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OFFICIAL JOURNAL OF THE NATIONAL GEOGRAPHIC SOCIETY WASHINGTON, D.C.

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"LIKE SEEING HEAVEN both above and below," observed Dr. Paul A. Zahl when he first viewed the pool-reflected Milky Way of glowworms in New Zealand's hushed Waitomo Caves (right). Myriad luminous fly larvae cling to the ceiling, dangling sticky threads from their tubular transparent homes (life-size, above). Flying insects, attracted by the lights, are caught—to be drawn up and devoured. But if visitors make a noise, the worms quickly dim or extinguish their glow.

Pursuing nature's night lights, Senior Scientist Zahl focused his cameras on fireflies in Malaysia that blinked in unison, and on luminescent bacteria in Baltimore, Maryland (lower right). In Japan he found dazzling squids, and crustaceans that, during World War II, served Japanese soldiers as flashlights.

Results of his research will come to you in the July NATIONAL GEOGRAPHIC. Your friends can share such educational adventures: nominate them for membership on the form below.

KODACHROMES (UPPER RIGHT) AND EKTACHROMES BY PAUL A. ZAHL © N.G.S.

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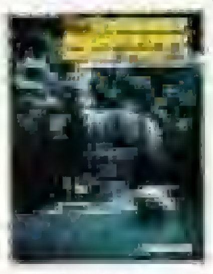

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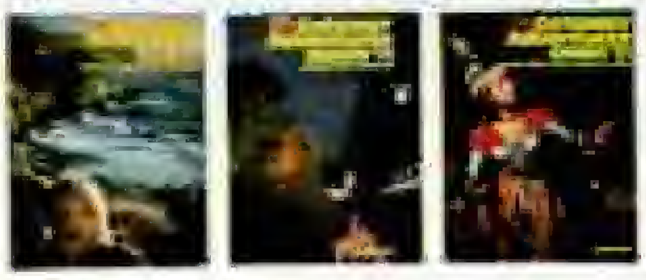

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On a 1600-mile trek through Kenya, Tanzania and Uganda, an adventurous young sculptor captures magnificent big game in enduring medallic sculpture . . .

Sculptor on Safari

Article and Photographs by Richard Walter

Land Rover's two sunroofs give Michael Sawyer, Chief Executive of East African Wild Life Society (right) opportunity to point out animal characteristics to sculptor Anthony Jones as he sketches.

"STOP—HOLD IT—TWO LIONS—THERE!" Terry shouted from the forward turret of our lurching Land Rover. "Beautiful . . . beautiful," he said, lowering his voice that the lions might not hear and swinging open his sketch pad as he spoke. As I zeroed in with my telephoto lens, he began sketching the king and queen of beasts with the swift, sure strokes of a skilled sculptor. First the awesome heads, and then the sleek bodies took form—and soon he had captured their majestic spirit, even the absolute air of confidence of the male as it strode away without bothering to give us a second glance.

Then, the lions were gone, and sculptor Anthony "Terry" Jones took a deep breath, shaking his head slowly in admiration. His unique safari had just begun, but now he was sure that this was to be one of the greatest experiences of his artistic career.

On the invitation of The East African Wild Life Society, the young American artist had come to Kenya, Tanzania and Uganda to study big game animals living naturally in their own domain and to record in medallic sculpture portraits of the magnificent creatures that inhabit this land.

East African buffalo glowers at Jones, who sketches hastily at close range. On-the-spot sketching provides him with both recorded and remembered detail for realistic, authentic sculptures.

The Society had decided to issue this series of Big Game Medals in its continuing effort to preserve the beauty of nature for future generations. Paper, canvas and film, the Society reasoned, will disintegrate in time—but metals like gold, silver and bronze will endure for centuries, assuring a permanent record of the creatures of this era—creatures which may well be extinct in the next.

The Society's director, Michael J. Sawyer of Nairobi, Kenya, not only arranged the safari—he personally came along to locate and identify the animals we wanted to see, and to make sure that Terry got all the answers he needed. I was there to provide a words-and-photos account of the journey. Antony Lutyens, owner-pilot of our little Cessna 401A and himself an authority on East African animal lore, rounded out our quartet.

After that first encounter with lions, we drove, bounced, hiked, cruised and flew over 1600 miles. We roamed Tsavo, the world's biggest national park. We found ten different game animals on Tanzania's Serengeti plain. We crossed vast Lake Victoria to Murchison Falls and trekked to Paraa in Uganda, at the headwaters of the Nile.

E.A. WILD LIFE SOCIETY
5Y-ADY

Wild Life Society's patrol plane expands preservation activities to every corner of Kenya, Tanzania and Uganda. Here, Warden David Sheldrick of Kenya's Tsavo East National Forest tells Jones location of zebra herd he has just spotted. The Society's Michael Sawyer looks on.

Easel in hand. Jones sets out in exploding East African dawn to track down giraffe. Young American's Kenya-made safari clothes protected him from sharp changes in temperature, moisture, and equatorial sun.

Capturing the African Elephant in medallic art takes many steps. *(left)* Jones sketches wild elephant foraging for food in the bush in Tanzania. Drawing quickly in the relative safety of Land Rover sunroof, Jones records environment as well as elephant "because each belongs to the other." *Studying elephant skull* (below) is next step for Jones, as Warden Sheldrick traces contours and points out functions of the many channels and chambers. *Native Ugandans watch Jones sculpturing a preliminary study in clay* (right) at later stage of safari. Working in dimension sharpened his familiarity with the subject. This sketching and sculpturing from every possible angle led to final design (inset). Jones saw dozens of huge elephants on banks of Nile the same day he did this study in clay.

And all the while, Terry worked at a fever pace—sketching, studying, observing and sculpturing—squinting into the bright East African sun to record the image of big game as it really is.

Once, his enthusiasm led him to forget safari rules. We had stopped our Land Rover so that Terry could sketch a giant bull elephant that had lumbered right into the middle of our road to investigate these intruders in his domain. Terry, seeking to sketch the giant from several angles, started to scramble down from his roof-top perch. Sawyer reacted immediately. He grabbed the young artist by the arm. Then, in soft but unmistakably firm tones, he underscored the danger of confronting a bull elephant on its own terms. "You can't match his speed, his strength, his rage or his cunning. Don't do that again!"

There were rare opportunities for Jones to approach his subjects directly. Alighting from the Land Rover, Jones was able to sketch a giraffe. Crouched low in the grass, he muttered while sketching his subject. "There, don't move. Please don't move." His intense concentration and involvement with the animals was just short of amazing. "Did you see that," he exclaimed. "She just stood there. Maybe she was studying me in *her* environment. This is fantastic."

Unfamiliar animals had to be learned from scratch. The Uganda kob, the hartebeeste-Kongoni, and the klipspringer were unlike anything Terry had known before.

Our journey took us over the snows of four-mile-high Kilimanjaro; we circled Mt. Kenya and Mt. Elgon; and we rode down the Nile by motor launch, narrowly missing hippos and crocodiles and meeting face to trunk with elephants who always stood their ground.

We visited safari lodges, where Terry talked at length with game wardens, government officials, and the natives who live in the midst of the mountains and grasslands and bushlands of East Africa.

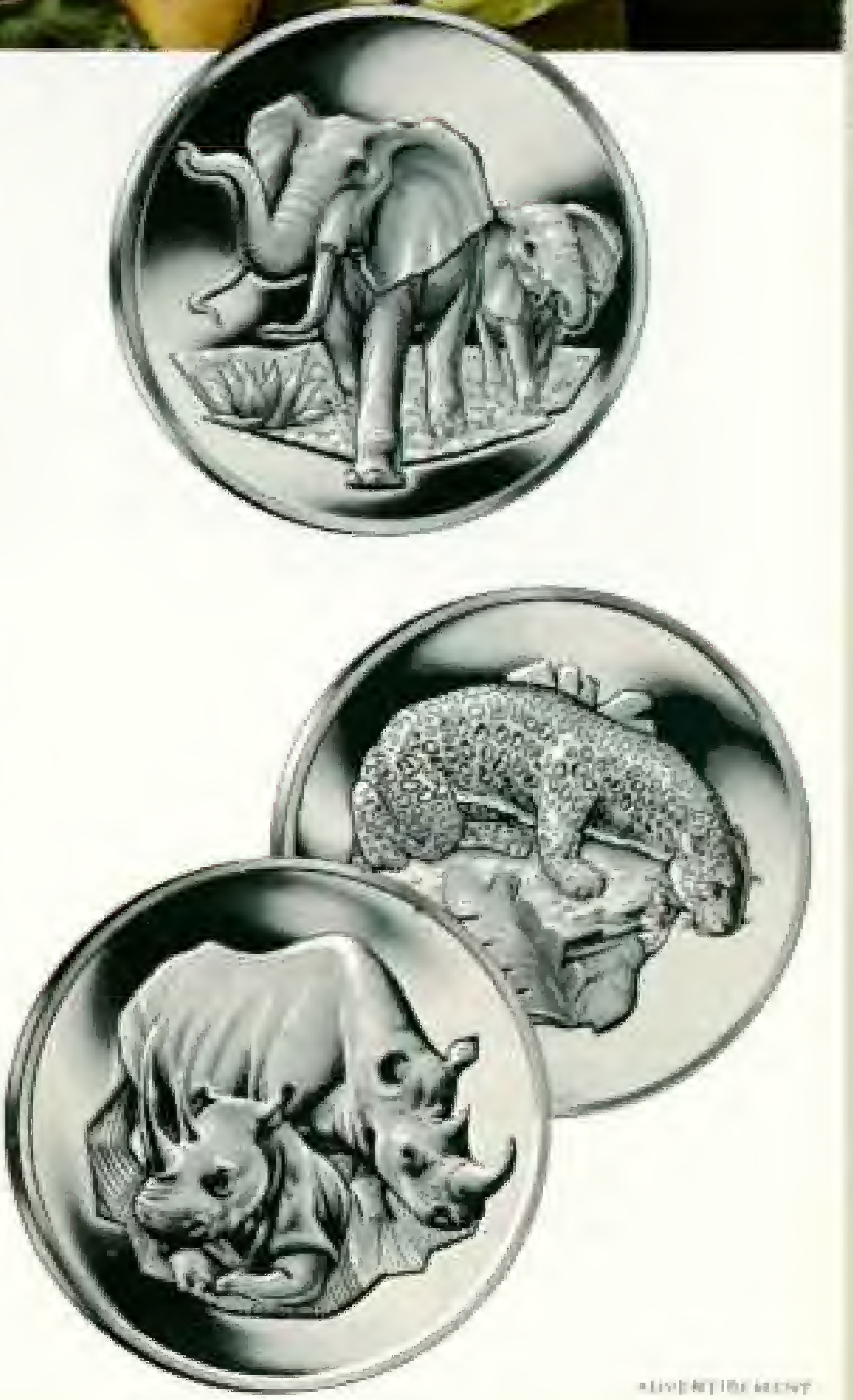
"Why do you sculpture the elephant, instead of painting him?" a Ugandan artist asked one day.

Terry paused. Then: "You know the bas reliefs they've found in the old Egyptian tombs?" he countered.

The Ugandan nodded.

"Well, those sculptures have lasted for thousands of years. And these big game medals—the work *I* am doing *now*—will last long after I'm gone. When these sculptures are transformed into medals by The Franklin Mint, they'll never wear out. They'll always show the imposing strength of this elephant, or the bounce of a gazelle, or the grace of the impala—just as I see it today."

Day by day, Africa worked its way deeper into Terry Jones' blood. Hundreds of sketches and many sculptures later, his medals began taking form. They will soon be issued as the East African Wild Life Society's Official Big Game Medals—preserving forever the matchless sights of today's Africa for collectors, museums, conservationists . . . and for future generations.



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THE PATRON'S EDITION *in solid bronze* will be sold at the Society's headquarters in East Africa and will be available to its patrons around the world.

A DATE TO REMEMBER: APRIL 30, 1971

Members of the National Geographic Society are invited to participate in this program and are extended the privilege—*until April 30, 1971* —of acquiring a PROOF SET *of any one of the three editions.*

After April 30, 1971, the Presentation Edition and the Museum Edition *will no longer be available to private collectors.* Only the Patron's Edition—and no Proof Sets in any edition—will be available after that date.

Each of the medals in this series is 51mm (two inches) in diameter, and they will be issued at the rate of one medal per month for twenty months, beginning in May 1971.

For storage and protection of the collection, the solid walnut exhibit case (illustrated at right) will be provided to each subscriber, at no charge, after the first three medals are issued.

The privileged subscription form on the overleaf *must be postmarked on or before April 30, 1971* to take advantage of this opportunity.

In commemoration of its 10th Anniversary
the East African Wild Life Society
under the patronage of
the Presidents of Kenya, Tanzania and Uganda
announces a limited minting
of Proof Sets of its

OFFICIAL
BIG GAME MEDALS

in 24-KT Gold on Sterling,
Sterling Silver
and Solid Bronze

The official minter of these medals, The Franklin Mint, has been authorized to handle the subscription processing and distribution of all collector orders in the United States. The Franklin Mint, an independent, publicly-owned corporation not affiliated with the U.S. Mint or any other governmental agency, is the world's foremost private mint and the preeminent international source for commemorative coins and art medals.

OFFICIAL BIG GAME MEDALS

Privileged Subscription Form

The Franklin Mint
Franklin Center, Pennsylvania 19063

Please enter my subscription for a Proof Set of the East African Wild Life Society's OFFICIAL BIG GAME MEDALS. This set is to consist of hallmarked proofs of each of the twenty medals, to be issued at the rate of one medal per month, beginning in May 1971. A walnut case to hold the Proof Set is to be sent to me separately, at no additional cost.

The edition I have selected is (CHECK ONLY ONE):

☐ The Presentation Edition
(24KT Gold on Sterling) at $25* per medal.

☐ The Museum Edition
(Solid Sterling Silver) at $20* per medal.

☐ The Patron's Edition
(Solid Bronze) at $8* per medal.

*Plus your State sales tax

I am enclosing my remittance for the first medal. If my subscription is accepted, I understand that these medals will be struck expressly for my account, and I agree to pay for them promptly upon being invoiced on a monthly prepayment basis.

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...with new dimensions in comfort, ...new air conditioning, ...new steering ease!

For king-size families or for king-size loads, Ford Club Wagons are the handiest wagons yet.

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Newfoundland is a holiday.

A holiday from stop-heres. And go-theres. And don't-do-thats.

Down here you do things your way. And you do them in your own sweet time.

Start out in St. John's, Canada's oldest, saltiest, friendliest city.

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Wend your way through bays and coves and tickles.

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Or, if you'd rather tackle something different, take in the Caplin Scull.

And be part of a cast of millions:

Millions of tiny, slippery, succulent fish, just waiting to be sizzled in butter and sloshed down with Demerara.

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The way you almost can't remember.

Come stop. Come stay. Come see.

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Newfoundland
and Labrador

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The smartest fishermen have the most "luck."

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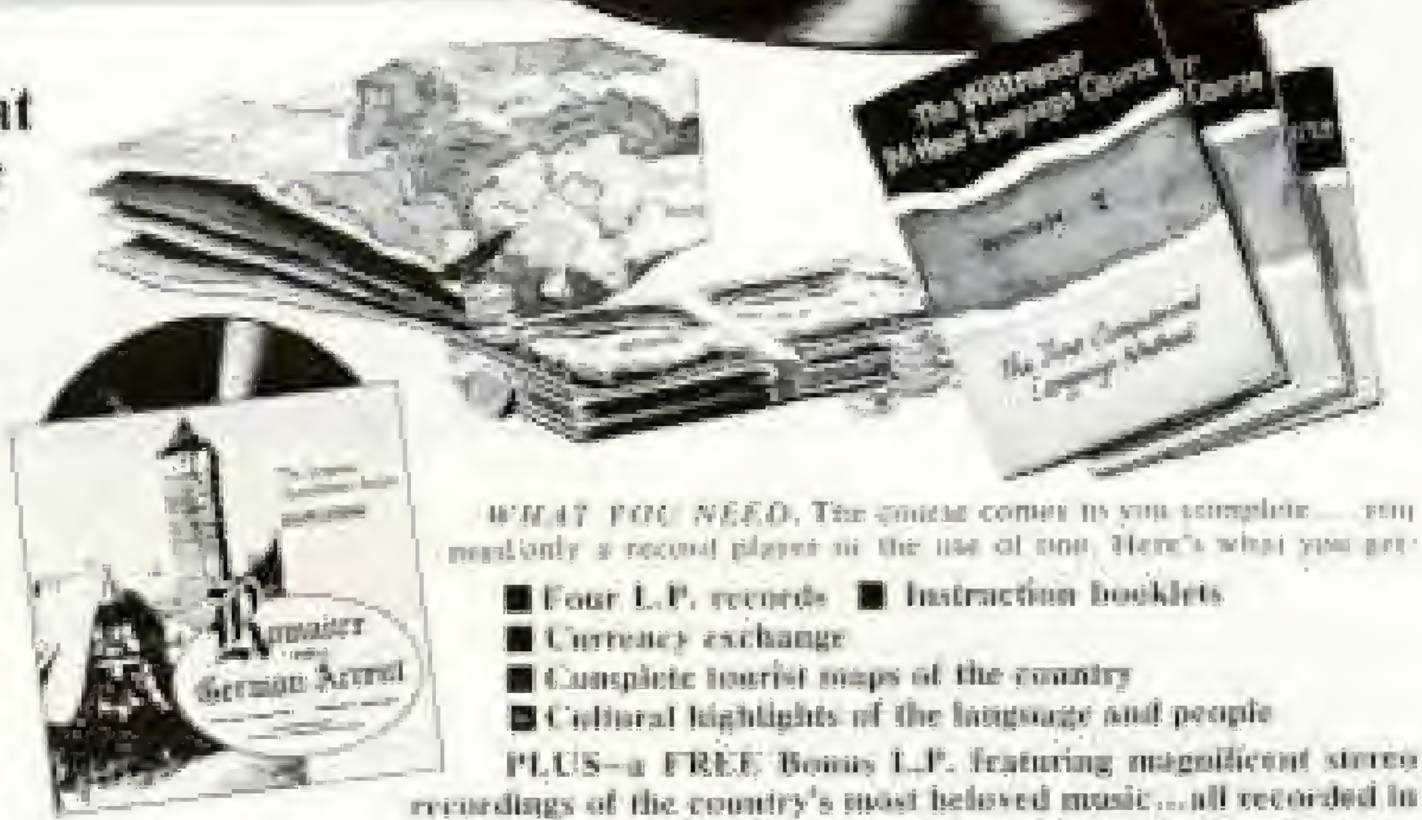
The Wittnauer 24-Hour Language Course
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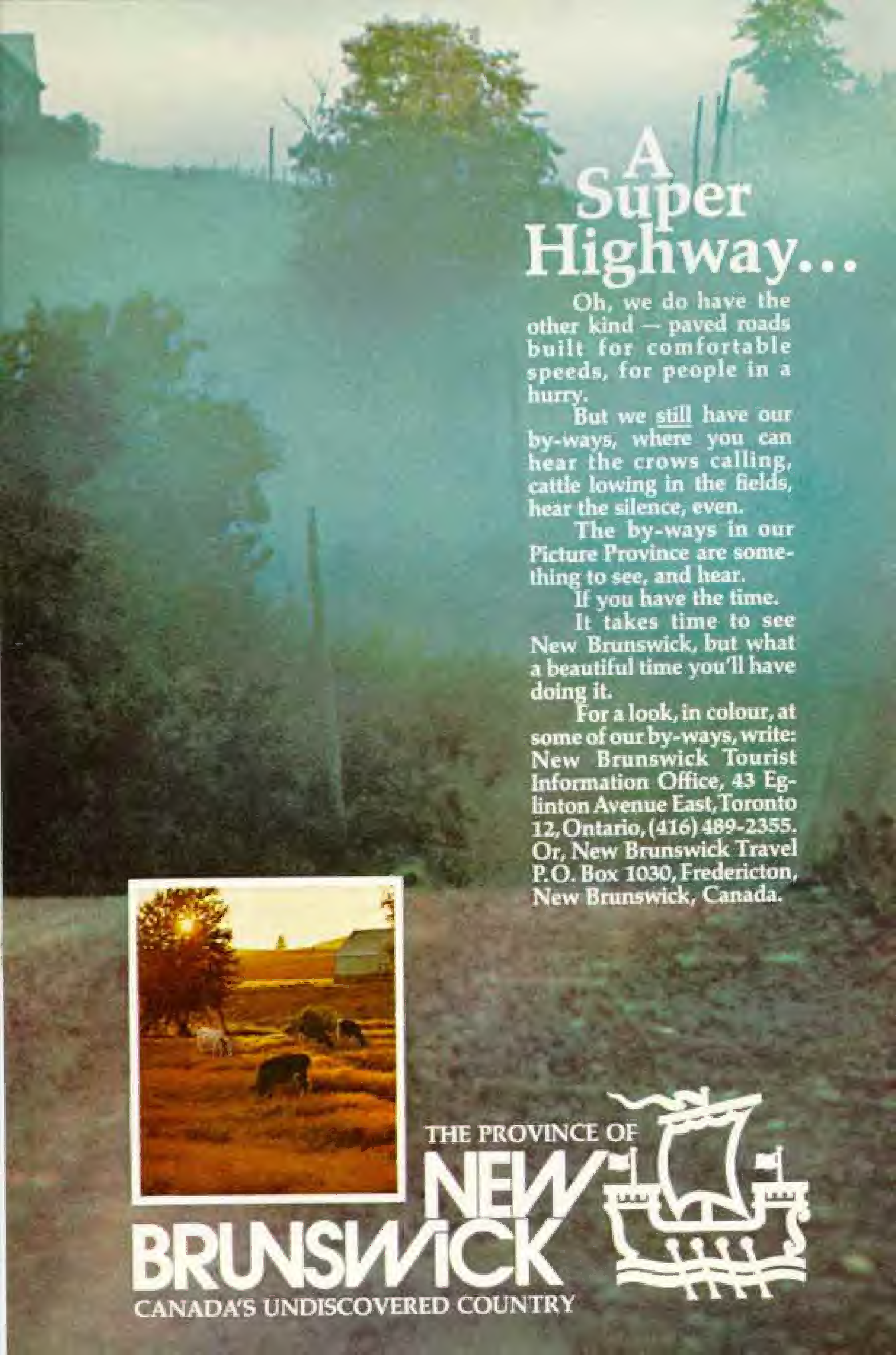
VIRGINIA
is for lovers.

Southwest Virginia Museum



A Super Highway...

Oh, we do have the other kind — paved roads built for comfortable speeds, for people in a hurry.

But we still have our by-ways, where you can hear the crows calling, cattle lowing in the fields, hear the silence, even.

The by-ways in our Picture Province are something to see, and hear.

If you have the time.

It takes time to see New Brunswick, but what a beautiful time you'll have doing it.

For a look, in colour, at some of our by-ways, write: New Brunswick Tourist Information Office, 43 Eglinton Avenue East, Toronto 12, Ontario, (416) 489-2355. Or, New Brunswick Travel P.O. Box 1030, Fredericton, New Brunswick, Canada.

THE PROVINCE OF
NEW
BRUNSWICK
CANADA'S UNDISCOVERED COUNTRY

Ask the man who borrows one.

We asked lawn mower expert, Tony P. Monaco, to describe for us his idea of the ideal lawn mower:

"It's one you sit on. After all, a man works hard all week. His body deserves a rest.

But just being able to sit on it isn't enough. Your riding mower should have an adjustable seat. After all, you may not be the only one who's ever gonna use it, and you always want to make sure the controls are within easy reach.

One I especially go for is the one Bob Stevens next door owns. It's a Jacobsen Mark II. Got some terrific things on it. Electric starting. And this automatic shift thing where when you push either up or down on the pedal, you go forward or backward. Take your foot off the pedal, and it acts like a brake. Your hands never have to leave the wheel. That's very important for your wives and teenagers.

Then sometimes when Bob's busy, I really go for that nice Ray Thiem's big Jacobsen lawn and garden tractor. It's got a grass cutting attachment, a snow throwing attachment. I'm telling you, it's got just about everything.

Yes, for my money, Jacobsen makes some ideal riding lawn mowers and tractors."

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JACOBSEN®

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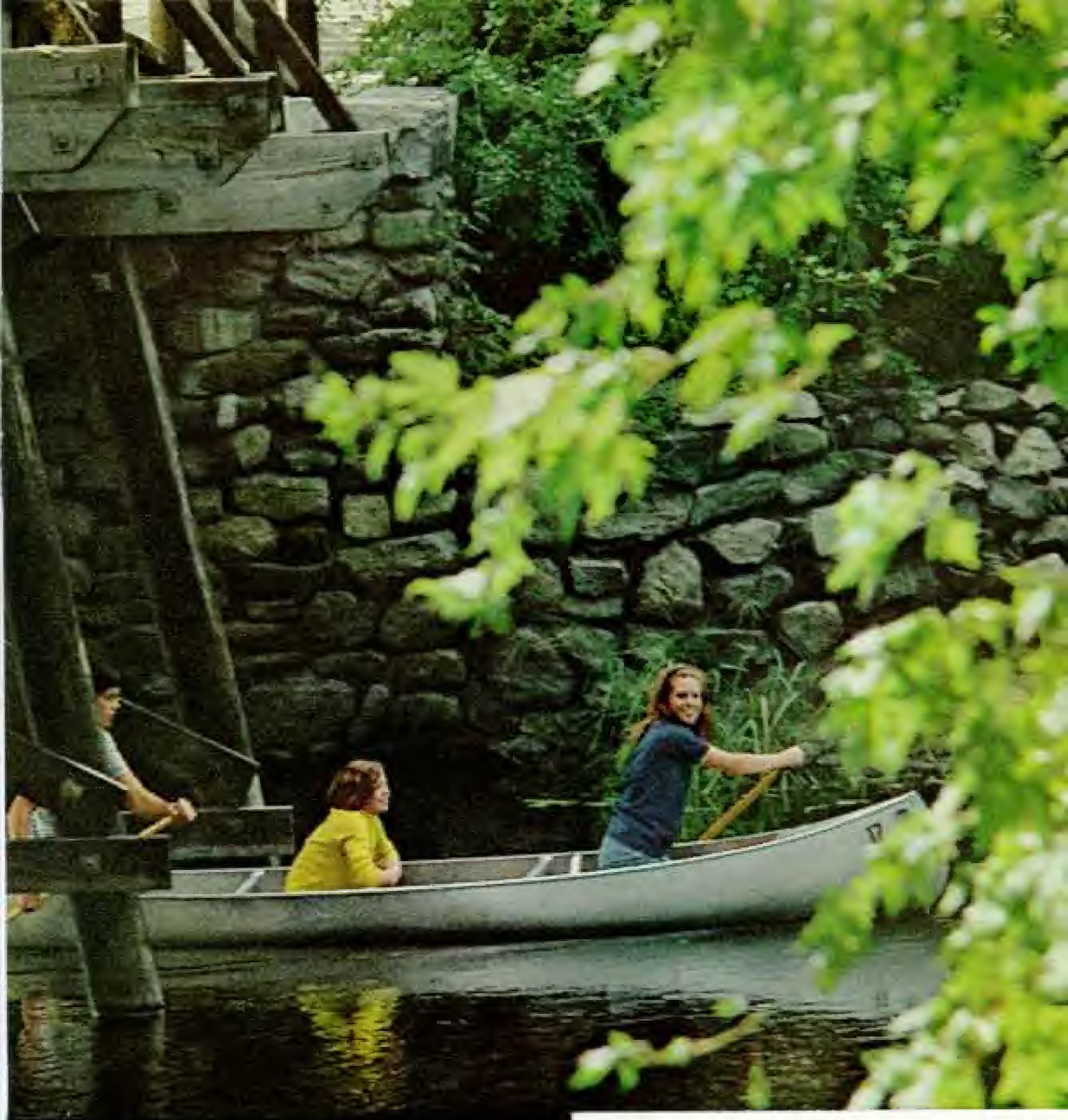

This summer, make a memory or two

What do you remember about a summer vacation? The way the kids laughed on their first canoe trip. Your exhilaration at the top of that mountain climb. Your wife discovering a tiny shop at the water's edge. A moment in history suddenly coming to life. We know all about it in Massachusetts. And we have names for it. Names like the Berkshire Hills. Rockport. Boston. Concord. And Plymouth, to name a few. We know all about the way memories are made. And we know the perfect place to make some.

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Please send me a free Summer Vacation Kit.

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Department of Commerce and Development · Division of Tourism, Carroll P. Sheehan, Commissioner. Department NG4

THE
BEAUTIFUL
STATE OF
MIND
Massachusetts

the sleeper

It happens time after time.

People start their 7-country trip in Austria. And end up skipping 6 countries. Or they try to sandwich Austria in between Denmark and Italy—and never get over the Alps.

Why is Austria always surprising people—delivering more travel fun than they expected? Because she still has what all Europe used to have, years ago. The good life. Unplanned. Uncomputerized. Undiluted.

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There's history: More "visitable" castles, palaces, and museums than any comparable area in Europe.

There are theatres and concerts—a cultural season that goes full tilt 12 months a year.

There's scenery: Snow-covered Alps. Mountain lakes. Lush forests teeming with game. Even steppes.

There's skiing. Snow or water. Or both in the same day, if you like.

And there's Vienna. A 2,000-year-old symposium on the art of living. And there's Salzburg, Innsbruck, and Alpine villages where you snooze under a comforter stuffed with goose down and wake up to cow bells.

And there's...but it's no use. No matter how much we tell you about Austria, you'll still have more fun than you expect.

Come.

And be pleasantly surprised.

(But if you must learn more, we'll send you a big colorful package of brochures, maps and useful information. Free. Just write to: Austrian Tourist Office **New York**: 545 Fifth Avenue, 10017 • **Chicago**: 332 S. Michigan Avenue, Suite 1401, Ill. 60604 • **Los Angeles**: 3440 Wilshire Boulevard, California 90005 • **Portland**: 2433 N.W. Lovejoy Street, Oregon 97210 • **St. Louis**: 1121 Timberlane, Warson Woods, Missouri 63122.)

Austria

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WE'D SELL EVEN MORE OF THEM IF THE OLD ONES DIDN'T LAST SO LONG.

This 16-year-old Gravely still takes every job in stride

1. Snowblower attachment takes the work out of winter
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3. All-gear drive puts the power directly to the job
4. New 408 lawn tractor features Gravely quality in a smaller size at a smaller price

The old Gravely tractors were built to endure, and plenty of them are still breezing through lawn, garden, and snow removal jobs. But the new Gravely tractors are built to make life even easier even longer, with more features than ever and wide choice of models ranging from 7.6 to 16.5 horsepower.

Pick from riding tractors or the convertible models (which let you ride or walk) . . . features like all-gear drive; instant forward, neutral, and reverse; electric starting; heavy-duty construction; and easy-change attachments to do any job that's worth doing.

Test a 1971 Gravely and see why we're selling more people more tractors less often. For your nearest dealer, call free 800-243-6000 (In Conn. 800-942-0655) any time, any day. Or write us for our free catalog. Gravely, 5604 Gravely Lane, Clemmons, N.C. 27012.

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Portland, Maine 04102

Please send me booklets on the subjects checked below:

Name

Address

City State Zip

☐ 1971 Events ☐ Guide to Maine ☐ Museums ☐ Historic Sites
☐ Lighthouses ☐ State Parks ☐ Camping

Within every man is an island.

Tucked away within us all is a quiet place we dream of. A thing of beauty, removed and free.

Prince Edward Island is like that.

Its shores an endless flow of sun-drenched beaches, touching on the warmest ocean waters north of Florida. You can roam to your heart's content, or find a spot of your own to bask in the sun.

Throughout, the Island is a garden of meadows, a harmony of greens nurtured by clean, fresh air.

Aside from moments of quiet contemplation, the Island can offer you an ample variety of things to do.

There's golfing, deep-sea fishing and the swiftly-paced excitement of an Island race track.

Prince Edward Island also has some of the liveliest theatre in Canada, at Charlottetown's famous Confederation Centre.

This summer come to Prince Edward Island, and see a dream come true.

Prince Edward Island
Canada

Please send me your free color literature and road map.

NAME

ADDRESS

CITY STATE ZIP

Mail to: The Director, Prince Edward Island Travel Bureau
Charlottetown, P.E.I., Canada

Just take Interstate 95 and the Trans-Canada Highway

TIME IS RUNNING OUT FOR THOSE WHO DREAM OF A BEAUTIFUL LITTLE COTTAGE BY THE SEA.

Many still dream of a quiet place by the sea, and yet there are only a few left. Pine Knoll Shores is one of them.

This rare community is tucked away in tall timber and thick vegetation on a small island just off the coast of North Carolina.

It's ideal for a vacation retreat, retirement or an investment, because we intend to keep it the peaceful place that it is.

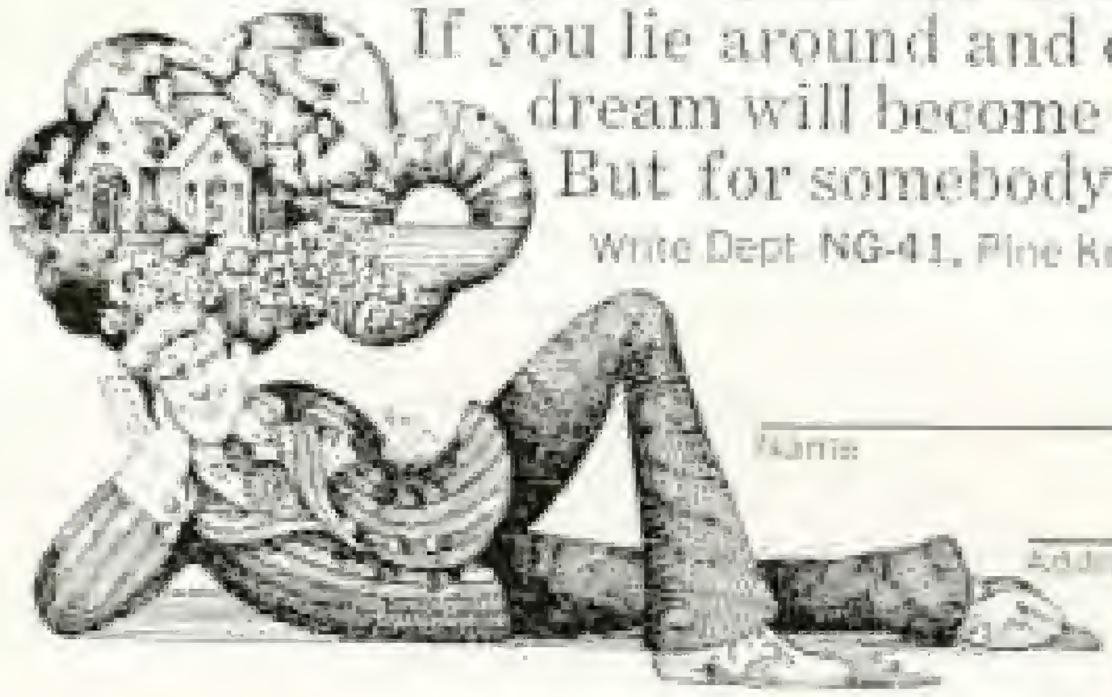
We have a beautiful booklet describing Pine Knoll Shores. Its people. And the types of homes that have been built.

We hope you'll send for it right away.

If you lie around and dream too much longer, then your dream will become a reality.

But for somebody else. **PINE KNOLL SHORES**

Write Dept. NG-41, Pine Knoll Shores, P.O. Box 736, Morehead City, N.C. 28557



Name

Address

City/State/Zip

America is alive and well and living in New Hampshire

Remember clear water, misty mornings, lily pads, and cantankerous fish! They're in New Hampshire this summer. (Some people say June and September are even nicer.)

Free Vacation Kit! Write N.H. Vacation Center, Room 13, State House Annex, Concord, N.H. 03301.

A climb towards the sky.

Gull-like. Poised above the sea.

A sweep and glide to the valley.

A run along the ocean's edge.

You're driving the Cabot Trail.

And making memories for life.

It is, to be sure, a safe and modern, highway. Yet it could be called one of the world's most beautiful nature trails.

A nature trail you experience by car.

185 miles of sea-coast and skyline and the rugged grandeur of Cape Breton's highland range.

With the sights and sounds of the nature you've been missing, and your children, perhaps, have never seen or heard.

And along the way, as your vacation spirit moves you, you can turn to golf, or swimming, or boating, or strolling the beach, or camping on a green and spacious site, or antique-hunting and shopping in a quiet coastal town.

We will look for you then, this summer in Nova Scotia.

And hope you will bring time to travel our entire province. To enjoy fresh air and clean water. To discover a sense of history. And to feel the presence of the sea.

We have information to tell you how to get here, where to stay, and all the things you can do while you're with us.

Just write to:
Nova Scotia Travel Bureau
5670 Spring Garden Rd.,
P.O. Box 130, Halifax, N.S.

NOVA
SCOTIA

Canada's ocean playground

We take sulfur out of oil in Venezuela

One cause of air pollution in American cities is sulfur dioxide.

Some of it comes from burning heavy fuel oil that has sulfur in it. (The kind of oil used by apartment houses, factories and utilities.)

Hundreds of miles away in Venezuela, something is being done to help solve this problem.

Venezuela supplies much of the fuel oil for our eastern cities.

Jersey's affiliate there, Creole Petroleum, built a special plant that can remove large amounts of sulfur from fuel oil right at the refinery.

It's a big plant.

It took three years to build.

And it cost over a hundred million dollars.

Using a process developed by Jersey scientists, the plant can produce up to 160,000 barrels of fuel oil daily, depending on the

to keep it out of the air at home.

amount of sulfur to be removed.

And another Jersey affiliate, Lago Oil & Transport, is building another desulfurization plant nearby on the island of Aruba.

Because of growing needs for energy, there still won't be enough low-sulfur fuel oil available to solve the whole problem.

But the new plants are significant steps forward.

If you would like to know about some of the other things we're doing to help make the air cleaner, we'll be glad to send you a booklet we've prepared.

Just write for a copy of "Breathing Space" to: Standard Oil Company (New Jersey), Dept. MAG., 30 Rockefeller Plaza, New York, New York 10020.

Standard Oil Company
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Esso

Vermont

Tell me all about summer in Vermont. Write:
State of Vermont, DD-17, Montpelier, Vt. 05602

Name______________________________

Address____________________________

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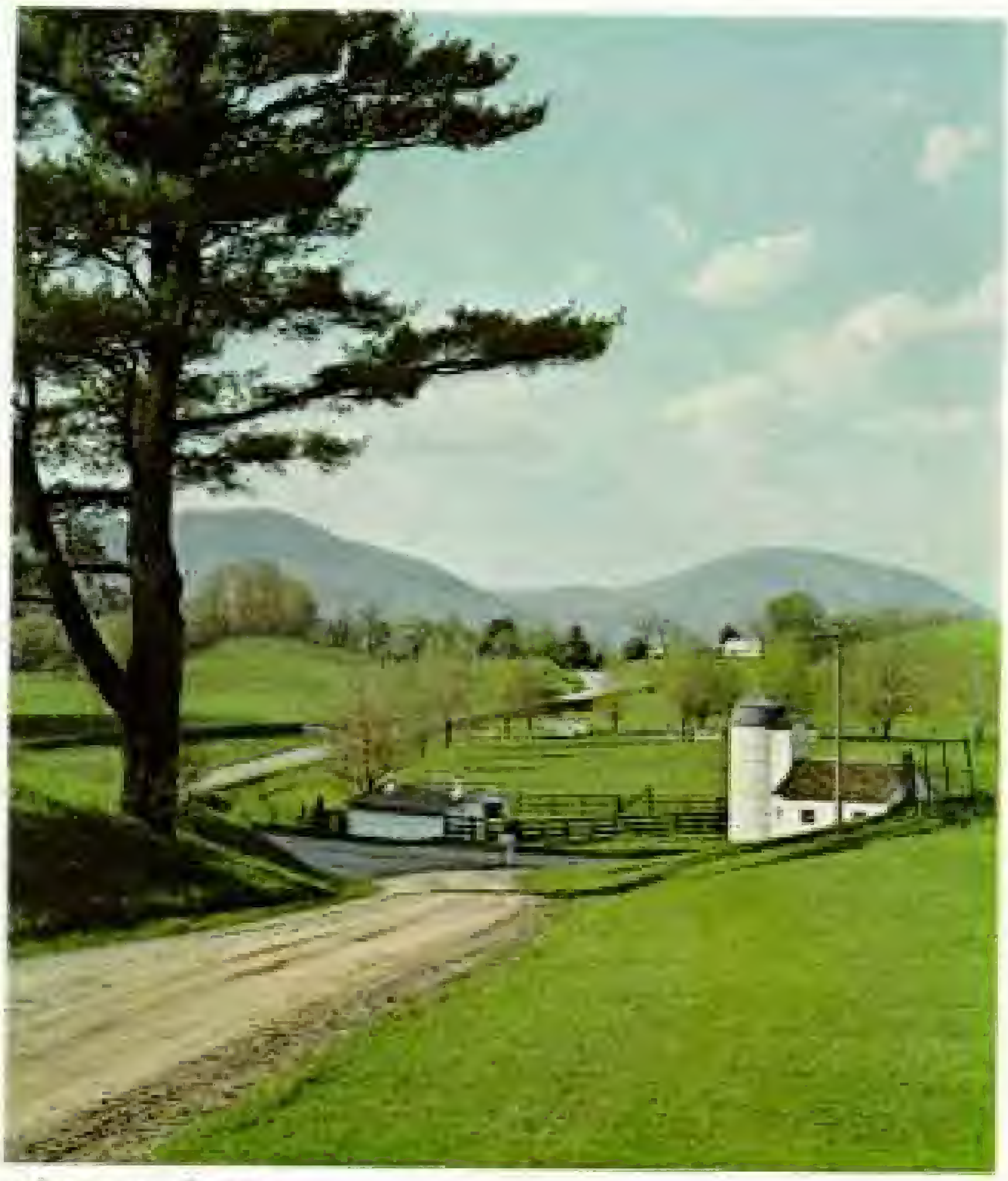

Come home and visit.

Now there's a small Husky* lawn tractor that works like the big ones.
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200,000 miles of our roads were built for cars like this.

If you've ever come close to sideswiping an oncoming semi on a narrow stretch of road.

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Then you know a lot of our highways have problems.

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200,000 miles of primary roads were built 30 to 40 years ago over old horse and buggy routes. For cars that seldom went faster than 40 mph.

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We can make the world a better place to live in. Caterpillar machines will help.

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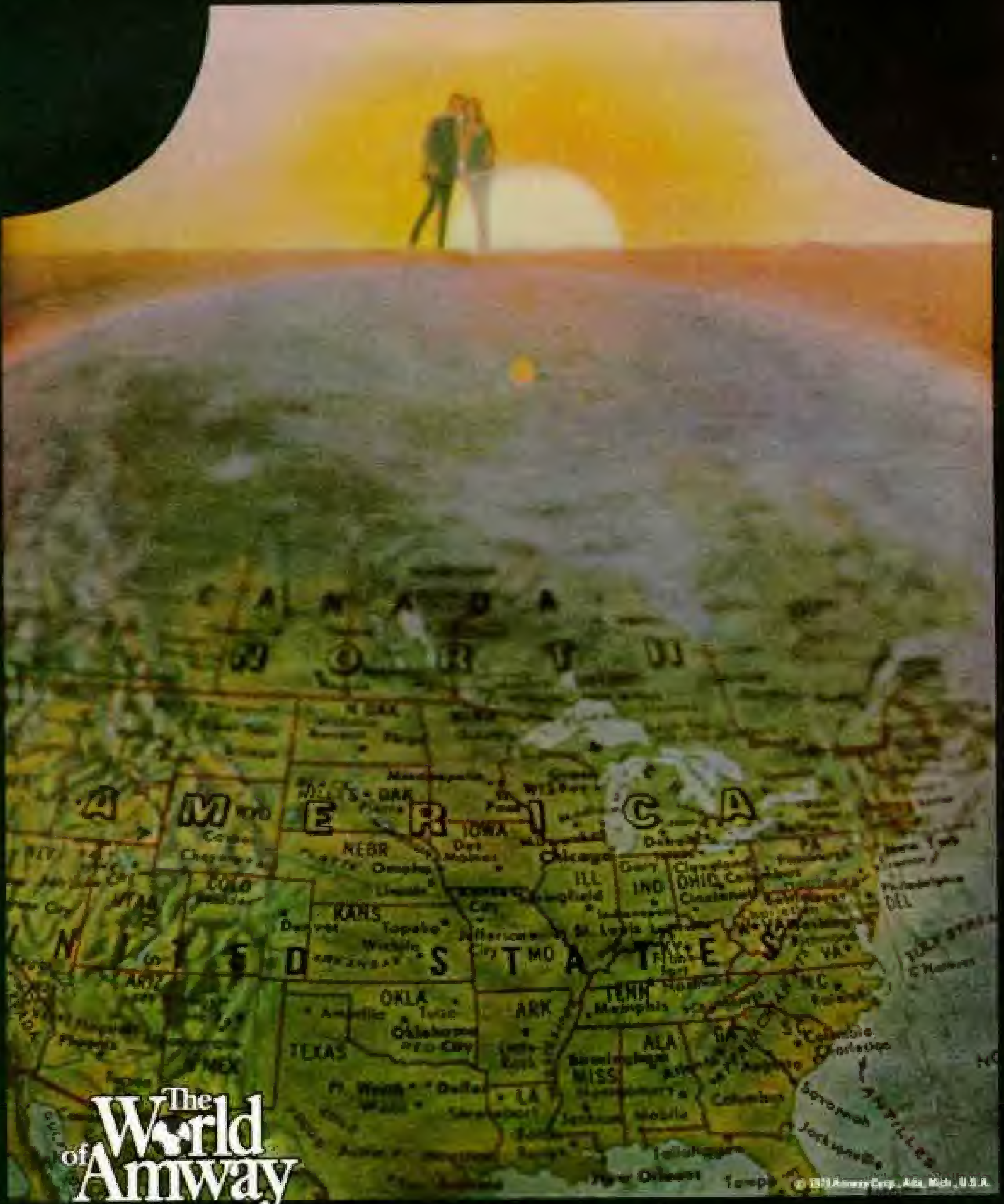

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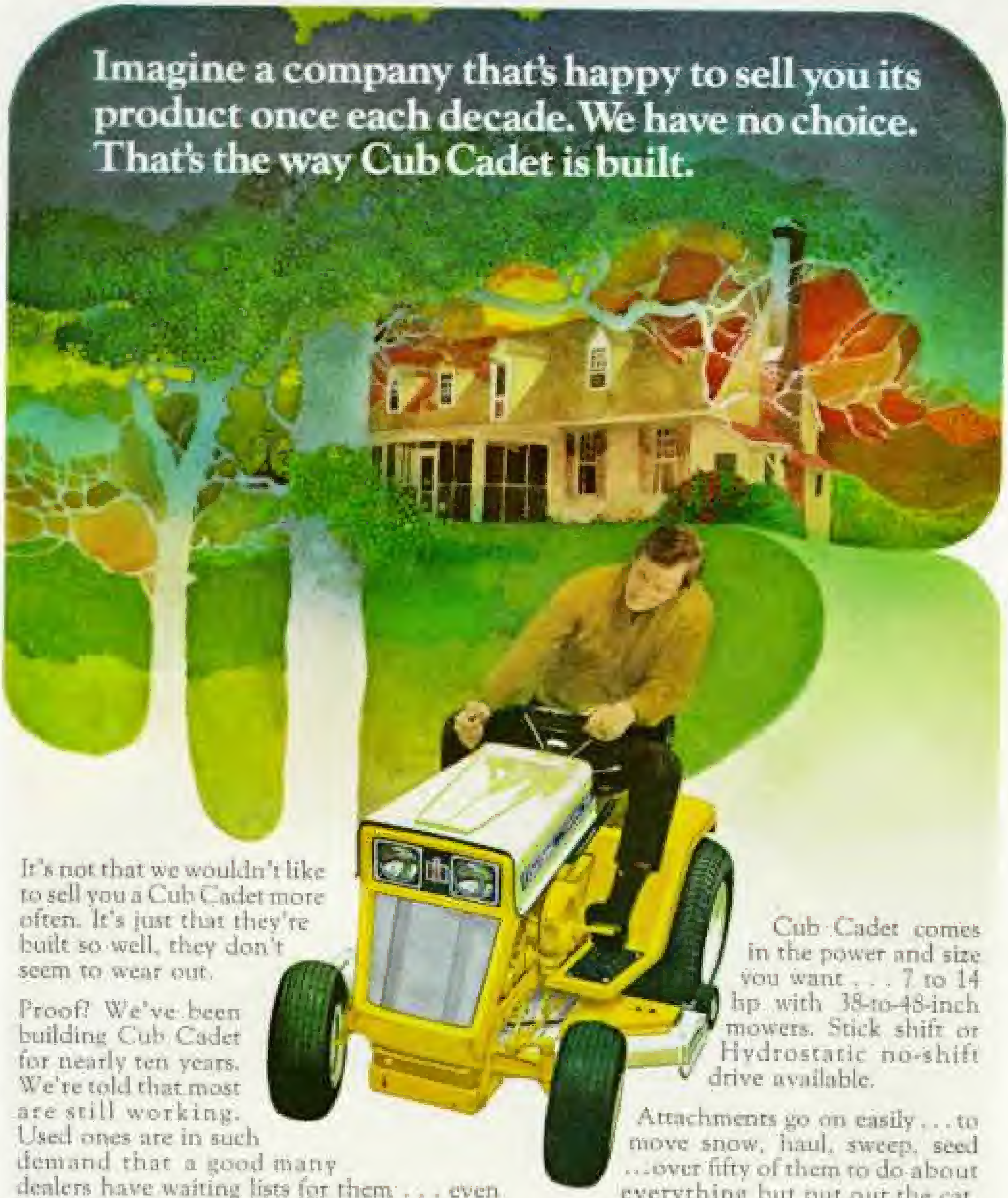

It's not that we wouldn't like to sell you a Cub Cadet more often. It's just that they're built so well, they don't seem to wear out.

Proof? We've been building Cub Cadet for nearly ten years. We're told that most are still working. Used ones are in such demand that a good many dealers have waiting lists for them . . . even at premium prices.

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Cub Cadet comes in the power and size you want . . . 7 to 14 hp with 38-to-48-inch mowers. Stick shift or Hydrostatic no-shift drive available.

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April 1971

NATIONAL GEOGRAPHIC

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Changing homeland of a tough, romantic people

HUNGARY

By BART McDOWELL
SENIOR EDITORIAL STAFF

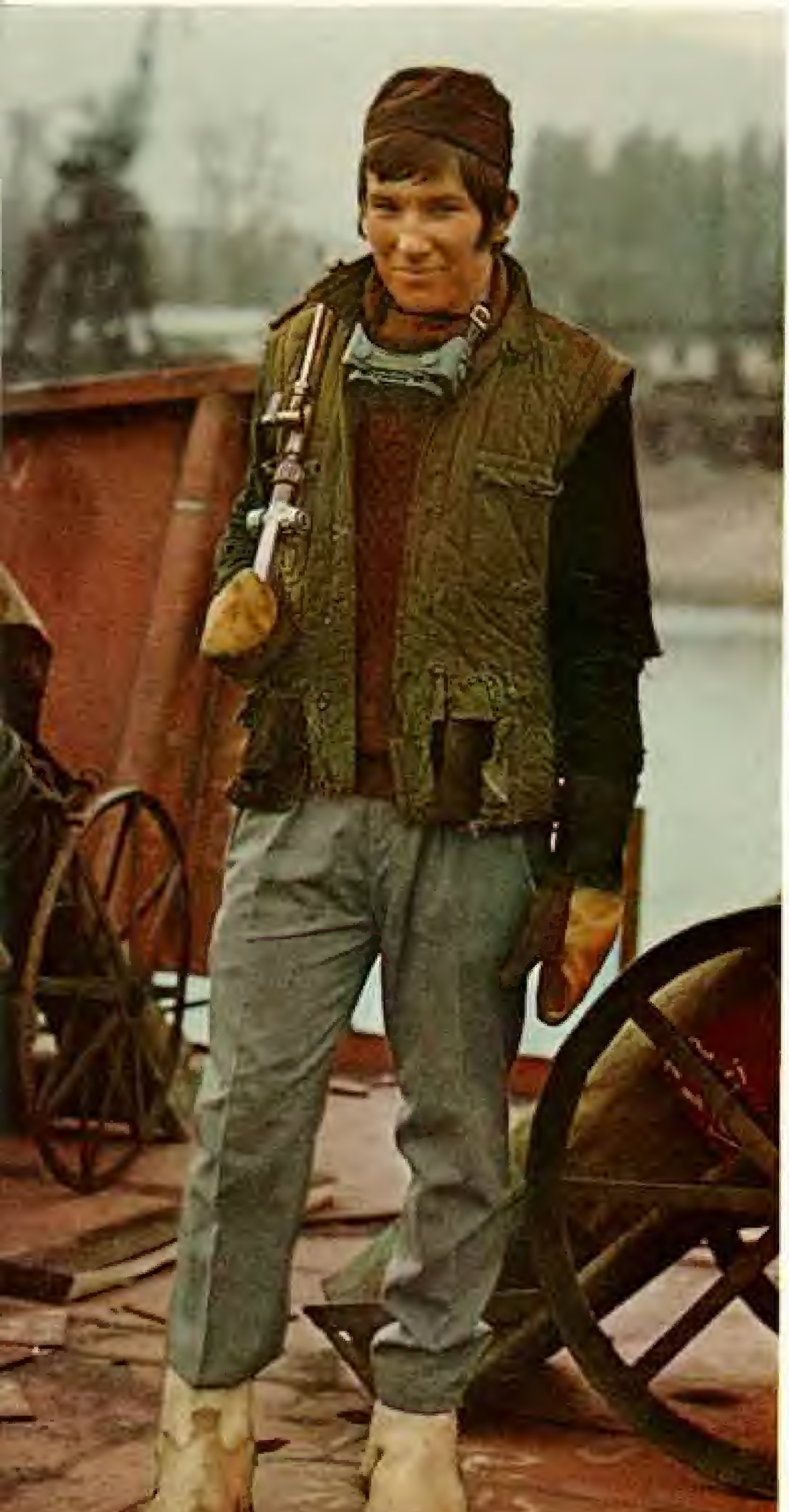
Photographs by ALBERT MOLDVAY
and JOSEPH J. SCHERSCHEL
NATIONAL GEOGRAPHIC PHOTOGRAPHERS

PERHAPS ÁRPÁD GAVE US THE IDEA, for we had read the folklore of that nomadic Magyar chieftain.

Before he stormed into Hungary with his conquering horsemen in A.D. 896, Árpád dispatched scouts ahead to bring back "two pitchers full of water from the Danube and a bundle of grass from the dunes," reported a medieval historian. And from those samples the chieftain formed his opinion of the land now known as Hungary.

Like Árpád's scouts, we collected souvenirs all over the land, and as we packed, our loot itself told the story of Hungary today. We had gathered cookbooks, wine, and records of Gypsy violins and Bartók concertos—proof of delicious, romantic fun. We had also acquired some needlework, fine china, a riding crop, a humor magazine called *Ludas Matyi*, and some medals marking the centennial of Lenin and the millennium of St. Stephen. We could read the keepsakes as if they were tea leaves: For us Hungary had been a creative, lively place, with odd crosscurrents of thought. "And don't forget my three invitations," added my 13-year-old son Josh. Not tangible souvenirs, perhaps, but three families had asked Josh back to spend a summer in their homes—a fair sample of the

INITIAL WITH FIGURE OF ST. STEPHEN, HUNGARY'S FIRST KING, FROM "THE HUNGARIAN ILLUMINATED CHRONICLE," PAINTED ABOUT 1360, IN THE NATIONAL SZÉCHENYI LIBRARY, BUDAPEST



KODACHROMES BY ALBERT MOLDVAY © N.G.S.

Shouldering his torch like a rifle, this Hungarian shipyard welder on the Danube looks the part of Communism's traditional worker. Yet by night he may don mod clothing and dance to the music of The Juniors. The popular Budapest rock quartet poses atop a Mustang in a scene that reveals a new tolerance of Western influence at work in Hungary.

In other, more meaningful ways this central European nation cautiously strains at Communist orthodoxy. Some Hungarians still work for private businesses. And, though collectivized, many farmers also tend private plots. Capitalist-flavored profits stimulate a productivity that makes Hungary one of the most prosperous of the Soviet-bloc lands.

But Hungarians open the door to the West with deliberate slowness. They remain mindful of 50,000 Russian troops on their soil, of the fate that befell a liberalizing Czechoslovakia three years ago, and of the failure of their own revolt of 1956.

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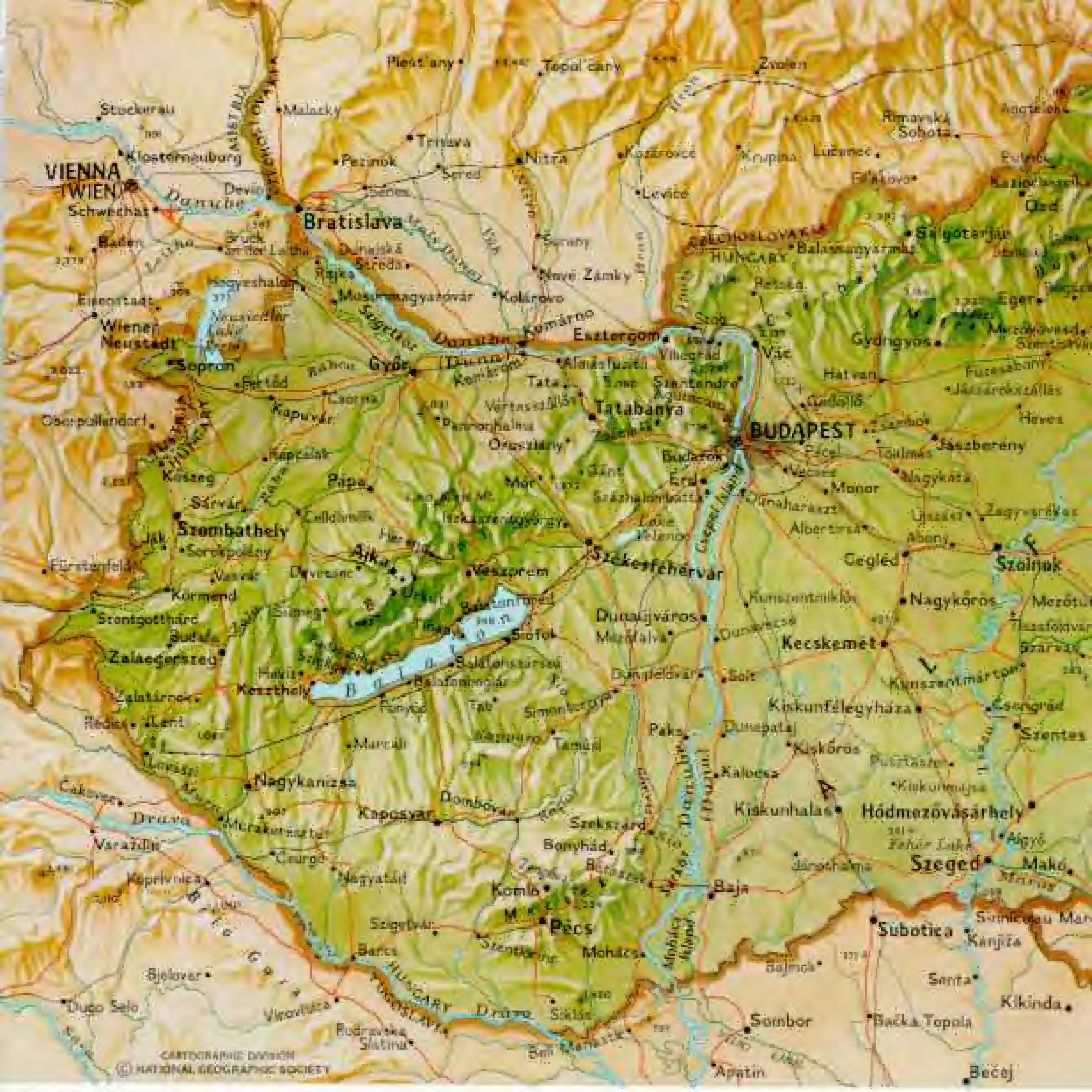
VIENNA (WIEN)
Bratislava
BUDAPEST
Győr
Esztergom
Tatabánya
Székesfehérvár
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Szombathely
Zalaegerszeg
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Pécs
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spontaneous hospitality we found everywhere.

