"CLOSE-UP: U.S.A." — HAWAII

VOL. 149, NO. 4

APRIL 1976

NATIONAL GEOGRAPHIC

IRISH WAYS LIVE ON
IN DINGLE 551

ROBERT FROST
THE POET 438
HIS BELOVED LAND 444

A CANOE HELPS HAWAII
RECAPTURE HER PAST 468

WILL BRAZIL'S FIERY BEES REACH THE U.S.? 491

MARSH ARABS, WATER DWELLERS IN A DESERT WORLD 502

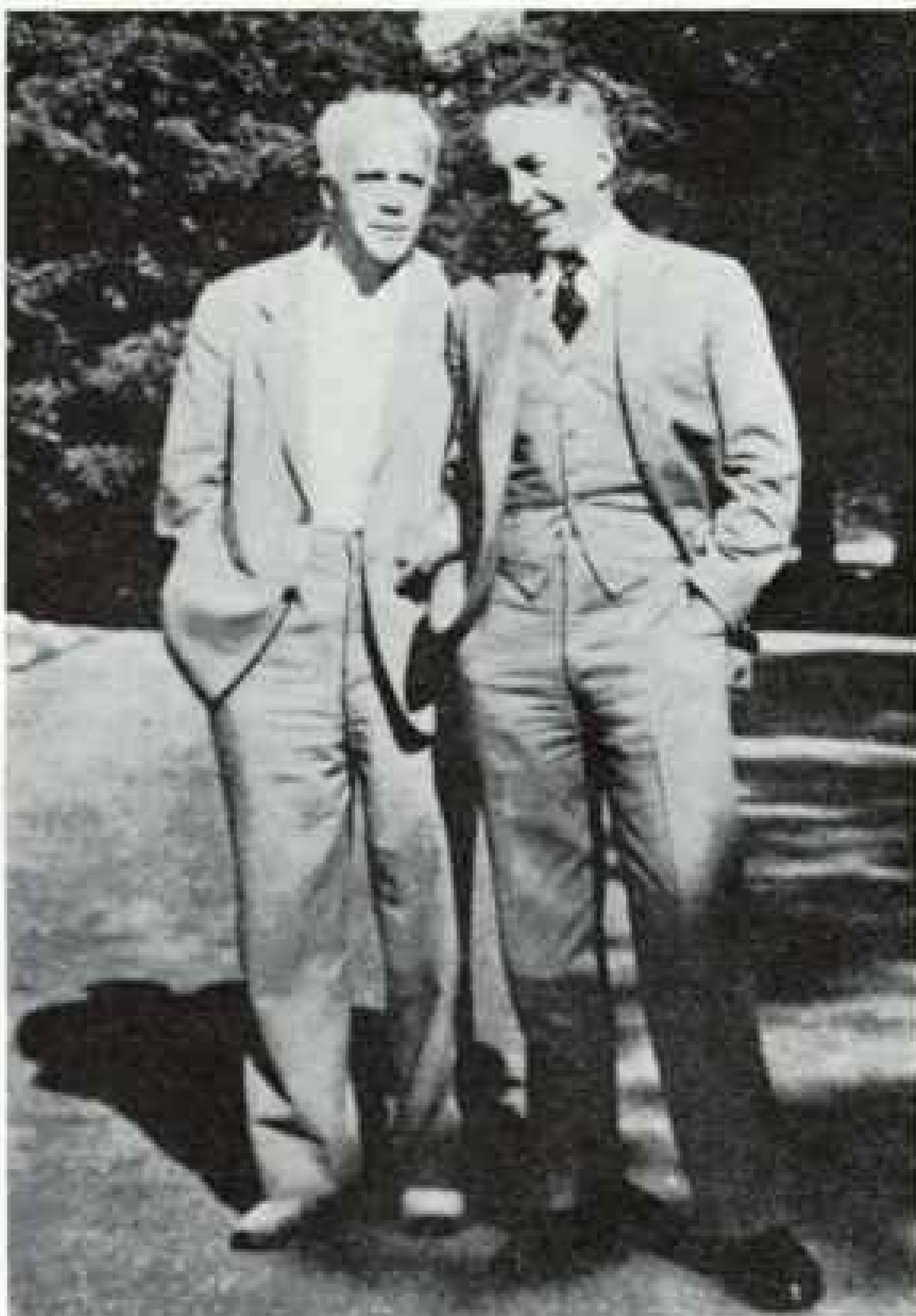
SAN ANTONIO—EVERY TEXAN'S HOMETOWN 524

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

IN THIS BICENTENNIAL YEAR, when we consider the riches of our past, what better place to look for authentic American images than the New England of Robert Frost? In the rock-ribbed boundaries of his New Hampshire farm, Frost first found inspiration for his poetic insights. And who better to help us appreciate his genius than Frost's friend Archibald MacLeish, our most distinguished living poet?

Perhaps the most difficult of all artistic endeavors is interpreting the essence of a man's work in a medium different from the one he employed. For our presentation of Frost's poetry, we found in the talented eye of photographer Dewitt Jones the perfect complement to the Frost idiom. In his poignant images of contemporary New England, the poetry lives. By giving us the very texture of the land and the people Frost wrote of, Mr. Jones has increased our capacity to understand and enjoy the poet's words. It is a high artistic achievement. Frost, MacLeish, and Jones—poetry, mind, and eye—present us with a true "gift outright"—a celebration of the human spirit.

Gilbert M. Grosvenor



ROBERT FROST (LEFT) AND ARCHIBALD MACLEISH AT THE 1938 BREAD LOAF WRITERS' CONFERENCE, RIPTON, VERMONT; COURTESY MIDDLEBURY COLLEGE LIBRARY

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April 1976

Robert Frost: The Poet ... 438
Archibald MacLeish remembers a friend and examines his ties with New England.

... And His Beloved Land 444
Dewitt Jones travels through New Hampshire and Vermont, recording the visual echoes—and perhaps the sources—of Frost's verbal imagery.

A Canoe Helps Hawaii Recapture Her Past 468
Planning Hokule'a*'s Bicentennial voyage to Tahiti brings a new awareness of Polynesia's all-but-forgotten folkways. By Herb Kawainui Kane and David Hiser.*

Those Fiery Brazilian Bees 491
When 26 African queens escaped and mated with local bees, they started a new menace—and a lively controversy. Rick Gore reports the differing views of scientists as the new strain swarms north toward Mexico and the United States. Photographs by Bianca Lavies.

Water Dwellers in a Desert World 502
Gavin Young and Nik Wheeler explore the seldom-visited domain of Iraq's Marsh Arabs.

San Antonio, Every Texan's Hometown 524
"San Antone" still offers the rich cultural brew author Fred Kline knew as a boy. Photographer David Hiser views the city with a newcomer's freshness of eye.

Irish Ways Live On in Dingle 551
Éire's outermost corner guards a rich heritage of life and language. Bryan Hodgson and Linda Bartlett thread the peninsula's sometimes tragic past and ponder its uncertain future.

COVER: *Five-year-old Paudie Boland listens to his grandfather's accordion concert on the Dingle Peninsula (pages 566-7). The boy represents the new hope of Ireland. His father brought the family back to the ancestral farm after years in England as a construction worker. Photograph by Linda Bartlett.*

Robert Frost and New

England

By ARCHIBALD MacLEISH

THERE ARE MORE WAYS than one to paint a portrait of a man. In a not too fanciful sense these photographs and these lines of verse (pages 444-67) compose a portrait of Robert Frost, or at least a perspective in which such a portrait could be painted. For the essential of Frost was his relation to New England. And that relation, as I hope to show, was not at all the one we commonly suppose. Rather it was the one Dewitt Jones's camera has caught and Frost's poems, rightly read, confess.

Frost's is a curious situation. Dead a dozen years, he remains something of an enigma to his readers and even to the biographer he himself selected to explain himself to his posterity. Not that Frost's achievement is in doubt. There is no question whatever of his achievement. He was a poet not only of his time but of his tongue: one of the very few who deserve that designation. He was also a respected man of letters, one of the most respected of his generation in this country. He was a lecturer seen and heard and listened to from one coast of this continent to the other. He was a public figure, an American symbol, who appeared as such at the inauguration of a President (next pages). His manuscripts, autographs, memorabilia are preserved in the most distinguished libraries. He had, and has, readers everywhere on earth. His poems, many of them, are known by heart to thousands and repeated over and over.

But who the speaker in those poems *is* remains a question not only to intellectuals and academics, who live by putting questions to the past, but to children in schools who are given poems of Frost's to read at an early age, and to young men and young women who read them for themselves, and even to the old among their books. "What does he mean?" asks the child.

I would have written of me on my stone:
I had a lover's quarrel with the world.

THE LESSON FOR TODAY

In the autumn of his years, Robert Frost (1874-1963) sits quietly at his work. Date: September 29, 1954. Place: the log cabin on his Vermont farm. Frost's conversation that day with photographer Tom Hollyman ranged from how to wash black socks and how to handle an ax to the function of poetry.

"Who'd say a thing like that?" asks the young woman. "I don't know," says the old man. "I don't quite get him."

The answers aren't always easy, particularly if you start with the assumption, as most of us do, that you know them in advance. Who is the speaker in these poems? A Yankee, you say. What is he talking? Yankee talk. Isn't Frost down in quotes in the Encyclopædia Britannica as the "poet of New England"? Didn't he live and farm in Derry, New Hampshire? Didn't he write "North of Boston"? And of course he did.

But the trouble is that if you start with the assumption that Frost was a Yankee poet you will expect him to write like a Yankee (which he often, but not always, does), and you will expect his poems to be New England poems, poems not only of the New England scene but of the New England mind, which they may not be at all. And it is there, at that point, that you get the children's questions and the occasional uneasiness in college classes and the discomfiture of distinguished scholars who, having used Frost's predecessors among New England poets as keys to his work, have ended up trying to explain why the keys don't fit.

TAKE, FOR EXAMPLE, the famous ironic tone that pervades Frost's work. His poems, even the early poems given to children to read, echo with irony. Irony, of course, is a common Yankee device. But is

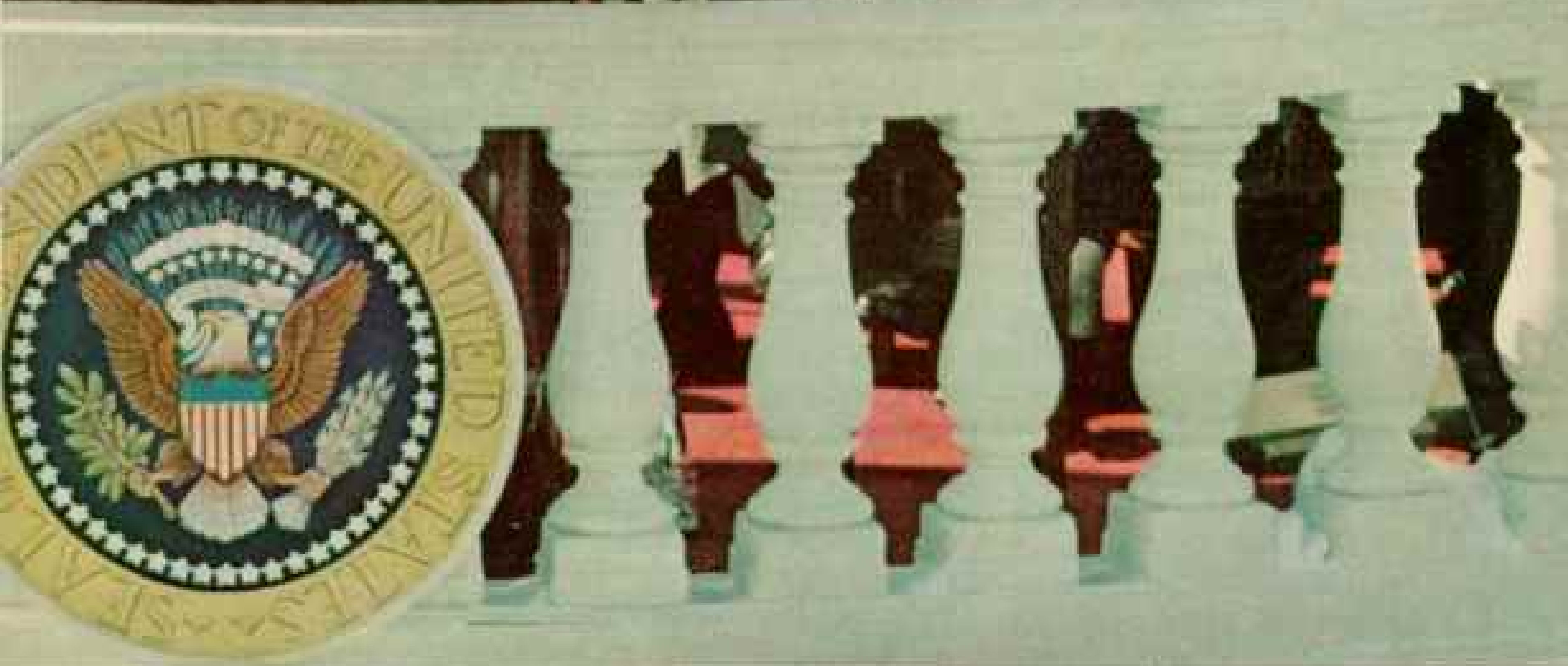
In the glare of pomp and snowshine on a bone-cold day, scarcely two years before his death, Robert Frost became, in effect, the first laureate in the republic's history.

Flanked by once and future Presidents, the 86-year-old Frost gathered himself to read a history in rhyme that he had composed for the inauguration of John F. Kennedy on January 20, 1961. But glare, as strong as sun glancing off a frozen New England pond, blinded the poet. Frost set aside his written text. But the inner eye of memory did not fail him. He quickly shifted to reciting *The Gift Outright,* just as he had planned:

. . . Such as we were we gave ourselves outright
(The deed of gift was many deeds of war)
To the land vaguely realizing westward,
But still unstoried, artless, unenhanced,
Such as she was, such as she would become.

Frost's irony Yankee irony? Try the edge on your thumb. The Yankee mind is ironic in the old Greek sense: It "dissembles" by saying more or less (usually less) than it means, and there is a laugh in the grain of the words to warn you. Frost's irony is something else. It is disturbing in its implications—tragic even—and it can be savage. (Read *Provide, Provide* again.) The difference is not in the humor or lack of it: There is enough humor in Frost for seven poets. The difference is in the irony itself, the way it mocks at things. And in the tone it imparts to the voice, the sense it gives you of the speaker.

Which means that the children are right. There is indeed a kind of contradiction in certain poems of Frost's if you read them in the assumption that they are Yankee poems. But it does not follow that the difficulty is in the poems. It is the assumption that needs to be reconsidered. And I can think of no better way to reconsider it than to look long and hard at these New England photographs with poems of Frost's, or fragments of poems, in your mind as you look. Do these words come out of that field, this pasture, those far trees, or is there a different relationship between the poem and the country? Is it the feel, the sense, the character of a corner of the continent that speaks in these lines? Or is it the other way around? Is it the man who sees that countryside, the man who loves it, uses it, employs it for his purposes, that speaks to us—but speaks for his sole self?



NATIONAL GEOGRAPHIC PHOTOGRAPHER B. ANTHONY STEWART

I think there is no question but that it is a sole and single man who speaks, a singular man, a uniquely singular man. I think that it is a mistake to look for the New England mind in Frost's work or the New England feel. It was not New England that produced Robert Frost; it was Robert Frost who chose New England. And the relation of Frost to New England was not the relation of the native son, who can take his country-earth for granted, but of the stranger who falls in love with a land and makes (literally *makes*) his life in it.

Frost, California born and bred, knew all that as well as we do. One of his most famous poems is a poem precisely of that choice. The road "less traveled by" in *The Road Not Taken* is not, as teachers sometimes tell, the art of poetry. No road is better traveled than the art of poetry. The road "less traveled by" is the *way to* the art of poetry—the way that Frost elected at the age of 26 when he moved into New England, real New England, country New England, to try to support himself and his family on a little farm in New Hampshire while he struggled to master that art.

I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I—
I took the one less traveled by,
And that has made all the difference.

He was neither the first, of course, nor would he be the last, to make that choice, take that impossible risk. Young writers, young artists, everywhere take chances. They bet their lives as men on their hopes as writers. They close their eyes to the odds, carrying their young wives with them—even children. But Frost was bolder than most, not only because the risk is greater in farming, particularly New England farming, but because he was less prepared to take it. He was city born and raised. He knew next to nothing of farming. And his knowledge of New England, real New England, was almost as thin.

His father had been a New Englander by birth, but not, as he frequently told his son and anyone else who would listen, a New Englander by choice. He was a Copperhead even as a boy, and during the Civil War he had run away from home in Lawrence, Massachusetts, to try to enlist in the Confederate Army. (He got as far as Philadelphia.)

Robert himself was born in San Francisco of a Scottish mother from Leith near Edinburgh, and San Francisco was his home for the first 11 years of his life, until his father died and the broken family settled near Lawrence. And Lawrence, of course, was a thriving, industrial city which was *in* a New England countryside but not *of* it. So that Frost, when he moved to his New Hampshire farm, was hardly a Yankee at all in the country sense.

And yet, when he moved to his farm and got safely through his first winter . . .

How the cold creeps as the fire dies
at length—
How drifts are piled,
Dooryard and road ungraded,
Till even the comforting barn grows
far away,
And my heart owns a doubt
Whether 'tis in us to arise with day
And save ourselves unaided.

. . . when he got safely through the first winter and settled down to writing, his poems became Yankee poems—became famous in time as *the* Yankee poems of his generation. And it is there, precisely in that curious, almost paradoxical fact, that one finds the real key to his relation with New England.

MOST OF THE AMERICAN youngsters who, before and since, have taken the road less traveled by, have treated their means of livelihood as means only. The farm, if they farmed, was a way of earning time to write, and the land they worked was just that—land. Not so Robert Frost. From the very first, as you can see in the earliest New Hampshire poems, New Hampshire was more than a means. It was a presence in the written word as well as in the farmland labor. New England became an all-including metaphor for everything Frost learned and came to feel: a bee tree for the honeycombs he was constructing.

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In the work of most poets, particularly young poets, you will find that themes change and scenes change from poem to poem, worlds change from book to book. As you read through Frost's first poems you are always "there," always in New England or what becomes, for the poems' purposes, New England. Where the early poems of most others owe the place where they were written merely for their bed and board, Frost's owe New England for themselves.

Take the first lines in the first poem (after the epigraph) in his "Collected Poems":

One of my wishes is that those dark trees,
So old and firm they scarcely show the
breeze,
Were not, as 'twere, the merest mask
of gloom,
But stretched away unto the edge of
doom.

I should not be withheld but that some
day
Into their vastness I should steal away....

It is not a particularly good poem—young, uneven, and awkward—but it shows you at once how Frost is using a characteristic New England scene: that view across open pasture toward the line of trees that ends the open everywhere in Massachusetts or New Hampshire or Vermont. At first "the merest mask of gloom," the trees become in his wish the "edge of doom," a dark, unending "vastness" in which a man who wanted to might lose himself. And Frost, or so he says, was such a man: "I should not be withheld...." The longing for the dark, in other words, was in himself. He calls the poem *Into My Own*. But the image that contains that longing is a New England image. And the man at the pasture's edge on one side, the trees against the sky at the other, compose the poem between them.

THE SAME THING is true of other deeply private emotions, as for example the fear he speaks of in the winter poem I have quoted. He called it *Storm Fear* and began it on a comic-apprehensive note appropriate to the city-bred in the silence and isolation of the country as the wind swings east and the first snow begins:

When the wind works against us in
the dark,
And pelts with snow
The lower-chamber window on the east,
And whispers with a sort of stifled bark,
The beast,
"Come out! Come out!"—
It costs no inward struggle not to go....

But though the tone is light, the fear is not only comic. There is an ancient human terror in that "stifled bark," and though the "beast" is a Halloween monster, there is nevertheless something truly monstrous there—something that could scarcely have been confessed if New England, with its myths of winter, had not made the image possible. One thinks, reading this early poem, of a later and far greater poem that also begins with New England snow ... "Snow falling and night falling fast, oh, fast" ... and that ends, as this does, with a lightly spoken, an ironic, dread —but one that chills the heart:

They cannot scare me with their empty
spaces
Between stars—on stars where no human
race is.
I have it in me so much nearer home
To scare myself with my own desert places.

These, obviously, are not country poems in the usual sense—certainly not pastoral poems. What they have to say about country things—snow, scything, meadow flowers—turns out to be something very different: something about man, about the experience of being human, being alive, upon this little sunstruck, wind-worn planet that will also end.

And the same thing is true of their New Englandness. They are New England poems, yes—none more so—but not in a descriptive or geographic sense. They are New England poems because they use New England for their purposes, and because the look and feel and smell of things in New England is so profoundly and yet so intimately usable: because this landscape lets the human meaning through: because the human asking is reflected here as nowhere else I know. But what's on our minds as we read them is not New England, it is ourselves: our condition as men: our consciousness as human beings.

So what, then, is the answer to our question?

What *is* this ironic voice, this sometimes cruelly ironic voice, saying to us? What does it want with us? With our children? With that young girl at the eager beginning of her life? With the old man at the end of his? With ourselves?

Our *selves?* Well, Frost left us an answer of sorts: a little poem he placed as epigraph at the beginning of his "Collected Poems." It is called *The Pasture,* a word that always evokes New England for me, and it is written in the teasing, tender voice a man might use to a child—or to a woman he loved:

I'm going out to clean the pasture spring;
I'll only stop to rake the leaves away
(And wait to watch the water clear, I may):
I shan't be gone long.—You come too.

This is a promise, of course, writer to reader: Come with me and I will show you.... What? Only the water clearing in a roiled-up spring? Yes, that and other miracles. To *show* the water clearing in a spring, really to *show* it (or a falling leaf, a life) so that the mind may confront it and the heart contain it, is the most difficult labor on earth, the labor of art.

And what Frost is saying to those children who understand but not quite, to the young who catch the irony behind the saying and resent it, to the old man winding up his thought, is what all art says: See! (Not *Look,* but *See.)* Anything can make us look, any chance movement in a room, the wind in poplar leaves, a paper bag uncrumpling in the sun. Only art can make us see. Henry Thoreau put the distinction as simply as it can be put: "... there is no power to see in the eye itself, any more than in any other jelly.... We cannot see anything until we are possessed with the idea of it, take it into our heads,—and then we can hardly see anything else."

It is true of the roiled-up water in that spring. And it is true too of Frost's poems, take them all in all. They too perform the promise of the epigraph at the beginning: They *show.* We see because of them: and not New England but the landscape of our hearts. As for the irony, irony too is a way of *saying* so that one may *see:* a reflection, a refraction, of the light that makes the too-familiar visible. □

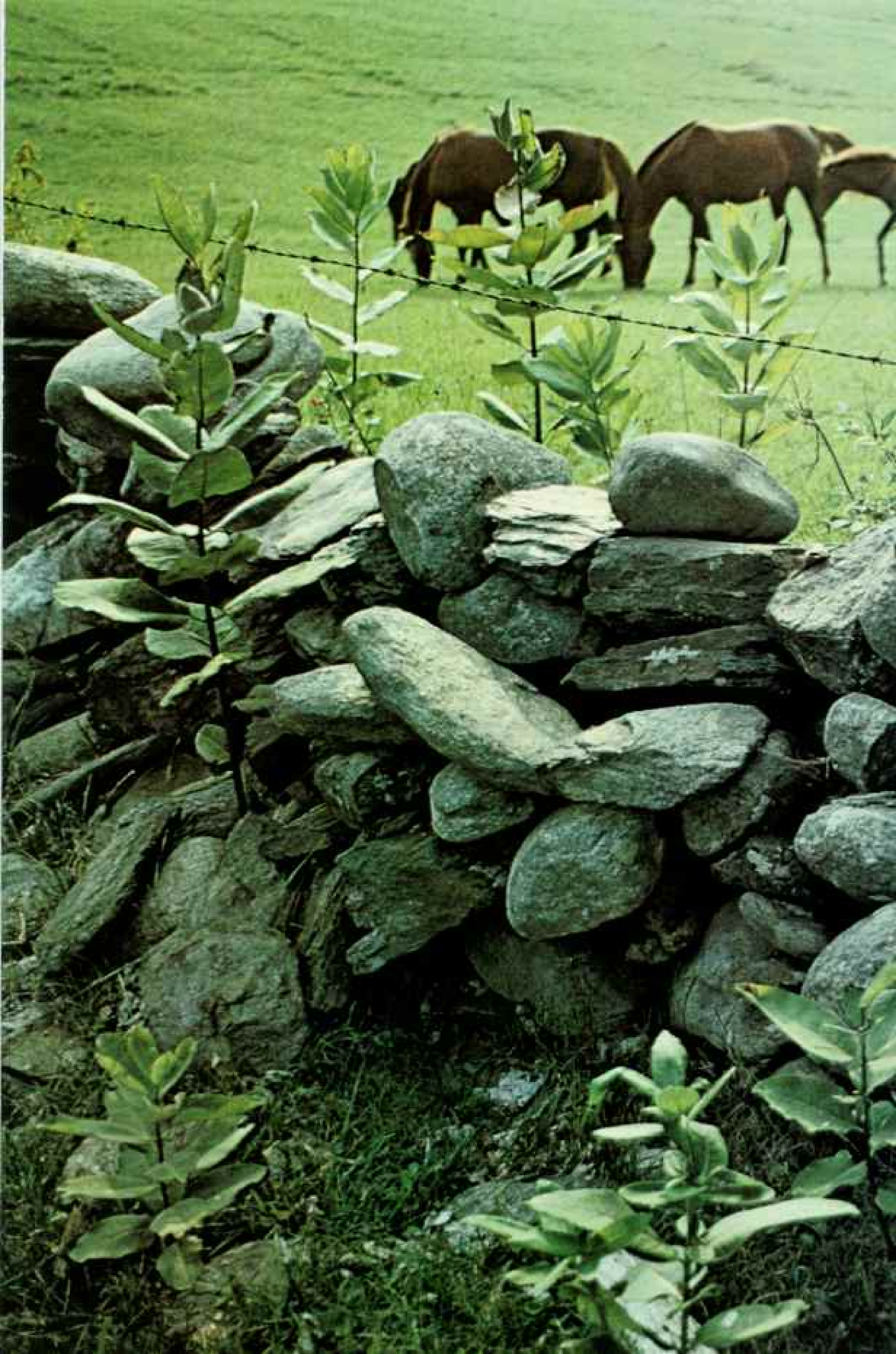
A PHOTOGRAPHIC PORTFOLIO BY DEWITT JONES

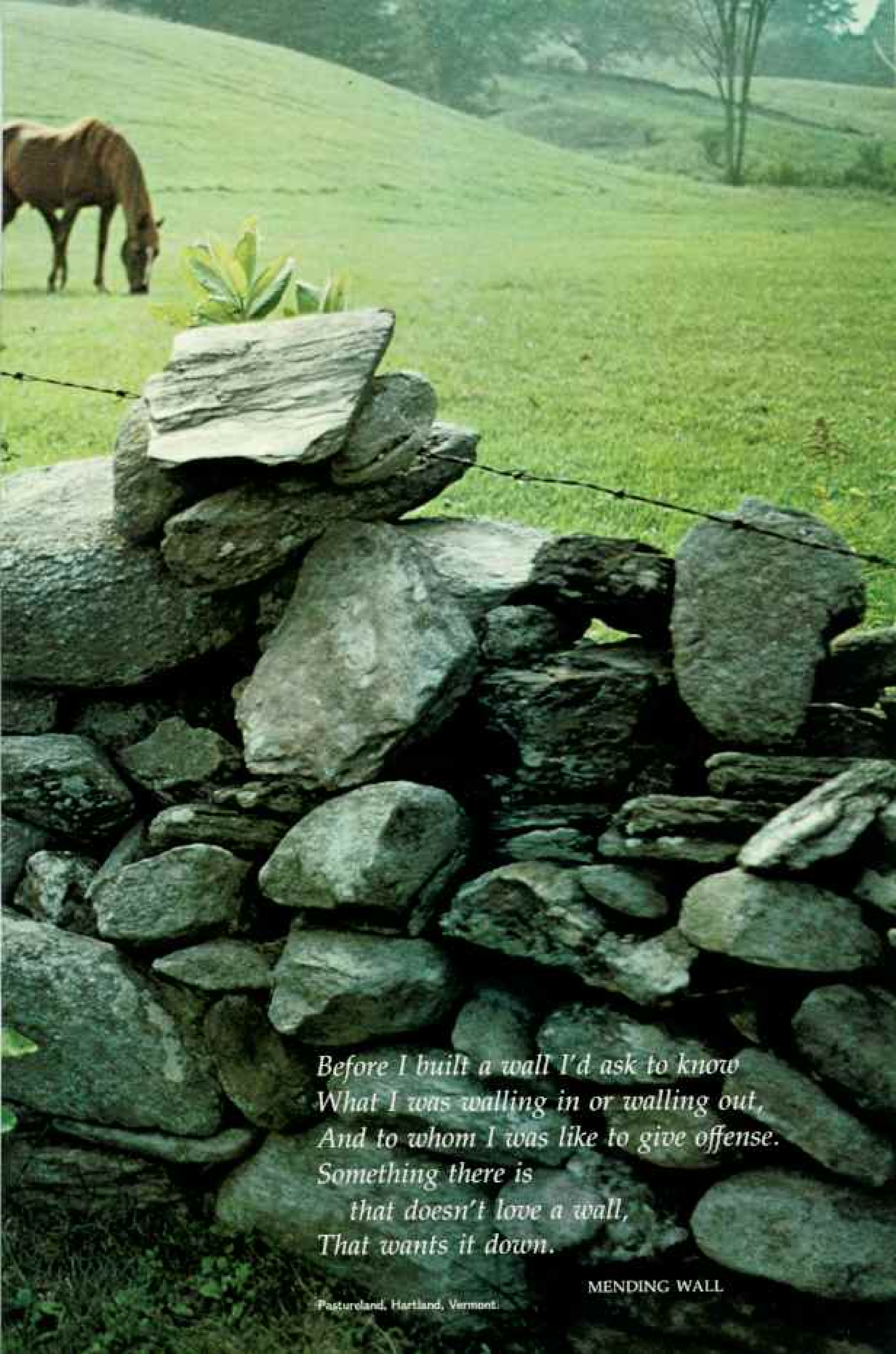
Look of a Land Beloved

I have been treading
on leaves all day
until I am autumn-tired.
God knows all the color
and form of leaves I have
trodden on and mired.
Perhaps I have put forth
too much strength
and been too fierce
from fear.
I have safely trodden
underfoot the leaves
of another year.

