil grew in

*See in NATIONAL GEOGRAPHIC: "Cappadocia: Turkey's Country of Cones," illustrations by Marc Riboud, January 1958; and "Where Early Christians Lived in Cones of Rock," by John D. Whiting, December 1959.



Tasting Cappadocian hospitality, the Blairs dine with the Hüseyin Çopurs in their cave home in the village of Avcılar. Can Arıner (above, left), a Turkish university student who lived with the Blairs and served as a general helper, joins the group on the floor as they dip rice and lamb from a bowl onto their bread.

A few hours earlier Mrs. Çopur had baked the flat loaves flavored with cheese in her smoke-blackened kitchen (left).

"The darkness didn't seem to bother her," recalls Mr. Blair, "and neither did the intense heat and stifling fumes, which made the chamber almost unendurable for us."

number until, by the 13th century, the area was honeycombed with caves. As many as 30,000 people may have lived here at one time. More than 300 rock-carved churches have been counted; others may yet be discovered.

Large groups of monks lived and prayed in some of the more elaborate cave complexes, while hermits occupied solitary caves nearby. In the 14th century, as the Byzantine Empire began its final decline, Cappadocia's monastic life withered. The monasteries filled again for a brief period in the mid-1800's, and some Christians continued to inhabit the caves as late as 1922.

Even today many of the caves are in use; Turkish farmers live in some, and others serve as stables or storerooms. New cave houses are still occasionally hacked out by peasants who prefer them to more expensive conventional homes (page 142).

Rooms of Rock Serve Many Purposes

Arlene and I had chosen an "apartment" in a cliff (pages 140-41) near the village of Avcılar. The living room and kitchen shared a single chamber in the central cave. When Arlene cooked there, she always faced the ridiculous possibility of backing out into space.

The bedroom was not connected. To reach it from the living room, we had to climb down a rickety ladder to the valley floor and then scale another ladder. But that bedroom was our treasure. Its beautifully arched ceiling, raised altar, and simple Christian crosses painted on the walls told us that once it had been a chapel.

There were still other rooms below and above us. A cool, dark one served for storage, and as sleeping quarters for two university students from Ankara—Can Arıner (above) and Asya Orbon—who had come along as interpreters and general helpers.

Another cave, above and to the right of our living room, turned out

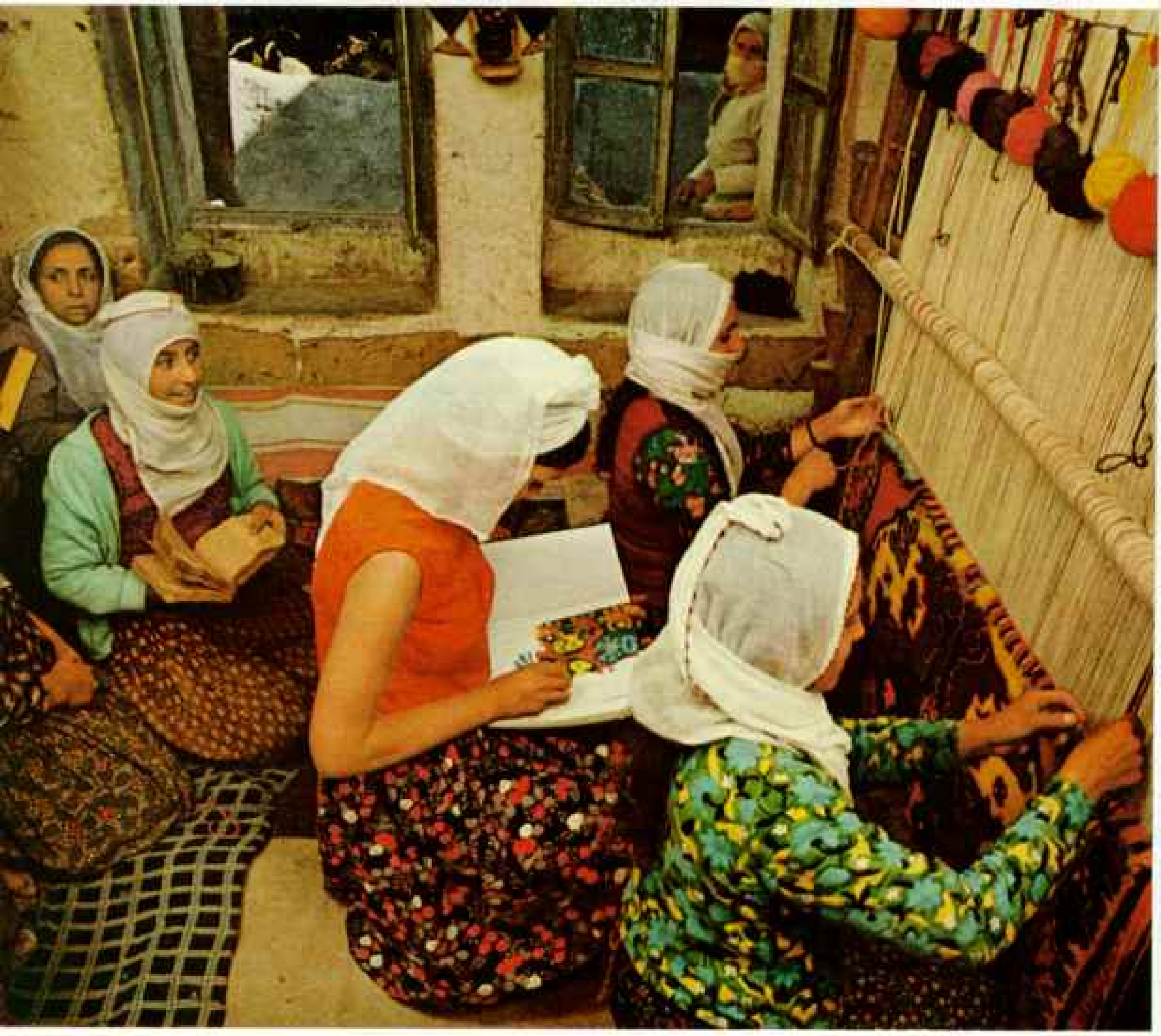
to be a mausoleum—four graves had been cut into its floor. Topping the whole complex was an ancient, badly eroded rock-hewn church.

Arlene's improvised broom simply could not cope with the dust of so many centuries. We shopped at Üçhisar and other nearby villages and, to our surprise, found a large sheet of plastic. Laying it on the thick dust, we spread our carpets on top of it. Arlene bought some brightly embroidered cushion covers, stuffed them with sawdust from the local sawmill, and solved our furniture problem. The monks had carved long, rectangular niches in the walls; they became our storage cabinets.

Cone's Owner and His Wife Come Calling

Our first guests were the Muzraks, Kezban and her husband Halil Ibrahim (page 132), who owned the wheat fields below us—and, in fact, our cave home. Never before had Kezban ventured up into the rocks. As Arlene and I helped her up the ladder, Kezban kept murmuring "*Maşallah, Maşallah*—What wonders God wills!"

Entering our cave, she looked around the room, then out over the



valley. "Why," she exclaimed, "the whole earth lies beneath your feet when you stand in this house!"

Halil climbed up to join his wife. When he looked out to survey his property below, I handed him a pair of field glasses. He placed them hesitantly to his eyes, then jumped backwards. "Look at Üçhisar," he said. "It came right to here! Somebody's house came right to my feet!"

Kezban, curious, reached for the glasses. Oh, her husband had deceived her. Üçhisar was very *far* away! Kezban was looking through the wrong end of the binoculars.

Outhouse Has to Be Wired Down

Wood is extremely scarce in Cappadocia, but I managed to buy enough lumber to build a privy about 100 yards from the cave. Not an hour after I had finished it, Arlene came running up the path shouting, "Quick, Jonathan! Someone has stolen the outhouse!"