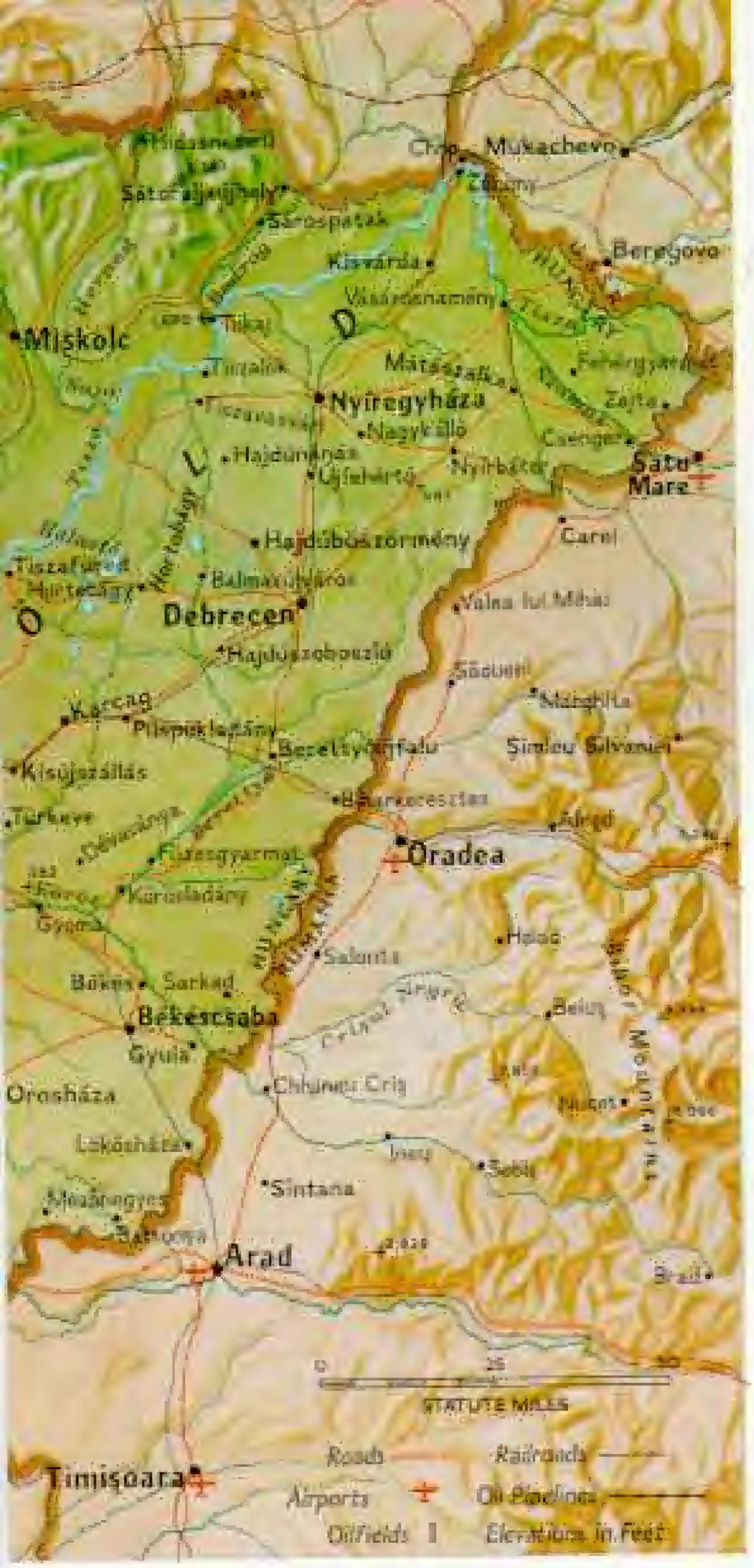
"But do these Communists let you travel freely?" asked an American tourist we met in Budapest. I assured him that we moved with complete freedom and that, if any secret policeman followed us, we had never been aware of it.

Since the abortive revolution of 1956, things have changed in Hungary. Nikita Khrushchev grumbled about its "goulash Communism." The *Wall Street Journal* went even further: "Hungary is making a major departure from Socialist orthodoxy." Unlike Russians, for example, Hungarians can own land privately. Their government no longer fixes all prices. Television broadcasts include a few commercials. And nearly 200,000 Hungarians work in privately owned bakeries, shops, and even small construction firms.

"I no longer think of Hungary as Iron Curtain," a Western diplomat told me.

Two years ago a Budapest friend of mine laughingly referred to Hungary as "the jolliest cellblock in the Soviet concentration camp." Last year he made the same joke, but his manner refuted the words: He told it without looking over his shoulder. And in two cabarets and the theater Mikroszkóp, the political jokes had sharper teeth.

Still, some 50,000 Russian troops remain on Hungarian soil. And I noted other details: My airmail letters from Washington took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Sátoraljaújhely
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Mukachevo
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Miskolc
Tokaj
Tiszalök
Mátészalka
Nyíregyháza
Zalka
Nagykálló
Csenger
Hajdúnánás
Újfehértó
Nyírbátor
Satu Mare
Carei
Hajdúböszörmény
Tiszafüred
Balmazújváros
Debrecen
Valea lui Mihai
Hajdúszoboszló
Săcueni
Karcag
Püspökladány
Marghita
Berettyóújfalu
Şimleu Silvaniei
Kisújszállás
Biharkeresztes
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Oradea
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Salonta
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Gyula
Beiuş
Bihor Mountains
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Nucet
Lőkösháza
Ineu
Sebiş
Sintana
Mezőhegyes
Battonya
Arad
Brad
HUNGARY
RUMANIA
Tisza
Hortobágy
Crişul Negru
Crişul Alb
Crişul Repede
0
25
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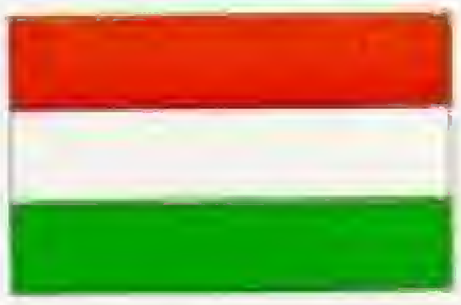
STATUTE MILES
Timişoara
Roads
Railroads
Airports
Oil Pipelines
Oilfields
Elevations in Feet

HUNGARY

Two-thirds of landlocked Hungary lies at an altitude of less than 650 feet. Silty soil has attracted farmers, but the gentle terrain has also lured conquerors to this natural battleground. In A.D. 895 the Magyars came, a band of tough nomads from the Ural Mountains, who stubbornly held the land against successive waves of later invaders. Since Russian troops arrived in World War II, Communism has ruled Hungary. The latest invaders are all tourists—six million a year—who sample spas, Gypsy music, fine food, and Tokay wine.



AREA: 35,919 square miles. **POPULATION:** 10,300,000. **CAPITAL:** Budapest (about two million), commercial center. **ECONOMY:** Industry (machinery, instruments, textiles) employs 35 percent of working population; agriculture (grains, fruits, potatoes, paprika, grapes, and sugar beets) employs 31 percent. Large bauxite deposits. **CURRENCY:** 30 forints equal $1 U.S.

Poland
Germany
U.S.S.R.
Czechoslovakia
France
Switz.
Austria
HUNGARY
Rumania
Yugoslavia
Black Sea
Italy
Adriatic Sea
Bulgaria
Corsica
Albania
Sardinia
Tyrrhenian Sea
Greece
Aegean Sea

nine days to reach Budapest—and every envelope had been opened. But the mail problem seemed slight; my mission was not political, but geographic and, in line of duty, even touristic.

During recent summers, perhaps the greatest change in Hungary has come with the rising wave of foreign tourists—some six million last year, a figure increasing by 25 percent annually. "Soon they will outnumber us Hungarians," sighed a hotel guest at crowded Lake Balaton. "Our population is only 10,300,000—and we increase far more slowly." He was right. The Hungarian birth rate—15 per 1,000—is one of the lowest in Europe. ("How ironic," added a young

Budapest lights up on an autumn eve (following pages). The domed 860-room Royal Palace, today an outstanding museum of art, sculpture, and history, dominates Castle Hill. An excursion boat chugs up the swiftly flowing Danube toward graceful Chain Bridge, completed in 1849 to link Buda, on the far side, and Pest, which merged in 1873. Above the bridge, lights bathe Matthias Church, where Hungary crowned many of her kings.

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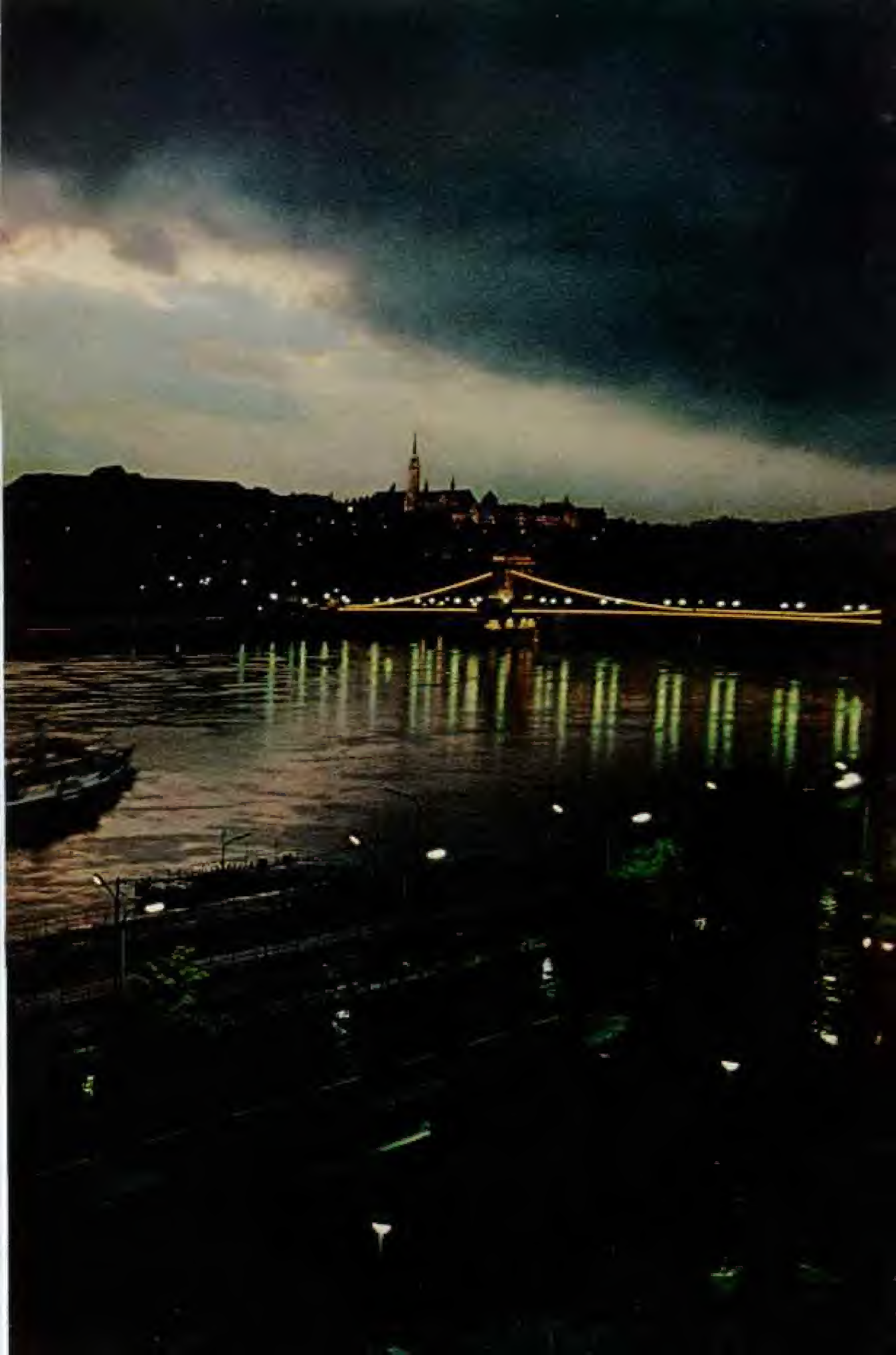
EKTACHROME BY ALBERT MOLDVAY © N.G.S.



Golden shroud of sunlit smog cloaks Budapest's Inner City, athrob with shuttling trams and the proliferating automobiles that threaten to choke the capital. Broad Kossuth Lajos Street leads to the 15th-century Inner City Parish Church. A Turkish prayer niche inside reminds Hungarians of their century and a half of life under Ottoman rule, when the church was used as a mosque. Today the Inner City, with its many stores and small factories, its hotels, restaurants, and ubiquitous coffee-and-pastry shops, dominates Budapest's business life. At a shop on Népköztársaság Avenue, the model below enjoys an espresso break.

teacher, "that our favorite bird is the stork.")

My son Josh and I were two of those six million visitors. And since this was Josh's first trip to Europe, I began his tour with Budapest—the nation's capital, cultural center, and home to a fifth of the Hungarian population.

"You mean the *Romans* founded this city?" he asked in wonder. We walked through the ruins of Aquincum, and I saw only the tumbled columns, the excavated walls, and the two amphitheaters. But Josh, his eyes focused upon adventure, could see the flashing swords of Tiberius Caesar's own First Hispanian Cavalry, camped here in A.D. 19.

"The name Aquincum comes from the Celtic *Ak-Ink*, meaning 'abundant water,'" explained our guide-interpreter Péter Magyarics, a third-year university student majoring in history. We had just met Péter, so he was still carefully erudite. "Also, a professor once told me that Buda may derive from the Slavic *voda*, or 'water.'"

"We have an ocean below the surface of Hungary," said another professor. He was Dr. Márton Pécsi, distinguished geographer

EKTACHROME (OPPOSITE) AND KODACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ALBERT MOLDVAY © N.G.S.

and member of the Academy of Sciences. "We have about 35,000 artesian wells, and underground thermal waters ranging from 60° to 120° Fahrenheit."

WE TRIED THE WATER from several of Budapest's 123 springs at local spas—among them the famous pool at the Hotel Gellért, with its wave-making machine, the acres of steaming outdoor baths of Margaret Island, and the domed stone Rudas Baths—one of the functioning relics left by 16th-century Turks (page 453).

Yet the city's major water resource remains the Danube River; from our window at the new 350-room Hotel Duna Inter-Continental, we watched tugs, barges, and freighters—an impressive waterborne parade. Upstream at Vienna, Strauss waltzes have tinted the Danube a romantic blue. But here the river seems a workaday stream.* Though 850 miles from the Black Sea, Budapest enjoys an official maritime registry as a seaport—thanks to the Danube and the 19 ocean-going ships in the merchant marine of landlocked Hungary (map, pages 446-7).

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*See "Down the Danube by Canoe," by William Slade Backer, NATIONAL GEOGRAPHIC, July 1965.

"We even build ships for Norway and West Germany," said József Schuster, of the MAHART Hungarian Shipping Company. Burdened by three million tons of annual cargo, the Danube River here carries a prosaic reputation.

The city is quite another romantic matter. Or rather, the cities, for Buda and Pest—which were separate municipalities until legally wed in 1873—remain essentially individual. Buda rides the hills and slopes of the west bank, garnished by gardens, crowned by castles, church spires, and forts (pages 448-9). Pest lies wide and flat, a tabular city neat as a ledger, with big streets and tall buildings, crowded shops and government buildings, the busy center of Hungary. Between them, the Danube provides vistas, commerce, and cleavage (pages 454-5).

"PRESERVE EVERYTHING that is Hungarian," King Stephen advised his son in an early document, "and do not forget that without a past a nation has no future."

Such advice has not always been easy to follow. The Danube Basin has forever offered invaders a hallway to Europe. Historic evidence bulges visibly upon the brow of Castle Hill. In 1241 the Mongols invaded Hungary, pillaged for a leisurely year, slew half the people, and then withdrew. Buda Castle was started then to guard Danube traffic and this, the new capital of Hungary, against the Mongols' return.

The Turks came and conquered in 1526. Strolling through Buda Castle, Sultan Suleiman the Magnificent sighed, "Oh, if only this palace were our seraglio in İstanbul!" Such sentiment vanished a century and a half later when the Turks were driven from this hill and from Hungary. They set fire to the castle, making it look, one eyewitness said, like "an empty skull in which a candle was stuck."

The Habsburgs rebuilt much of the castle as a part-time royal residence for their Austro-Hungarian Empire. We watched workmen rebuilding that palace again, for Buda Castle and its hill were wrecked once more in 1944 when the Russians shelled its German redoubt. Thus an epic struggle raged here through the centuries, or as British scholar C. A. Macartney puts it, "Europe and Asia strove for mastery, and neither ever achieved it quite completely."

The contention continues. We drove around Pest's semicircular Great Boulevard and watched the street names change: Franz, then Josef—for two Habsburg emperors—then Lenin, then St. Stephen. On other drives Josh called out landmarks honoring György Washington, Roosevelt, Marx, Attila, and a prolific 13th-century chronicler, Anonymus.

"Have you heard the latest Lenin joke?" a Hungarian acquaintance asked me. Officially, Hungary had just observed Lenin's centennial, and posters covered the city with pictures of the bald Russian. "You haven't heard *any* of our Lenin jokes? Well. . . ." Many of his stories just weren't printable.

"The Russians even have a contest for the best Lenin jokes," insisted my friend Rudolf Víg. "The winner gets 30 years in Siberia."

Rudi had helped me with a book I wrote about Gypsies.* As a musicologist with the Hungarian Academy of Sciences, Rudi himself has collected some 5,000 Hungarian folk songs and knows more about Gypsy music than anyone else on earth. His wife Anna Víg is a leading fashion designer who still finds time to tend a lively brood of five children. Two of them, Mihály, 13, and Balázs, 14, showed Josh around their town.

Together, they moved through the great museum of Buda Castle ("spooky lighting—but neat") and spired splendors of the 13th-century Matthias Church, where many of Hungary's kings were crowned, and over the roller coasters of Vidám Park. Yet one of Josh's greatest thrills was his ride on the Budapest subway at a brisk 45 miles an hour.

"Next to London's, ours is the oldest subway system in Europe—and the oldest on the Continent," boasted László Udvari, chief of Metro technical development. We saw the quaint Metro car first ridden by the Austro-Hungarian Emperor Franz Josef in 1896.

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*Mr. McDowell's book, *Gypsies: Wanderers of the World*, 216 pages, 194 illustrations, is available for $4.25, plus postage and handling, from National Geographic Society, Dept. 670, Washington, D. C. 20036.

Cure bequeathed by onetime conquerors: Men soak in mineral-laden 108° F. waters of the Rudas Baths, built by the Turks in 1566. Sun streams through tinted glass like spotlight beams. People flock to Budapest's baths—fed by 123 bubbling thermal springs—to treat ailments ranging from fatigue to arthritis.

EKTACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JOSEPH J. SCHERSCHEL © N.G.S.

And—25,000 of us in one rush hour—we rode the newest section opened in 1970 to commemorate 25 years of Communist rule.

"Our equipment is Russian," said Mr. Udvari. "But our rail width differs." Pride rather than engineering seemed involved.

One morning we donned hard hats and went underground 90 feet where workmen are drilling new metro routes. Sloshing over cables and rails, we waded in the slime from seeping mineral waters. Over the noise of jackhammers, Mr. Udvari shouted, "Soon we will complete this first tunnel under the Danube!"

ON A LOFTIER PLANE, I visited Budapest's restaurants to sample my favorite paprika-flavored foods, the excellent white wines from Lake Balaton, and Gypsy violins. In the Mátyás Pince restaurant and in the hilltop Citadella, I ran into old Gypsy friends.

"You're back!" said Lajos, *prímás*—violinist-leader—of one six-man Gypsy band. "You were last here with the linguists." And so I had been. Professor József Vekerdi and his associate Éva Valis had introduced me to some of Hungary's 300,000 Gypsies.

"They shy at no audacity in music," Franz Liszt once wrote. And, indeed, Gypsies have supplied the background score for much Hungarian history—at least since the 15th century. Melodic *verbunkós* helped recruit the army, and for centuries Gypsy violinists led troops into battle.

Hungarian dictionaries even note some special words for Gypsies: *cigányozni* (literally Gypsying) and *mulatni* (to have a good time with Gypsies). In fact, Gypsy music has been such a festive part of historic Hungarian revels that Communist authorities at first banished the traditional orchestras as aristocratic symbols.

"Now, no more of that nonsense," shrugged Lajos, and he slipped into the melody of Lara's theme from *Doctor Zhivago*.

"In the heroic age of Budapest . . . fortunes were wasted on champagne, flowers, and music," wrote the nostalgic Gyula Krúdy. Krúdy recalled "Király Street . . . where Edward VII while Prince of Wales learned to dance the *csárdás*," and the time an entertainer named Fifi "replaced her knocked-out eyetooth with a piece of a wax candle." He described bald-headed waiters who "carried the wine . . . in silver coolers with the solemnity of funeral directors. . . . The lovely, glittering great world!"

It glitters yet. On any summer evening you can count the lovers strolling beside the Danube, holding hands, whispering, embracing. Once a cabdriver pointed out some

Sightseeing the sociable way, loungers man the ramparts of Fishermen's Bastion, built in 1905 to honor medieval Danube fishermen who defended the river's Buda bank. It provides a favorite vantage point for Hungarians and for a swelling tide of tourists. Parliament Building bristles with Neo-Gothic spires on the Pest side. The city's eight bridges were all rebuilt after retreating Germans blew them up in World War II.

lovers entwined in the middle of Erzsébet Bridge. "The housing shortage causes this," he explained, but I wasn't convinced.

"Budapest is simply a romantic city," said Mrs. Hédy Blum, manager of a town house for retired actors and actresses. "Next week we have a wedding here—an actor 75 and his actress-sweetheart 66. See her there? In the white dress. Theirs is an old love, they have known each other 40 years. . . Yes, we often have romances. I recall one retired opera singer in his seventies. He lived on the first floor, his wife on the ground floor, and his sweetheart on the second floor. Difficult. Especially with the stairs. But the ladies never met."

In less romantic fashion, the housing shortage remains "our number-one national problem," according to an official of the Institute of Economic Planning. "A third of our women say housing is the reason they do not want children.

"In Budapest half our population lives in two-room flats left over from before World War II. But we are now building 10,000 flats each year—6,000 of them state-owned and 4,000 privately built for family ownership."

Planners hope to have 400,000 apartment units built throughout the country in the next five years. Meantime the humor magazine *Ludas Matyi* prints a typical housing-shortage cartoon—proposing an apartment

KODACHROME BY JOSEPH J. SCHERSCHEL © N.G.S.

building skewered on a church spire: "No elevator, but what a view!"

"We are all crowded and rather poor in the city," one housewife told me. "Country people live better."

Yet I noticed that she, unlike women in other socialist lands, dressed, if not with elegance, at least with style. I had also heard that the wife of Yugoslavian President Jozsip Broz Tito particularly enjoys shopping in Budapest's boutiques.

"Is this really the Paris of Communist Europe?" I asked Anna Vig at a showing of her own collection.

"Warsaw does some better designs," said Anna. "But we are richer than the Poles."

"At least the models are beautiful," said Rudi. No doubt about it—Hungarian girls are lovely, with their high Magyar cheekbones, and—frequently—tilted Asian eyes.

"Ah, the girls!" exclaimed one young German tourist. "Paprika, paprika!"

"The secret of our girls is the fish they eat," confided one Hungarian. "The Turks always fed their harem girls fish, called *harcsa*, from the Tisza River."

WHATEVER THEIR SECRET, we admired the results on the popular beaches of Lake Balaton—the "Hungarian Sea," as people call this 230-square-mile body of fresh water (map, page 446). In July and August cityfolk carpet the beaches with their bodies, and wade out half a mile to swim—for the depth of Balaton over-all averages only 10 to 13 feet. Hotel rooms are attractive, cheap (our double cost $7), and impossible to get on short notice.

"We have 11,000 rooms in all," tourism director Róbert Gombos told me. "And far more guests here today. We're praying for a storm to make people leave. Fortunately, our new Hotel Helikon is 85 percent complete.

"But we're also encouraging people to build private houses here. Our government tourist agency, IBUSZ, offers advice. The owner builds. He gets to use the house part of each season. IBUSZ acts as his agent, renting it to tourists. After a few years, the owner has paid for his house and can rent it outside of our office."

I inspected 28 houses already built under these terms—and also some smaller private villas where owners rent out apartments and rooms (6 bedrooms, 2 kitchens, 4 ceramic-tile bathrooms, ample gardens with flowers and poplar shade).

"Yes, yes, privately owned—we may sell if we like," said one landlord. I noticed a few dozen sailboats tacking smartly out on the lake—small yachts that were also privately owned. And without remorse—and without saying so—I wondered about something called "creeping capitalism."

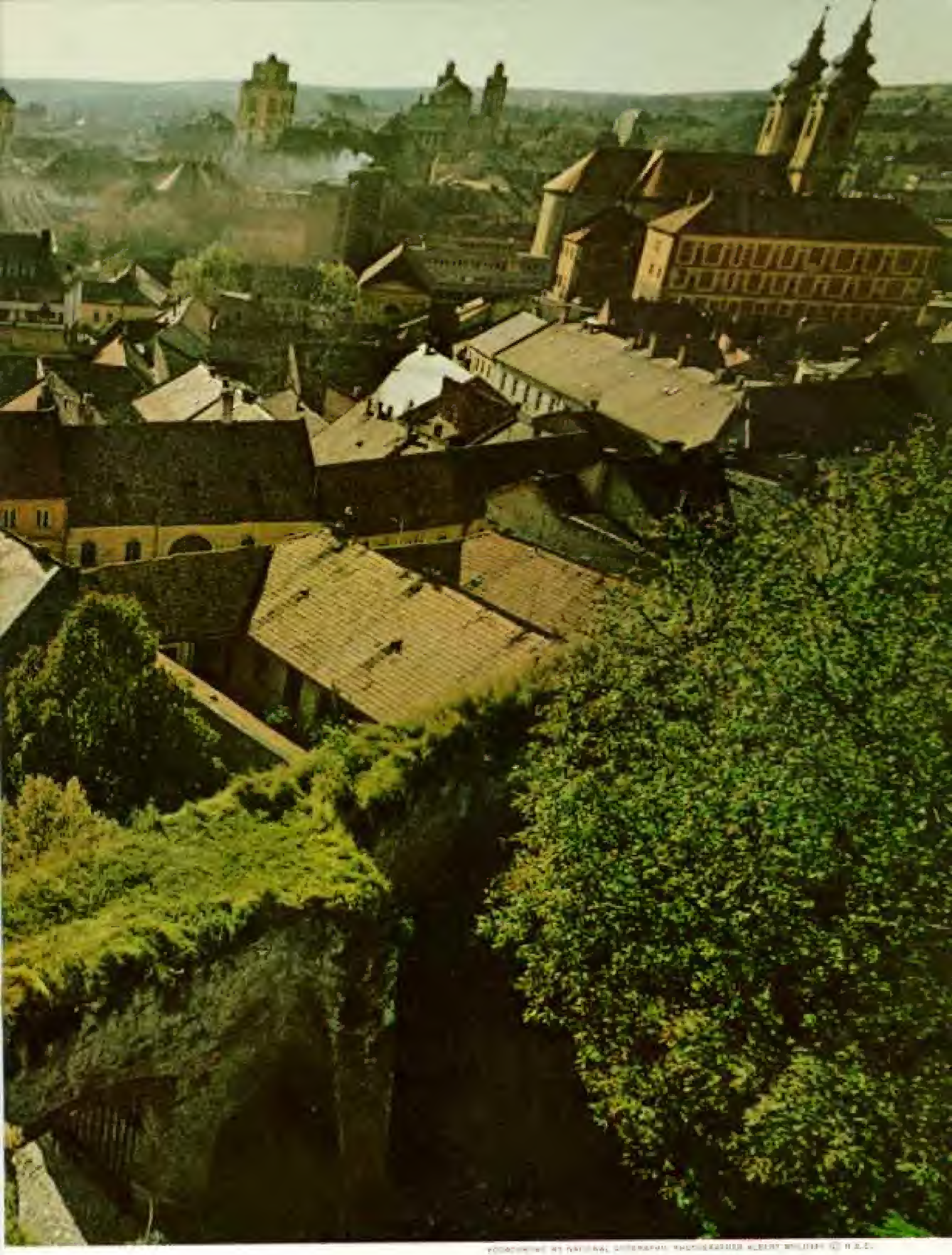
Next day it rained; amid lightning flashes

EKTACHROME (ABOVE) AND KODACHROME BY ALBERT MOLDVAY © N.G.S.

Fashion's reading room: Customers crowd a beauty salon in Debrecen. Catering to Hungary's intensely style-conscious women, such government-run shops give a shampoo and set for only 20 forints—equivalent to 67 cents U.S.

Spice of Hungarian life: Beneath Lenin's gaze, women of Szeged package paprika, a seasoning dear to the national palate. The municipal factory processes 76 million pounds a year, with 60 percent destined for foreign sale.

Quiet reigns where battle raged in the wine-producing center of Eger; thick castle walls now wear soft mantles of vegetation. Here in 1552, some 2,000 desperate defenders—the women fighting beside their men—hurled back the assaults of more than



KODACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ALBERT MOLDVAY © N.G.S.

120,000 Turkish invaders in a victory celebrated ever since by Hungarian poets and studied in every Hungarian schoolroom. Twin-towered Minorite Church at right, tilted by the camera's lens, is one of the country's finest examples of Baroque architecture.

we crossed by ferry to Tihany on the north shore. "But this is not a true Balaton storm," János Varró, a blue-eyed, deeply sunburned fisherman, said with a smile as he led us into his house.

"Excuse us, please," apologized Mrs. Varró, "but we rent our upstairs rooms to tourists in summer. We move to the kitchen —television, washing machine, children!"

"Yes, we catch that whitefish you like—*foga*," said Mr. Varró. "The law protects it on Balaton; we must throw back all foga shorter than 13 inches [page 478].

"Now: our famous storms. First we see high white clouds with edges like lace; then a long mist cloud. In five minutes the sky turns dark green. The northwest wind blows down—sometimes 75 miles an hour. The danger is the shallow water, when boats are dashed against the sand bottom in the troughs of the waves."

Each year some two dozen swimmers drown in Lake Balaton. "But we number 75 fishermen on the lake—and we never drown," said Mr. Varró.

On the hilltop above the Varró house, we visited the famous Tihany Abbey, founded by the Benedictines in the year 1055.

"Yes, our charter was the first to record words in the Hungarian language," explained Abbot Lajos Hegyi. "Mixed with its Latin, we can find some 59 Hungarian words."

IN PURSUIT OF HISTORY, we drove toward Székesfehérvár—meaning "white residential castle." "King Stephen was buried here," Péter explained, "and thus it became a ceremonial center for the kingdom." Stephen became something more. Converted to Christianity, he became the first Hungarian king, and brought his subjects into the faith. His technique was humane and practical. According to modern historian György Györffy, he decreed Sunday as market day so shoppers could be herded into church; even now the Hungarian word for Sunday is *vasárnap*, or "market day." Canonized, Stephen became the patron saint of Hungary and his feast day, August 20, the greatest national celebration for the Hungary of old.

After World War II, Stalinist Communism put St. Stephen into eclipse, and August 20 was called Constitution Day. But three years ago, when I visited Budapest during this national feast, a friend pointed out a newspaper editorial to me. "Look—it praises King Stephen as devoted to constitutional rule! Such a comment could not have been published a few years back."

Now, as the feast day approached again, the People's Republic of Hungary was officially planning to celebrate the thousandth anniversary of King Stephen's birth.

A GREAT CROWD had gathered in the square at Székesfehérvár. We watched as dignitaries filed onto a platform: government officials, Communist Party functionaries, then two Protestant bishops, three Roman Catholic archbishops, and the President of Hungary, Pál Losonczi. In his speech, the president praised "the statesmanship of the state-founding Stephen." Together the prelates and the party functionaries applauded. No one mentioned József Cardinal Mindszenty, Primate of Hungary, who since 1956 has preferred refuge in the United States Embassy to exile. Likewise, no one seemed to notice that the ceremony had no precise precedent in any Marxist land.

"We're hopeful," remarked Dr. Ulrik Monsberger, prior of the Benedictine Pannonhalma Abbey. "We have enough religious vocations for our task. Hungary has nine religious grammar schools. And the state pays salaries to all our teachers—yes, even to the priests."

The faith seemed firm next day in Budapest's Basilica of St. Stephen. There we filed past a jeweled reliquary where lights blazed on the brown, withered right hand of St. Stephen (page 467). We stood in a steaming crowd through the Mass, then pushed our way out into the fresh air. Thousands of worshipers unable to get inside were loudly singing hymns: old men with bristly mustaches, young citified dandies, girls in miniskirts, peasant women wearing the embroidered *főkötő*, or topknot cap.

Still with the crowd, we moved to the Danube bank to watch a parade of floats that

Bent as if never to straighten again, a woman near Pécs pulls weeds amid wavy rows of sugar beets. Many peasants who work on state-owned collectives also keep small plots of private land which they zealously cultivate for private gain.

EKTACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JOSEPH J. SCHERSCHEL © N.G.S.

MANT

KODACHROMES (FOLLOWING PAGES) AND EKTACHROMES BY ALBERT MOLDVAY © N.G.S.

"You can't get away without eating," concluded Hungarian-born photographer Moldvay after visits to hospitable homes such as that of József Pozsa, pouring. This get-together had its origin three years ago when Győző Moldvay, in the middle, saw Albert Moldvay's name in the GEOGRAPHIC and wrote to ask if they might be related. While working on this article, Albert called on Győző, a schoolteacher and poet, and traced a probable kinship. Visiting Mr. Pozsa and neighbor Endre Papp, the two Moldvays found it impossible to leave without partaking of food, drink, and conversation.

Deep in a man-made cave, a vintner near Lake Balaton samples his wine. Vineyards cloak the shores of Balaton and Hungary's Tokay-producing hills in the northeast.

Enduring as the hill it crowns, vast Pannonhalma Abbey (following pages) steadfastly serves the faith, undaunted by a thousand years of buffeting from the wars that have swirled across Hungary. Founded by the teaching order of Benedictines in 996, Pannonhalma today still harbors a parochial high school, a home for retired priests, and renowned archives containing treasured medieval manuscripts.

In a typical rural scene, two countrymen patiently travel by wagon. A single animal pulls this two-horse rig.

actually floated—fireboats, military craft, rescue and excursion boats. Paratroopers splashed into the water. Bands played. Children consumed ice cream and got separated from their parents. Gypsies drank cheap wine. Finally, by night, we watched a double display of fireworks—once, blazing up from the Citadella atop Gellért Hill, and again as reflected in the Danube below.

And already the jokesmiths were at work. Pondering King Stephen's recent rehabilitation, they now remarked, "It is sometimes difficult to foresee the past."

HUNGARY, about the size of Indiana, has good roads that bring every town within half a day of Budapest. Even the mountains seem like scale models, for the highest, Kékes, rises only 3,330 feet.

We drove around easily from hilly Sopron near Austria ("on good days we see the Alps") to Debrecen, the "Hungarian Calvinists' Rome," on the eastern plains. Only a shortage of hotel rooms proved a problem. "But don't worry," said Péter. "In Sopron, we can stay with my aunts. They are tailors, and they have a large apartment." They were also excellent cooks and bountiful hostesses. So were Péter's cousins in neighboring Kőszeg. And from such family visits, we got an insight into Hungarian home life—as animated and exuberant as the decor: embroidered pillows, painted plates, lace doilies, framed religious prints, and pots of flowers.

Traveling along the Danube, we got another kind of insight: into modern Hungarian industry and its close ties to the U.S.S.R.

"We have great bauxite resources, but no cheap electricity for processing aluminum," said László Horváth, an executive engineer at the Almásfüzitő Timföldgyár—meaning "alumina factory."

"No mountain rivers for generating power. Yet we have solved that problem; we reduce the bauxite to alumina and ship it by train to the U.S.S.R. The Russians process it with their cheap electricity and return finished aluminum to us. Within six or seven years Hungary will produce a million tons of alumina each year."

FARTHER SOUTH, near Szeged, we turned off toward the new Algyő oil field. A red-letter sign proclaimed "978,000 tons of oil greets our Tenth Party Congress."

"We got our first well five years ago," said the director, Aladár Juratovits. "By 1975 this Algyő field will supply oil for half our national gasoline production, and in only a few months we'll finish a pipeline to the refinery." Someday, with more oil supplies of their own, Hungarians might purchase less Russian oil from the Friendship Pipeline that now stretches to the Danube.

Hungary almost lost this oil field last spring. "Our elevation here is the lowest in Hungary," said Mr. Juratovits, "and, you can see, the Tisza River cuts right beside us. Well, in full flood the Tisza rose 32 feet—the highest water in recorded history—enough to submerge us completely. The army brought sandbags; 20,000 volunteers pitched in. In one week we built a new riverbank here with 90,000 cubic yards of earth. Then 70 frogmen lined that bank with plastic, so the Tisza would not undermine it. The floodwaters remained from May 20 until July 1. We barely slept. But we saved Algyő."

Between our industrial stops, as we drove across flat Hungary, Péter kept Josh entertained with a large supply of student jokes.

All Hungarians collect jokes: Lenin jokes, as we had already noted, policeman jokes, fool jokes, Chinese jokes, and jokes about a certain Ivan Ivanovitch. In a special way such stories show how Hungarians feel about life, letters, and authority; Josh doubled up laughing at all of them.

But he quickly grew serious each time we passed a castle. At the town of Siklós, we rattled across a drawbridge and checked into the castle itself.

"It's real!" Josh shouted. "Built before 1294—see the plaque?" Only 13 refurbished rooms were ready for renting, but ours measured 40 feet square by 20 feet high.

We found more history in the neighborhood when we drove northeast to Mohács to see a famous battleground.

Rapt townsfolk of Zsámbok follow a Sunday sermon in their Roman Catholic church. Agleam in Budapest's vast basilica, a gold reliquary (right) displays a hand of St. Stephen—Hungary's first king. Last year multitudes attended the celebration of the thousandth anniversary of his birth. Thus, in the countryside and the capital, Hungarian devotion survives under an atheistic government.

Hungary's Communist leaders systematically attacked the church in 1948, expelling 11,000 monks and nuns, nationalizing church schools, and imprisoning József Cardinal Mindszenty. Freed during the 1956 revolt, he found refuge in the U. S. Embassy. Though later offered safe-conduct out of the country, he has remained there ever since.

The people, two-thirds Catholic and one-third Protestant, stubbornly continue to practice their faith. Today they attend church unmolested, and a handful of religious schools carry on; ironically, the state pays teachers' salaries.

KODACHROMES BY FRED PELS (ABOVE) AND NATIONAL GEOGRAPHIC PHOTOGRAPHER JOSEPH J. SCHERSCHEL © N.G.S.

"Sultan Suleiman the Magnificent waited on Merse Peak—there—in 1526," said our guide László Harsányi. "He had 80,000 Turks. The Hungarians stood here—only 25,000—sweating in their armor, for this was late August." Mr. Harsányi described the 90-minute battle and how one of the sultan's scribes saw that "like a black cloud the *Gyaur* [the Christian dogs] were running." And thus began a Turkish occupation lasting a century and a half.

We followed Sultan Suleiman to other castles. At Kőszeg, 1,000 defenders held off the Turks and saved Vienna in 1532. At Szigetvár the sultan, at 76, died quietly during his 33-day siege in 1566. His generals propped up the sultan's body, kept his death a secret, and fought on to victory. Aptly, Suleiman's heart remains buried there—near the battlements his warriors stormed. Josh noticed dormitories inside the thick stone walls and made inquiry. "It costs only 15 forints to stay here—50 cents a night," he reported. "Good for students," I agreed.

Castle accommodations with a clean cot and indoor plumbing fetch similar sums all over Hungary. Near Sopron, the 126-room Eszterházy Palace of Fertőd—Hungary's Versailles—rents double rooms with splendid antique furniture—though without a private bath—for $1.70 a day. In the hilly north country near Tokaj, the 15th-century Sárospatak Monastery charges 65 cents for a dormitory bed—and $3 for a split-level double room complete with a grand piano.

YET WE HAD little time for grandeur. We left our Siklós Castle, for example, by seven o'clock each morning to visit cooperative farms. Our first was at Barcs, on the River Dráva, smack on the Yugoslav border. Here we saw the Red Star Cooperative farm, a 4,050-acre establishment with 410 farmers and 80 industrial workers.

"We're not the largest or the smallest," said Mihály Losonczi, the cooperative president. "Just one of the 2,676 cooperative farms in the country."

Along with raising corn and wheat, the Red Star co-op is moving into pork production on a large scale. We tramped around a new pen facility that soon will handle 15,000 pigs. "With mechanization, we'll have only 17 people working here to produce 1,600 tons of pork a year," Mr. Losonczi informed me. "And as our people become more productive, we will need fewer workers elsewhere. So we are starting a small plastics factory—yes, right here on the farm—where the discharged people can work."

NEARBY, the 4,000-acre Hungarian-Bulgarian Friendship Cooperative was also diversifying. "Sure," said Zsigmond Roskó, the administrator, "we even raise Thoroughbred race horses—just sold some to Austria. We have 45 brood mares. My daughter rides each afternoon. And now our cooperative has built a restaurant. No, it's not strange at all. One cooperative farm outside Budapest owns an auto-repair shop; another manufactures prefabricated houses in the winter. People joke—they say farms will be in the city and factories in the country.

"Still, our 360 families do well here. A count owned part of this land; the church owned some, too. Peasants owned the rest—parcels of 3 to 15 acres. A regular co-op member gets a house and land for his personal garden—one acre for each working member of the family. Some large families have more land now than before. They sell their personal crops, of course. One man just made 60,000 forints [$2,000] from his family garden. People here are wealthy."

But a cooperative farmer faces one significant restriction: High taxes prevent him from hiring full-time labor outside the co-op. And not every co-op farmer likes the collective arrangement.

"At first—in the 1940's—we feared my uncle might kill himself," one man told me. "Now, he is happier—but you talk to him."

And so I talked with Uncle János Csorba. "Satisfied? No, I have no choice," he sighed. "Look, I inherited one and a half *kataszter* of land [about two acres]. I worked—two jobs. Saved. And bought more—six kataszter in all.

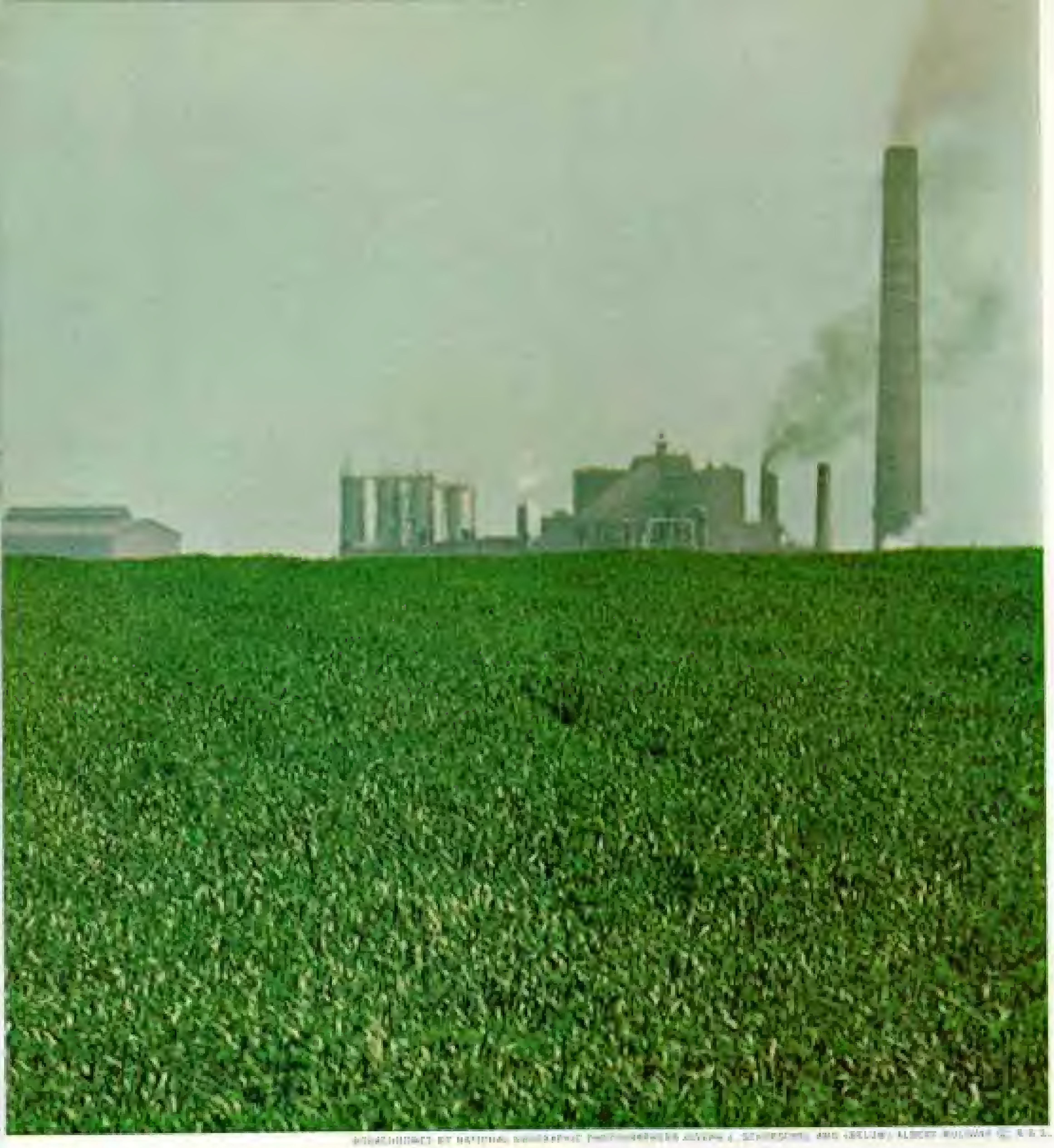
A whole house for a canvas: Mrs. Lajosne Vargacz sits before a bedroom mural painted with the help of her neighbors at Kalocsa. Such folk art, once common in the region, today has few practitioners. Cane-and-feather duster resembles the long-handled paint brushes the artists used to decorate hard-to-reach heights.

KODACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JOSEPH J. SCHERSCHEL © N.G.S.

Technology creates a new skyline beyond a tranquil field at Dunaújváros, a town established in 1950 largely to support this steel works. Called Sztálinváros until the downgrading of the Russian dictator, the settlement grew with the aid of Soviet engineers.

Today the self-contained city, topping a hill above the Danube, houses 45,000 people, many in apartment buildings like those at right. Stores, bookshops, and concert halls serve residents, plus a hotel, technical school, and the Culture Palace—a theater.

Goggled foundry hand works the day shift in a round-the-clock smelting operation that employs 11,000.



KODACHROMES BY NATIONAL GEOGRAPHIC PHOTOGRAPHERS JOSEPH J. SCHERSCHEL AND (BELOW) ALBERT MOLDVAY © N.G.S.

It was taken from me, all but my house and the tenth of an acre where I raise grapes for this wine."

"Our son has television," said Mrs. Csorba. "But I believe no news except *Új Ember*." That is the Catholic weekly newspaper. Still, we toasted the future and ate stacks of *bogácsa* biscuits. "We don't starve," conceded the old lady.

Hers was an understatement. Hungarians hold food in a reverence that is almost religious. I once thumbed through a collection of traditional children's stories; instead of "living happily ever after," the happy endings are edible—"one hundred chefs cooked," "their wedding feast lasted for two weeks," and "such a magnificent wedding that they can still taste the flavor of the food."

KODACHROMES BY ALBERT MOLDVAY © N.G.S.

Student turns teacher when he shows a co-ed how to ride his motorbike at Kossuth Lajos University in Debrecen. Most young people spend at least a year as workers before they go on to college.

Levity breaks the grind for university students, who traditionally carry heavy burdens in a land that values education. Mathematics class (right) at Budapest's University of Technology meets in a lecture hall equipped with closed-circuit television. In the front row sit three of some 200 North Vietnamese who study at this prestigious Hungarian university.

The greatest Hungarian poet, Sándor Petőfi, wrote gastronomic odes ("Fine food, fine wine . . . both sweet and dry. A Magyar nobleman am I!"), and novelist Gyula Krúdy described a desirable lady "plump as an oriental dream."

"My husband and I eat almost 40 pounds of lard each year," one dear old melon-shaped peasant woman told me. I believe her. In the country, you can often tell Hungarians' ages by their girth—like a tree-ring system. Lard, onions, paprika, and flour provide the base for most Hungarian dishes.

"And pork—our people complain if we give them beef," Mr. Losonczi told me. In peasant homes I was often served brandy with breakfast and a lunch of bread, bacon fat, paprika, and wine. My dinners always weighed heavy with calories, cholesterol, and my own feelings of guilt.

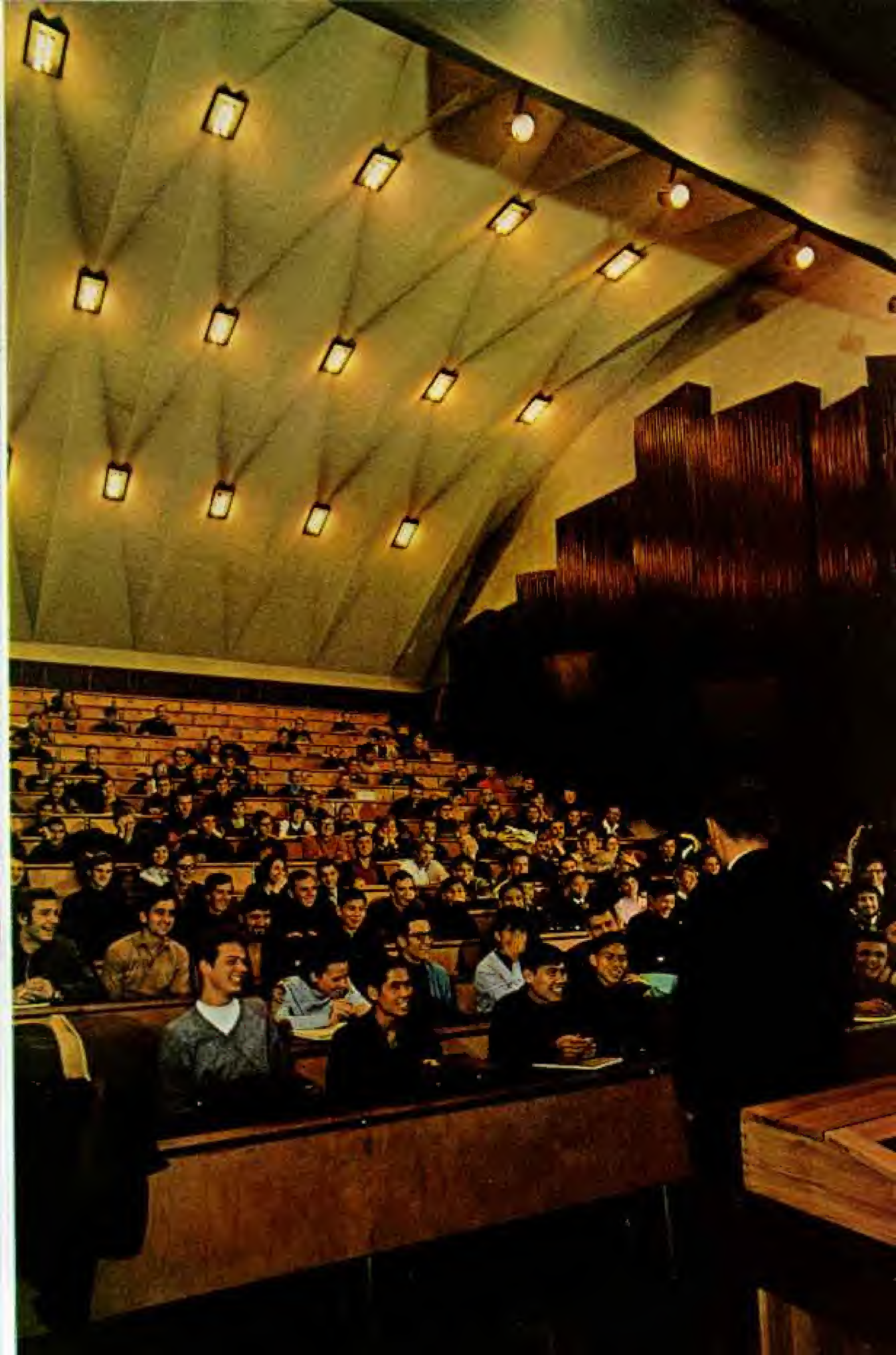
I SOON LEARNED that true Hungarian goulash *(gulyás)* is less a stew than a soup, and that Hungarian cookery has been historically flavored by the Turks, Italians, French, and the food-loving Magyars themselves ("Escoffier's assistant at the London Savoy was Hungarian!").

"And what are your favorite foods here?" Hungarians asked me time and again. In summer I always enjoyed the cold fruit soups and *paprikás csirke galuskával*, paprika chicken with dumplings. The best was served me by Péter's mother in their home. I also recommend *libamájfilé roston burgonyával*—fresh grilled goose liver with potatoes—and *cigánypecsenye hideg körítéssel*—pork with cold vegetables, Gypsy-style.

Appreciatively, I visited cool, moldy cellars from Budafok to the hills of Tokaj, sampling casks of what Hungarian Communists still advertise as "the wine of kings and the king of wines." Vintners boast that "ours are the strictest wine laws in the world."

In Szeged I examined a scarlet harvest of paprika (page 457). "Yes, our scientist Dr. Albert Szent-Györgyi, who now lives in the United States, won the Nobel Prize when he isolated vitamin C from our paprika," one son of Szeged assured me.

I then tasted my way through the nation's



most famous factory of strong red salami: "Now this is our scale where we weigh all crates of salami. Care to step on? Yes, sir, 89 kilos." Roughly, I calculated 196 pounds and hoped that the scale made allowances for the crate. But I didn't dare ask.

"We consume more calories than anyone else in central Europe," one Hungarian boasted. "More than 3,000 a day." Thereafter, I tried switching to saccharine-flavored espresso—the fresh, steaming coffee essence that people sip all day long.

"The Hungarian used to drink tea," a friend told me. "Then one day a waiter asked him, 'Do you want Russian tea or Chinese tea?' 'Well,' he answered, 'just bring me coffee.'"

Besides fine food and drink, other aristocratic pleasures flourish in the People's Republic. Great hunting preserves once owned by noble families have simply changed management. "Hunting was discouraged after World War II," said young Béla Berdár, of the Ministry of Agriculture. "But the wild game multiplied dangerously. Now we must reduce this surplus with a 10-year plan: from 37,000 deer to 20,000, from 140,000 roe deer to 100,000, from 14,000 wild boar to 7,000."

Foreigners, especially West German businessmen, come to the refurbished hunting lodges to bag trophies and leave behind

Toddling hand in hand, children follow teachers from a day-care school to a nearby park.

Faced with a perennial labor shortage, the state operates countless child-care centers, freeing mothers for work. Most welcome the opportunity. With average annual earnings equal to only $800, both husband and wife usually must be breadwinners, and those with an appetite for consumer goods hold two and even three jobs. Easing the income squeeze, Hungary's Marxist regime provides free medical care and secondary-school education, paid vacations, and old-age pensions.

Hungary in 1968 launched its bold New Economic Mechanism. The plan revived the sagging state-run economy with such unabashedly capitalist devices as measuring a plant's success by the money it makes, and generating worker incentive through profit sharing.

$500,000 a year in hard currencies. I can testify that they get their money's worth. Near Nagykanizsa, at the Budafa preserve, I went out on a game-inspection trip with chief hunter Béla Horváth.

We followed paths neatly trimmed for an easy stroll, climbed into well-tended blinds, and saw a wealth of pheasants, foxes, and smart little roebucks. Then, by moonlight, Horváth inhaled a deep breath and began to bark into a cow horn—an imitation of a barking deer so convincing that three big does came out of the forest and followed us half a mile back to camp.

"Conservation is really the theme of our World Exhibition of Hunting this September," said Dr. Zoltán Tildy, the distinguished naturalist who is helping to plan the program. No one can talk with greater authority of local wildlife or of the 300 nature sanctuaries in the nation ("Of course, some are small—like one very old tree"). His remarkable photographs of Hungarian birds—spoonbills, purple herons, white storks—are famous throughout Europe.

"It all started in 1944 when the Gestapo put me in jail," Dr. Tildy laughed. "I could not see outside, and my cell had whitewashed walls. I didn't know white could be so horrible. I was thirsting for *color*—green, red,

KODACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JOSEPH J. SCHERSCHEL © N.G.S.

anything. My mother once sent me a food package that included a red pepper. I saved that beautiful pepper and looked at it until it rotted. I promised myself then to work for nature when I got out—and so I went into the forestry service."

In the same spirit, we sought the open spaces of the flat, wide *puszta* to meet a friend, Mrs. Dorothy Grant, at Hortobágy. The owner of a riding stable in Washington, D.C., Dorothy Grant has organized horseback tours of Hungary for five summers now (above). "Towns are just the right distance apart," she says. "And these farms have no fences to jump. Sometimes we even ride the best stallions from the stud farms; but all the horses are good. Want to try one?"

Josh did. So, at the state farm stables, he mounted a bay gelding 173 centimeters tall. "More than 17 hands," Josh calculated in apprehensive awe.

"Don't worry, your son can handle him," said Tamás Flandorffer. A former hussar officer, Mr. Flandorffer started Hungary's

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postwar breeding stables and the cross-country horseback tours that bring 500 lucky riders here each year. "We keep the tours small and individual," Mr. Flandorffer explained. "We have a tradition."

"Indeed they do," said Dorothy. "At Lake Balaton, we ride a steep trail up to a castle drawbridge—climbing steps that were spaced for the stride of 13th-century Hungarian horses. Ours follow the same hoofprints."

"Your son's horse is called Bulcsú," said Mr. Flandorffer. "That was the name of a

Across a purple plain, visitors from the United States see Hungary on horseback. Led each summer by Mrs. Dorothy Grant of Washington, D. C., small tour groups ride for two to three weeks over a countryside rich in history and beauty. Here on Lake Balaton's Tihany Peninsula, they cross a field of lavender; when ripe, the flowers will be harvested for their fragrant oil.