A LEAF-TREADER

Old roadway, Thetford Hill, Vermont





Before I built a wall I'd ask to know
What I was walling in or walling out,
And to whom I was like to give offense.
Something there is
that doesn't love a wall,
That wants it down.

MENDING WALL

Pastureland, Hartland, Vermont.

Retired couple, Lyme, New Hampshire (left), and harvest figure, Post Mills, Vermont

Spades take up leaves
No better than spoons,
And bags full of leaves
Are light as balloons.

GATHERING LEAVES

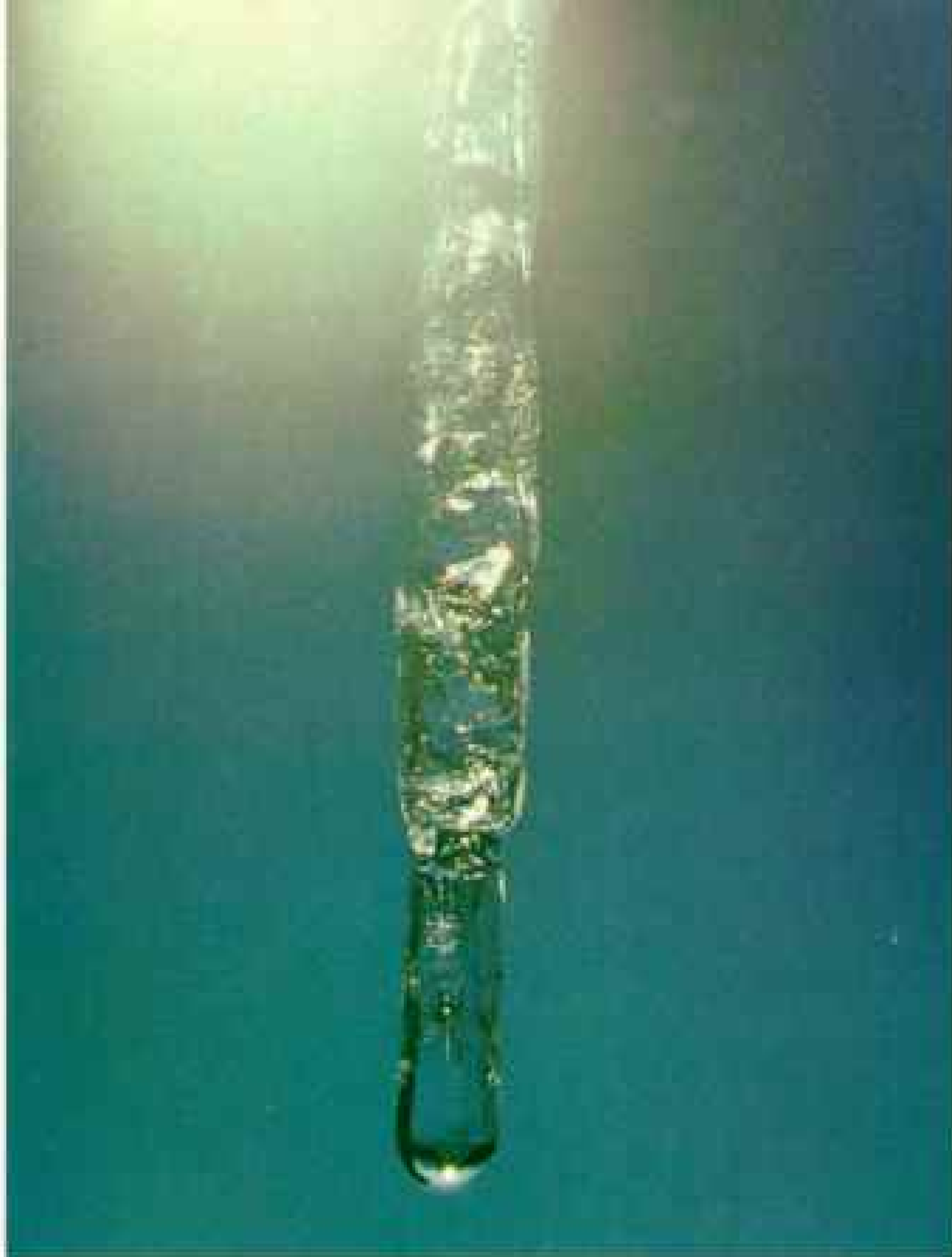
Life is not so sinister-grave.
Matter of fact has made them brave.
He is husband, she is wife.
She fears not him, they fear not life.

ON THE HEART'S BEGINNING TO CLOUD THE MIND

The woods are lovely,
dark, and deep,
But I have promises
to keep,
And miles to go
before I sleep,
And miles to go
before I sleep.

STOPPING BY
WOODS ON A
SNOWY EVENING

Near Strafford, Vermont

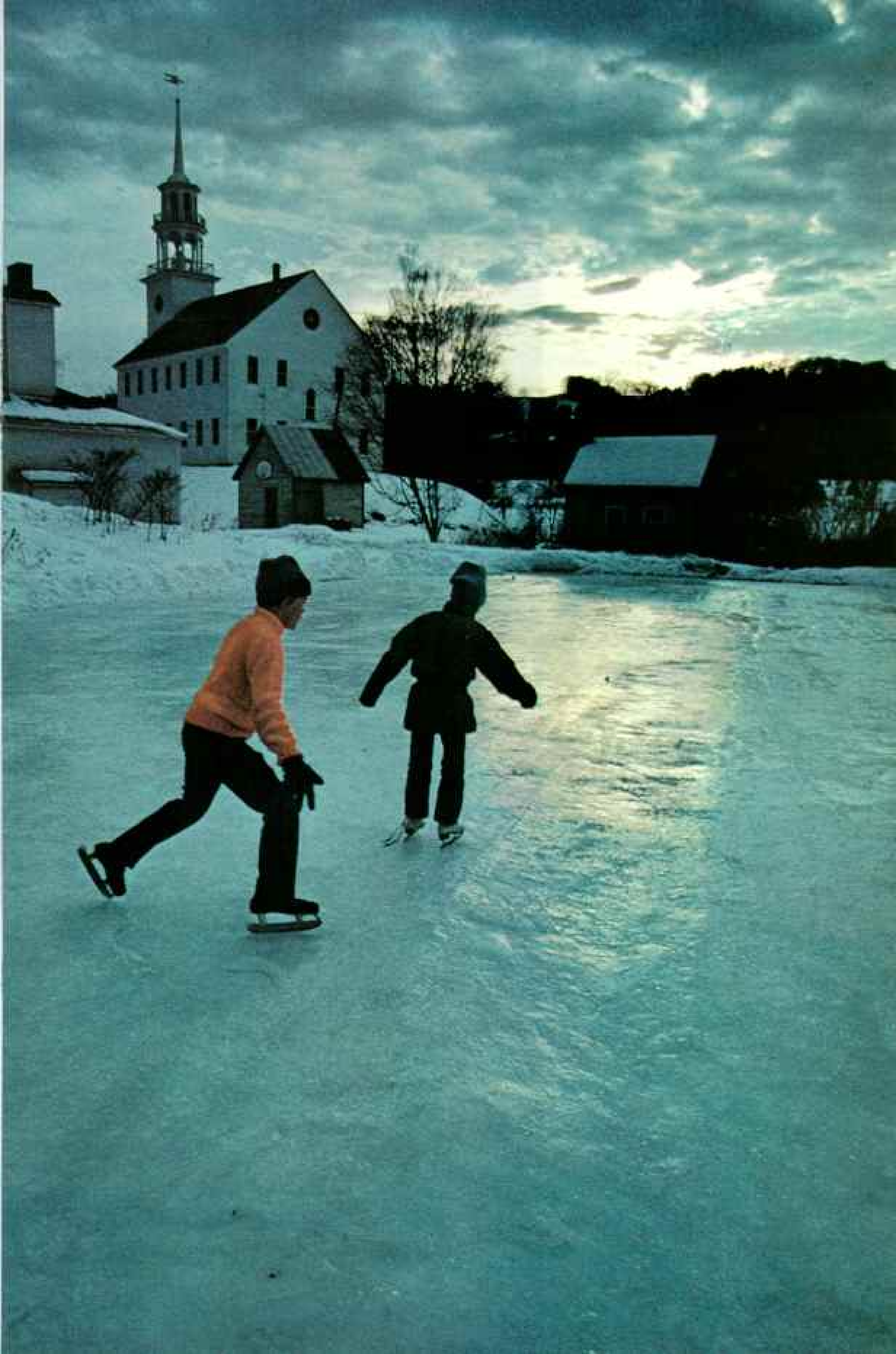


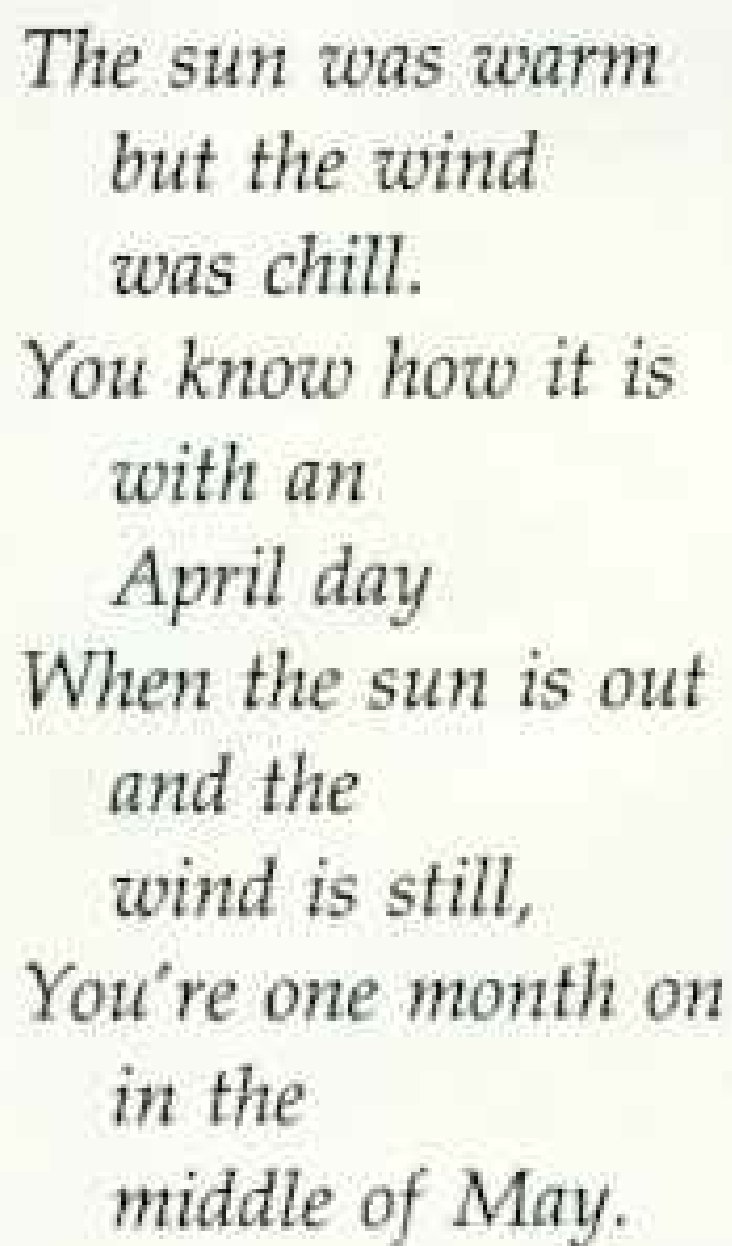
Town rink, Strafford, Vermont (right)

Some say the world will end in fire,
Some say in ice.
From what I've tasted of desire
I hold with those who favor fire.
But if it had to perish twice,
I think I know enough of hate
To say that for destruction ice
Is also great
And would suffice.

FIRE AND ICE

A feather-hammer gives a double knock.
This Eden day is done at two o'clock.
An hour of winter day might seem
too short
To make it worth life's while
to wake and sport.





The sun was warm
but the wind
was chill.
You know how it is
with an
April day
When the sun is out
and the
wind is still,
You're one month on
in the
middle of May.

TWO TRAMPS
IN MUD TIME

South Strafford, Vermont

Come with rain,
O loud Southwester!
Bring the singer,
bring the nester;
Give the buried flower
a dream. . . .

TO THE THAWING WIND

Flutist and Fiddleheads, Thetford Center, Vermont

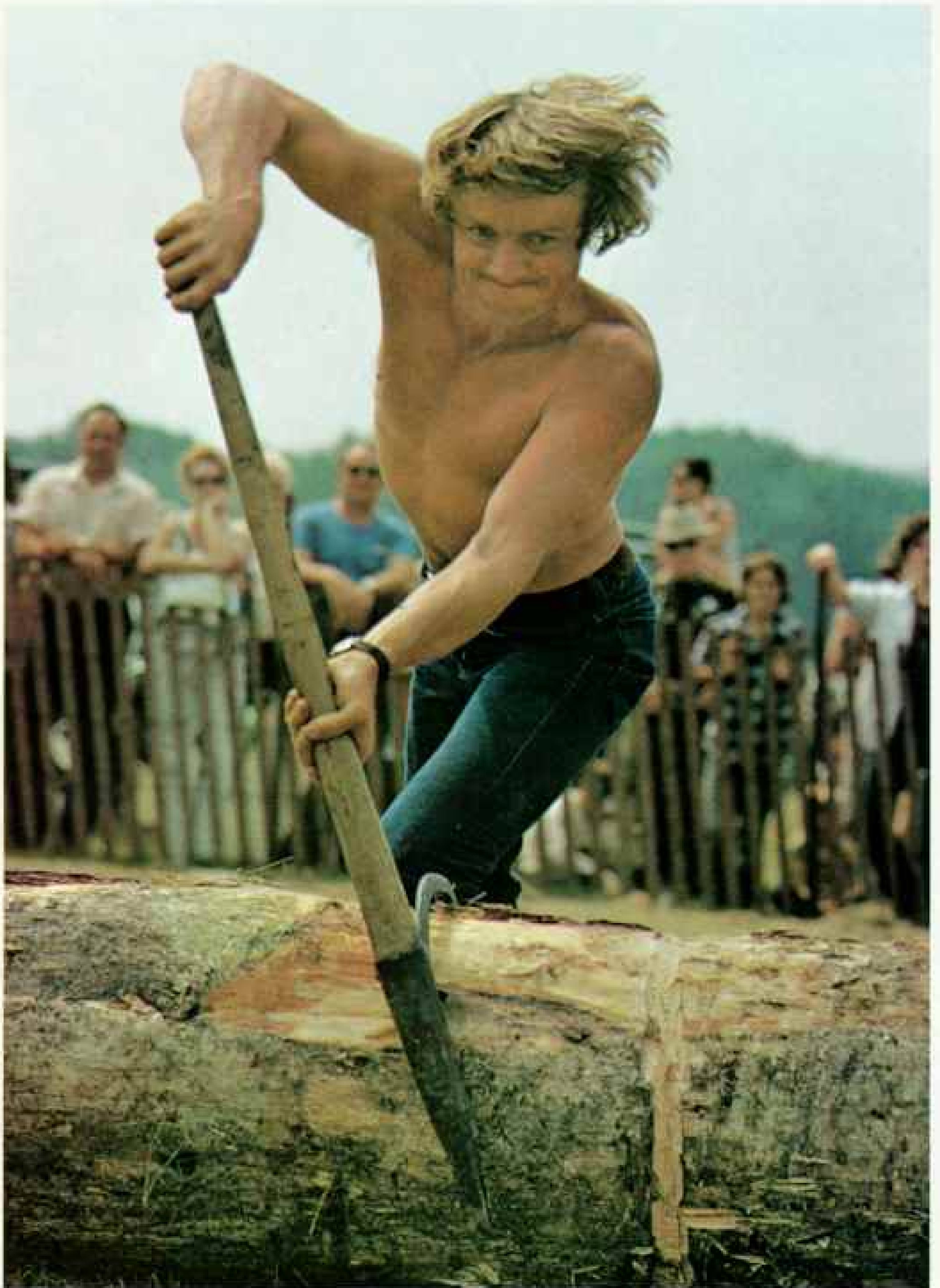
Oh, give us pleasure
in the flowers today;
And give us not to think
so far away
As the uncertain harvest;
keep us here
All simply in the springing
of the year.

A PRAYER IN SPRING

Newborn lamb, Orford, New Hampshire,
and (right) meadow, South Strafford, Vermont

Nature's first green is gold,
Her hardest hue to hold.
Her early leaf's a flower;
But only so an hour.
Then leaf subsides to leaf.
So Eden sank to grief,
So dawn goes down to day.
Nothing gold can stay.

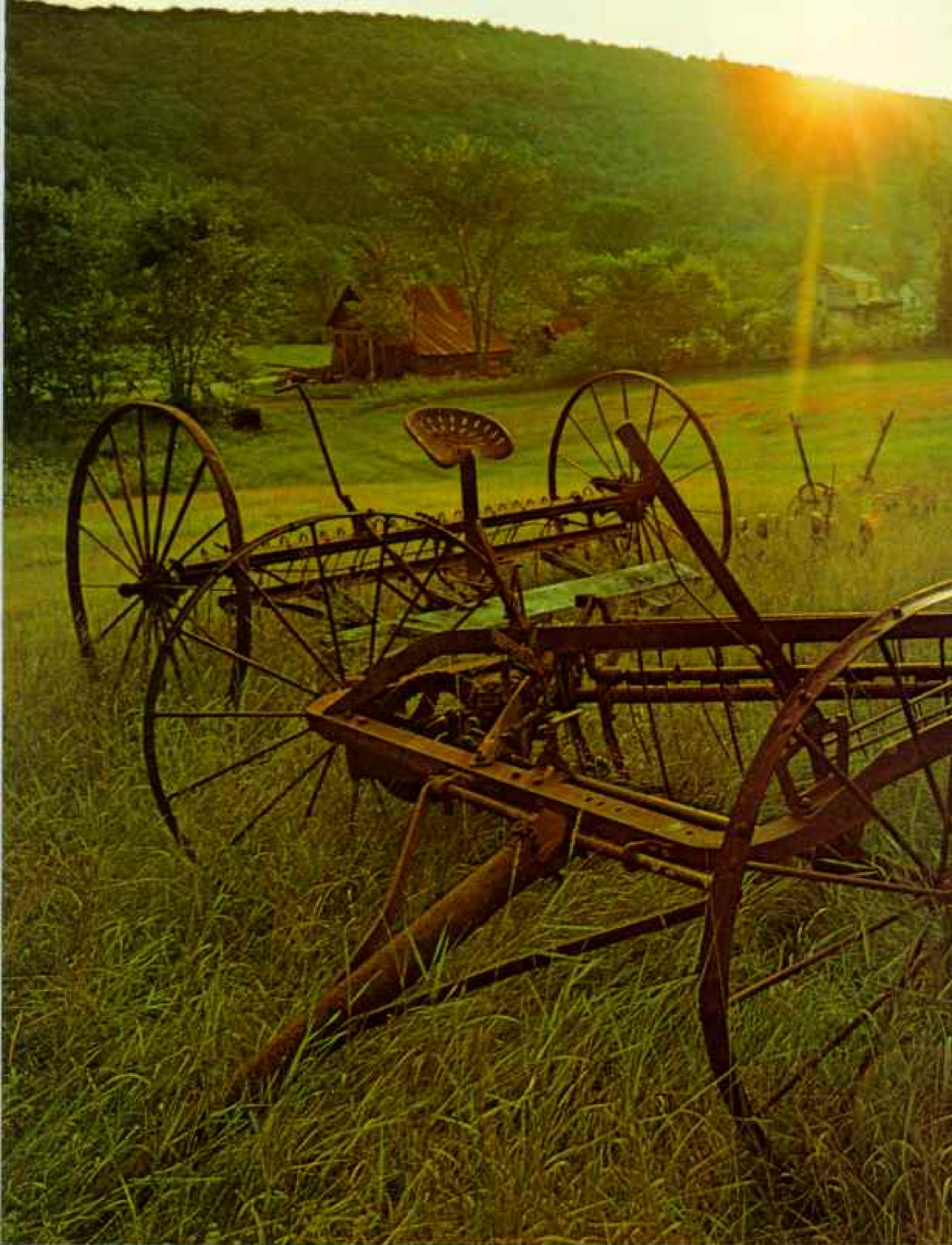
NOTHING GOLD CAN STAY



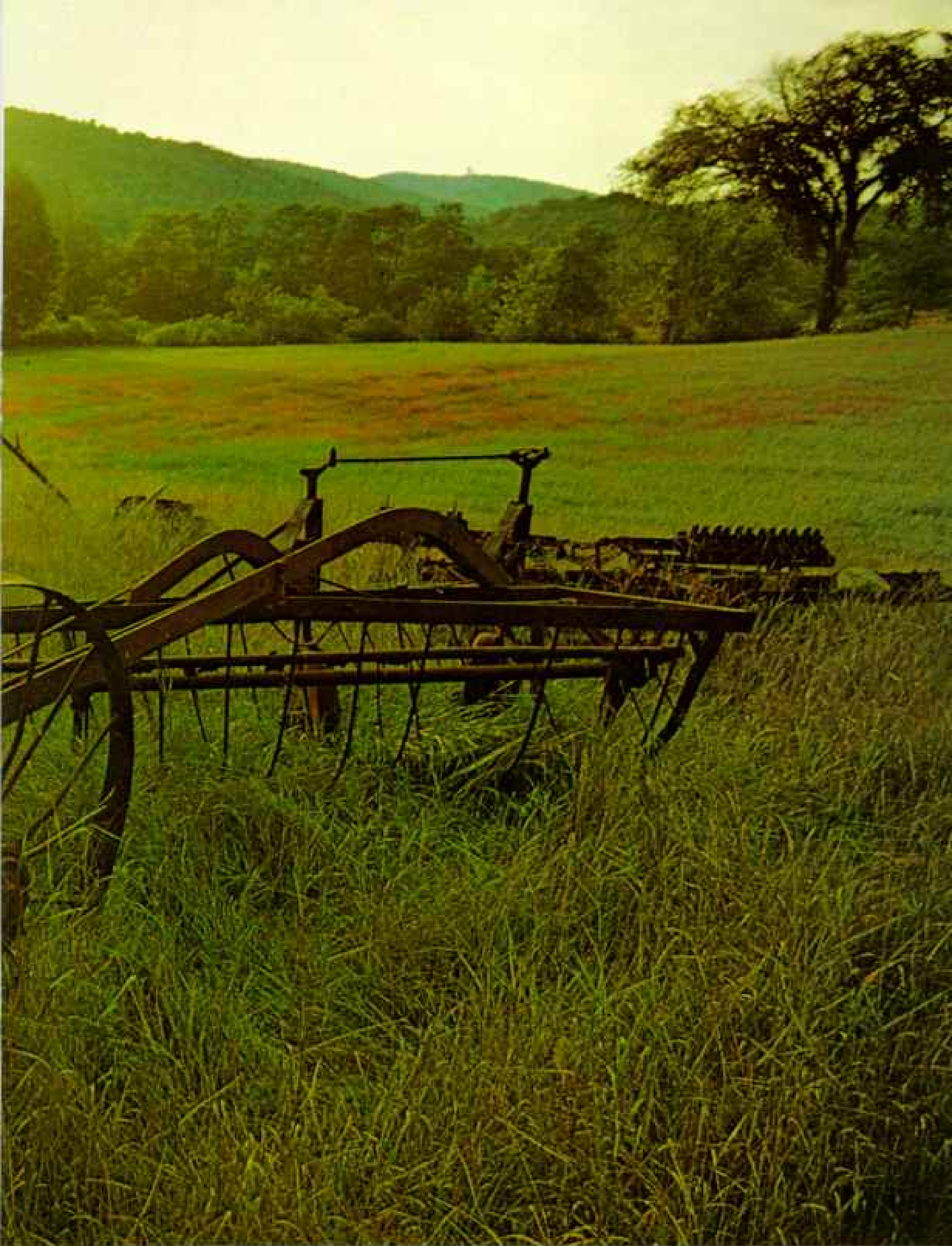
Logrolling, Plymouth, New Hampshire, and (right) older resident, Orford, New Hampshire

Just specimens is all New Hampshire has,
One each of everything as in a showcase,
Which naturally she doesn't care to sell.

NEW HAMPSHIRE



The land was ours before we were the land's. She was our land



Farm implements, Thetford Center, Vermont

more than a hundred years Before we were her people.

THE GIFT OUTRIGHT

Ah, when to the heart of man
Was it ever less than a treason
To go with the drift of things,

Old graveyard, Lyme, New Hampshire

To yield with a grace to reason,
And bow and accept the end
Of a love or a season?

RELUCTANCE

Paper birch (left); old man, North Thetford, Vermont

I'd like to go by climbing a birch tree,
And climb black branches
up a snow-white trunk
Toward *heaven, till the tree*
could bear no more,
But dipped its top and set me down again.
That would be good both going
and coming back.
One could do worse than be
a swinger of birches.

BIRCHES

A Canoe Helps Hawaii Recapture Her Past

By HERB KAWAINUI KANE
Photographs by DAVID HISER

LUMINOUS SPRAY outlined the double bows of *Hokule'a* as she raced through the darkness in gale-force winds toward the island of Hawaii. It was a stormy rehearsal at sea—a real test for our Hawaiian crew, and for the sailing canoe itself. In 1976 we plan to take her in the manner of our ancestors on a 6,000-mile round trip to Tahiti.

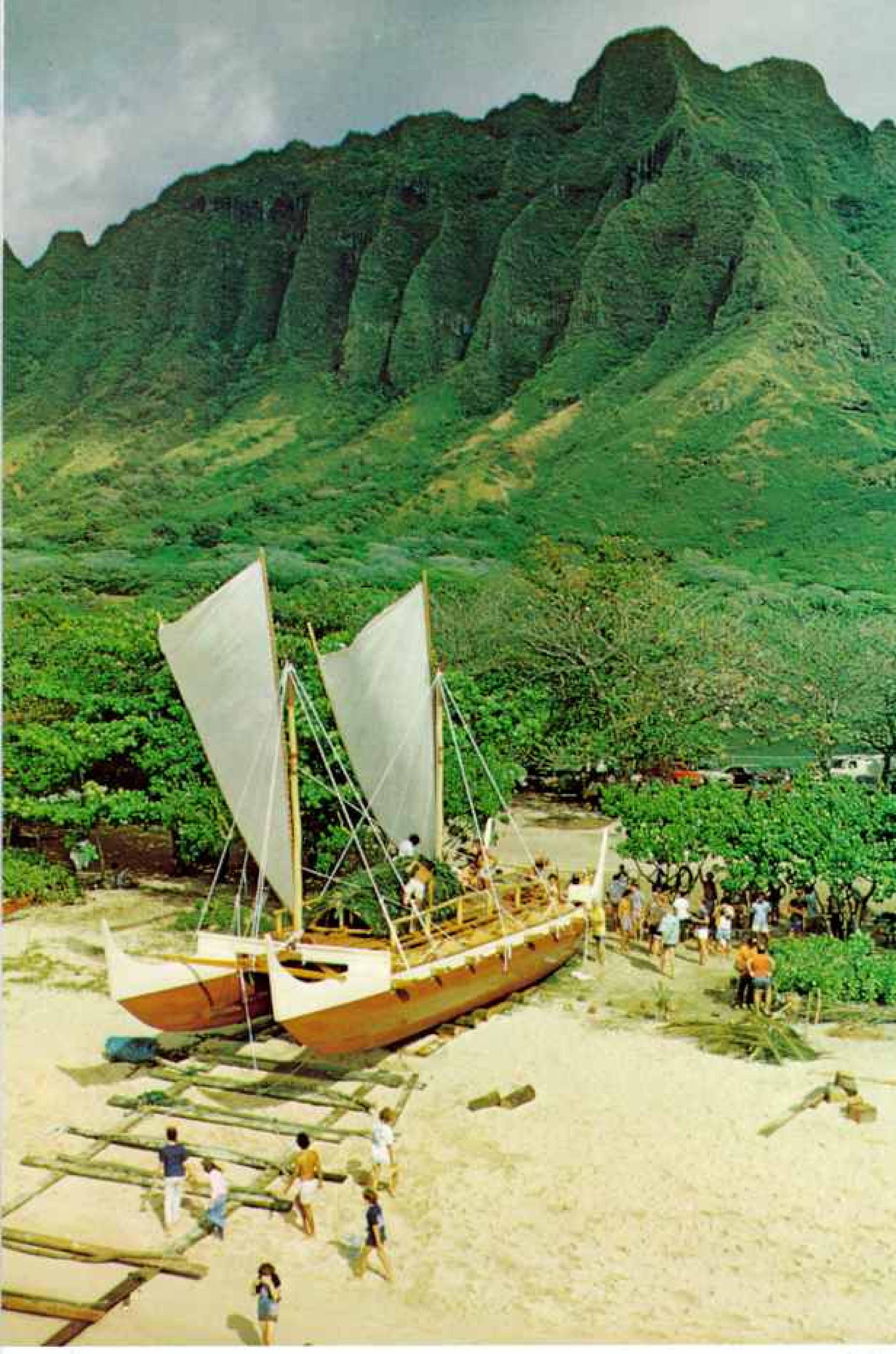
Chilling rainsqualls came out of the blackness to pelt us without warning. Gradually wavetops became visible under a brightening sky, and we could see another squall bearing down on us.