It was too late. Two small boys were disappearing over the hill, triumphantly carrying my handiwork with them.

EKTACHROME (LEFT) AND KODACHROME BY JONATHAN T. BLAIR © N.G.S.

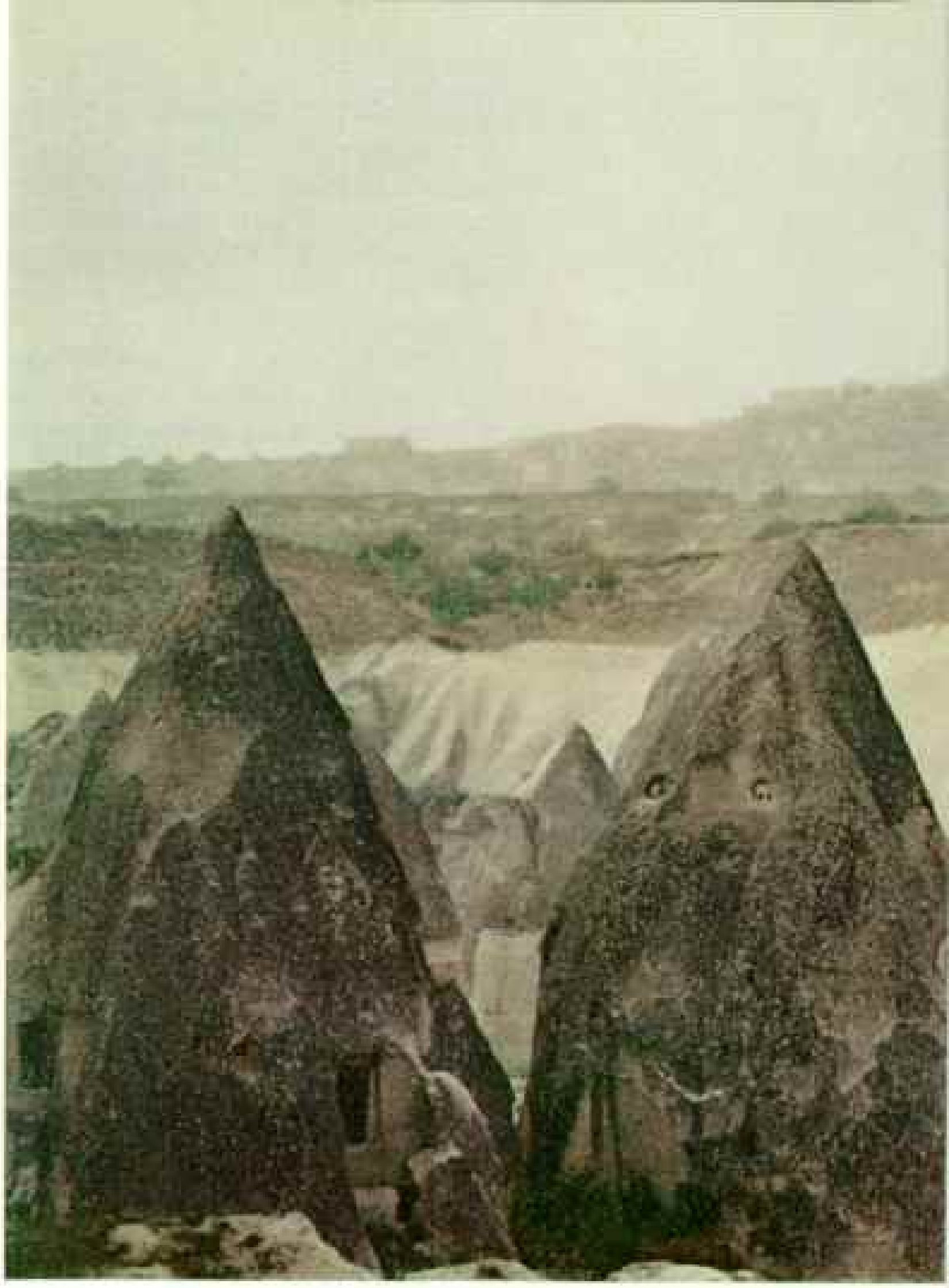
Fashion—the universal language

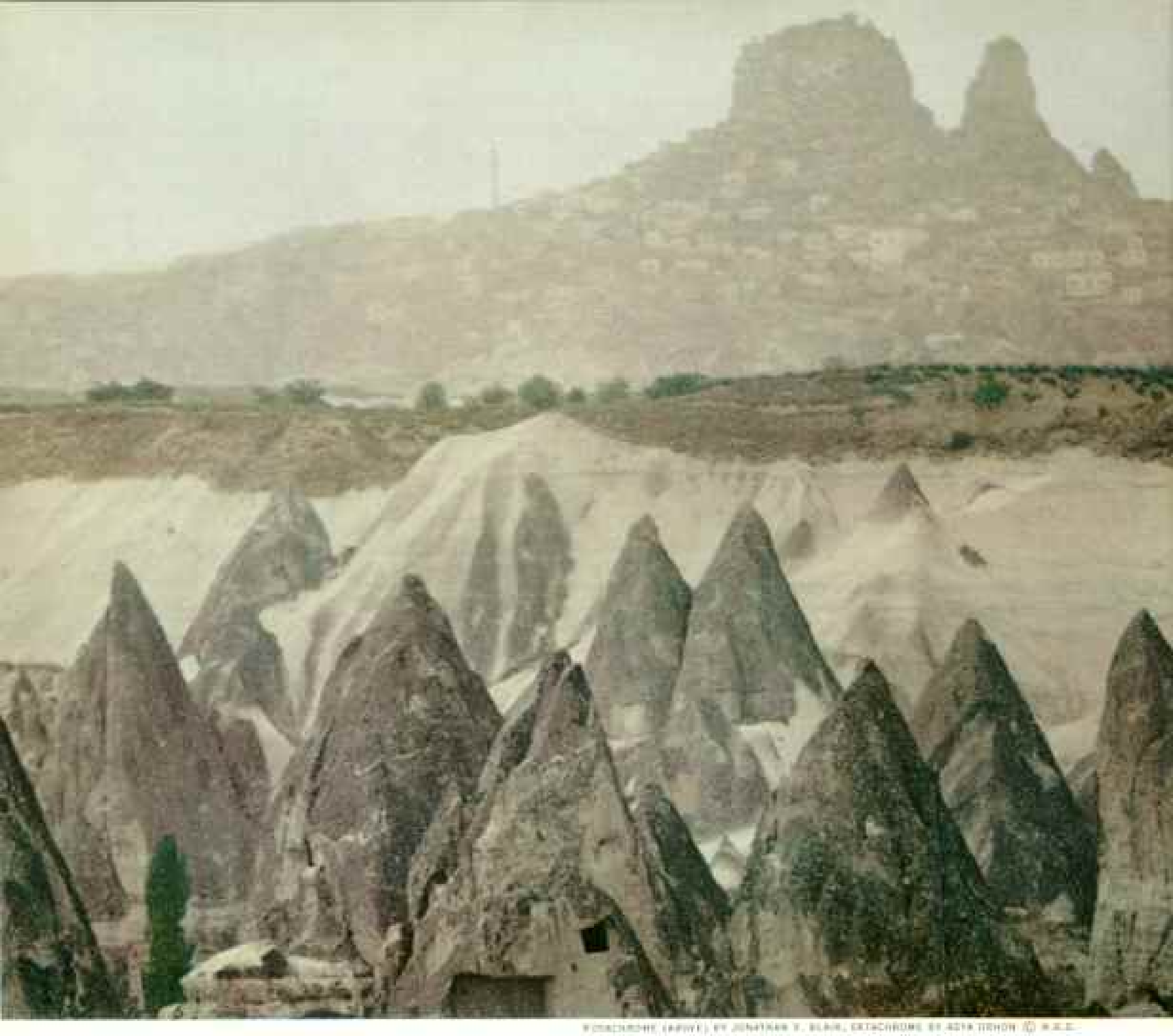
With sighs of admiration, villagers of Soğanlı inspect Arlene Blair's handmade Italian sweater. The woman at left wears a printed headscarf called a *yazma*.