Magyar chieftain from the time of Árpád." Through history, almost all the country's conquerors have come by horseback, and as we watched Dorothy's group quickly ride off—and they were visible for miles on the oceanic horizon—I could understand the horseman's advantage here. He could swiftly traverse this terrain to rule or plunder, according to his pleasure. With the horseback invasions came the great variety we noticed in Hungarian faces.

Yet the marshy puszta was often spared the worst of the wars. Not until the 19th century did engineers transform this great flood plain. Then 300,000 people worked here to build dams and dig drainage canals for "the world's largest civil-engineering project in that century," as economic geographer Dr. Gyula Bora calls it. "And when their work ended in the 1890's," he adds, "many of those people emigrated to Canada and the U.S.A."

In a one-horse buckboard, we drove around the wide, flat pastures, stopping at water holes to see herds of gray long-horned cattle. Here I met some *csikós*, the native Hungarian horsemen.

"You want to see us do our stunts?" one csikós asked. Proudly he ordered his neat cow pony to lie flat, then, standing atop his patient mount, he expertly cracked a horsewhip like a rifle—and in perfect rhythm. I envied the csikós his nimble way of mounting a horse, for he uses no girth on his saddle. But the small, lonely wagon where the csikós sheltered I envied not at all.

PUSZTA LIFE has always been isolated. Author Gyula Illyés has written, "I still remember the stark, palpitating astonishment that gripped me . . . when at the age of eight or nine I first entered a village. The streets, the houses built side by side . . . all filled me with endless amazement and terror. . . . Up to that time I had never seen two houses deliberately built in line. . . ."

My colleague Joseph Scherschel, taking photographs in the Hungarian hinterlands, recently ran into cases of similar isolation. Joe, whose mother was Hungarian, recalled a few phrases of greeting. "Why does the photographer speak so strangely?" an old farmer asked Joe's translator.

"He is a foreigner," the translator replied.

In deep puzzlement, the old man then asked, "And what is a foreigner?"

It came as a shock that in such a modern country this question could still be asked. Hungary, after all, has given America conductor Eugene Ormandy, entertainer Zsa Zsa Gabor, and physicist Edward Teller, and the forebears of quarterback Joe Namath and publisher Joseph Pulitzer—a disparate but obviously gifted crowd.

Yet the prior of Pannonhalma Abbey (pages 464-5) jokingly toasted me with the famous Latin maxim—"*Extra Hungariam non est vita, si est vita, non est ita.*" (Roughly, and in rhyme: "Outside Hungary, no life you'll find. And if you do, it's not our kind.")

HUNGARIANS have withstood outside pressure only with strong cultural defenses. A hard language helps. "Our code," laughs Rudi Vig, but he adds affectionately, "If only our poets could be properly translated, they would be as famous as composers like Kodály and Bartók."

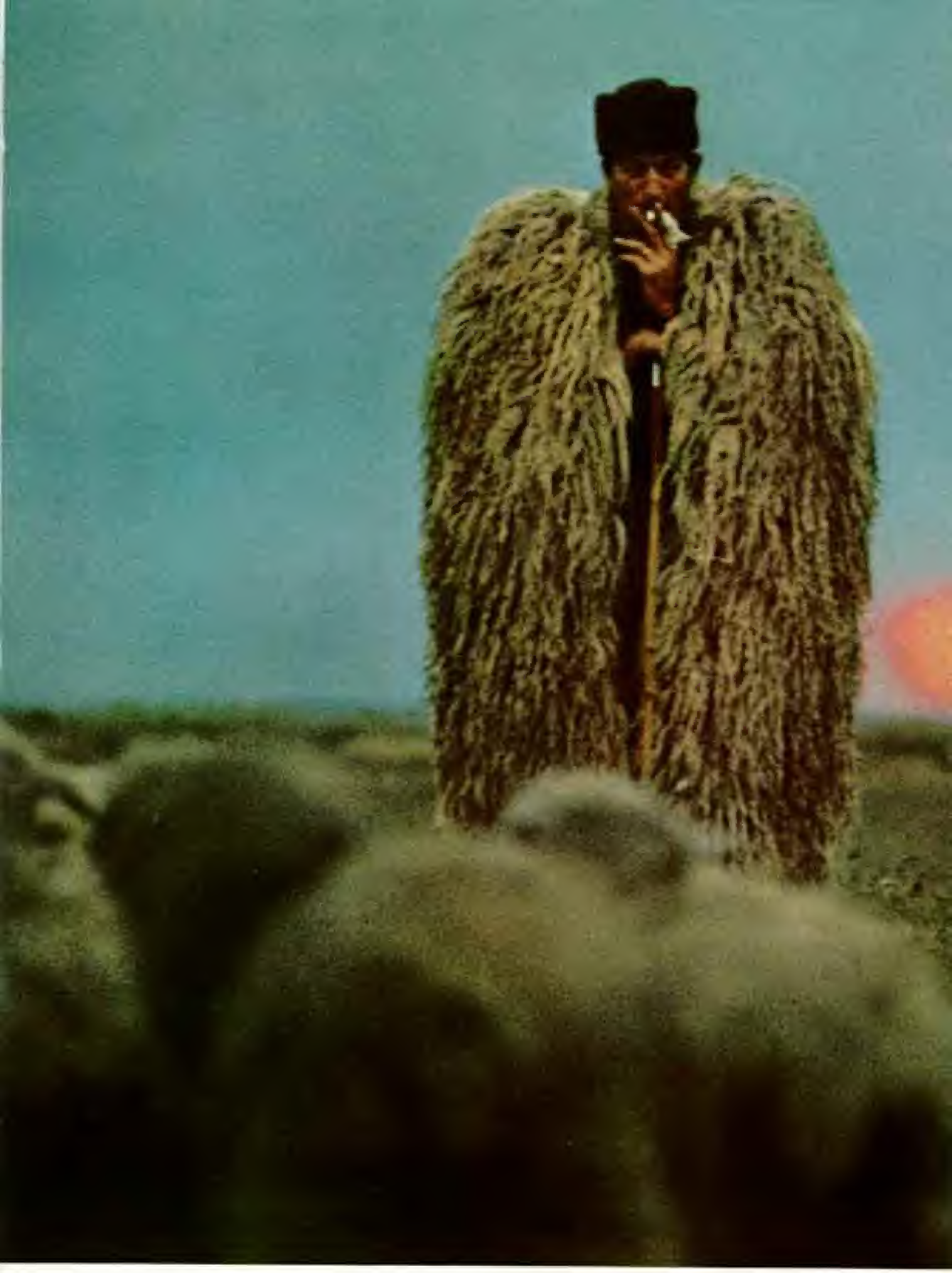
Foreigners, however, will not soon master such single glued-together tongue twisters as *Legeslegmegengesztelhetetlenebbeknek*. (It means "to the most irreconcilable ones.") One engineer told me, "Don't bother with the name of our bauxite mine—no foreign journal has ever spelled it correctly." On behalf of the Society's typesetters, I accept his challenge, though nervously: The mine is named Iszkaszentgyörgy—Iszka Saint George.

Behind the cultural bulwarks, Hungarians are a lively, demonstrative folk. Emotions—whether of love or anger—find easy outlet. "We are quick-tempered—a straw-flame people," says Miklós Rábai, leader of the famous Folk-Dance Ensemble. "We are small, but like pepper."

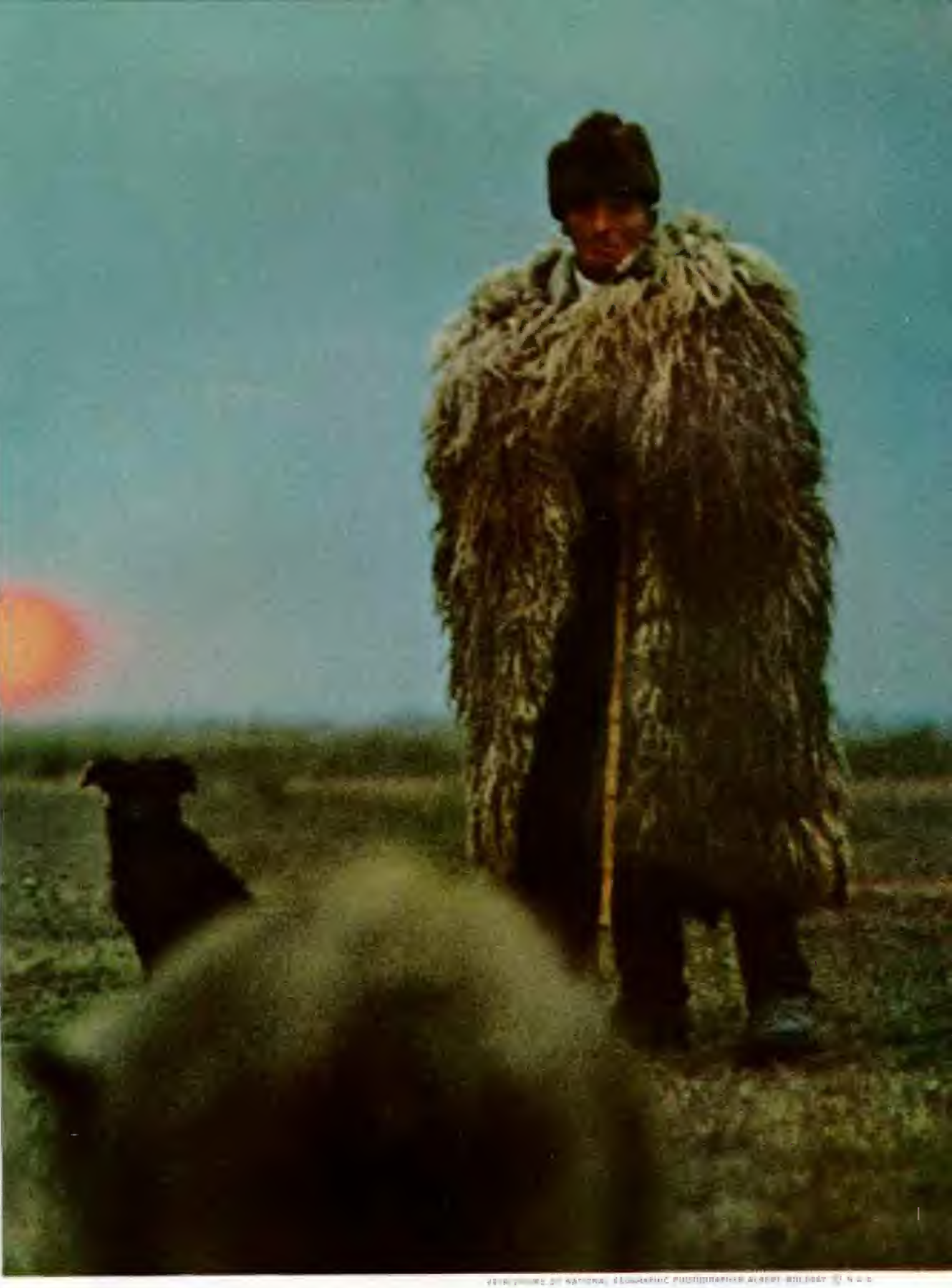
With all the changes in their land, the Hungarian character prevails. And most of all, the national personality asserts itself in small villages. With Rudi Vig we visited Bogács, the village near Eger where Rudi himself grew up. We passed a cluster of old

Fresh from Hungary's inland sea, Lake Balaton fish pass from boat to dockside sorting bins. Spotted *fogas*, esteemed above all others, partially fill the basket in foreground. The fresh-water lake's 230 square miles lure throngs of summer vacationists; resort facilities line its beaches.

KODACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ALBERT MOLDVAY © N.G.S.



Shaggier than their sheep, shepherds wear huge *suba* to escape autumn's chill on the Hortobágy Plain. With winter's onslaught they will reverse the cloaks and wear them woolly



EKTACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ALBERT MOLDVAY © N.G.S.

side in. The monotonous prairie—once barren wasteland over most of its 75,000 acres—today blossoms with grasses and crops, irrigated by waters drawn from the broad Tisza River.

[illegible]

BERT HOLLOWAY (ABOVE) AND JOSEPH J. SCHERSCHEL © N.G.S.

At once proud and sad, the mother of the bride sobs into her handkerchief during a village wedding at Zsámbok. The girl's father, at right, listens gravely while a friend of the groom pays tribute to the parents, thanking them for bringing the bride into the world.

The service introduces a note of solemnity into a day-long round of feasting and dancing before and after the ceremony. For each child of the union, the government will pay 600 forints—20 dollars—a month for two years.

In traditional caps, young women of Zsámbok sip beer at a party sponsored by their farm cooperative.

men smoking pipes under a locust tree. "Our parliament is debating world affairs," he laughed. Rudi introduced me to the village elders, to his cousins and aunts, and even to the Gypsies who live on the outskirts of town. "I remember that narrow walled street—always useful for the drunks," said Rudi. "Yet there are changes. Electricity—television—even that espresso house for the youngsters." Recorded music shook the windowpanes while village youths danced. "We were always more shy in visiting the girls."

Each village changes at its own pace. In Zsámbok, population about 300, we stopped to watch the tomato harvest, met the postwoman as she delivered the mail—and got invited to a wedding. Our invitations were better than engraved. Here guests are invited by superbly embroidered lace-trimmed handkerchiefs that they then pin to their shirts.

THE BRIDE, Margit Povázsonyi, came from Tóalmás, a village three miles away and considered quite progressive. The groom, Erazmus Tóth, was the son of a Zsámbok widow who embroiders főkötő caps for a living.

We met at the bride's house, danced to a country band, and—before leaving for the church—sat down to a huge paprika-flavored feast. "How can you stay so slim?" I asked our pretty bride.

"I pick many tomatoes," Margit laughed. But she also has worked in Budapest—and thus Margit and her sisters wore city clothes. Not so the traditionalists from Zsámbok. The women came in big swirling skirts with bright embroidery and lace, as they have done for generations.

"Let's start for the church, in the name of God," the best man declaimed in verse. So we walked through streets where flocks of geese had left wedge-shaped footprints in the dust.

After the wedding Mass, Margit took leave of her parents, while the best man recited more verse ("My mother, I have much pain in my heart. . ."). Everyone shed tears, including the groom, and some relatives sobbed loudly.

But tears dried quickly; we returned to Zsámbok and the groom's house to find a six-piece band, pitchers of beer and wine—and a second feast. The bride herself served us, but only between tunes, for men paid money to dance a csárdás with her. "The bride is mine!" they would shout, and dance away, *one-two, one-two,* sweating away their beer. The bride's parents now arrived in their city clothes—and as jolly as any of us. "You must not leave until you eat some more!" insisted the groom's mother. But this time we could not; the evening had been full—and so were we.

Hungarian life goes on, full of noise and tears and laughter. And in a land with strong customs and strong tempers, no proletarian dictatorship can long be considered total.

"What is the difference between an optimist and a pessimist?" asks the comic in a Budapest political cabaret. With a twist of lemon, the answer comes back: "A pessimist is better informed."

When a comic can publicly say such things, he makes me optimistic. And I know I haven't been brainwashed.

Heartwashed, perhaps. □

The Exquisite Orchids

By LUIS MARDEN

CHIEF, NATIONAL GEOGRAPHIC FOREIGN STAFF

WHAT IS AN ORCHID?

An orchid is a big, spectacular, delicate flower that grows in steaming jungles; it is rare and difficult to grow, it takes seven years to produce a flower, and it is, above all, surpassingly feminine. Well, not quite.

An orchid is a tough, exceedingly common flower that will grow almost anywhere; it may be so small and drab that it can hardly be seen without a magnifying glass; it is one of the easiest plants to grow, produces many flowers once or twice a year, and far from being feminine, it is—in name at least—superlatively masculine.

All this is true about orchids, the strangest and most beautiful flowers in the world. It is also true that orchids, with perhaps 35,000 species, comprise the largest family of flowering plants, nearly a seventh of all those on earth. Some do grow in jungles, but many grow in high country—on the limbs of trees, on bare rock, in the ground, and in water. Two peculiar orchids grow and flower completely buried in earth, never seeing the light of day (page 504).

The word "orchid" projects at once an image of the clubwoman's resplendent purple blossom, but the variation of form and color among orchids is hard to believe even when seen. Some of them mimic bees, wasps, butterflies, or moths; some

Members of earth's largest, most complex plant family, orchids grow on every continent except Antarctica. Some are already threatened with extinction—victims of a century of collectors' depredations. Most of the spectacular "Catts" seen in corsages are hybrids of such tropical American species as these Cattleya trianaei, *photographed in their native Colombia.*

[illegible] BY LUIS MARDEN © N.G.S.

resemble swans or doves; others look like frogs or lizards, or miniature men; some even display perfectly-formed Arabic numerals.

In size the orchids overdo things a bit, too: The smallest plant could fit in a thimble, and the largest—a vine—reaches a hundred feet. In between burgeon flowers in strange shapes and nearly every color: red, orange, yellow, green, purple, brown, white, and, rarely, blue. Despite legend there is no black orchid, though some come quite close.

"Impossible Parasites" Challenged Growers

The ancient Greeks were the first to take botanical notice of these curious plants. Writing of European ground orchids, the father of botany, Theophrastus, gave the name Orchis to the plants, from the resemblance of the paired underground tubers to masculine anatomy. This suggested to the Greeks and later to the medieval herbalists that orchid roots might "provoke Venus," and eating them might influence the sex of unborn children.

If today we have lost belief in the orchid's physical powers to incite Venus, florists insist that the magnificent flowers have the same effect psychologically. A booklet published by a growers' association claims:

"When you send your Valentine . . . orchids, WONDERFUL THINGS HAPPEN!"

We even eat orchids. The flavoring in vanilla ice cream—at least in the best kinds—comes from the cured seed pod of an orchid (pages 500-501).

Although it is true that orchids are found almost everywhere, the most spectacular varieties come from the tropics. For a number of years I traveled regularly through tropical America. In the rain forests and highlands of Central America, Colombia, Venezuela, and Brazil, I often saw these beautiful flowers in their native habitats.

Temperate-zone orchids are all terrestrial, but most tropical orchids are epiphytes—air plants that cling to trees or rock. They take nourishment from the minute particles of organic matter in rain water, or the detritus that collects round their roots. Orchids use trees only as supports; they are not parasites, contrary to popular belief.

In 1731 an English botanist received a dried herbarium specimen from New Providence in the Bahamas. "But the tuber appearing to have life in it," he potted and carefully nurtured the plant. It revived and next year brought forth handsome pink-and-rose flowers. It was ***Bletia purpurea.***

The name and date are worth noting; this was the first tropical orchid to flower in England, foreshadowing a mania for orchids that nearly rivaled the madness for tulips that swept the Netherlands in the 17th century.

Early greenhouse men misguidedly kept their "stoves," as they aptly termed their hothouses, tightly sealed, sodden, and as hot as flame-fed flues could make them. Most of the "impossible parasites" died as fast as they arrived. "I had caught my orchid," one of the early amateurs remarked, "but how to treat it I knew not."

It was 1835 before an English gardener first grew epiphytic orchids in anything like their natural treetop conditions. This pioneer simply lowered the glasshouse temperature and admitted air. His results were, for the times, phenomenal.

Key Role Played by a Mysterious Fungus

About the middle of the 19th century competition grew so hot that men like Low, Sander, and Veitch—names now classic—established nurseries and dispatched orchid hunters to the tropics. These men sent back plants by the tens of thousands. Why so many? Simply because no one had yet discovered a sure method of raising orchids from seed.

In nature, most orchids require insects to pollenate them. Insects are carefully denied access to greenhouses, but when a seed pod was occasionally produced, through an errant bee, the dustlike seed almost invariably failed to produce offspring. What the growers did not know was that orchid seed, unlike most seeds, contains almost no nutrient, and depends on a strange relationship for survival.

In 1904, nearly two hundred years after the

Passion for beauty keeps orchid fancier Robinson Abbott busy far into the evening. One of an estimated 100,000 amateur orchid growers in the United States, Mr. Abbott keeps his collection—acquired over the past 20 years and valued at $5,000—in a $2,000 greenhouse in Silver Spring, Maryland; others make do with a few pots on a sunny window sill. The efforts of conservation-minded collectors help preserve species that are becoming rare in the wild.

EKTACHROME BY GORDON W. GAHAN © N.G.S.

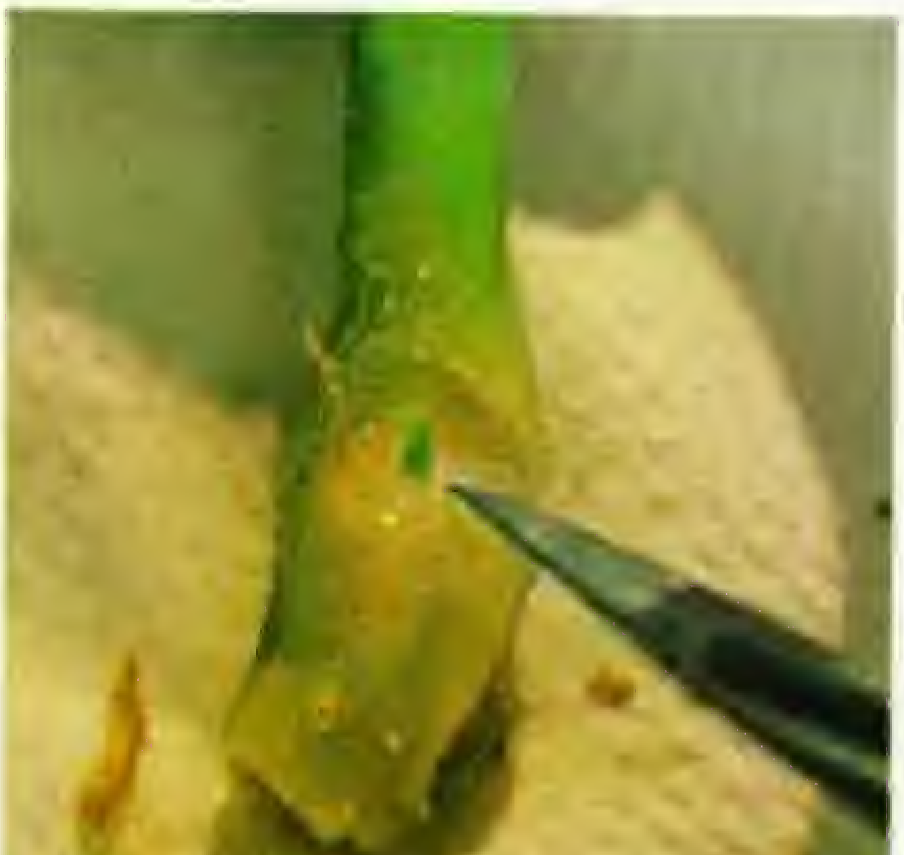
EKTACHROME (ABOVE) BY GORDON W. GAHA

Carbon-copy orchids

A startling technique of asexual reproduction called meristeming produces countless young orchids identical to a single parental plant.

Within the shoots of plants lies a spear of meristematic tissue, the basis of new growth (near right). Cut out, the tissue is placed in color-coded bottles with nutrient solution and then rotated on a wheel to expose it constantly to fresh nutrients (above). The growth proliferates into a cluster of nodules (middle right). When separated and left at rest with another nutrient, each nodule becomes a plantlet (far right).

Since ordinary seeding (page 502) propagates offspring as varied as children in a family, many commercial growers now employ meristeming to duplicate prized hybrids (page 490).



1½ TIMES LIFE SIZE

KODACHROMES BY VICTOR BOSWELL, JR. © N.G.S.

first tropical orchids appeared in Europe, a French botanist, Noël Bernard, penetrated the secret. Bernard found that a microscopic fungus invades the seeds of most orchids and ensures germination. He did not entirely comprehend the role of the fungus, but he showed that without it there would be no progeny.

Despite this new knowledge, growing orchids from seed remained a chancy business until 1922, when an American plant scientist discovered a sure and easy method.

New Technique Starts a Revolution

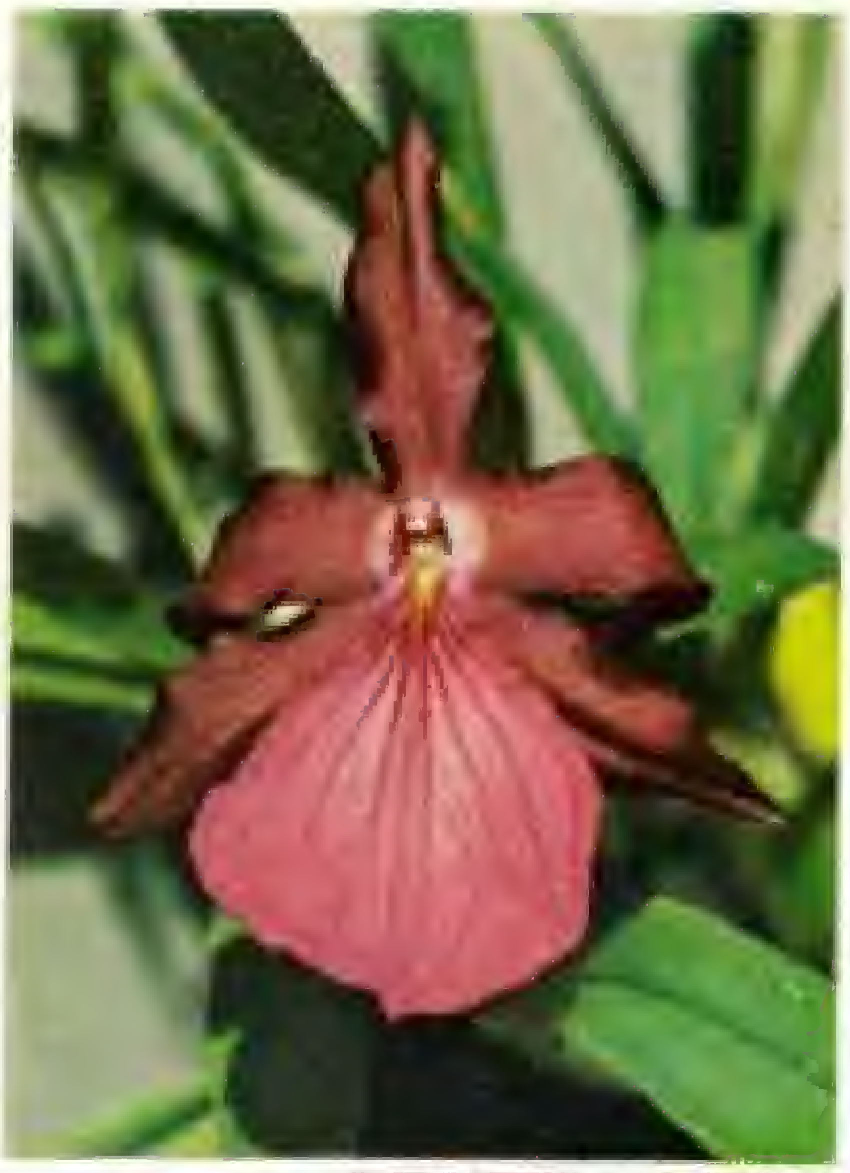
Dr. Lewis Knudson found that the only function of the fungus was to convert complex starches into simple sugars. He mixed a formula of nutrients with agar, added plain sugar, and sowed orchid seeds on it. The seeds, which were isolated in a sterile flask, germinated and grew into sturdy plantlets. The mysterious fungus had been by-passed; from then on, anyone could grow orchids from seed.

Professor Knudson's sure and simple method of growing orchids in bottles transformed orchid culture. Today a revolutionary development promises an even greater upset.

Called meristem (from the Greek for "divisible") culture, the method had a prosaic beginning. The French Government had asked plant physiologist Georges Morel to find a way of growing a virus-free potato. He discovered that apical meristematic tissue—that is, the growing cells at the tip of a new shoot—was free of virus. Dissecting out this tissue, he grew it in a culture medium and obtained a virus-free potato plant. Professor Morel grew orchids as a hobby, and in 1956 he experimented with tissue from the shoot tips of *Cymbidiums*. This, too, grew readily.

13 TIMES LIFE SIZE

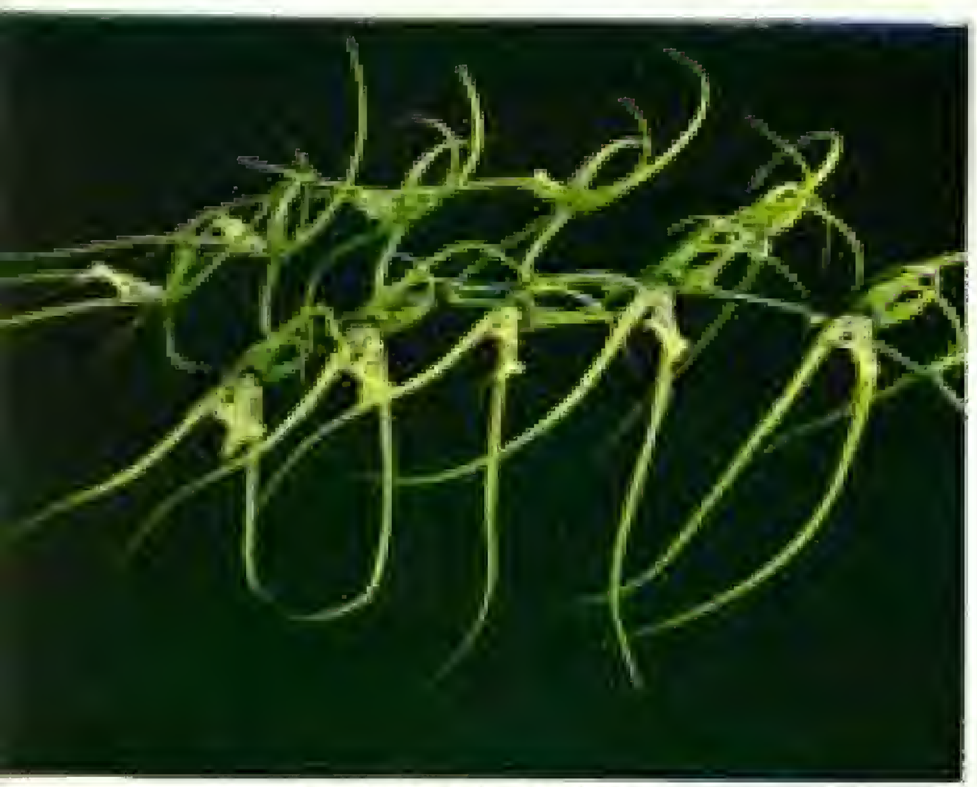
13 TIMES LIFE SIZE



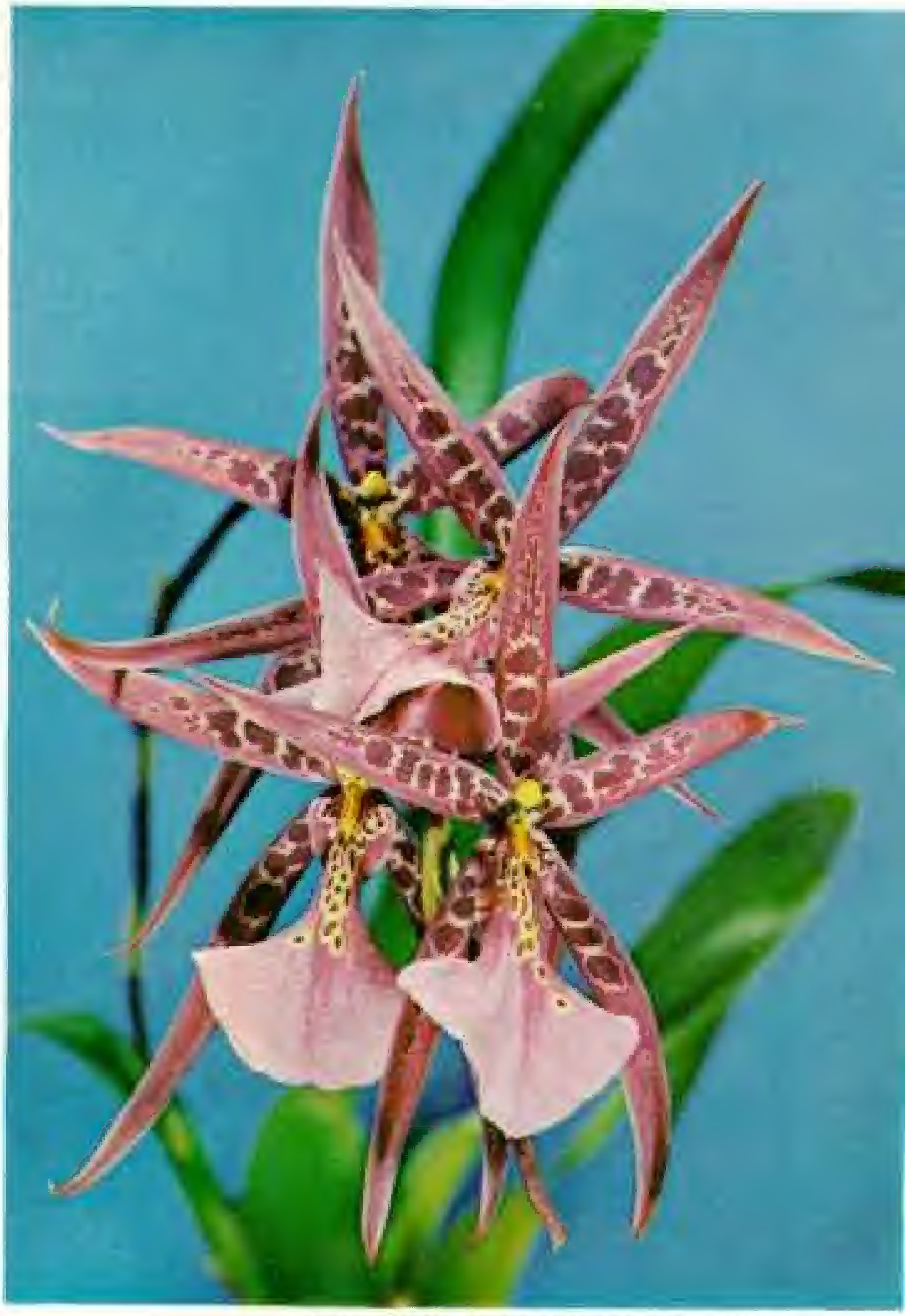
MILTONIA SPECTABILIS VAR. MORELIANA, 1/2 LIFE-SIZE; HERMAN R. SWEET

When Michel Vacherot and Maurice Lecoufle, third-generation commercial orchid growers, began large-scale experiments with other orchids, based on Dr. Morel's work, they obtained sensational results.

Properly speaking, growth, whether of a plant or a human, begins when cells "differentiate," that is, begin developing into a recognizable plant or animal, rather than merely reproducing themselves over and over again. Investigators found that when excised meristematic tissue is exposed to rich nutrients, the cells will divide indefinitely, postponing their normal growth, and form cell clusters that can be separated. The bits can then either be allowed to develop into normal plantlets, or they can be returned to the solution to produce more undifferentiated cells. Whenever this process is stopped, each bit grows into a



BRASSIA VERRUCOSA, 1/4 LIFE-SIZE; [illegible]



MILTASSIA CHARLES M. FITCH, 1/2 LIFE-SIZE; [illegible]

"You will drive the botanists mad," exclaimed scientist John Lindley, after English gardener John Dominy first produced a flowering cross between different species of orchids in 1856. So far, more than 35,000 hybrids have been reported, among them the Miltassia *(right), the result of a marriage between a* Miltonia *(top) and a spider orchid,* Brassia *(above).*

Such crosses seldom occur naturally because most orchids are adapted to a specific pollenator. The fragrant Miltonia *depends on a night-flying bee; a wasp, attacking spiderlike spots, pollenates* Brassia.

full-size plant, an identical copy of the original (pages 488-9).

It is now possible to reproduce an orchid plant identically and infinitely, copy after copy, like an image reflected endlessly in a series of mirrors. In theory there is no limit; one can make ten, a hundred, a million plants.

Meristem culture has turned the orchid world upside down. When I talked to M. Lecoufle, the first to place Professor Morel's discovery on a production basis, he told me: "You can see the advantages. Let us say you have a very special hybrid; everyone wants one like it. You can't grow it from seed, as hybrids rarely breed true. Most offspring revert to characteristics of their ancestors.

"Heretofore the only way to make more plants from it was to divide the plant itself each time it put out a new growth. This way we might get one or two new plants a year, that would cost $150, $500, or even more. Meristem can give you *exact* copies of the finest plants in the world for about $10."

The technique offers other dramatic advantages. For one, plants grown by meristem culture mature faster than those grown by conventional methods. And now cut-flower growers can easily supply choice orchids at periods of peak demand—Christmas, Easter, and other holidays. The grower simply selects plants that blossom precisely on time and meristems them, making thousands of duplicates.

Shriveled Plants Launch a Lifetime Passion

But all this science-fiction side of orchids was far in the future in the classic days of wild-plant collecting. The giant whose shadow stretched across the whole Victorian Age of orchid hunting was Frederick Sander, a naturalized Briton of German birth whose name is commemorated in a dozen species of orchids and scores of hybrids. He started in England as a seedsman, but when one day he found a discarded lot of shriveled orchids under a bench, a lifetime passion took root.

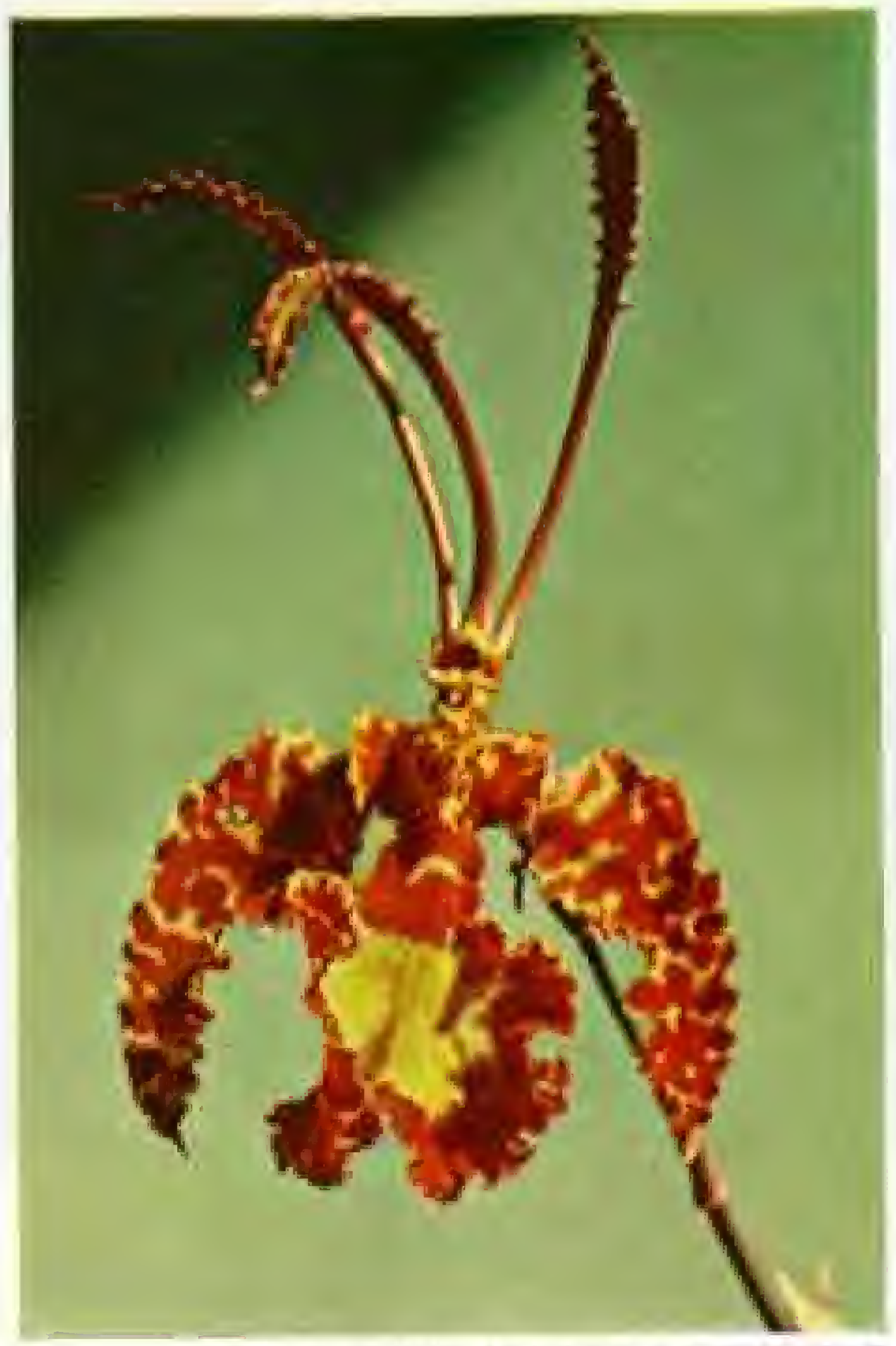
In the decade before the turn of the century, the House of Sander rose in an imposing glitter of glass and maze of pipes in the old cathedral city of St. Albans. A private railway spur led to the heart of the orchid-growing world. Sander's grandson David, editor of *The Orchid Review*, told me:

"Alighting visitors stepped directly into a great conservatory filled with palms. A top-hatted foreman led them down a corridor to

(Continued on page 498)

EKTACHROME BY LUIS MARDEN © N.G.S.

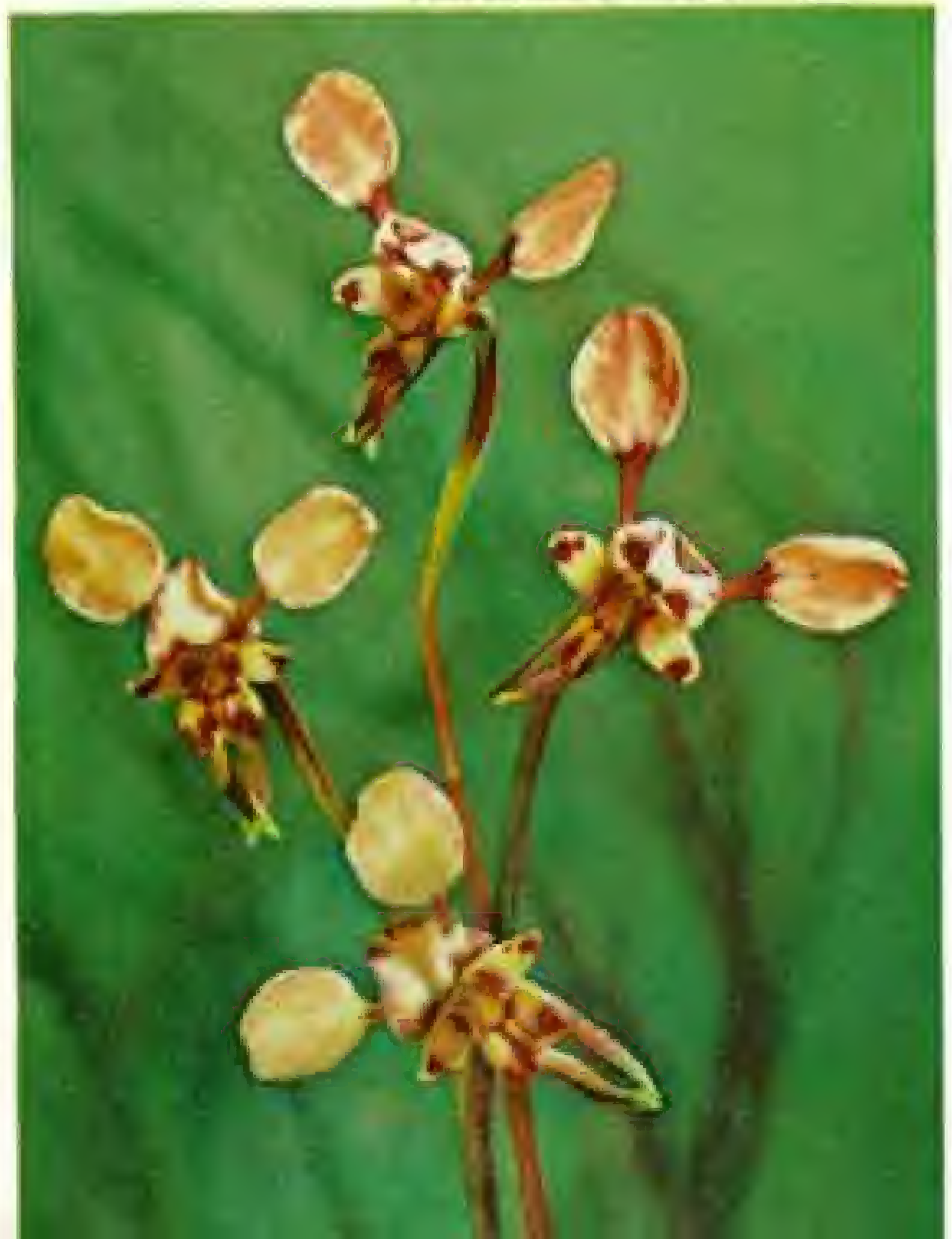
Detectives for science identify flowers sent by growers and collectors around the world to Harvard University's Orchid Herbarium of Oakes Ames, named for its botanist founder. Curator Dr. Leslie Garay (foreground) and Research Associate Dr. Herman R. Sweet consult the herbarium's collection of 100,000 preserved specimens and 5,000 library volumes. Dr. Garay estimates that as many as 35,000 species of orchids are known and that others still await discovery.

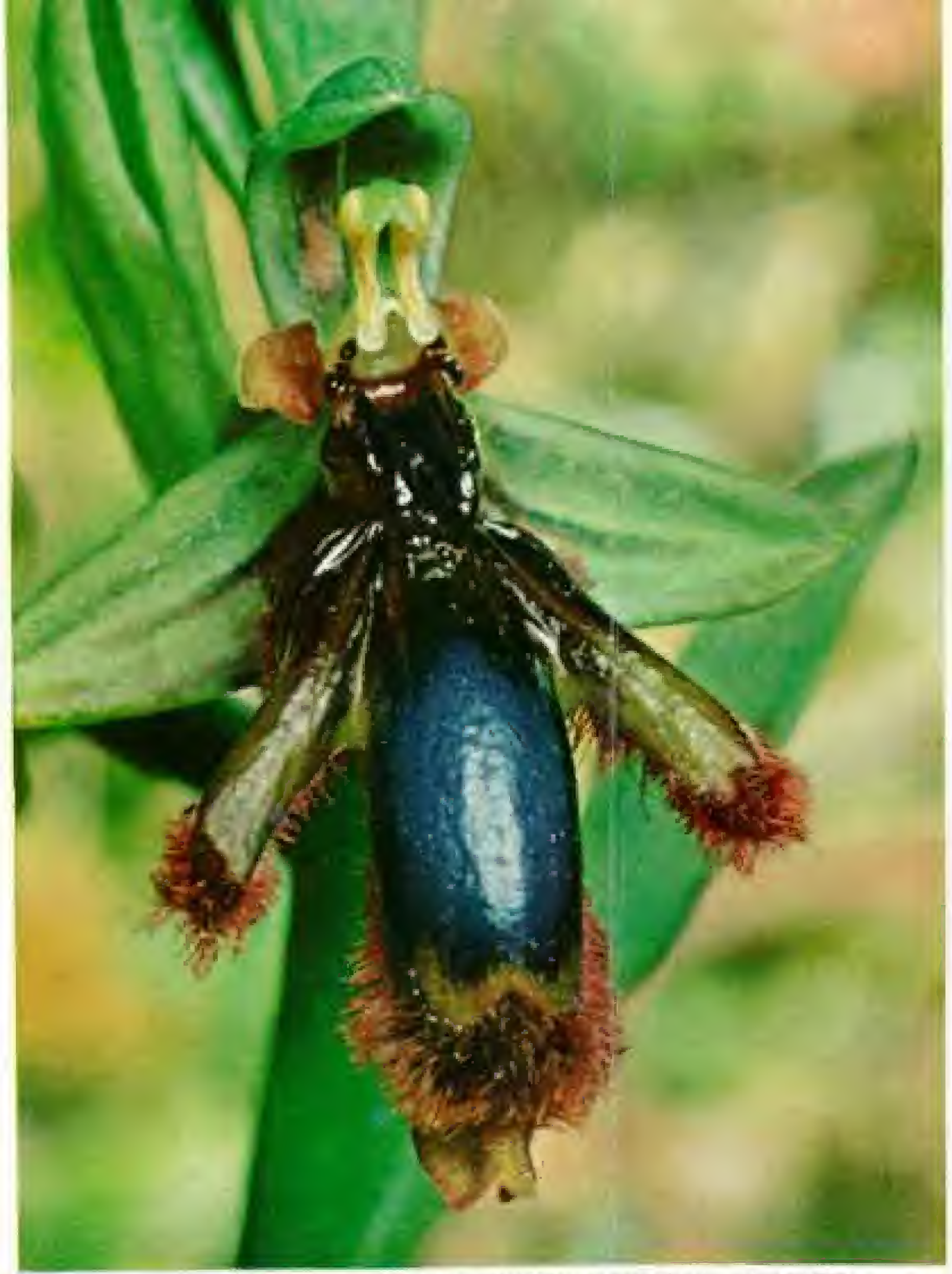


ONCIDIUM KRAMERIANUM, 2/3 LIFE-SIZE; R. ANTHONY STEWART

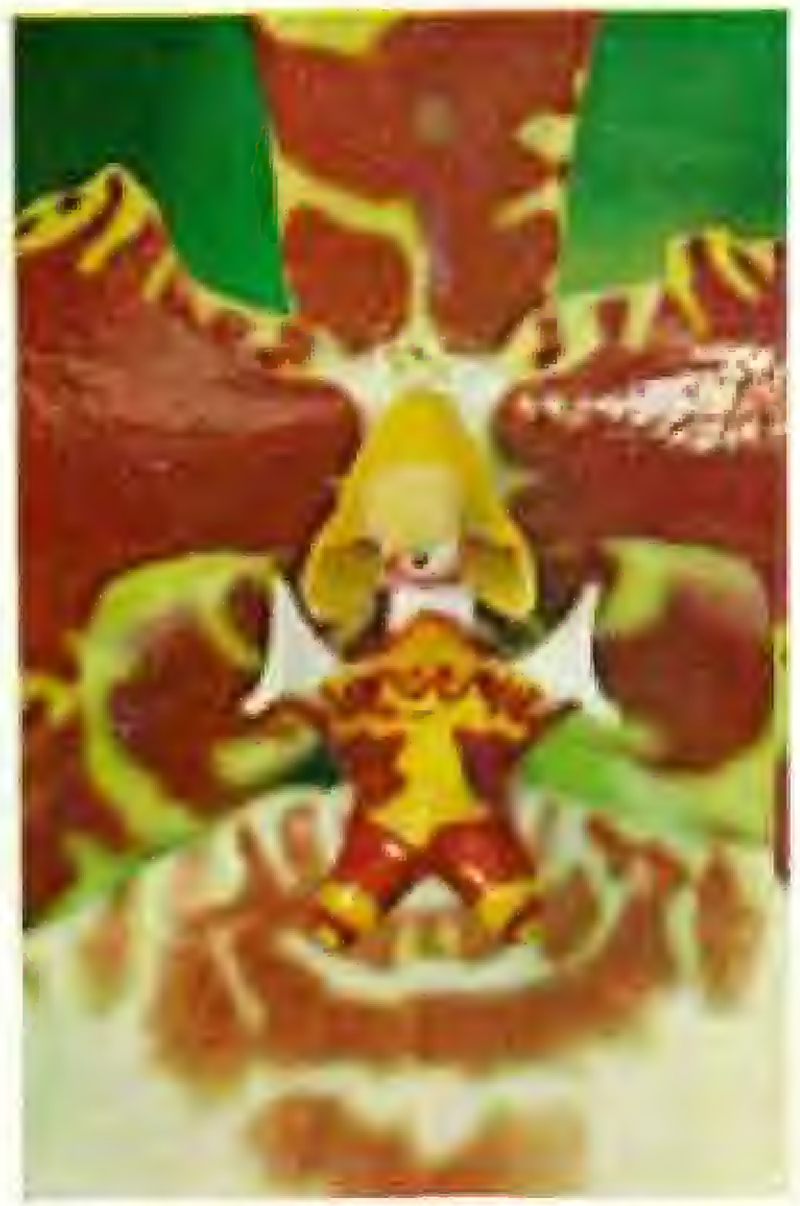
A butterfly rising (above), four donkeys braying (below): How these curious configurations attract pollenators remains unknown. The long-lasting butterfly orchid, popular with home growers, ranges from Costa Rica to Ecuador. With extended earlike petals, the donkey orchid blooms in the wild in Australia.

DIURIS MACULATA, 4/3 LIFE-SIZE; DOROTHY M. [illegible]





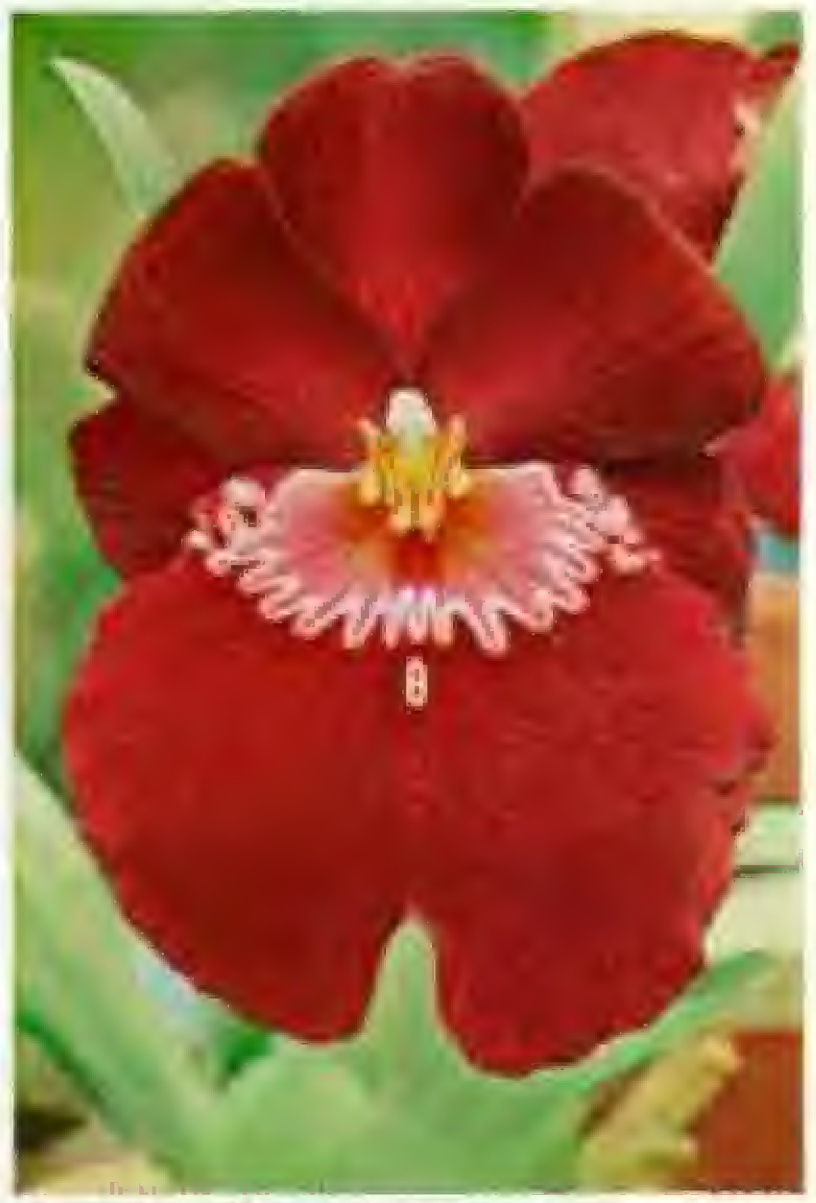
OPHRYS SPECULUM VAR. LUSITANICA 5 TIMES LIFE-SIZE; [illegible]



ODONTOGLOSSUM GRANDE, TWICE LIFE-SIZE; LUIS MARDEN

Incredible deceiver, the Mediterranean's Ophrys *(above) resembles a female wasp and emits a similar odor to attract the male wasp. In his attempt to mate with the plant, he picks up pollinia—pollen masses—which eventually brush off onto another flower.*

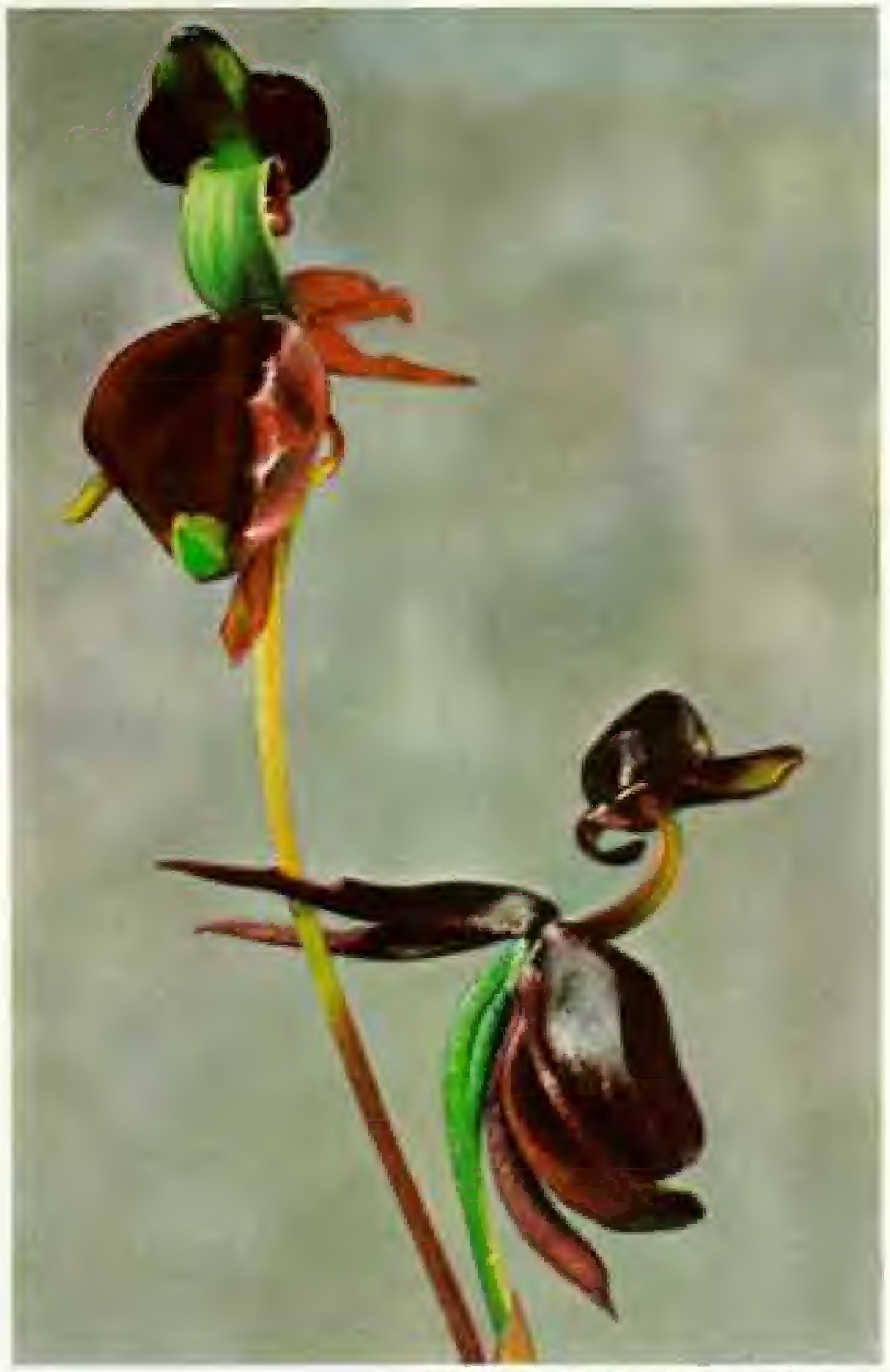
Miniature Santa (left) in a Guatemalan tiger orchid forms a platform for bees searching for nectar under the yellow, winged column. Though the platform resembles a nectar-bearing flower, it offers no food.