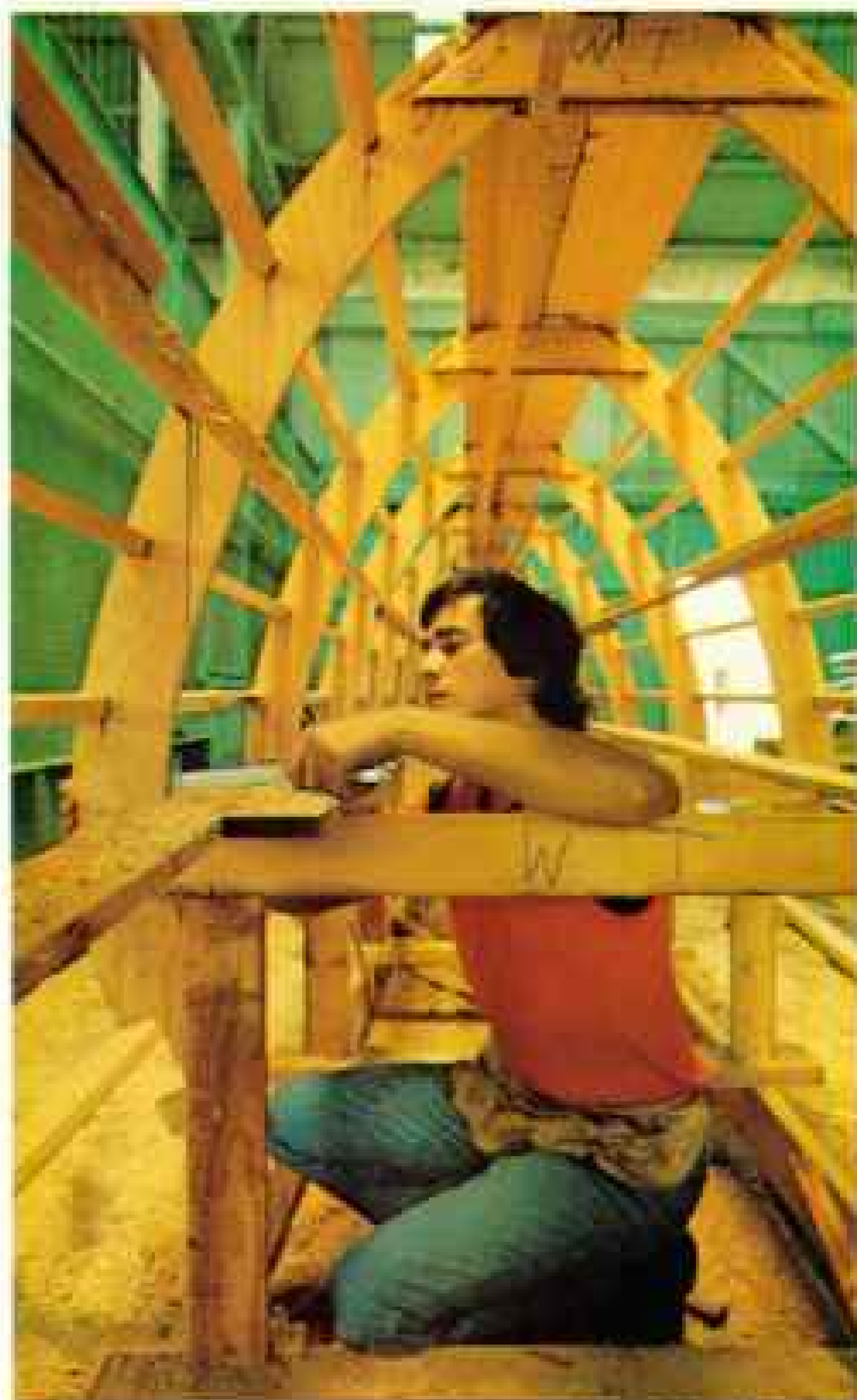
Crewmen straining at their steering paddles, *Hokule'a* veered off the wind, to outrun it. *Hokule'a* picked up speed until she was surfing at 12 knots or more; the 22-man crew broke into exultant cheers.

That afternoon we neared Kailua-Kona, on the island of Hawaii. Without knowledge of our arrival, a thousand people had gathered to watch canoe races there. Among them was slight, gray-haired Iolani Luahine, regarded by many as Grand Mistress of Hawaiian dance—and by some as handmaiden to the volcano goddess, Pele.

"When I saw *Hokule'a* appear, paddles flashing as you came into the bay, I was spellbound," she told

In the wake of his forefathers, Allen Balangitao steers a re-creation of a voyaging canoe that may have linked Hawaii and Tahiti 800 years ago. Hawaiians hope to test this legend with a 6,000-mile round trip in *Hokule'a*, "Star of Gladness"—whose emblem is borne by a sternpost figure.





IRA LERNER (LEFT AND ABOVE)

Poised for her baptism, *Hokule'a* awaits solemn consecration rites on Oahu (**left**). Sponsored by the Polynesian Voyaging Society, the 60-foot vessel took nine months to complete. Calvin Coito (**above**) assembles one of the twin hulls, using modern tools and materials such as plywood and fiberglass. "But hull shape and sail plan are true to ancient design," says author Kane. A petroglyph of such a double-hulled canoe etches a cliff on Maui (**bottom**).

me later. "It looked like a ghost out of the past. Nobody on the bay made a sound. Then, when you blew the conch-shell trumpets, there was a shout from the people such as I have never heard!"

Hokule'a is much more than just a sporting craft. She is also a floating classroom on which, already, more than a hundred Hawaiian Islanders have learned to sail as their forebears did. And in our voyaging between the Hawaiian and Society Islands, she will serve as a laboratory for a range of scientific tests. That trip will also help settle an old question: Did the early Polynesians make extended round-trip voyages between Pacific islands, as our legends relate?

To us Hawaiians, though, the canoe is something even more. She is a beautiful, dramatic reminder of our rich heritage.

"Spaceship" Fascinates Island Folk

Next day we sailed to Honaunau Bay (see **"Close-Up: U.S.A."—Hawaii**, a supplement to this issue). There racing canoes guided us to a safe anchorage, then ferried us ashore to a waiting feast. Off the beach at the City of Refuge National Historical Park, an ancient sanctuary, *Hokule'a* floated in water so clear that her twin hulls seemed to be hanging in midair.

In the days that followed, the people came from Honaunau, Milolii, Volcano, and Hilo; whole families from Kona, Ka'u, and Kohala. Some were delighted to come aboard, others too shy. "We just want to look at the canoe," many said. Some sat all day on the rocks at water's edge, until it was too dark to see.

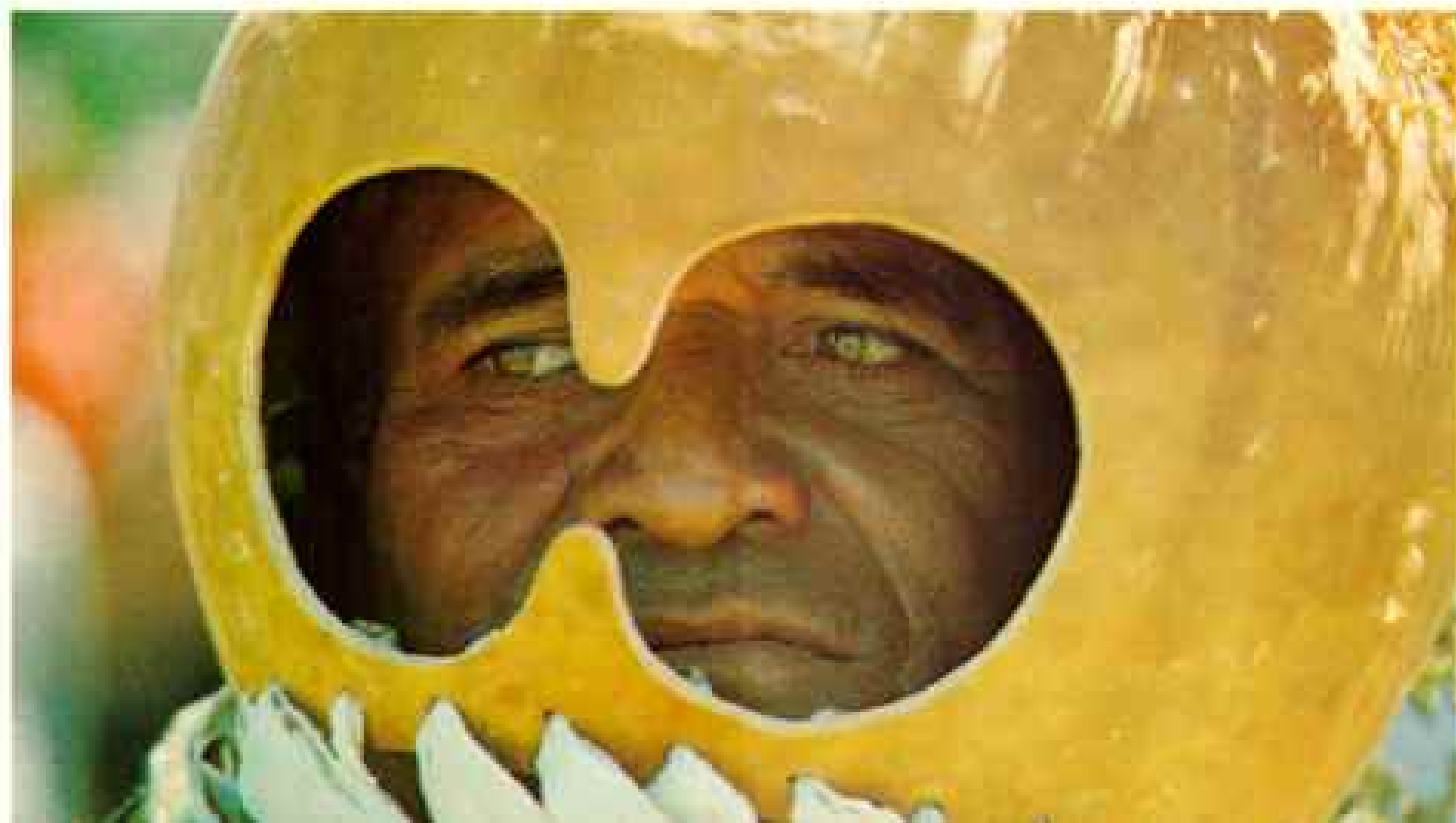
For this was the "spaceship" of their ancestors. Such vessels, designed by men who had no knowledge of metals and who navigated without instruments, had made voyages that, in the context of their time, were comparable to landing men on the moon. According to archeological evidence, the first canoes from the South Pacific arrived in the Hawaiian Islands more than 1,200 years ago.*

Our planned round-trip voyage from Hawaii to Tahiti and Raiatea (map, page 477) will commemorate a later time when venturers from the Society Islands began a new era of exploration. They discovered islands, and dominated those *(Continued on page 475)*

*Kenneth P. Emory told of "The Coming of the Polynesians" in NATIONAL GEOGRAPHIC, December 1974.

Mirrors of old Hawaii: Straining past a haze-wreathed Kauai shore, a team of the Hanalei Hawaiian Civic Canoe Club—whose members helped test *Hokule'a*—trains for a race (**right**). Two centuries ago canoes in a similar tableau (**below, right**) were painted by John Webber, one of Capt. James Cook's artists, off the island "which the Natives call O'why'he." The English explorer guessed that Polynesians in like vessels made "long and distant Voyages . . . otherwise they could not have the knowlidge of the Islands in these seas they seem to have." Webber's study of a Hawaiian in a gourd mask (**below**) inspired a re-creation worn by Sam Kalalau (**bottom**).

HAND-COLORED ENGRAVING BY T. COOK AFTER JOHN WEBBER, COURTESY DIXSON LIBRARY, SYDNEY



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that had already been settled by earlier Polynesian discoverers.

Such a man was the high priest Pa'ao, who sailed from Raiatea to the islands of Hawaii thirty generations ago. According to our legends, he found that the islands lacked strong rulers. He sailed home again, and returned with the high chief Pili, who founded the dynasty of which our greatest king, Kamehameha I, was a member.

Another legend tells of Mo'ikeha, who voyaged from my home valley of Waipio, on the island of Hawaii, to "Tahiti of the Golden Haze." With his navigator, Kama-hu'a-lele,* Mo'ikeha returned to Hawaii to wed the daughter of the ruling chief of Kauai. His voyage was repeated by his son, and by his grandson.

When European deepwater exploration was still in its infancy, Polynesians had explored a huge triangle of the earth's surface, with Hawaii, Easter Island, and New Zealand as its outer limits. Eventually, however, the impact of Western technology, with its metals and its gunpowder, dealt a fatal blow to Polynesian self-esteem, which led to the disintegration of Polynesian culture. Still, today's descendants of those early mariners can take heart from the courage and inventiveness with which their forebears survived in an appallingly meager environment, and progressed beyond mere survival to develop a life-style of amazing richness.

Project Could Reawaken Cultural Pride

That was the drift of a chat I had in 1973 with Dr. Ben R. Finney, Professor of Anthropology at the University of Hawaii and Research Associate at the East-West Center. Ben agreed that some celebration of ancient Polynesian achievements might hearten Pacific islanders, strengthen their pride in a rich heritage, and enable them to endure the relentless external pressures and to make their own choices between old ways and new.

Dr. Kenneth P. Emory, the Bernice P. Bishop Museum's senior anthropologist, pointed out that native Hawaiians' lack of confidence in their culture results in the abandonment of features that have played a significant role in island life. And when an important object, such as the voyaging canoe, is forgotten, all useful culture associated with it disappears too.

The voyaging canoe! It lay at the very heart of Polynesian culture. Without it, there would be no Polynesia. As an artist, a sailor, and an amateur anthropologist, I had come to regard it as the finest artifact that the Polynesians had produced.

The canoes probably exerted a "shaping" influence on their makers. When a chief began a voyage of exploration to find new land for his people, he would choose as companions men with powerful muscles, stamina, and ample fat to sustain them in

*The chant of Kama-hu'a-lele is recorded on the NATIONAL GEOGRAPHIC record "The Music of Hawaii."

Free spirit on her maiden voyage, *Hokule'a* hurtles over a swell. Five different crews, trained on each of the major Hawaiian islands, sailed the canoe through the island chain. From this statewide pool, top hands have been chosen for the round trip to Tahiti planned for this spring.

TIP DAVIS

times of hunger, and to insulate them against the energy-sapping and eventually deadly exposure to wind and spray. He would bring women who seemed capable of bearing children of that type.

So when his group landed on an uninhabited island, it would become the ancestor pool for future generations. To me it seems no genetic accident that Polynesians, as a race, are large and powerful people.

Successful Voyage Depends on Research

I felt that if a voyaging canoe were built and sailed today, it would function as a cultural catalyst and inspire the revival of almost-forgotten aspects of Hawaiian life.

I learned quickly that other Hawaiians believed in that idea. Mrs. Paige Kawelo Barber of the Congress of Hawaiian People, Fred Cachola, Jr., of the Kamehameha Schools, and psychiatrist Dr. Ben Young of the University of Hawaii were among many who shared my enthusiasm for the project.

There was much to be done. The canoe would have to be built to ancient design. Launching it would require the revival of old ceremonies. There would be training in early Polynesian seamanship, navigation, astronomy, and craft skills. Long-forgotten food-preservation techniques would have to be studied. We'd need to know much more about the old Hawaiian ways of farming, animal husbandry, and fishing, for our ancestors carried plants and animals with them and caught fish during voyages.

Tommy Holmes, an outstanding waterman, shared my interest in building a copy of the voyaging canoe and making an experimental voyage to Tahiti. "You've been reading my mind!" he exclaimed. "I've been thinking of that idea for years."

More support came from Kenneth Emory, whose investigations over the past half century laid the foundation for our experiment, and Ben Finney, who had already built a 40-foot re-creation of a classic Hawaiian double canoe. Ben's experiments showed that such craft, under sail, could make voyages between Hawaii and Tahiti, though probably no canoe could carry enough food and water for paddlers over that long distance.

Dr. David Lewis, in Honolulu to work with me on another project, was a leading expert in noninstrument navigation techniques.* Though he was still recuperating from the ordeal of a single-handed voyage through Antarctic waters, he joined us with alacrity.

Other prominent men and women also contributed special talents, and the Polynesian Voyaging Society was formed, with offices at the Bishop Museum. Meanwhile, our project had been accepted as a Hawaiian event of the U. S. Bicentennial celebration.

Our canoe would be named *Hokule'a*—"Star of Gladness," in Hawaiian. It is the name for Arcturus, the zenith star of Hawaii, the "Big Island." The star would lead the canoe home on her return voyage.

As she took form on the drawing board, I made sure that her appearance would be faithful to the old canoes, whose lines had been well documented by early European visitors. Hull shape and sail plan were true to ancient eastern Polynesian designs, and parts would be secured with rope lashings.

Canvas sails would serve for training voyages, but on the trip to Tahiti, sails of plaited pandanus leaves would be used.

Modern materials went into our canoe—but only where they would not affect sailing performance. In earlier times the trunks of two great trees would have been painstakingly shaped with hand tools to form the underbodies for twin 60-foot hulls. Such giant logs are unobtainable now; instead, our shipwrights planked up frames with plywood and covered the hulls with fiberglass.

Sacred Site Picked for Launching

We built her at Dillingham Shipyard in Honolulu, then trucked the completed parts across Oahu to the beach at Kualoa—a place once so sacred that canoes lowered their sails as they passed.

Volunteers came to lash her together with five miles of rope. Finally—nine months after her design began—she was ready to take to the water.

On March 8, 1975, the beach at Kualoa rang with chants and ceremonies dating from Hawaii's earliest years. The chanter Ka'upena Wong officiated that day, as *Hokule'a* at last took to her element.

A thousand spectators watched men take hold of hauling lines. Paddlers stationed

*Dr. Lewis's "Wind, Wave, Star, and Bird" in the December 1974 NATIONAL GEOGRAPHIC documented his rediscovery of ancient Polynesian navigating techniques.

themselves at the cross booms connecting the two hulls. Ka'upena began the traditional launching shout, and the canoe moved forward. Her bows came down over the crest of the beach, and with a thunderous rumble *Hokule'a* plunged into Kaneohe Bay.

For two months we tested her in all types of weather, and her personality revealed itself. She did not seem to like the reef-studded bay. But when she headed for open water, she took surf and channel swells eagerly.

New Mariners Try Old-time Diet

Paige Barber (page 479) had organized a great feast for that launching ceremony. Now she headed the massive effort of provisioning a crew of 18 for their month-long Tahiti voyage plus their three-week stint on a training diet. Fish, taro, breadfruit, bananas, sweet potatoes, yams, coconuts, octopus, medicinal herbs, and the specially flavored Hawaiian red salt—all would be needed to give the crew a varied diet.

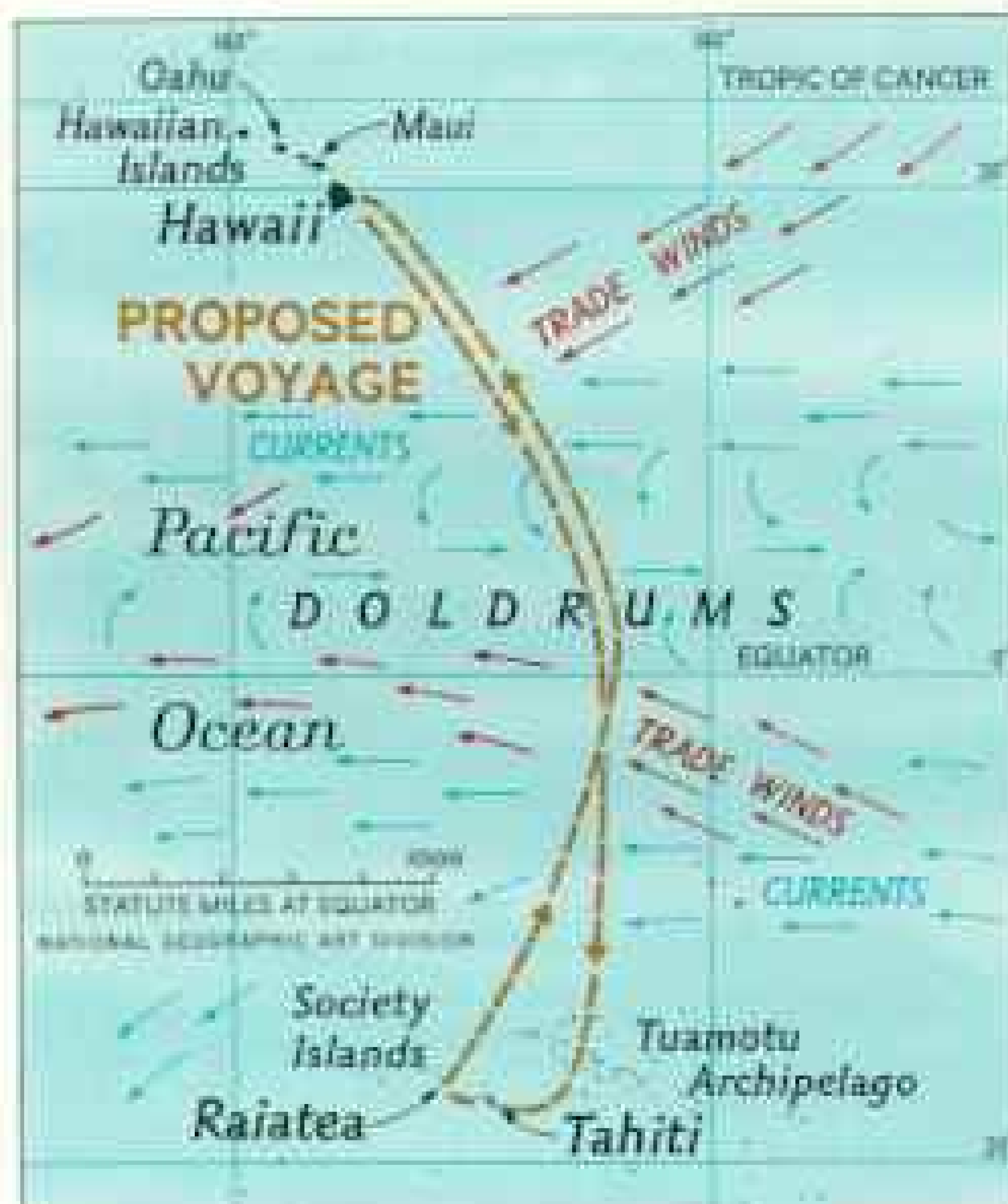
Acquiring enough taro root—once the staple of Hawaii—was a problem; with changing tastes and rising costs, its popularity even among tradition-minded Hawaiians has waned. First boiled, then pounded into a heavy paste, taro becomes hard poi, and that too is a voyaging food; its slowly fermenting sugar acts as a preservative.

Our taro search focused new interest on the traditional plant. As a taro farmer on Maui pointed out: "It shows that the native farmer has much to offer the world. This may restore pride and dignity to an art of farming that is passing into antiquity."

Dried bananas came from the Cook Islands. They are still produced there, as a candy, but once they must have been an important high-energy food for voyagers.

From Kona we received information on ancient techniques used to dry fish. But where, we wondered, could we obtain the great quantities of fish we would need to dry for the voyage?

Contestants at the Hawaiian International Billfish Tournament at Kona answered by donating more than two tons of marlin and tuna. Each night, after the fishing boats docked, Mauna Roy worked long hours cleaning the big fish. The 3,700 pounds of fillets were wrapped and frozen. Before the long voyage, Mauna and other volunteers will take



Route of *Hokule'a*: To reach Tahiti, the crew first must sail to the southeast, or upwind of their goal, sight the island's zenith star, then follow it west, or downwind (**above**). The stars will also guide them home. The crew must be prepared to paddle (**below**) in the event of a calm.

HERB KAWAINUI KANE (FACING PAGE)

Taste of history: To feed a crew of 18 during a month-long voyage to Tahiti, *Hokule'a*'s creators have revived foods that stocked canoes of the ancient voyagers. At a demonstration Mrs. Paige Kawelo Barber (**above**), who chairs the provisions committee, shares a long-lasting type of Hawaiian poi. The staples to be stowed include hundreds of pounds of dried bananas, sweet potatoes, breadfruit, and sun-dried fish—the latter to be supplemented with fresh fish caught on trolling lines. Sam Ka'ai, wearing a rain cape of dried pandanus leaves, displays his catch—*aku*, or skipjack tuna (**far left**). Trainee George Kalama, Jr., (**left**) shows how to get milk from a coconut, the canteen of Polynesia. Such milk will supplement the crew's water supply.

the fish out to the hot, dry lava desert north of Kailua-Kona and dry them in the sun.

Wherever *Hokule'a* landed, Paige Kawelo Barber and her ladies were there, demonstrating old preservation techniques and getting volunteer help. The drying boxes were flat racks, three by eight feet, screened on top and bottom, with a heavier screen inside to hold the food. Almost all of our fruits and vegetables were dried in these boxes, which generated considerable interest.

"With the high cost of electricity," a Kona fisherman commented, "I'm going to dry my surplus fish now instead of freezing them."

Another onlooker mentioned that a lot of homegrown bananas on Hawaii went to waste, because they all ripened at once. "If people dried those bananas," he suggested, "they'd save money on their grocery bills."

Paige nodded. "Yes, and children eat them like candy, they enjoy them so much."

Trainees Vie for the Big Voyage

Men of Oahu sailed the canoe on her maiden voyage to Maui. By unspoken agreement, crewmen often wore *malo* (loincloths). Even photographer David Hiser donned one, earning many a remark about his *okole kea*—his pallid posterior.

After five weekends of training off Maui, a Maui crew sailed her to the island of Hawaii. Crews from Hawaii, Molokai, Oahu, and Kauai would participate in other training voyages. Finally, the crew selection would be made for the long voyage to Tahiti and Raiatea and back.

Like the ancient voyagers, we will carry breadfruit and other plants to be transplanted on Tahiti and Raiatea. There will be animals too. The Honolulu Zoo, which has been conducting a breeding experiment to produce modern equivalents of the barkless, vegetarian dogs that early Polynesians raised for food, has offered to share the results; one such dog, named Hoku, will accompany us.

Physiologists, psychologists, physicians, navigation experts—people in each of those specialties will be checking our crew members before and after the trip. They want to learn how well we withstand the rigors of long weeks at sea, and how well we fare on the ancient foods. And, of course, how precisely we find our way, without the help of sextant, compass, chronometer, or chart.

Those shorter cruises between the various Hawaiian Islands were more than crew-training voyages; they were shakedown cruises for *Hokule'a*. What we learned in the rough channel waters would guide us in refitting the canoe for the long trip.

In bright moonlight, six-foot swells, and a steady breeze, we left Hawaii bound for Maui. At sunrise we turned downwind to run the rough water along Maui's southern coast (below). The wind picked up and we surfed in 12-foot seas, reaching speeds of more than 15 knots.

It was an exhilarating sensation, and we relaxed our guard for a moment. Suddenly

Shattering shakedown: Twelve-foot waves bear down astern of *Hokule'a* during a cruise in Hawaii's treacherous Alenuihaha Channel. Seconds later crew chief Kimo Hugho, at right, was nearly knocked out when a huge wave smashed his steering paddle into his temple.

a powerful wave lifted the stern, and swung *Hokule'a* off course. The wind got behind us, slamming the aftersail around in an uncontrolled jibe. Both gaff and boom snapped.

Kimo Hugho, a Honolulu fireman and expert in racing canoes, looked up from the port steersman's cockpit to view the damage. At that moment, a wave tore the nine-foot steering paddle from his hands. The shaft clubbed him on the side of the head and, stunned, he fell forward.

"Grab Kimo—I'll take the sail," I shouted to crew instructor Buffalo Keaulana. But "Buff" was already in motion. He wrapped his powerful arms around Kimo and dragged him to the safety of the deck. Meanwhile we struggled to get *Hokule'a* back on course.

Kimo revived quickly and washed the blood from his face. We were relieved to see that his eyes were clear and focused well.

We unfurled the aftermast's storm sail and, in strong offshore gusts of gale force, we slogged upwind off Maui. Two hours later the canoe reached the calm waters of Lahaina, and another feast of welcome.

Yes, *Hokule'a* was our floating classroom, and we were learning our lessons. It became clear, for example, that the traditional *manu* —the upswept ends of the hulls—were more than mere ornamentation. While running downwind, the surfing canoe would speed down the face of a swell, into the trough ahead. Those bow pieces would strike the back of the next swell in a burst of spray, plowing a way for the hulls to glide upward.

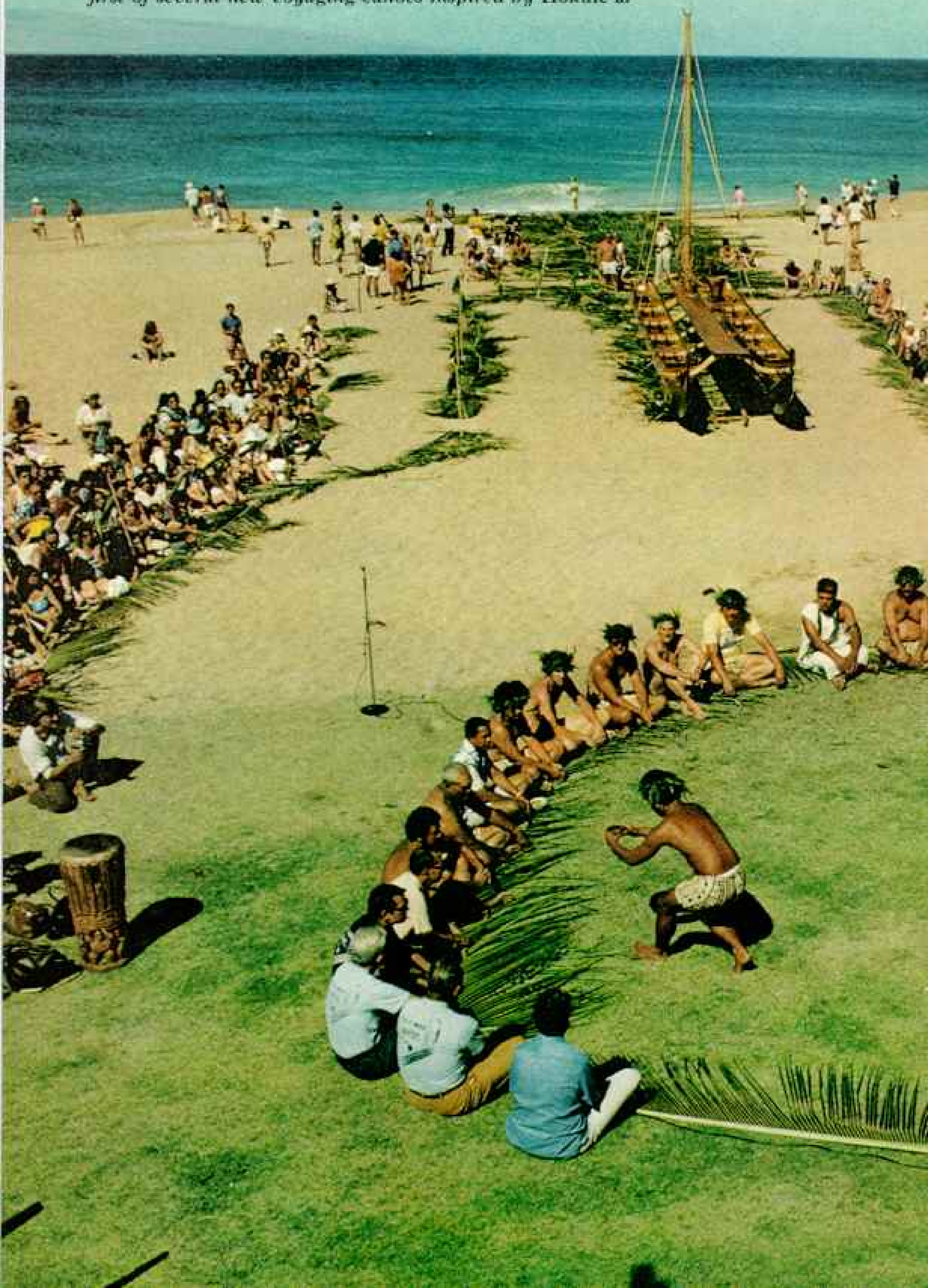
Another lesson was this: On a vessel that does not depend on metal parts, almost anything that breaks can be seized with splints and cord.