At the home of Mehmet Aslan in Avcılar (left), Meliha Aslan, foreground, and her sister Meryem weave a carpet. Mrs. Blair, a textile designer in Buffalo, New York, sketches a rug pattern, one of several she created for the Aslans. Fleeces, sheared from their flocks and dyed in steaming pots, provide yarn for these home weavers. A six-foot-long carpet the width of their loom may take several months to finish and sells for $30 to $40. All the women, including the author's wife, wear baggy trousers called *şalvar*.

"Rain becomes this arid land," says the author. In this view from his cave home, a misty veil envelops nearby cones and the distant village of Üçhisar, a name that means "Three Castles."

Entertaining their first visitors —Halil İbrahim Mızrak and his wife Kezban—the Blairs serve tea in their combination living room and kitchen. The Mızraks, who own this cave and the wheat fields beneath it (page 146), brought gifts of yogurt and dried apricots. Borrowing a Cappadocian custom, the Americans welcomed their guests with lemon-lime cologne to refresh hands and faces. Here, sitting on a rock sofa, the guests leaf through back issues of NATIONAL GEOGRAPHIC.





PHOTOCHROME (ABOVE) BY JONATHAN T. BLAIR; ORTHOCHROME BY AZIZ ÖNHON © N.G.S.

Less than 200 miles from Ankara, Turkey's modern capital, lies timeless Cappadocia. In the prehistoric past, 12,848-foot Erciyeş Dağı spewed a mantle of lava and ash over the region; eroding rains and wind created the cone-spiked scenery of today. Here, at the peak of population, some 30,000 early Christians sought haven. The First Epistle General of Peter, addressed to dispersed Christians, includes the Cappadocians in its salutation, but the Biblical name Cappadocia no longer appears on modern Turkish maps.

Asya set out to solve the problem. Next day he rattled off in his ancient Mercedes-Benz and returned with a large refrigerator crate balanced precariously on top of the car. We put it in place, but when sunrise came, it was gone! This time Cappadocian wind was the culprit. The box had blown over and rolled down a hill. We retrieved and reset it—firmly staked and wired down to withstand the elements as well as temptation—and camouflaged it with brush.

We had brought only a few provisions. Arlene planned to buy local produce and do all our cooking on a one-burner stove fueled by bottled gas. But she and Can Arıner, who had volunteered as assistant cook, found that one burner simply would not handle a Turkish meal.

"Cooking like this," Can moaned, "is like digging a well with a needle." Asya soon found us a second stove.

Mrs. Hacer C. Boray, a long-time friend of Arlene's from Ankara, spent a week with us to help ease us into Turkish village life.

"We must make you some bright-colored *şalvar*," she told Arlene. "You should dress in the costume of the village women when in the countryside."

The women's baggy trousers were perfect for cave living, my wife discovered (page 132). Soon she and Hacer were making the rounds of neighboring homes, and our list of friends grew.

Hacer quickly improved our simple meals. She showed Arlene how to make a mint salad that went nicely with fried squash and fresh yogurt. As my wife became more experienced in cave cooking, we enjoyed *börek*—a kind of Turkish lasagna that we baked in an oven made from a covered frying pan. Eggplant, rice pilaf, and shish kebab were also added to our menu.

Fresh water was a problem at first; it was more expensive than the local wine. Then we arranged with Mustafa Keleş, who owned a nearby vineyard, to bring us water each day on his donkey from a cool spring in the Göreme valley. Would we like fresh yogurt each morning, too? Of course we would! The next day we were enjoying Mustafa's yogurt with rose-petal jam for breakfast.

In a pensive mood, retired farmer Mehmet Aslan smokes an aromatic Turkish cigarette (opposite page). Face and hands weathered from many summers of toil in the fields, he sits now and enjoys the sun while his son cultivates the family's vineyards, orchards, and gardens. Though the harvest may not be bountiful, he often fingers his prayer beads (below) as he thanks Allah for the blessings of a long life.

PHOTOGRAPHED BY JONATHAN S. BLAIR © N.G.S.

Local Farmers Fear Haunted Caves

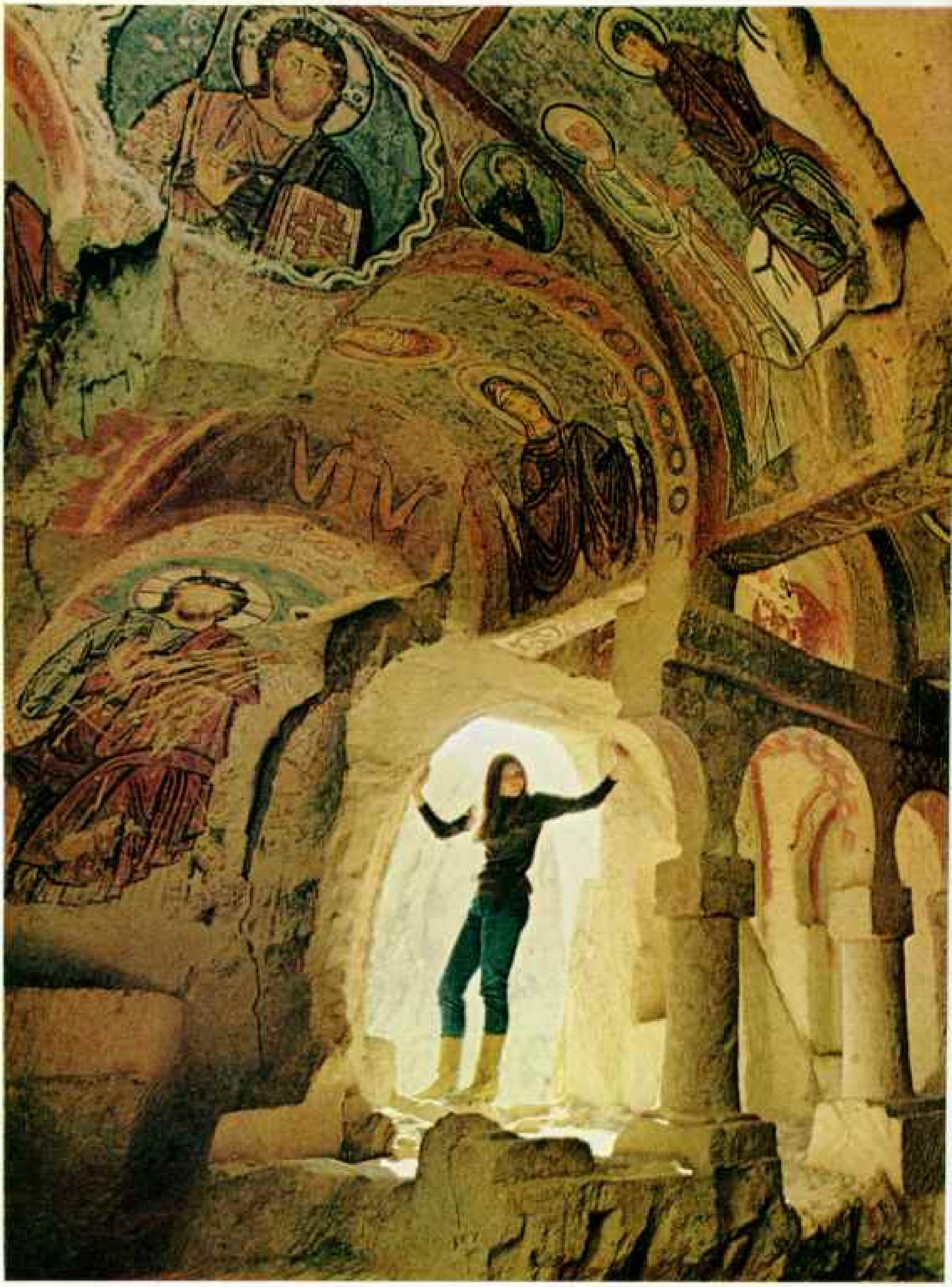
Many of the local farmers view the caves with a mistrust born of superstition. They would mutter ominously about "cave ghosts." Even Can and Asya, both sophisticated university students, almost became believers.