MILTONIA [illegible], 2/3 LIFE-SIZE; LUIS MARDEN

Pansy face (left) displays a figure right on its lip. Such marks on Miltonia *hybrids vary from plant to plant.*

Australia's flying-duck orchid (below) springs a trap when an insect lands on its lip—the duck's head. With a jerk, the orchid tosses the intruder into a cup formed by petals around the green column visible in the upper blossom. The escaping insect carries away pollen masses to deposit on the next flower.



CALEANA MAJOR, 3 TIMES LIFE-SIZE; DOROTHY M. [illegible]

Bizarre members of a fabulous clan

A bearded hillbilly (left) stares from an Australian orchid; a laughing gnome lurks in a Peruvian blossom (right). Fuel for man's imagination, such curiosities attract specific pollenators—usually insects—that unwittingly perpetuate the species. Glossy hairs of the "beardie," as Australians call it, mimic a caterpillar, prey of a wasp; the brilliant cinnabar gnome attracts hummingbirds.

Despite the variety of shapes and sizes, all orchids share common structures. Each blossom has three outer sepals and three inner petals, one of which is a distinctive lower lip, or labellum, that serves as a landing platform for insects. In the beardie it takes the form of whiskers; in the gnome it lies hidden within the mouth.

In most plants the male and female reproductive parts are separate, but in orchids they unite in a single column, here the beardie's nose. In most orchids this organ is ingeniously constructed so that when a pollen-carrying insect crawls under the column, seeking nectar, it deposits a golden burden on the female stigma. Backing out, it picks up new masses of pollen from the male anther and carries them to another flower.

CALOCHILUS ROBERTSONII (LEFT), 5 TIMES LIFE-SIZE; DOROTHY M. FOSTER

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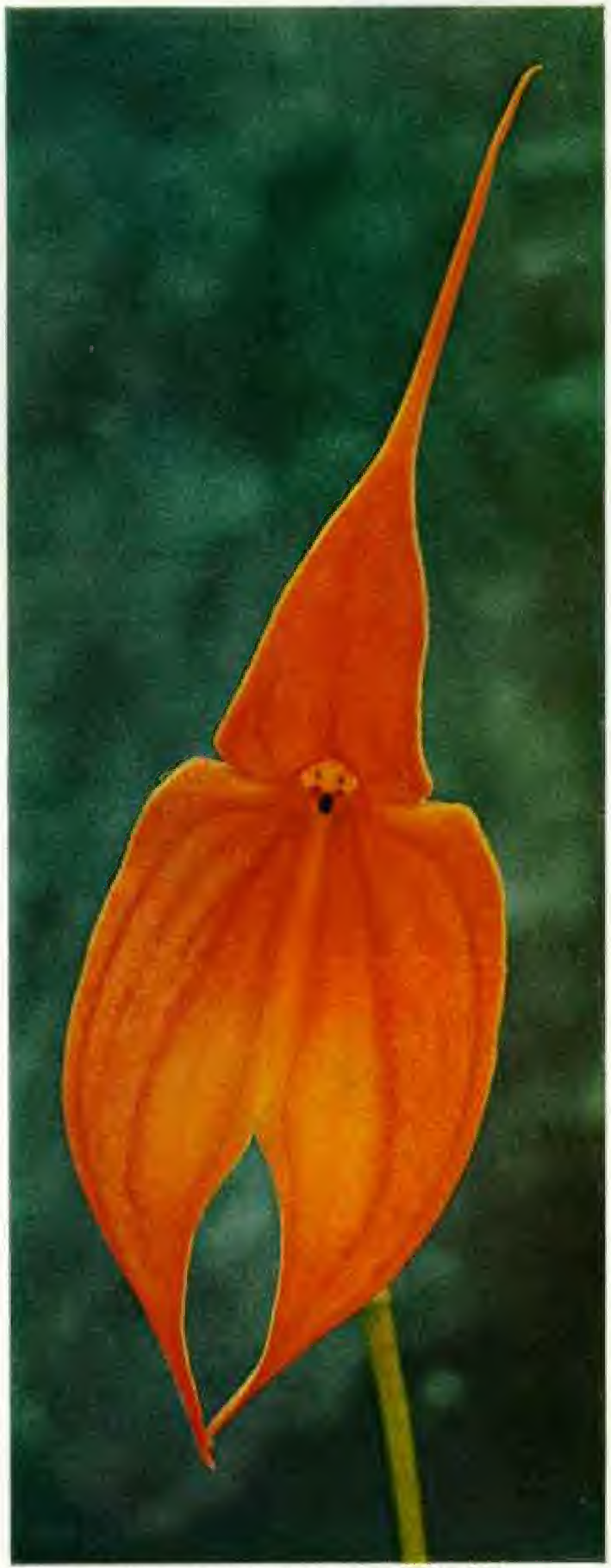
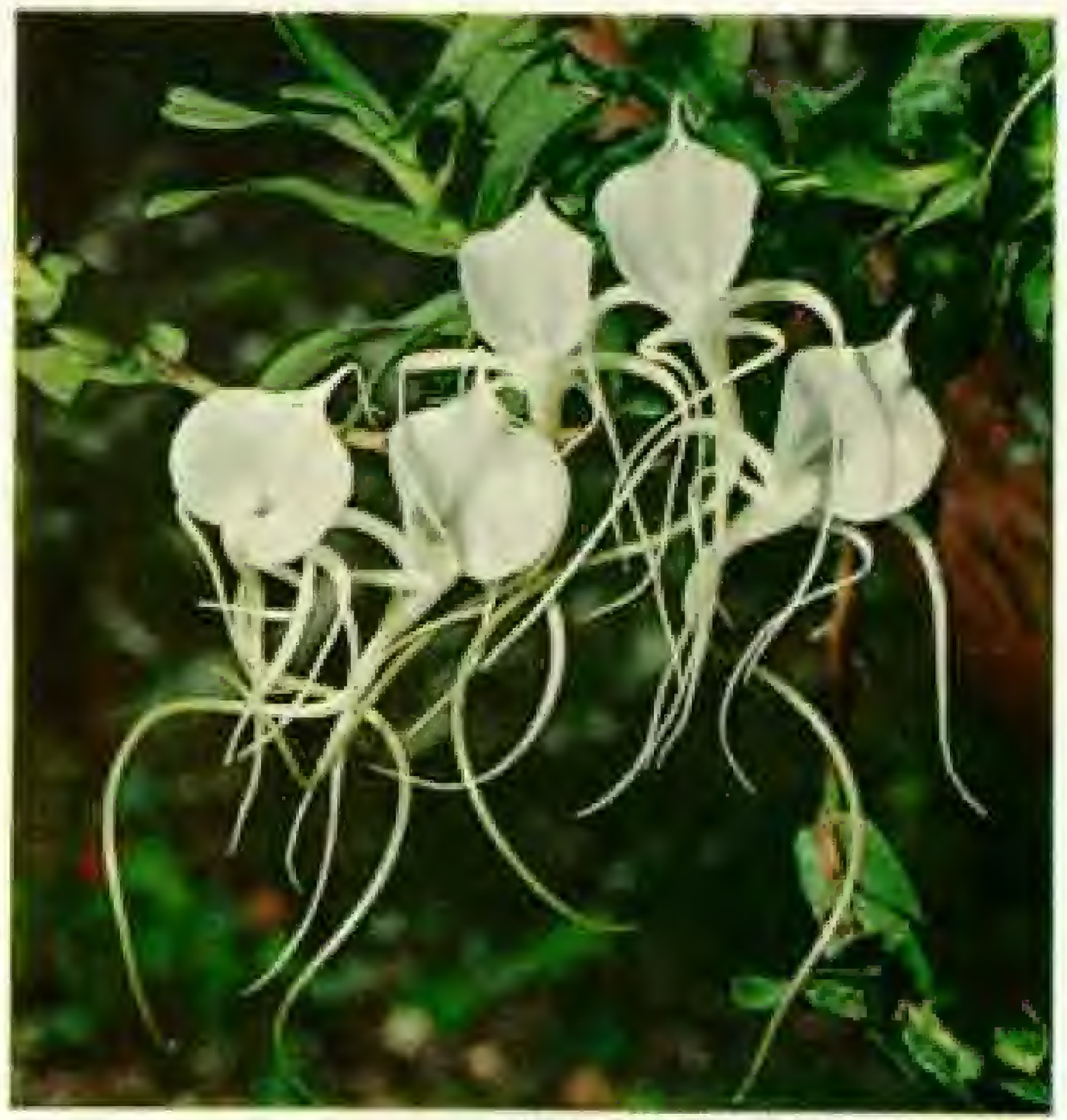


MASDEVALLIA VEITCHIANA VAR. GRANDIFLORA, 1 1/2 TIMES LIFE-SIZE; GORDON W. DILLON

Beneath the lip of Madagascar's Angraecum *(right) trails a spur holding a sip of nectar.*

False name clings to a hybrid (below). Botanists changed the classification of its parental stock—an Asiatic lady's-slipper—from Cypripedium *to* Paphiopedilum *in 1886. But florists persist in calling this corsage favorite a "Cyp."*

PAPHIOPEDILUM [illegible] 'NIGHT GLOW,' 2/3 LIFE-SIZE; ROD McLELLAN CO.



ANGRAECUM [illegible], [illegible] LIFE-SIZE; [illegible] CAMPBELL

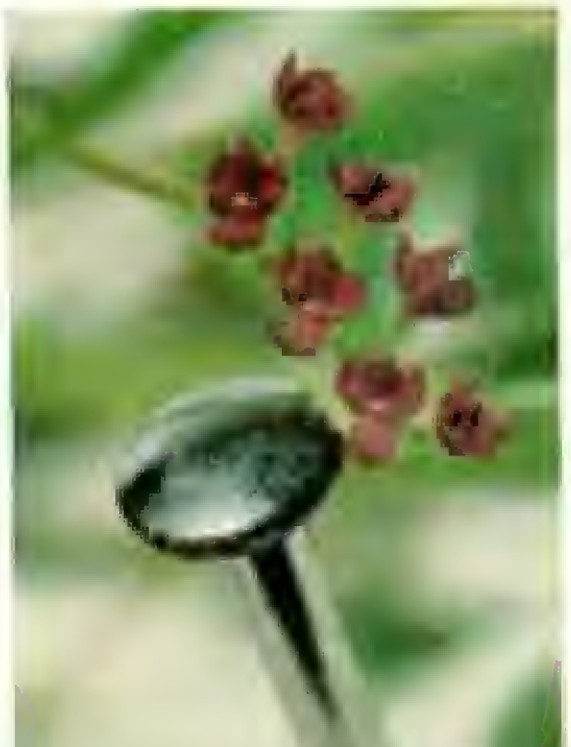
Come-hither scents guide pollenators to some orchids. The scorpion orchid of tropical Asia (lower left) emits a strong musky odor that probably attracts an insect, thus far unidentified, to the white column. Asian forebears of the Cymbidium *hybrid (lower right) inspired Chinese poet Chu Yuan to write in the fourth century B.C. that he was overpowered by the blossoms' "melting fragrance." Commercial hybrids, bred for large, long-lasting flowers, often lose the aroma of their ancestors.*

ARACHNIS FLOS-AERIS VAR. INSIGNIS, 2/3 LIFE-SIZE; [illegible]

CYMBIDIUM HYBRID "THE GLOBE," 1/3 LIFE-SIZE; [illegible]

DENDROBIUM DENSIFLORUM, 3/4 LIFE-SIZE; JOHN [illegible]

DACTYLORHIZA FUCHSII,
1 1/2 TIMES LIFE-SIZE; EDWIN S. GROSVENOR



PLATYSTELE ORNATA, VICTOR BOSWELL, JR.

Bright as flocking butterflies, golden Dendrobium *blossoms (above) grace a garden in Gangtok, Sikkim. The 1,200-member genus ranges from the Himalayas to Australia and Oceania.*

Smaller than a pin (left), lilliputian Platystele ornata *grows in treetops in the cloud forests of Venezuela.*

Denizen of the north, Dactylorhiza *(right) was photographed in a moist meadow in Iceland; the genus ranges throughout Europe.*

a vast nursery overflowing with orchids."

Sander kept collectors constantly in the field. Crates streamed in from all parts of the world: the tropics of the New World, Asia, Africa, the East Indies, Madagascar.

Through all this activity moved the stern and upright figure of the master, driving himself and his people. In a book called *Sander the Orchid King*, Arthur Swinson tells how Sander's implacability reached out to his field collectors. Sander's orchid hunters risked dysentery, fever, snakebite, and hostile Indians. Seven died in the field.

In 1892 one field man, Oversluys, struggled to track down an orchid called *Cattleya rex* in Peru. Rival collectors moved in an atmosphere of intrigue, bribery, and espionage. For seven months Oversluys listened, observed, collected rumors, and finally ferreted out the orchid's habitat.

He collected his plants, but he wrote that the town where he was based "was plundered by the troops . . . I just escaped. . . . They came upon us by night, and opened the cases but were quite disappointed to find only plants . . . next day one of my men was shot with a bullet in his head and the other ran away, so I was left alone. . . ."

Sander's scribbled notes on this dispatch: "7 cases from Oversluys. All temperate. Look out for new *Masdevallia*."

Soon after, he sent Oversluys to Chile, adding, "I hope you won't draw too much money."

Discovery Yields a Lavish Reward

Orchid hunting was a wholesale business at the turn of the century. When Oversluys finally tracked down *Cattleya rex*, he gathered the incredible number of 17,000 plants of this species. A Mr. B. S. Williams, in 1885,

Arbiters of the hybridist's art. British judges consider a Phalaenopsis *during a semi-monthly meeting of the Orchid Committee of the Royal Horticultural Society. Victor Summerhayes, right, retired orchidologist of Kew Gardens, and his colleagues evaluate color, size, and shape. A prize-winning plant sometimes sells for hundreds of dollars.*

EKTACHROME BY LUIS MARDEN © N.G.S.

wrote: ". . . in their native country the plants are heedlessly torn from their native habitats . . . some of our collectors having so little respect for these treasures of nature's production that they gather all they can, having no regard for the future. . . ."

Today most countries in which orchids are native prohibit mass export of the plants.

Early orchid growers had some success with sowing seed on compost of the parent plant, but they met trouble in another direction. For a long time gardeners working with other kinds of flowering plants had been transferring pollen from one plant to another and so producing hybrids with improved size, color, and keeping qualities. The difficulty with seeds deterred fanciers from trying this with orchids, but there was another reason.

In ordinary flowers the male stamens and female pistils are separate. In the gynandrous orchids these are fused into a column, often of strange and complicated appearance (pages 492-3). Enthusiasts were so certain that orchids would never be hybridized that one collector said he liked these flowers "because those fiends the hybridizers cannot get at them."

Until the middle of the past century botanists had despaired of ever hybridizing an orchid. It took an English surgeon with botanical training, John Harris, to analyze the flower's strange anatomy and suggest how it might be done. Following his counsel, gardener John Dominy in 1856 produced a flower from a cross between two species of the genus *Calanthe*—the first "orchidaceous mule," to give it its splendid Victorian title. Thereafter man could select desirable color, size, or other characteristics and breed orchids as he bred horses or dogs (page 490).

Hybridists worked so assiduously after the first success that they almost drove the printers mad. By the beginning of this century interest had shifted to hybrids. Today, the grand stud book, *Sander's Complete List of Hybrids*, includes about 35,000 crosses.

The results are a matter of taste. I agree with a Colombian orchid fancier who told me he prefers natural species to hybrids because *"allá la mano del hombre no ha metido la pata"*—literally, "there the hand of man has not put his foot into it."

Orchids: Evidence for Darwin's Theory

In 1859 Charles Darwin published his explosive *Origin of Species*, which set out to prove that species in nature were not immutable, but could and did change and evolve. No organism, he argued, fertilizes itself indefinitely, but must at least on occasion cross with another being of the same—or related—species. In further proof Darwin brought out three years later a work entitled *On the Various Contrivances by Which Orchids are Fertilized by Insects*. These, he wrote, "are varied . . . as any of the most beautiful adaptations in the animal kingdom. . . ."

I think that Darwin, with true scientific caution, understated the case. Orchids ensure fertilization by contrivances that are often so bizarre as to be hardly believable.

Most flowers release pollen in minute particles like yellow dust, but even here orchids are different, concentrating their pollen in sticky knoblike masses called pollinia. One genus of terrestrial orchids attracts the pollenating insect by imitating a female of the same species (pages 493-4). The male attempts to mate with the flower, and so carries off the pollinia to the next blossom.

Another orchid mimics the insect prey of the *Campsomeris* wasp. The wasp dives on the orchid and stings it, departing with the pollinia neatly glued to its body, to be brushed off on the next flower.* Some orchids shoot the pollinia at the insect; others provide exit tunnels through which the insect must crawl past the pollen masses.

Orchidologist Takes a Busman's Honeymoon

Dr. Calaway Dodson of the University of Miami, the leading investigator in the field today, described to me the brilliantly colored bees that pollenate highly fragrant orchids of the genera *Stanhopea* and *Catasetum*.

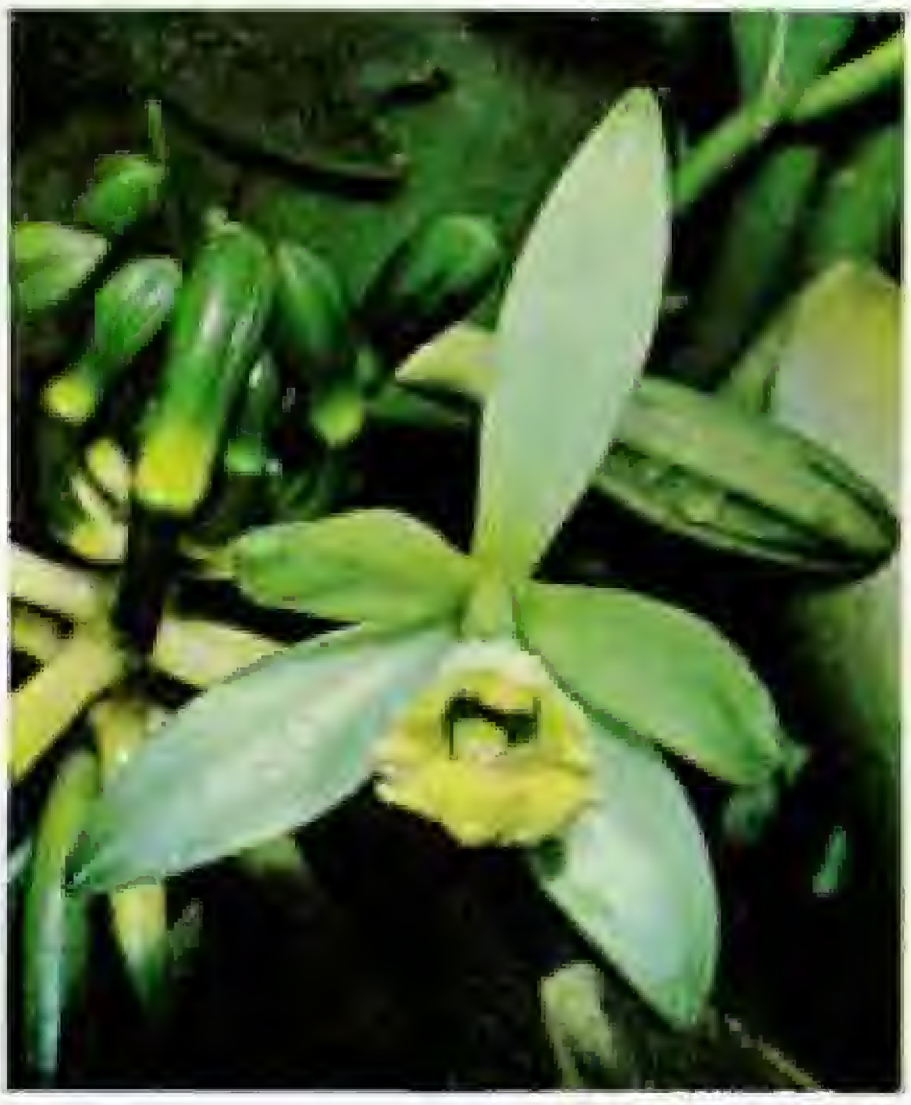
"The Euglossine bees that pollenate these orchids are iridescent green, gold, and old rose. We calculate that about 2,000 species of orchids are pollenated by these bees.

"Like most scientists, I am so engrossed in my work that even my honeymoon was a field trip. When I married in Ecuador in 1960, I took my wife to an old cacao plantation where the trees were covered with orchids. I found a budding plant of *Stanhopea tricornis* and took it back to the hotel to keep overnight until the buds opened. Then we would hang it where the bees could find it.

"We kept the plant in the room beside ours, where my assistants were staying. Next morning I got up early and went to wake them. The scent of my wife's perfume was very strong in their room, but she had not been there. Then I saw that the orchid flowers had opened. I returned to our room and sniffed my wife's perfume bottle. The label said Diorissimo, but the scent was that of *Stanhopea tricornis*.

"Well, I dipped bits of blotting paper in the perfume, and, do you know, the bees came to them in preference to the flowers. I kept scattering Diorissimo around, but my wife was very put out when I used up all her perfume to attract 'some stupid bees.'"

I told Dr. Dodson that on a jungle river in



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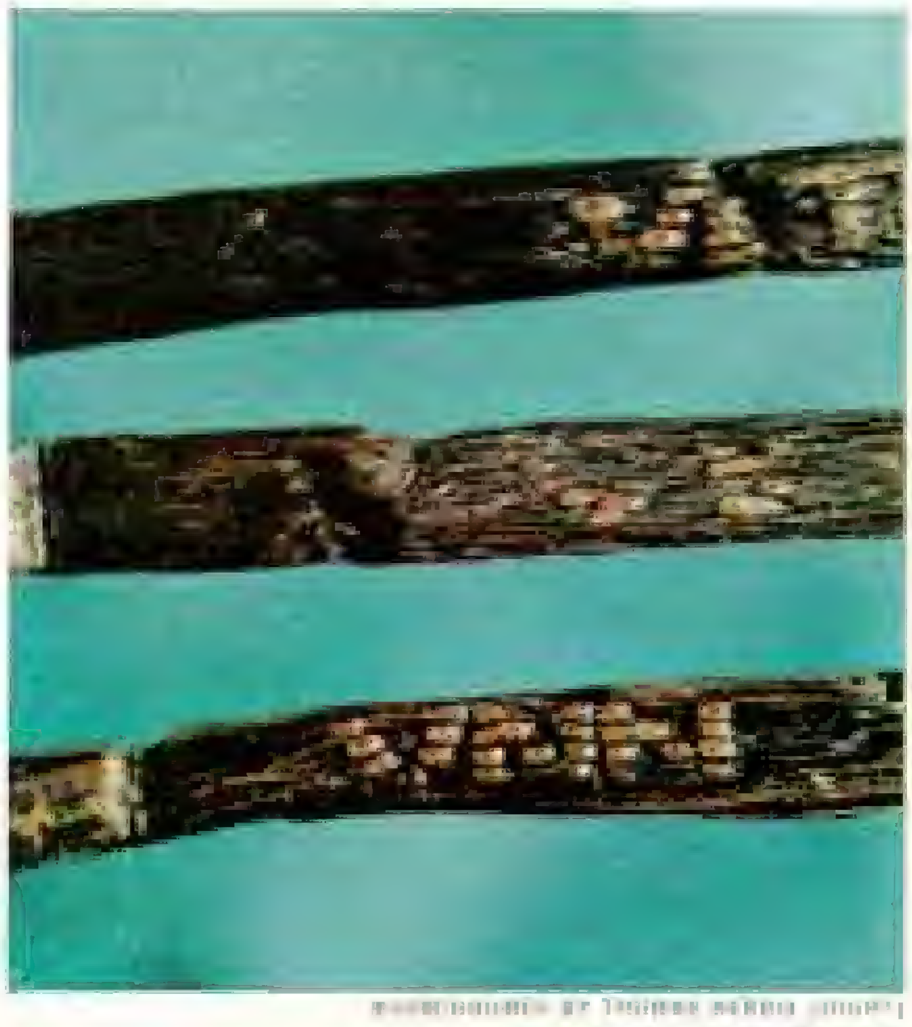
Some 450 years ago, Spain's conquistadors found the Aztecs of Mexico adding bits of an orchid's fragrant seed pod to their cocoa. Vanilla planifolia *traveled to Europe and thence to Madagascar. Today the island supplies half the world's needs. The vanilla flower (above) lasts only a day and must be pollenated by hand, since no Madagascar insect performs the task. To guard against theft, growers prick their initials in the pods (below). When ripe, the pods are spread out to cure under the hot sun of Antalaha (right).*



KODACHROMES BY THOMAS NEBBIA (RIGHT) AND ROBERT F. SISSON © N.G.S.

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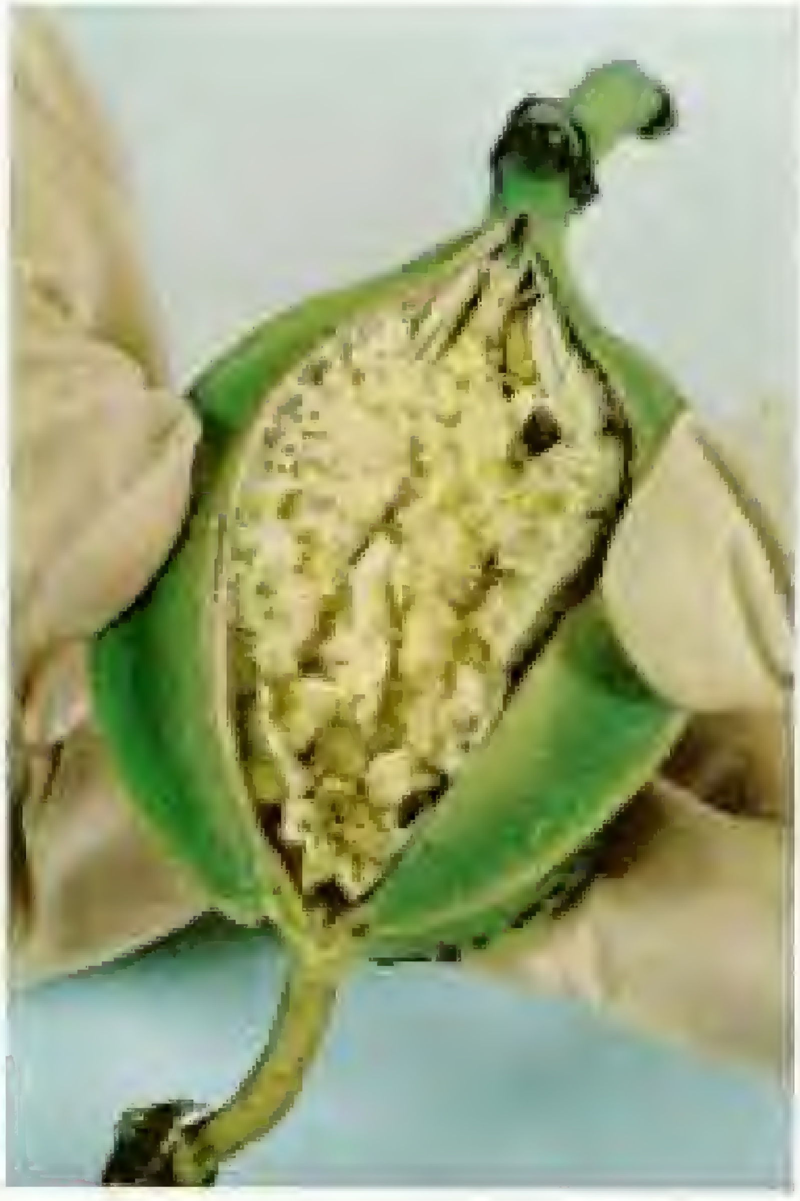
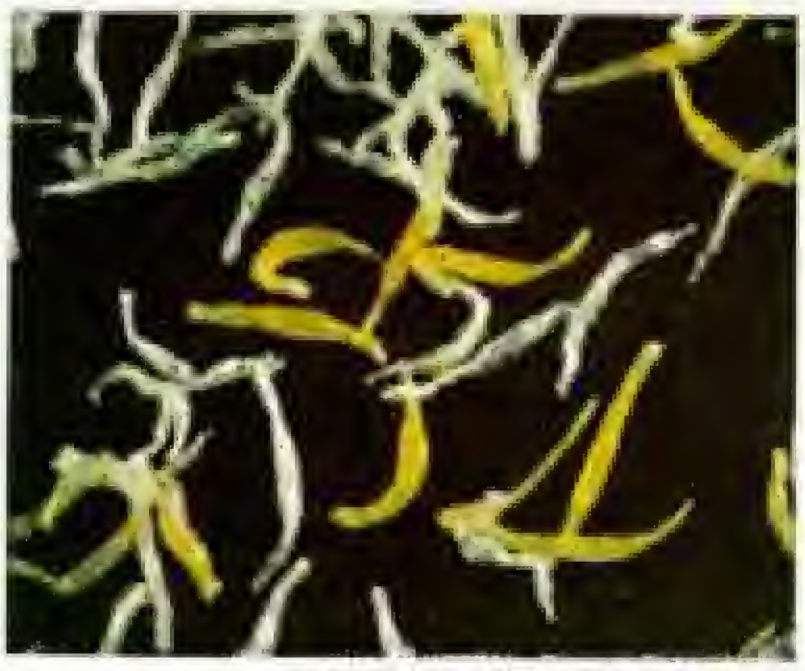
*For an account of the highly specialized process by which a tiny female wasp pollenates the Smyrna fig, see NATIONAL GEOGRAPHIC for November 1970.

Colombia I had seen green *Catasetum* orchids that had such wonderful fragrance that any perfumer who penetrated the secret of that scent could make a small fortune. Even the name was ready to hand: Green Orchid.

"We probably know what it is," said Dr. Dodson. "We have analyzed many orchid scents, and of the 56 compounds so far discovered, we have identified 32. For example, one substance our honeymoon orchid and Christian Dior's perfume share is benzyl





[illegible] VICTOR BOSWELL, JR.

Panoply of Easter blossoms rises from seed as fine as dust. Some 30,000 seeds puff from a ripe Cattleya *pod (top). In nature they would ride the wind. To live, they must settle on soil or on dust-laden bark containing food-providing fungus, since they contain few nutrients. Under a microscope (above), living seeds appear yellow; infertile ones are white.*

Here at Thomas Young Orchids in Middlesex, New Jersey, head grower Sam Scagliotta (foreground) and manager Joseph Donnelly vary heat and light to ensure that the orchids' debut coincides precisely with peak Easter demand. They ship a quarter million blossoms a year, mostly showy Cattleya *hybrids.*

acetate. Another compound that attracts bees to some orchids is cineole, also found in eucalyptus leaves and Vicks VapoRub.

"When we knew that, I was able to dip blotting paper in the pure stuff and attract a hundred times more bees than with the flower itself. My wife was happy, because after that I let her perfume bottles alone.

"The other day a man from Paris who does research for the big perfumers came to learn about the compounds that make some orchids smell so good. So your Green Orchid may yet be on the market."

Insect-pollenated orchids display the most ingenious and bizarre adaptations to ensure their survival.

The white Christmas Star orchid from Madagascar, *Angraecum sesquipedale*, has an exceedingly long spur, or nectary, hanging down from the flower lip. Despite the name (*sesquipedale* means a "foot and a half") the spur is about a foot long, but the

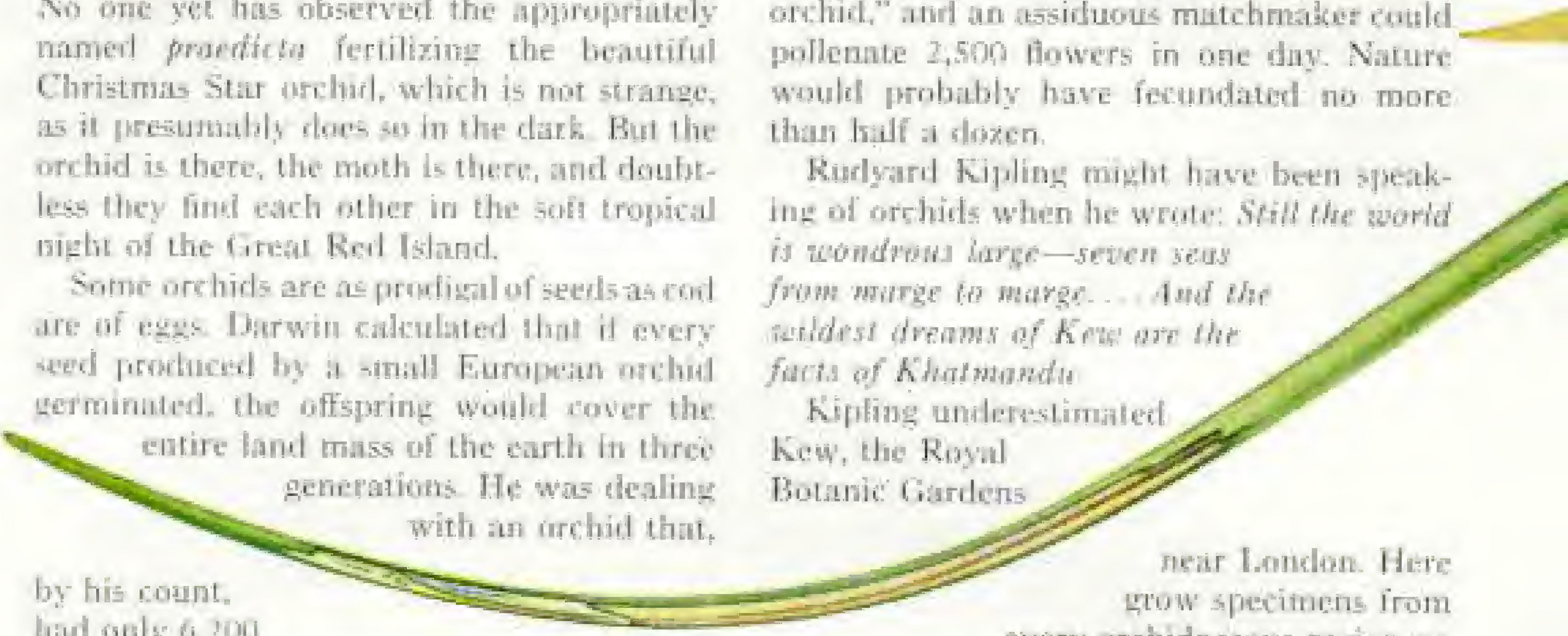
KODACHROMES BY THOMAS NEBBIA © NATIONAL GEOGRAPHIC SOCIETY

nectar fills only an inch and a half at the extreme end (below). More than a hundred years ago Charles Darwin speculated on the nature of the insect that could reach the nectar and pollenate the flower:

". . . In Madagascar there must be moths with proboscides capable of extension to a length of between ten and eleven inches! This belief of mine has been ridiculed by some entomologists. . . ."

Forty years later a moth exactly fulfilling Darwin's prediction was found in Madagascar and named *Xanthopan morgani praedicta.* No one yet has observed the appropriately named *praedicta* fertilizing the beautiful Christmas Star orchid, which is not strange, as it presumably does so in the dark. But the orchid is there, the moth is there, and doubtless they find each other in the soft tropical night of the Great Red Island.

Some orchids are as prodigal of seeds as cod are of eggs. Darwin calculated that if every seed produced by a small European orchid germinated, the offspring would cover the entire land mass of the earth in three generations. He was dealing with an orchid that, by his count, had only 6,200 seeds in each of some 30 capsules. I know of a Venezuelan orchid that produces only one or two capsules, but each contains four million seeds.



Darwin wrote: "What checks the unlimited multiplication of the Orchidae throughout the world we do not know."

Dr. Calaway Dodson gave me at least part of the answer: Extremely few actually get pollenated.

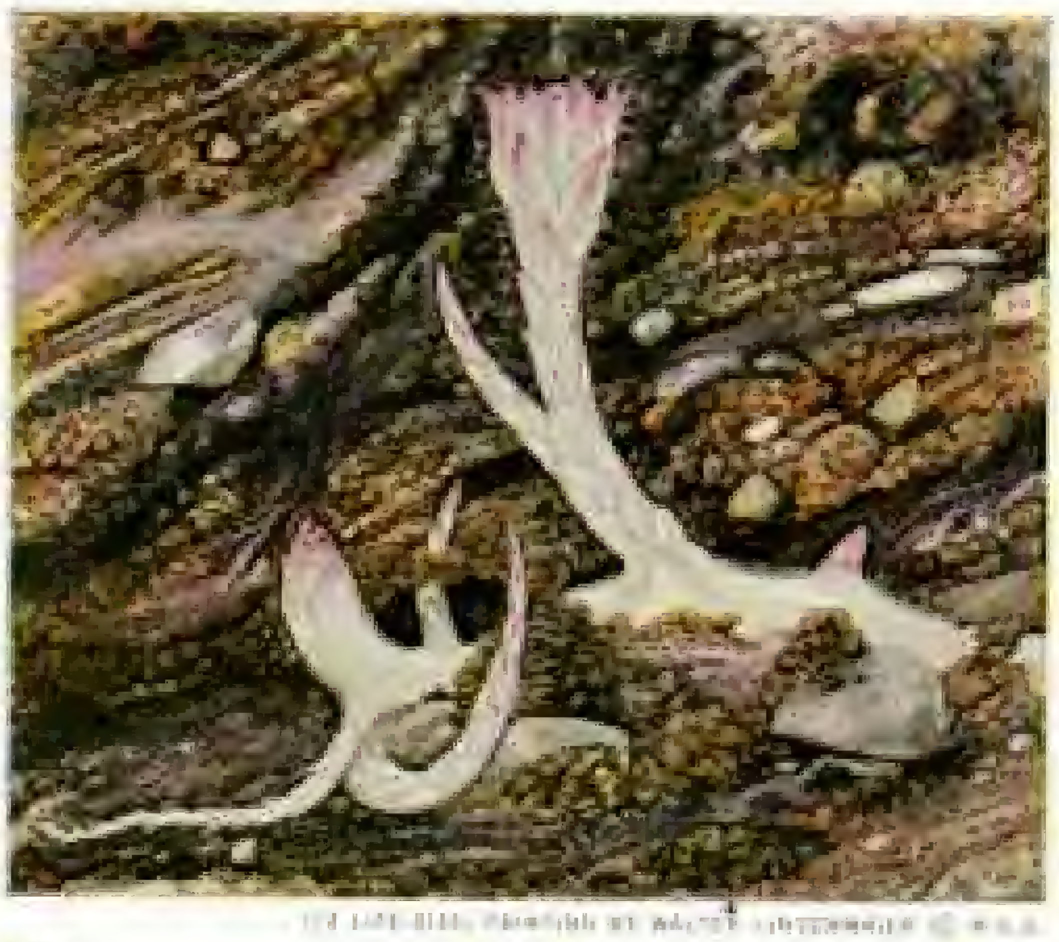
"In an acre of forest," Dr. Dodson said, "there may be roughly a thousand plants of *Oncidium*, and each plant may have a hundred small flowers on it. Yet of these thousands of flowers rarely do we find more than five seed pods produced. This tells us that pollenation is a rare occurrence, yet since one seed pod contains thousands of seeds, this is enough to keep the population going."

On vanilla plantations in Tahiti I used to watch girls going from flower to flower, lifting the little tongue on the flower column with a pointed stick, and pressing anther and stigma together. They called it "marrying the orchid," and an assiduous matchmaker could pollenate 2,500 flowers in one day. Nature would probably have fecundated no more than half a dozen.

Rudyard Kipling might have been speaking of orchids when he wrote: *Still the world is wondrous large—seven seas from marge to marge. . . . And the wildest dreams of Kew are the facts of Khatmandu.*

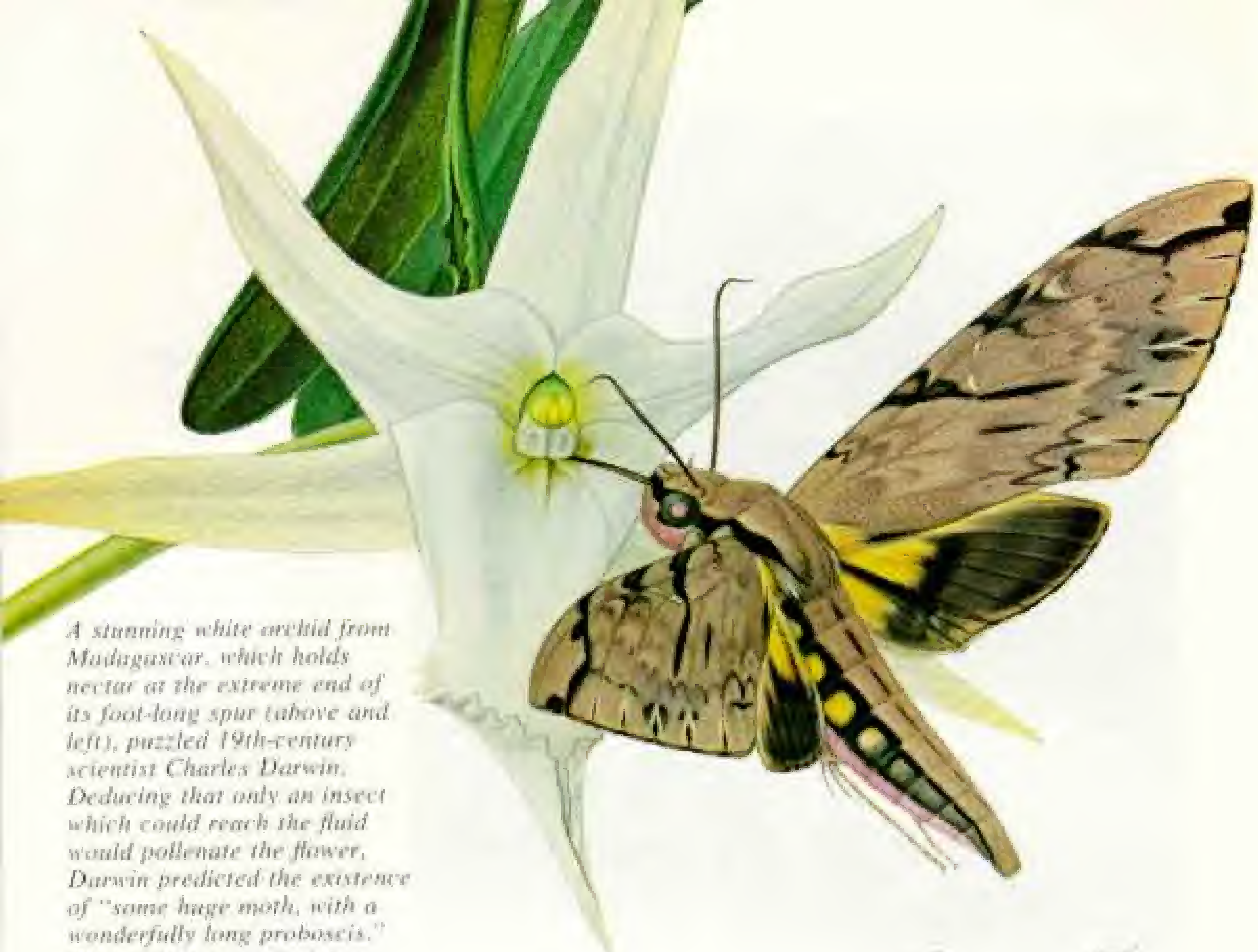
Kipling underestimated Kew, the Royal Botanic Gardens near London. Here grow specimens from every orchidaceous region on earth, but especially from Katmandu and other valleys of the Himalayas, for Kew specializes in Asian and African orchids, leaving to Harvard University's herbarium the emphasis on orchids of the New World.

Kew, the most famous botanical garden in the world, was started in 1759 when Augusta, Princess of Wales, set aside nine acres of land beside the Thames above London. Today it maintains a herbarium of preserved



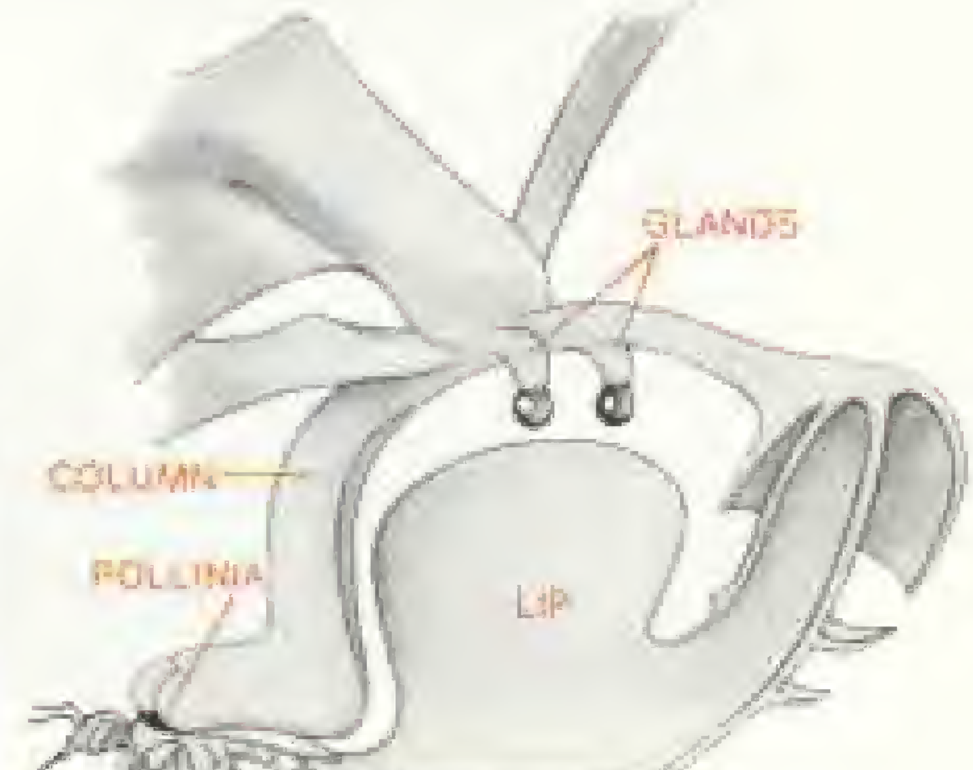
1½ LIFE-SIZE; PAINTING BY WALTER LINSENMAIER © N.G.S.

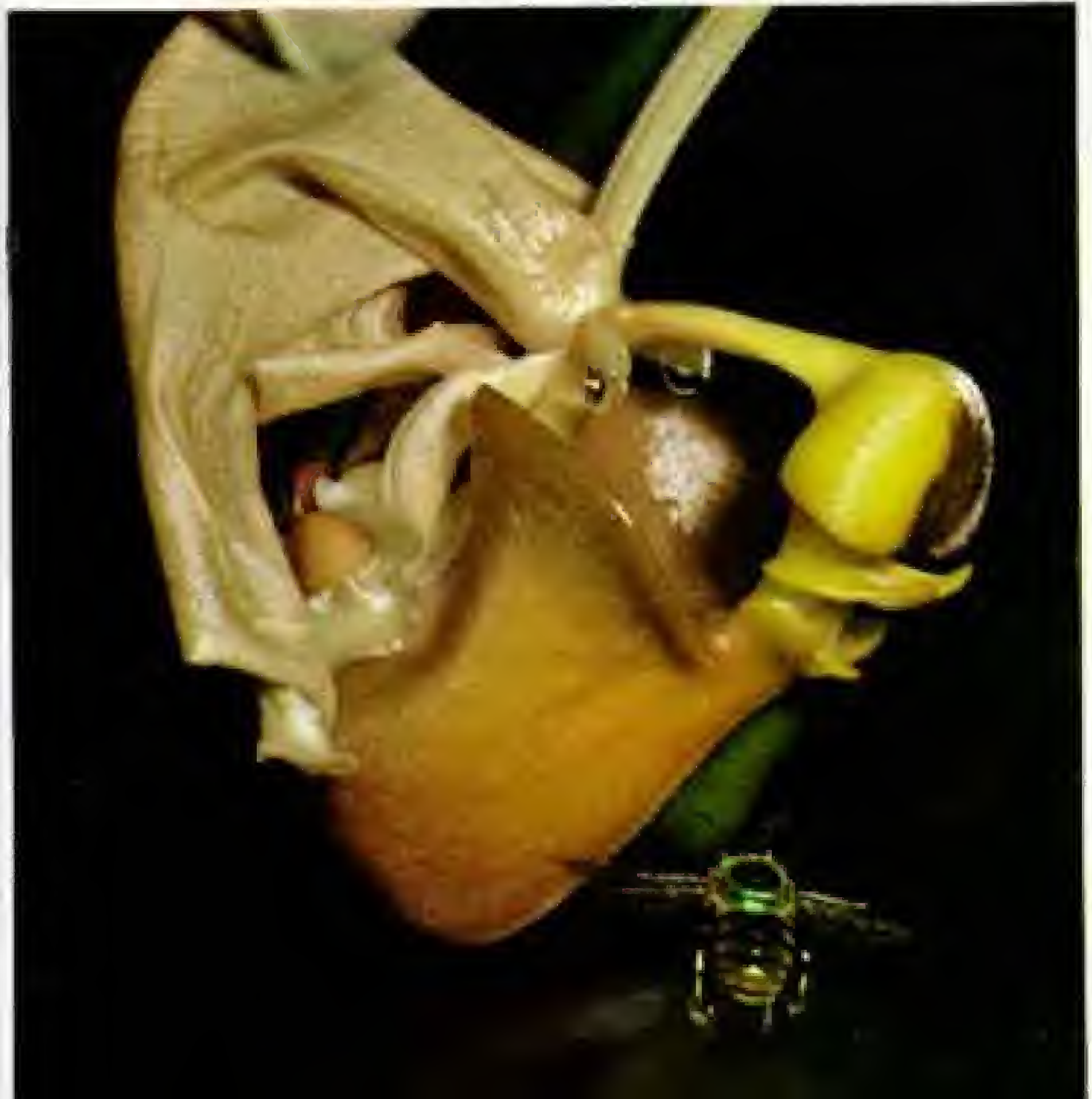
Out of sun, out of sight, Rhizanthella gardneri *grows entirely underground, where it feeds on decaying organic matter. Its flowers crowd at the center of petal-like bracts. The remarkable orchid was discovered in Western Australia in 1928; scientists know of only one other subterranean species.*



A stunning white orchid from Madagascar, which holds nectar at the extreme end of its foot-long spur (above and left), puzzled 19th-century scientist Charles Darwin. Deducing that only an insect which could reach the fluid would pollenate the flower, Darwin predicted the existence of "some huge moth, with a wonderfully long proboscis." Entomologists scoffed, but 40 years later Xanthopan morgani praedicta, *a night-flying moth with a 12-inch tongue, was discovered on the island.*

CORYANTHES [illegible] (BELOW) [illegible] TIMES LIFE-SIZE; [illegible], LIFE-SIZE PAINTING OF ANGRAECUM [illegible] (ABOVE) BY WALTER [illegible]; DRAWING (RIGHT) BY NED M. SEIDLER © N.G.S.





Attracted by fragrance, a bee homes in on a Peruvian bucket orchid (left). As it tries to land inside the waxy lip (diagram above), it will slip into a pool of fluid secreted by the flower's glands. To escape drowning, the insect crawls out under the column, picking up pollinia. Wet and groggy, the bee rests, then continues his pollenating rounds.

THELYMITRA PAUCIFLORA VAR. HOLMESII, 2 1/3 TIMES LIFE SIZE; DOROTHY M. FORTH

Green-leaf valentine (right) bears a gift of fleeting loveliness. Rare Lepanthes calodictyon *opens for only two days during spring in Ecuador's shadowy rain forest.*

Blue seldom occurs in orchids; an exception is Australia's sun orchid (left). It blooms in bright, hot weather, each flower exposing a column hooded with yellow and tufted with white hairs. This variety grows near Portland, Victoria.

Natural species—some of them less showy varieties which growers call "botanicals"—win increasing favor. Prices range from $5 to $100. Requirements of temperature, light, humidity, and ventilation vary from plant to plant.

4 TIMES LIFE-SIZE; THOMAS DAVIDSON (OPPOSITE)

specimens of many thousands of orchids.

Mr. Peter F. Hunt, who is in charge of the Orchid Herbarium at Kew, told me:

"At the last count—as of the first of November 1970—we accepted about 18,000 species as occurring in the world. The stud books record about 35,000 hybrids; by these counts, we might say that there are twice as many man-made orchids as natural species. But no two orchidologists agree on how many natural species there are in the world.

"The question is: What is a species? As someone aptly said, nature made only populations; it is man who groups plants and animals into artificial categories of his own invention: species, genera, and families. But what are the absolute distinguishing marks of a species? When does one feature of a flower make it a variety or a different species?

"Today the orchid world is divided into what we call the 'lumpers' and the 'splitters' —those who want to reduce the mass of described orchids to fewer species, and those who try to subdivide them still further."

Some time later I asked Dr. Leslie Garay, curator of the Orchid Herbarium of Oakes Ames at Harvard (page 491), about this:

"We, too, recognize more than 18,000 species officially, but I think that's too conservative," he said. "At home I have a personal card file listing more than 60,000 orchids that someone has described sometime, somewhere.

And if you search the literature, you will find some 140,000 names actually recorded. Obviously, many of these are synonyms.

"You see, the splitters would regard a blond man and a black man as two different species. The lumpers, on the other hand (and today they are in ascendancy), recognize that plants are like men in that there are wide differences among them. The trend now is to regard a plant population, not a single specimen, as the basic biological entity. That is why I estimate that there must be some 20 to 35 thousand species of orchids so far known."

If Man Is Comfortable, So Are Orchids

It took 100 years for orchids to spread from the hothouses of the rich into the homes of the common man. One man who helped to bring this about is Mr. Thomas Fennell, a Florida horticulturist. I talked with his son, Thomas Fennell, Jr., in his Orchid Jungle, a thickly wooded Florida hammock 25 miles south of Miami. Here orchids grow in their natural state, and at any moment two to three thousand blossoms may be open.

"My father reasoned that a modern house has a temperature range well within the tolerance of many orchids. He hung muslin curtains over the windows to filter the summer sun so that it would not burn the leaves. Some heated but unhumidified houses are too dry for orchids in winter, so my father devised what we now call our 'cake-pan' method to raise the humidity.

"Here is all you do: Take a baking dish and fill it with coarse aquarium gravel. Pour water into the dish to just below the surface of the gravel. Then stand your potted orchid on the gravel and put it in the window. That, and a little sunshine each day, plus some periodic feeding, is really all you have to do to grow showy orchids."

A word of caution: Many northern amateurs find their houses so dry that the cake pan alone is not enough. They raise the humidity by spraying or using a humidifier.

Amateur growers in the United States today cultivate their orchids everywhere—on window sills, in miniature glasshouses called Wardian cases, and in elaborate climate-controlled greenhouses (page 487). Many amateurs belong to the American Orchid Society, whose members have increased from a few hundred before World War II to more than 11,000 in 1970.

Today cut-flower growing is a multimillion-dollar business. Growers provide florists with *Cymbidium* (the waxy spray orchid that originally came from China and India), *Paphiopedilum* (the lady's-slipper orchid, page 496), *Phalaenopsis* (the moth orchid most used in bridal bouquets), and especially the big *Cattleya*. Two hundred million *Cattleya*, showiest of all orchids, are annually sold on the American market (pages 502-3). And jet aircraft make it possible for Southeast Asian countries like Thailand to ship thousands of hybrid *Vanda* to Europe every day.

Of all the tropical American countries, Colombia has the largest number of orchid species, and some of the handsomest. This is because the Andean mountain ranges divide the country into three distinct zones: From the Isthmus of Panama a tongue of Central American flora thrusts deep into Colombia; against the eastern cordillera lap the last waves of the Amazonian flora, and in the central valleys and on the mountain slopes grow orchids typical of the high Andean flora.*

Dr. John Lindley laid true immortality on Mr. William Cattley of England, an orchid collector of the 1820's, when he gave his name to the most beautiful genus of the most beautiful flower in the world. On a recent trip to Colombia I flew with a well-known orchidologist, Dr. Mariano Ospina Hernández, to Neiva, high in the eastern cordillera, in search of *Cattleya trianaei* (page 484).

Before commercial cut-flower growers turned almost entirely to hybrids, the forests of Colombia were ransacked for *Cattleya trianaei*, which usually bloom at Christmas, and those of Venezuela for *Cattleya mossiae*, an Easter flower.

Blooms Go Into a Bitter Brew

From Neiva we drove in a jeep through cool country of azure skies and rushing torrents. Coffee bushes grew in the shade of trees 70 feet high, but relatively few orchids remained in the trees. We saw more in pots hanging under the eaves of village houses.

"We need to pass more stringent laws regulating the export of our orchids," said don Mariano, "but our greatest menace to orchids is the burning over of land for planting. Sometimes whole tracts of forest burn down when the flames get out of control."

Everywhere I asked if orchids were used for anything except decoration. At last, in the little town of Suaza, I watched a woman brew a special tea of eucalyptus leaves, violet leaves, flowers, lemons—and a white *mayo*, the alba variety of *Cattleya trianaei*. The woman held up the pot for me to sniff, and the astringent steam made me blink and sneeze.

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*See "Colombia: From Amazon to Spanish Main," by Loren McIntyre, NATIONAL GEOGRAPHIC, August 1970.

"It loosens the chest and cuts off the cough," she said. "Taste a little." The clear brown decoction lay bitter on my tongue, and I thought that I should like to see the face of a city florist as he watched an expensive white orchid tossed into a pot in a village kitchen.

From Colombia I flew east to Venezuela. The Easter orchid was past blooming, but in the mountains of Monagas State *Cattleya gaskelliana* was still in flower.

In the company of Dr. Pierre Couret, President of the Venezuelan Orchid Society, I flew to Maturín in extreme northeastern Venezuela, then drove into the hills.

Huge Plant Alive With Stingless Bees

Near a big cave, where *Cattleya gaskelliana* clung in purple splashes round the entrance, some boys told us of an extremely big plant that grew close by. They led us to a tall tree and pointed upward. There, encircling the trunk 60 feet above the ground, grew the biggest single orchid plant I have ever seen.

Dr. Couret carries a special license to collect specimen plants, and a local man volunteered to climb the tree for it. It took him nearly an hour to make the climb, carefully detach the plant, and lower it in a rope sling (following pages). Once it was on the ground we could appreciate the plant's enormous size. It was four feet across, took four men to carry, and bore more than a hundred and fifty purple blossoms. We separated the plant into three portions for transport to Dr. Couret's orchidarium and found hundreds of *Melipona* bees swarming in the root mass. Fortunately, these bees cannot sting.