Covert Gifts Honor Canoe Crew

Few secrets are safe from the "coconut wireless" in the islands. I still don't know how the people of Molokai learned we were coming, but they were waiting with a feast.

All during *Hokule'a*'s stay there, boxes of food would appear on the pier nearby. "People just put them there and leave," Kimo told me

IN RITES UNPRACTICED FOR GENERATIONS, *Maui islanders consecrate* Mo'olele, *or "Flying Lizard," the first of several new voyaging canoes inspired by* Hokule'a.



when I arrived from Oahu for a weekend of training. "The people here are so generous that it's difficult for us to buy anything on this island."

There were other compliments, and some complaints. But nowhere did we encounter the behavior that in Polynesia can express disapproval: studied indifference.

Hokule'a Inspires More Boatbuilding

When news of *Hokule'a* spread, it created interest in building other double-hulled sailing canoes. On Maui, the 42-foot *Mo'olele*, or "Flying Lizard," has already been launched (preceding pages), and other canoes are being planned on Kauai, Hawaii, and Oahu.

The Tahitians are interested, too. It is possible that they will complete construction of a long-distance voyaging canoe in time to sail in company with us on our scheduled return to Hawaii from Tahiti this summer.

Fiji Islanders are talking of intervillage sailing-canoe races. Plans are also in the works there to build a copy of the swift double-hulled *ndrua*, which aroused the fervent admiration of early European visitors.

By the time our Tahiti voyage takes place, *Hokule'a* will have become even more authentic. Thousands of feet of braided sennit, or coconut-fiber rope, from the Tuvalu (Ellice) Islands and the Tuamotus will replace some of the nylon rope that we now use.

Pandanus sail matting has come from the Gilbert Islands and the tiny Polynesian atoll of Kapingamarangi. Two elderly women on the little atoll still knew the old technique of plaiting sails. They recruited younger women and taught them the craft. Unfortunately our agent forgot to tell them when to stop plaiting —so now there is an oversupply of genuine

sail matting on Kapingamarangi, available to museums and to collectors.

One of our last interisland training voyages involved a cruise to the island of Kauai and back to Oahu. The trip to Kauai was one of the most idyllic sails we had experienced. We knew, though, that the return to Oahu would be most difficult: some 300 miles of long, pounding tacks against powerful winds and currents.

But it was more than difficult—it was almost disastrous.

Oversight Threatens Tragedy

The problem began, ironically, because of a "safety feature"—a mounting frame that had been added for an emergency outboard motor. The mount deflected wavetops over the stern of the starboard hull; it also caused seepage through the hull's storm cover.

During the second night of the voyage, the hull was bailed twice, then we relaxed our vigilance. I was awakened at sunrise for consultation about a course change, and noticed that the starboard hull was riding dangerously low in the water.

We began an emergency bailing effort, but it was too late. Several large waves poured in around the bailers, and the hull swamped.

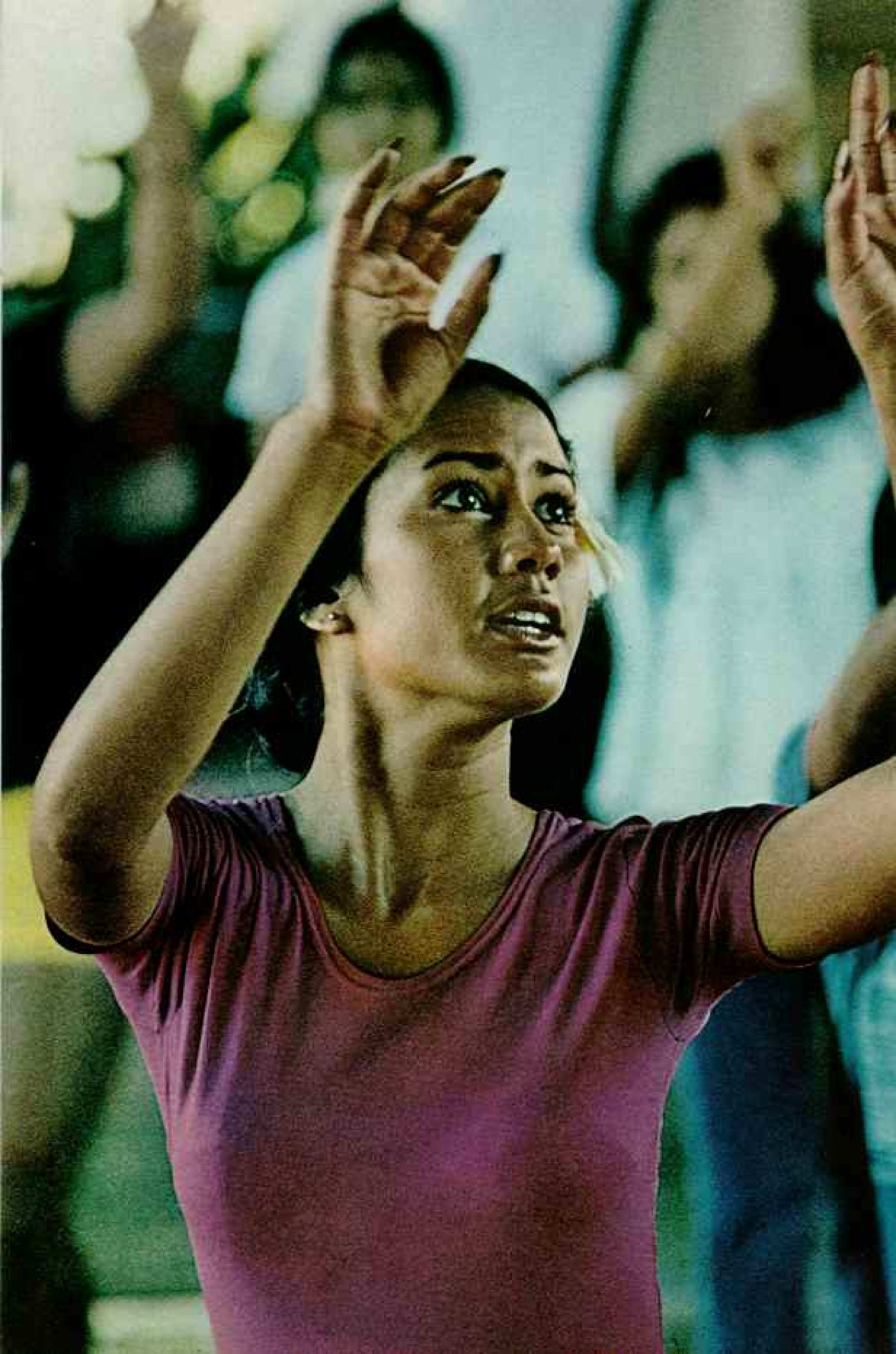
Hokule'a tilted at a sharp angle, broadside to the waves. We cut away sails, spars, and the deck shelter, then lashed them all to windward of the floating port hull to help prevent capsizing. The radio was inoperative, but except for the lurking presence of a large shark, there was now little danger. We were not far off Kauai, in a current that would carry us along its south shore.

Fighting tears of disappointment, a crew member began a *(Continued on page 489)*

A time to sail, a time to sing: Relaxing on a calm sea, *Hokule'a* crewmen break out ukuleles and guitars for a songfest (**left**). An *ipu*, or gourd drum—popular long before Europeans brought stringed instruments to Hawaii—is played by a schoolgirl (**above**) at a festival honoring the launching of the *Mo'olele*.

***Hokule'a*'s crew struggles** to save the canoe after one hull swamped on a training cruise from Kauai to Oahu. Kimo Hugho, smothered in spume, dives into the submerged starboard hull (**above, right**) to cut away dragging canvas. Attwood Makanani (**left**) rescues the vessel's symbolic navigator.

An oversight brought on the near disaster. The frame for mounting an emergency outboard motor—installed only for training cruises—splashed waves over the starboard hull cover, allowing water to seep in. "And that was the one time we neglected our rule of frequent inspection and bailing if necessary," recounts author Herb Kane, the vessel's designer and training skipper. During belated bailing, waves flooded the hull. Ballast lashed to the port hull prevented capsizing. Four hours later the crew hails a hydrofoil (**right**), whose captain radioed a Coast Guard boat to take the stricken canoe in tow.



traditional Hawaiian song. All aboard joined in the solemn yet optimistic chorus as we saw the jet-powered hydrofoil *Kalakaua* approaching on her morning run to Kauai (page 487). A few hours later a Coast Guard boat took us in tow.

Ever since *Hokule'a*'s 800-year-old design first appeared on my drawing board, I had wondered how well she would hold together in heavy seas. Now she had survived stresses that might have shattered a rigidly constructed modern catamaran, for her flexible lashings enabled her to withstand the battering of eight-foot waves and the strain of being towed.

"A most fortunate accident," wrote David Lewis, soon to arrive to begin our training program in noninstrument navigation. And he was right. With the knowledge we gained from the mishap, we could refit the canoe and retest her for the long voyage to the South Pacific.

Many messages poured in after the swamping, some accompanied by donations. One caller, an elderly Hawaiian lady, expressed the feelings of many: "When I heard on the radio that *Hokule'a* was in trouble, I felt as though one of my own family were in danger."

Supreme Test Yet Uncompleted

Already *Hokule'a* has logged many weeks at sea, and voyaged some 1,500 miles. By the time you read these words, we hope to be en route to Tahiti, following one of the longest and most difficult of the early Polynesian sea routes. Unlike the ancients, who preferred to travel in company with other canoes, we will sail alone—although somewhere nearby a modern sailboat will be tracking us by radio. When we reach our South Pacific goal, we can compare our position estimates with its charts, to see how accurate our navigation has been, using the ancient ways.

What effect has the voyaging canoe *Hokule'a* had on the islands where she was born?

Because of her, the Polynesian Voyaging Society was formed—a nonprofit organization that will continue to enrich the teaching of Hawaii's past. And, because of her, there are more double canoes a-building, or already sailing Pacific waters.

The food-preservation project that made it possible for us to provision *Hokule'a* has brought in many inquiries about the old foods—so many, in fact, that we have had to print up recipes.

We who sail *Hokule'a* are meeting the same challenges that those early mariners faced, and we have developed a strong feeling of kinship with them. And when our voyage is over, I hope we will have properly commemorated the achievements of our ancestors for all Polynesians. □

Hymn of the hands frames Debbie-Lou Nakanelua as she learns a traditional hula at a workshop of the State Council on Hawaiian Heritage. To launch *Hokule'a,* the council revived dances and chants created by ancient voyagers to bless their canoes—an indication of the growing interest throughout the state in a cultural renaissance.

BIANCA

Those Fiery Brazilian Bees

By RICK GORE

Photographs by

BIANCA LAVIES

BOTH NATIONAL GEOGRAPHIC STAFF

THE BEES CAME ON US like a squall. At first we felt only the warning—the pelting of a few sentinels against our protective veils. Then, as we drew closer to their hives in the equatorial Brazilian bush, the torrent broke. The buzzing of countless wings filled the air.

The bees seemed possessed by rage. I grew queasy watching them swarm over my bee suit, embedding their stingers in the heavy canvas. Each was giving its life in defense of its hive, for a honeybee soon dies after losing its stinger.

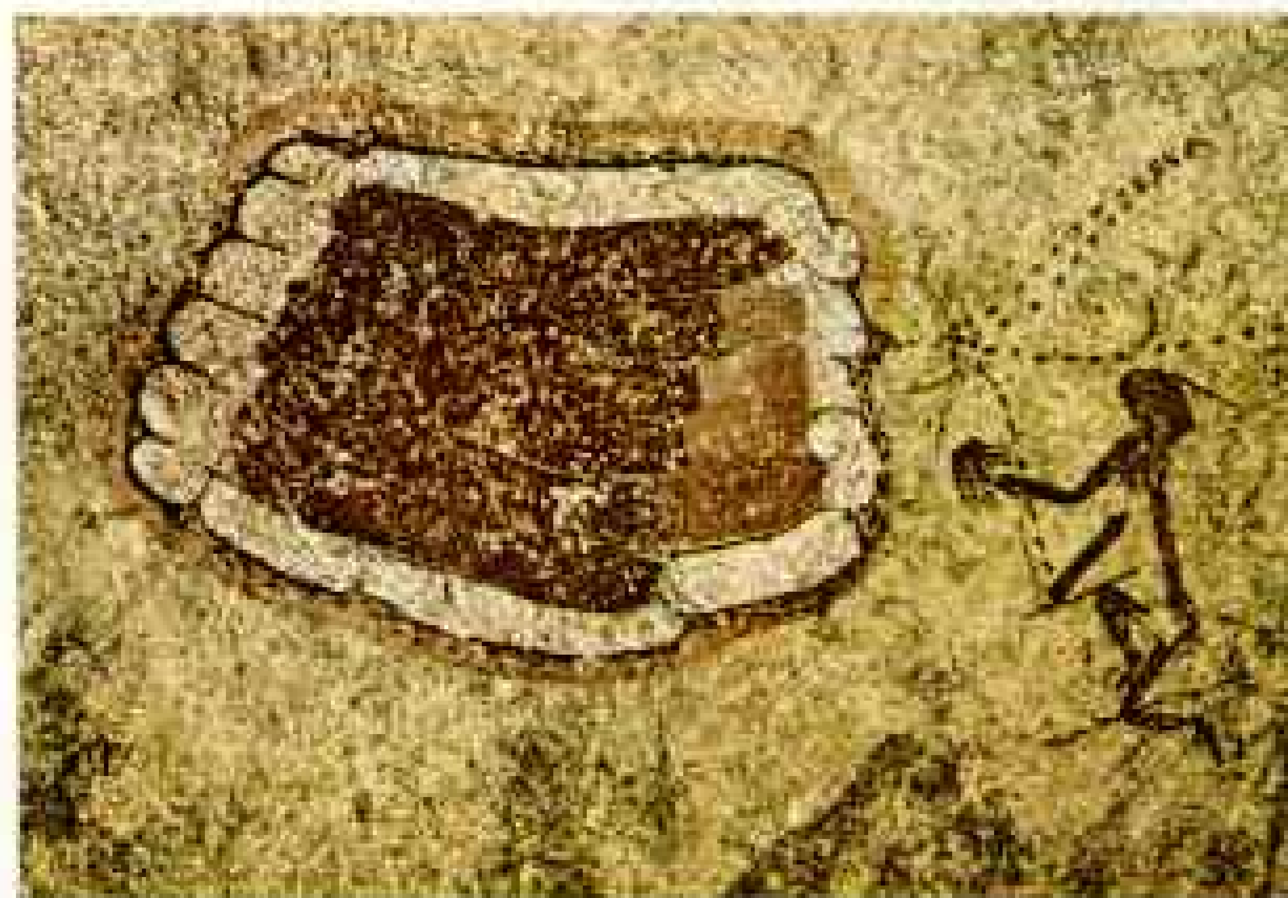
Inches from my eyes, frenzied bees clung to my veil and pumped their barbed abdomens at me through the netting. So many bees attacked National Geographic photographer Bianca Lavies's cameras that she could not press a shutter release without squashing some (left). Our guide, beekeeper Antônio Both, fled as bees stung through his suit. I felt a stinger pierce my glove and had to fight my own urge to run.

We had met the full fury of the Brazilian bee, the phenomenal product of a bee-breeding accident. Twenty-six queens of a notoriously ferocious race of honeybee from Africa, *Apis mellifera adansonii*, escaped in 1957 from the site of a genetics experiment near São Paulo. Honeybees are not native to the Americas, but over the years Brazilians living in the temperate south had imported gentler European bees. The Africans quickly intermixed with them and procreated a fierce new race.

Since then the African hybrids have spread throughout much of South America. Now advancing northward about two hundred miles a year, Brazilian bees threaten to invade Central America, and then Mexico, and ultimately the United States. Bee attacks as violent as the one Bianca and I experienced are isolated incidents. Yet at least 150 people and countless animals in Brazil have died in such encounters.

The story begins ages ago, scientists speculate, as honeybees migrated westward from Asia into Europe and Africa, where they met different destinies. Southern Europe's mild climate and, later, man's beekeeping practices, fostered the gentler strains.

The bees that pushed south into Africa, however, had to struggle with a much harsher environment, hotter and drier. They remained nomads, an entire colony following the



RICK GORE (FACING PAGE) AND HARALD L. PAGER

Frenzied horde near Belém bombards the protective suit of photographer Lavies. In 1957 fierce African bees, imported to Brazil for controlled breeding, escaped and mated with resident honeybees. The Africanized offspring, sometimes lethally aggressive, now move slowly northward. A rock painting in Rhodesia (**above**) depicts a Stone Age man using a torch to rob a hive, a destructive practice that may help explain the belligerency of the African bees.

flowers and nesting in a crevice or in the hollow of a baobab tree. Their honey drew predators, including man, that destroyed the colonies they robbed. Only the most unapproachable colonies were likely to survive.

The African honeybees developed into a nervous, easily provoked race. They have a marked ability to communicate alarm by releasing chemical secretions called pheromones. The odor often triggers an explosive response throughout the colony. African bees are no more venomous than others; they simply sting in larger numbers, and a few hundred stings are enough to kill anyone unable to outrun the bees.

Although highly aggressive, the Africanized bees possess one outstanding virtue: They produce large amounts of honey. On their native continent the bees developed into industrious workers, able to store enough honey during the flowering seasons to help support them in times of drought.

The Brazilian Government had asked University of São Paulo geneticist Warwick Estevam Kerr (below) to improve the output of European honeybees, which had never produced well in tropical areas of Brazil. So in 1956 Kerr placed 35 African queens in an isolated apiary in the State of São Paulo, for use in breeding experiments.

"We knew they were fierce," recalled Kerr, now director of the National Institute for Amazon Research in Manaus. "Every precaution was taken to prevent their escape."

Kerr placed grids over each hive with slots large enough for worker bees to squeeze

Subdued by smoke, Brazilian bees remain quiescent as brush is cleared from around their hives. Geneticist Warwick E. Kerr (**above**) imported high-strung but hardworking African bees to boost honey yields. Grids on their hives in the State of São Paulo (**left**) kept queen bees imprisoned while permitting the smaller workers to come and go. Removal of the devices by an uninformed beekeeper allowed 26 African queens to fly free.

through but too small for the queen and drones. These devices keep the drones inside and also prevent the queens from swarming with an entourage of worker bees to establish new colonies of their own.

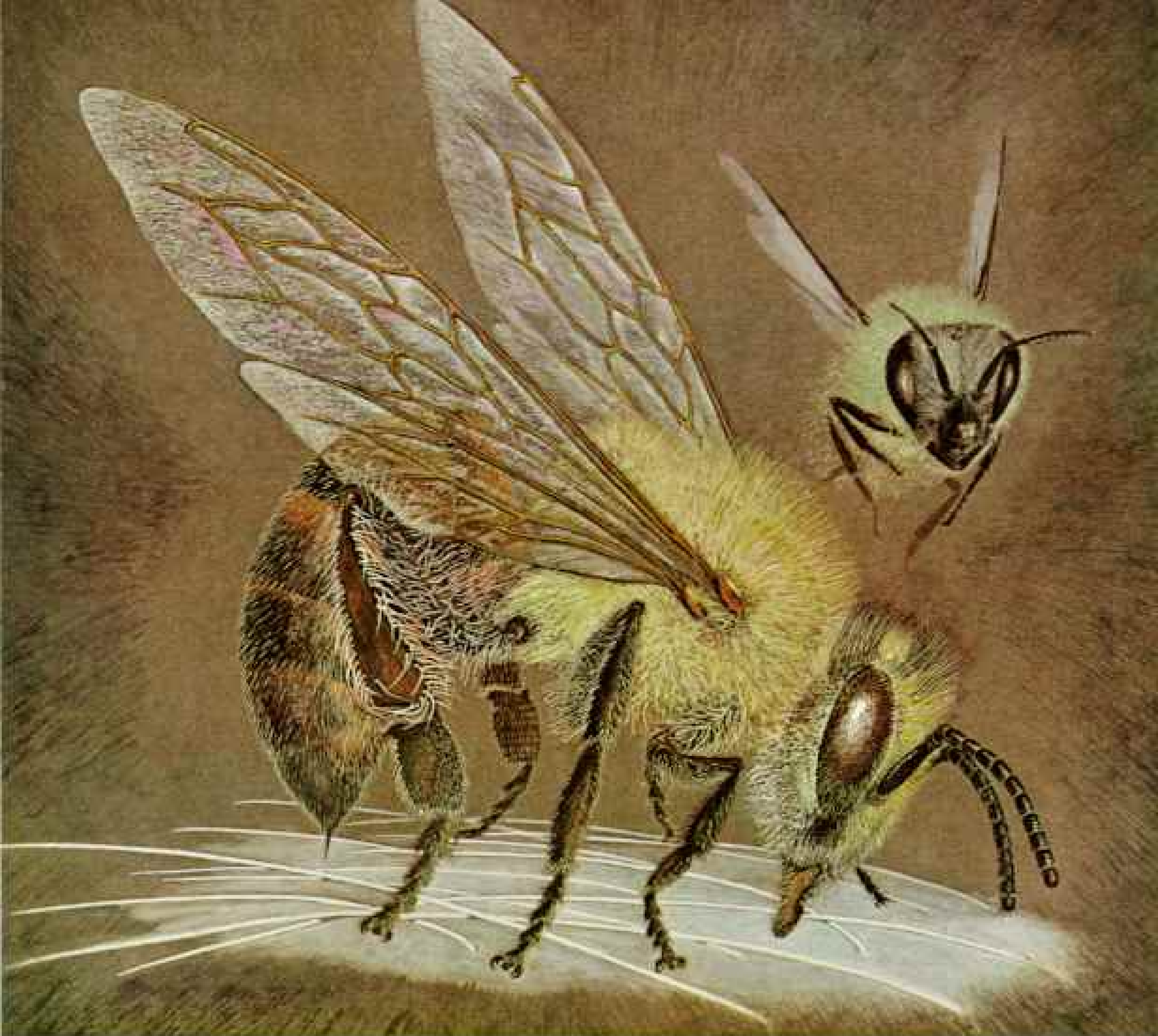
Swarming is the way all honeybees reproduce their colonies. By nature, African bees swarm frequently. Before an old queen and her swarm leave, the colony begins to feed a royal jelly to selected larvae, which will then develop into new queens. The first or strongest new queen kills her competitors and soon flies off to mate with drones from her own or nearby colonies.

Unfortunately a beekeeper visiting the secluded apiary did not know Kerr's bees were dangerous and removed the devices. By the time Kerr discovered what had happened, 26 queens had flown with swarms into the bush.

As the aggressive Africans spread out, their drones began to cross with the local European queens, outcompeting the domestic drones on mating flights. At that time many people in the south of Brazil kept hives near their houses. Suddenly these families found their bees turning vicious, stinging children, killing cows. African invaders also swooped in to rob the European bees of their honey, or, often, to kill a colony and take over its hive.

The Africans drove most beekeepers out of business. As one man put it, "Horrible things began to happen." At times bees terrorized towns, forcing residents indoors.

Choked with emotion, Lazaro de Godoy of Águas de Lindóia told me that he had found the body of a friend with a thousand stings on



PAINTING BY SU ZAN SWAIN FIRMAGE

his head. He had shot himself in his agony.

"I thank God I'm not dead," said Joaquim da Silva, 74, of the same town. Five years ago a swarm of bees collided with him and his horse along a highway. The horse went wild, throwing da Silva to the ground and breaking his leg. Luckily for him, the bees pursued the horse; it died three days later.

African Strain Braves the Dry North

Honeybees were virtually unknown in the hot, arid northeast of Brazil until the Africanized bees arrived about nine years ago.

"It's incredible how many bees we have in the bush now," a farmer complained to Bianca and me in Ceará, a northern state.

"Bees have killed 18 people in this state," a ministry of agriculture aide told us. "Many more have been attacked. How many animals have they killed? Surely thousands. This falls hard on our poor people."

In July of 1975 bees killed a teacher in the city of Aracaju. There I learned the details.

A bee stung Dr. Eglantina Portugal as she arrived at school. She slapped it, and the bee apparently released its alarm odor; swarms in nearby trees responded.

"Suddenly hundreds, thousands of bees appeared," a witness told me. "Dr. Eglantina ran, but she had a lame leg. She tripped and fell into a ditch. She crawled out. I could see many bees on her face and neck. More bees were coming all the time.

"I wanted to help, but it was impossible to leave my closed car; bees were all over it. Some people from nearby houses arrived with

Africanized bees could survive winter temperatures at least as far north as the dashed line. Red arrows trace the bees' possible routes through Central America.

Nearly identical in appearance to gentler honeybees of European origin, the African bees quickly dominate hives of the less aggressive strains. Although a sting from the new hybrids (**left**) injects about the same amount of poison, the insects' excitability provokes mass attacks that have proved fatal to at least 150 Brazilians and innumerable animals. Swarming across South America (**map, right**), Africanized bees advance at a pace that could put them in the United States within two decades. Crossbreeding might offer the best solution. To dilute aggressive traits, sperm from a European drone is injected into an African queen at a laboratory in Ribeirão Prêto (**below**).

In the south the bees are approaching their probable low-temperature limit, shown here by the dashed line. The high cold wall of the Andes has long spared South America's west coast, but recently the bees have been reported in Santiago.

water, but the bees stung them and drove them back. Finally firemen arrived, but they, too, ran away with bees all over them. They returned waving smoking torches and were able to get Dr. Eglantina to the hospital. But it was too late."

During the swarming that follows the annual rains, bee incidents are common, especially in the country. City people have learned to call the *bombeiros*, or firemen, to kill invading swarms. "We may get 20 calls a day," a Fortaleza bombeiro told me.

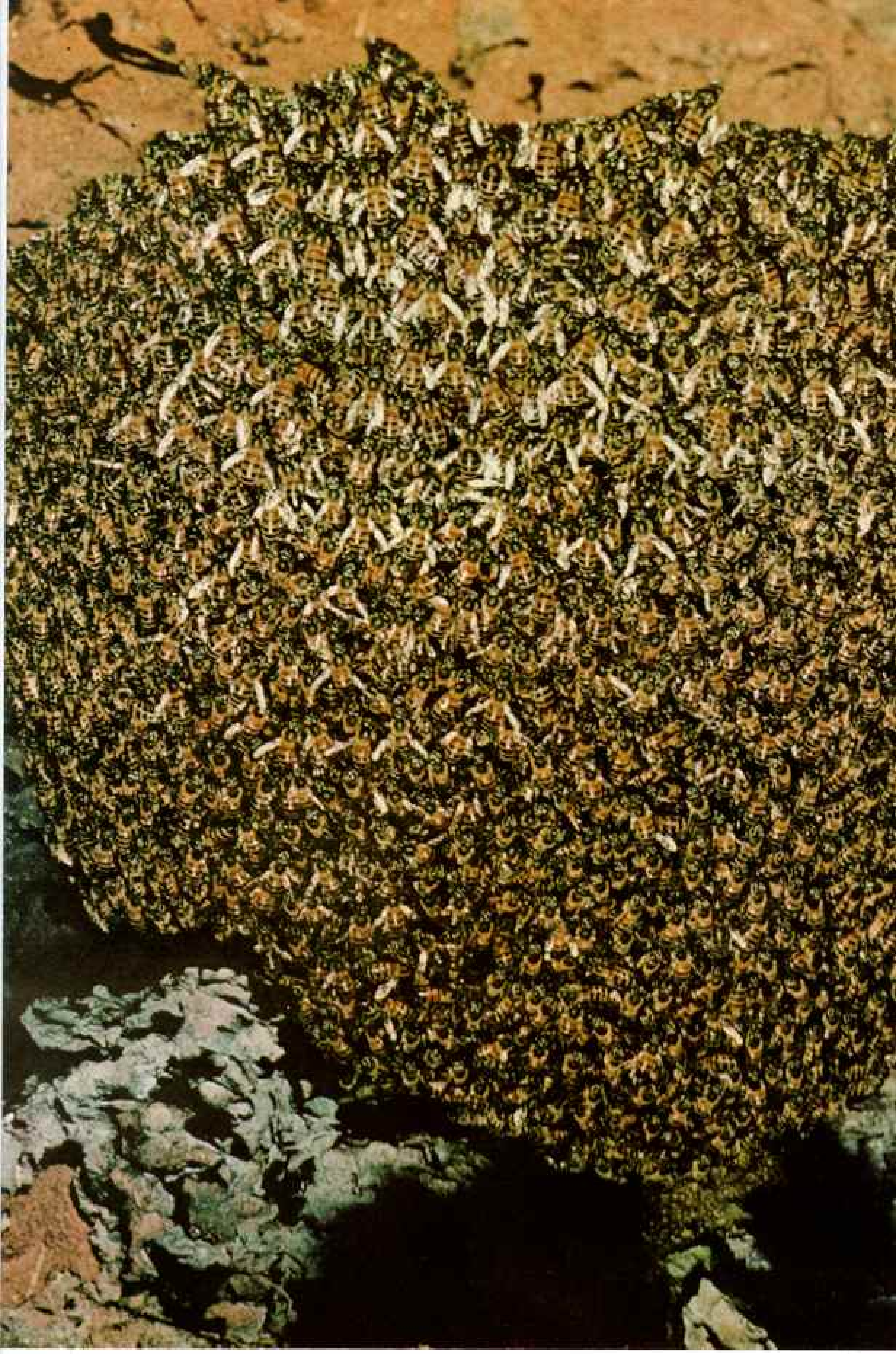
Soccer games are sometimes interrupted by swarms of bees that settle in the stadium. When the crowd begins to stomp and shout, agitated insects attack the spectators.

In the Amazonian delta town of Soure, a jubilant celebrant in a procession honoring the local patron saint fired a pistol into the air. The shot excited a swarm in the trees. The bees descended. End of procession.

In Rio Grande do Norte, drivers of sugar-cane cutting machines now wear bee veils. Syrup from cut stalks draws bees, which become frenzied by the rumbling vehicles.

"I was plowing with my tractor," Natanael Soares Fereira told us near Goianinha. "I must have driven over a nest. I felt a few stings on my leg. I looked behind me; the sky was dark with bees. God gave me legs to run, and I used them that day. I let my machine run free, and the bees chased it. It was hours before I could return to it."

Professor Paulo Mesquita, who teaches agricultural technology in Natal, said that two local men had been killed recently while



Bee bomb hangs from the wall of a termite nest (**left**) that has been opened to remove the unwelcome invaders. Tranquilized by smoke and cold, the Africanized swarm allows bee specialist Paulo Sommer to search for the queen (**right**). Her transfer to a box hive and removal from the area will draw away workers and drones, to the relief of a Brazilian family living nearby. Workers surround the larger body of the queen (**below**), who has slightly broader stripes than her courtiers.