One morning, Can awoke us with a tale of night visitors. "I could hear two people breathing in the darkness," he told us, "and neither of them was me!"

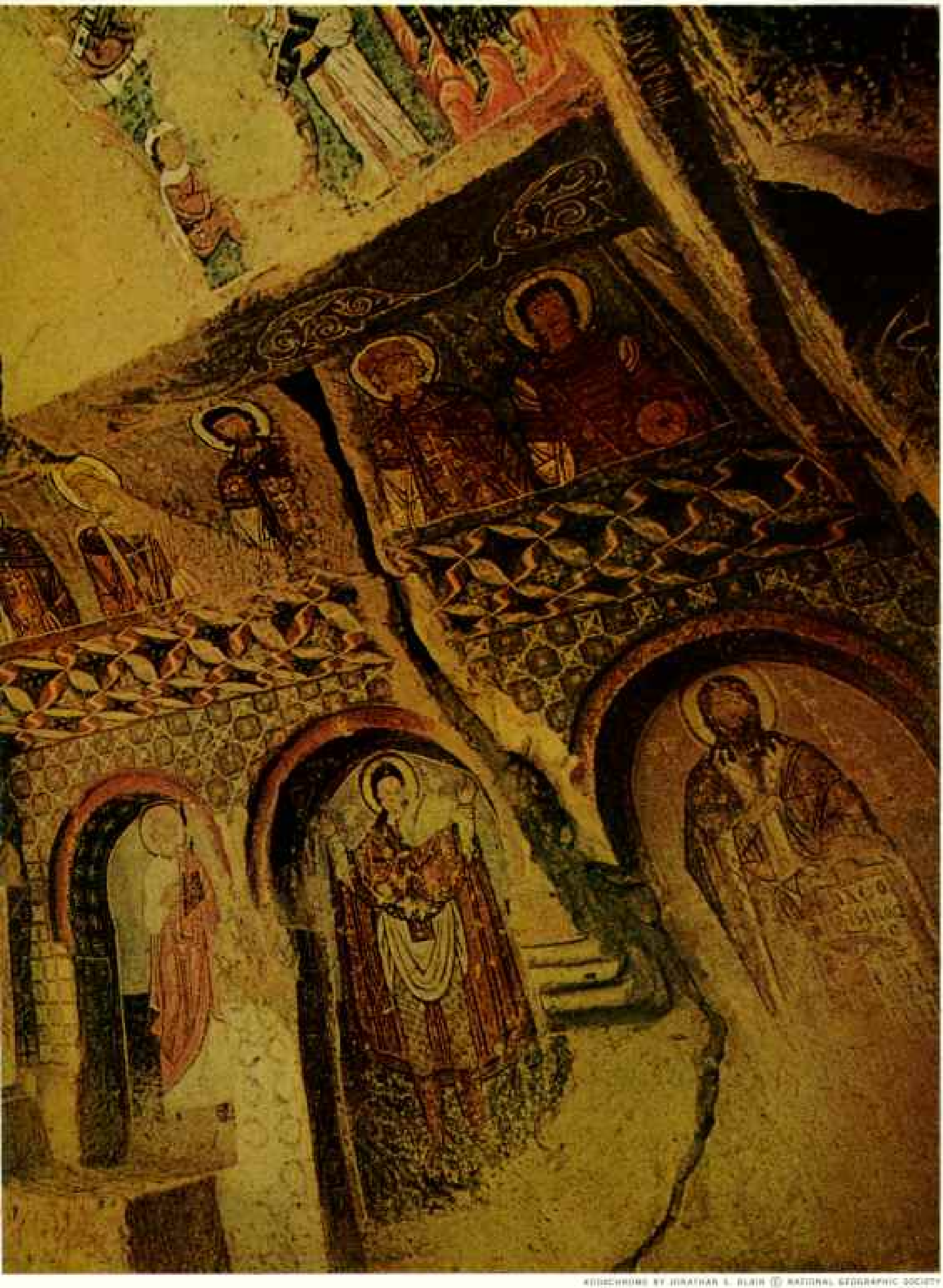
Asya, lying on the other side of the cave, had heard the breathing, too. Can groped for his flashlight and turned it on. Its beam revealed that their "cave ghost" was only a stray dog that had wandered in, seeking human companionship.

During the heat of the day, the cave proved a welcome retreat from the blazing sun, just as it must have been for the monks who once lived here. When we did emerge, usually late in the afternoon, each walk was an adventure, with hundreds of caves to explore within sight of our home.

Behind our cave was an overhanging cliff where monks had carved an exceptionally beautiful church. Golden sunlight, like a soft cloth, settled over the land as we climbed a winding pathway toward Kılıçlar Kuşluk, which villagers call the Church of the Virgin Mary. Light streamed along the walls, revealing primitive paintings



Testimonial to lives of fervent devotion, the Church of the Virgin Mary glows with the mute yet eloquent messages of early Christians. Monks, who lived in Cappadocia from the fourth to the fourteenth century, carved more than 300 such chapels in the cones. With only the most rudimentary tools, they pierced and shaped the soft rock, then covered walls and ceilings with brilliant



AUTOCHROME BY JONATHAN S. BLAIR © NATIONAL GEOGRAPHIC SOCIETY

frescoes depicting the world of Christ. Saints and archangels look down from domes and lean toward one another in the vaulting. Back-lit by the searing summer sun, Arlene Blair stands in an opening to survey the well-preserved paintings in the cool, dark interior. Perhaps because it lies off the road, this church has escaped with less damage from vandals than have others in the area.

of Christ and His Apostles in a rainbow of colors. Unlike those in some of the other churches, these frescoes had not been marred beyond recognition by vandals (preceding pages).

Cappadocia's rains may be infrequent, but they can disfigure with their violence. Many churches stand with gaping holes where walls and ceilings have been washed away. Others surely have disappeared under the rubble that storms roll down onto the valley floor from weather-eroded cliffs and towers.

Fortunately, our cave had withstood the elements well and, with us in it, soon became an object of local curiosity. One day Yusuf Işık, a gentle old man whose face bore the weathered lines of more than 70 Cappadocian summers, padded slowly up to our ladder.

"Why do you choose to live high in the rocks?" he asked.

We smiled and beckoned. Yusuf inched up the ladder, dangling his prayer beads from one hand and a clean pair of socks in the other. When he reached our living room, he slipped out of his sandals into the clean socks, in order not to soil our carpets.

Across the valley the sun was a big red ball rolling down behind the horizon. Yusuf watched it in silence for a moment.

"I have lived in Avcılar all my life," he said, "and have never seen such a beautiful sight."

He was intrigued with Arlene's water-color paints and wanted to use them. The proffered cup of tea grew cold beside him, for he had begun to paint.

Slowly his brush traced "Allah" in ornate Arabic script. "Everything must begin with God's name," he said gently. "Allah should begin the morning, the food we eat, the work we do."