Every orchidophile dreams of discovering a new species, especially one with a big showy flower. Even today it is not hard for a botanist to find orchids new to science, but these usually bear small inconspicuous flowers, and are known to the orchid trade as "botanicals." Most of the big brilliantly colored flowers, precisely because they are so splendidly visible, were discovered long ago.

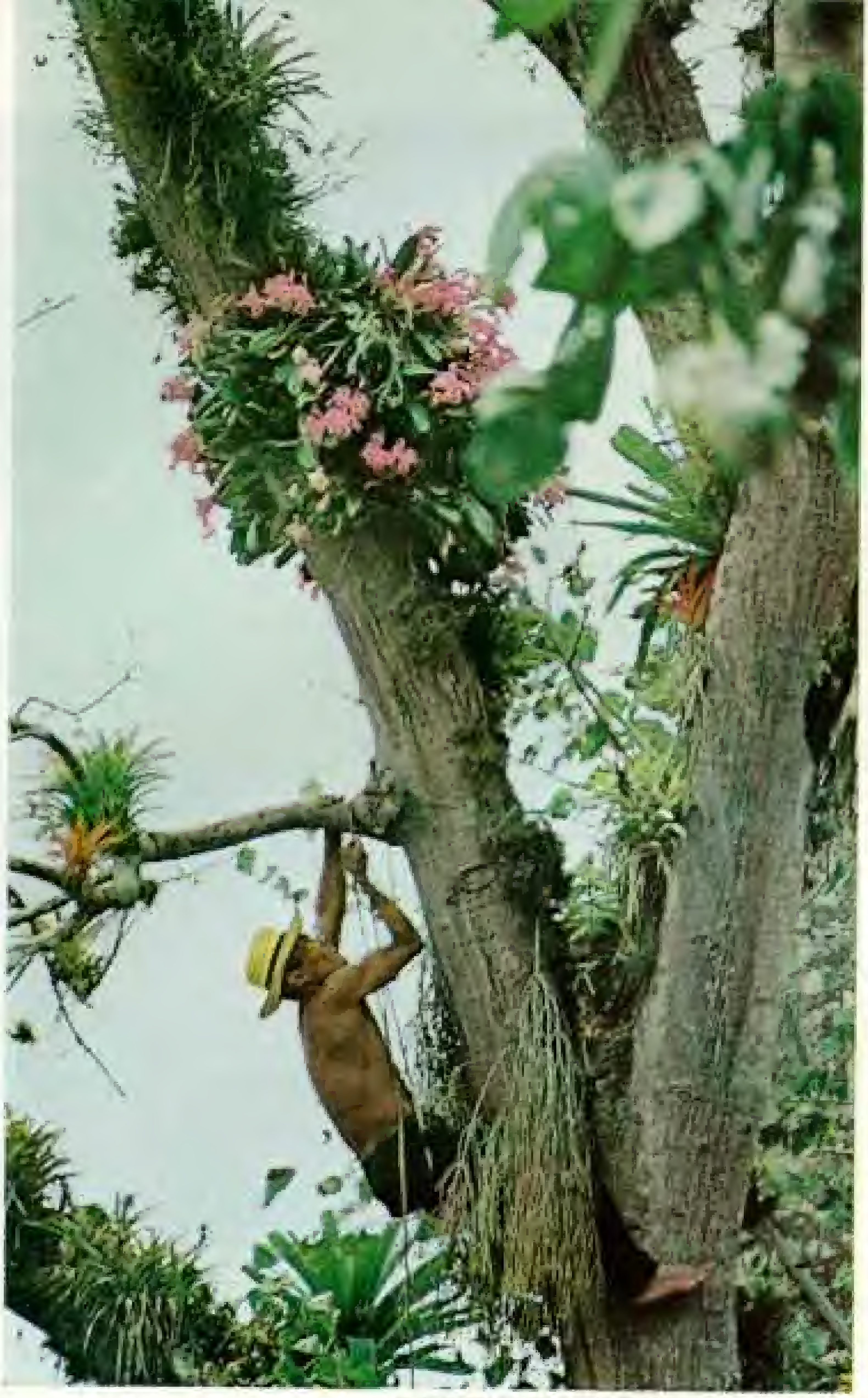
I reasoned that if there was any chance of finding a showy new orchid, it would most likely be in Brazil. That vast country embraces almost a whole continent of diverse climates and habitats, and parts of it are still scientifically virgin.

Seven years earlier I had explored the

EKTACHROME BY GORDON W. GAHAN © N.G.S.

Orchids in the family: David Sander of Sussex, England, carries on an interest inspired by his grandfather Frederick, a 19th-century businessman who became known as "The Orchid King." With single-minded passion, the elder Sander imported new species, encouraging European aristocrats to raise exotic plants. As rare tropical varieties became Victorian status symbols, collectors competing for botanical prizes stripped forests around the world. Plants had to endure the long sea voyage home; when 177 cases of valuable orchids went down in a wreck, Frederick wrote a friend, "I damn near went mad."

One species, Odontoglossum crispum, *seen above, brought Sander a small fortune. A plant collected near Bogotá, Colombia, sold for £1,500 in 1904—the equivalent of $25,000 today—one of the highest prices ever paid. Grandson David, keeping up the family tradition, edits* The Orchid Review, *Britain's oldest orchid publication.*



KODACHROMES BY LUIS MARDEN © NATIONAL GEOGRAPHIC SOCIETY

The hunt goes on

The desire to discover a striking new orchid drives men even now to scour the interiors of Brazil, Venezuela, and Colombia, where most wild Cattleya *species live.*

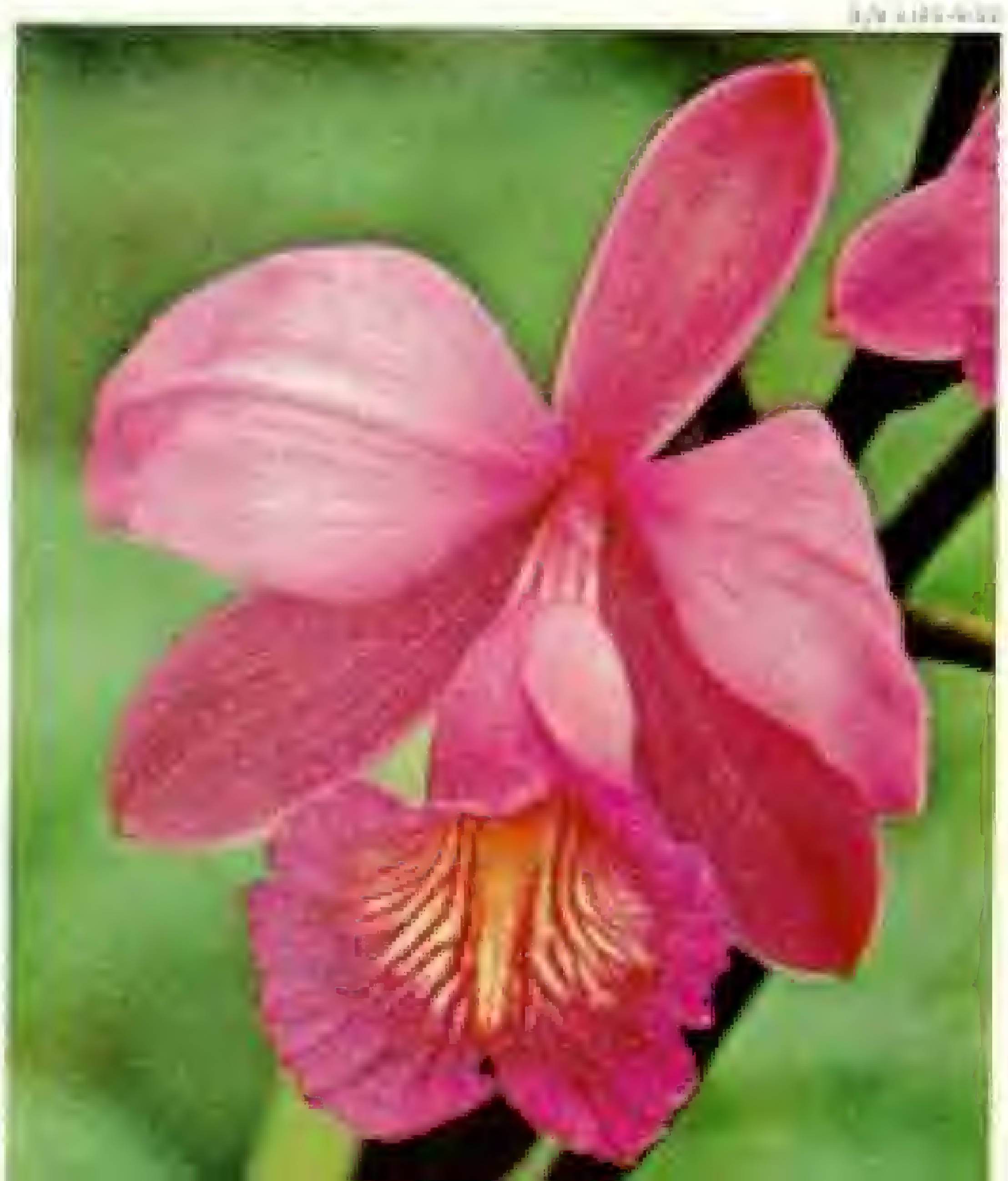
In the mountains of Venezuela's Monagas State, accompanied by a scientist licensed to collect, author Luis Marden photographed this enormous Cattleya gaskelliana *60 feet above the ground (left). A local man climbed the tree and detached the plant from its perch, lowering it in a rope sling (right). The scientist kept the 150-flower giant for study.*

To control the depredations of commercial collectors, Venezuela and most other Latin-American countries now require permits for the export of live plants.

[illegible]

A new species makes its debut

This striking orchid swayed on a three-foot stem beside a track traveled by Mr. Marden in the back country of Brazil. Naturalist Dr. Augusto Ruschi recognized the flower as new and named it Epistephium mardeni *for its discoverer.*



heavy forests of Espírito Santo State in Brazil with Dr. Augusto Ruschi. Then we were looking for hummingbirds, those minuscule flying jewels that dart through the Brazilian bush. Ruschi is probably the greatest living authority on hummingbirds, but he came to their study through his first love—orchids.*

We sat in Dr. Ruschi's comfortable old house 2,000 feet up in the hills of Santa Teresa and looked at color photographs he had made in the years since my last visit. He showed me pictures of half a dozen species of brilliant orchids he had found while on a trip to the mountains of Bahia State in search of a supposedly extinct hummingbird.

"Some of these may be new," he said. "I was the first botanist ever to go there."

I wanted to leave for the north at once. Dr. Ruschi smiled at my enthusiasm. We would seek out Senhor Raimundo Freitas, a cacao planter who had accompanied the doctor on his first visit to the area.

Diamond Fields Yield Living Treasures

From the old port city of Salvador we flew in a light aircraft to the town of Andaraí, 200 miles into the highlands of Bahia.

On the coast it had been raining incessantly but at Andaraí, 1,400 feet above the sea, the airstrip was bone dry. With Senhor Raimundo, a big, bronzed man, we drove a jeep into the mountains, following a steep track past pinnacles of rock that rose in shapes like ships and animals against a cobalt sky.

"You would not think to look at it," said Senhor Raimundo, waving his arm round at the utter solitude, "but every foot of this earth has been turned over many times. Diamonds were discovered here in 1847, and our people have been seeking them ever since."

We topped the last rise beside a sheer cliff that leaned over the track. Down its face trickled a crystal thread of glacial water. Just beyond, at 3,000 feet, we debouched onto a high grassy savanna.

Great boulders crowned with orchids and bromeliads dotted the plain. The ground underfoot was riven with crevasses, some more than a hundred feet deep.

There were orchid plants everywhere—on the rocks, in the few sparse trees, and on the ground. In a quarter of a square mile we identified the following: one *Cattleya*, five *Epidendrum*, two *Laelia*, two *Encyclia*, one *Zygopetalum*, two *Cyrtopodium*, four *Pleurothallis*, two *Octomeria*, one *Craniches*, one *Epistephium*, one *Cleistes*, one *Habenaria*, three *Maxillaria*, one *Lycaste*, and one *Vanilla*—in all, 28 species of 15 different genera.

Rocky Outcrop Hides the Ultimate Prize

On the other side of a rock outcropping moving spots of bright rose, like spilled paint, caught my eye. Against a background of yellow-green ferns, rippling like wheat in the upland breeze, rose the three-foot-high stem of a terrestrial orchid, tipped with spectacular flowers, each nearly four inches across. The flaring bell-like labellum was boldly marked in stripes of chrome yellow.

I sensed Dr. Ruschi looking over my shoulder. Hesitatingly I pointed to my ground orchid. I felt certain that anything so showy had to be well known.

"That's new to me," exclaimed the doctor, "and I'll wager it's new to science."

It turned out later that it was an *Epistephium* that had never been described, and Dr. Ruschi did me the honor of giving it my name, *Epistephium mardeni* (page 510).

A little before midnight on New Year's Eve I walked down to the bridge that spans the small stream that flows through Andaraí. Puffing on a good Brazilian cigar, I leaned on the parapet and looked up at the gray-green El Greco sky that shifted and changed behind the mountains that rim the town. Under the bridge a croak of frogs was hoarsely quoting Aristophanes, sounding a bass chorus to the thin solo voice of the stream.

At the stroke of midnight pistol shots banged around the town, and a rocket arched into the sky to explode in golden rain. Another year had gone forever, but I shall always remember it as the year we added one more to the list of the strangest and most beautiful flowers in the world. □

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*The author wrote of Dr. Ruschi in "The Man Who Talks to Hummingbirds," NATIONAL GEOGRAPHIC, January 1963.

"The divine mystery in things," cherished by the writer Dostoevsky, seems concentrated in the "Pink Lady," an outstanding Cymbidium hybrid that took six years to flower. Both of its parents were also hybrids, one the winner of the British Royal Horticultural Society's highest award.

CYMBIDIUM SUSPENSE 'PINK LADY,' THREE TIMES LIFE-SIZE; ROD MCCLELLAN CO.

WHERE OLD HAWAII STILL LIVES
MAUI

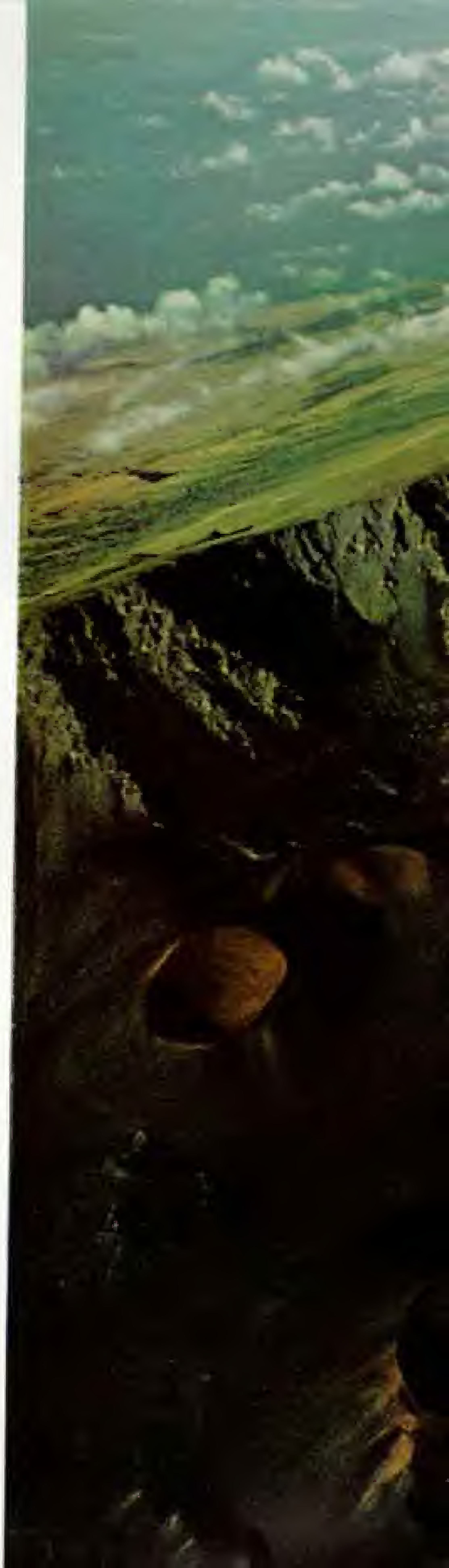
By KENNETH F. WEAVER
ASSISTANT EDITOR

PHOTOGRAPHS BY
GORDON W. GAHAN

"OPEN YOUR EYES—Beware the Fiery Car!" It is a voice from the past, this warning sign where my road crosses the tracks of the Lahaina-Kaanapali & Pacific Railroad on the island of Maui.

You can translate the Hawaiian words—*Akahele I Ke Ka‘aahi*—more formally, but the essence of their meaning is what I have written. That is how the old-timers understood them, in the days when trains 30 cars long moved sugar cane in endless quantities to the Pioneer Mill down the road.

The sugar trains are gone, replaced by mammoth trucks, but another and fancier "fiery car"—all red and black and shining brass—chuffs along in front of me. An authentic reconstruction of a 19th-century locomotive, put into service just a year ago, it tugs carriages of laughing passengers six miles from Lahaina, historic port



"House of the Sun," erosion-ravaged Haleakala Crater crowns Maui, second largest of Hawaii's isles. From the volcano's heights, legend tells, the demigod Maui snared the sun to slow its journey and thus give mankind more daylight hours. Crystalline air of the 10,023-foot summit helps observatories of "Science City," on the far ridge, track satellites and probe space.

Glowering war god Ku (left), carved by Maui sculptor Sam Kaai, reflects the islanders' renewed interest in their heritage.

KODACHROMES BY GORDON W. GAHAN (RIGHT)
AND KENNETH F. WEAVER © N.G.S.

of whalers and missionaries, to Kaanapali Beach, Maui's gold coast of resort hotels. Like the crossing sign, it too evokes the past.

Now the puffer-belly's melancholy whistle echoes from Kekaa, the sacred black rock that juts into the sea by our hotel cottage. There, long before the days of hotels or sugar mills or whalers or missionaries, the souls of Maui folk came to leap into the spirit world.

On Maui the Past Refuses to Die

In much of Hawaii, the onrushing present is relentlessly obliterating the past. The taro patch and grass shack give way to the subdivision, the freeway, the high rise. Fewer and fewer Hawaiians remember the traditions, the old chants, the old skills. "The child of the land is fading," says my friend Sam Kaai.

But on Maui the past is fighting back, and that is what, for me, makes Maui the most fascinating of all the Hawaiian Islands.

To be sure, Maui has its share of tropical enchantment, and would be pleasant enough for this alone. Red hibiscus and white-and-yellow plumeria bloom around our sea cottage at Kaanapali. Palms rustle in the cooling trade winds that funnel through the channel between West Maui and Molokai. Beyond the crescent beach and the curling surf, my wife and I can follow white sails against the

cloud-topped slopes of Lanai, 10 miles away, or watch the spectacle of a Pacific sunset behind Kekaa's jagged silhouette.

On the *mauka* side (everyone in Hawaii says "mauka" when he means inland), beyond close-cropped golf fairways and bright stretches of sugar cane, a rainbow often arches across the mile-high mountains of West Maui. Mist and clouds play among the peaks, and precipitous ravines, shrouded in green, testify to eons of massive rainfall.

Not far away—Maui is only 48 by 26 miles at the outside—I found other treats: lush rain forests abloom with ginger and heliconia, towering waterfalls, a slumbering volcano.

EKTACHROME (ABOVE) AND KODACHROMES BY GORDON W. GAHAN © N.G.S.

Cigar-smoking grandmother, the pineapple harvester (left) came from the Philippines in 1965 to Maui's melting-pot society. Polynesian forebears of the taro farmer above had settled the uninhabited Hawaiian isles by about A.D. 750. Europeans began to arrive after Capt. James Cook discovered the archipelago in 1778. In the late 1800's and early 1900's, the need for workers in the sugar and pineapple industries attracted immigrants from China, Japan, Portugal, and the Philippines. Plumeria blossoms enhance the beauty of a Maui schoolgirl of pure Filipino blood (top).

Maui has all this indeed, but it has much more—the smell and sense of time. As I roamed the island, which is in fact a double island connected by a narrow isthmus, I kept hearing voices of the past.

The old and the new come together most gracefully on Maui's western end at Lahaina, once the royal capital of the Hawaiian Islands and a busy port, now a charming but sleepy town that lives by sugar, pineapples, and tourists (pages 522-3).

Sugar affects Lahaina quite visibly: The high stack of the Pioneer Mill dominates the town, and rampant fields of cane all but squeeze the slender community into the sea. When the fields are put to the torch before harvest, the slightly acrid smell of burning cane trash often pervades the air. One morning, as I breakfasted in the open-air Old Whalers Grog Shoppe at the Pioneer Inn, a bit of "Lahaina snow"—cane ash—drifted in on the breeze and settled on my papaya.

Lahaina Wins Landmark Status

The Pioneer Inn, with its double veranda, its old-fashioned appointments, and its original house rules still posted ("Women is not allow in you room; if you burn you bed you going out; only on Sunday you can sleep all day"), gives a delightful but deceptive air of antiquity to the town. Actually the inn has operated only since 1901.

Across Front Street from the Pioneer Inn I found Tim Mitchell in the offices of the Lahaina Restoration Foundation. A transplant from the mainland, Tim is deeply concerned with the preservation of Lahaina's historical treasures and reconstruction of those that have disappeared.

The foundation, which Tim manages, is nonprofit, existing on gifts and grants. With strong support from the County of Maui Historic Commission, which strictly controls building styles, heights, and uses, the foundation has launched a major restoration plan.

"Maui has become very popular in the past several years," Tim told me, "and visitors seem to find our exhibits both entertaining and educational. We have a colorful story to tell here; this is where a lot of Hawaii's most tumultuous history took place."

In 1962 the National Park Service recognized the significance of Lahaina by designating it a National Historic Landmark.

Long before Captain Cook discovered, in 1778, what he called the Sandwich Islands, Lahaina was a pleasuring ground for the *ali'i*, or chiefs. They sported in its surf with their "wave-sliding boards."

Lahaina was ravaged late in the 18th century during the time when Kamehameha I was conquering the islands and uniting them into a single kingdom.

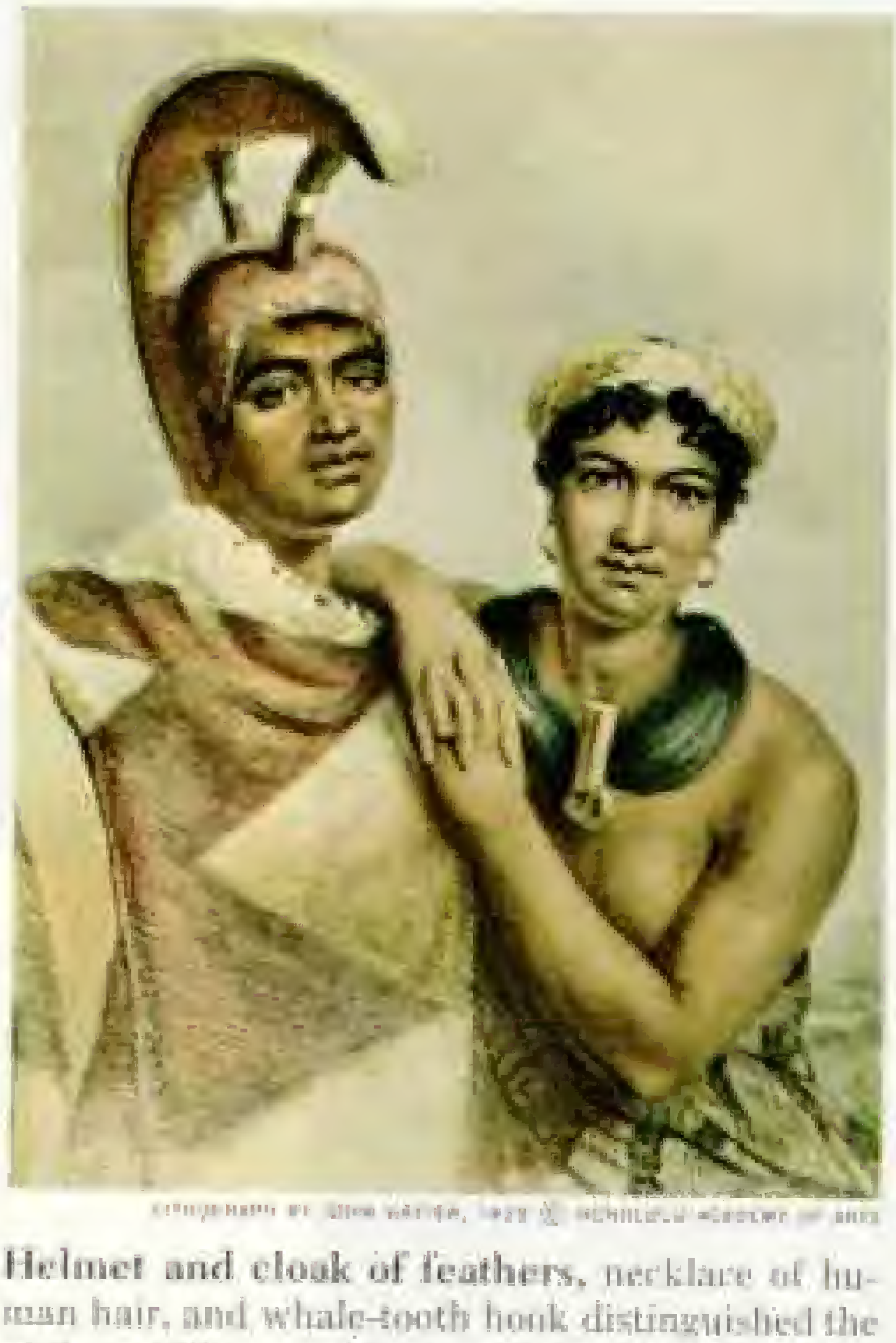
"If we had been here in those days," Tim told me, "we could have seen his war fleet, a flotilla of platformed double canoes, covering the beach for several miles."

After the conquest, Kamehameha made Lahaina his temporary headquarters. He lived in a two-story brick "palace" on the waterfront, the first Western building in the islands. The Maui Historic Commission plans an archeological exhibit on the site.

In 1819 the most turbulent period of Lahaina's history began. In that year whaling ships appeared in the roadstead—the anchorage shielded by Maui, Lanai, Molokai, and Kahoolawe. The town became the whaling capital of the Pacific, and it was never to be the same again.

In 1846, the peak year, 429 whaleships anchored off Lahaina, compared to 167 at Honolulu. In that year, records show 882 grass houses, 59 stone or wooden houses, and 3,000 residents in Lahaina.

"You can imagine the impact when as



LITHOGRAPH BY JOHN HAYTER, 1824 © HONOLULU ACADEMY OF ARTS

Helmet and cloak of feathers, necklace of human hair, and whale-tooth hook distinguished the *ali'i*—nobility—on Maui and other Hawaiian isles.

many as a thousand rowdy seamen came ashore at one time," said Tim.

Those adventuresome days come to life aboard a three-masted whaling ship, the *Carthaginian* (page 522), tied up in Lahaina's harbor, scarcely a harpoon's throw from the Pioneer Inn. Once a Baltic cargo schooner, the 93-foot *Carthaginian* was converted to a square-rigger with 17 sails for the movie *Hawaii*. Later the Restoration Foundation bought her for a floating museum of whaling.

One afternoon I went aboard to chat with Don Bell, the skipper, and Eddie Furtado. I found them busy at maintenance.

"Fighting rot—that's the big thing," said Captain Bell. "We recently had to do some redecking and put in new beams. Soon we're going to have to take off all the yards and scrape them. It's like painting the Golden Gate Bridge—we're never finished."

I left them scraping rust and went below to see the exhibits. I found myself walking inside the skeleton of a whale. All about me were memorabilia of whales and the sea—harpoons, blubber knives, try-pots for melting blubber, lanyards, deadeyes, casks, logbooks.

I sat on a bench in the *Carthaginian*'s hold and watched a movie with music of the sailor's hornpipe in the background. The film told of the wild and uproarious days when whalers from New Bedford and Nantucket "refreshed and provisioned" at Lahaina, and the crews, for whom there was "No God West of the Horn," came ashore lusting for rum and the sensuous pleasures of Hawaii.

What a place old Lahaina must have been!

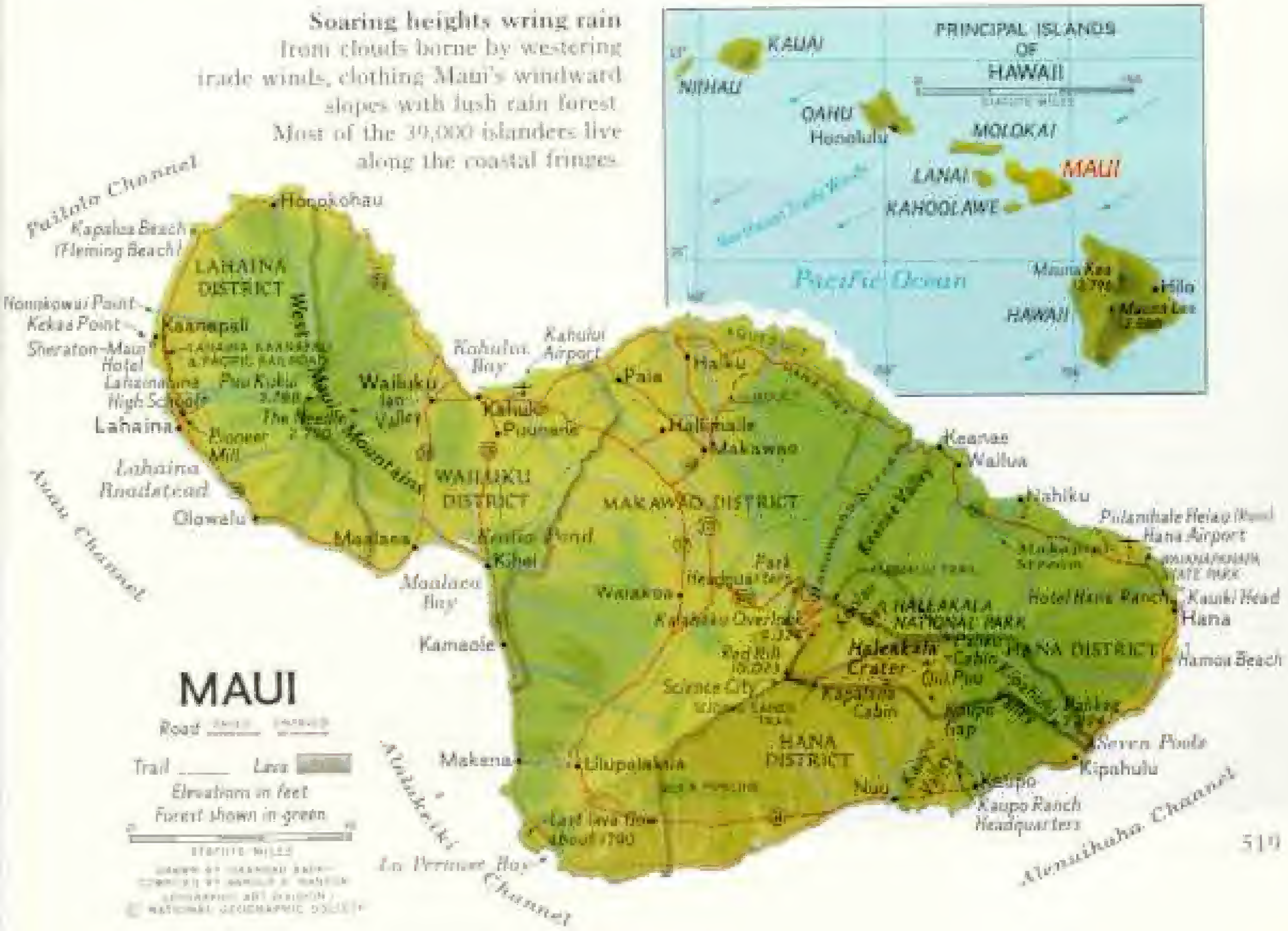
Zeal for Faith Curbs Zest for Vice

Hard on the heels of the whalers arrived Protestant missionaries from New England, bringing the Bible and much-needed medical knowledge.

Tim showed me fascinating reminders of missionary life in Baldwin House, one of the foundation's restorations. This two-story whitewashed house on Front Street was for many years the home of the Reverend Dwight Baldwin, one of the most prominent of Hawaii's medical missionaries. I marveled at its coral blocks—nearly two feet thick—and the graceful hand-hewn *ohi'a* beams.

In one of the bedrooms, among the Baldwin personal effects, I saw an incongruous item—a bed warmer. How little those New Englanders knew what to expect in the tropics!

Inevitably, friction developed between vice and virtue. "In 1825," Tim said, "when the chiefs put a *kapu* [taboo] on women visiting



Soaring heights wring rain from clouds borne by westering trade winds, clothing Maui's windward slopes with lush rain forest. Most of the 39,000 islanders live along the coastal fringes.

PRINCIPAL ISLANDS OF HAWAII
STATUTE MILES
KAUAI
NIIHAU
OAHU
Honolulu
MOLOKAI
LANAI
MAUI
KAHOOLAWE
Pacific Ocean
Mauna Kea
Hilo
Mauna Loa
HAWAII
MAUI
Road
Trail
Lava
Elevations in feet
Forest shown in green
STATUTE MILES
© NATIONAL GEOGRAPHIC SOCIETY
Pailolo Channel
Honokohau
Kapalua Beach (Fleming Beach)
LAHAINA DISTRICT
Nonnikowai Point
Kekaa Point
Kaanapali
Sheraton-Maui Hotel
Lahainaluna High School
Lahaina
Pioneer Mill
Puu Kukui
The Needle
West Maui Mountains
Lahaina Roadstead
Olowalu
Auau Channel
Maalaea
Waikapu
Wailuku
Iao Valley
WAILUKU DISTRICT
Kahului Bay
Kahului Airport
Kahului
Puunene
Kealia Pond
Kihei
Maalaea Bay
Kamaole
Makena
La Perouse Bay
Alalakeiki Channel
Last lava flow about 1790
Paia
Haiku
Haliimaile
Makawao
MAKAWAO DISTRICT
Park Headquarters
Waiakoa
Kalahaku Overlook
Red Hill
Science City
Haleakala Crater
Kapalaoa Cabin
HALEAKALA NATIONAL PARK
HANA DISTRICT
Kaupo Gap
Keanae
Wailua
Nahiku
Piilanihale Heiau
Hana Airport
Hotel Hana Ranch
Kauiki Head
Hana
Hamoa Beach
Seven Pools
Kipahulu
Kaupo
Kaupo Ranch Headquarters
Nuu
Alenuihaha Channel

the ships, angry seamen from the English whaler *Daniel* roamed the streets for three days, repeatedly threatening the missionaries, whom they held responsible for the edict.

"Violence struck again in 1827 when the whaler *John Palmer* fired on the town after a dispute about women coming aboard. The missionary families took refuge in the cellar while cannonballs landed in the mission yard."

After that the chiefs erected a coral-stone fort along the waterfront. Each evening at sundown a soldier on the ramparts "beat a drum furiously" as a warning to seamen to return to their ships. Those who did not were imprisoned in the fort.

I saw reconstructed corners of the fort near the Pioneer Inn. But on Prison Road, a couple of blocks away, I got a real feel for those troublesome times. In the walled prison compound of Hale Paahao, "Stuck-in-irons House," I saw the cells and shackles that once detained men who had deserted ship, worked on the Sabbath, or offended the community by drunkenness or reckless riding.

Oil Discovery Ends Whaling Boom

Despite the problems, Lahaina profited greatly from the whalers. But the prosperity could not last. With oil discoveries in Pennsylvania in 1859, the whaling industry began to wane. Whale oil gave way to kerosene; whalebone for corsets was replaced by cheaper celluloid and steel.

As the Maui Historic Commission has written, "They are all gone now, the kings and their counselors, the whaling masters and the harpooners and the try-pot men, the ship-chandlers, grogshop keepers, seamen's chaplains, and land sharks. Only the whales remain, coming down each mating season to leap and frolic and spout in the roads."

The characters of the play are gone, but some of the props for the sets are still there, giving to Lahaina an indelible air of history and adventure.

With Pete Sanborn, one of Lahaina's civic leaders, and project manager for AMFAC, Inc., developers of the Kaanapali Beach resort area, I toured the environs of Lahaina.

On a rise high above town we found Lahainaluna High School—"the oldest school west of the Rockies," Pete said. "It was founded in 1831 by the missionaries to train Hawaiian teachers. There is a tradition that some students came here from the U. S. West Coast rather than travel east through Indian country. Today it's the only boarding school operated by the State of Hawaii."

Neither teachers nor students were to be found when we visited Lahainaluna last summer. But we went into one of the original buildings, a simple square coral structure where the Restoration Foundation operates a museum. There Pete showed me a replica of the press that printed the first newspaper west of the Rocky Mountains. It was set up by the missionaries to print textbooks in the Hawaiian language. The attendant at the museum inked the plate, laid down a sheet of paper, and ran off a handbill for me.

EKTACHROME (ABOVE) AND KODACHROME BY GORDON W. GAHAN © N.G.S.

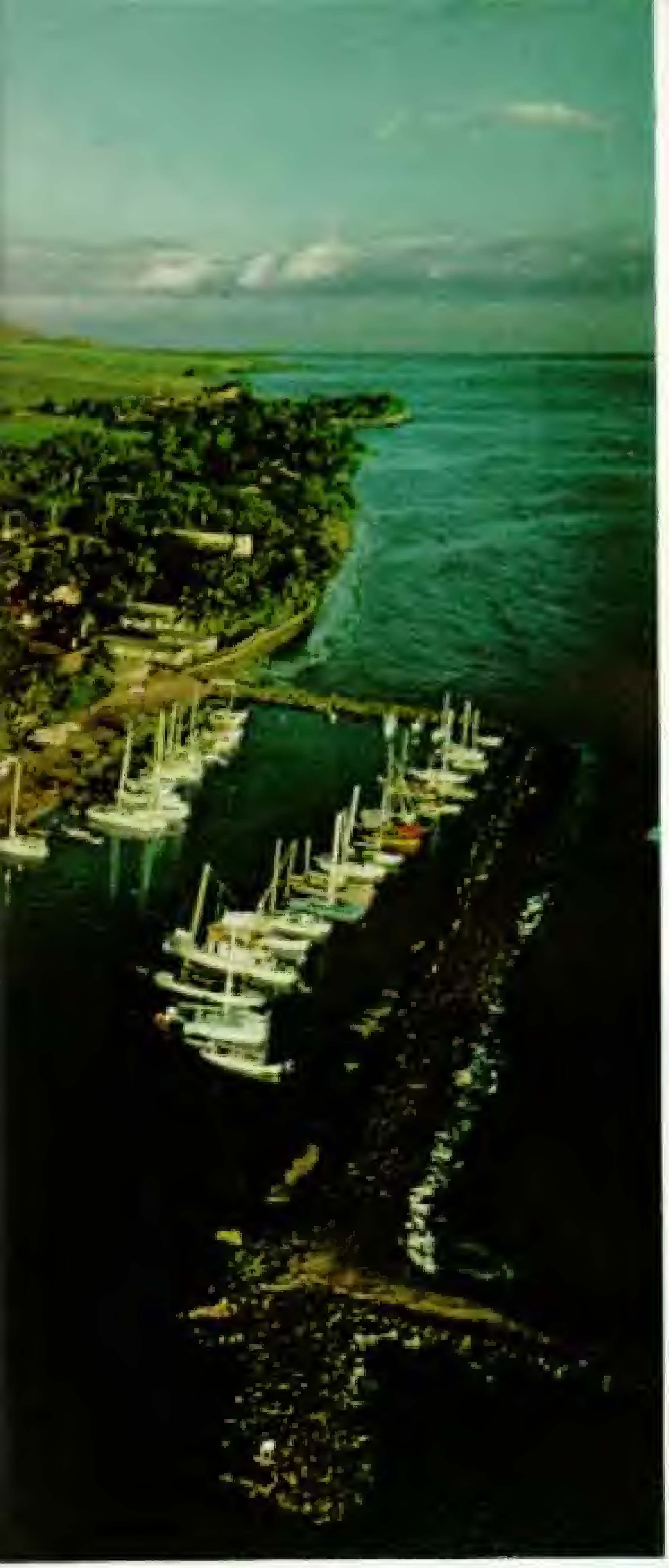
Free spirit meditates in the nude at sunset on a secluded East Maui beach. To the consternation of many citizens' groups, easy-living youths have flocked to impromptu communes in Maui's isolated fastnesses, sleeping in rude shelters and eating the island's plentiful fruit and fish.

Slicing a path in the sea, a teen-age surfer rides the crest of a six-footer near Honokowai Point on West Maui. Though less challenging than the mountainous breakers of Oahu, Maui's tricky waves still lure surfing buffs. When Europeans reached the islands, they found Maui's chiefs frolicking off Lahaina on immense "wave-sliding boards." Some of them weighed 100 pounds, compared to today's 8- to 12-pound boards.

At Waiola Congregational Church we found the graves of missionary families and of members of the ali'i, notably Keopuolani, sacred queen of Kamehameha I and mother of the two kings who followed him.

When we attended services at Waiola, where (in an earlier building) the Reverend Dr. Baldwin used to preach, the sermon was in English, but we sang from Hawaiian hymnbooks: "*Hoonani I Ka Makua Mau*—Praise God From Whom All Blessings Flow."

There is more to Lahaina, of course, than mementos of the past. On a given afternoon, for example, I could go to the "town square" and sit in the shade of Lahaina's century-old banyan tree—which covers two-thirds of an acre—listening to the chatter of the mynas, or appraising the displays of local artists. Or I could stroll into The Gallery, a collector's shop with an incredible display of Oriental treasures in bronze, porcelain, ivory, jade, and silver. I priced some of them: $30,000



Port of call for history

NOW-PEACEFUL ROADSTEAD of Lahaina belies its turbulent past. In 1795 Kamehameha I conquered the town and yoked Maui to a kingdom that eventually included all the Hawaiian Islands. One of his successors made Lahaina the royal capital.

The town became the whaling hub of the mid-Pacific by the 1840's; its streets aswarm with pleasure-starved seamen. A missionary denounced it as "one of the breathing holes of hell." Virtue finally triumphed, but only after the whaling boom ended in the 1860's. Today, sugar, pineapples, and tourism buoy the town's economy. Lahaina was designated a National Historic Landmark in 1962; several of its old buildings have been painstakingly restored. At a pier before the red-roofed Pioneer Inn (left), the square-rigged *Carthaginian*—featured in the motion picture *Hawaii*—now serves as a floating museum of the whaling era.

During the boisterous Whaling Spree, an annual celebration of Lahaina's past, an entrant in a beard-growing contest (below) grooms his prize-winning whiskers.

EKTACHROMES © N.G.S.

for an Imperial jade bracelet; $3,200 for a Chou Dynasty bronze vessel in the shape of a crouching griffin; $7,000 for a pair of lapis lazuli table screens.

If I could not afford these, at least I could spend 25 cents in the ice-cream parlor for a sherbet flavored with island fruits—guava, mango, or passion fruit; or savor *saimin* or pork *tofu* in Morikawa's tiny restaurant; or visit the studio of Maui artist Tadashi Sato, whose impressionistic paintings of rock, sea, and shore have won international acclaim.

At Lahaina Jodo Mission one night I joined members of the town's Japanese community in the annual O-bon festival at which, according to Buddhist belief, departed spirits come back to visit (next page). In the cemetery, incense hung on the air and paper lanterns and flowers decorated each grave as families sat communing with their ancestors.

In the adjoining temple yard, lights glinted on the copper roofing of a brand-new pagoda and illuminated the serene face of a 12-foot bronze Buddha. Booths selling food and drink or offering games of chance catered to the throngs. Inside the temple I listened as five black-robed priests recited passages from the Sutra in a rapid monotone, accompanied by the loud beating of wooden blocks.

After the services, members of the congregation carrying paper lanterns left the temple and moved in single file around the Buddha. Then, as I joined the procession, it wound down to the shore to place the lanterns on the water. Soon a long ribbon of softly glowing lights floated on the tide.

"They symbolize the return of the spirits to the Buddhist paradise," the Jodo priest, the Reverend Gensho Hara, explained.

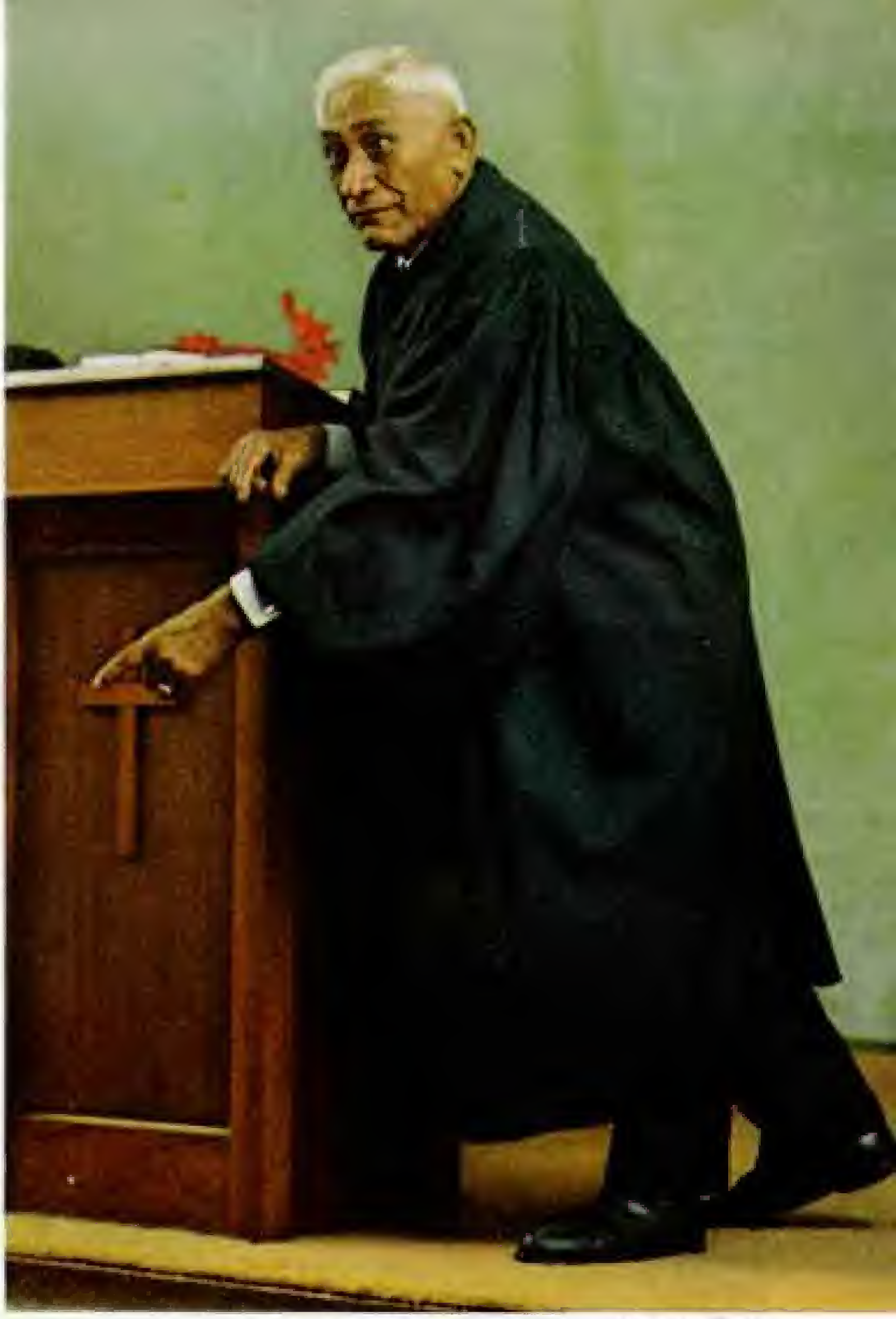
The lantern ceremony ended. Folk dancers in Japanese costume now circled a central pavilion, their stylized postures and gestures keeping time to the wailing of a flute and the offbeat rhythms of the drummer.

One of the most passionate believers in preserving the past, and one who has done something about it, is Sam Kaai, a native of Maui; wood-carver, sculptor, and businessman whose ancestry includes Hawaiian, Chinese, Portuguese, and French. ("My great-grandfather was a seaman from the Azores who jumped ship on Maui," Sam told me.)

To stem the decline of Hawaiian culture, Sam encourages artisans to take up the old arts and crafts. In a shop in Lahaina called Ka Honu (The Turtle) he sells their work. There he showed me the finest wood carving I saw in Hawaii, of koa and monkeypod; leis—necklaces—of shiny black nuts from the kukui, the state tree of Hawaii, skillfully grooved or faceted; handbags of lauhala, the leaf of the pandanus tree; exquisite hatbands of pheasant feathers; even scrimshaw, the sailors' hobby—polished whale teeth delicately engraved with scenes of whales and ships. To these Sam adds the ethnic arts of some 30 islands in the South Pacific, whence came the first Hawaiian settlers.

In his studio I found Sam working with adzes of his own manufacture, fashioned

EKTACHROME © NATIONAL GEOGRAPHIC SOCIETY



EKTACHROME © N.G.S.

Pointing to perdition, the Reverend John Kukahiko of Keawalai Congregational Church near Makena exhorts parishioners with a fervor worthy of Hawaii's first missionaries.

Arriving in the islands in 1820, a pious band of New England evangelists wrought a cultural revolution—Christianizing many, building schools, devising a written form of the language, translating and printing the Bible, and imposing as best they could a moral discipline that often ran against the grain of the free-living islanders. Sighed King Kamehameha II when a missionary implored him to change his ways, "Give me five years more, and I will become a good man!"

Twirling ceremonial flags, a kimonoed Japanese lass at Paia steps to the music of flute and drum at a Buddhist O-bon festival honoring ancestral spirits. The Japanese make up Hawaii's largest ethnic group.

from jeep springs and GI mattocks but designed to imitate the stone adzes of old. A newly carved image of Ku, ancient god of war, scowled fiercely at my intrusion.

I had always thought of the adz as a crude tool. But in Sam's hands it was capable of amazingly delicate work. "It's all in the angle of the blade and handle," he explained. "If the angle is correct, the blade bites in just the right amount."

Somewhat disbelieving, I asked to try it. To my surprise, a few easy strokes on an undressed mahogany log left a beautifully smooth, even surface.

"House of the Sun" Dominates Isle

No matter where I went in the isthmus or on East Maui, I could not escape the presence of Haleakala. Indeed, East Maui *is* Haleakala, one massive volcanic upthrust that rises steadily from the sea to a spectacular depression at its peak.

Haleakala means "House of the Sun." It takes its name from a legend told throughout Polynesia about a struggle between the sun and the demigod Maui. Here is the story as Sam Kaai told it to me:

"Long before the reach of memory, the sun sped so rapidly across the heavens each day that men had too little time to harvest crops and bring in fish. Hina, Maui's mother, complained that sundown always came before she could finish drying her tapa, the Polynesian cloth made of pounded bark. Maui asked the sun to slow its pace, but in vain.

"Watching from hiding, Maui observed that the sun each day passed directly over the mountain, and there came very close to earth. So Maui, famed as a trickster, devised a plan to catch the sun and force it to do his bidding.

He wove ropes of his sister's hair, took the jawbone from his grandmother's grave for a hook, and lay in wait atop the mountain.

"When the sun reached its closest point, Maui hurled his hook, caught the sun by its rays, and refused to let go until the sun promised to go more slowly for half the year. And thus it is that, in summer, man has time to harvest his fields and dry his tapa. And that is why the mountain is called House of the Sun."

It was this same legendary hook with which Maui dredged up the islands of Hawaii from the ocean floor. It is not by coincidence that the hook is one of the royal symbols of Polynesia, and that Hawaiian royalty once wore leis of finely braided human hair from which hung massive hooks carved from whale teeth (page 518).

Writers have called Haleakala "the largest extinct volcanic crater in the world," a description that is wrong on all counts. Many craters are larger. Moreover, although the volcano's fiery indigestion has long since subsided, it gives an occasional burp. As recently as the late 1700's, a tongue of lava poured from its side near La Perouse Bay.

Finally, the huge depression one sees today atop Haleakala was created primarily by erosion, not volcanism. Over many millenniums it has been cut down by torrential rainfall and by two streams that carved Keanae Valley to the north and Kaupo Valley to the south, leaving two great gaps in the crater rim.

Overlook Borders a Black Abyss

Early one morning we drove to the top of the mountain to watch the sun come up over the crater. We passed the sleeping towns of Wailuku, the county seat, and Kahului, the island's port and chief air terminal, cut through rural avenues lined with cane and pineapple, then switchbacked up the dark mountainside through cattle pastures and eucalyptus groves. The road narrowed to eight feet before we finally passed timber line and reached Kalahaku Overlook at 9,324 feet.

And overlook is the right word: Below the restraining rail the crater wall dropped with frightening suddenness into a black abyss whose boundaries we could not see.

Only the wind broke the stillness, a chill wind that kept us huddling in our warmest clothes, remembering ruefully the balmy seashore temperatures we had left below.

Beneath us a majestic sea of clouds surrounded the mountain to the north and east. Warm, moist clouds often pile up against Maui's windward slopes, dropping as much as 400 inches of rain a year in places.

With the coming of daylight—as pinks turned to yellow and gold and overwhelmed the purple shadows—Haleakala's full dimensions spread before us. On the floor half a mile below, a black river of hardened lava and a dozen or so huge cinder cones—red and brown and black—gave evidence of volcanic eruptions since the present crater was carved out by water. Nearly seven miles away rose the steep wall of Paliku, the pali (cliff) that encloses the crater on the east.

At the crater's southwest corner and just under its summit (10,023 feet), we found a gathering of gleaming white domes that seemed strangely out of place in this austere, lifeless world (page 515). They are observatories, taking advantage of Haleakala's clear, rarefied atmosphere. Collectively known as "Science City," they carry on research for the University of Hawaii, the U. S. Department of Defense, the Smithsonian Institution, and other agencies.

By day a handful of men at Science City study the constantly changing face of the sun. At night other men monitor the passage of missiles and satellites, and photograph infrared emissions from the stars.

KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

Pup jumps from the trough as cowhands on Kaupo Ranch water their mounts during roundup. Maui accounts for about a fifth of the beef produced in the islands.

Paniolos—Hawaiian cowboys—take their name from a mispronunciation of *españoles* —Spaniards—a title applied to Mexican cowpunchers who came in the 1820's.

EKTACHROME © N.G.S.

Pineapples pattern the land near Paia. The hand-picked harvest, second only to sugar on Maui, sweetens the economy by some $20 million annually.

KODACHROME BY GORDON W. GAHAN © N.G.S.

Suburbia, a new phenomenon on Maui, spreads outward from Kahului, the island's present-day port. A 25-year plan, four-fifths completed, directs the growth of the city.

62

KODACHROME © N.G.S.

Like an Impressionist painting, a photograph captures the daughter of a Japanese carnation grower dashing through a field of blossoms. Trucked into nearby Waiakoa, they will be strung into leis, the flower necklaces that mean welcome, farewell, congratulations, and love in Hawaii.

Even losers wear leis. Members of the junior varsity football team of St. Anthony School in Wailuku slake their thirst after a loss to Lahainaluna High School. Maui's largest town, with 8,000 residents, Wailuku is the government seat of Maui County, which also includes the islands of Lanai, Molokai, and Kahoolawe.

Two well-marked trails enter the crater: Halemauu Trail, a series of steep switchbacks best descended on horseback, and Keoneheehee (Sliding Sands) Trail, a longer but gentler route.

We opted for Sliding Sands, and in the company of Larry Guth, one of the rangers for Haleakala National Park, began a two-day trek through the crater.

The trail is well named. For several miles it loops across a broad, smooth slope of cinder and ash. Shoes grip with difficulty.

Larry told us of a couple who left the trail, in violation of park rules. "They slipped and there was nothing to stop them. When their long slide ended, one was dead and the other badly injured."

Silence Mantles a Lifeless Realm

An unearthly silence settled over us shortly after we began our descent. No sound of plane or machine filled the thin air, no voice of man or animal, no insect hum. On this barren slope, neither tree nor shrub nor grass rustled in the breeze. Just dead silence, a disquieting absence of the everyday noises with which man always lives. Only the scuff and crunch of our boots on the cindery path brought us back to reality.

It was the House of the Sun we had entered, but the sterile wasteland of fragmented lava, dotted with rock and boulder, seemed more lunar than solar.

"I felt like the Last Man, neglected of the judgment, and left pinnacled in mid-heaven, a forgotten relic of a vanished world," wrote Mark Twain in *Roughing It* after first looking into Haleakala. His words seemed especially appropriate at this point.

At length we reached the bottom. By now we were finding vegetation: bunch grass, bracken fern, an orange-berried shrub called pilo, and a heatherlike evergreen, called pukiawe, with red and white berries.

But most exciting was an occasional glimpse of the silversword, a spectacular plant found nowhere in the world except on the arid volcanic heights of Maui and Hawaii (page 540).

A member of the sunflower family (although superficially there is not the slightest resemblance), this silvery globe displays a hundred or more thick spiky leaves densely covered with silky down. After growing for as long as 20 years, the plant produces a tall stalk with scores of purplish blooms, then dies.

Once abundant, the silversword has been all but exterminated by wild goats, cattle, and thoughtless souvenir hunters. Today it is protected and slowly making a comeback.

After a brief lunch of apples, cheese, and raisins at Kapalaoa Cabin, one of several shelters maintained by the Park Service, we moved on through a sea of coarse cinders and clinkers where Pele, the goddess of volcanoes, seemed to have emptied a thousand ash barrels. Waist-high ferns almost blocked the trail at times. We passed a rare sandalwood tree, heavily festooned with moss.

Suddenly Larry stopped and held up his hand. "Listen. You can hear the nene."

Sure enough, three Hawaiian geese—grey birds with striped throats and black caps—were honking at us no more than a hundred feet from the trail—the first animal life we had spotted (page 541).

"The nene is like the silversword," Larry said; "it exists naturally only on the islands of Maui and Hawaii. It was once extinct on Maui, but in 1962 the Park Service brought a few birds from the other island. So far, no goslings have lived, and the nene's future here is uncertain—more the pity, since it is Hawaii's state bird."*

Part of the nene's undoing is the mongoose, a weasel-shaped animal imported into the islands in 1883 to kill rats on the plantations. The mongoose preys on birds' eggs. Ironically, it is ineffective as a rat fighter—the mongoose hunts by day, but the rat is nocturnal.

Goats Pose a Threat to Island Park

Throughout the day we had seen clouds flowing through the two gaps and hanging in tendrils from the palis to the north and east. Now, as we rounded Oili Puu, last of the cinder cones, mist dampened our faces. Rain threatened ahead.

We stopped under a mamane, a small shrublike tree with tiny leaflets, to empty the sand from our shoes.

"Notice the tree's umbrella shape," Larry said. "Goats have stripped it as far as they can reach. That's a sure sign of overbrowsing."

We had heard the bleating of goats from the cliffs, though we had not been able to see them. But a few moments later, a black-haired billy and his harem of five brown nannies scampered across our trail.

These handsome animals, possibly descendants of the goats originally introduced by Captain Cook, run wild on the mountain. Many slopes show severe erosion because goats have chewed vegetation to the roots. By controlled hunting, the park tries to keep the population in check.

"Portagee" Lilt Flavors Cowboys' Speech

Paliku ranger cabin, a welcome sight after our ten-mile hike, stands in a meadow of heavy grass at the very base of a sheer thousand-foot cliff. No sooner were we safely indoors than the rains came down.