Supreme matriarch of bee society, the queen is fertilized only at one time during her entire egg-laying life, which may extend over several years. During the flight when mating takes place in midair, the most zealous six or seven among hundreds of competing males usually reach her first, thus passing on their characteristics to offspring.

Three bees planted their painful stingers in the cheek of photographer Lavies (**right**) when a fold in her bee-covered veil touched her face.

RICK GORE (ABOVE)

clearing land. "We protect our people with heavy suits and veils. But it is so hot, the people take them off. This is how they are killed. Bees make land clearing expensive. The workers demand more money."

Honey Hunters' Defense: Alcohol

Oddly, the African bee has brought to northern Brazil one of the most primitive forms of livelihood: A number of peasants have become *meleiros*—wild-honey hunters.

Francisco Soares da Costa (page 500) lives in grim poverty with at least a dozen children and grandchildren in a mud hut near Aracati. He explained how, during the four-month honey season, he uses smoke to chase the bees away from their nests long enough for him to extract their honey. Often meleiros begin their day by drinking. Alcohol, they allege, counteracts the forty or more stings they receive going after a colony.

"Sometimes my husband comes home stung so badly he has fever all night," Francisco's wife, Maria, told me.

For his efforts Francisco harvests some 130 gallons of honey a season. He can sell that for about 100 dollars—most of his income for the year. Francisco's hardships so moved Bianca that as soon as she returned from Brazil she sent him a bee suit.

As the wild bees have moved northward, the perils have subsided in southern Brazil, where stories of terror and stinging death are now largely memories. Commercial beekeepers have moved their hives far from populous areas. Many wild colonies have been eradicated. And, as the Africanized bee has continued to cross with the European, the former has grown markedly less aggressive. The cooler climate, also, may have helped tone down its temper.

Many beekeepers now praise the very bee they cursed five years ago. They have discovered that some African genes are good for honey production.

"The Africanized bee is the only one I want now," said Dr. Paulo Sommer, president of the Beekeepers' Association of Paraná. "It gives me twice as much honey."

Thus the Africanized bee promises to become a new resource not only for Brazil, but also for many lean and hungry lands throughout the tropical and subtropical world.

But it can still be aggressive. The beekeepers usually wear bee suits and veils now and practice continual genetic selection. Whenever a hive becomes overly aggressive, the beekeeper replaces its queen with a gentler one. The apiary queens often mate with Africanized drones from the bush, and after several generations the African traits frequently build up too strongly.

Africanized bees are physically almost identical to European bees, yet even my untrained eye could tell that the bees in Dr. Sommer's apiary, like all bees in Brazil

Flower-bright boulder proclaims a "City of the Bees" (**right**), a Brazilian apicultural center near south-coast Florianópolis designed to encourage beekeeping. In northern Brazil a veiled and canvas-covered doll used in teaching bee-protection techniques intrigues a young visitor (**left**). Despite inconvenience in handling high-strung swarms, apiarists recognize the higher honey output of Africanized bees. They sometimes double the amount made by European strains. Hives at the bees' point of origin in southern Brazil become gentler with succeeding generations, a possible effect of the crossbreeding programs that eliminate the fiercest swarms. Barriers of cold in the United States may halt the northward spread of the easily provoked insects; Africanized bees winter poorly in low temperatures.

today, varied widely in behavior. Some hives seemed to ignore us, while defenders from others boiled out at us, braving heavy doses of smoke.

Interestingly, none of the bees actually stung us. Dr. Sommer explained that because it was winter in Paraná, the colonies were small; presumably the workers would not sacrifice themselves unless seriously provoked. "Come back when it is warm and the hives are strong and full of brood and honey," he said. "You'll see some aggressive bees."

Feisty Insects Heading Northward

We left Dr. Sommer and flew north to neighboring French Guiana to meet with University of Kansas entomologist Orley Taylor, who is studying the bees' advance for the United States Department of Agriculture. The front line, Dr. Taylor said, has reached Surinam (map, page 495). And with few European strains in this region to dilute the genes, the bees seem almost pure Africans.

They are moving slowly now, however—probably because the dense forests and heavy rains of the Guiana region create poor conditions for forage.

"Within two years they should reach the more hospitable terrain of Venezuela," Dr. Taylor said. "I think they will build up large populations there and move rapidly, reaching Panama in about seven years. Then it will probably be clear sailing through Mexico."

The best current estimate would place the African bees' arrival in the United States somewhere in the early 1990's. However, imponderables such as unexpected predators or diseases could slow their march.

On the other hand, warns Dr. Taylor, "We can't discount that someone, say a misguided beekeeper in Mexico or the United States, might sneak some in because they are such good honey producers in warmer areas."

Most U. S. experts are counting on Mexico, which has a large European-bee industry, to tone down the invaders genetically. "We hope that whatever forces operated on the bees in southern Brazil will operate on them in Mexico," explained Dr. Charles D. Michener, University of Kansas entomologist.

Some scientists favor creating a genetic barrier by releasing droves of gentle bees near the narrow Isthmus of Panama. But would Panama permit it? Also, would European bees prove effective competitors in the tropical wilds? Dr. Taylor, for one, believes that the bees have a chance of reaching the United States relatively unchanged.

What then? The Brazilian experience proves that the bees' aggressiveness can be tempered. Whether this happens in Mexico or the United States, it will take at least several years of interbreeding and sophisticated beekeeping. No one knows how much North America's cooler climate will mollify the bees.

Honeybees and their relatives already kill

twice as many people in the United States as do venomous snakes. In most cases the deaths are allergic reactions, often to a single sting. Nonetheless it must be stressed that no honeybee stings except in defense of itself or its hive. The African instinct is simply to overreact to disturbances anywhere near the hive. So the nervous African genes would result in more accidental deaths, but certainly no widespread menace.

The new bees could have a less sensational, but potentially severe impact on agriculture. Honeybees account for about 80 percent of insect pollination in the U. S. They affect 90 major crops, including alfalfa, the primary feed of the livestock and dairy industries. With the honeybee's value estimated as high as six billion dollars a year, the invaders must not be attacked with pesticides.

"If you wipe out bees, the production of many important fruits and vegetables would be seriously reduced," said Marshall Levin of the U. S. Department of Agriculture.

Pesticides and the dwindling of open space have already put bees in such short supply that commercial beekeepers now sell pollination services. They cart truckloads of hives from one flowering crop to the next.

"If our honeybees become at all like the ones in Brazil, it will be a catastrophe," John Allred, a California beekeeper, predicted. "We beekeepers could gear up to handle them, but the irrigators, harvesters, and tractor drivers—the people who have to work in the fields—would have an awful time."

An aggressive bee would force many of the country's 200,000 amateur beekeepers to drop their hobby. "People who play with bees are not going to work with wild beasts," said Marshall Levin.

Bee experts seem more concerned about other African traits, which hybridizing apparently has not altered. For one thing, while the African hybrids work in far cooler temperatures than European bees, they cannot cope with a hard winter. The Europeans cluster into a ball, and by constant movement keep their temperature at 96° F., thus surviving extreme cold.

Bee Threat to U. S. Remains Uncertain

This inability to winter over will confine the natural spread of the African genes to warmer regions: in the East as far north as Charleston, for example, and in California north to San Francisco. However, these areas house the bulk of the bee-breeding industry, which every spring sends bees to the North and Canada. Africanized bees could devastate this industry because few Northerners would order aggressive bees that cannot survive the winter.

The migratory nature and excessive swarming of the nervous African hybrids also concern bee scientists. When colonies swarm frequently, they stay small. Beekeepers, particularly those who truck their hives around to pollinate crops, might have trouble keeping Africanized hybrids; absconding bees would create more wild colonies, and thus more stinging accidents.

Such problems are today only guesswork. Indeed some scientists say it is folly to speculate, that nature will somehow intervene to thwart the bees' advance.

But having been attacked for more than two hours by these bees, I have great respect for their persistence. As for changing their nature, I recall what Dr. Norman Gary of the University of California at Davis told me: "We don't understand aggression in our own species. How much less we know about it in this little insect!" □

Humming with life, a statue at the town of Recife (**above**) harbors bees that bother no one, perhaps due to the height of their nest. Demand for honey encourages hive hunter Francisco da Costa (**left**), who endures numerous stings to gather the wild product that he bottles and sells.

Water Dwellers in a

Desert World

By GAVIN YOUNG
Photographs by
NIK WHEELER

LONG BEFORE AMARA'S small reed house came into view, the Iraqi marshes themselves seemed to welcome me back. The setting sun bronzed winding waterways almost too narrow for the old and chugging launch I had hired. An eagle floated high overhead. Turtles slid down the banks and plopped into the boat's wake. A pied kingfisher, sighting on its prey, dropped like a stone into the water.

Now, as darkness fell, I could make out the familiar humped shapes of the houses and the flicker of fires through doorways.

"Who's there?" someone called in Arabic from the shore. We stepped onto the flattened earth of the bank. Through the smoke and shadow a tall, lean man appeared. Behind his mustache and stubble of beard, I recognized Amara.

"Welcome, sahib," he said gravely, no glint of recognition in his brown, deep-set eyes.

"How are you, Amara?" I replied, and then added the only four words in English that he knows: "... damn and blast it!"

Amazement creased his lined, worn face, and he seized my hand with a broad grin. "God is wonderful!" he cried jubilantly. "Sahib, how many years has it been? Twenty? Twenty-five?"

Rugs and cushions were fetched. I heard the women urgently pounding coffee, and through the smoke I felt rough-palmed handshakes. We ate rice and chicken with our fingers, then gossiped long into the night.

When I lay down to sleep at last, immense stars hung above the marsh. And the years of

Ghostly voyagers in a riverine wilderness, Arab villagers pole through the marshes of southern Iraq where the Tigris and Euphrates Rivers meet on their way to the Persian Gulf. As buffalo herders, mat weavers, fishermen, and rice cultivators, they live amid a surplus of water—a startling incongruity in the arid Middle East.

exile from this place I loved slid away through the darkness.

My return that summer evening marked the fulfillment of a dream that had tugged at me since the early 1950's, when I spent more than two years exploring parts of the 6,000 square miles of lagoons, reed banks, and island villages that comprise the world of the marshmen of southern Iraq.

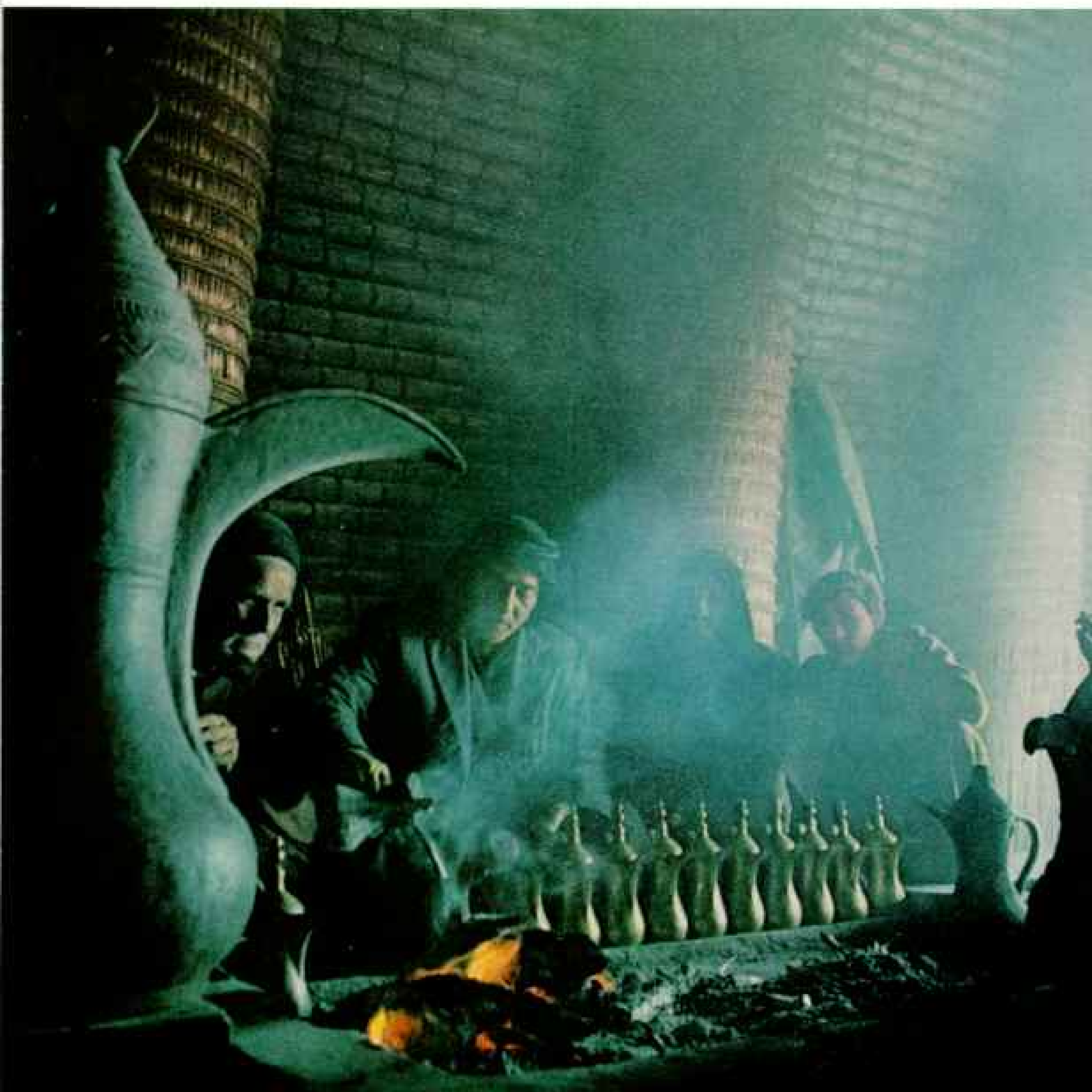
World Where Ancient Rivers Rule

Perhaps 30,000 buffalo breeders dwell in this watery world that stretches from just above Basra in the south to within 200 miles of Baghdad in the north. Some call these people the Marsh Arabs, but their name for themselves is the Ma'dan. Their lives are distinctive, shaped by the marsh they inhabit.

Geologists differ on the origin of the marsh. Some have theorized that the Persian Gulf once covered the area, leaving a swamp as river sediment built up the land. But in historic times the marsh has been fed by the spring floods of the Tigris and Euphrates.

These rivers rise in the mountains of Turkey, flow roughly parallel for 600 miles, then draw closer in the lowlands of southern Iraq. Here they overflow across an utterly flat countryside before uniting as the Shatt al Arab to enter the Persian Gulf (map, page 509).

In the 1950's it had seemed to me that life in the marsh could have changed little in the



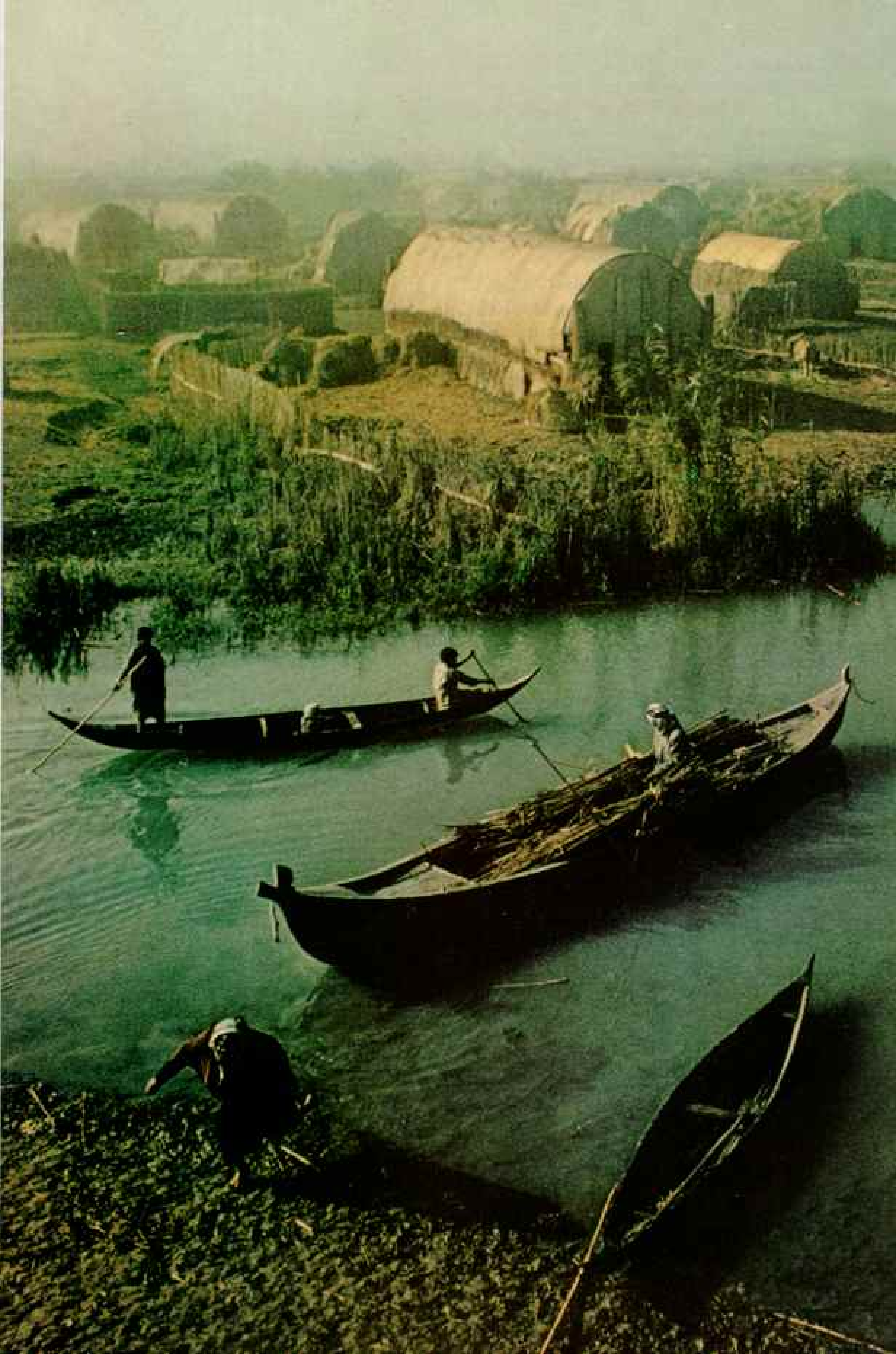
5,000 years or more that people have lived there. Travel was possible only by boat, and the vast stretches of water and reeds sealed off the marshmen from the outside world.

Water buffalo and *qasab*, the giant reed, were the basis of their existence. Buffalo were prized for their milk, butter, and hides. Reeds, split and woven into mats, were sold in quantity outside the marshes. The marsh people also cultivated a little rice.

In those days I often traveled with Wilfred Thesiger, the English explorer who first studied the marshmen.* Journeying by boat with these tribesmen, staying in their houses, I

*See his article, "Marsh Dwellers of Southern Iraq," in the NATIONAL GEOGRAPHIC, February 1958.

Guesthouse of towering reeds welcomes villagers and strangers alike to fireside conversation in each marsh settlement. Like tent-dwelling Bedouin, marshmen gather in the evening to drink bitter coffee brewed in small brass pots. They help each other arrange marriages and settle disputes. Here too they celebrate feast days of the Shia branch of Islam. Those younger men who enter trade have little time for such customs, and thus lose prestige in the eyes of traditionalists.



made many friends and came to know their special world almost as well as my own.

For me the marshes, where local belief places the Garden of Eden, were indeed a sort of paradise. But in 1958 a revolution overthrew the monarchy in Baghdad, and for years travel to the marshes was impossible. Recently, however, the Iraqi Government granted permission for me to return for two visits—one in the summer, one in winter.

My delight was mingled with fear. Perhaps Amara and my other marsh friends, after all these years, would be dead or gone. Perhaps the marshes themselves would be drained or otherwise changed.

But now, lying in Amara's house at the edge of the marsh, my mind was at ease. I had learned that most of my friends remained. "And tomorrow," Amara had told me, "we shall go by canoe deep into the swamp, just like in the old days—damn and blast it!"

Tyranny Lifted From the Marsh

At dawn a great high-prowed canoe lay in the water at Amara's door. We set off on the first of a series of journeys. Smoke rose from villages and hung motionless in the humid air. Water buffalo huffed and rolled their eyes. Goliath herons flapped away, rising from the reedbeds with the noise of someone shaking out a sheet. We hailed marshmen in smaller canoes with delicate prows that slipped through the lagoons like stately black swans.

Clearly the beauty of the marsh had not faded. But while briefly visiting different villages as the days slipped by, I noticed that change had come to the marsh. People were better dressed and had more food and money; there seemed a greater liveliness.

Amara cited one reason. The tyranny of the old absentee landlords had been lifted. The revolutionary government had removed most of the landowning sheikhs, their tax gatherers, and strong-arm men. "Not all of the sheikhs were bad," Amara said, "but some were tyrants. How they taxed us and made us work!"

Keeping their homes above water, marsh people create artificial islands, as here at Al Shayqal, by fencing a patch of swamp, then layering it with mats, reeds, and mud. Each year, to avoid flooding, they must add more layers to the settling foundation.

The great holdings were broken down into one- and one-and-a-half-acre lots and distributed among villagers living in and on the edges of the marsh. Thus they could plant and harvest rice. Amara himself had received one and a half acres.

Some of the sheikhs remain, he added, but only those who had always lived with their tribes and guided them wisely.

Hospitable Descendant of Mohammed

My summer visit was all too brief, but with winter I returned to push deeper into the marsh and learn more about the changes. This time I was accompanied by photographer Nik Wheeler. We went by launch to the house of another old friend, Sayyid Sarwat.

Sayyid is the title given in lands of Islam to one believed to be a descendant of the Prophet Mohammed. Sayyid Sarwat is widely respected, and tribesmen and government officials consult him on such matters as interpretations of the Koran, family disputes, or even blood feuds.

He is a jolly, bulky man with a resonant voice and heart of gold. He is 73 years old, and age has practically blinded him, so that he can no longer read his beloved Koran. But his hospitality—even among Arabs renowned for their generosity—is prodigious.

"Welcome! Welcome! Welcome!" he boomed as we landed. "Bring tea! Bring coffee! Hurry!" As we chatted, I learned that his much-loved eldest son had recently been killed in a traffic accident in Baghdad. Another father would have been distraught. The sayyid said quietly, "It was written."

Then: "You want my *tarrada*. There it is on the water. Take it for a week or a month."

We gratefully accepted the offer of his 30-foot war canoe and with three paddlers set off again. The tarrada was heavily loaded with our presents of foodstuffs, cartridges, medicines, and Nik's equipment. The one oarsman I didn't know, Jabbar, was a strong-looking 20-year-old with a fine mustache. The other two had been with me before: Farhan, a clown and fine singer, and his brother, Idan. Both were expert boatmen.

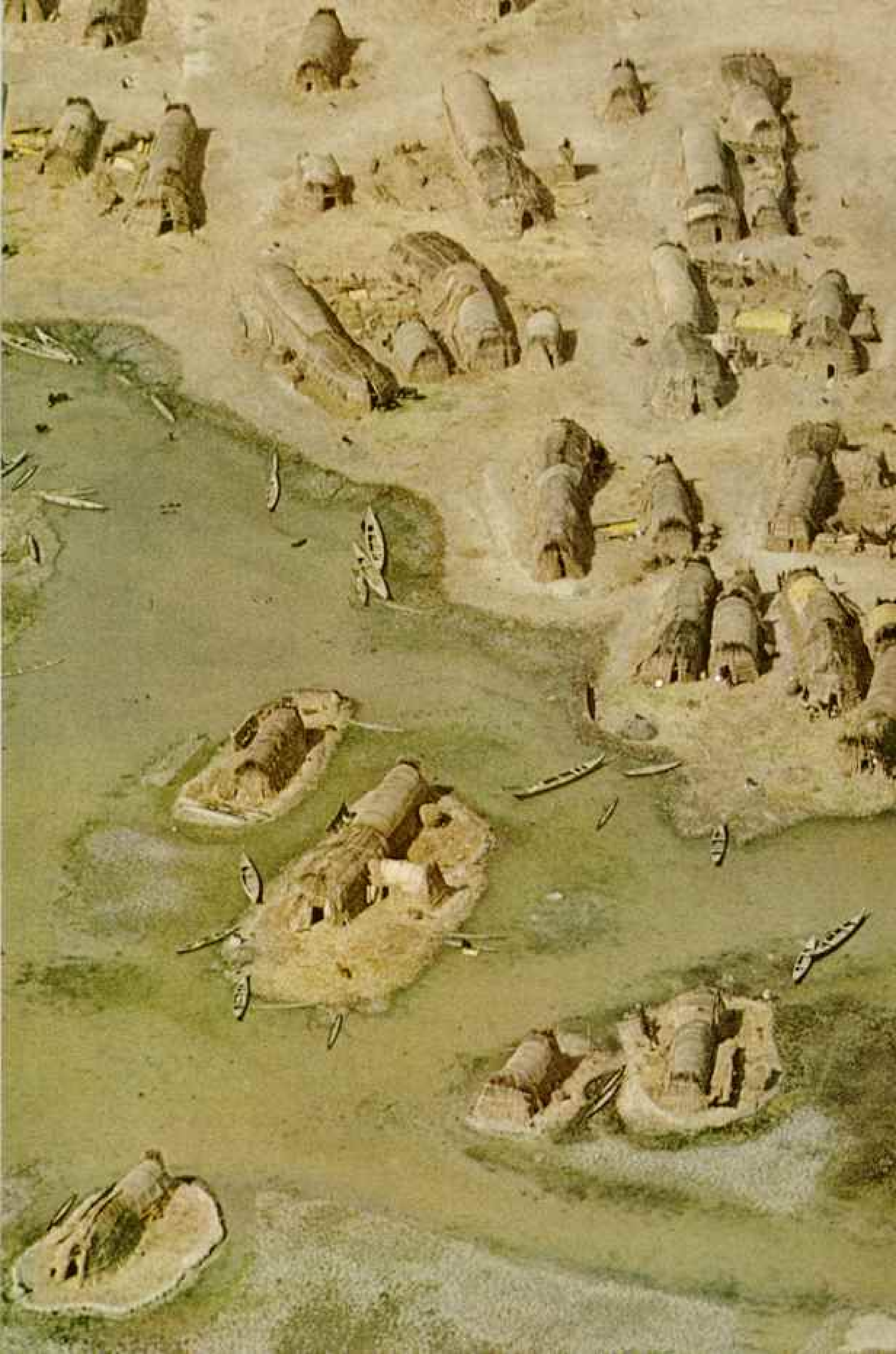
In the summer we had been baked by the sun and plagued by ticks, fleas, and marsh mosquitoes. But now the *shamal*, a north wind, cooled us and dispersed the insects. Soon we were surrounded by water and marsh vegetation—reed forests, bulrushes, papyrus. We might have been alone at the beginning of the world.

Through the clear, eight-foot-deep marsh water I could see small fish darting among the water plants. Now and then we cupped our hands to drink from a lagoon.

Our destination was the village of another old marsh friend, Sahain. We reached there at noon. The village is only a cluster of islands,

Wrapped in a fringed headcloth to ward off the sun, this boy of the Al-Essa tribe (**facing page**) lives near the Euphrates River. Customs of Arabia have affected the western marshes, while Persian influences have seeped across the Tigris. A cultural sponge, the region absorbed diverse peoples for millenniums, as the rebellious and defeated sought refuge in this 6,000-square-mile vastness of water and reeds.

High and dry: Low water in early March outlines artificial islands and mainland shore near Al Qurnah (**following pages**).



with a reed house standing on each. Even to visit each other the villagers must use boats.

Sahain embraced me as we stepped ashore: "We didn't think you would return." His hair was now white, but he was still tough looking, with a deeply lined face. He told me that with the departure of the old sheikh's agent, he had been voted headman of the village and leader of the Furaijat tribe.

We sat on bright rugs spread on the platform of trampled reeds outside his house. Such a platform serves a marsh dwelling as wharf and porch, and here the family's water buffalo, cows, and sheep feed during the day and sleep at night.

The village had obviously grown and prospered. Over the heads of the Marsh Arabs thronging round, I could see perhaps 150 reed houses of various sizes, mostly large. Many had eight or nine sleek buffalo and the same number of cows or sheep. The women and girls had brighter dresses and more ornaments than before.

When Ajrum, another old friend, joined us with his four sons, I asked him about the new prosperity. "I remember," I said, "when you had only one buffalo."

"That's right," he said. "But now I have eight, and several calves and sheep, and rice-land." Relief from the sheikh's tax gatherers and improved marketing and transportation explain part of the relative prosperity. But Ajrum added another reason: "I am also now a fish merchant."

Spear Fishermen Turn to Nets

Formerly tribesmen fished only with a five-pronged spear called a *falah;* they ate their catch and never sold it. They despised the Barbara, the nomadic professional fishermen of the marshes, who used nets and sold fish to the towns for a living.

Shots in the air will herald happiness during a wedding celebration. Friends rent motor launches to fetch the bride (**below**) and her dowry to her husband's home. Families arrange matches, preferably between paternal cousins. Thereafter wives, neither veiled nor secluded, work beside their husbands, whatever the occupation.

"You mean the Ma'dan use nets now? You've become Barbara, Ajrum?"

He laughed. "Yes, that's what's happened."

The marshes teem with fish, mostly various kinds of barbel or carp. The binny, about a foot and a half long, is the tastiest.

Now, every morning, Ajrum buys the fish caught by his fellow villagers. Under sail or poled along by several men, big, clumsy *balams* take the catch, packed with ice, to the nearest dry-land market town. From there it goes to the shops of Baghdad or Basra, where fish brings a good price.

But buffalo remain the basis of family wealth. In summer, at dawn, the animals are driven into the water. Marsh boys scramble onto their backs and steer the swimming beasts to the grazing ground in the shallow water, where the green rush shoots grow. At sunset the buffalo are rounded up and driven home.

At their owners' house-islands, the buffalo lumber up onto their platforms, urged on by the boys' shrill cries, and settle round the fire, not for warmth but to be near the smoke that helps keep the tormenting insects away.

In winter, when the water is cold, the buffalo are kept all day on the platforms. The family goes off to gather forage. As the sun sinks, the fleets of small canoes return piled with fodder—marsh grasses, rushes, and sedges for the buffalo, sheep, and cows. The Ma'dan treat their beasts with tender care. One night Ajrum sat until dawn with a sick buffalo, talking and singing to it.