For the rest of our Cappadocian stay, Yusuf's painting—a carefully lettered prayer—hung on our wall.

Moslem Prayer From a Christian Cave

Until age had weakened his voice, Yusuf had been a muezzin, whose duty it had been to call the Moslem faithful to their prayers five times daily from the mosque minaret. With Asya interpreting, I asked him if he would mind calling the prayer from a Christian cave. He could see no harm in it. I quietly flicked on my tape recorder as he began with a quavering voice:

Allah is the highest.
I am a witness that Allah is one.
Mohammed is His Prophet.
Come to prayer, He will give you comfort. . . .

"Would you like to hear your prayer again?" I asked, rewinding the tape. He stared at me, puzzled. Then I pushed a button on the recorder. Yusuf was hearing his own voice for the first time. Amazed, he asked if I could play "himself" a second time. I partially rewound the tape and switched the machine on. With the first words, his face suddenly fell.

"*Yok! Yok!*—No! No! It is bad; it is very, very bad!" he cried. "It did not begin with God's name—the machine didn't start with Allah's name."

Quickly, I rewound the tape and began again. This time, Yusuf was happy. The machine began with "Allah."

Life is hard for a Cappadocian farmer, for the soil yields nothing without a struggle. The hard work, the heat, and the jarring rides to and from the fields leave little time for leisure. Yet, even when a man is forced to go to the city where he may earn more money and where,

perhaps, more ease exists, he often leaves his family at home. He is reluctant to take them from the land that has been their lives.

We asked Yesari Aslan, one of our local friends, if anyone was getting married this spring. The question surprised him.

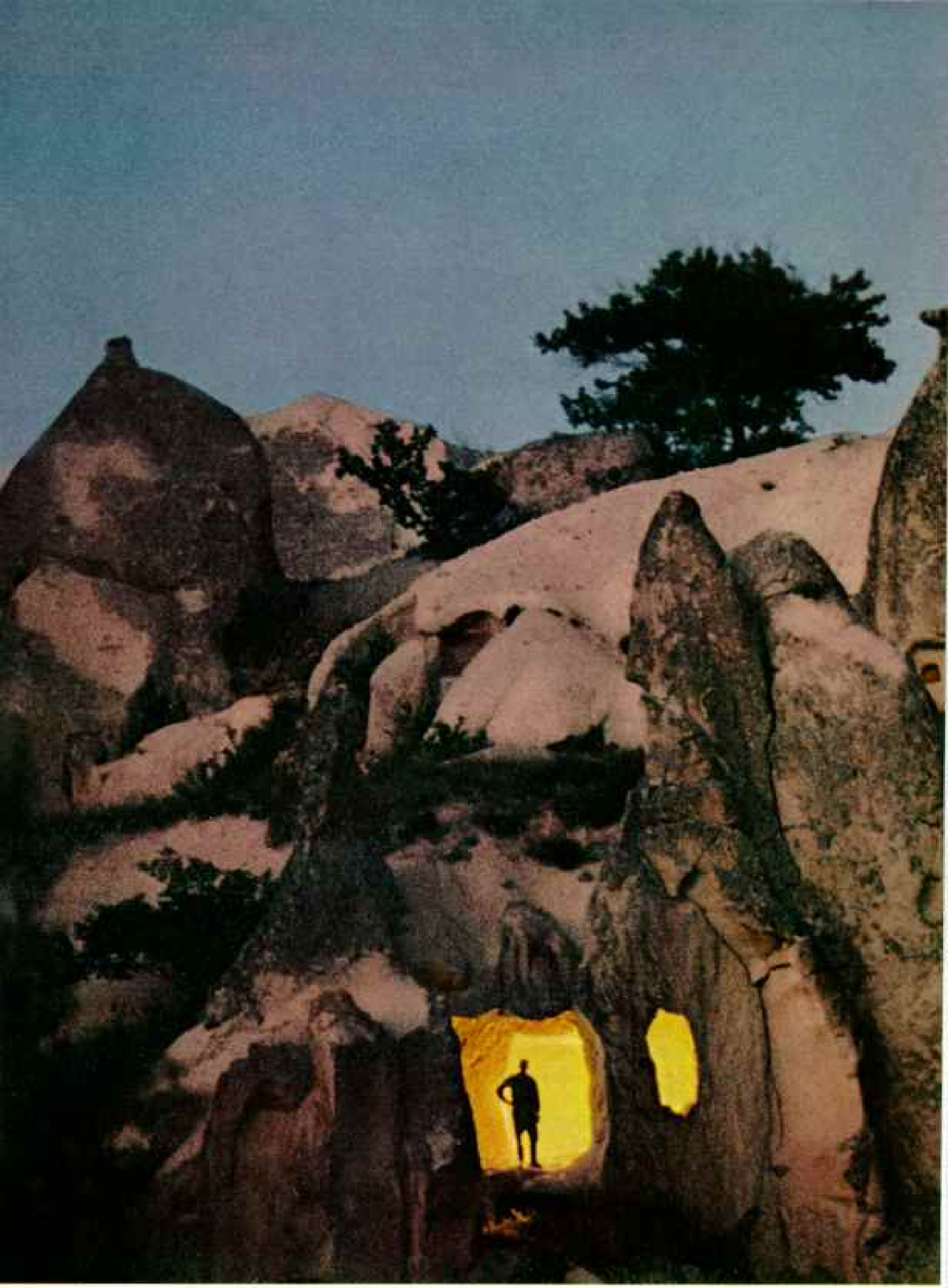
"No," he said. "Spring is not the time for weddings. People are too busy with their fields. The best time for marrying is after the harvest, when nothing else can grow."

We had arrived in Cappadocia in mid-May, when the wheat fields were spring green. Occasional rains eased the day's heat; nights were comfortably cool. But with June, the wheat suddenly changed from green to summer bronze. Our cool nights were gone.

At five o'clock one morning, Yesari Aslan brought us gifts—onions, fresh yogurt, and grape jam. But he could not stay for the cup of tea we offered him.

"The sun is already very hot, and I must get to the fields as soon as possible," he explained.

Loving hands rock a cradle in the Avcılar cave home of Mrs. Hatice Kılıç. She must serve as both mother and grandmother, for her daughter-in-law died in childbirth. With covers tucked tightly to keep her from falling out, the infant, Şükrüye, will soon sleep; then grandmother can return to her loom.



Bathed by the light of a full moon, the author's cave home looms like a fairy castle. Gasoline lanterns silhouette Mrs. Blair and a guest in the living room-kitchen at right center; the master bedroom—once a chapel—glows at right, guest room at left, and storerooms above and below. Ladders lead to some

of the unconnected chambers. These cones reminded the Blairs of Habitat, the housing complex featured at Montreal's Expo 67 (pages 28-9). Mrs. Blair found her home "almost impossible to keep clean, but wonderful for entertaining. Sometimes we had as many as eight of our Turkish neighbors at dinner."

I went with him. As the horse-drawn cart jolted over the washboard road, it was as though I were sitting on a giant reducing machine. We bounced along amid carts, people, horses, and cows.

And donkeys. They moved unhurriedly, weighted down with water jugs, shovels, and saddle bags. Usually a villager perched on top of the load, and, as he bobbed up and down, he tried to hurry the donkey's lazy pace (page 144).

Along the way we passed a farmer and his wife. My Turkish is rudimentary, but I had no trouble understanding the comment she made to her husband.

"Look at him," she observed. "He has nothing more useful to do than take photographs."

The women were already in the fields when we arrived. In their bright clothes they reminded me of spring flowers as they worked the dry earth, carefully nurturing young plants. They must tend them daily and diligently if their families were to eat next winter.