Larry explained that this end of the crater gets a great deal of spillover from the torrential downpours of windward Haleakala.

"In 1968 we got 250 inches of rain here at Paliku. That's far wetter than the wettest place in the continental U. S."

The jangle of spurs and the blowing of horses announced the arrival of company—three employees of the park who had been hunting goats and checking on the nene. They were members of a substantial Portuguese community at Makawao, which provides many of Maui's cowboys.

Supper featured venison from Molokai and meat from the goats the men had killed. Conversation turned often to the exploits of horsemen, with sentences ending in the lilt so characteristic of Hawaiian "Portagee" speech.

In my bunk after dinner, as I drifted into slumber, I heard one of the men telling how his horse had once spooked on Halemauu, throwing him over the cliff. . . .

Early the next morning we headed for Kaupo Gap. Misty veils drifted across the precipitous cliffs and gulches. Our trail led through sopping-wet grass, sometimes waist high, and our shoes squished with every step.

Against the thunder of waterfalls we heard the song of the crimson apapane and the squeaky call of the iiwi, whose vermilion

Knee-deep in cabbages, a Japanese couple hoe their field near Makawao. The original Polynesian settlers brought many useful plants to these isolated islands—sugar cane, taro, bananas, coconuts, sweet potatoes, and breadfruit. Pineapples, native to South America, arrived by 1813. All continue to flourish in Maui's rich volcanic soil.

EKTACHROME © N.G.S.

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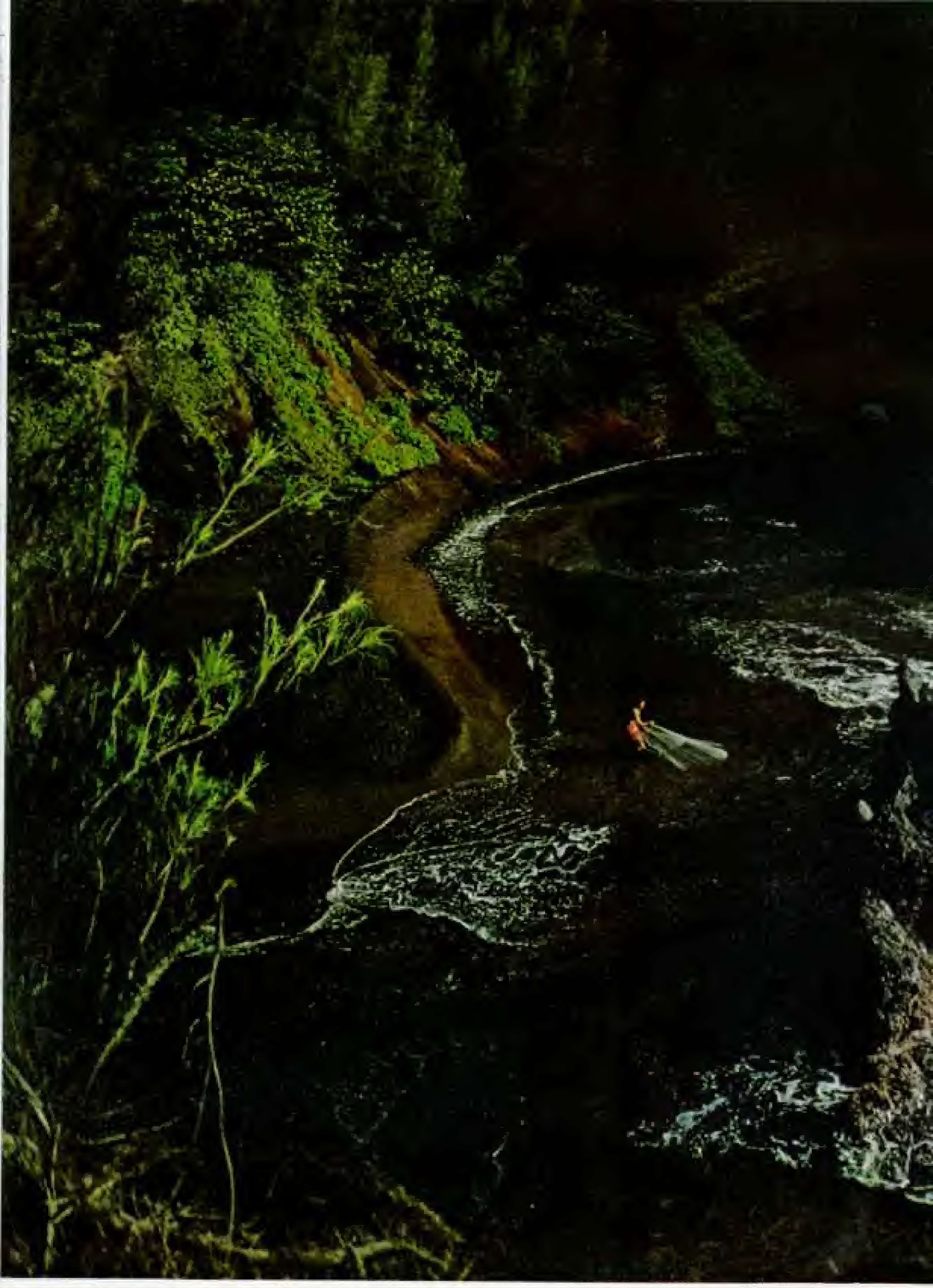
*S. Dillon Ripley reported on "Saving the Nene, World's Rarest Goose," in the November 1965 issue of NATIONAL GEOGRAPHIC.



Foaming surf breaks its sweep against the rock outcrops off Kauiki Head on Maui's east

EKTACHROME BY GORDON W. GAHAN © N.G.S.

coast, where a net-casting fisherman and a pair of swimmers make a lonely cove their own.

feathers were eagerly sought for cloaks for the Hawaiian chiefs of old.

Heavy growths of ferns, mosses, trees, and flowering plants created a lushness that had been starkly absent when we entered Haleakala Crater the day before.

Halfway down the mountain, under a giant koa tree, park ranger Tom Vaughan met us with a four-wheel-drive Scout for the rest of the journey. We were on our way to Hana.

Hana is an isolated village at the eastern end of Maui. It is also a district. In a 36-mile stretch along the deeply indented flowering coastline—from Keanae's lava tongue on the north to Kaupo, the last outpost before the desert begins on the south—live a thousand souls. But above all Hana is a state of mind, a way of life that harks back to old Hawaii.

Most of Hana's people are related to one another. The Polynesian strain is unmistakable—the strong, handsome faces, the brown skin, the love-of-life disposition, and, in a few cases, the huge bulk of the chiefs of old. Some can boast of pure Hawaiian blood (and even a little Hawaiian blood is a reason for pride in the islands).

King Sugar still reigns on Maui; the island's output of 269,000 tons helps boost the 50th State's production to first in the Nation. Woman at left unties a bundle of seed cane thrown out by her companion and drops each cutting into a prepared furrow. Some two years will pass before the cane ripens, reaching three times the height of a man.

Demand for sugar soared during the U. S. Civil War, pumping new life into an economy shaken by whaling's decline.

KODACHROME © N.G.S.

You can leave Hana by air, or you can drive a frighteningly narrow, tortuous sea-cliff road (a roller coaster on its side) that repays your apprehension with stunning views of sharply slashed gulches, cascading waterfalls, and an exuberance of vegetation.

But few of Hana's people seem inclined to leave; they already live in their version of paradise. They even call it "Heavenly Hana."

At first glance, life at Hana seems about as modern as anywhere on the island. At Hasegawa's General Store (given a measure of fame in a song written by Paul Weston some years ago) you can buy almost anything you want. TV reception is very poor in most places, because the mountain blocks transmission, yet I saw families parked along the Hana road watching portable TV's plugged into their car cigarette lighters.

But Hana is different, nonetheless. Even a *haole* (white man) outsider can sense it. Change comes more slowly here. Far more people can still speak the Hawaiian tongue, with its distinctive staccato sounds. And those who do not speak Hawaiian are adept at pidgin, a form of makeshift English with Hawaiian and sometimes Oriental words thrown in.

"*Pau* [finish] this one before you fellah go home," says the supervisor. "*Soah* my body [I'm sore all over]," says the patient. "When you *kaukau* [eat] you food, you *kaukau* one *peel* [pill], and *moemoe* [sleep] time you *kaukau* one *moah*," instructs the nurse. "*Da kine* movie one man take," is a film lecture at the community house. "*Da kine* movie all talk" is a film lacking in action.

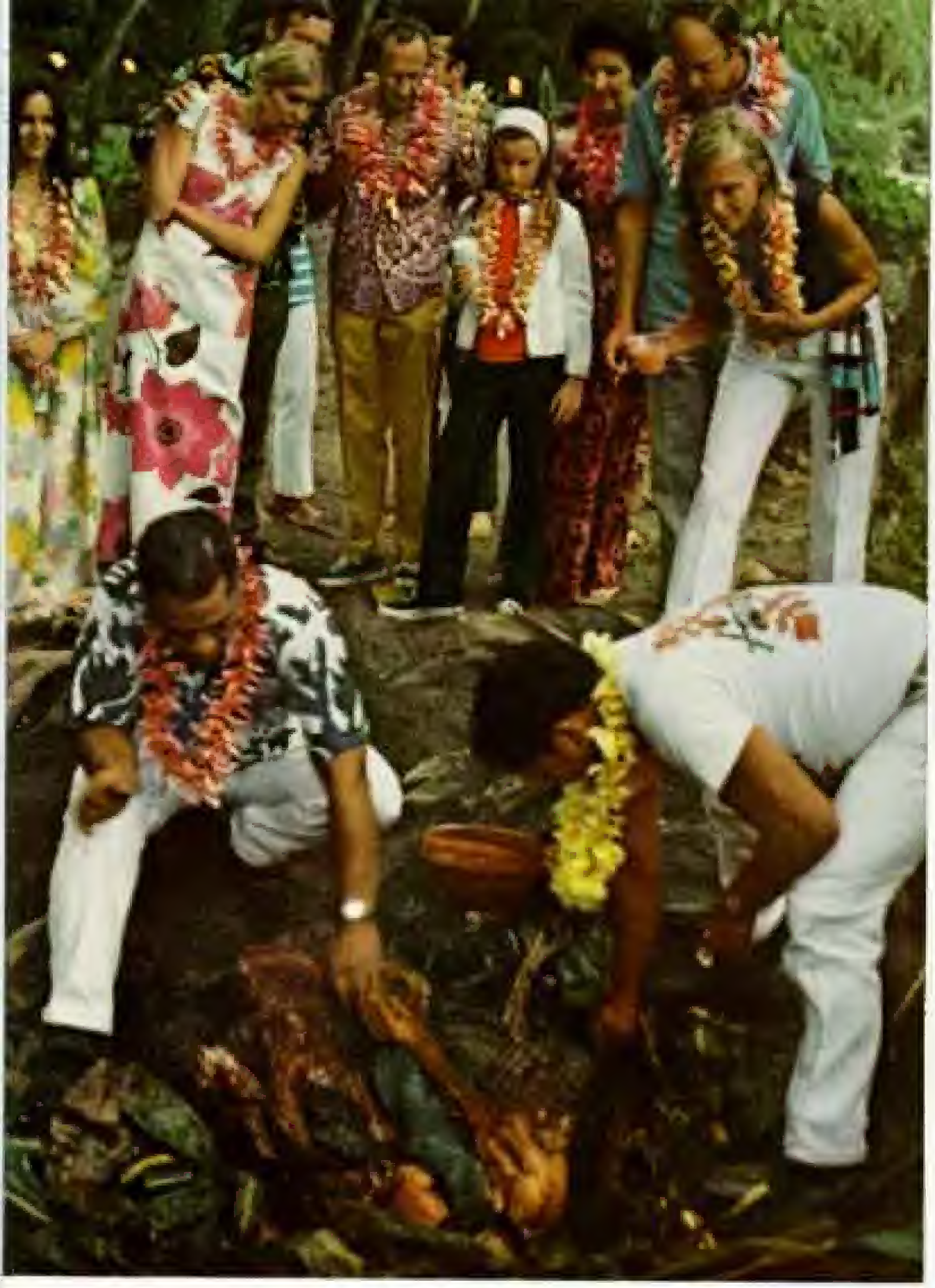
A teacher in Hana High School has used pidgin to get across difficult points in Shakespeare. And a year ago the community produced its first play to an overflow crowd—*My Three Angels*, done entirely in pidgin!

Talent for Feasting Survives in Hana

I found that the luau, or feast, still plays an important role in Hana life for celebrating a wedding, the first birthday of a child, or moving into a new house.

At such a time, regular work takes second place to preparations for the luau. What is more important, after all, than net-casting for fish in the cove behind Kauiki Head? Or wading into a pool in Makapipi Stream to net opae, fresh-water shrimp? Or clambering down the cliffs near Keanae to pry the succulent opihi (limpets) from the tidal rocks?

The old arts and crafts have not been totally lost at Hana. Mrs. Maria Marciel, an



Pungent aroma of *pua'a*—pig—baked whole in an *imu,* or earth oven lined with heated stones, tantalizes guests at a luau at the Hotel Hana Ranch on East Maui.

Echoing scalloped breakers on the shore below, balconies of the Sheraton-Maui Hotel overlook Kaanapali Beach. The hotel stands on a sacred rock from which spirits were said to leap into the world beyond.

Missing not a beat, a student at Hana Elementary School finds a whimsical and difficult way to strum his guitar—while holding an after-school snack of two wild oranges with chin and thumb.

EKTACHROMES (FAR LEFT) AND KODACHROMES © N.G.S.

English-Hawaiian whose serene face belies her 75 years, showed me how to weave lauhala mats, and Wilfred Kala demonstrated how to pound taro tubers into the mucilaginous staple called poi that Hawaiians love to eat. Machines now make poi all over the islands.

Ti Leaves Take Danger out of Pork

Traditions, customs, and religious ideas never die easily. Even today, a century and a half after the coming of the missionaries, the ancient Hawaiian spirit world has not been banished completely. Nowhere is this more evident than at Hana.

For example, as Dr. Milton Howell, Hana's beloved haole doctor, told me, "It is unwise to ask a man if he is going fishing. If he reveals his intentions, the spirits might overhear and drive the fish away. It is also taboo to take anything red in the fishing boat, and if you bring bananas along, you will be most unpopular; they mean trouble.

"It is also considered bad to take pork along on a trip. The car will not work, or you will have an accident. However, if you wrap the pork in ti leaves, there is no danger."

Spirits are widely supposed to hang about the sacred places. I heard many stories about drums beating and lights shining at the *heiaus*, or temples, where human sacrifices once took place. Some Hawaiians stay away from such spots on principle.

I found the largest heiau in the islands—a stone platform 425 feet long and 50 feet high on one side—hiding in a jungle just a few miles by jeep from Hana town. The stonework itself is being cleared of a heavy covering of guava, pandanus, and kukui trees.

"It won't do you any good to try to photograph it," one old-timer told me. "The spirits fog the film."

Fortunately the spirits weren't working very hard when I snapped my pictures.

One day I sat down to "talk story" (chat) with a group of Hana people whose memories go back a long way. I was particularly interested in learning about the *aumakua*. Every Hawaiian family once had an aumakua, a personal ancestor-god, quite distinct from such shadowy, august deities as Ku, the war god. The aumakua might take the form of a shark, a lizard, or an owl, but whatever its form it served as a family protector.

"Does anyone still believe in an aumakua?" I asked.

"I don't know anyone who does," said one *tutu* (grandmother) quickly. Then she smiled. "But I can tell you one thing—our aumakua is the shark!"

Another woman added, "Our aumakua is the shark, too, but I wouldn't go near one!"

Because the aumakua was supposed to enter the body through the head, a man's head was considered kapu—sacred or forbidden. To this day it is wise not to pinch the cheeks or pat the head of a Hawaiian child.

I asked about the *akualele*, a destructive flying spirit.

"I saw one once," said Miss Eva Kalama, who has lived in Hana all her 70 years. "I was a little girl, maybe ten. My father was a mailman and he had to go to Haiku. Between Keanae and Honomanu gulch—we were on horseback—we saw a big ball of fire, two feet across. It had a long tail, like thread.

"I asked my father about it. He said it was an akualele, and it was going to a sorcerer. Then my father yelled, and bang! The ball of fire broke into pieces and fell in the ocean."

Learning to Cherish Tradition

Can Maui continue to preserve the best of its past? Can it weather the forces that have turned some of the world's places of beauty into nightmares of noise, crowds, pollution, high rise, and bad taste?

The answer may be found in part with men like Sam Kaai and Tim Mitchell in West Maui. It may also be found in Hana town in East Maui.

Directly below Kauiki, the cottages of the Hotel Hana Ranch merge so deftly with the landscape that you scarcely know they are there. It was by design that the original builder kept the hotel unobtrusive, and the current owners intend to keep it that way.

Taylor A. "Tap" Pryor, whose Makai Corporation operates not only the hotel but also the surrounding 7,000 acres of Hana Ranch, has strong feelings on the matter:

"Hawaii is a very fragile being. It can be seriously hurt by thoughtless, unbridled development. Our aim is not to change the culture but rather to add to it, to keep a balance between pasture and people and visitors.

"We see Hana as a useful microcosm of society, of cultures pressured by civilization. But the people there have a lot to offer if they can maintain their traditional ways. We want to give them an economic base but not change them with that base."

Part of the answer to Maui's future is also

Jewel of the wasteland, a silversword gleams on the floor of Haleakala Crater. Kin to the sunflower, the plant grows only on the islands of Maui and Hawaii. Once in its lifetime of 4 to 20 years, it sends up a glorious stalk of purplish flowers, then dies.

Hawaii's state bird, the nene once flourished on Maui and Hawaii. Thousands of the geese were killed to provision whaling ships, and they became extinct on Maui. Birds reared elsewhere were reintroduced to Haleakala Crater in 1962, but survival in their native wilds remains uncertain.

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

to be found in Kipahulu Valley, an almost untouched wilderness of virgin forest and rare birds a few miles southwest of Hana.

For a look into the valley, I climbed with ranger Tom Vaughan along a slippery, waterlogged ridge, through tangles of fern and vine and fallen trees, to a promontory called Palikea. Behind us the green land gave out in a froth of white surf against black lava and an endless wash of blue Pacific. Ahead a magnificent cloud-dappled valley choked with green climbed in one sweeping turn all the way to the rim of the Haleakala Crater.

"Not many men have ever looked into this valley," Tom told me. "Far fewer have gone into it. It's one of the truly wild places on earth, an almost impenetrable rain forest."

A Wilderness Saved for Posterity

An expedition sponsored by the Nature Conservancy and the Department of the Interior struggled through Kipahulu in 1967. It found that 90 percent of the plant species in the upper reaches are native to Hawaii; in most other places in the islands exotic plants have all but crowded out the indigenous growth. Moreover, the scientists found a number of birds, varieties of honeycreepers, that are exceedingly rare. One, the Maui nukupuu, had not been seen for 71 years.

Through a gift of part of the valley by Laurance Rockefeller, and through the efforts of the Nature Conservancy and of many citizens, virtually the entire sweep of Kipahulu from sea to crater has recently become part of Haleakala National Park. Thousands of acres will never be opened to exploitation. For the foreseeable future, Kipahulu will be safe as a primitive wilderness and a textbook of nature's past—and one of the things that makes Maui very special to me.

Often on the island I heard the expression, "*Maui no ka 'oi.*" That means "Maui is the best." With that sentiment I most certainly agree. □

Caldron of dawn-gilded clouds brims in Haleakala Crater. Lava last spilled from its slopes about 1790. Recent efforts of National Geographic trustee Laurance S. Rockefeller and the Nature Conservancy have helped add the unspoiled Kipahulu Valley on the volcano's southeast flank to Haleakala National Park—thus preserving a magnificent portion of Maui's primeval wilderness.

KODACHROME BY GORDON W. GAHAN © N.G.S.

By VERONICA THOMAS

PHOTOGRAPHS BY
WINFIELD PARKS
NATIONAL GEOGRAPHIC PHOTOGRAPHER

The Arans, Ireland's Invincible Isles

“AH, SURE, the Aran people are a friendly sort—once you get to know them,” says the priest having tea with me at the hotel in Galway. It's the part about “once I get to know them” that I don't like; I wonder if they will be slow to talk to a woman.

“Well, I'll give you a little tip,” he says, winking, and down goes his voice to an ear-tickling whisper. “It mightn't hurt if you were to offer a glass of porter or two at the pub.”

The Aran Islands have two happy things in this troubled age—more than 2,000 miles of fresh, nonpolluted air sweeping in off the Atlantic and virtually no crime. Three *gardai*—unarmed policemen—represent the law on Inishmore, or Big Island, and one of them pays a token visit each month to the two smaller islands—Inishmaan and Inisheer (map, next page).

The real umbilical cord between the Arans and the

Bobbing on Atlantic swells, Inisheer islanders draw alongside the steamer that will take their children to Inishmore for confirmation. For generations the people of the sea-lashed Aran Islands have depended for transport on archaic curraghs—lath-ribbed, canvas-covered canoes propelled by long, narrow-bladed oars.

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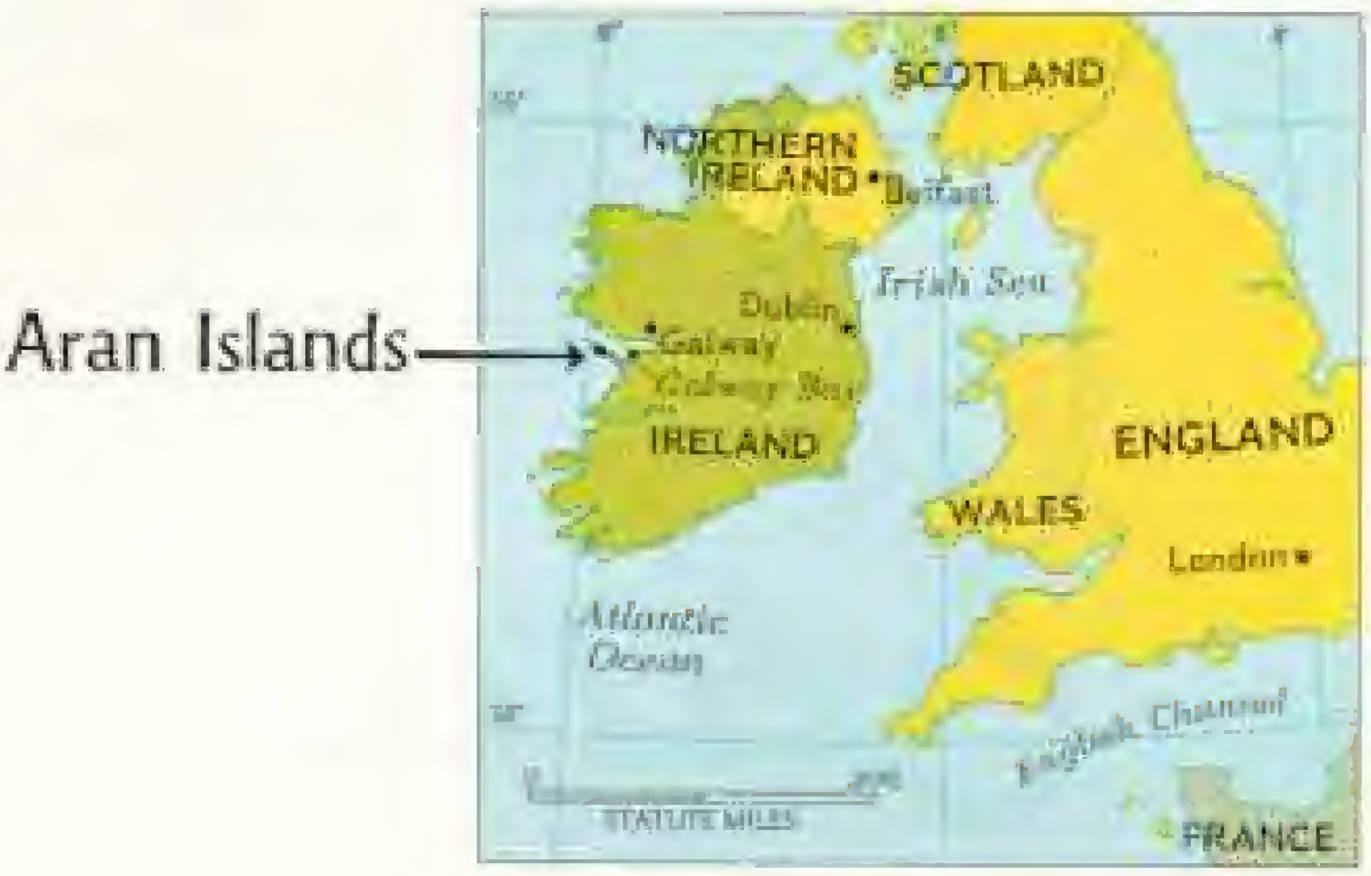
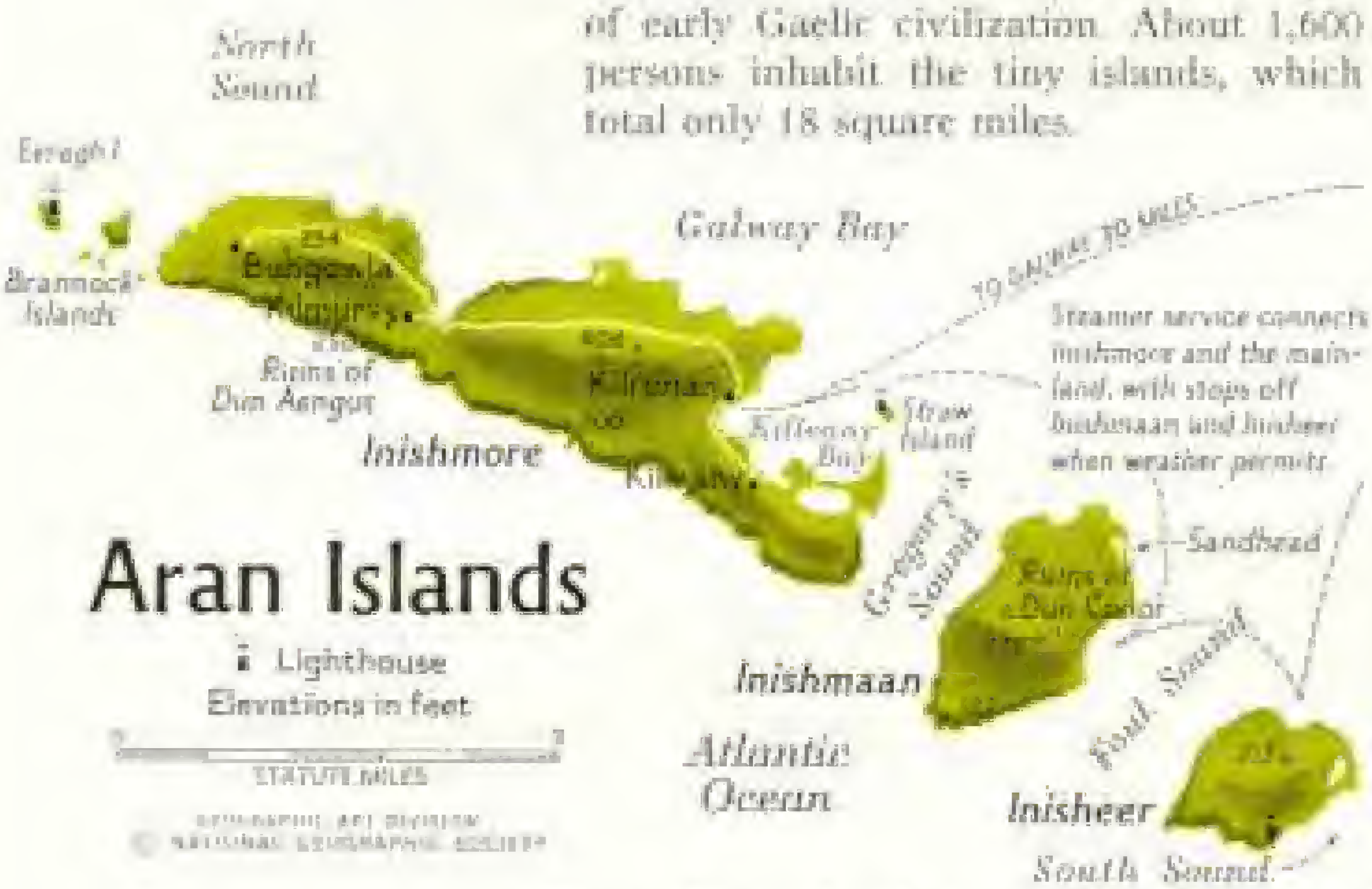

Aran Islands
SCOTLAND
NORTHERN IRELAND
Belfast
Irish Sea
Dublin
Galway
Galway Bay
IRELAND
ENGLAND
WALES
London
Atlantic Ocean
English Channel
STATUTE MILES
FRANCE

Limestone snaggleteeth rooted in Galway Bay, the Aran Isles preserve vestiges of early Gaelic civilization. About 1,600 persons inhabit the tiny islands, which total only 18 square miles.


North Sound
Eeragh I.
Brannock Islands
Bungowla
Galway Bay
TO GALWAY 30 MILES
Ruins of Dun Aengus
Kilronan
Inishmore
Killeany Bay
Straw Island
Kilronan
Steamer service connects Inishmore and the mainland, with stops off Inishmaan and Inisheer when weather permits
Gregory's Sound
Sandhead
Ruins of Dun Conor
Inishmaan
Foul Sound
Aran Islands
Lighthouse
Elevations in feet
STATUTE MILES
GEOGRAPHIC ART DIVISION
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Atlantic Ocean
Inisheer
South Sound

Fierce love of a dog, moistly proclaimed, delights a farmer in his stone-walled field on Inishmore—Big Island. Colorful wild flowers help relieve the slate-hued sameness of its nearly treeless landscape, constantly filled with the roar of the sea.

Irish mainland, 30 miles away, is the good ship *Naomh Eanna* (pronounced NAVE ANE-uh). There's a touch of South Seas excitement about steamer days. The dock at Galway seethes with action as cargo and mail are loaded and passengers arrive. Capt. Leo Tynan runs a tight little ship, but there's a pleasant sizzle of informality that a big British transatlantic line wouldn't go for at all, at all.

"Well, now, is that everyone?" shouts a navy-jerseyed sailor to the man handling the lines on the quay below. Apparently it is, for down rolls the gangway, throb go the engines, and off sails the *Naomh Eanna*, her whistle blasting across Galway Bay.*

Only the harbor of Kilronan on Inishmore can accommodate a ship the size of the *Naomh Eanna*. There is no way to land at Inisheer or Inishmaan except with a smaller boat or a curragh. Curraghs, made from wood covered with tarred canvas, have been in use for as long as men can remember.

THE STEAMER'S WHISTLE sounds; we are nearing Inisheer. I decide to go up on the bridge and meet the skipper.

Captain Tynan is so handsome that he reminds me of a movie star dressed up for the role of captain. He has blue eyes and longish gray hair with sideburns. He wears a yellow slicker over his gold-braided uniform.

A Galway man, Leo Tynan has been master of the *Naomh Eanna* for three years and, before that, her first mate for ten. Despite this solid experience, I still can't help thinking of him as an actor and the bridge a film set.

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*See "The Friendly Irish," by John Scofield, NATIONAL GEOGRAPHIC, September 1969.

KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

Inishmore, increasingly tourist-oriented, has the only airstrip, the only automobiles, and the only harbor in the Arans. Ships stopping at the two smaller islands drop anchor half a mile out, men in curraghs meet the vessels to carry passengers and freight ashore.

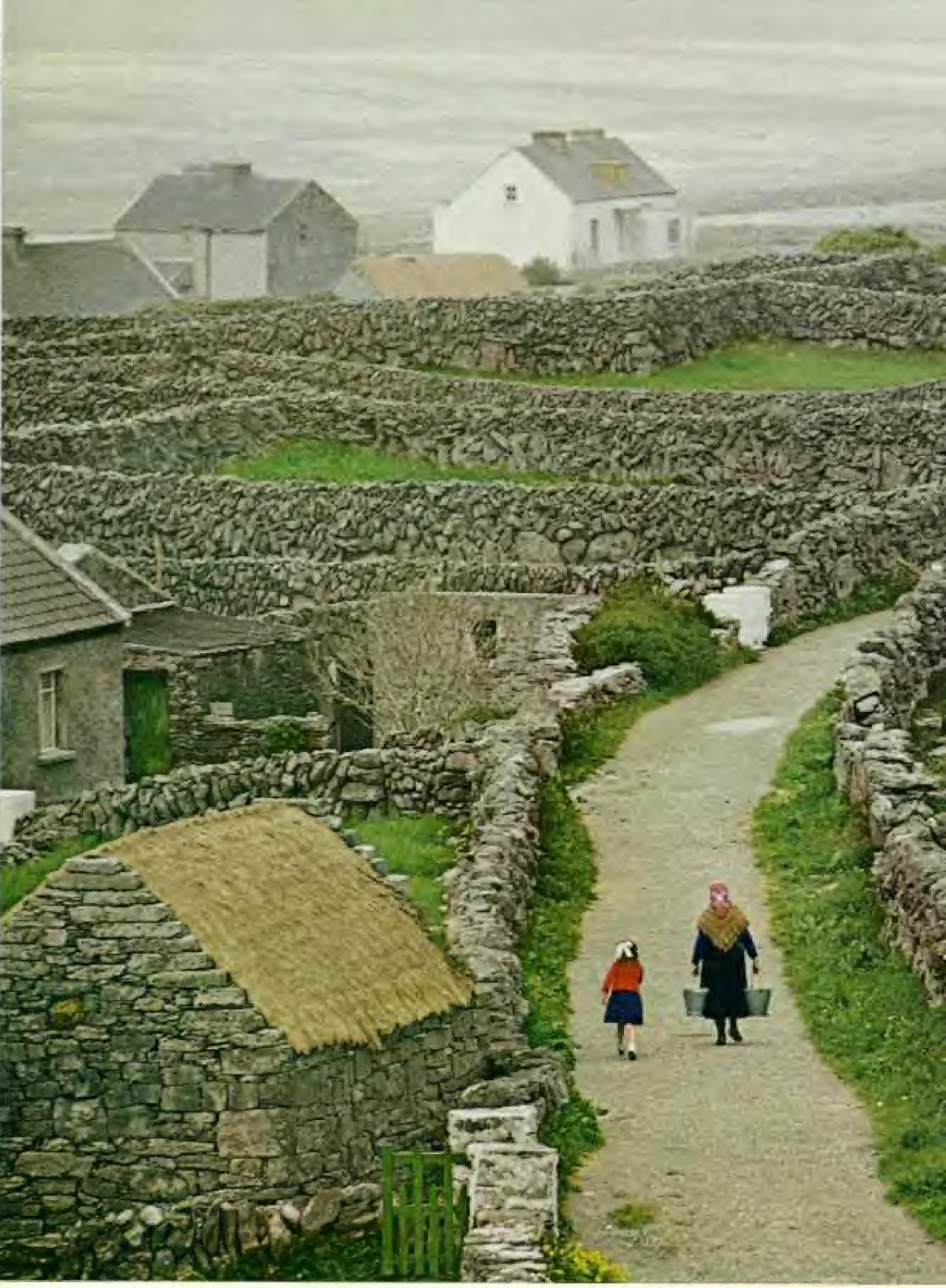
Even the name Leo isn't the least bit Irish. "Ah, well, I was named for one of the Popes," he says with a nonpontifical smile.

The ship drops anchor as a flotilla of curraghs comes out to meet her from Inisheer, the smallest island with only two square miles and 345 people. Passengers and cargo must be ferried ashore.

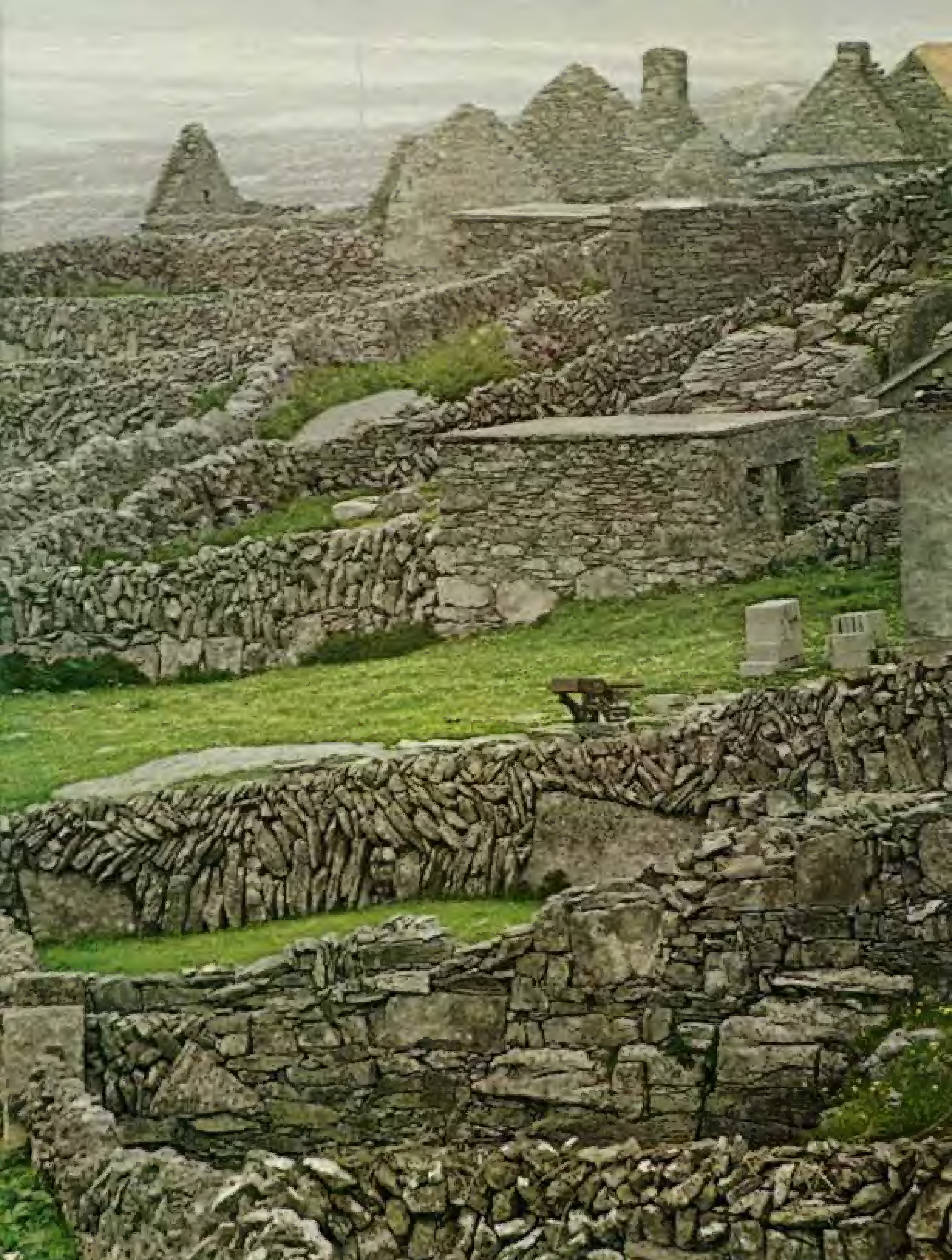
From the bridge I can see down into the forward hold, and then reality strikes in the form of a brown donkey. The animal, limp and helpless, is being hoisted up from the hold in a sling. Three men in a curragh wait alongside the steamer as the little beast is lowered into the sea. The man at the stern of the curragh grabs the rope around the donkey's head, and the animal struggles fiercely in the water. A soundless scream of terror seems to rise. Then the two other men row away from the *Naomh Eanna* back to Inisheer. The donkey is still threshing its legs about in a wild underwater dance as it is towed along.

Tynan no longer looks like a movie star. His eyes follow the curragh, and I am surprised at the compassion in them. When he speaks, it is more to himself than to me. "It's hard," he says. "It's hard for the men too as well as for the poor beasts."

The donkey makes it to shore, and presently the *Naomh Eanna* gets underway again. We make a short stop at Inishmaan—Middle Island—whose four square miles are home to 342 people. Then the steamer is tying up at the pier in Kilronan, chief town of the Arans. On steamer days the quay clatters with the traffic of ponies and traps and jaunting cars, as many of Inishmore's 925 residents turn out to meet the boat.



Field-girdling fences of unmortared stone, built of rocks cleared from the land, create a gray maze on Inishmaan—Middle Island. The hundreds of miles of gateless walls that honeycomb Aran pastures and gardens shield the shallow soil from



KODACHROME BY WINFIELD PARKS © NATIONAL GEOGRAPHIC SOCIETY

buffeting winds. Passage to a field means climbing the fence or taking part of it down. The child and shawl-clad woman trudge toward a distant water pump—one of the daily chores on this timeless isle that even today enjoys few modern conveniences.

I'm booked in at the Ave Maria guesthouse, a few miles out of Kilronan. The son of the house, Bartley, is waiting on the pier for me with his pony and trap. Bartley is a rawboned, middle-aged man who has never married. "Would you be the Yank that's expected?" he asks, then heaves my suitcase into the trap. Away we go, passing houses with signs outside—"Bicycles For Hire," "Teas," "Accommodations Within." The signs are in English, for the benefit of visitors, though the islanders prefer to speak that lilting torrent of the Celtic-Gaelic language called Irish. But most islanders are bilingual, and English is more in evidence on Inishmore, because its pier and newly opened airstrip make it the most commercial of the Arans.

A car zooms down the hill toward us, and Bartley mumbles something in Irish that I don't understand. "They do be having too many cars here now, they do, they do," he explains with some bitterness. "The island isn't right for all the cars." There are 38 motor vehicles on Inishmore. Inisheer and Inishmaan have no cars or traps—and need none; just the occasional bicycle and a few ponies serve those compact isles.

There are also no hotels on the Arans, nor restaurants. The only place you can stay is a guesthouse. Accommodations are simple but comfortable, once you get used to the sharing of bathrooms and going to bed by gas lamp or candlelight. Except for a few privately owned generators, there is no electricity. To unaccustomed eyes, the black darkness of an Aran night is something to be reckoned with.

INISHMORE, like its smaller neighbors, is a maze of tiny fields padlocked against the elements by low stone walls. Basically the islands are layers of limestone jutting out of the sea. Great slabs of rock lie everywhere, and large trees do not exist, because of the shallow topsoil (page 561). Potatoes remain the staple crop; corn, wheat, and rye are also grown. When speaking in English, the islanders always refer to a field as "the garden." Nearly every Aran woman has her own kitchen plot where she grows carrots, onions, cabbage, spinach, and lettuce. Most families keep a few sheep and cattle. Land is scarce, but somehow the islanders manage.

They bake their daily bread. They build their own houses and cut their own hair. They make their curraghs—and their coffins. They sing, they laugh, they drink, and they pray. If ever there was a lesson of courage to be learned, you'd learn it from these people.

The courage has persisted through long centuries. Bronze Age relics and cairns, ruined pagan forts, and beehive monks' cells all attest to the continuity of life on the islands. Evidence suggests that a Stone Age people first settled the Arans. The Celts, a "tall race, red-blond of hair," arrived around 350 B.C. Folklore intertwines with history, telling of a lost island nearby called Hy-Brasil. Every seven years, the story goes, enchanted Hy-Brasil rises from the Atlantic.

The *Naomh Eanna* bears the name of the patron saint of the Arans—St. Enda, or Eanna in Irish. He and his disciples went to the Arans in the sixth century A.D., founding churches and monasteries. Scholars swarmed to study under St. Enda, and the islands became known as "Aran of the Saints."

AS WE PROCEED to my lodgings, Bartley clucks at Dick, the pony, giving him a few taps with the stick. "That place there is a pub," Bartley says, pointing to a thatched cottage. "Not everyone do be knowing it, so they don't." I see why, for no sign distinguishes it from a private dwelling. "Joe Flaherty's," adds Bartley. "He is the oldest man in these parts. You could be giving him a shout this evening, you could, you could."

Being on the islands is the nearest thing to being perpetually afloat. The sea is everywhere. Often giant waves explode against the rocky shores. If you're not actually looking at the sea, you are hearing it, smelling it, or tasting its brine on your lips. The coastline of quiet coves and sandy beaches repeatedly rises into sheer rock cliffs as high as 250 feet.

It was on Inishmore in the early '30's that Robert Flaherty, Michigan-born and no kin of Joe's, filmed his famous documentary *Man of Aran*, about the constant battle for survival against the sea.

Gentle interlude in an arduous life: Enjoying a respite from the sea, Inishmaan fisherman Rory Concannon cherishes a moment with his red-haired daughter Una. Aran islanders, though they traditionally marry late, produce large families—often six to ten children.

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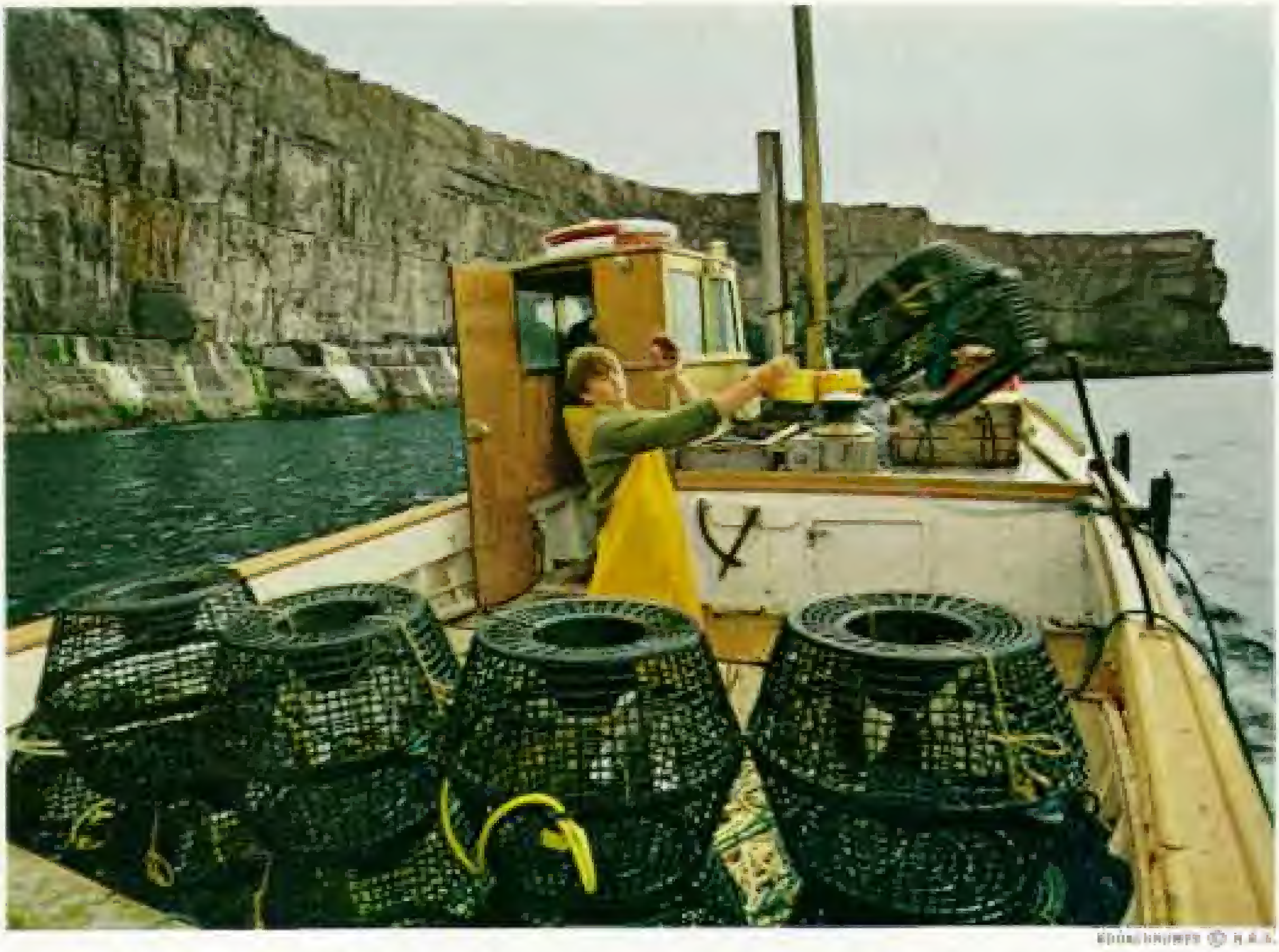

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Martin Conneely hurls a lobster pot over the gunwale of *Muir Ara*, Sea of Aran, as the vessel plows along the Inishmore coastline (above). The Irish mainland dealer who buys the haul sends the live shellfish by chartered aircraft to cities on the Continent. Because of the lobsters' value for cash income, islanders seldom taste one.

From a fate-taunting perch on an Inishmore cliff, angler Peter Gillen (left) jigs his line to attract rockfish lurking in the surf 250 feet below. Hauling a catch to the top of the wind-lashed crag takes about five minutes, and fish sometimes wriggle free en route. Beyond Gillen lies the piled-rock outer rampart of Dun Aengus, one of several ancient hilltop forts. Archeologists are unsure who built them; island folklore credits a mythical people called the Fir Bolg.

From time to time we drive past tall stone monuments beside the road that beseech our prayers for men lost at sea. Suddenly, I am startled at the sight of one life-size white statue—a red-haired Christ on the Cross. A few minutes later we arrive at the Ave Maria guesthouse.

THAT EVENING I decide to take the priest's advice and go into Kilronan to meet the people. I'm intrigued by the signless cottage pub Bartley pointed out earlier. I find the entrance at the back through a small garden. The pub proper is in a little room at the front. Plain wooden benches line the walls, and four or five men sit apart from one another, drinking porter.

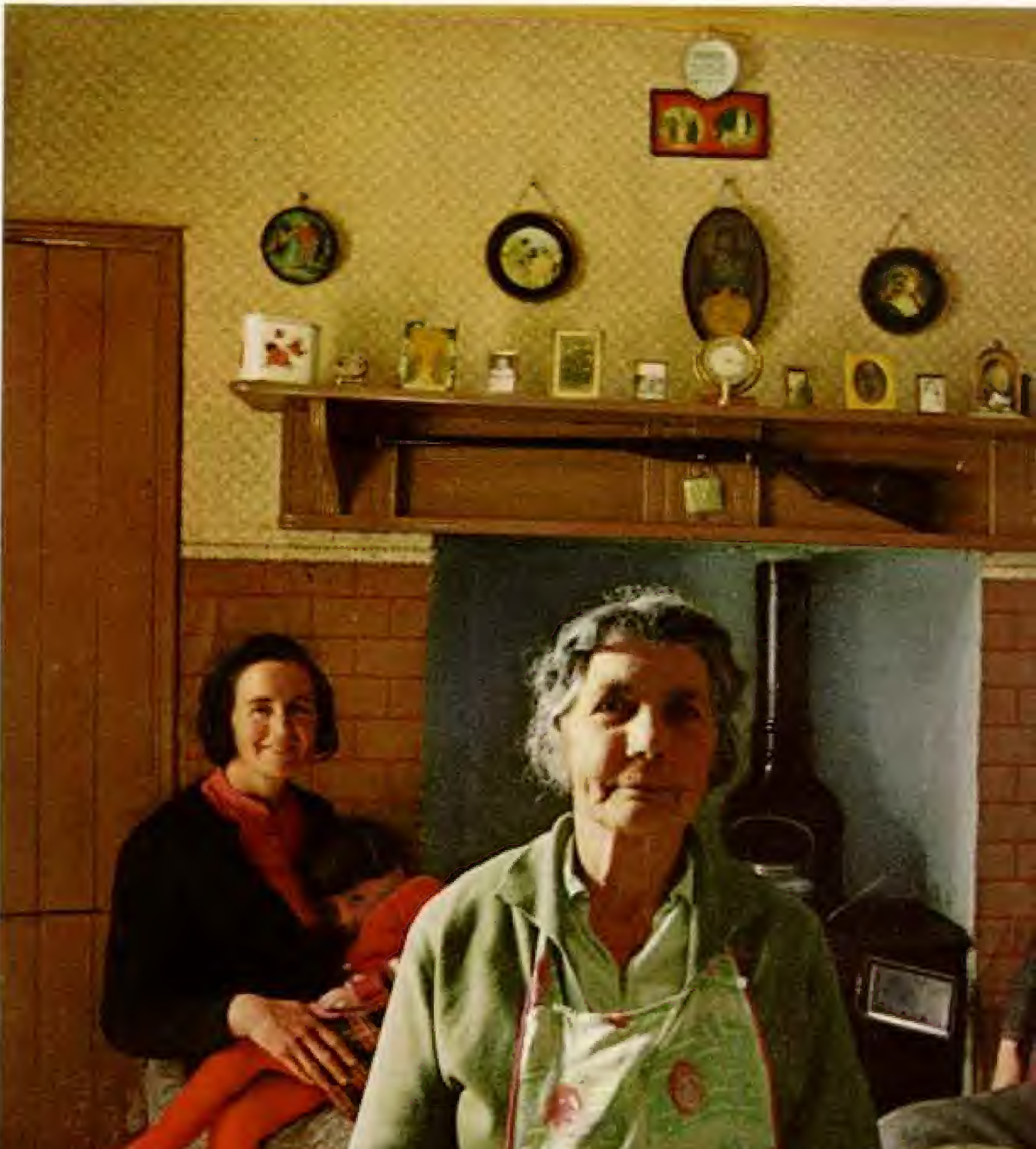
Each man sits as if he were completely alone in the room. Only the scrape of a match or the sound of a glass being put on a table breaks the silence. Joe Flaherty himself tends the tiny bar. He has thick white hair and a bushy mustache, and he wears a tweed cap at a jaunty angle. The silence is like that of a library reading room.

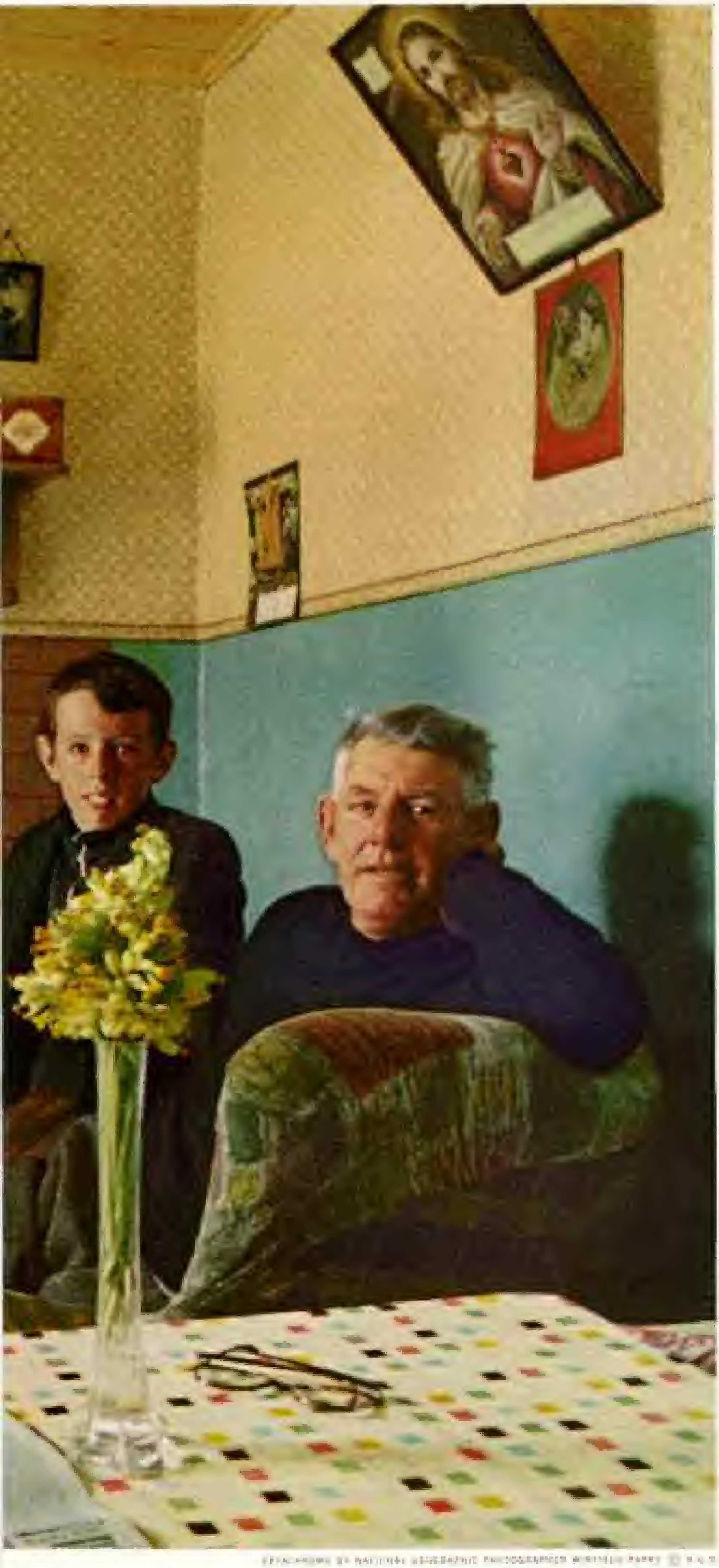
I find myself hissing at Joe in a strange whisper when I order a drink. Clutching the glass, I sit down in the corner. The rustly silence continues, and suddenly I begin to laugh. I try to make it sound like a coughing fit, but it's no use.

One of the men raises his head and stares at me for a moment. "Well," he says, "and would you be sharing the joke?"

Not having any funny story to relate, I tell the truth.