Winter nights can be bitter cold in the marshes. Side flaps of rush matting, raised to let breezes in during the summer, are lowered and tied tight to resist the gales that sometimes roar in from the Kurdish mountains to the north, or out of Iran to the east. The men wrap headcloths around nose and

Outsiders bring help and hope to marsh dwellers who rarely saw a stranger 20 years ago. A doctor who travels by launch examines a patient in Qabiba (**below**). Dysentery, schistosomiasis, tuberculosis, and trachoma are commonplace.

In fair weather an instructor sent from Baghdad teaches English outside his reed house and classroom. Iraq hopes to bring elementary schooling to all marsh boys by 1985, all girls by 1990. But for further education and opportunities young people will have to leave marsh life behind.

chin and don cloaks and pajamalike trousers.

Still it was snug in the evenings, when as many as forty men and boys would gather in Sahain's house. We would sit by a buffalo-chip fire, with light from hissing lanterns.

Gunfire Signals a Blood Feud

The Ma'dan have a lively and ribald sense of humor. They admire good singing, especially love ballads, and are great tellers of tales. Yet even caught up in an epic, they have the vigilant ear of a warrior people. Any unexpected noise, even the splash of an oar, will cause them to call, "Who's there?" and send one to the door to look outside.

One night we heard the distant chatter of automatic weapons. "That's near Rufaiya," Sahain said. "Does anyone know who could be fighting there?"

One man did: It was probably members of two neighboring tribes, locked in a blood feud. We learned later that several men had died in that clash. The marshes have a long, violent history of feuds and smuggled guns.

Sahain told of a feud among his own people. A kinsman had run off with a girl from a neighboring tribe. Her relatives were demanding compensation—two girls of marriageable age and four hundred Iraqi dinars (about $1,400).

Sahain had pledged to find the kidnapper, and asked for a truce. The other tribe had refused. Sahain had then gotten local government authorities to help enforce a truce, with Sayyid Sarwat as guarantor.

In the old days the great sheikhs dealt out summary and often brutal punishment. Today the government lets the marshmen manage their own affairs, intervening only if a conflict gets out of hand.

"Has your tribe always been in the marshes?" I asked Sahain on another night. We had finished a meal of chicken soup, buttermilk, rice, unleavened bread, and tea. Now we discussed the history of the Ma'dan.

"Sahib, the Furaijat in the marshes now number about a thousand. There are more in and around Baghdad. We came from dry

Cathedral-like arches give grace to dwellings whose design may be as old as 6,000 years. Near Al Kabayish (**left**), kinsmen bend bundles of reeds for the main supports. Another home beside a road embankment (**below**) awaits completion of crossbeam reinforcing before mats are unrolled for roof, walls, and floor. Other mats are destined for market.

During mat making, husbands split the canes they have gathered; then wives pound them pliant with a wooden pestle, and everyone weaves, completing a 4-by-8-foot mat in two hours. A collector advances cash or credit, then picks up the product to sell to a merchant who may load his truck to the toppling point (**right**).

Mat weaving has become an important source of income as demand elsewhere grows for the pliable coverings, used in housing, fencing, and cargo packing.

land north of here about a hundred years ago."

"Well, who was in the marshes before—hundreds of years ago?"

"I am not a very well-instructed man. But I think no one was here. Just the birds and beasts and the water."

Sahain can recite his family tree back seven generations, but his history was in error. The marshes have been populated for at least five millenniums. The Iraq Museum in Baghdad displays a silver model of a canoe shaped like the one I was using (page 521); it had been found at Ur of the Chaldees, near the marsh. In the British Museum stands a bas-relief five feet high depicting a victory of the army of Sennacherib, the Assyrian king (705-681 B.C.), over marsh people. It shows canoes, reed houses, water buffalo, and marshmen hiding in reedbeds.

While history has largely swept by the marshes, it has also shaped the marsh people. Through the centuries, refugees from this or that invasion or tyranny have found sanctuary in the reed maze. The faces around Sahain's fire reflected this. Some were fine and long, like the features of desert tribesmen. Others had something of the flatness and high cheekbones of the Mongols. Still others were plumper, potato-shaped like those depicted in the art of ancient Sumer.

Good aim assures a catch in marshes filled with wildlife. The fisherman hunts carp for the family table with a five-pronged spear. Once an occupation of low esteem, commercial fishing now attracts more marsh dwellers; they market fish through government cooperatives that ship the catch in iced crates to Baghdad and Basra.

Marsh Children Now Go to School

Our winter mornings were diamond sharp. Some days I took Sahain and others hunting, to contribute something to our keep. Marsh food is adequate but sometimes monotonous, and ducks and geese were welcome.

On other days I watched the village youngsters, for theirs is the first generation in the marsh to attend school. The school building, like the houses, stood on an island and was fashioned of reeds. I listened to one of the two young male teachers introducing the youngsters to English. He stood at a blackboard and said slowly in English: "Look now, this is a three. What is it?"

"Three, three!" yelled the class, flushing two cattle egrets from the roof.

"One, two, three," said the teacher.

"One, two, three!" yelled the class.

At 18, village boys are drafted for two years of military service. I asked Sahain if most came back to the marshes. "Yes, most," he said, "which is good." And new. Formerly young men, fed up with a hard life, ran away to Baghdad. Often they found only poverty, disappointment, perhaps a life of crime. Now, with new prosperity in the marshes, there is reason to stay.

Sayyid Sarwat's splendid war canoe carried us from Sahain's village toward a much larger one, Al Aqar al Kabir. Jabbar, Farhan, and Idan wove unhesitatingly through the reeds and lagoons. Once they plunged us like Alice in Wonderland into a rabbit warren of bulrushes, sedges, and giant reeds. They

squeezed the tarrada along a snaking channel where feathery tips of 20-foot qasab almost closed over our heads. "A shortcut," grinned one paddler. Another sang a love ballad, full of sobs and "woe is me."

At noon two men hailed us unexpectedly from an island, guiding us to a crude reed lean-to. One of the men I recognized. He was tall and craggy and wore a tattered shirt with a dagger at his belt. Like most marshmen, his hands and feet were cracked and callused by years of contact with canoe decks and hard, sharp reeds.

"How's your throat, Chethir?" I asked.

He laughed: "You remember? Much better, thank God." I remembered taking him to a doctor in Basra. He was then a skinny 16-year-old, and his throat bore the white spots that usually mark a streptococcus infection.

Chethir's fishing nets hung drying in the sun, his fishing spears leaned against the hut. The small sickle used to cut the reeds lay near his old single-barreled shotgun.

From time to time Chethir, like other tribesmen, camps out in such temporary lodging for two to three weeks of hunting and fishing. He'd seen many ducks, and heard many wild boar thrashing about in the night.

Now, building a fire of dried reeds, he insisted we stay for lunch. He mixed rice flour and water to make dough, spread it on green rushes, and positioned the ends of the burning reeds over the dough. He split three freshly caught fish and placed them on reed stakes, facing the fire. We resumed our journey well fed and warmed by hot, sweet tea.

As we approached the sprawling conglomeration of houses that is Al Aqar al Kabir, the *thump-thump* of a large machine proclaimed progress. Sure enough, Hajji Yunis, the village's elderly headman, was soon proudly showing us a large rice dehusking and winnowing machine.

An engineer in oil-stained clothes stood beside it, telling village women how to pour the rice in and how to gather it up again after processing. Hajji Yunis said he had purchased the machine with government aid. All were permitted to use it for a small fee. It was old, but English-made and worthy.

That evening I talked with the hajji. A headman under the old sheikhs, he had been asked to stay on by vote of the villagers. "Al Aqar al Kabir is better off," he said. "We own our own land now, and since 1971 there has been no land tax—no taxes at all."

The hajji also runs an embryonic farmers' marketing cooperative; some 400 villagers belong to it. They sell to the government, but he added, "Anyone is free to sell to private merchants too." Launches serving the marsh's main routes and a new system of truck transport from the edge of the marsh to principal markets facilitate the sale of the rice.

If the rule of the sheikhs is gone, their memory lives on. One night there was a big party. Three men thumped on drums made of earthen jars covered with sheep gut or pelican pouches. The villagers chanted an old tribal song about a heavy-handed sheikh:

The Arabs told me of him,
A tyrant from a tender age. . . .

Doctors Fight Ancient Maladies

I found more changes at Al Shayqal, the largest of the marsh towns with 7,000 inhabitants. It lies near dry land. The novelties were a doctor, a nurse, and a clinic—all paid for by the government. A young graduate of the University of Baghdad College of Medicine told me there were now five other doctors going out into the marshes.

Schistosomiasis, caused by waterborne parasitic worms that invade the bloodstream, used to be the curse of the marsh. Now, the doctor said, "It's way down. Serious malnutrition has also been reduced. Today the major problems are trachoma, dysentery, and tuberculosis."

Doctors in the marsh! Something new indeed. In the 1950's, Ma'dan had to make the difficult journey to dry-land towns for medical aid.

One thing hadn't changed. The Ma'dan remain dependent on their small canoes, called *mashhufs*, for basic transportation. The boatbuilding center is Al Huwayr, a town near the junction of the Tigris and Euphrates. I called on the "dean" of boatbuilders, Hajji Mehsin. We found him working under a canopy of palm trees. Rusty anchors and weathered beams lay about, remains of mashhufs dead and gone.

"Yes, there are more launches, but our trade still does well," he assured me. "Do you know we build 200 mashhufs every month? On the average we charge 15 dinars [about $50] each. A good one should last five years."

(IRAQ MUSEUM, BAGHDAD (ABOVE AND RIGHT))

Foggy-morning flotilla: Villagers of Al Shayqal paddle off to fishing grounds in low-floating boats. Most are made of lapped and tarred planks.

In such craft ancient Mesopotamians traveled, as seen on an engraved stone cylinder (**left**) that dates from Sumerian times of 3000 B.C. As the seal rolled across moist clay, it left an impression of

boatmen approaching a shrine. Decorations on the mud-brick shrine resembled reed latticework of today (page 523).

Mesopotamians believed this silver canoe (**left**) carried the soul of their king to the afterworld. The two-foot-long model with leaf-bladed paddles was found in a royal tomb at Ur of the Chaldees, less than 40 miles from the marshes.

Snug when north winds blow, a swaddled infant dozes on a bed of reeds; he rides papoose style when his mother works outside. At the buffalo-dung fire, she bakes bread; the staple is sometimes accompanied by fish, onions, dates, or chicken. Buffalo are rarely butchered. Women turn milk into butter or yogurt to sell for barley, wheat, and tea at local shops.

Reed siding (**facing page**) wards off wintry blasts; it comes down in summer. In the first Middle Eastern civilizations, designs on stone pillars imitated such reed columns.

The sides of the mashhufs are made from two layers of light planking joined by thin struts. Wood for the planks is imported from Malaysia and Indonesia. Stouter wood from Iraq goes into the ribbing and thwarts. The finished mashhuf is covered with a layer of bitumen, which bubbles from natural wells in central Iraq. Water buffalo like the pitch, and sometimes nibble it off the boats.

Fewer war canoes are made now. They were always custom built and expensive. Today the price tag is more than $200. Tarradas like Sayyid Sarwat's are distinctive not only for their size, but for the rows of broad iron nailheads that decorate the inside planking. The nails are made by a small local colony of Subba, a religious sect that also makes silver ornaments for the tourist trade.

Isolation Protects a Land of Beauty

Tourism in the marshes? Once the idea seemed incredible, but the Iraqi Government has established two small guest facilities on the fringes. The marshes are vast, however, and such limited development will not destroy them or the way of life of the Ma'dan.

As our time in the marsh drew toward an end, Nik Wheeler and I relished each of its beauties more intensely: dark clouds of geese from Siberia, flocks of pelicans that turned the lagoon into an agitated sea of white feathers, the tiny, brilliantly colored kingfisher called the "sheikh's daughter."

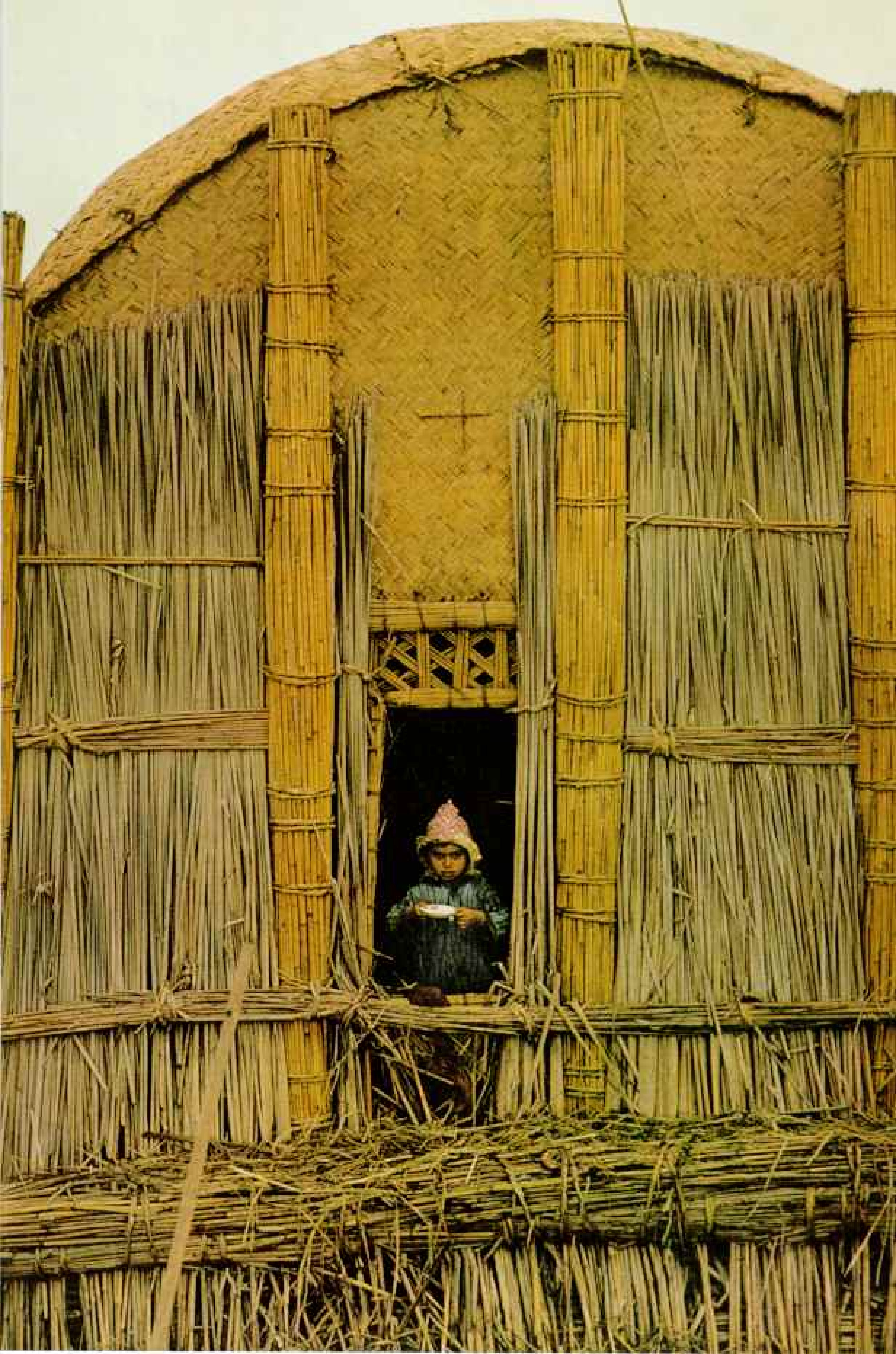
Our tarrada plunged at last into the reed corridors toward the village of Sayyid Sarwat. We saw the sayyid's stout figure in his doorway. As usual, he hurried to the water's edge, arms wide, calling, "Welcome! Welcome! Come and rest. Bring food, tea, coffee! Bring pillows and mattresses!"

He wanted details of our trip. "Things are better now, eh?" How had his tarrada behaved? Now, he bellowed cheerfully, we must stay with him a week and relax.

But our time was up.

I thanked the sayyid and warmly embraced Amara, Ajrum, and the others. Nik and I rowed across the waterway to the dirt road and found a car to take us back to Baghdad.

My journey had been doubly rewarding. The marshes, the Garden of Eden of local tradition and my own paradise, remained intact. More important, the lives of its people have changed—for the better. □



"Texas, actin' kind of natural"

SAN ANTONIO

By FRED KLINE
NATIONAL GEOGRAPHIC STAFF

Photographs by DAVID HISER

In war as in peace, Mexican influence has shaped San Antonio's growth and character. Blood flowed in 1836 at the siege of the Alamo (**above**). Mexican-American heritage now blends in a city nowhere more tranquil than along the San Antonio River, where waterborne diners enjoy a mariachi serenade (**right**).

NO MATTER HOW ONE LOOKS at it, San Antonio lies deep in the heart of Texas. As writer J. Frank Dobie put it: "Every Texan has two homes, his own and San Antonio."

No doubt he had in mind the Alamo, shrine of Texas liberty and symbol of those maverick spirits who founded and still characterize the state.

The often-quoted words ascribed to Davy Crockett reflect that spirit: "You kin all go to hell, I'm a-goin' to Texas." Thus he was off to join the Texas revolution against Mexico, after losing his seat in Congress. At San Antonio's old mission church of San Antonio de Valero, better known in history as the Alamo, Crockett, Jim Bowie, William Barret Travis, and 185 other "Texians," bravely fighting a force of some 2,500 Mexican soldiers, died to the last man on March 6, 1836. Texas has not forgotten them.

As history has converged at San Antonio, so does geography. Here the hot and fertile south Texas prairie, where cattle ranches and truck farms flourish, merges into cooler, hilly sheep and goat country, rising to the northwest of the city.

A lovely green ribbon of water, the San Antonio River, flows through the heart of the city on its way to the warm waters of the Gulf of Mexico, 150 miles to the southeast. It is a slow stream, generally no wider than a neighborhood street and no deeper than a swimming pool, and it runs quietly below street level, hidden by trees and buildings.

Along the banks, reminders of the city's past and present are linked like charms on a bracelet. The river flows by five *(Continued on page 528)*

DAVID L. ARNOLD, NATIONAL GEOGRAPHIC STAFF (ABOVE)

Magnifica! Tremendous! Right on! No matter the lingo, the ten April days of Fiesta and its scores of events yearly entertain more than a million people. A procession of floats, the riverborne parade swings to "Remember Jazz," the entry of St. Philip's College (**above**). Founded as an all-black institution, the college now accepts students of any ethnic origin, reflecting San Antonio's diversity of cultures and peoples.

Sneakering along between bands, a Texas-size sombrero (**left**) joins the Battle of Flowers street parade.

At "A Night in Old San Antonio," crowds swirl through La Villita, the rebuilt original Mexican village (**right**), to enjoy international food, games, and entertainment at booths manned by volunteers. Proceeds go to the San Antonio Conservation Society, whose staff member Conrad True says: "Surgeons drawing beer, the head of a think tank running the show at the Gay Nineties Saloon, a politician flinging pizza, a bank president counting receipts—that's a show in itself."

Politics and pasta get a chewing over when the City Council and Her Honor, Lila Cockrell (**below**), lunch on Italian food at Mike's Ice House. Mrs. Cockrell in 1975 became the first woman mayor of this, the tenth largest U. S. city. With 756,000 people, San Antonio is larger than Boston or Pittsburgh within city limits.

Emphatic as an exclamation point, the 750-foot Tower of the Americas (**right**) rose for the city's 250th anniversary. Lower-keyed in tone than Dallas or Houston, San Antonio looks to future progress by developing light industry and by expanding trade with Mexico. Problems include poverty among Mexican-Americans, aggravated by the presence of perhaps 50,000 illegal aliens.

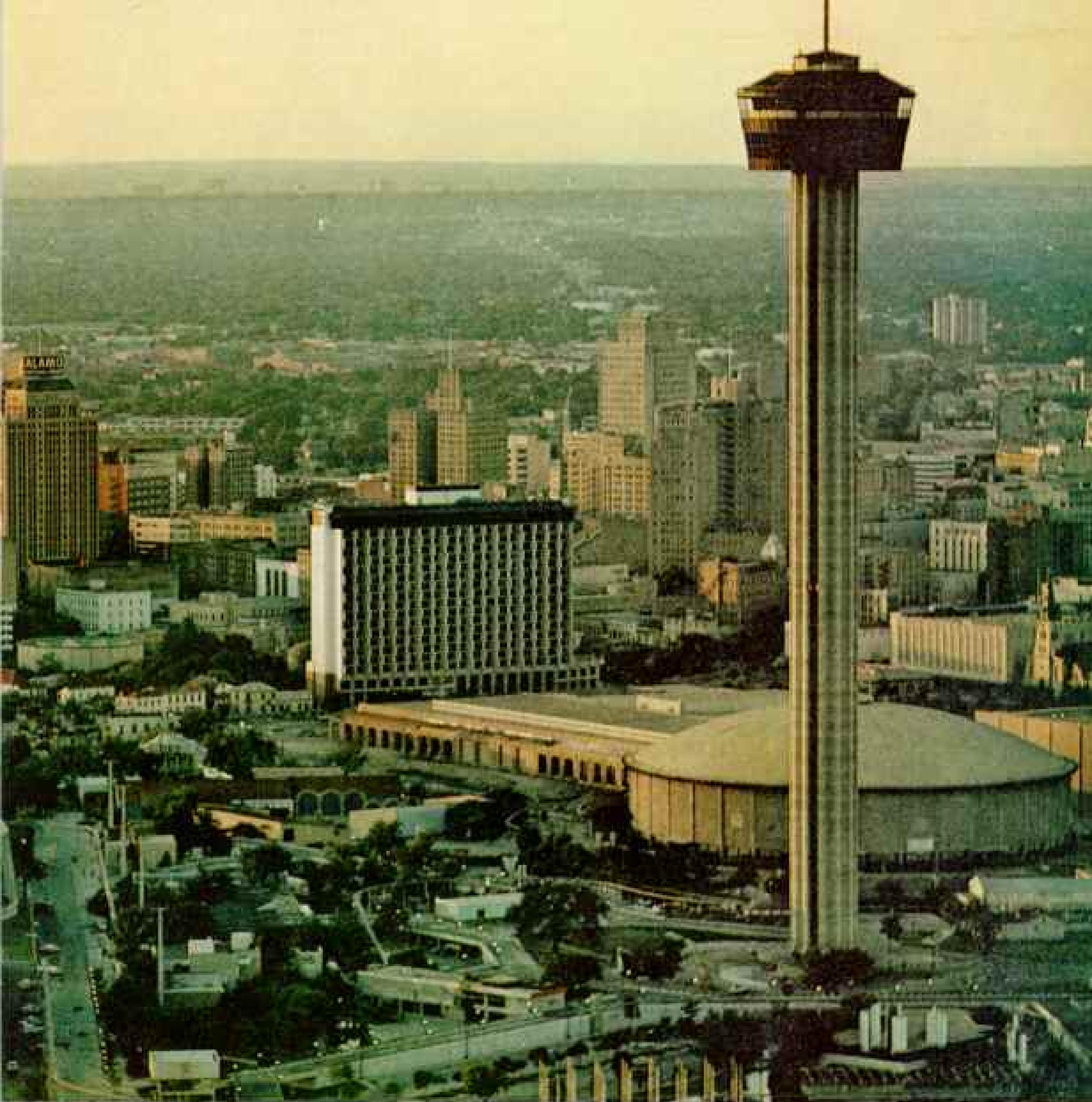
18th-century Spanish missions, four of them still-active Roman Catholic churches, and the Tower of the Americas, symbol of San Antonio's 1968 HemisFair and 250th birthday.

Downtown the San Antonio winds beside the Paseo del Rio, a 2½-mile stretch of riverside walkways, hotels, shops, tropical plants, and outdoor cafés. Here the river passes such diverse landmarks as the King William area, an inner-city neighborhood recalling days of Victorian elegance amid the simplicity of the Old West, and La Villita, the Mexican village of old San Antonio, now a quarter of restaurants and artists' and craftsmen's shops.

"San Antonio is our sweet secret," clubwoman Dorathy Lang told me—"no smokestacks polluting the sky, a mañana-paced life-style, an oasis of sorts."

Ancient cypress, live oak, and pecan trees, towering above the riverway, have swayed in winds that once ruffled the flags of Spain, Mexico, the Republic of Texas, and the Confederacy. The people of these cultures have scattered and mixed across the city, and they too have been growing here for a long time.

Mexican-Americans constitute nearly half of the San Antonio area's million people, making it the most Mexican of the nation's big



cities. Accents of Spanish soften conversation, tunes of mariachis add romance to social occasions. Fiesta, the city's ten-day-long April holiday, celebrates life in the jubilant spirit of a Mexican *carnaval*.

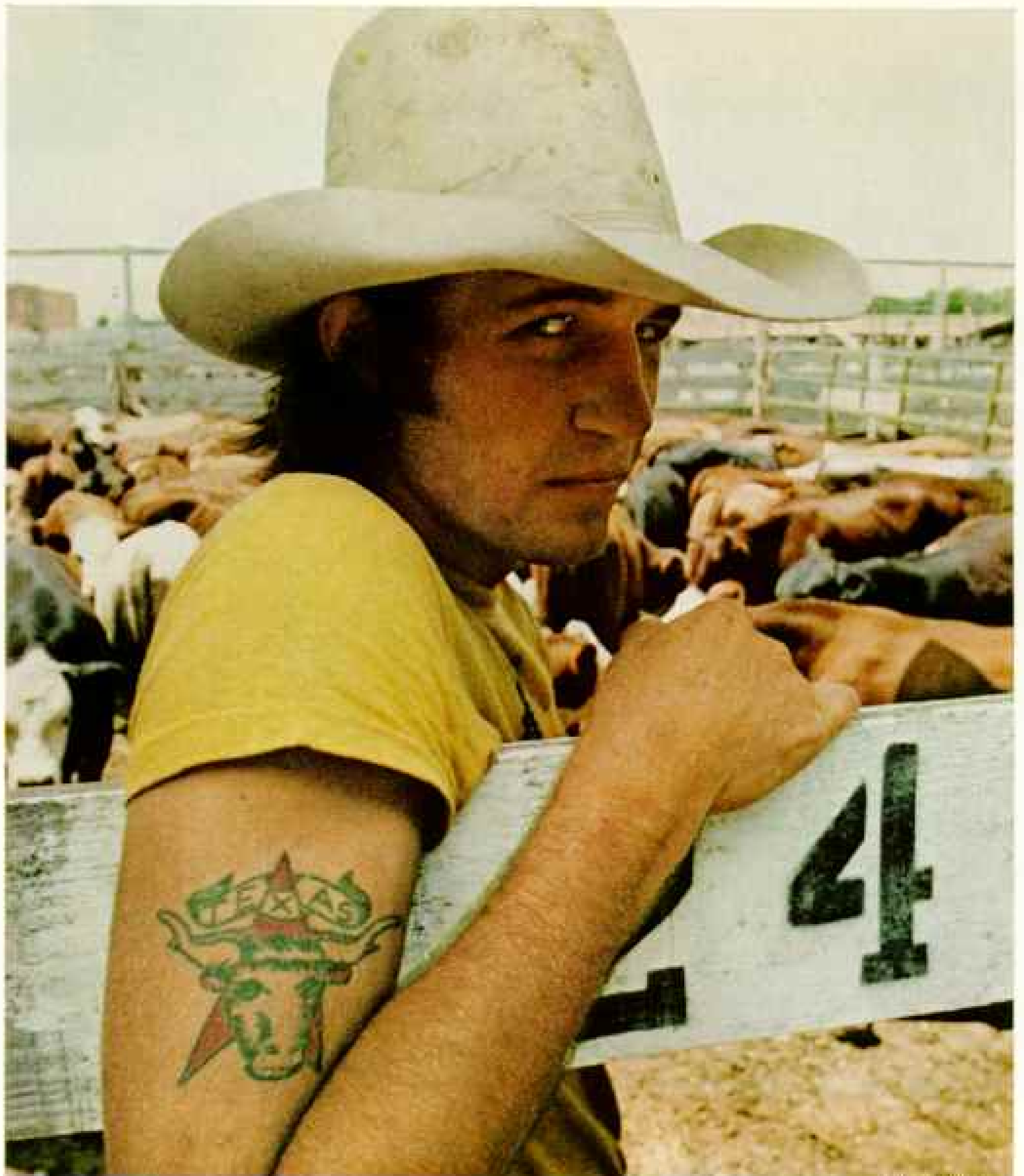
Smells of frijoles, chilies, and tortillas flavor the air in San Antonio homes, while the craftsmanship, designs, and materials of Mexico flavor the shapes of the city. Streets with Spanish names touch most areas: Mariposa, Zarzamora, Culebra, Flores, Dolorosa. Mexico's intimate, and often personal, interpretation of Catholic faith appears frequently in celebrations, ritual, and folkways of the city.

But the charms of San Antonio's Mexican style fade in the light of problems that beset a substantial part of the Mexican-American community, barely subsisting on an income well below the national poverty level.

Where the Cowboy Was Born

For 15 years I lived in "San Antone." I never did own a horse, but my brother and I rode lots of them while growing up here, and we often played cowboy in this city that was the birthplace of the American cowboy.

For more than a century San Antonio has been the central city of the largest calf-



BLAIR PITTMAN (RIGHT)

With a six-gun stare and a Texas tattoo, a stockyard worker (**above**) might have sauntered in from the days when San Antonio reigned as *the* cattle town of Texas. Just after the Civil War, cattlemen gathered longhorns here for the long drive to railheads in Kansas.

Together with a good horse and saddle, a cowboy needs good boots. Since 1883 Lucchese Boot Company has filled that need. Whether custom formed on hand-carved lasts (**right**) or taken from stock, all are handmade to exacting specifications. Lucchese has shod Presidents, generals, cowboys—including the Hollywood variety—and tenderfeet.

producing area in North America. Here the United States cattle industry developed during post-Civil War years, when the first enterprising south Texas cattlemen started to gather the millions of wild longhorns that had proliferated from stock left by the Spanish conquistadors.

Beginning in 1866 San Antonio changed from a sleepy army garrison to the first cow town of the Old West. Young men signed on here for the long drives to Midwestern railheads, on trails known as Shawnee, Chisholm, and Western. Here the cowboys' clothing and gear were store-bought or custom-designed to the demands of the trail. Even today, boots and saddles made by San Antonio craftsmen are judged among the finest.