Chipping away with a long-handled pickax, Mustafa Demirkol carves a new cave. He can work only in his spare time, so the Avcılar farmer will spend a year hacking out the five rooms and cellar before he can move his family of four from the crowded, noisy village. In his youth he worked as a miner in Belgium; his name, Demirkol, appropriately, means "Iron Arm."

That evening we visited Yesari and his family at their village home. Meryem, the eldest daughter, was returning from a nearby field, cradling a bright bouquet of red poppies, and Yesari and his wife were unhitching the horse from a wagon loaded with tangled sticks for fuel. Grandfather Mehmet sat beside the house, leaning against his cane (page 135).

We all followed the horse through the front door—for the stable adjoined the kitchen—then took a long, narrow passageway toward the center of the house. From there we climbed to a room at the top of the house. Leaving our shoes on the white-washed stairs, we stepped into the "company room"—which, in a Turkish farm home, is often the main bedroom.

Thick carpets lined the wall behind a blue-enameled four-poster bed. On the other walls faded photographs and newspaper clippings were pinned in haphazard fashion. Yesari plied us with raisins and apricots. As more food and tea arrived, we realized that we were

expected to stay for dinner. We were unexpected guests—would there be enough food for everyone?

But Yesari calmed our fears. "Don't worry," he said. "I have nine jars of food cooking in my kitchen. Tonight you will not have to worry about preparing a meal for yourselves."

His wife served beans cooked with lamb and butter, along with fresh green scallions. The food came in a single enamel dish; everyone was expected to spoon it onto wafer-thin bread. Dessert was wheat-flour pudding with *pekmez*—a sweet grape sauce.

Tomorrow—Friday—would be the Moslem Sabbath, Yesari told us, and people would stay home from the fields until after services at the mosque. Would we like to visit his friend Hüseyin? He and his family had built their house around an old Cappadocian chapel just up the road. Yesari volunteered to send his children ahead to announce our arrival. With thanks, Arlene and I accepted.

Hüseyin lived inside a low, sprawling white rock, but the round-

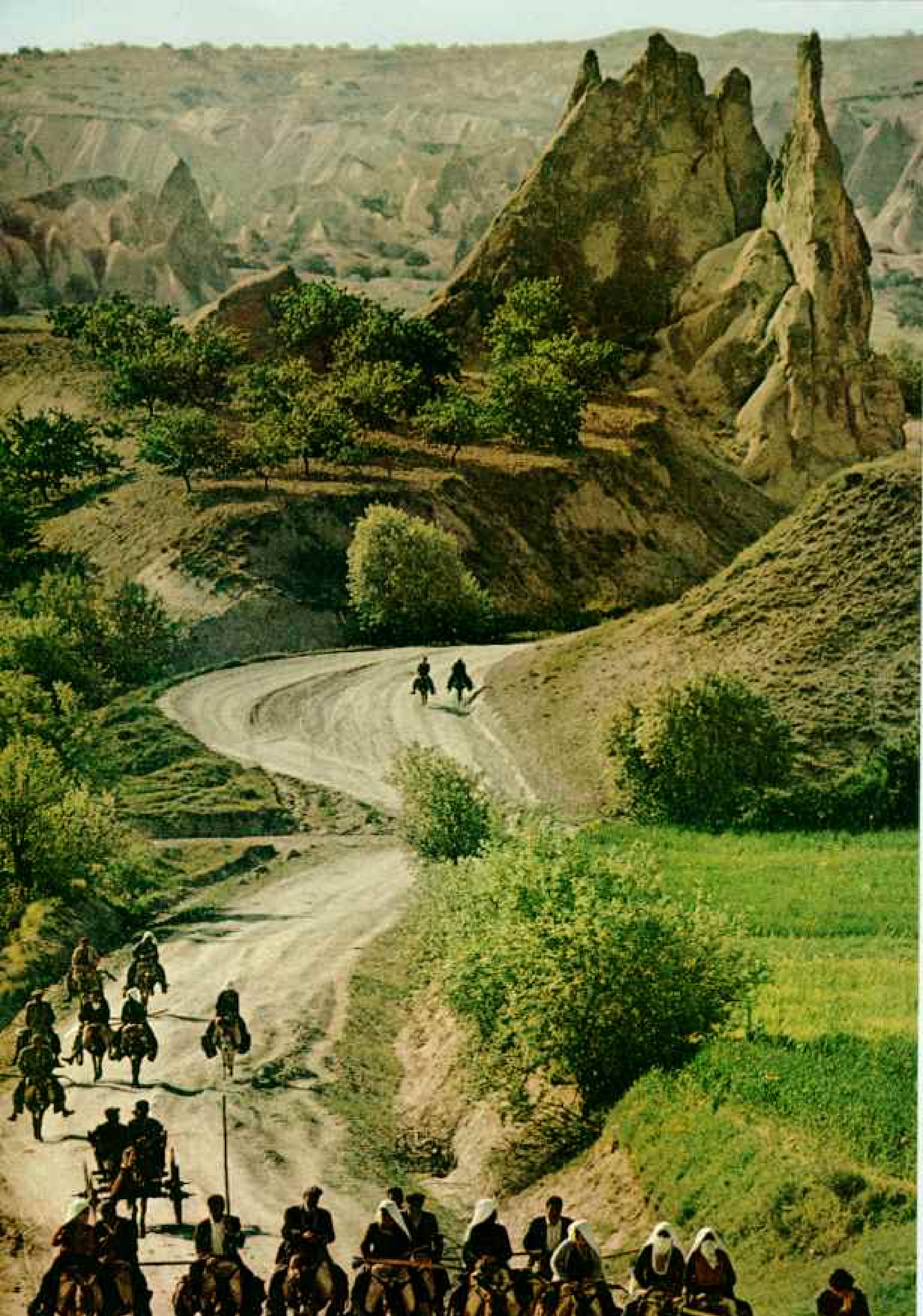
Traveling minstrel, Şükrü Başaran performs on his saz at an Avcılar coffeehouse. He was disconcerted for only a moment, remembers the author, when two of his instrument's five strings popped as he began to play. "Never mind," he told his audience, "I'm good enough to make three sound like five." A delighted Jonathan Blair invited Şükrü home for lunch.

ed windows carved into the stone gave his home a fine sculptured look. He greeted us warmly. Of course we were not intruding. Come any time. Consider this your second home!

Our host led us down a low whitewashed tunnel toward the center of the rock cone, and suddenly we breathed cold, fresh air. We were in the chapel. As our eyes became accustomed to the dim light, we could see four hand-carved pillars rising to a dome almost two and a half stories overhead. Connecting arcades in the shape of a Greek cross surrounded the dome.

Cappadocia had been freed from the Arab threat during the 10th century; then for some 300 years the monks apparently enjoyed considerable prosperity under Byzantine and Seljuk rule. Most of the larger churches were carved during this period. Now, after the passage of more than six centuries, this chapel served as Hüseyin's storeroom and refrigerator.

Outside, small stones rattled along the smooth rock, pushed by a



rising wind. Rolls of thunder sent pigeons whirring from their perches in the cave's dome. Like a woman's veil, misty rain enveloped Cappadocia while we explored Hüseyin's chapel. There was really no need, we reflected, for the columns and other simulated architectural elements; the dome would have stood without them. Obviously the monks who carved this structure were copying early Christian church design.

They had done their best, these monks. But stone sculpture is more suited to the leathery hands of skilled masons than to hands that clasp in prayer. These cornices slightly askew, these wall moldings that didn't quite match up when they met at a corner—these imperfections made the ancient monks come alive for us, and seem very human.

Long ago, Turkish farmers learned the art of cave-cutting from Christians in the area. We wanted to see how the job was done. But spring is not the best cave-cutting season; like marriage, a new house can wait until after the work has been done in the fields.