"Oh, if it's only your nerves," he says, "the Arans will cure that. They have a calming





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The kitchen: hub of Aran life

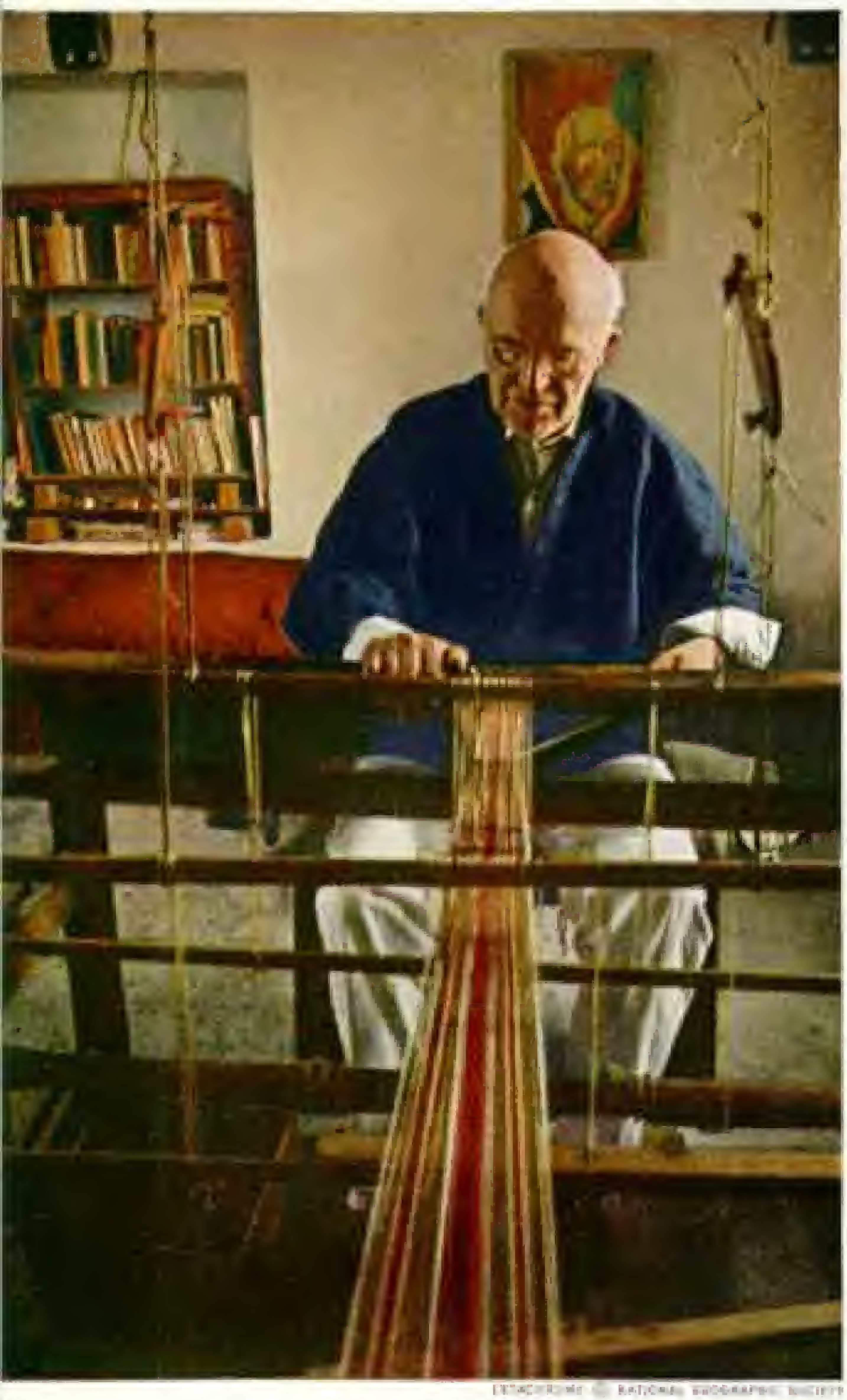
ROUND THE HEARTH of his home on little Inisheer gather Colman Conneely, right, his wife Maura, with daughter Una on her lap, his sister Mary, and his son Padraic.

Family photographs and religious pictures adorn the walls and mantel. Many homes also boast likenesses of the late President John F. Kennedy.

English coal, supplemented by bottled gas, serves for cooking and heating. Most islanders prefer clean-burning peat imported from the Irish mainland, but increasing scarcity makes it too costly for regular use.

The islanders must also rely on the mainland for their newspapers, printed mainly in English, a language most Aran adults understand, although they prefer to converse in Irish. Many experts believe the ancient language remains purest on these islands.

Visitors to the Arans lodge in guesthouses such as the Conneely home; no regular hotels or restaurants exist. Many houses now have running water, and a few have privately generated electricity.



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"Solitude without loneliness," lure of the Aran Isles, brought self-taught weaver Orla Knudsen—known to islanders as "the Dane"—to Inisheer. For 17 years, until his death last December, he supported his frugal bachelor life by making ties and *criosanna*, the colorful cloth belts of the islands, on a loom he crafted from driftwood. On the wall hangs a self-portrait; painting as a hobby competed with reading and music for his leisure.

effect. Indeed they're famous for it—'solitude without loneliness.'"

The ice broken, they talk. "Very choppy, so it was this morning," says one. "We were out potting."

"Potting?"

"Lobstering, bringing in the pots."

Lobster is one of the principal products of the summer months (page 553). The catch goes mostly to the gourmets of the Continent.

I order a round of porter, which the men accept graciously. Despite their much-patched homespun clothing, Aran men have an aristocratic bearing. By now things are warming up, and even old Joe leans on the counter looking interested.

"Is it true," I ask him, "that you are the oldest man in all the Arans?"

Joe isn't sure. Joe thinks he must be 80-something. "Eighty two and a half," he hazards.

"Ah, you are, Joe, for God's sake, and the rest. Aren't I 70 meself? You must be 96!"

They all discuss Joe's age and finally decide on 94.

THE NEXT DAY is a scorcher, which means it's about 70° F.—a good time to go fishing from the cool heights of the cliffs. I'd heard that a few Aran men still fish from the cliffs with just a long line, hook, bait, and sinker.

"Well they do, they do," says Bartley. "If you want to go fishing from the rocks, Peter Gillen will take you. And you can be seeing the ruins of Dun Aengus while you're at it, because he fishes from the cliffs up there. He'll have to get his bait first though, so he will."

That afternoon I'm back in Bartley's trap, trotting in sprightly fashion along the road to Dun Aengus—a complex prehistoric fort now in ruins. Peter is to meet us where the road ends; from there you climb the rest of the way to the fort.

"That's Peter now," says Bartley, pointing to a young man wearing a tan shirt and carrying a small sack slung over one shoulder. A crossbred collie with brown, white, and black markings frisks by his side. There are many of these dogs on the islands.

The way to Dun Aengus traverses acres of limestone rocks and innumerable stone walls. Up and up we climb. Finally we reach the top of the cliffs by Dun Aengus. Offshore the sea is more green than blue today, and farther out it changes to a smoldering violet.

Peter opens his sack, removes a coil of twine, and baits three hooks with periwinkles. He attaches three feathers to conceal the hooks. Their colors glow in the sunlight—peacock blue, scarlet, and purple. Then he weights the line with a stone that he fastens to the end with a piece of string. Two hundred and fifty feet below, the sea sounds like muffled explosions as it hits against the rocks.

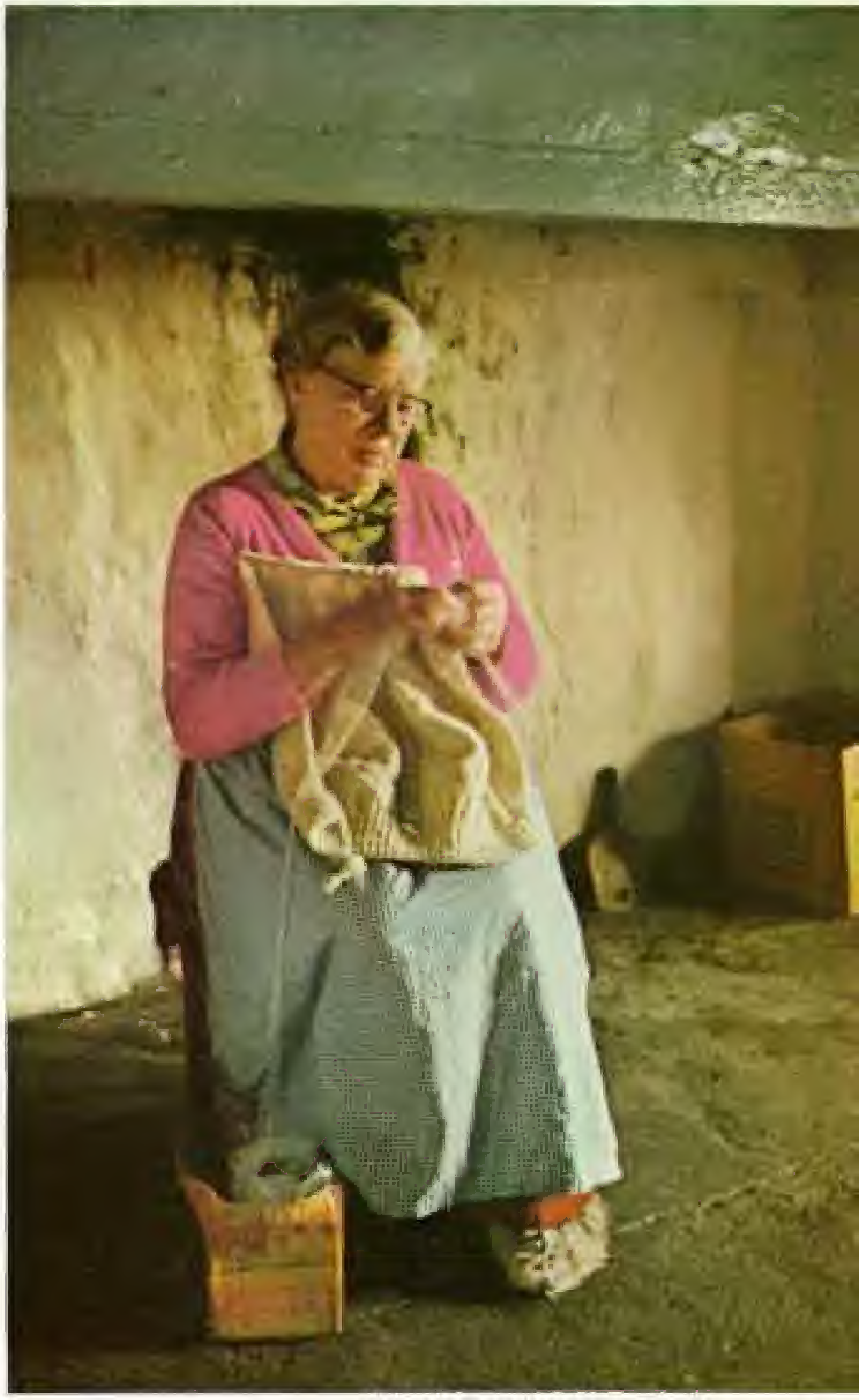
Peter stands at the edge of the cliff and swings the line in an arc several times. The feathers fly like little bright birds around his head. Then down streaks the sinker, and Peter drops to his knees as he pays out the hissing line (page 552). He stares over the cliff after it. "It's very windy all right," he says. "The wind is blowing the line along the rocks." Then he sits so close to the edge that watching him makes my stomach flip.

"I'm in a good spot now here. Just beside a big rock. There should be plenty of them I think," Peter says. "Come on then," he calls, leaning over the cliff. "Come on. Fish! Fish!" He throws back his head and laughs exuberantly. I feel his excitement pulse through me, and I begin to laugh too. "Isn't it the sport, though," he cries. He tests the line for a catch—actually he doesn't use the word "catch" but instead speaks of "killing" a fish.

Suddenly he jumps to his feet. "I got a fish!" he exclaims. "Yes, a big one. I'd say he's about 12 pounds. Ah, I've lost him. Or have I? I have a fish. Only a little one." Peter swings the line back over the cliff top, and there's his first catch—a reddish four pounder that he doesn't know the name of in English.

I LEAVE PETER still fishing, because I have arranged for a curragh to take me out to Eeragh Lighthouse, which Joe Flaherty's father helped build. Dating from 1857, the light is on remote Eeragh Island, one of a cluster of deserted islets called the Brannocks, off western Inishmore (map, page 546). Three keepers man it.

Because of the tide, we can't leave until six that evening. The curragh men—one



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Clicking off stitches with masterly speed, Mrs. Margaret Flaherty knits a highly prized Aran sweater in her Inishmaan cottage. Made from native wool, each garment carries the personalized stitch of its knitter—a custom that helps identify drowned island men when bodies wash ashore.

Pampooties encase Mrs. Flaherty's feet. Homemade from raw cowskin, hair to the outside, the shoes must be kept damp to retain their softness.

Tumult of gulls at Killeany Bay fills the air above the Kilronan lifeboat, manned by a largely volunteer crew, it maneuvers near dockside, preparing to take aboard an ailing islander for

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transport to a mainland hospital. With only one doctor for the three islands, a medical emergency in the Arans results in a hurried call to the lifeboat, which also serves 130 miles of Irish coast.

young, one old—are waiting at the water's edge, and they put me in the middle seat. The older man rows away from the shore, then the younger one, MacDonagh, starts his Yamaha outboard. We pass two tiny islands, and after a while we approach Eeragh Island, dominated by the white lighthouse with its two wide bands of black. There is no jetty here, and the shore is a moonscape of rocks.

I splash ashore, but the boatmen stay with their curragh. Beyond the lighthouse I can see the building where the three keepers live. It has several doors, so I pick one at random and knock. After a few seconds one of the keepers opens it and stands there gaping. Then his two colleagues join him, and now there are three of them just standing there gaping. Suddenly they burst into wild laughter and can't stop for several minutes. They are still laughing long after they've ushered me inside to the kitchen.

Finally one of them wipes his eyes and says, "Don't mind us, but no visitor *ever* comes out here, and we didn't see you arrive!"

They produce freshly cooked lobster caught in the one pot they keep near shore, and we all share a hammer to break the shell. Nothing fancy, but I've never tasted better lobster. Then one of them takes me to see the light. "It's 375,000 candelas," he tells me as we climb the winding stairs to the top. "It can be seen for 15 miles." The idea of 375,000 candles shining out to sea delights me.

SUDDENLY shouts rise from the foot of the stairs—MacDonagh, my curragh man. The keeper and I hasten down, and MacDonagh says, "If we don't leave at once, we won't be getting out of here at all tonight."

Fuss, fuss, think I, but I change my mind when I look down at the sea from the cliff. Since we arrived, it has worked itself into a fury, with great walls of surf dashing against the rocks. A northeaster has sprung up, and the sky looks bruised and ugly.

It starts to rain, and one of the keepers lends me his oilskin coat. "Will you hurry then, for the love of God," shouts MacDonagh.

The older man is struggling to row the curragh close to shore, but the waves twist it back out again. Then one of the keepers picks me up and wades out to the little boat.

We lose no time in pushing off and, once we're clear of the rocks, MacDonagh starts the outboard. The curragh sways and bounces in the waves. A half-dead conger eel from a lobster pot lies on the bottom between my feet. He is about three feet long, black, with open mouth and pale, staring eyes.

"It's a contrary place when there's a sea running," says the older man. "We're sorry to be rushing ye, but if the tide was like any higher now, we couldn't get off there at all."

At that moment there is a loud crack of thunder, and the sky splits asunder. The rain intensifies and makes little bullet-hole shadows in the sea. MacDonagh laughs. "Well, I'd say it won't go past the skin anyways!"

THE NEXT MORNING dawns all things dark and ugly, with the rain dripping mournfully into Bartley's trap as we drive to Kilronan. I'm going to Inisheer and, as it's not a steamer day, I've arranged for one of the Inishmore fishermen, P. J. Mullen, to take me across in his lobster boat, the *Muir Ara*—Sea of Aran (page 553).

"Looks like we'll be having a few showers before the day is out," says Bartley, as we pass a large Celtic cross along the road to the pier. It begins to rain hard, and savage gusts make me wonder about the trip ahead. "Ah, not at all," says Bartley, "sure that's nothing. You'll be finding it as calm as glass when you're out there, you will, you will."

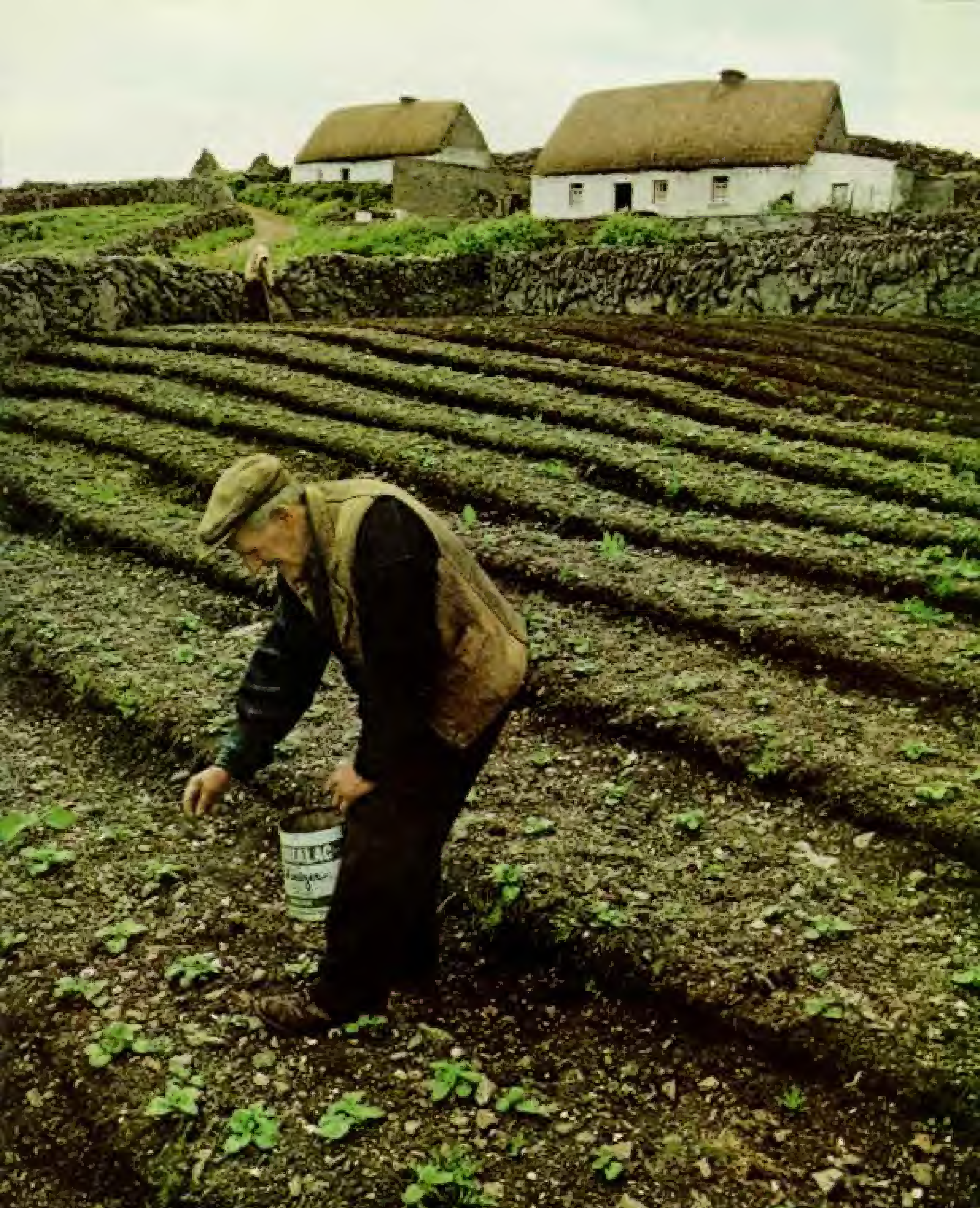
P. J. Mullen has the bluest eyes, or perhaps it's the direct way he looks at you that draws attention to them. He is looking at me now. "Ah," he says softly, "so *you'd* be the one going to Inisheer?" I nod. The blue eyes remain fastened to my face. "Don't get seasick, do you?"

"No," I reply truthfully, thinking there's always a first time.

P. J. starts the engine, and I join him in the wheelhouse, which isn't much bigger than a telephone booth. Presently Kilronan harbor is behind us, and the small boat begins to buck in the open sea.

I look over P. J.'s shoulder and promptly wish I hadn't. A huge wave is descending on us, and the window becomes like a periscope as the sea smashes down on top of the boat.

P. J. winks at me. "Well, are you enjoying yourself?" he asks. The boat is now in Gregory's Sound approaching Inishmaan. "I wouldn't change places with anyone else in the world," says P. J. "If I had to work in a smelly old office, I'd shoot meself."



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More precious than gold, the man-made soil of the Arans yields life-giving food in return for pampered care. Here an Inishmaan farmer lavishes fertilizer on a field by a thatch-roofed cottage. Mixing seaweed and sand with small bits of clay scraped from rock clefts, generations of islanders have created virtually all the arable land that now covers the Arans' stone flagging. Irish potatoes remain the staple crop.

The waves seem to subside a bit and I light a cigarette. It is still raining.

"'Tis good you're having a smoke now," says P. J., "because we're going to be hitting the weather after this." I thought we already had hit the weather. "Ah, sure, that was nothing," says P. J., reminding me of Bartley's calm-as-glass comment.

Soon we are in Foul Sound between Inishmaan and Inisheer (map, page 546). "Now here we go!" shouts P. J. These waves make the others look like ripples as they tower and crouch over the *Muir Ara*.

Along comes a wave so enormous I can't even see the top. "Hold tight!" yells P. J., grabbing my arm, and we brace ourselves against the wheelhouse wall. There is a tremendous crash and up we go as if in a fast elevator. Another crash follows and we fly back down, the boat tilting so much that I expect her to roll right over. But she doesn't.

"That was a good one!" says P. J. "That was a beaut."

"At least a hundred feet high!" I exclaim.

P. J. shakes his head. "Twenty would be more like it."

Gradually the sea calms again, and finally we're coming alongside the small jetty at Inisheer. "Have to be quick or I'll miss the tide," says P. J. No sooner do I step ashore than the *Muir Ara* is backing away and heading out to sea again. It is still raining.

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Light-skinned and fair-haired as the Celts who settled on the Arans around 350 B.C., children at Inishmaan's coeducational elementary school help preserve their heritage by reciting, reading, and writing in Irish. The school teaches English for three half-hour segments daily; students learn more of the language when they go to the mainland to secondary school at age 14.

The next day sunshine floods the island. Even the little cottages radiate brightness, and the air is fresh with a taste of salt to it. I leave Colman Conneely's guesthouse (pages 554-5), and walk along the rocky shore where several ewes—their legs hobbled—graze with their lambs. A white pony trots around the bend, kicks up his heels, and races past me, his tail a long streak behind him. The skinny silhouette of a curragh slides into view across the on-fire blueness of the sea. Three men are rowing, and from here they look almost languid as they bend over the oars.

There is a belief that a curragh will not capsize if a priest is in it, but that is not too comforting a thought if you live on Inishmaan, where there is no priest. With one exception, the Aran clergy reside on Inishmore. The exception, Father Patrick Gilligan, serves Inishmaan as well as Inisheer, where he lives.

Known affectionately as Father Paddy to the islanders, he is very young and very dedicated to this, his first parish. Every weekend he goes by curragh to Inishmaan where he says Mass, then returns to say Mass again for the people of Inisheer. Short of a force-eight gale, Father Paddy is always game to serve his flock. He smiles boyishly. "People often think priests have a soft life, but no one can say that to me!"

ALTHOUGH there is a resident nurse on each island, the only doctor—petite, mini-skirted Marie Keane—lives at Kilronan. In bad weather with heavy seas, the only way she can answer emergency calls from the two smaller islands is via the Inishmore lifeboat (pages 558-9) or a helicopter summoned from the mainland.

When employing the lifeboat as an ambulance, Dr. Keane uses the small cabin to give what aid and comfort she can to her patient. If the boat ever turned over in a storm, she wouldn't have a hope down in that cabin.

Coleman Hernon, a young-faced, white-haired man who likes bright-blue sweaters, is coxswain of the Inishmore lifeboat. "We're responsible for 130 miles of coastline," he says. "Since Ireland has no coast guard, we have to meet all kinds of emergencies."

Inishmaan, the most rugged of the three islands, draws very few visitors. The small landing ramp is the most dangerous in all the Arans, and so the islanders own no boats other than curraghs, which they can store on shore (pages 570-71).

I find no guesthouses listed on Inishmaan, but I'd been told of a Mrs. Mulkerrin who has rooms, and that's where I'm staying. Mrs. Mulkerrin is a tall woman with a gentle way to her. She never seems to stop working, and yet she always has time to make another pot of tea for you.

If Inishmaan were to have a tourist attraction, then I suppose it would be the thatched cottage where the great Irish playwright John Millington Synge spent his summers from 1898 through 1902. The cottage is just a stone's throw from Mrs. Mulkerrin's house, and I don't imagine Synge, born 100 years ago this month, would notice too many changes if he were to rise from his grave to revisit the place. The three-foot-thick walls still stand, and the wide hearth still comforts any chill.

"It must be over 200 years old," says Mrs. Mary Faherty, who was born in the cottage and continues to live there with her husband and children. "My grandmother knew Synge, and many's the story she'd tell about him. But she is dead now, God rest her, and all of the stories have gone with her. I can't remember a one of them!"

We are in the cement-floored main room known as the kitchen (pages 568-9), and there is a picture of John and Jacqueline Kennedy on the wall.

"One day," recalls Mrs. Faherty, "an American fellow off the *Naomh Eanna* comes running up to the door. Panting and all out of breath he was. 'Quick,' he says, 'is this Synge's cottage?' I tell him that it is and 'Oh, thank God,' he says, 'now I've seen it.' And away he runs again. The two miles back down to the pier."

ONE DAY I climb up the cliffs to see what the islanders call Cathaoir Synge—Synge's Chair. The "chair" is a rough semicircular clump of rocks that Synge is supposed to have assembled himself. He loved to spend whole days in this clifftop retreat. I sit in his chair and stare down at the Atlantic far below. Straight ahead is Inishmore, and on my right is Galway Bay. I can't see Inisheer from here.

A sea gull floats by. It is a bird in slow motion. Drifting. Aloof. Behind stretches a vast graveyard of rocks. Some wild orchids in shades of yellow and pink grow out of the crevices. There is something both valiant and frivolous about these little flowers. Far out in the sea a curragh is fishing. I can imagine Synge in this same chair where I am sitting, developing the idea for his play *Riders to the Sea*—the story of a woman whose husband is drowned, and then, one by one, so are all her sons.

I have been told that if a male member of a household is lost at sea, the pattern of his handmade sweater—and Aran sweaters have become world-famous—can often prove positive identification. Each woman evolves her own personal family pattern from the traditional stitches she learns.

"We all do be putting a bit extra of our own into the knitting, we do, we do!" says Mrs. Margaret Flaherty, a merry, rosy-cheeked woman with graying red hair. Her eyes twinkle at me from behind her glasses and she laughs. I am in the kitchen of her cottage watching her knit a stitch called "the honeycomb" into the

Aran cattle make a big splash on sale day

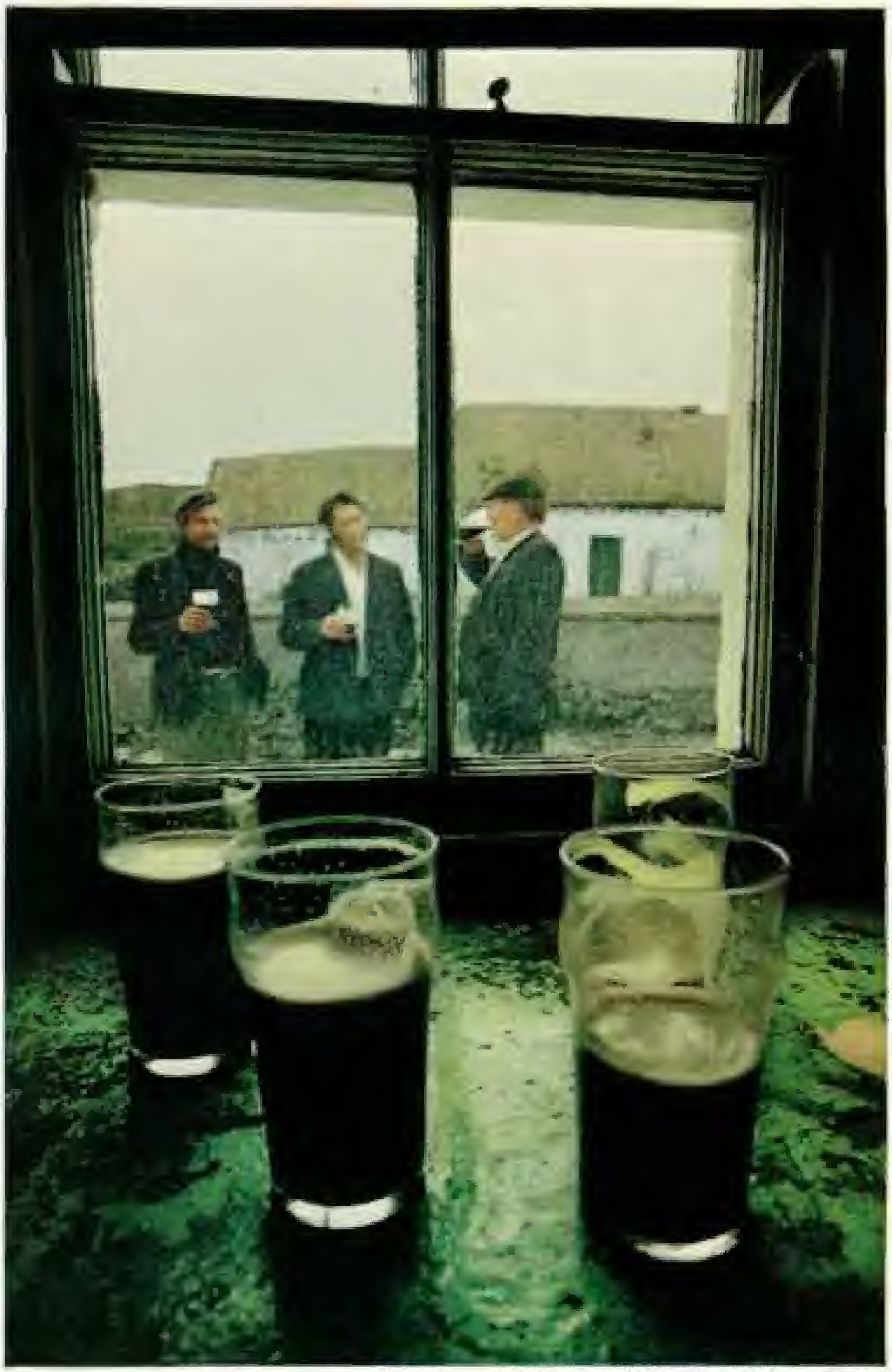
RODEO FRENZY AND AUCTION CALM share the spotlight when the jobber from Galway visits Inishmaan to deal for Aran cattle. Their quality stems from year-round pasturage—a gift of warming currents curling off the Gulf Stream—and the high calcium content of grass grown on limestone.

Clustered spectators (right) watch a fellow islander parade his bullock past jobber Patrick Coyne. After some vigorous haggling, Coyne will purchase the steer.

Prodded and tugged, one of the sold "beasts," as islanders call them, plunges into the sea (below) to be towed to the offshore *Naomh Eanna*. The steamer's winch will lift the animal aboard by the harness fastened around its middle.

EKTACHROMES BY WINFIELD PARKS © NATIONAL GEOGRAPHIC SOCIETY

OENIX



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"We drink to loosen our tongues"

STARK, MUSTY PUBS are havens of comfort and camaraderie for the austere men who, in the words of Irish playwright and author John Millington Synge, "feel their isolation in the face of a universe that wars on them with winds and seas." Inside Inishmaan's only pub (left), islanders—now finished with the sale of their livestock—somberly nurse pints of dark, frothy porter. Cattle buyer Coyne and two other men (above) take their drinks outside to discuss the day's events. The silence of bar patrons dwindles, author Thomas observed, in proportion to the amount of porter consumed.

Times change, and faces too, but not this thick-walled Inishmaan cottage where Synge spent his summers from 1898 through 1902. He captured the harsh life of the islands in his play *Riders to the Sea.*

A frugal fire warms Mrs. Mary Faherty and her children, the present occupants. Portrait shows Patrick H. Pearse, Irish patriot and poet executed in 1916 for insurgency.

white sweater she is making. The needles seem to fly in her hands as she knits with effortless rhythm (page 557). "We get three pounds, twelve shillings for a sweater." That is almost $9.00.

Mrs. Flaherty sits on a little wooden stool, although there are two armchairs in the room. "I prefer the stool when I'm working, isn't it funny?" she says and laughs again. "It's handy, too, for the winter when I can sit in close to the hearth. I like the winter. I love the wind coming down the chimney and the fire so warm. I do, I do."

Abruptly she stops talking and the needles lie idle in her hands. "My son," she says. "Nothing will ever be the same for me again." All the merriment has vanished from her face, and there is such a desperate sadness in her eyes that I have to look away.

"Last summer he was fishing from the rocks. He was alone. There wasn't anyone with him at all. Somehow . . . well anyways somehow he must have fallen. That was on the third of June, so it was. And I prayed that God would return his poor body to me. Oh, I prayed so *hard.* Then on the fourth of July my prayers were answered, for on that day wasn't his body washed ashore. . . ."

JOE LOVETT, one of Inishmaan's three schoolteachers, lives at Mrs. Mulkerrin's house. An amiable man, Joe combines a down-to-earth outlook with an engaging elegance of manner.

One day Joe invites me to join his English class. He talks in an easy way to the children, questioning them about an assigned story of a miser named Pedro. A girl reads aloud from the book, and her voice is totally flat—no change of intonation whatsoever. It sinks home to me then. The child reading English is truly reading a foreign language.

The pupils get three half-hour English lessons a day. The rest of their classes are in Irish. And Irish is the language they talk among themselves or at home with their families. They will not become fluent in English until they go away to secondary school on the mainland. As Joe says later, "Inishmaan is the most Irish of any part of Ireland. The language is purest here."

The big occasion of the year for any islander with a beast to sell is when the jobber, or cattle buyer, from Galway arrives on Inishmaan. Patrick Coyne, the jobber, is a burly man in a dark suit complete with waistcoat. He wears a peaked cap and carries a blue ballpoint pen in his breast pocket.

Today Mr. Coyne is the Pied Piper of Inishmaan as the island men follow his

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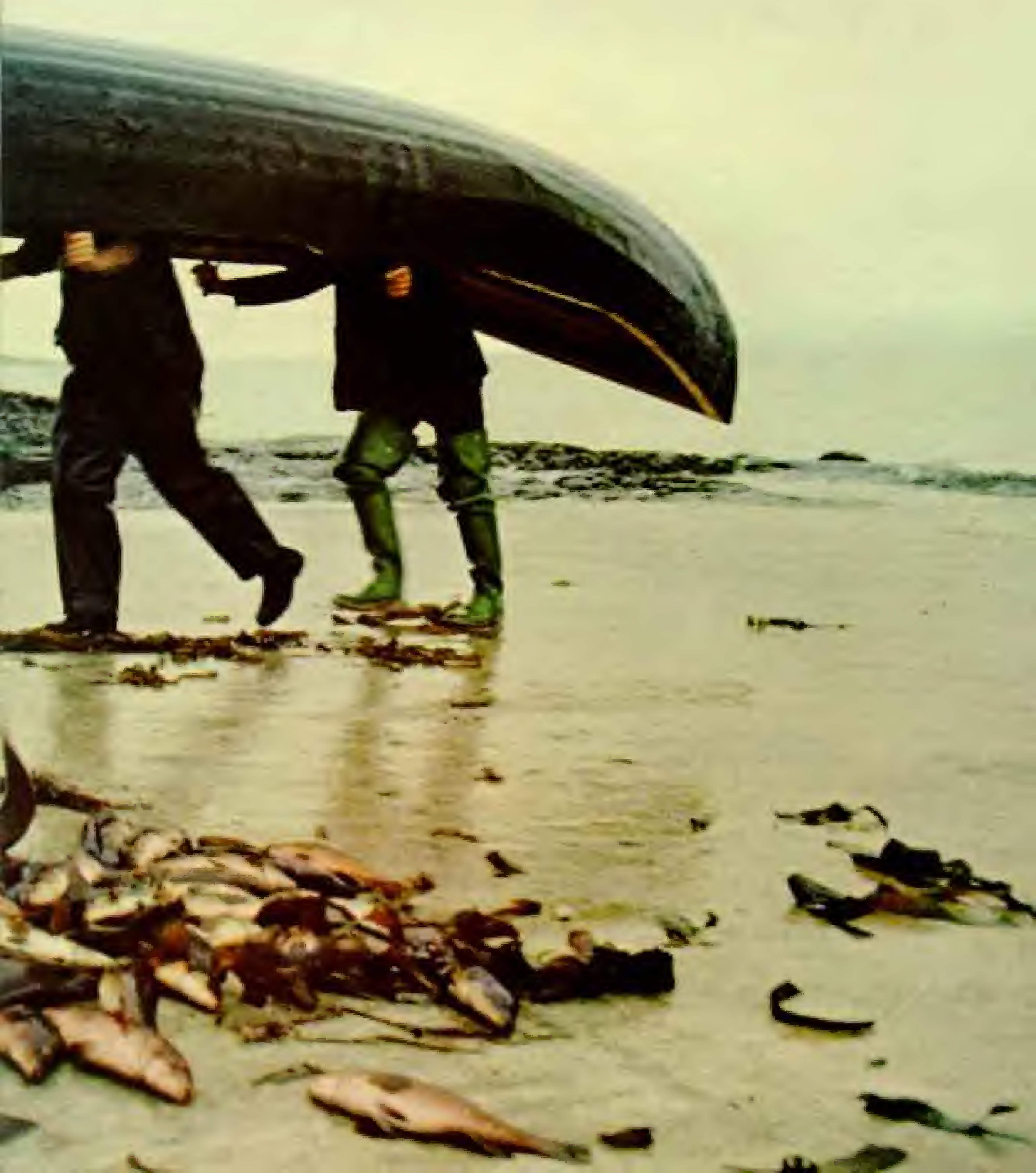
cattle-buying progress along the road. Coyne is full of largesse with pints of porter at the pub. Yet no matter how many pints he consumes or how many rounds he stands, when it comes to the bargaining he knows exactly what he is doing.

He has just inspected two bullocks in a field behind the church. "Sure they were no good at all. They were asking a rob," Coyne says in his deep, slightly harsh voice. "Ah, well, you don't be good judges of cattle. I watch the prices so closely."

Coyne pauses by a stone wall, watching two beasts being led toward him (page 565). He continues his loquacious banter. "So these are the two prizes now, are they? Well, I won't give you 90 pounds for either of them. Couldn't give it. No. Leave them alone. Not worth 90 pounds at all."

A third bullock is being walked slowly up the road. "Well," says Coyne, "and here he is then. We waited long enough for him. Asking 97 pounds for that bloke there? Well, it's ridiculous!"

Coyne turns to the watching crowd of men standing several feet behind him. "I'd better



"A man who is not afraid of the sea will soon be drownded," an islander told Synge, "for he will be going out on a day he shouldn't. But we do be afraid of the sea, and we do only be drownded now and again." Like a giant beetle, Inishmaan boatmen carry their curragh above the high-tide mark of the ocean they both love and fear. Their day's catch lies on the beach. EKTACHROME © NATIONAL GEOGRAPHIC SOCIETY

get out of here, I think. But ye've got me blocked. They don't want to let me out, is that it?" He turns back to Mourteen, the owner of the bullock. "I think 85 pounds would be too much for him. I think 83 pounds is a good price. A good enough price. If you like. Hmm? Hmm?" The bullock turns its backside and stares sulkily at the stone wall by the road.

"No," says Mourteen.

Coyne sighs. " 'Tis very hard to do business with a man like this. Eighty-five pounds."

"No."

"Eighty-six pounds."

"No," says Mourteen firmly. "No good."

"I'll give you 88 pounds."

"No."

"I won't be able to bid here the way ye're asking. Go on if you like and you needn't be selling at all."

Coyne stands like Napoleon with his right hand thrust into his jacket and his head jutting forward slightly. "Wouldn't I need a couple of quid for meself anyways," he says. "Mourteen, I'll tell you what I'll do with you."

They go into a huddle by the stone wall and the next thing Coyne is pulling out his checkbook. Click goes the blue ballpoint as he writes the check leaning against the stone wall. "A bit of a national sport. Hmm? Hmm?" With a flourish he hands the check to Mourteen. Later, according to the custom, Mourteen will give the jobber what is called his "luck penny"—usually a pound.

"AH, BUT I'VE a terrible thirst come on me. Why didn't all of ye bring the beasts down to the pub same as last year instead of making me traipse around like this?"

The men laugh, and the jobber jumps nimbly over a stone wall into a nearby field to inspect another beast. The bargaining and the banter continue. A couple of hours later finds Coyne back at the pub with all business finished and the porter flowing (page 567).

Men, women, and children—everyone is down at Sandhead watching Coyne's beasts being roped and driven into the sea, where the curraghs tow them out to the *Naomh Eanna*. The island dogs run up and down the beach, barking and snapping at the cattle. Eight men are handling a spirited bullock. They wade out into the sea, pulling and pushing the reluctant beast. The dogs keep running and barking, while the bullock's hoofs fly at all angles. It is like something from a rodeo when the beast finally goes leaping and bucking into the sea (pages 564-5).

Tonight there is the traditional party in the pub. The women don't go, but most of the men do. A large keg of Guinness stout stands on the floor. Custom decrees that anyone who has sold a beast provides a gallon of free brew. "Ah, the Guinness," sighs one man, "there's the eating and the drinking in it."

Dara Beag has joined the throng. Beag is Irish for "small." Dara is short, sharp-featured, with high cheekbones. He is also the bard of Inishmaan. He sings one of his own songs in Irish, and two men catch hold of his hands, swinging them in rhythm to the song. There is an oriental lilt to his voice as he stands there singing lyrics I can't understand.

IT'S A STEAMER DAY, and I am leaving the islands. Mrs. Mulkerrin has arranged for "the lad next door" to jog my suitcase down to the jetty in his wheelbarrow. The *Naomh Eanna* has already been to Kilronan and now, after Inishmaan, there's only little Inisheer before steaming on to Galway.

When we reach Inisheer, on the spur of the moment I jump into a curragh and go ashore. The priest, Father Paddy, is on the crescent-shaped strand. We talk for a while as the curraghs go back and forth to the steamer.

The sky has turned a mournful gray and the sand is blowing lightly. There will be no more sunshine today. Some sea gulls are hopping along the edge of the sea and the *Naomh Eanna's* whistle sounds. It is time to leave.

I take the last curragh out to the steamer. "When will you be coming back to us?" asks the curragh man.

"Oh, you never know with me!" I reply, jokingly. We both smile, but there is sadness between us too. "One day," I tell him then, "one day for sure." □

Sea forgotten and wind ignored, fisherfolk in homespun reaffirm their faith at Roman Catholic Mass on Inishmaan. Christianity blossomed in the sixth century, after St. Enda, drawn by the isolation of this sea-moated sanctuary, established on Inishmore one of Europe's leading centers of religious training and earned the islands the name "Aran of the Saints."

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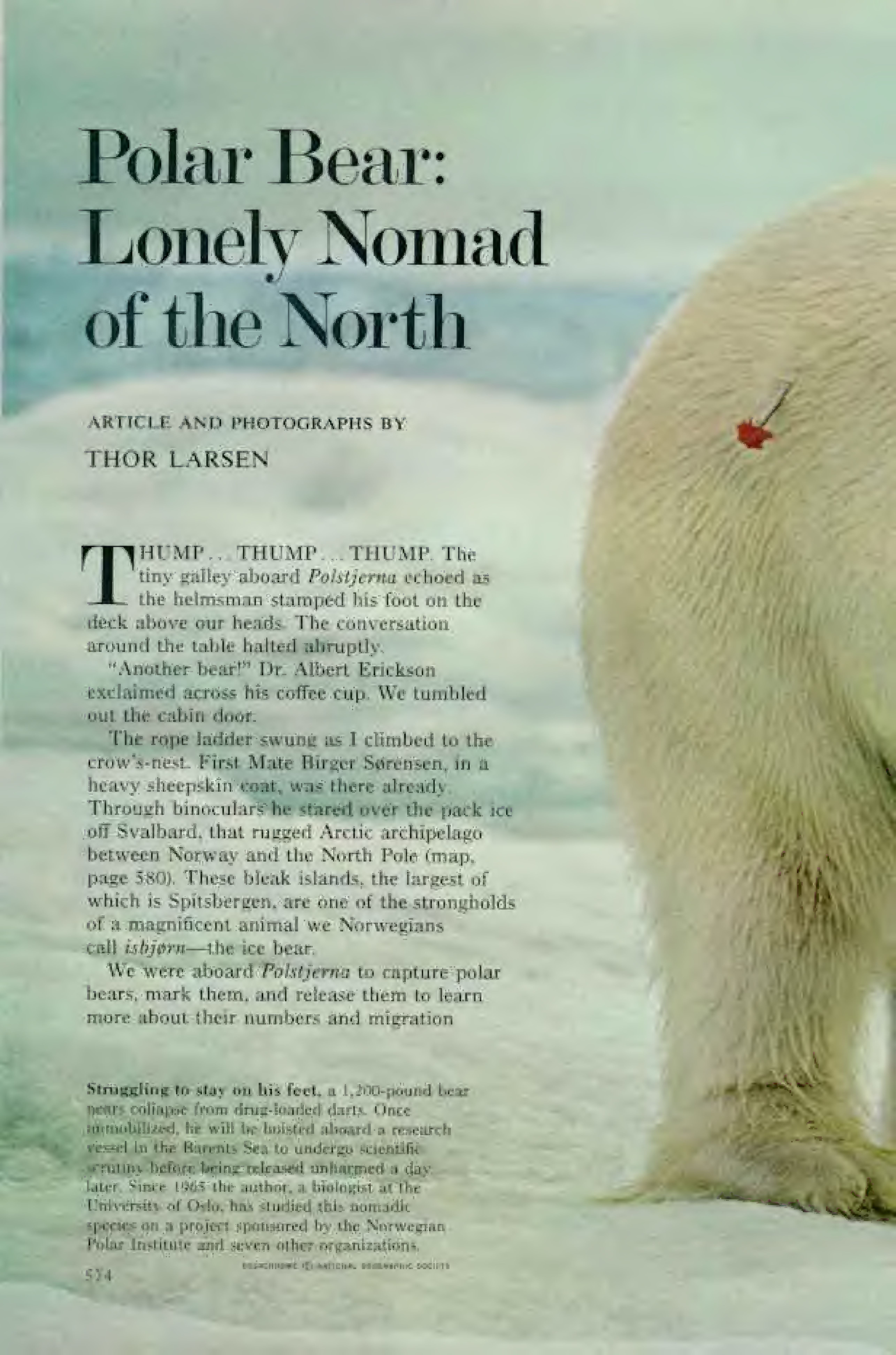

Polar Bear: Lonely Nomad of the North

ARTICLE AND PHOTOGRAPHS BY

THOR LARSEN

THUMP . . . THUMP . . . THUMP. The tiny galley aboard *Polstjerna* echoed as the helmsman stamped his foot on the deck above our heads. The conversation around the table halted abruptly.

"Another bear!" Dr. Albert Erickson exclaimed across his coffee cup. We tumbled out the cabin door.

The rope ladder swung as I climbed to the crow's-nest. First Mate Birger Sørensen, in a heavy sheepskin coat, was there already. Through binoculars he stared over the pack ice off Svalbard, that rugged Arctic archipelago between Norway and the North Pole (map, page 580). These bleak islands, the largest of which is Spitsbergen, are one of the strongholds of a magnificent animal we Norwegians call *isbjørn*—the ice bear.

We were aboard *Polstjerna* to capture polar bears, mark them, and release them to learn more about their numbers and migration

Struggling to stay on his feet, a 1,200-pound bear nears collapse from drug-loaded darts. Once immobilized, he will be hoisted aboard a research vessel in the Barents Sea to undergo scientific scrutiny before being released unharmed a day later. Since 1965 the author, a biologist at the University of Oslo, has studied this nomadic species on a project sponsored by the Norwegian Polar Institute and seven other organizations.

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patterns—part of an international study of these animals, which are threatened by encroaching civilization.

Clinging to the ladder aloft, I looked around and marveled at the beauty of the Arctic under the midnight sun. The ice was bathed in fragile pink light; frosty sea smoke hung low over open leads, where the water shone black. In distant bluish haze loomed Halvmåneøya—Half-moon Island—and the steep snow-covered mountains of Edgeøya, where four of us would spend nearly a year ashore.

Birger handed me his binoculars. "Two bears. They disappeared just behind the iceberg up ahead," he said. "A sow with a cub."

I spotted them when they emerged. The mother's rather small head swayed back and forth on her powerful neck as she moved with surprising grace across the uneven pack. For a female, she was big—perhaps 600 pounds. The chubby youngster trotted close behind her. The pair seemed oblivious of our ship, only a few hundred yards away.

"We'll catch them easily," I said. Birger nodded and turned to the wheelhouse intercom: "Full speed and right rudder." The rigging vibrated as the ship turned slowly in the lead, cracking an ice floe under her bow.

I hurried down the ladder. Waiting on deck were other members of our international crew: Dr. Erickson, polar bear specialist from the University of Minnesota, Dr. Charles Jonkel of the Canadian Wildlife Service, and two German wildlife photographers, Eugen Schuhmacher and Hans Bopst, of the World Wildlife Fund, one of our supporters.

Dart gun at the ready, an expedition member cautiously approaches a male barbed with four syringes, one of them visible. Until the drug takes effect—usually within fifteen minutes—Kjell Reidar Hovelsrud dares advance no nearer; one swipe of a powerful paw could be fatal.

Cradling a massive head, Per Johnson strains to keep a drugged bear from drowning. After being struck by darts, the animal dived from a floe. With a noose, Johnson lashed it to a small boat for transfer to the mother ship. Of 103 animals captured, the group has lost only one to the sea.

KODACHROMES © N.G.S.

Al handed me the syringe gun loaded with Sernylan, an immobilizing drug.

"Chuck and I will use the small boat," I said. "You take the ship around the ice floe and herd the bears toward us."

We swung the outboard motorboat over the side, threw in our gear, and jumped in. *Polstjerna* disappeared behind the pressure ridges. Though we couldn't see the ship, the shouts and commands aboard and the rumble of her engine carried far in the quiet August night, driving the bears toward us.

"There!" Chuck whispered, pointing. The bear and her cub bounded into view. They hesitated at the edge of the ice, and the female stretched her neck, sniffing the air. Then they slipped into the water.

Although polar bears are tough and persevering swimmers—some apparently have covered more than 200 miles of open sea—they are slow and vulnerable in the water. We let these swim a few yards before I gunned the motor, cutting off their retreat. Our boat herded them onto an ice pan, where we could use the syringe gun.

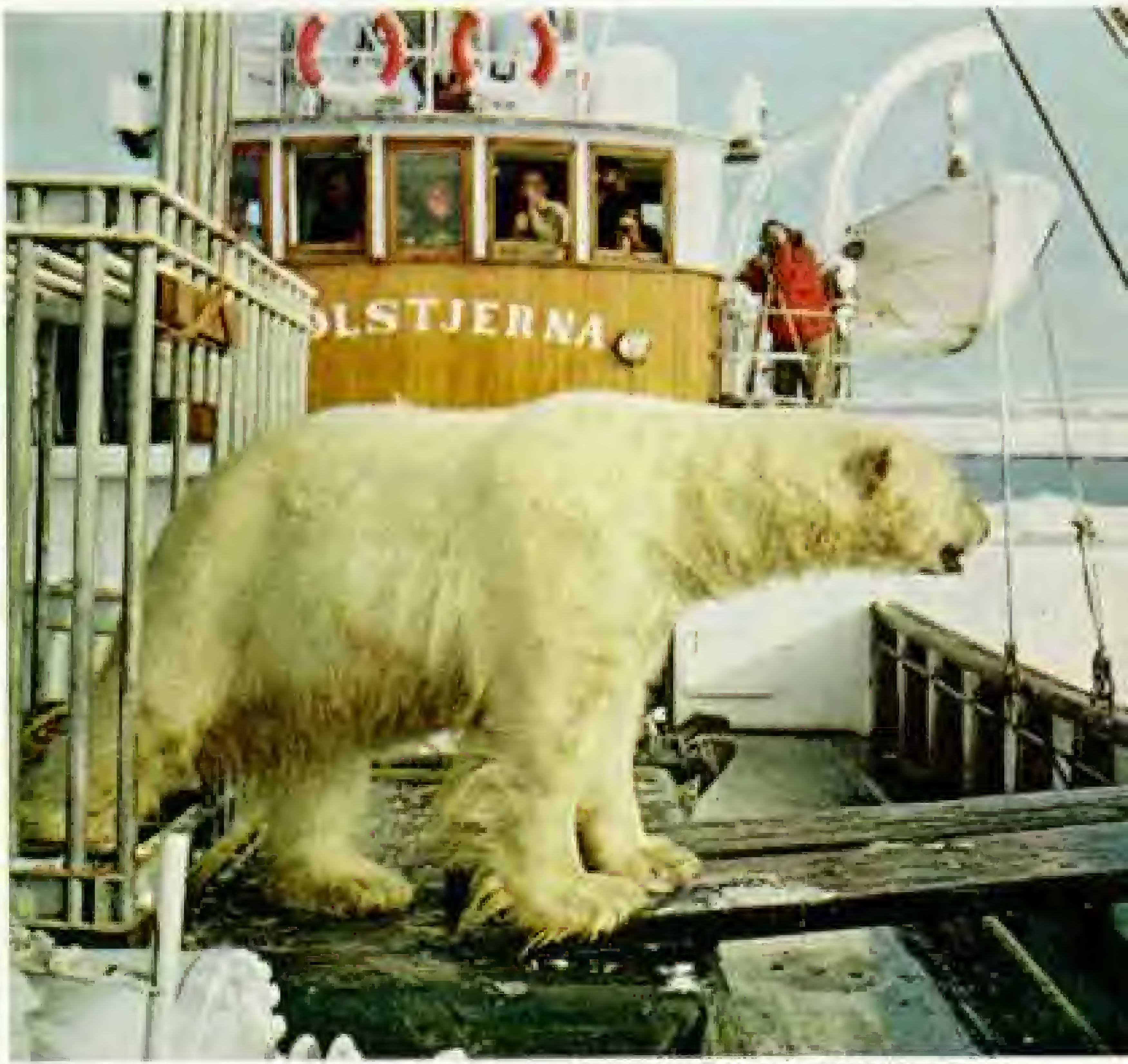
Chuck took aim: A dry "ping," and the shiny aluminum syringe hit the sow's right thigh. She growled and threw herself around, then turned toward the water. The cub at her side bellowed. I moved full speed to head them off. Should the mother be swimming when the drug took effect, she might drown.

In a few minutes the mother keeled over on the ice. We went after the cub with our bare hands; it was a wild one—half a year old and weighing a hundred pounds or more. Chuck and I grasped the youngster by the fur behind its ears. Its sharp fangs and claws tore our clothing and drew blood from our hands. Finally Chuck injected the drug with a syringe. When it took effect, both bears lay prone and harmless.

Polar Bear Milk: Rich and Nutty

The ship came alongside the floe. Crewmen hoisted the bears aboard and dragged them into a cage. We set to work.

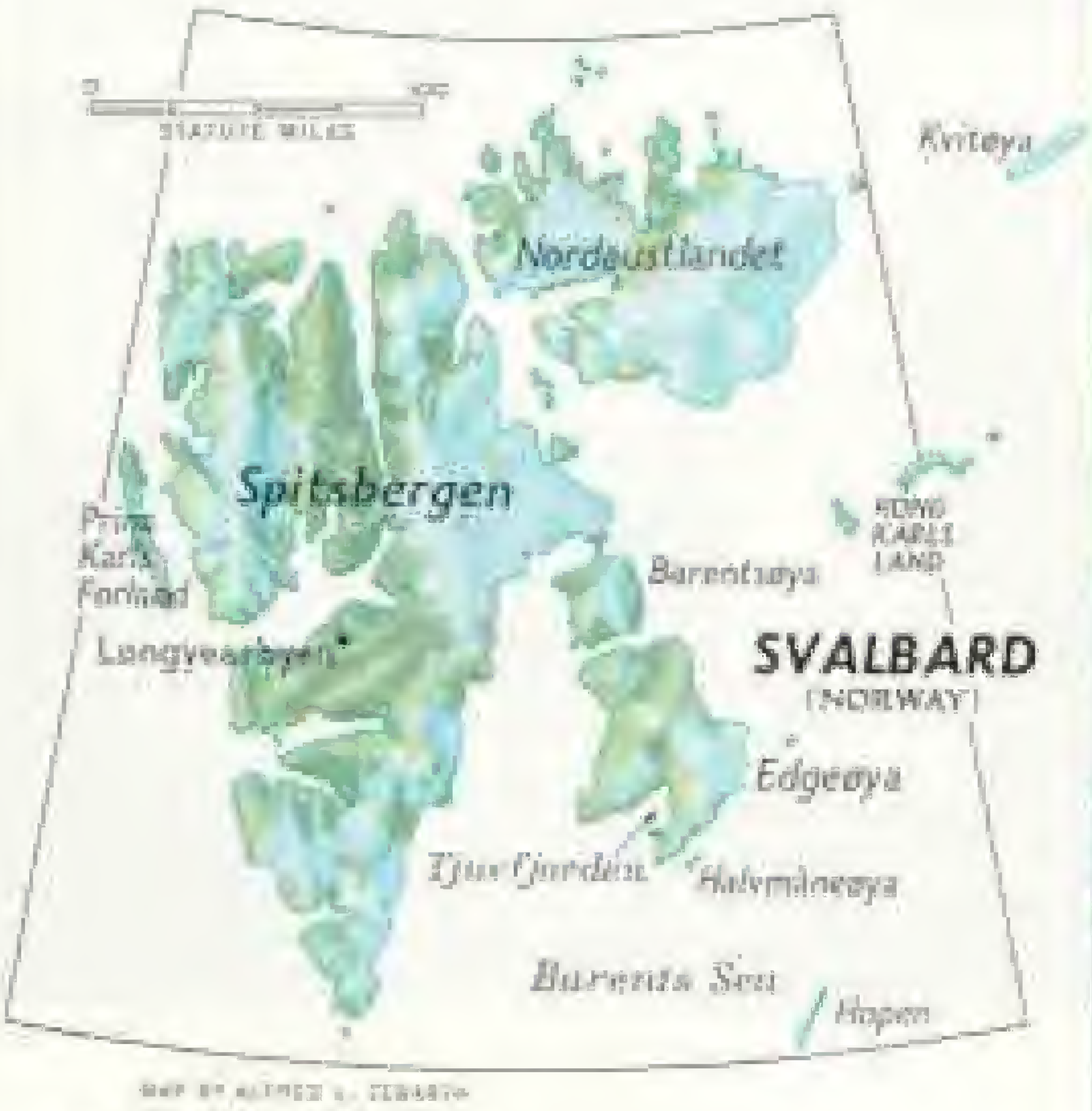
We weighed, measured, and marked each bear with numbered tags—one nylon and one steel in each ear. The numbers were also tattooed on the upper lip, and the last two digits were painted with a dark-purple dye on both haunches. Thus we could identify individual bears at a distance, at least until the spring molt. The big dye numerals also would protect them temporarily from trophy hunters;



Helpless as a toy, half a ton of flesh and fur swings from a boom. On deck scientists will weigh and measure the bear, extract a tooth to determine its age, and take blood samples. They will clip a nylon and a steel tag to each ear, tattoo a number on the upper lip, and dye the fur with purple numerals for identification on subsequent sightings.

Walking the plank to freedom, a bear heads back to his icy habitat from *Polstjerna*—Pole Star—a commercial sealer chartered for the expedition.