The cowboy's language was also fashioned here with words borrowed from his teacher, the Mexican vaquero: mustang from *mesteño,* ranch from *rancho,* stampede from *estampida,* savvy from *saber* (to know), barbecue from *barbacoa,* lariat from *la reata.*

Manhood Comes With a Boy's First Deer

Though the trail drives have gone the way of the Old West, you still find cowboys here, city cowboys like Edd Owen, who rents a run-down, one-horse spread on the outskirts of San Antonio, about a 20-minute drive from downtown. He ekes out a living in today's world as a concrete form setter, but just looking at him—7 feet from boots to hat—and listening to him talk, no one would mistake Edd for anything but a cowboy.

"Just a Texan," he corrected me, "actin' kind of natural."

Edd is a rodeo buff, he listens to country and western music, he loves his beer and tequila, and during the late-fall season he does little else but hunt the fleet and canny white-tailed deer—probably the most sought-after animal in all Texas.

He and his two boys, Monty and Marlon, don't have to go far to hunt, since deer roam the live oak and mesquite woods on their land. They just have to remember not to shoot in the direction of neighbors or the highway. The day before I stopped by, 9-year-old Marlon had just bagged his first deer, and the head with its eight-point antlers hung from the big pecan tree in their front yard.

"That deer meat comes in handy," Edd said. "We ain't been eatin' too high on the hog lately, work bein' scarce an' all. There's nothin' quite like killin' your first deer; right, Marlon?" Marlon blushed and nodded as his father tousled his hair. "Now he's a deerslayer. He's come of age."

Many working cattlemen make San Antonio their "city" home and the business and supply center for their ranches. Some also move here so that their children can go to one of the city's notable private schools, like Saint Mary's Hall or Texas Military Institute.

"There are probably more ranching families in San Antonio than in any other major Texas city," San Antonio resident "B" Johnson told me. Belton Kleberg Johnson, widely known as B, is the great-grandson of Capt. Richard King and presently one of eight directors of the fabled King Ranch—the nation's largest family-owned cattle ranch, comprising some 800,000 acres. He is a far cry from the cowhand of the Old West; his wide-ranging activities include serving as a director of American Telephone and Telegraph Company and as a trustee of Deerfield Academy in Massachusetts.

But B, a youthful and robust 45, has ranching deep in his blood. With the independence of mind of a true Texan, he set out on his own Chaparrosa Ranch to improve the breeding of Santa Gertrudis cattle—the first U.S. purebred, originally developed on the King Ranch. At San Antonio's 1975 Livestock Show and Rodeo, his bulls took 11 out of 14 first-place ribbons.

"I like the challenge of testing my own theories about cattle breeding and being responsible for the results," said B. "To me, that's what being a cattleman's all about."

Trucks Now Make the Cattle Drives

At San Antonio's Union Stockyards, the oldest in Texas, 300,000 head of cattle were sold in 1974. With packing plants so close by, I asked stockyards president Carlton Hagelstein if they didn't sometime have a cattle drive up the street just for old time's sake.

"The last cattle drive into San Antonio occurred in 1930," Carlton said. "Today, if we tried, I'm sure we'd wind up paying thousands of dollars for torn-up lawns and trampled flower beds. We still drive 'em, but now we use trucks."

The legacy of the Alamo's rugged individualism took root in San Antonio, today

still a city of mavericks—and Mavericks. The latter, now some 200 strong, are the descendants of Samuel A. Maverick, an 1835 settler who gained lasting renown because he allowed the calves of his small herd to roam unbranded.

One story goes that when he finally sold his herd, the buyer rode over the country rounding up all brandless cows on the theory that they were Maverick's. But Maverick himself wrote that the buyer found no more than 400 animals, the number in the original herd. In any event, the word entered the language for any unbranded cow, and later for an independent-minded person.

Sam Maverick, a Yale graduate and a lawyer, was chosen by his comrades-in-arms at the Alamo, soon to be besieged, to travel to Washington on the Brazos River and help draft the Texas Declaration of Independence. "My family agrees that old Sam's education did him the most good when it got him out of there," joked his great-grandson Maury Maverick, Jr., himself a lawyer (page 535).

Mavericks Are Still Pure Texan

At City Cemetery 1, where Sam Maverick and his wife, Mary, are buried, Maury talked about his family's stake in American history. "A Sam Maverick died in the Boston Massacre," he said, recalling the famous engraving by Paul Revere. "I guess you could date our civic involvement from there."

Maury, a Marine Corps veteran, has been, as he says, "a defender of lost causes"—such as his defense of Viet Nam war resisters. He is also known in law circles for his successful argument before the U. S. Supreme Court of *Stanford* v. *Texas*, a landmark case emanating from San Antonio that won the constitutional guarantee that no state official could ransack a home and seize papers under authority of a general warrant.

Chili is another native San Antonio item that Maverick is an authority on. "There's no doubt that chili con carne originated here," said Maury. "It's pure 'Tex-Mex.'"

San Antonio cuisine also features enchiladas, tamale pie, and *chiles rellenos*. Mexican restaurants, a longtime trademark of the city, seem to be on every corner.

When I returned to San Antonio, one of the first things I did, along with feasting on Mexican food, was call my old friends, artists Richard Harrell Rogers and his beautiful wife, MarJo. "Come on over," said Dick. "You're just in time. I'm showing 'Daedalus' to General Harbold."

"Daedalus" turned out to be a 10-foot-high stainless-steel sculpture commissioned by the Order of Daedalians, a fraternity of military pilots with its headquarters in San Antonio. Retired Maj. Gen. Norris B. Harbold, a past national commander of the Daedalians and a pioneer in air navigation, was checking on the piece, which will be displayed in the Smithsonian's new Air and Space Museum.

Smoking's a drag for Ringo, but he earns a reward of drinking water. At the Southwest Foundation for Research and Education, a leading area laboratory, the baboon puffs for a study on the role of inhaled tobacco smoke in hardening of the arteries.

Maverick with a big M, Maury Maverick, Jr., as a lawyer and defender of unpopular causes, carries on the tradition that made his family name part of the language. After his great-grandfather's unbranded cattle were styled "mavericks," the word came to mean anyone who broke away from herd mentality.

Visiting from her LBJ Ranch 70 miles northwest of the city, Mrs. Lyndon B. Johnson (**left**) lunches at the home of Mr. and Mrs. Marshall Steves. Their house, designed by San Antonio architects Ford, Powell & Carson, was built by Mexican craftsmen.

"We were looking for a symbol of man's first flight," said General Harbold, "and Rogers' unique construction of wedges really spoke to us. You know, of course, that military heavier-than-air aviation had its first base here in San Antonio."

On March 2, 1910, Lt. Benjamin D. Foulois made what he later called his four Army flying firsts: "My first takeoff, my first solo, my first landing, and my first crash on the same day."

The historic place was Fort Sam Houston—today Fifth Army Headquarters and site of the Army's Health Services Command. Fort Sam is also home for Brooke Army Medical Center, one of the Army's largest hospitals. Its allied Institute of Surgical Research, better known as the "Burn Center," is considered by many to be the world's most effective burn-care facility (page 547).

The Air Force is much in evidence in San Antonio, with some 31,000 people on active duty spread among four bases: Kelly, Brooks, Lackland, and Randolph. Kelly, site of the San Antonio Air Logistics Center, employs nearly 20,000 civilians in the repair and maintenance of aircraft. At Brooks, Headquarters Aerospace Medical Division runs the USAF School of Aerospace Medicine and Wilford Hall Medical Center at Lackland Air Force Base, the Air Force's largest medical facility.

Since 1946 Lackland has provided the rigorous grind of recruit training for most people in the Air Force. Randolph Air Force Base is headquarters for the Air Training Command, and it also processes nearly all the personnel records of the Air Force. It is home as well for the USAF Recruiting Service and the Air Force graduate school for instructor pilots.

With this panoply of installations, it is no surprise to find that a third of the city's economy is directly attributable to the military presence in San Antonio.

Soldiers Come Home to San Antone

The city's retired military and their dependents number 50,000. What draws them? "We came back to a home place, not just a familiar duty station," a retired colonel told me. "San Antonio's got beauty and charm, and it doesn't cost too much to live here."

Thousands of servicemen over the years have married sweethearts they met in San Antonio. The city's military lore is endless—and not lacking in love stories. Lt. Dwight D. Eisenhower met Mamie Doud here, and also coached local football teams. Teddy Roosevelt's Rough Riders drilled by day in a city park and regrouped by night in hotel bars. Charles A. Lindbergh spent a year in the city perfecting his flying at the Army's Primary Flying School at Brooks Field and at Kelly

All the splash and splendor San Antonio can muster goes on display at the Order of the Alamo's coronation of the Queen of Fiesta. The public ceremony, held in the

Municipal Auditorium with pageantry, music, and debutantes in many-thousand-dollar gowns, precedes a private coronation ball, the social event of the year.

"**Medic!**" A soldier with a chest wound needs help at once. Four figures race out and lift the trooper onto an improvised litter as rifle fire cracks and exploding bombs sweep the field with smoke (**right**). Realistic, but not real. Battle conditions, the wound—all are simulated as part of Army medical corps training at Fort Sam Houston.

Between drill sergeant and deep-blue pit (**below**), a recruit tries to Tarzan across one obstacle in a basic-training "confidence course" at Lackland Air Force Base.

Field, two years before his solo Atlantic flight.

Today in San Antonio you continually find living links to the military's past as well as to its space-oriented future.

Many of the legendary Flying Tigers of World War II received their pilot training in San Antonio. One of them, renowned ace David Lee "Tex" Hill, married a Texas girl and is now in the oil business here. Over coffee one morning in his home, we talked about his exploits and even some movies that were based on the squadrons' adventures: *Flying Tigers*, starring John Wayne, and *God Is My Co-Pilot*, with Dennis Morgan. Actors played Tex Hill in both films.

"Our name was officially the American

Volunteer Group," Tex said, "and we were recruited to help keep the Burma Road open. We were asked by the Generalissimo, Chiang Kai-shek, and we went because if China had collapsed the Germans and the Japanese might have linked up across India and Burma.... We got the tiger-shark motif from the British, who earlier used it in the desert against the Germans and Italians...." I listened for several hours as Tex recounted tales and added footnotes to history.

Pioneer on the Frontier of Space

In those years Tex would never have dreamed that he would be living in the same city with Dr. Hubertus Strughold, director of Nazi Germany's Aeromedical Research Institute in Berlin before and during World War II. After the war Dr. Strughold left a university professorship at Heidelberg and moved to San Antonio to work with the U. S. Air Force at what is now its School of Aerospace Medicine. He has been here ever since, helping in many important ways to change the history of aviation.

Today Dr. Strughold is known throughout the world as the "Father of Space Medicine" and as the man who conceived the first space-cabin simulator. Typical of his unconventional imagination was his test of a hypothesis about the surface of Mars by shooting a BB gun at frozen mud pies.

ROBERT MADDEN

Trabajo y suerte — work and luck — stand as the first two rungs on the ladder of success for San Antonio's 400,000 Mexican-Americans. The enterprising shoeshine boy (**top**) may one day own the kind of boots he now polishes.

From a shoestring start, Frank Sepulveda (**above**) built a multimillion-dollar produce business. Involved now in politics and philanthropy, his roots remain in the Mexican "West Side."

Fighting his way up, Mike Ayala (**right**) became national bantamweight champ before turning pro. The prize-fight route out of poverty attracts many more than it can reward.

As he showed me around Brooks Air Force Base, where he still has an office, I asked Dr. Strughold about the influences of the space program in our everyday life.

"The man on the street," he said, "knows he is no longer a man on the street in the old sense; now he knows he is more or less a man on the Milky Way."

Wetbacks Keep Labor Pool Filled

But thousands of San Antonians are still very much on the street—those of the barrios, the Spanish-speaking neighborhoods. Large numbers of illegal immigrants, bred in the poverty of Mexico's rural villages, have made their way here hoping for a new life. Instead, many have created social problems in yet another place. The United States Immigration and Naturalization Service guesses that as many as 50,000 illegal aliens from Mexico may be living in the San Antonio area.

The immigrants from Mexico keep coming. Jorge Laredo, a construction worker whose wife works as a maid, told me his reasons. "I believe that there is more hope here, more money to be made, more chance for my children to survive. And there is in San Antonio a community of Mexico that makes me feel at home. We work very hard here, and we do not mind. But I pray it will get better."

Except for contractors of farm labor, it is not against the law to hire wetbacks, as the illegal aliens are called. The only person at fault, the law says, is the Mexican who illegally enters the country.

"The illegal alien and the poor Mexican-American are the same to an employer," Carlos Mata told me. "They're all in the same big pool of cheap labor that forever has been low paid, nonunion, and grateful for any job."

The needs of his people seemed more urgent to Carlos Mata than a boxing career. After a few years as a pro, he entered the field of social work for the House of Neighborly Service, a United Way agency sponsored by the United Presbyterian Church, U.S.A. As chairman of the Bexar County Food Stamps Task Force and Monitoring Committee, he had success in improving distribution of food stamps in the overall San Antonio area.

"Food stamps are chipping at the tip of the iceberg," said Carlos. "Census Bureau figures show there are now about a million people in the San Antonio area. In 1970 some 166,000 existed on incomes below poverty level. If

Drumming up an audience, the company of the Teatro de los Barrios marches through a housing project. The cast performs "The Alamo," a play that looks at history from the Mexican viewpoint and debunks the motives of Anglo heroes. They were, after all, Texas newcomers, and Jim Bowie, though courageous, also traded in slaves.

you are existing 'below poverty level,' it comes to this: not only hunger, but inferior education, no skills, discrimination, fatherless children, crime, hopelessness. All these things are eating at the poor people of the barrios, and it's a vicious cycle."

Awareness of these unsolved problems has led many to the "Chicano" social-change movement, where they have found renewed hope based on racial and cultural pride. I talked to one of San Antonio's Chicano leaders, Barrio Professor Ernesto Gomez, director of Centro del Barrio, a field unit run by the Worden School of Social Service of Our Lady of the Lake College. Ernesto earned his rank through lifelong involvement in barrio life, which included a precarious apprenticeship as a gang leader.

"Things are changing," said Ernesto. "Social institutions have responded with long overdue bicultural programs. There is a commitment among young Chicanos toward

social work and politics. We have a pride in our identity. These are things to build on."

Jesus (Jesse) Villarreal has come up the hard way and made a success in the electrical-contracting business. Recently he and some friends opened the Mission Federal Savings and Loan Association, aimed primarily at helping to secure the fairest home loans possible for some of the city's lower-middle-class Mexican-Americans.

The Villarreal family came from Mexico during the Pancho Villa era, and Jesse's father worked for the railroad. "I remember discrimination, but I never took it seriously," Jesse said. "In 1952 my big break came when an Anglo, Harry Chandler, and I went into partnership in a firm we called Jesse and Chandler; we both thought the name Villarreal might keep Anglo customers away. You have to compromise here and there.

"Anglos want the Mexican worker because he'll work for less. But once you can sell a good job, not cheapness, then those hiring realize that good work is really what they want.

"San Antonio's been real good to me and to a lot of Mexican-Americans. If a person isn't lazy and has the will to get ahead, he can make it here. There is a large middle class of second-, third-, and fourth-generation Mexican-Americans to prove it. Our problems are not cured, but they're coming around."

A River Shapes the City

In the early morning along the San Antonio River, such problems seem far away. When the dawn mist rises from the water, the marshy woodland in Brackenridge Park seems especially primordial. Here the river is born of artesian springs bubbling from the limestone caverns of the Edwards Underground Reservoir, 500 feet below the ground. This 175-mile-long aquifer provides water for San Antonio and a five-county area.

That headwater is a borning place for more than a river. It is the site of one of San Antonio's earliest known settlements, a 10,000-year-old Indian campground in the forested backyard of Incarnate Word College.

And it was here, at San Antonio Springs, that I put into the river for a canoe trip with a group of people interested in the San Antonio River Corridor—a 15-mile swath through the city, most of which is still surprisingly unexploited. The River Corridor has been studied for extensive housing, business, and recreational development.

In its present state the river can be an irksome obstacle course, with many portages required to get from the park to downtown. Nevertheless, we pushed on past the zoo, the Witte Museum, a golf course, a brewery.

"Even Tourists Act Civilized Down Here"

Then we glided into the lovely realm of the Paseo del Rio—an inspiring example of what can be done along the river. I waved to young Arthur "Hap" Veltman, one of San Antonio's visionary businessmen along the Paseo del Rio. Hap was busy working on yet another enterprise, a restaurant and discotheque called the Royal Street Crossing, near his popular Kangaroo Court.

At one of the riverside tables of the Court, I often passed pleasant hours with New York expatriate writer-editor Margaret Cousins, Conrad True of the San Antonio Conservation Society, and other "River Rats," a group who enjoyed lively talk and the timeless ambience of the river.

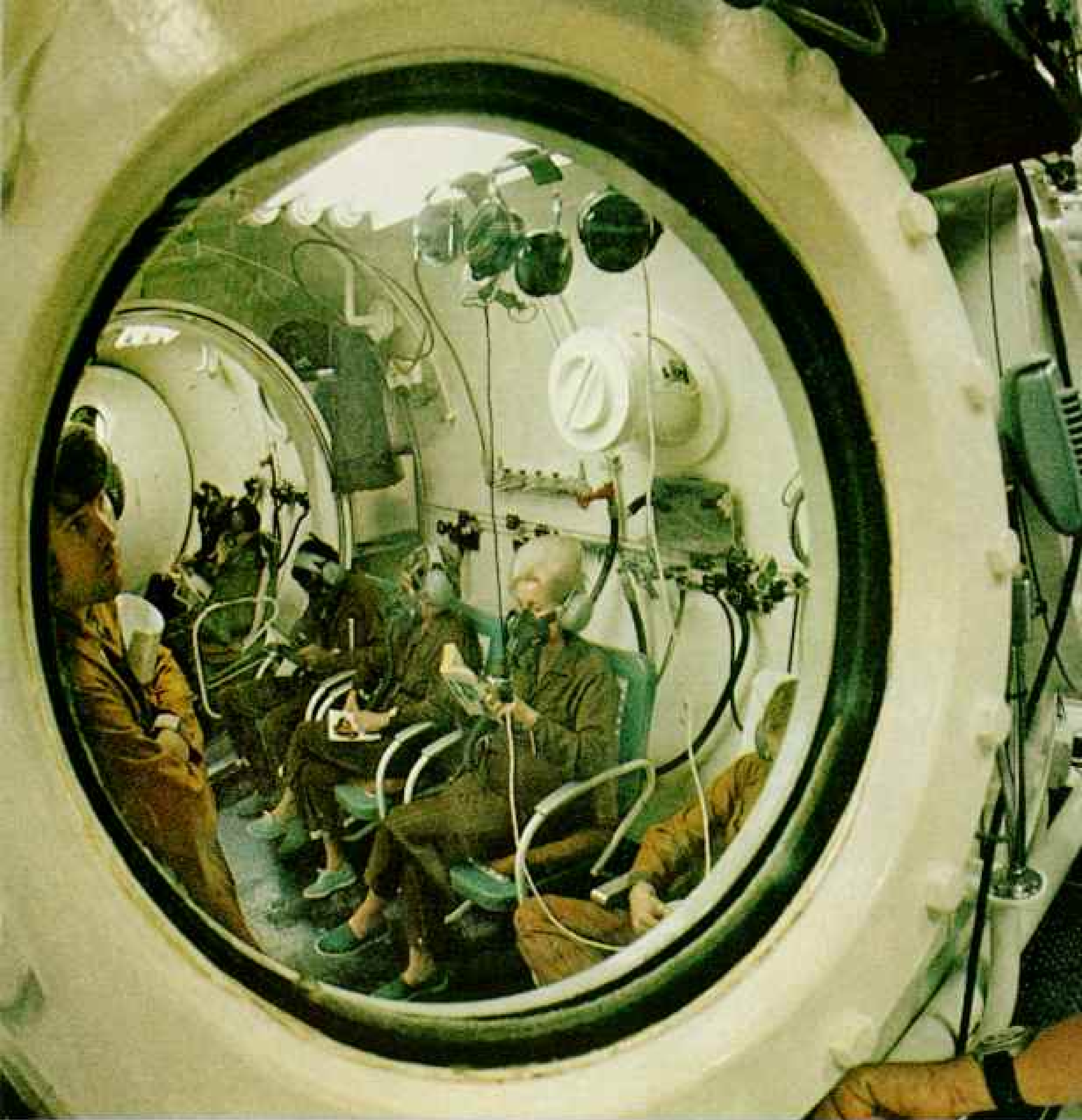
"This is the finest place in the whole world," observed Maggie Cousins, who lives in a riverside apartment. "Even tourists act civilized down here."

Our convoy of canoes stopped at the Paseo del Rio office of lawyer and fellow voyager Phillip Hardberger, for the seaman's traditional ration to fight the January chill.

"I look forward to the day," said Phil, "when I can walk out of my house on River Road, get into my canoe, and in a pleasant half hour dock here at my office. All we need are the pigeons and I'll think I'm in Venice."

Years had gone by since a costly study on the River Corridor was published, and I wondered when development would begin.

Fitness fans work out at Air Force Village, a private community for widows and retired officers that includes apartments for the active and a nursing home for others. What San Diego offers retired admirals, San Antonio holds for retired generals—an easy life-style at reasonable cost in the company of congenial friends.



"The six agencies involved just haven't raised the money," said Larry Travis, urban planner and architect. "And yet the River Corridor project could well be a catalyst to make the inner city get up and go."

Architect Melds Past and Future

The dean of San Antonio's architects is 70-year-old O'Neil Ford, a man to whom the city owes much for the preservation and creation of that special San Antonio fabric.

When I first talked to him in his King William Street office, he was quite distressed over a recent turn of events. He and many others, including his wife, Wanda, and a partner, Boone Powell, had just lost a 14-year fight against the route of the city's northbound expressway. We went out to take a look.

"Can you believe this?" he said to me as we looked over the expressway's newly bulldozed course through Olmos Basin Park. "They have to cut a beautiful live oak wood, that took hundreds of years to grow, for a concrete racetrack. Look at the land they're building on: Across a floodplain, through dedicated parkland, and splitting perhaps the most beautiful residential area in the city. This insensitivity will kill us all yet."

Chamber of health forces pure oxygen, under high pressure, into the blood of patients at Brooks Air Force Base (**left**). The hyperbaric chamber, once used to study the effects of altitude on military pilots, now treats such afflictions as bone disease.

At the "Burn Center" of Brooke Army Medical Center at Fort Sam Houston, the even pressure of a mask (**below**) helps soften and reduce scar tissue to minimize disfigurement of the severely burned.

Ford's creations are considered beauty spots throughout the city: The brick-and-glass campus of Trinity University, as inviting as an Italian hill town; the Tower of the Americas, San Antonio's ever-present beacon of progress; a 46-million-dollar University of Texas campus, fitting into the countryside like a natural wonder.

Mexican Village Rises Again

One of the jobs he is proudest of is the restoration of La Villita, where he worked with young Lyndon B. Johnson, then Texas head of the National Youth Administration, which directed the city-sponsored project. Ford talked about the extraordinary legacy of the Roosevelt era's Work Projects Administration in San Antonio: La Villita, the zoo, parks, and beautification of the river.

"You know, it *is* possible to do something under the sponsorship of a government project and also do work of the highest quality," said O'Neil. "I remember those kids learning how to cut limestone in La Villita. They were busy building up their own city, a city that they now had a stake in. What a needed concept today, and what a stake in the future that would give us all!"

Many men like Ford and Travis worry about San Antonio's downtown, suffering because shopping centers have made suburban areas self-sufficient, and because few people can live in town owing to the scarcity of middle-income houses and apartments.

Recent proposals have suggested making downtown into a residential community; turning HemisFair Plaza into a garden park, with Copenhagen's Tivoli and Paris's Tuileries as models; redeveloping Alamo Plaza into a park with a pedestrian mall and first-rate tourist attractions; remodeling the Municipal Auditorium into a new center for the performing arts.

One businessman digging in to do battle is R. Jay Casell. Casell—with the assistance of Western artist Clinton Baermann—has recently built what he calls the Alamo's artillery command post in Alamo Plaza. There an exciting five-screen film, *Remember the Alamo*, re-creates the siege 18 times a day.

"We need a few more volunteers," said Jay. "Not the world's greatest bear hunter or knife fighter to defend the Alamo, but this time businessmen with imagination who have the same kind of fight in them for Alamo Plaza and our downtown."

Foundation Strives to Create Jobs

While San Antonio is far from the nation's wealthiest city, its economy is one of the more stable. But there are long-standing problems.

"The day is past when we can sit back and naively believe that our economic health depends solely on revenues from the military, tourism, or agribusiness," said Rabbi David Jacobson, a man much honored for his humanitarian works in the city. "What we must do to realistically achieve that economic balance is attract new industries and provide more jobs, especially for those in the vital low-income and semiskilled areas."

The newly formed San Antonio Economic Development Foundation, Inc., wholly financed by the business community, is trying to do just that. "We're going after companies that fit our labor force," said retired Gen. Robert McDermott, organizer of the EDF. "Light industries, insurance companies, electronics firms, and hospital-medical industries growing with South Texas Medical Center—our giant new complex of hospitals and the University of Texas Health Science Center.

"We're also advertising San Antonio's assets as a headquarters city." McDermott, as head of the 4,000-employee United Services Automobile Association, speaks from experience: USAA is opening its new hundred-million-dollar corporate headquarters here.

Permanent Fair for Mexico's Products

San Antonio has excellent truck, rail, and air links to Mexico. With Laredo, the biggest U.S. commercial gateway to Mexico, only 150 miles away, the possibility of a permanent Mexican Trade Fair—a showplace for Mexican goods—is an exciting new potential for San Antonio's economy. The short history of its yearly fair has shown phenomenal growth: Orders for Mexican goods have jumped from 1.5 million dollars in 1972 to 80 million in 1975.

The Trade Fair's guiding force is Tom C. Frost, Jr., chairman of the board of Frost National Bank, San Antonio's largest. The family-owned bank was started by his Texas Ranger great-grandfather a century ago.

"Since HemisFair, we've been developing more and more as a hub for trade with Mexico and the rest of Latin America," Tom said. "San Antonio and Mexico are both sleeping giants, and our partnership could be an important stimulus to both of us to awake and use our potential."

Many people told me that to become a place where Mexico and Texas can evolve in a spirit of helpfulness, to make a city that goes deeper than great allure and colorful traditions, San Antonio will have to meet its challenges and problems as head on as did the defenders of the Alamo.

And in this San Antonio of sweet air and friendly people, there is enough promise and intelligence and strength to make you think that they might do it. □

MG translates into "munchable greens" at a restaurant called the Magic Time Machine, where a sports car becomes a salad bar and a waiter the devil. Though in some ways staid, the city still lives up to poet Sidney Lanier's 1872 observation: "If peculiarities were quills, San Antonio . . . would be a rare porcupine."

Mr. D

Irish Ways Live On in Dingle

By BRYAN HODGSON
SENIOR EDITORIAL STAFF

Photographs by LINDA BARTLETT

IN AUTUMN, when the oats are ripe, old men's scythes sweep whisper-sharp along the hills, laying down the heavy stalks for binding. John Hanifin shows me the trick of it—a swift turn of arm and wrist that ties each sheaf with a firm straw knot devised perhaps a thousand years before Druid or Christian set foot in Ireland.

Now his bright-cheeked face beams down from the summit of the stack, his soft Kerry voice a benediction on my aching muscles as I pitch up the sheaves to him. "Look at 'oo now! I think 'oo was born to it!"

We have worked through a sultry afternoon on the flank of Croaghskearda mountain, stopping only now and then to gauge the storm of rain standing in from Dingle Bay. Autumns are wet here, and farmers speak of saving the harvest, not of reaping. The weather holds. We start a final stack, laying the sheaves grain-inward on a fresh bed of fern and scarlet-blossomed wild fuchsia so that none will mildew against the earth. John loosely thatches the top with straw, then slides blithely down, his legs resilient as a lad's despite his 64 years.

"There, Bryan! The day is down! Come in with me to the house."

John and Nellie Hanifin live on the Dingle Peninsula, a 30-mile tongue of cloud-hung mountains and sea-scoured bays that juts into the Atlantic from County Kerry in southwest Ireland (map, page 555). Its western end is known officially as Kerry Gaeltacht, one of seven tiny enclaves within the republic where Irish is still the language of the home.

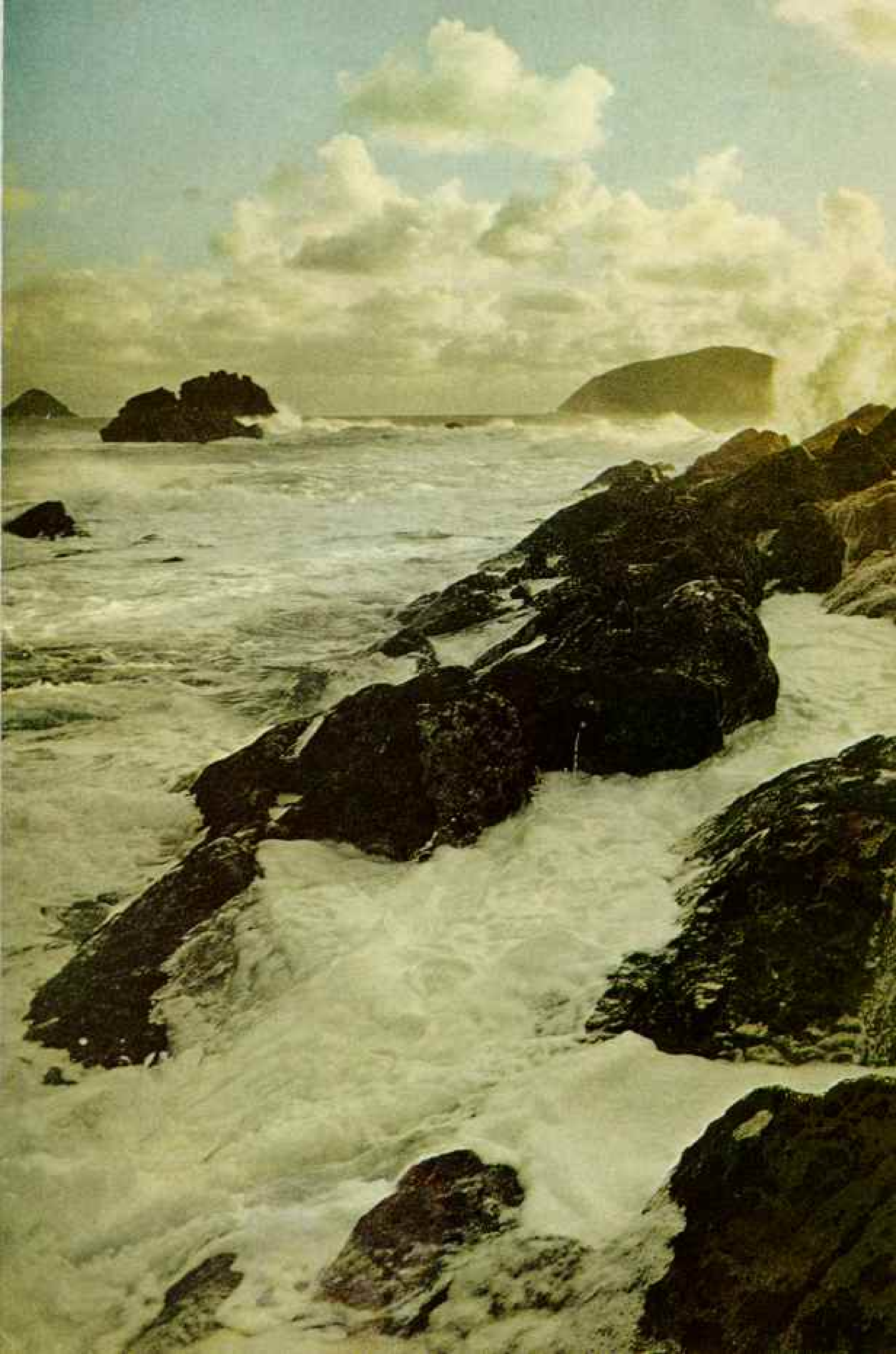
Irish speakers call the peninsula Corca Dhuibhne (Cork-a-GWEEN-eh), Seed of the Goddess, in memory of prehistoric tribesmen who so named themselves. Around its bays and headlands lie ancient ruined villages, and shrines that mark the age when Druid priests and Christian monks first met.