Word reached us that someone was carving a new house near the village of Avcılar. "You must mean Mustafa," the villagers told us. Mustafa? We sighed. It seems that nearly everyone is named Mustafa. Half a dozen Mustafas later, we found the right man.

"Fortunately, the cave was already started when I bought it," Mustafa told us. "I'm glad of that, for it is a killing job when you must, like me, do it all yourself."

A newly completed five-room cave such as this would sell for around $500. Ancient ones like ours are the property of the farmer who owns the land, and can be rented.

Plod of hoofs and creak of wagon wheels herald an early-morning pilgrimage as villagers of Avcılar ride from homes to fields. Donkeys sway under the weight of water jugs and the shovels and hoes that women as well as men will use to till their plots. At dawn, day after day, week after week, the exodus takes place during the growing seasons. Only on Friday—the Moslem Sabbath—do Cappadocians find some surcease from the constant struggle for survival in their harsh, uncompromising land. SCHOENHUT © N.G.S.

Cave Construction Takes Patience and Power

I persuaded a dubious Mustafa to show me how to cut the stone. I watched as he used chisel and sledge hammer to chip a four-inch-deep groove into the unfinished wall, making a rectangle about three feet square. Then, carefully, he began pounding chisels at an angle into the groove, until his rectangle broke free in a thick slab. Later, he would use that slab as part of a courtyard wall.

It was my turn. I hoisted the heavy hammer and began. Slowly, Mustafa's serious face broke into a grin as he watched me swing the hammer again and again against the rock.

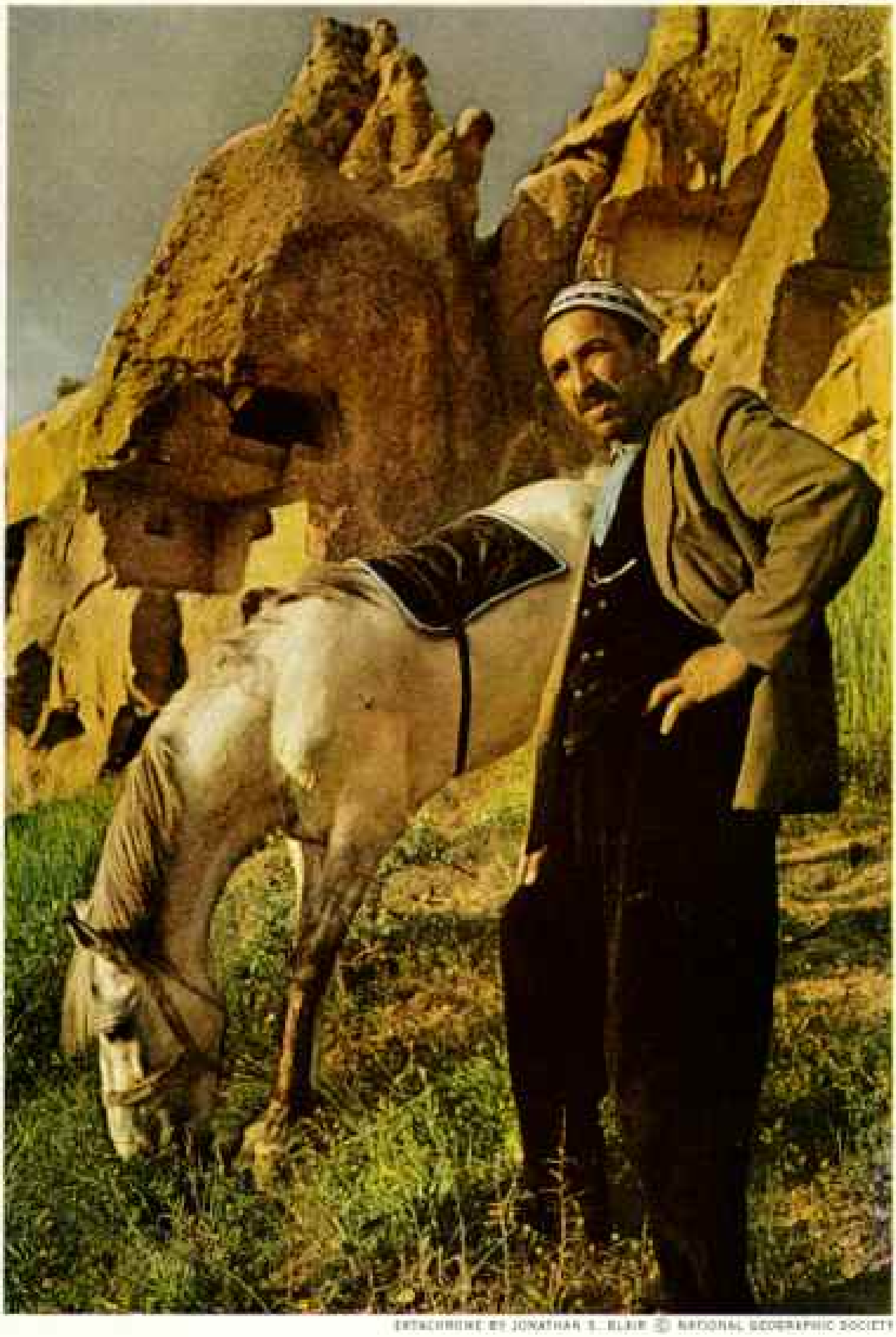
I added little—almost nothing—to the size of Mustafa Demirkol's new home, but I began to appreciate his right to bear his last name. In Turkish, it means "Iron Arm" (page 142).

Iron Arm! Suddenly I was filled with boundless respect for the monks of old who had patiently and devoutly created all these great pieces of anonymous architecture.

With our Cappadocian stay drawing to a close, Arlene reminded me that arrangements must be made for the disposition of our furnishings. We could not bring ourselves to part with Yusuf's painted prayer or the embroidered cushions—they simply had to come back to the United States with us. But ready purchasers were found for our cots, carpets, and cooking gear.

On the day of our departure, a babel of voices woke me at five in the morning. I peered out at the group of people who shuffled impatiently at the foot of our ladder. They were friends—but this was no social call.

"Arlene, get out of bed!" I called to my wife. "The policeman from Göreme has come for the cots I sold him." She was still rubbing sleep from her eyes when the policeman left with our cots under his arm.



Man of property, Halil İbrahim Mızrak owns this cone complex, a portion of which he rented to the Blairs. Like three-quarters of Turkey's working population, he tills the soil for his livelihood.

Today cone-studded Göreme valley is classified as a tourist *bölge*, or zone, by the Turkish Government, and guards stand watch over many of the caves that once served as churches. Visitors may take guided tours through them. Not infrequently, Cappadocians dwelling in cones will warmly invite tourists to "come inside and see our home."

Mustafa Keleş spirited off our water cans—payment for our final supply of water and yogurt. Halil almost pulled his newly purchased rugs out from under our feet. He handed them down the ladder to Kezban, who put them in sacks on the back of her donkey.

The pots were Kezban's too. We ate breakfast from them rather nervously—glancing over at the ladder top where Kezban's little face was stationed. Hurry, her eyes told us. There is work to be done in the fields this morning.

Breakfast ended in a cave that was virtually bare. Down the ladder for the last time, then, and into a hired car. We jolted off on the first leg of our long journey home.

I am glad, now, that our last morning was such a frantic one. It spelled out the difference between the contemplative life we had led and the materialistic world outside. Our cave *had* been a retreat. Its solidness, its shadowy coolness, ever turned our thoughts away from the world that surrounded us. I think I know and understand a little more about those monks now.