KODACHROMES © NATIONAL GEOGRAPHIC SOCIETY


STATUTE MILES
Kvitøya
Nordaustlandet
Spitsbergen
Prins Karls Forland
Longyearbyen
Barentsøya
KONG KARLS LAND
SVALBARD
(NORWAY)
Edgeøya
Tjuvfjorden
Halvmåneøya
Barents Sea
Hopen

MAP BY ALFRED L. ZEBARTH
GEOGRAPHIC ART DIVISION
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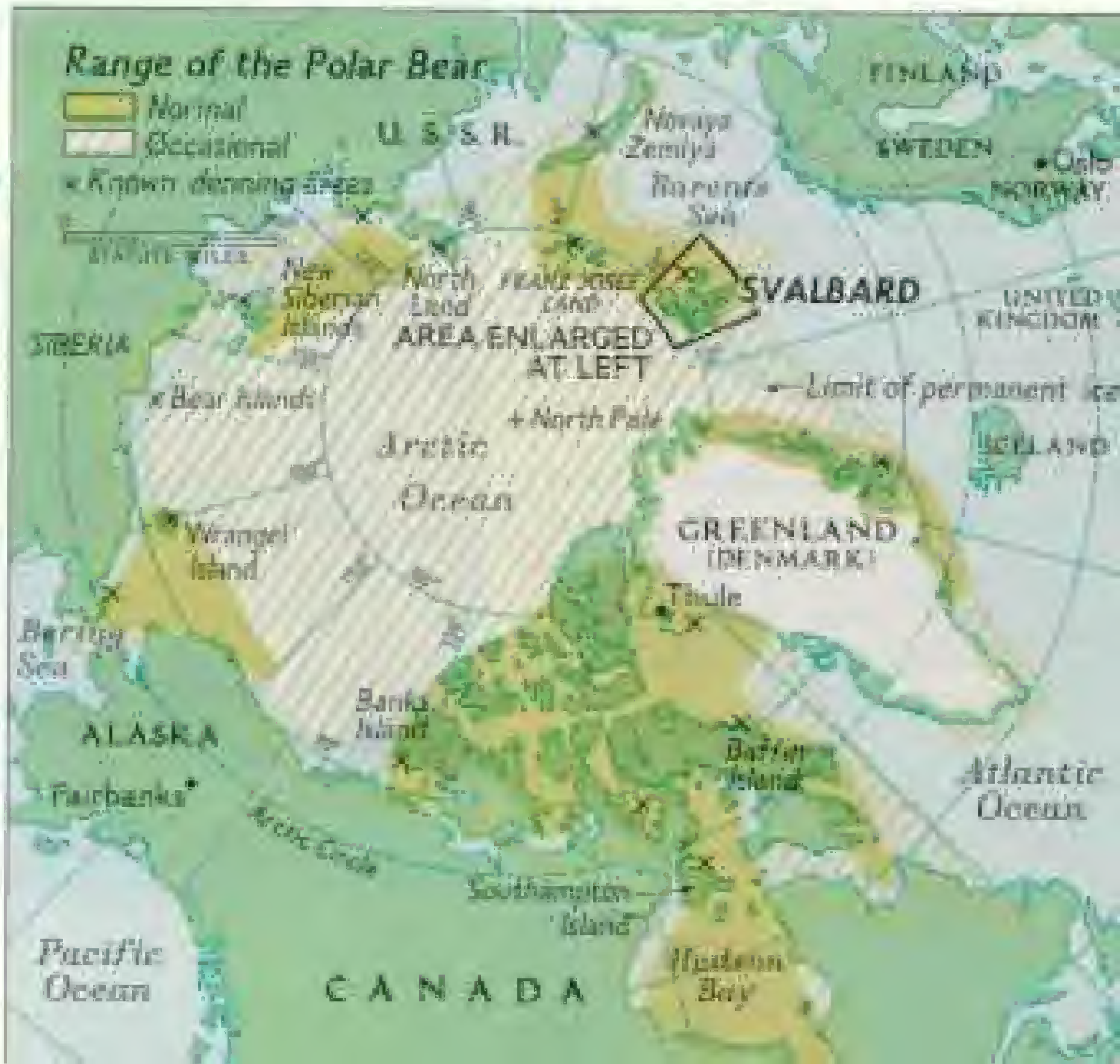
Range of the Polar Bear
Normal
Occasional
× Known denning areas
STATUTE MILES
U.S.S.R.
Novaya Zemlya
Barents Sea
FINLAND
SWEDEN
Oslo
NORWAY
New Siberian Islands
North Land
FRANZ JOSEF LAND
SVALBARD
AREA ENLARGED AT LEFT
UNITED KINGDOM
SIBERIA
Bear Islands
Limit of permanent ice
North Pole
Arctic Ocean
ICELAND
Wrangel Island
GREENLAND
(DENMARK)
Thule
Bering Sea
Banks Island
ALASKA
Baffin Island
Fairbanks
Arctic Circle
Atlantic Ocean
Southampton Island
Pacific Ocean
CANADA
Hudson Bay

KODACHROME BY THOR LARSEN © N.G.S.

Stumbling like a drunken man, a newly released bear slips from one ice floe, then climbs onto another. Crewmen watch the animal from a small boat until they can be sure of its safety.

Remote and inhospitable domain favored the polar bear until recent decades, when excessive hunting and man's increased activity in the Arctic aroused concern for the species. Following the First International Scientific Meeting on the Polar Bear in 1965, scientists of five nations with Arctic territory—the United States, Canada, Denmark, Norway, and the Soviet Union—intensified their study of the creature's migratory traits, food habits, and reproductive rates. The information is essential to sound management of a species that now probably numbers fewer than 20,000 animals.

we had spread the word that the dye could not be removed from the pelt.

With forceps, Chuck deftly removed a small premolar from the mother's upper jaw. Later, by sectioning the tooth and reading the annual rings, as a forester would do with a tree, we could determine her age (page 587).

We drew blood from both bears, and a milk sample from the mother (page 586). Analysis might reveal genetic differences among various bear populations in the Arctic. Eugen Schuhmacher stuck his finger in the milk and tasted it. "Not bad," he said. "It tastes like nuts. But it's very rich."

When the bears had fully recovered, we would release them. *Polstjerna* resumed course, with Birger back in the crow's-nest.

Burning Blubber Draws Hungry Nomads

We kept up this routine around the clock. Occasionally we captured bears that approached the ship out of simple curiosity. We lured others within range by burning seal blubber in a bucket hung over the side. A polar bear's keen nose picks up this scent more than two miles away.

Clad in white camouflage, we sometimes stalked bears across pack ice. We always carried a rifle, but only once did I have to use it, against a full-grown female I was herding toward the ship. The animal looked at the vessel, then at me. Obviously I posed less of a threat. She raised her head, snorted, and charged with astonishing speed. When she was within 30 yards, I fired low, spraying snow into her face. She fled back toward the ship, where she was drugged and captured.

At one time or another these white nomads have been seen almost everywhere in the Arctic, even near the Pole itself. Once full-grown, they seldom seek out others of their kind, except in the spring mating season. No one is sure of their life span in the wild, but one captive lived 40 years in a zoo.

Most carnivorous of all bears, they eat principally seals, though in some regions their diet includes kelp, grasses, berries, carrion, sea birds, and even garbage near settlements.

Recent study indicates that the polar bear may surpass the Kodiak brown bear as the world's largest carnivore. Last spring Dr. Jonkel accurately weighed a big Canadian male at 1,450 pounds; we may yet find one even larger. The average female weighs less than half as much as the male.

Wandering across icy wastes, the polar bear—the very symbol of the Arctic—has always held a special place in men's minds. Its glossy white fur was treasured in medieval Europe, and as far away as Egypt. In Norway polar bear pelts, spread before cathedral altars, kept clerics' feet warm while they celebrated Mass. A live polar bear was a gift befitting kings and princes.

Traditionally, these giants of the Arctic were hunted with spears, lances, and dogs. The hunt was a test of manhood, and many Eskimos consider it so today, even with modern weapons. A young man of Thule, Greenland, isn't worthy of the daughter of a great hunter until he has killed his first bear.

The slaughter of these mighty animals for their fur continues at an ever-increasing rate, giving rise to fears of extinction. Even optimistic estimates put the total bear population at fewer than 20,000.

At the First International Scientific Meeting on the Polar Bear, held in Fairbanks, Alaska, in 1965, scientists from the United States, Canada, Denmark, Norway, and the Soviet Union noted that more than 1,300 polar bears were killed yearly in the Western Hemisphere. (In the Soviet Arctic the polar bear has been protected since 1956.)

At the Fairbanks conference it became obvious that more research was needed. How was increasing hunting pressure affecting the world's polar bear population? Was *Ursus maritimus* a single circumpolar species in eternal migration around the polar icefield, or were there separate populations?

Only intensified tagging programs, biochemical tests, skeletal studies, and long observation could answer such questions. A Norwegian project, led by Nils Are Øritsland and myself—both of us from the University of Oslo—began in 1965 under the auspices of the Norwegian Polar Institute. We have concentrated our research in Svalbard.

Walrus Skulls Tell of Slaughter

At the end of August *Polstjerna* set course for our winter base at Tjuvfjorden, a bay on the south coast of Edgeøya. By then our research team had tagged and released 32 bears. The nights were becoming noticeably darker, and the air had a chill edge.

As we unloaded gear, Eugen Schuhmacher poked about the campsite. Behind an abandoned trapper's hut, bleached bear bones lay scattered. The photographer picked up a thighbone. "In a few years things like this may be rare even in museums," he said sadly.

Southern Edgeøya is an old hunting place. Walruses by the thousands once gathered there. But the huge animals were slaughtered by Russian and Norwegian hunters using lances and primitive weapons. The hunters usually took only the tusks and hides, leaving the huge carcasses to rot. Now hundreds of skulls lie shining grayish white on the level plains among fragile, nodding arctic poppies.

Today the walrus is nearly extinct in Svalbard waters. During the ten years I have worked in the Arctic, I have sighted only five of these creatures, though a 1970 expedition counted more than two dozen.

Camp Readied in a Race Against Winter

With mixed feelings, Nils and I and our two assistants, Tor Alf Andersen and Kjell Reidar Hovelsrud, stood outside the tiny weather-beaten hut at Tjuvfjorden. *Polstjerna* weighed anchor and turned down the fjord.

There, at that isolated outpost, we would spend the next year, with a pack of 11 howling Eskimo dogs for company. Only by radio would we talk to other humans.

The hunters' hut needed repair, and we had to set up another hut for a laboratory and additional living space. By late September our camp—we called it Permafrost City—was ready for winter, including outdoor racks filled with frozen meat for our dogs and ourselves. Each dog would need two pounds of seal meat a day, and we often ate seal steak ourselves, along with guillemots and ducks we shot on the island.

Reidar and I attacked the plentiful driftwood with a chain saw and ax, and built dozens of traps. We placed them at the set-gun sites used by bear hunters. Set guns—boxlike contraptions in which a bear triggers a weapon when he seizes the bait—took two-thirds of the bears killed in the Norwegian Arctic until they were outlawed in 1970.

Our traps resembled set guns, but did not kill. We placed a piece of seal blubber over a wire snare, which, when triggered, would pull tight around the bear's foot. We could then immobilize the animal by syringe gun.

We checked the traps daily. By dog team and snowmobile we followed the shores and valleys of Edgeøya, seeking bear sign. But the edge of the winter ice, where the bears had to go to find seals, lay too far south. Months passed without success. We saw

KODACHROME © N.G.S.

Wherever Nils goes, his bear is sure to follow. Nils Are Øritsland found this three-month-old cub in early spring, tamed it, and named it Douglas before discovering it was a female. Polar bear cubs are born hairless, blind, and weighing about half a pound. Alaskan Eskimos call them *ah tik tok*, meaning "those that go down to the sea."

occasional tracks (page 590), but no bears.

Despite these frustrations there were certain rewards, for the Arctic winter night has a peculiar beauty. There was also the stillness, unbroken except for the panting of the dogs, the creaking of the sled and harness, and the swishing of our skis across the snow. Along the ice edge huge chunks boomed as they toppled, and the ice grumbled under the tremendous pressures of sea currents.

And there were the storms. Often we were stranded in camp for days and weeks while blizzards raged. We spent these times in laboratory work, studies, and reading.

With savage winds, and temperatures as low as minus 50 degrees F., it was a major feat simply to move from one hut to the other. We'd call ahead on a battery-powered field phone that we were coming—and then feel our way across the 20-yard distance on hands and knees. Often the trip took 15 minutes. Always in our minds was the meteorologist on Jan Mayen, off Greenland, who stepped outside his station in a storm to read his instruments. In the spring his companions found his body, blown several miles away.

A few days before Christmas, nearly four months after our arrival, the dogs started yelping excitedly. Alf and Reidar sprang to their feet from the chess table.

"Bear!" they shouted and rushed outdoors.

"Turn Tokto loose," I said to Nils. "I'll get the syringe gun."

We had not expected a visit from bears while we had dogs in camp. But here was a female with two cubs, sniffing the antenna mast. Like a gray shadow Tokto circled them. Suddenly a box on the ear by the mother sent the dog spinning. He yelped, tucked his tail between his legs, and disappeared.

Without much difficulty, we drugged all three bears and pulled them into a cage by the laboratory. Later we found Tokto unhurt, cheerfully raiding our meat racks.

Nils constantly needed captive bears, such as these three, for his research on how the species has adapted to the Arctic's extreme climate. By implanting tiny radio transmitters under their skins, he gathered data about how the bears control their body temperature.*

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*For accounts of similar research, see, in NATIONAL GEOGRAPHIC: "Trailing Yellowstone's Grizzlies by Radio," August 1966; and "Knocking Out Grizzly Bears for Their Own Good," August 1960, both by Frank Craighead, Jr., and John Craighead.

KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

In quest of bear dens, Kjell Reidar Hovelsrud drives a sled team across tortured ice. Temperature: minus 36° F. Time: late February, when the sun hangs briefly only a few degrees above the horizon.

Striking out from their winter camp on Edgeøya—an island in the Svalbard group—Reidar and the author search for cavelike lairs in the snowbanks, where mother bears nurse their cubs for three to four months.

During a three-week survey, the men found only two such lairs. Yet in Franz Josef Land, a few hundred miles eastward, Russian scientists estimate nearly 200 dens exist. Some bears apparently have dual nationality, the author concludes; those that frequent Svalbard may have been born in Russian territory, migrating annually across pack ice and open water.

Previously, Nils had found that polar bears often have trouble getting rid of excess heat. Even though the huge beasts can move surprisingly swiftly during a short dash, they cannot tolerate long exertion. In summer we could often run down a bear on foot by keeping it away from the sea. Nils suspected that the animals must have to cool off in water to avoid overheating.

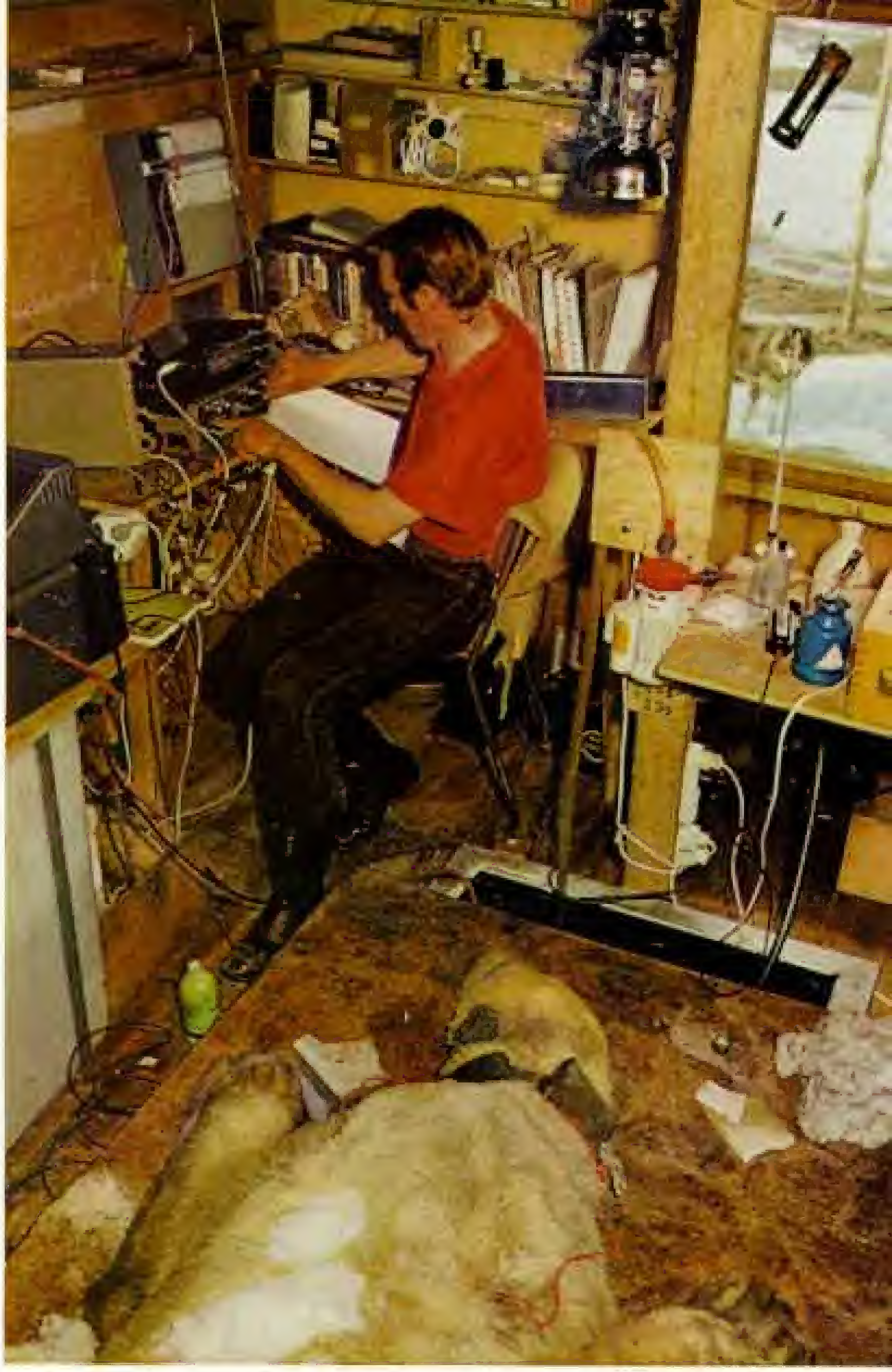
But the animals had no such problem in winter. On Edgeøya we found it impossible to overtake a fleeing bear either on foot or on skis, and difficult even on a snowmobile.

Daylight returned slowly during February, and in midmonth we again saw the sun. By then trapping had improved; we had taken six bears in our snares and had captured a dozen more roaming about the island.

Nils brought a small cub—a ball of fur he named Douglas—to live with us in the hut. At first the animal was frightened and aggressive and almost unmanageable. But with patience and kindness Nils gentled the cub, until it followed him everywhere just like a

Like a living rug, a drugged bear sprawls at the feet of Nils Øritsland at the expedition's base on Edgeøya. Tiny transmitters attached to the animal broadcast data on body temperature. Patches of snow still cling to this captive, whose coat appears rust-colored in the cabin's artificial light.

Comparative studies of bears in Svalbard, Canada, and Alaska indicate genetic differences between those of the Eastern and Western Hemispheres. "We believe there are several distinct populations of the one species," says the author.



Milking a mother bear, scientists collect a small sample for biochemical analysis. The protein composition provides one more clue to genetic differences among polar bears.

Donation to science: Gently the author examines the mouth of a captive bear after removing a small premolar with forceps. Cross-sectioning the tooth, he will determine the age by counting growth rings, like those of a tree. Frozen saliva, bloodied from the extraction, dangles from the jaws of this 10-year-old male.

KODACHROMES © N.G.S.

puppy (page 583). We all felt the loss when Douglas died—of distemper, we think.

As spring approached, the females and their three-month-old cubs were beginning to break out of their dens. Reidar and I set out on a month-long den survey (pages 584-5).

When a pregnant female comes ashore from the ice pack in October or November, she digs a lair in a snowdrift. The dens often have more than one room, usually higher than the entrance to trap warm air inside. As drifts pile up, the bear keeps only a narrow air channel open to the outside.

Apart from pregnant and nursing individuals, however, polar bears generally do not den up. Most prowl throughout the long dark winter, searching for food.

The cubs, usually two but occasionally one or three, are born in midwinter—naked, blind, about the size of a rat, and quite helpless. When they leave the den three or four months later, each weighs 20 to 30 pounds and is plump and strong. The cubs sometimes follow the mother for more than two years.

Reidar and I traveled some 70 miles across the sea ice to the steep east coast of Spitsbergen. Finding no dens, we headed our sled back eastward across the ice to the smaller island of Barentsøya. There, too, we crisscrossed the island, our dogs sniffing for dens in the hillsides and snowbanks.

"I can't understand it," Reidar said one night as we ate our evening soup in the tent. "Three weeks of work, and only two dens."

I, too, was disappointed. Svalbard had been considered an important polar bear breeding ground, and ice conditions this year seemed ideal for denning. In contrast, Russian scientists estimate that almost 200 dens lie in their territory, only a few hundred miles to the east, in Franz Josef Land (map, page 580).

"It looks more and more as though some of the bears we have here actually were born in Russian territory," I said.

Spring Sets Off a Bear Migration

Our observations of migratory patterns also suggest a common Norwegian-Russian polar bear stock. From Edgeøya the previous fall we had watched the bears moving westward, following the edge of the ice, seeking out seals. Now in the spring, as the ice broke up and retreated, the migration was reversed. From a southern headland we saw as many as five bears daily, all moving eastward. The Russians have observed a similar migration pattern in the eastern Barents Sea. If this is true, hunters in the Svalbard area may be

KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

Prowling the pack ice, a bear seeks its favorite food—ringed seals. With elongated body, narrow

KODACHROME BY THOR LARSEN © N.G.S.

head, long neck, and high rump, the animal appears awkward, but moves with grace and agility.

KODACHROME © N.G.S.

Trail of a lonesome nomad patterns fresh-fallen snow. The author caught up with—but did not capture—the big male that plodded slowly toward the Barents Sea during spring migration. Of the bears tagged by Mr. Larsen's expeditions, almost a third had died at the hands of hunters by the end of last year—an alarming toll. With the Arctic becoming ever more accessible, the author fears not only for the future of the polar bear but for the North's other wildlife as well.

killing part of the same bear stock that is officially protected in the Soviet Union.

As spring approached, the birds began to return. First a couple of fulmars flew in. One March morning a few guillemots arrived in the rookeries west of Halvmåneøya. Soon auks, kittiwakes, eider ducks, and geese were everywhere.

By July the ice in Tjuvfjorden had broken up, and we could expect the Norwegian Polar Institute's expedition ship to call at any time. A few weeks later we were home.

Species May Vanish as Habitat Changes

We have learned much since that first polar bear conference in Fairbanks in 1965.

Scientists of five Arctic-bordering nations now coordinate their activities. Many of us are convinced that the bears do not belong to a single circumpolar population, but to several distinct stocks. Biochemical blood analyses indicate significant differences between bears from Svalbard and Alaska. Canadian biologists, using skull measurements, have arrived at a similar conclusion. And Norwegian, Canadian, and U. S. marking programs show that polar bears tend to remain within well-defined regions.

At this writing, 103 polar bears have been captured and tagged in the Svalbard region; of these almost a third had subsequently been killed by hunters as of late 1970—an ominously high rate. Such signs, along with declining hunting success in certain localities, have led Norway to ban set guns and impose a hunting quota, currently 300 bears a year.

But these measures may not be enough. The Arctic, though harsh and remote, is highly vulnerable. Man's activity increases year by year. Tourism is growing. With the development of modern icebreakers, and the use of planes, helicopters, and snow vehicles, the polar region is no longer an inaccessible wasteland. Utilization of vast recently discovered oil resources carries with it great risk. Pollution could be fatal to all life in the Far North, including the polar bear.

Thus, to ensure the survival of the magnificent white nomad, we must begin by preserving his unique and fragile environment—the Arctic itself.

SIX-MONTH INDEX AVAILABLE

As one of the benefits of membership in the National Geographic Society, an index for each six-month volume will be sent, upon request, to members who bind their GEOGRAPHICS as works of reference. The index to Volume 138 (July-December 1970) is now ready.

WATCH "JOURNEY TO THE HIGH ARCTIC" ON MOST OF THESE CBS TELEVISION STATIONS

(Canadian and some U.S. stations may schedule the program on another date. Check your newspaper.)

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Huntsville WHNT-TV (19)
Mobile WKRG-TV (5)
Montgomery WCOV-TV (20)
ALASKA
Anchorage KTVA (11)
Fairbanks KTVF (11)
Sitka KSA-TV (13)
ARIZONA
Phoenix KOOL-TV (10)
Tucson KOLD-TV (13)
ARKANSAS
Fort Smith KFSA-TV (5)
Little Rock KTHV (11)
CALIFORNIA
Bakersfield KBAK-TV (29)
Chico KHSL-TV (12)
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Eureka KIEM-TV (3)
Fresno KFRE-TV (30)
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Monterey-Salinas
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San Francisco KPIX (5)
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Hartford WTIC-TV (3)
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Fort Myers WINK-TV (11)
Fort Pierce WTVX (34)
Jacksonville WJXT (4)
Miami WTVJ (4)
Orlando WDBO-TV (6)
Tallahassee WCTV (6)
Tampa WTVT (13)
GEORGIA
Atlanta WAGA-TV (5)
Augusta WRDW-TV (12)
Columbus WRBL-TV (3)
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Savannah WTOC-TV (11)
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Boise KBOI-TV (2)
Idaho Falls KID-TV (3)
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Twin Falls KMVT (11)
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Champaign WCIA (3)
Chicago WBBM-TV (2)
Peoria WMBD-TV (31)
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Minneapolis WCCO-TV (4)
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Meridian WTOK-TV (11)
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Philadelphia WCAU-TV (10)
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York WSBA-TV (43)
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Providence WPRO-TV (12)
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Anderson WAIM-TV (40)
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Florence WBTW (13)
Spartanburg WSPA-TV (7)
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Lead KHSD (11)
Rapid City KOTA-TV (3)
Sioux Falls KELO-TV (11)
TENNESSEE
Chattanooga WDEF-TV (12)
Johnson City WJHL-TV (11)
Knoxville WBIR-TV (10)
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Amarillo KFDA-TV (10)
Austin KTBC-TV (7)
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Corpus Christi KZTV (10)
Dallas KRLD-TV (4)
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Harlingen KGBT-TV (4)
Houston KHOU-TV (11)
Lubbock KLBK-TV (13)
Nacogdoches-Lufkin
KTRE-TV (9)
Odessa KOSA-TV (7)
San Angelo KCTV (8)
San Antonio KENS-TV (5)
Waco KWTX-TV (10)
Wichita Falls KAUZ-TV (6)
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Burlington WCAX-TV (3)
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Norfolk WTAR-TV (3)
Richmond WTVR (6)
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WASHINGTON
Bellingham KVOS-TV (12)
Pasco KEPR-TV (19)
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WYOMING
Casper KTWO-TV (2)
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*See neighboring states

EQUIPPED FOR ICE OR OPEN WATER, NATURALIST AL OEMING HEADS FOR ISLAND ROOKERIES IN HUDSON BAY. KODACHROME BY [illegible], JR. © N.G.S.

A NATIONAL GEOGRAPHIC SPECIAL
Journey to the High Arctic
SEE IT IN COLOR
TUESDAY
APRIL 13

Adventure at the top of the world

GET OUT YOUR EARMUFFS and fur-lined parkas, and head north with National Geographic. On Tuesday evening, April 13, the Society presents "Journey to the High Arctic," fourth in its 1970-71 color television documentaries. Join Eskimos on Coats Island in Hudson Bay as they capture walruses from a herd of 500. Chase a narwhal at Repulse Bay. Visit a colony of arctic hares on Ellesmere Island. Help Indian boatmen round up white whales; take part in a caribou drive; and fly in bush planes across tundra, glaciers, and ice-choked seas.

Narrated by Joseph Campanella, the hour-long program is produced by the Society in association with Metromedia Producers Corporation (MPC). Sponsors are the Foundation for Full Service Banks and Timex Watches.

EKTACHROMES BY ROBERT W. MADDEN (UPPER CENTER), THOMAS ANTHONY DEFEO (LOWER CENTER), AND PETER STEPHAN (LOWER LEFT); KODACHROMES BY BOB LOSEY, JR. © N.G.S.

Ski-fitted Cessna 185 glides above Hudson Bay, carrying a Geographic film crew. The men flew 10,000 miles in quest of arctic wildlife.

Beady-eyed arctic hare wears white all year on Ellesmere Island. Farther south the species changes into a summer coat of brownish gray.

Too young to be frightened of men, wolf pups emerge from their den in Arctic Canada.

Defying captors, a young musk ox churns lake waters in Canada's Northwest Territories.

Indian rides bareback on a white whale—a beluga—after tagging it in the Seal River during a study of its migration.

Tear out this page and keep it near your TV set as a reminder.

New approach to Italy

Your car glides by green hills and picturesque villages where castle towers and church tops reach for the blue skies.

You are driving to a famous «trattoria» where you'll enjoy the most delicious local specialities; along the way, you ride through a large «piazza» with black and white pavement where a *live* chess game is played by Italians in classical costumes. Another square is host to the pageantry of medieval horse-racing exactly as it was centuries ago. The Italy made rich by history, monuments, mountains, seas and lakes is also the Italy made exciting by vivacious young people, smart fashions, lively «ristoranti», late-late night spots, international swingers and of course the beautiful people of Italy. Here, in Italy, are the racing cars that win, the small lake boats and the luxury yachts, the panoramic ski slopes, comfortable new hotels, «autostrade», highways designed for enthusiastic driving. Here are the fascinating streets where you may see the Pope pass by in his car and bless his people.

Only sunny Italy offers you so much of the glorious past and the exciting exciting present.

Enjoy the new approach to Italy this year.

For further information, please contact
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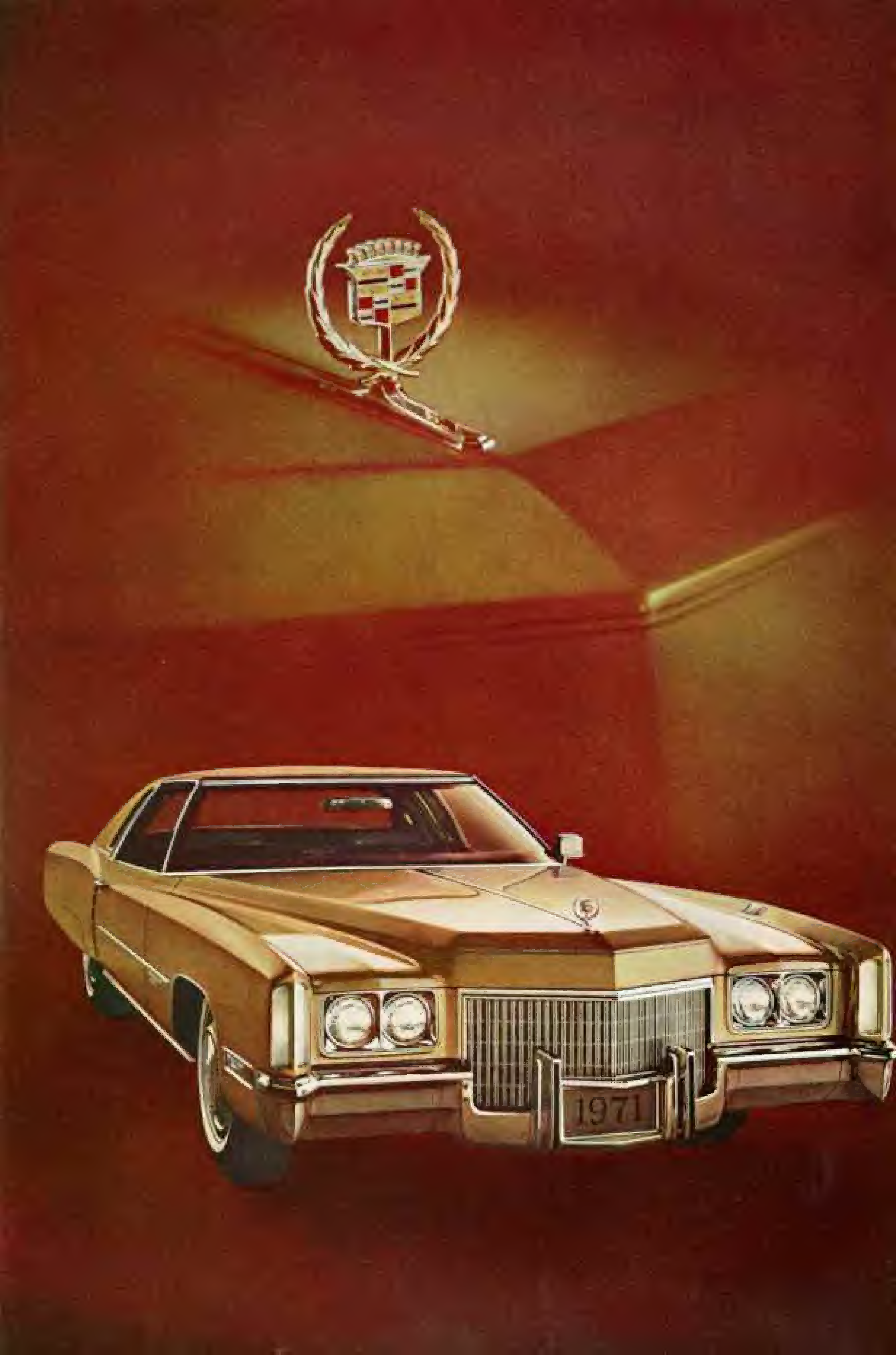
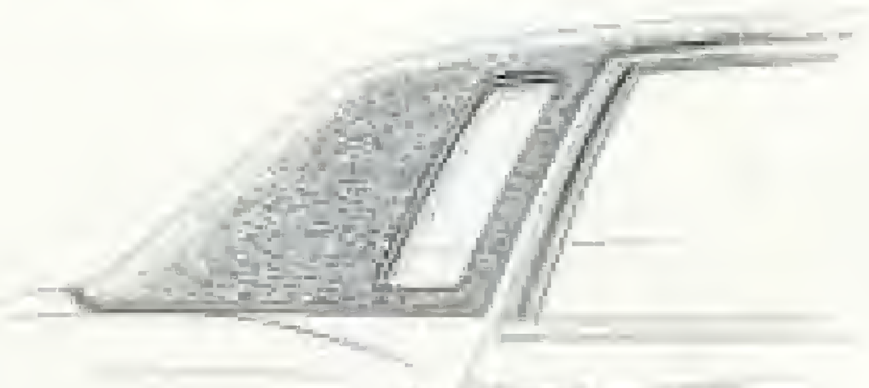

1971

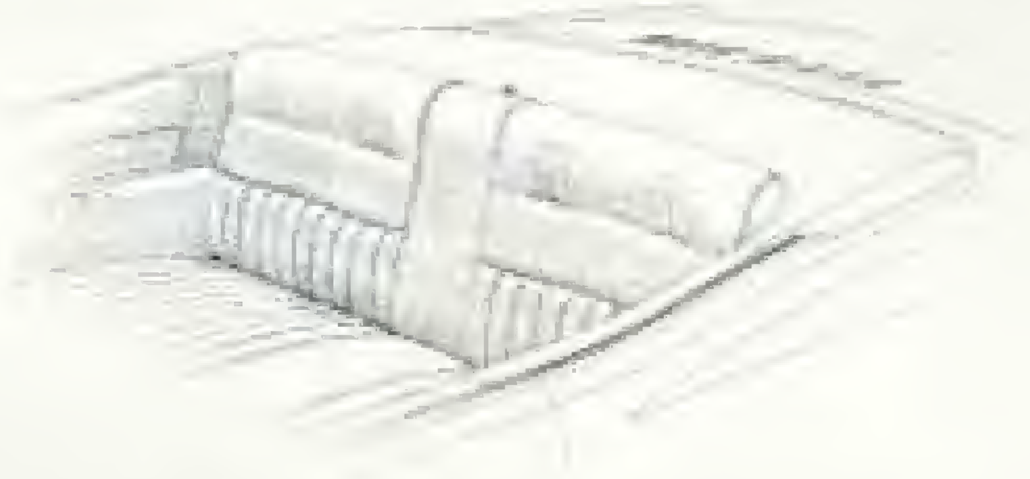
Eldorado by Cadillac.
Admire it for its beauty.
Respect it for its ability.

The dramatically beautiful 1971 Fleetwood Eldorados—equipped with Cadillac's front-wheel drive and an exclusive 8.2 litre V-8 engine—usher in a whole new era of personal luxury motoring. Everything about the new Eldorados—the long, low, distinctive design, the luxuriously appointed interior, the incredibly quiet riding qualities (quiet even by traditional Cadillac standards)—marks them as the world's most elegant personal cars.

The completely restyled Eldorado Coupe has a distinction and poise that are elegantly expressed in its beveled hood and rear deck, and in its graceful proportions. New coach windows—an Eldorado exclusive—accentuate its classic, personal car appearance. Side-guard beams in the doors show typical Cadillac concern for your security. And you will discover new low-profile seats, finished in rich fabrics or soft leathers, along with the many comforts and conveniences that you expect in a personal car built by Cadillac.



Personal motoring achieves an even greater dimension of luxury with an all-new companion model to the Eldorado Coupe—the youthful and glamorous Eldorado Convertible. Now the only luxury convertible built in America, it comes equipped with an ingenious new inward-folding Hideway Top, which folds behind the seat when lowered, providing full-width room for rear-seat passengers. Rarely is such an exciting personal car introduced to the motoring world.

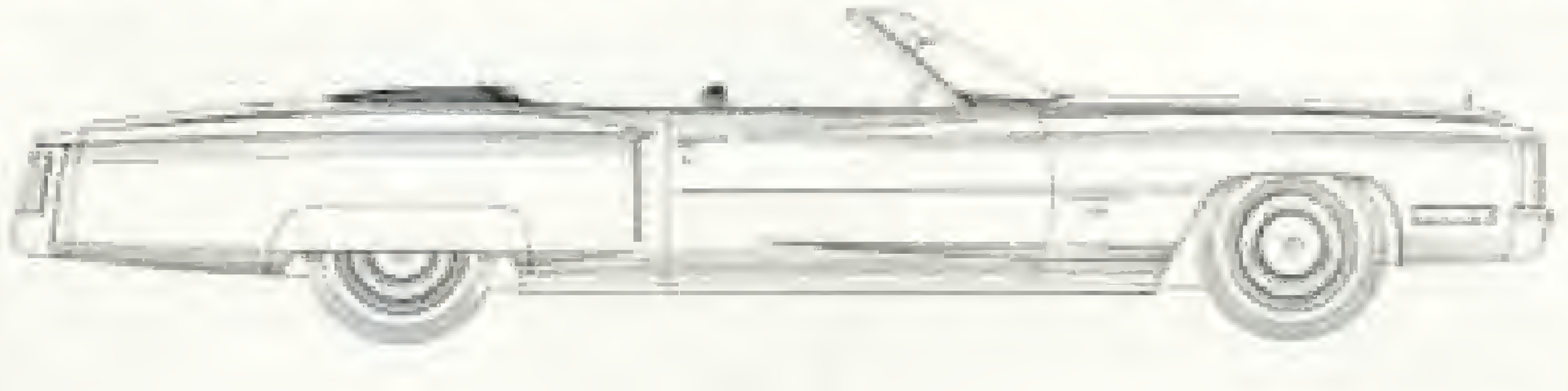


But only when you're actively behind the wheel of either of these great personal cars will you fully appreciate Eldorado individuality. The big, quiet, exclusive 8.2 litre V-8 engine (which can perform brilliantly, and with lower exhaust emissions, on the new no-lead, low-lead gasolines) responds smoothly to your driving demands. Combined with the precise handling of Cadillac's front-wheel drive, variable-ratio power steering, power front disc brakes and Automatic Level Control, it provides luxury performance that's uniquely exciting. Add to that the smoother, softer, quieter ride attributable to Eldorado's new, longer wheelbase and new suspension, and you will experience driving pleasure unequaled anywhere in the world.

No other automobiles can match the distinction and quiet performance of the 1971 Eldorados. Your Cadillac dealer invites you to experience the pleasure of driving the world's most elegant personal cars.

GM
MARK OF EXCELLENCE

Cadillac Motor Car Division



Cadillac

Shown opposite is the 1971 Eldorado Coupe.

Watch Masters Golf with the Leader, Cadillac, April 10-11, CBS-TV.

Even when you've blown a fuse,
we're still on the line.

You could blow every fuse in your house and still be able to use your telephone.

Because a telephone doesn't get its power from your house circuits.

Instead, it operates from a low-voltage direct current supplied by Telephone Company batteries.

Much like the battery you have in your car, ours, too, must be constantly charged.

For this purpose we have battery chargers that convert power from the local power company.

But knowing that storms and other emergencies can sometimes affect power lines as well as our own, we have auxiliary generating equipment ready to take over at any time to keep the batteries charged.

The American Telephone and Telegraph Company and your local Bell Company are constantly working to provide reliable telephone service.

So if a blown fuse does leave you temporarily in the dark, you can at least call somebody about it.

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Scenery. Bluffs, springs, caves, lakes, hills. Mother Nature works overtime in Missouri. The panorama is constantly changing. And you'll like the change. Always in color. Always in season. Come see.

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MISSOURI:
bet you didn't know
we had it in us!

If all wagon buyers were alike, we'd build just one wagon.

Kingswood Estate

Our medium wagon...with walk-in tailgate.

Treat yourself to a tailgate that goes two ways.

Now the doorway.

You step up easily. The low cutaway bumper step is just the right height.

You step in naturally. The roofline is slanted to let you stand tall.

You sit down comfortably. On a big, wide sofa seat.

Now the gateway. Another treat: a loading gate that lies flat. Not at an angle like some we know. You'll see. The treat's on us.

Concours Estate

Our big wagon...with vanishing tailgate.

We've changed it. Actually, you've changed it.

You want a big wagon that's easier to load, easier to use. And, man, nothing's easier than ours.

You can open our Glide-Away tailgate even in a closed garage. Even when a trailer's hooked on.

Just turn the tailgate key and the window automatically glides into the roof. Out of sight. Another turn and the gate drops down, disappearing under the floor with one easy push. Out of your way.

We also put in a new forward-facing third seat you get to from the side door. And we designed the rear end so you don't have to put money into an air deflector.

You'll see. We put a lot into putting you first.

Vega

Our little wagon...with swing-up tailgate.

Vega. It's a lot of wagon for such a little wagon.

And like all '71 Chevrolets, it runs like a charm on no-lead or low-lead gasolines.

The tailgate?

Up it goes like a canopy—window and all—with one little effort. But what it leaves is a very big opening to a very big room. For such a little wagon.

You'll see. At your Chevrolet dealer's.

Chevrolet

1971. You've changed. We've changed.

GM

MARK OF EXCELLENCE

The Schifano kids started Polyunsaturating Grandma

with chicken cacciatore and Mazola.

The Schifanos are not health fanatics, and they don't want to turn Grandma into one. But they do pay attention to what many medical authorities are saying about the American diet.

So, the family has cut down on calories and total fats, and are replacing solid fats with polyunsaturated vegetable oils.

The Schifanos use Mazola® 100% Corn Oil. Why Mazola? Because it's higher in polyunsaturates than any other leading national brand.

Mind if we say that again? It's important. Mazola Oil is the highest in polyunsaturates of all leading national brands. That's why Mazola is more than worth the few extra pennies it costs.

P. S. They use Mazola® Margarine, too. It's made with liquid Mazola Corn Oil.

Mazola
Corn Oil

Best Foods, [illegible] cpc

At $12.50 an hour for a repairman, think how much a cheaper dishwasher could cost you.

We build KitchenAid dishwashers to work well for a long, long time. How long we can't say. But we get letters that tell us some of our original models are still in use after 21 years; and with *very few service calls.*

We build KitchenAid dishwashers with special features. Like the Soak Cycle on our Superba model. It soaks dirty pots and pans automatically.

It washes so thoroughly that even a plate with dried egg on its face comes clean.

It dries so safely that you can put in your good dinnerware without worrying.

If you want a reliable dishwasher, look in the Yellow Pages for your KitchenAid dealer. Or send the coupon.

KitchenAid Dishwasher Division,
Dept. 1DNG-4
The Hobart Manufacturing Company,
Troy, Ohio 45373

Send me free literature on KitchenAid dishwashers.

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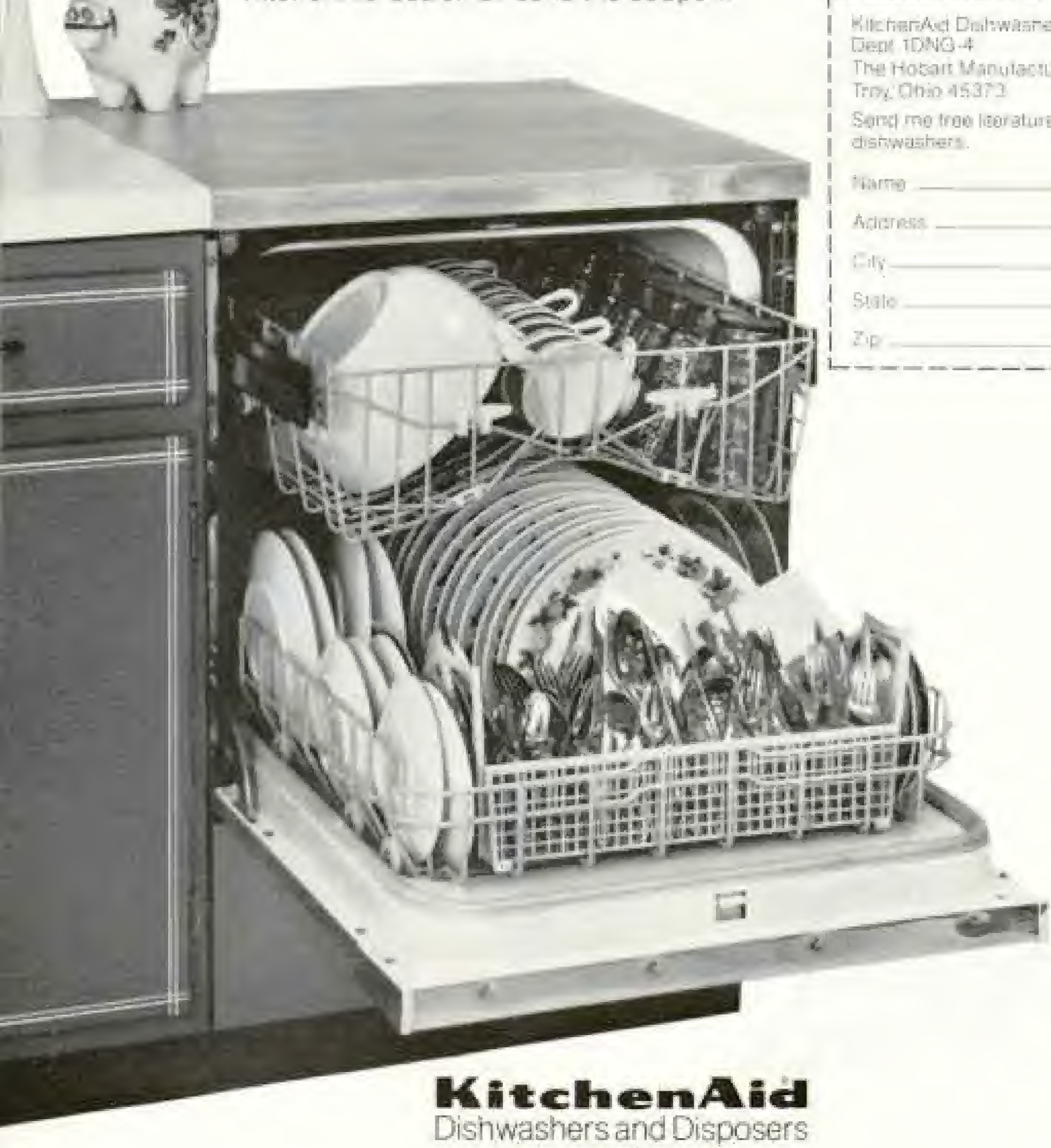

KitchenAid
Dishwashers and Disposers
Hot-water Dispensers

portable

Not the piano. The music. Once you've got it, music is a portable pleasure that follows you all your life. It's a bit of peace you can call up at will. It's a magical gift.

The best way to learn music, of course, is to take piano lessons. Once you play the piano, the way is paved to understand all music better. Wouldn't that be a marvelous gift to give your child? Or yourself?

Naturally we hope you will buy a Yamaha instrument. They are among the finest, richest sounding, most responsive in the world.

But we'd rather you buy another brand of piano than no piano at all.

YAMAHA
INTERNATIONAL CORP. Montebello, Calif. 90640
Ask your dealer about the Yamaha Music School

Southern California is a great place to vacation.

Find out about all the places to go. Send for our free sight-seeing map, write:
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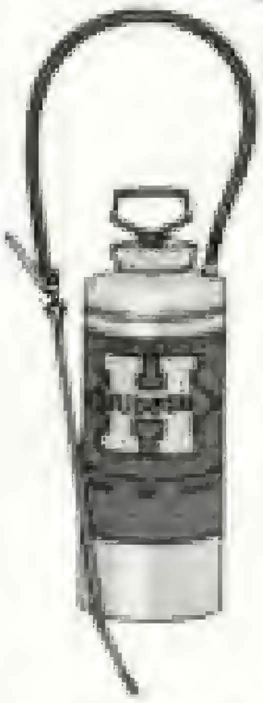
Visitors Council
Dept. NG-43, Box 55026
Los Angeles, Calif. 90055

EVERYTHING'S GOING FOR
Southern California

Horticultural Horoscope



Your guide to a more beautiful environment

Enjoy a lovely lawn! Save it from ugly weeds that have the tenacity of a Taurus. Apply weed-killer with a Hudson sprayer. It's fast, easy. Coarse, low-pressure spray helps prevent drift and harm to wanted plants. Get your Hudson sprayer now.

Good Housekeeping

HUDSON®
SPRAYERS AND DUSTERS
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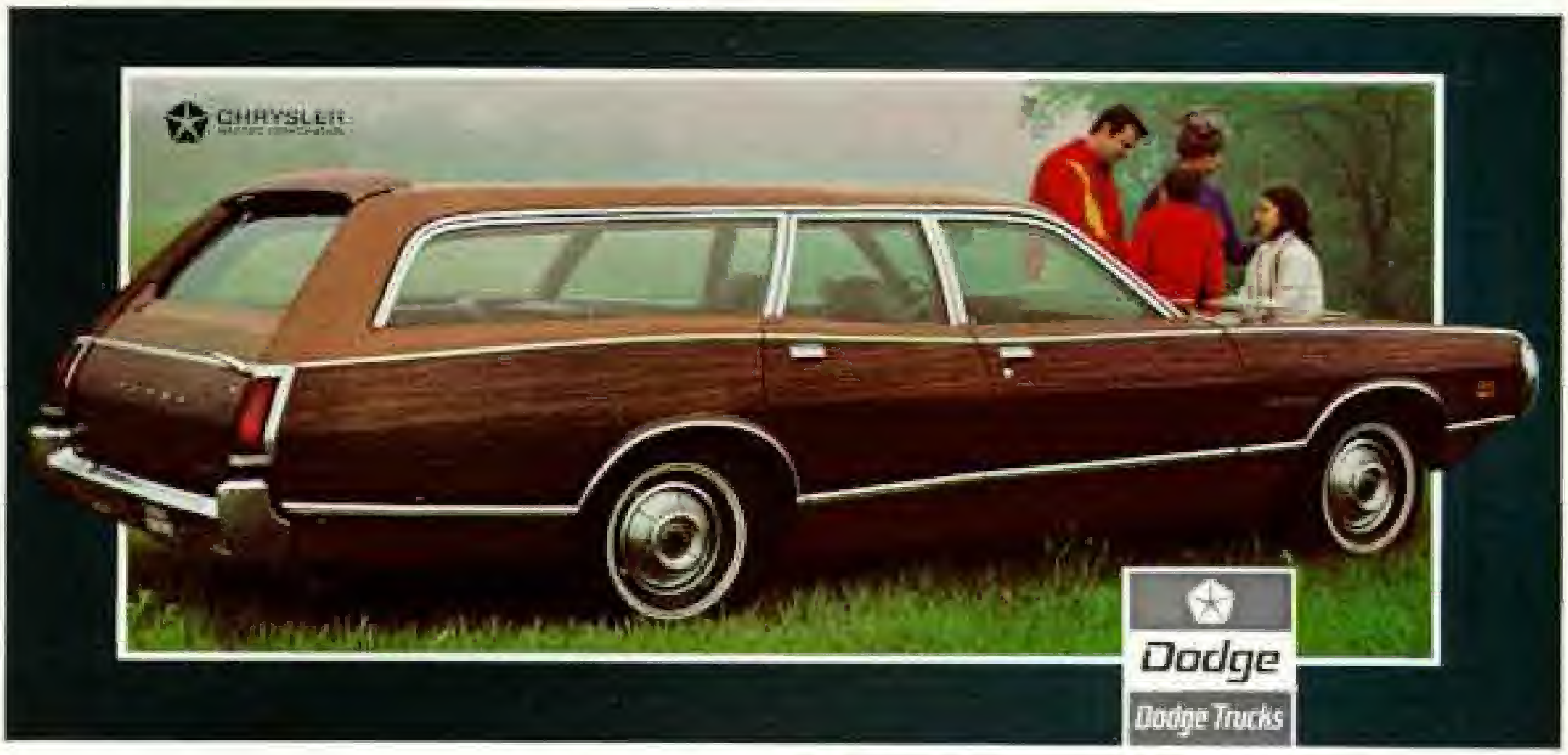
154 East Erie Street, Chicago, Illinois 60611



Question:

If our Coronet wagons have the style, the space, and the features you want, why pay more?

For those with whom price is no object, boy, can you buy a dandy station wagon today. Big as a house, with a V8 whose power is exceeded only by its appetite. But how about the rest of us? Will we be forced to jam our plywood edgeways between the wheelhousings? To sit in a slightly stooped position with our knees under our chin, a constant irritating reminder that we just can't afford the green to go first class? And why doesn't somebody build a family-sized, plywood-panel-sized, great-looking wagon right in between the too smalls and the too expensives?

Boy, would a wagon like that be a buy. And here it is. Dodge Coronet. What is it? Great-looking. Sized and priced right in the gap. Plywood, it holds flat; headroom and legroom you get, with features that rival those of the biggies. And a price that gives your budget a little breathing room.

A few words about value.

A great wagon has to be both a great family car and a versatile utility vehicle. Here are some thoughtful Coronet features.

- A cargo area that holds four-by-eight plywood panels flat.
- A two-way tailgate that opens like a door without your rolling the window down.
- Convenient side storage areas in the rear.
- An optional rear window cleaning vane that really works.
- Choice of two- or three-seat models.

A few words about features.

Coronet gives you a wide choice in the amount of richness you get—from the fully carpeted, simulated wood-sided Crestwood shown above to the more utilitarian standard models.

Only the trim is changed. All models include:

- Fully unitized body construction for greater strength and a quiet ride.
- Adjustable torsion-bar suspension that offers greater handling ease and stability on curves and over rough roads.
- A low emission 318 V8 that runs on regular gas, either low or no lead gas.
- A list of standard safety features more than twenty items long including a dual braking system, padded instrument panel and sun visor, and Safety-Action inside door handles.

A few words about how much you should pay for what you want!

You can find wagons priced a lot higher than a Coronet that really don't give you that much more. Rest assured that Coronet offers all the room, ride and comfort that a going, growing group like yours is ever likely to need. And then some. Visit your nearby Dodge Boys and try one on for size. Try one on your budget for savings. Dodge Coronet. The great looking wagon priced right in between the too smalls and the too expensives. Right on, Dodge.

Dodge Coronet. How's that for a thoughtful answer, wagon lovers?

Girls' Schools

FAIRFAX HALL Accredited Preparatory School for Girls in famous Shenandoah Valley. Grades 9-12. Music, art, dramatics. Shorthand, typing. Private stable, riding rings. Pool. New students admitted to grades 9, 10, 11. Catalog, **Wm. B. Gates, Jr., Pres., Box N-714, Park Station, Waynesboro, Va. 22980**

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Fully accredited Military Preparatory School on the Pacific Ocean, 90 miles south of Los Angeles. Strong academic emphasis, grades 7-12. Honor M.I. ROTC. **Box N, Carlsbad, CA 92008**

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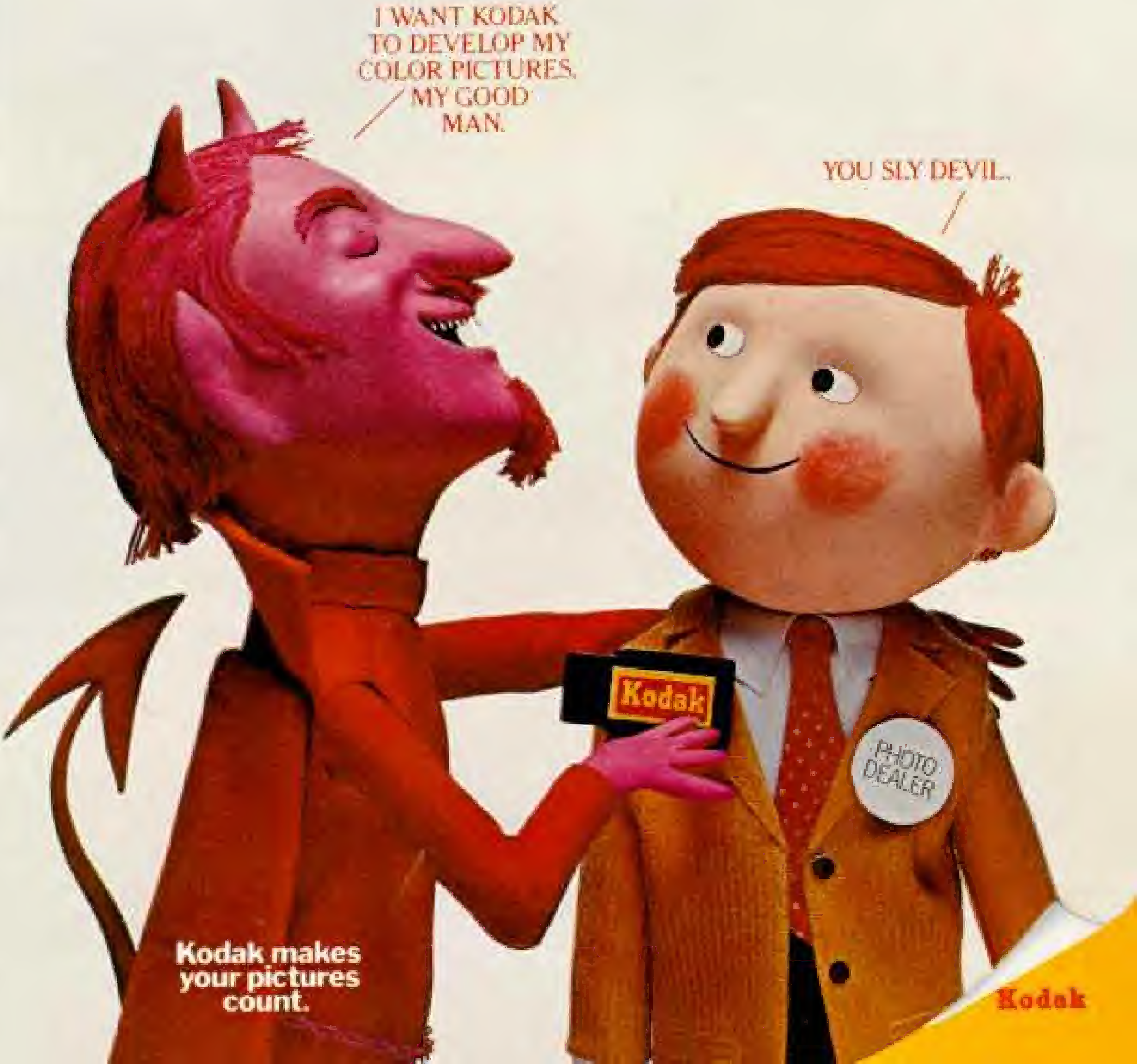
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