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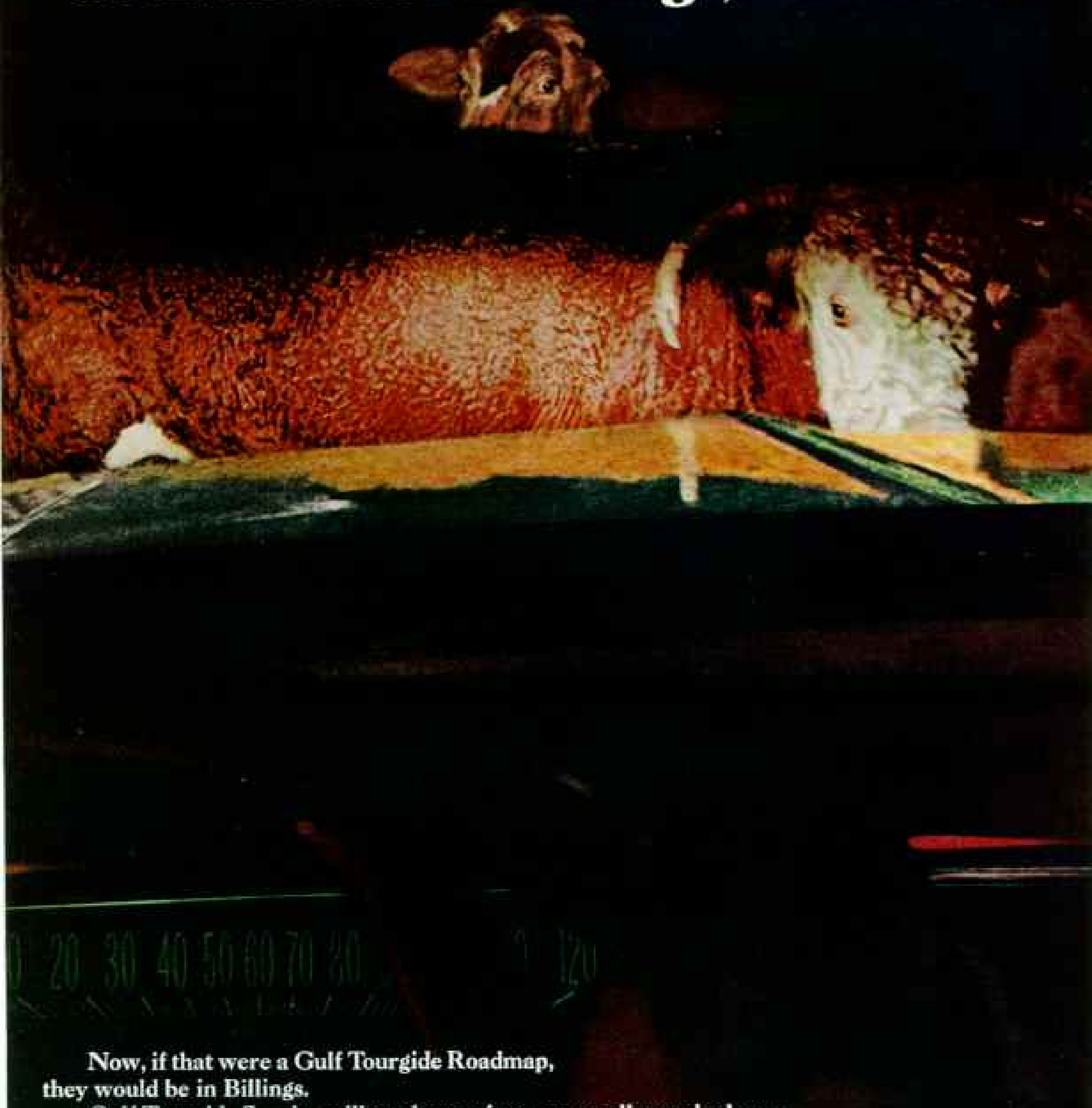
"According to the roadmap, we should be in downtown Billings, Montana."



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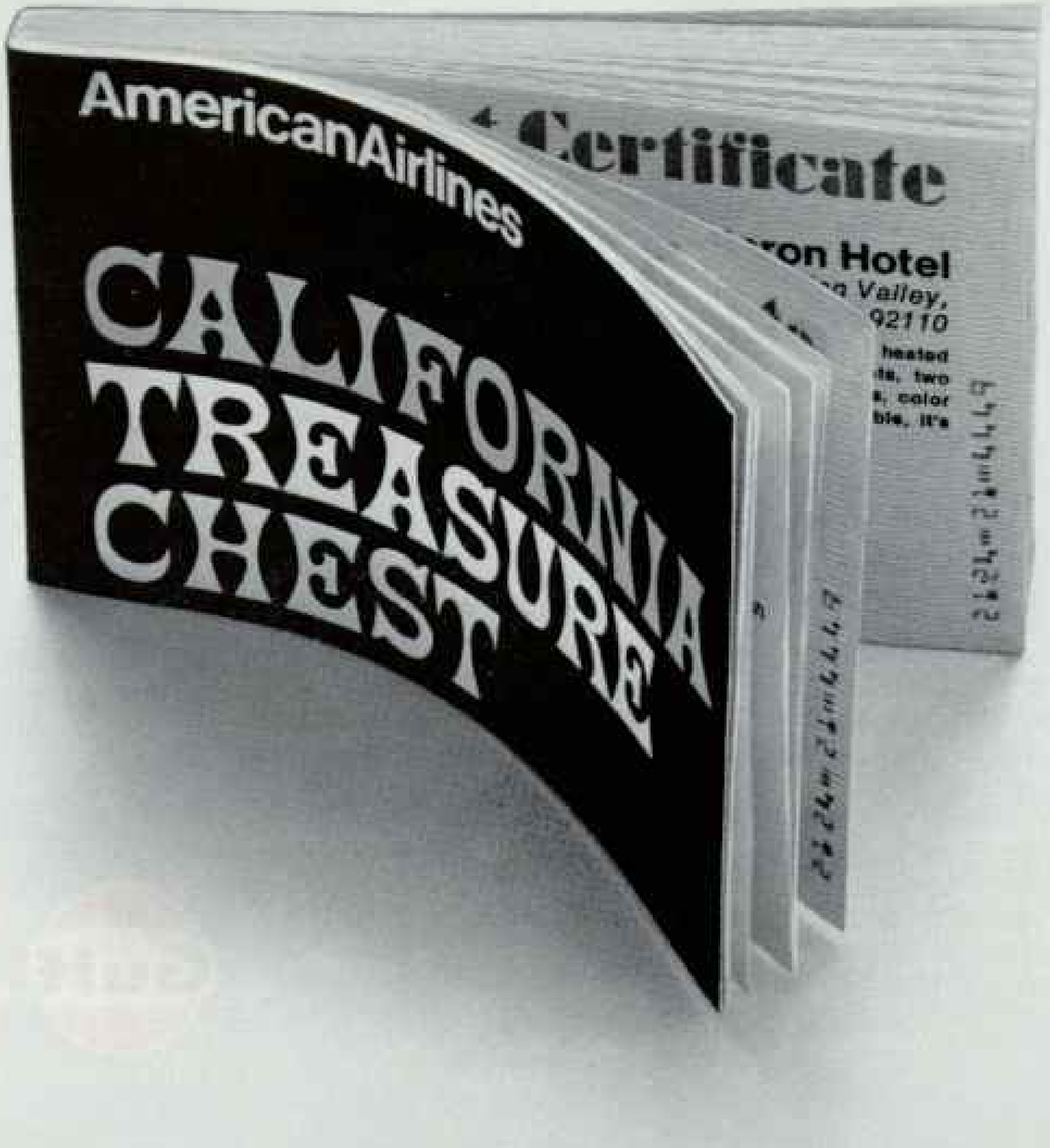

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