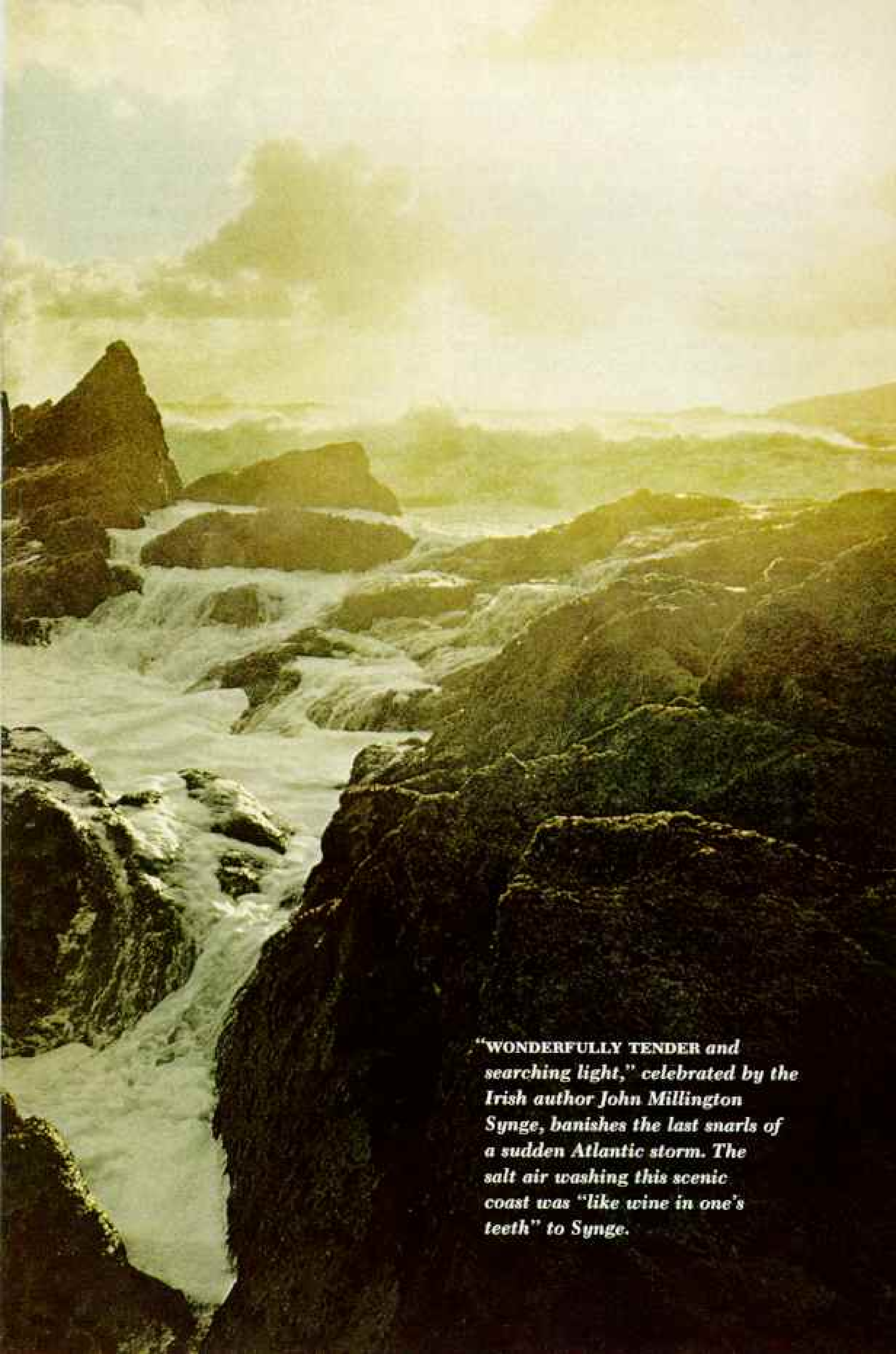
No shrines commemorate the bloodier meetings of English laws with Irish men, nor the century of exodus born of hope and hunger. To the later days when Irish men spilled Irish blood, no marker stands save silence—and headlines from the north.

"MY GREAT-GREAT-GRANDFATHER was John, and his son was Patrick. My grandfather was John, and my father James. I am John, and my son too, and our name was in the village before all of us, but how long I do not know."

John Hanifin sits easefully in the spotless kitchen while Nellie prepares tea. "Just a rough cup, out of your hand," she says, piling up slabs of fresh-baked soda bread and cake,

Rugged as the land he tills, John Hanifin stands with scythe and sharpening stone in his oat field on the Dingle Peninsula. Hearths here glow with peat fires and the Irish tongue is still spoken by many of the 9,000 inhabitants. But as modern influences invade the isolated peninsula, the survival of Irish traditions becomes uncertain.





"WONDERFULLY TENDER *and searching light," celebrated by the Irish author John Millington Synge, banishes the last snarls of a sudden Atlantic storm. The salt air washing this scenic coast was "like wine in one's teeth" to Synge.*

bringing out the crocks of fresh cream and butter and homemade blackberry jam.

"Those old ones, now, they knew the land, each place by name and what grew best there. They wasted not a grain nor straw, and never a thing they needed but they made themselves. When I was a lad, we'd thatch our roof with rushes from the bog, and a fine cozy roof it was in winter, in the floggin' rain. Once 'oo would hear the whir of the spinning wheel in every house. But no more.

"Times got bad. I had five sisters and a brother, and away they went to Dingle Town one after another to earn the cost of the road to America. Somebody had to stay, and I was the man.

"I am not sorry. 'Oo can live anywhere if 'oo like. I have the grass of 15 cows—about 30 acres, that'd be. I raise calves for market on their mother's milk, and I have 40 sheep on the mountain, on the common land. And my son, he has a fine trade as a boatbuilder, so he'll not be off to England for a job."

The gentle voice, touching each word with proper music and respect, stirs echoes in the summertime corners of my mind. I am an Irishman by half, for my mother was born in Cork, and I spent childhood holidays in West Clare, not far north. Brian Óg, Young Bryan, they called me then—and sometimes Brian Boru as well, an extravagant comparison with the 11th-century warrior of Munster who won the high kingship of Ireland.

THE IRISH WAY with English speech has haunted me since, with its half-wild, half-majestic cadences that seem to come from a world behind the one I know. But I heard no word of Irish then, and John Hanifin speaks it not at all. Only 70,000 people in all Ireland speak it as a native tongue today.

How, I wondered, had such disaster overcome a language that possessed a literature perhaps two centuries before English?

Pillars from the past tell of early Ireland, when Christianity came to its southwest corner. The fifth-century Reask Stone (**above**) marks the site of an ancient monastery near Ballyferriter. At Kilmalkedar a Celtic marker, or Ogham stone (**left**), rises before the 12th-century church. Early Irishmen sealed agreements by touching fingers through the holes in such "treaty stones."

It may have begun in the year 1014, when my namesake, Brian Boru, died at the Battle of Clontarf after shattering the Viking hold on Ireland. Never again was born a man strong enough to unify the nation. Anglo-Norman invaders came in 1169 to help settle an Irish power struggle. They stayed as conquerors, yet adopted the language and customs of the Irish kings. For 400 years they disputed the authority of the English throne.

In 1366 a parliamentary edict warned: "If any Englishman, or Irishman dwelling among the English, use Irish speech, he shall be attainted and his lands go to his lord till he undertake to adopt and use English."

The warning was ignored. In the 16th century an Irish poet wrote to his Anglo-Norman, now Anglo-Irish, lord: "The land of Ireland is swordland; let all men be challenged to show that there is any inheritance . . . except of conquest by dint of battle."

It was not a challenge, but a prophecy.

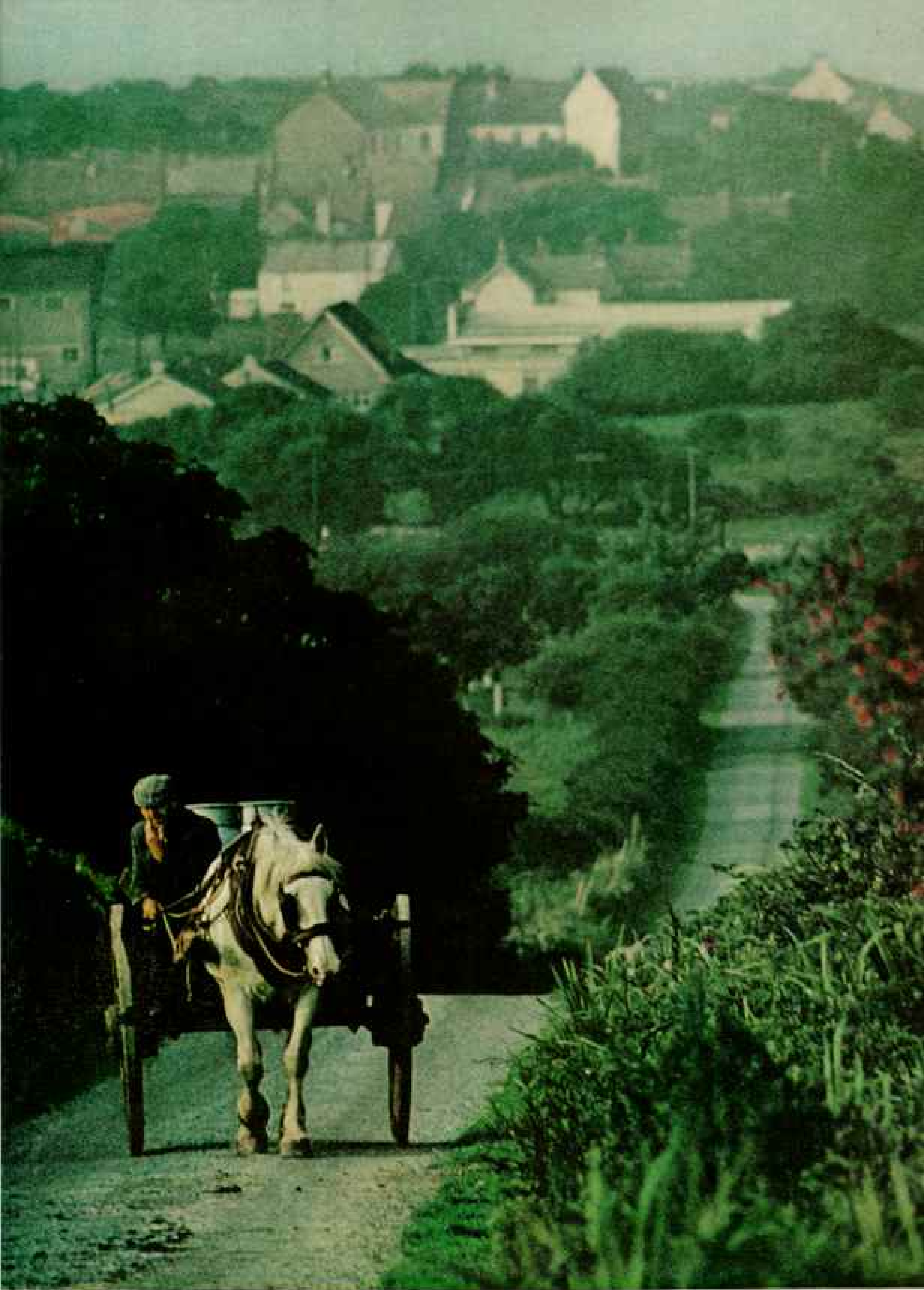
Henry VIII and later his formidable daughter, Elizabeth I, crushed the rebellious Irish Earls of Kildare and Desmond. Elizabeth's armies scourged the earth of Munster, killing all they found in their path.

The British poet Edmund Spenser, secretary to Elizabeth's commander, Lord Grey, described the survivors: "Out of every corner of the woods and glens they come creeping . . . like anatomies of death. . . ."

Corca Dhuibhne saw one of the bloodiest deeds of all. In November 1580 some 600 Spanish and Italian troops who had come to aid the Catholic Desmonds were besieged on a spit of land called Dún an Óir, the Fortress of Gold, and surrendered to Lord Grey. His report to Elizabeth was brief:

"I sent streight certein gentlemen in to see their weapons and armures layed down. . . . Then pute I in certeyn bands who streight fell to execution. There were 600 slayne. . . ."

Leader of the "certeyn bands" was Sir



Walter Raleigh, who received a grant of 40,000 acres in Ireland for his work.

During the next century Ireland was torn by rebellions and brutal repression. Irish culture and language began to drown in their own blood. The Irish lords were dispossessed and their poets were driven among the poor. A thousand-year heritage of metaphor and rhyme became the legacy of cottage storytellers. The language retreated to Ireland's ragged western edge, where land and people were too poor to merit further conquest.

IN DUNQUIN, the westernmost town in Ireland, my wife, Linda, and I begin our Irish education with a prayer.

"Dia's Muire dhuit—God and Mary be with you," says Micheál Ó Duláine.

"Dia's Muire dhuit agus Pádraig—God and Mary and Patrick," I reply, and the schoolchildren laugh to hear the English cramp in my tongue.

"Never mind. My own Irish had them giggling when I first came," says Micheál. He is the teacher at St. Gobnet's National School in Dunquin. The simple two-room schoolhouse looks very little like a battleground, and Micheál seems an unlikely warrior (pages 558-9). But for more than two years a struggle swirled around St. Gobnet's that roused all Ireland's attention to the precarious plight of the Irish language.

It began in 1970 when the government closed Dunquin's school and ordered the 20 remaining students bused to Ballyferriter. "There was great anger," says Micheál. "Dunquin people have some of the purest Irish in the country. Why not bring pupils in to get the language, they asked, and never mind sending their own children away! They set out to keep the school open privately. I came from Kildare to volunteer as a teacher."

Gaeltacht protesters marched to Dublin, and staged a sit-in at the Irish parliament. Police charged at them and carried Micheál and other leaders off to jail.

"It created great furor. People didn't fancy seeing Irishmen getting beaten for defending the language. And at the trial we refused to speak English, so they had to translate for the judge. It brought out the fact that Irish isn't quite an 'official' language. They say it is the 'soul of Ireland,' but we're having trouble keeping soul and body together!"

A new government gained power in 1973. One of its first acts was to reopen the Dunquin school. Micheál was named teacher.

"Now parents around the country send children at their own expense, to live with the local people and study here, just to get the Irish," he says. "And we're testing a program of scholarships to bring whole classes for a month from other schools around the country, teachers and all!"

As he speaks, a happy roar comes from the other room, where 30 Dublin youngsters chant a lesson I cannot understand.

In the evening, Micheál's gentle wife, Áine, gives us an Irish lesson delightful to the tongue—*brotchán foltchep*, a delicious soup of leeks, oatmeal, and milk. There is also roast chicken served with fresh-picked mushrooms, and cottage cheese made of milk curdled with nettle juice. Primrose wine adds a golden touch of spring.

The soup and cottage cheese recipes are probably prehistoric, for oats and milk were staple foods in Bronze Age Ireland; in early Christian times St. Patrick himself reportedly blessed the leek, and St. Colmcille took particular pleasure in nettles for flavoring.

"The potato didn't get here until the 17th century," says Micheál. "Some say it was Sir Walter Raleigh that brought it here. But there's few who'll believe he brought anything but misery. Mothers still scare their children with 'Raleigh's to ye!' Memories are long where people speak Irish, and there are some here, the Blasket Island people, who have no other tongue."

THE BLACK CANOES crouch like beetles at the foot of Dunquin cliff. The sea shimmers in the first sun of morning, and Seáinin O'Sullivan smiles. The day is good; we will go to the Great Blasket Island.

Four of us crawl beneath one of the upturned *naomhógs*, as the canoes of lath and

Homeward bound, a farmer leaves Dingle after his morning delivery to the creamery. Nine out of ten of the area's farmers maintain small dairy herds, averaging 12 animals. To supplement meager earnings from their cows, many farmers hold part-time jobs.

Keeping their language alive, Micheál Ó Duláine's students speak only Irish at St. Gobnet's National School in Dunquin. At other public schools in English-speaking Ireland, students like Pádraig Sullivan of Ballydavid (**left**) still must study Irish, but no longer need master it to graduate.

Only 70,000 native speakers remain in Ireland, most living in the Gaeltacht, a small group of Irish-speaking areas including part of the Dingle Peninsula. Interest in preserving Irish has led to the opening of several schools in the Gaeltacht for adults and children from throughout Ireland.

tarred canvas are called here. We lurch upright and plod in step to the launching place. Afloat, our grotesque burden is suddenly light and graceful as a cormorant's quill.

Seáinín's brother Pádraig hands down three pairs of oars to neighbor Eddie Campion. Linda and I take our ease in the stern, and the three men set their backs into the 2½-mile journey to the island.

For the brothers it is a voyage home. They are Blasket men by birth. As children they learned no English. Declining population forced evacuation of the island 23 years ago, but they have felt no need to learn it since.

For many years scholars visited the island to study Irish. Their interest prompted authorship by islanders of four of the best-loved books in modern Irish—*The Islandman*, by Tomás Ó Crohan, *An Old Woman's Reflections* and *Peig*, by Peig Sayers, and *Twenty Years A-Growing*, by Maurice O'Sullivan.

WE CLIMB to the ruined village across fields grazed garden-smooth by island sheep. Rabbits leap indignantly away, and we are left in sunlight amid memories.

Long ago, at one of these empty hearths, Peig Sayers told of a young girl who "made honey in her heart" for her beloved, and how another was "in a hundred pieces" about him. In the lonelier days of old age, when most of the young islanders were gone, she remembered how "we helped each other and lived in the shelter of each other.... Friendship was the fastest root in our hearts."

Pádraig brings icy water from the spring, and we produce ham and a plump loaf of soda bread baked for us by Máire Guiheen Kavanagh, another islander living in Dunquin. "There's no bread like that baked in an iron pot over the fire," she had said, and we feast on the truth of it.

Seáinín beckons us then, and we visit the White Strand, blinding in the sun, and Seal Cove, whose pebbled beach tells the ocean's endless litany. Nearby is the Mournful Slope, named so by 16 island women who watched dreadfully as their men drowned when a sudden squall engulfed the canoes.

The wind freshens as we return to Dunquin. We land and climb the steep cliff path. On the Blasket, shadow drenches the ruined village. Sheep scattered on the shoulder of the hill wear the golden fleece of sunset.

Last parish before Boston: The Bay of Coumeenoole washes the final spit of Irish land that emigrants glimpse on departing by air for the promise of America. Paddy Fitzgerald made the trip by sea in 1922. He returned in 1930, resumed farming, and now lives with his wife, Eileen (**facing page**), in a house near the bay. Most who leave, however, don't return, posing the greatest problem facing the Dingle Peninsula and other rural areas—the loss of their youth. Ethna Carbery told of the exodus that sprang from hardship and suffering in the 1840's, the decade of the potato famine:

> *They are going, shy-eyed* cailins, *and*
> *lads so straight and tall,*
> *From the purple peaks of Kerry, from*
> *the crags of wild Imaal,*
> *From the greening plains of Mayo,*
> *and the glens of Donegal.*

Now most emigrants from Dingle go to England or other parts of Ireland, rather than to the United States. Money sent home by sons and daughters has long played an important role in the rural economy.

Hole in the wall solves a big problem for Seáinín O'Sullivan as he fashions lath and tarred canvas into a *naomhóg*, traditional "canoe" of Great Blasket Island fishermen. His brother Pádraig and a friend visit the island (**facing page**), their home until the government resettled its few residents 23 years ago. The O'Sullivans still run sheep on the small island.

Seáinín brings us to the bachelor cottage he shares with Pádraig and an older brother, Micheál. In the flickering light of a turf fire he takes down an old fiddle from the mantel and plays the *port na bpúcaí*, the "fairy music" of Inishvickillane. Legend says the tune, like the soft sighing of night wind, is the funeral song of spirits gone to bury one of their own on the island. Ireland's fairies are not immortal, but weep and mourn and die as humans do.

The music recalls a sound that emptied me of ease at the hearth of Máire Kavanagh. The restless figure of an ancient cat moved to the fire, seeking comfort against the bitter edges and corners of old age. He moved too close, felt pain, and uttered one thin mournful cry, betrayed in life by his too long living of it.

NO SPIRITS MOURN at the Stone of Reask, which marks the site of an ancient monastery near Ballyferriter (page 554). But as I gaze at the gaunt monolith, with its Greek cross carved like a fossil flower atop a net of abstract spirals, the sun's slant turns spirals into eyes, and suddenly I glimpse the death's head worshiped by the ancient ones of Ireland.

Perhaps the artist who carved it some 1,500 years ago purposely combined Christian symbol with pagan design. Reask was a holy place in the earliest days of Ireland's Christianity, and the stone stands like a challenge to the *gallauns*, the holy pillars of the Druids, which still stand nearby.

Reask was almost certainly a meeting ground between early monks and the Druids, whose sacred task was to preserve the unwritten law and legend of the Celts.

Such meetings through the fifth and sixth centuries bore fruit. Irishmen learned Latin, and used its alphabet to make a written language that glittered with the storyteller's art. Converts brought the same talent to Christianity. For six centuries Irish monks were famed throughout Europe for the rigor of their training and the vigor of their tongues.

The Irish scholars continued the tradition of the *filid*—a caste of learned seers honored in Ireland for a thousand years.

Doncha Ó Conchúir is something of a *fili* himself. He is a teacher at Ballyferriter school, and his recently published book, *Corca Dhuibhne*, which presents a detailed study of

the peninsula's archeology and history, is one of the few works of modern scholarship to be printed exclusively in Irish.

"Students of the language should have something to chew on besides old tales," he says. "And we should not have to study the history of our own land in a foreign tongue."

Doncha is too charitable a man and too conscientious a scholar to abandon me to my monoglot ignorance. He teaches me the language of stone and sets me on the way.

Near Reask, I enter the Gallarus Oratory, a small chapel shaped like an overturned boat. Its unmortared stone walls have stood against Atlantic storms for more than a thousand years. The early monks built many such cells and chapels on Corca Dhuibhne's islands, cliffs, and mountaintops. Certainly they felt closer to God on that wild seacoast. Perhaps their faith gave birth to the proverb that says, "Heaven lies in the west, a foot and a half above the head of a man."

Thanks to the government, Lizzie Ashe has a pension to live on and a slate roof to sleep under. Grants improve housing but change the face of the countryside; few thatched cottages remain on the peninsula.

Inside Lizzie's home, life goes on as usual —without plumbing or electricity. On the walls hang three pictures: Jesus Christ, John F. Kennedy, and her cousin Thomas Ashe, a hero of the 1916 Easter Rising that helped win Irish independence. In another home, soda bread marked with the traditional cross warms over a peat fire (**below**).

Monks produced the first written Irish poetry. With a Celt's eye for worldly beauty, one of them wrote:

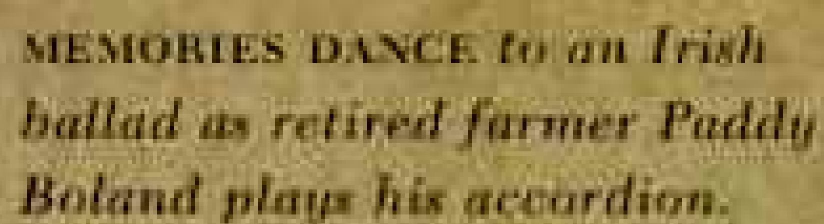
Let us adore the Lord,
Maker of wondrous things,
Great bright Heaven with its angels,
And on earth the white-waved sea.

And another, taking a spur-of-the-moment holiday from scholarship in the ninth century, wrote this beguiling verse in Irish on one of the pages of his weighty work:

I and Pangur Bán my cat,
'Tis a like task we are at:
Hunting mice is his delight,
Hunting words I sit all night.

It pleases me to think that Gallarus, too, may have been the cheerier for a cat.

A mile away in the graveyard of the ruined 12th-century church of Kilmalkedar, I find a pillar of stone cut with the codelike lines of



MEMORIES DANCE *to an Irish ballad as retired farmer Paddy Boland plays his accordion.*

The Irish Land Commission helps men like Paddy either to continue farming or to retire "with dignity and guaranteed financial security." Consolidating the peninsula's patchwork of tiny fields into larger, more productive tracts, the commission also helps introduce modern equipment and techniques.

Ogham script, probably Latin-based, the earliest alphabet of the Celts (page 554). Nearby a huge cross battered crudely from a slab of stone leans toward a plaster Madonna. At the base is a jar of plastic flowers. The grass whispers, and centuries blur and blend.

BUT IT IS NOW, of this moment, that the old accordion squawks and puffs like an orchestra of elves, and Paddy Boland is a concertmaster (preceding page). His blunt fingers tap out hornpipes and marches on the worn keys, his foot marking time and his eyes turned sidelong down the years. "The Laddo From Cork," he plays, and "Bold Thady Quill," and the room dances with memories.

Paudie would dance too, if he were not too shy, and too caught up in the magic of his grandfather's skill. He is 5, and Paddy 72, and they are at the two ends of a great friendship.

Paudie's father, Micheál, is 39. Five years ago he quit his construction job in England and returned with his wife, Kathleen, and daughter, Eileen, 7, to the family farm at Coumaleague, near Ventry.

"There's good money in Birmingham," he says. "But it's no place to be raising children."

His return is something of a phenomenon. Since 1946 more than a million Irish men and women have sought employment overseas. The Gaeltacht—the Irish-speaking enclaves —have suffered a 4.5 percent annual population loss, mostly among the young. Some 20 percent of the remaining males are bachelors,

and men over 18 outnumber women 3 to 1.

Since 1956 the Department of the Gaeltacht has tried to stem the loss by establishing handcraft industries and offering cash grants and tax benefits to investors willing to set up industries. In Dingle Belgians own a lucrative trout farm, whose packinghouse also buys and ships the daily catch of the local fishermen's cooperative. An American-owned computer center employs 65 local people to process magazine subscriptions. Two government-financed hotels and several guesthouses cater to a growing tourist trade.

But subsistence farming is still the main occupation in Corca Dhuibhne. Like most farmers, Micheál Boland hand-milks his small herd twice daily; he drives his pony cart three miles each morning to the creamery and back. He will net between £1,000 and £1,500 ($2,000 to $3,000) in a good year, plus cash from his small flock of sheep. Inflation has bitten deep—Ireland has one of the highest rates in Europe, coupled with low average earnings.

Things will get better, Micheál says. But lately his eyes don't quite agree.

Paddy Boland ends his concert. He and Paudie go out to the field. It is never too soon for a boy to learn about cows.

FIFTEEN CENTURIES before Christ, Irishmen built "beehive" dwellings of stone called *clocháns*. Hundreds of the structures remain clustered on the shoulders

"'**Twas a fair price,**" says Patsy Fitzgerald with a twinkle (**above**). "There'll be a pound each for the lads and a glass of whiskey for me." He had walked with his sons from Kilcooly, eight miles, to sell three calves at the Dingle livestock fair. Buyers (**left**) lead away a ram.

of Slea Head at Coumeenoole and at Fahan.

"Most date anywhere from the Bronze Age to Cromwell's time," says Doncha Ó Conchúir, the Ballyferriter schoolteacher who has become my pedagogue again. "Each community had good land, called the infield, which was sown to grain in spring. After harvest cattle were brought down from the rough pasture to graze and manure the grainfields."

Doncha's interest in the ancient cooperative system is more than academic. Besides his roles as schoolteacher and author, he is chairman of Comharchumann Forbartha, a farm cooperative financed jointly by the government and by 800 farmer-shareholders.

Since 1967 the cooperative has built community halls, created some 3,000 acres of new pasture from useless bog, and established profitable Irish-language courses for summer students. Last year saw the first crop of tomato plants grown by specially trained local men in a $300,000 greenhouse overlooking Smerwick Harbour. Doncha is particularly proud that Irishmen, not foreigners, own and operate the project.

"We could be doing much more," he says. "It's all small farms here—30 to 40 acres, most of them—and half of those split up into two to five separate plots, making modern farming methods impossible."

But there is great resistance to change—and great fear lest one man benefit more than another by a new program.

Fragmented farms and village jealousies are rooted deep in Ireland's history. The old cooperative system decayed as population grew and new types of crops were planted.

The once-shared infields were divided. Each family jealously measured its portion of good land against poor. Confusion grew

Fog born of a still morning muffles Brandon Bay and obscures nearby

with the generations. A man might inherit 30 small plots of ground, or find himself with a farm 20 feet wide by half a mile long.

When English planters arrived in the 17th century to dispossess the Irish lords, farmers lost all rights to their ancestral fields. They reacted with hatred and violence to land consolidation and eviction of families. Their anger gave birth to the Land League in 1879 —the first truly unifying political movement in Ireland. In 1903 the farmers at last were able to own land.

Since 1922 the Irish Land Commission has worked to "re-stripe" villages, combining scattered plots into more-productive units. The process has been slowest in the Gaeltacht, where owners endlessly debate the merits of one plot over another. Time will bring a partial solution—half the farmers over 50 have no heirs to work the land.

"But the young will not wait around," Doncha says. "And when they go, the language goes with them. There's a good Irish proverb we should hear more often: *Fear na bó féin faoin a heirbeal.* Loosely translated, it means, 'The cow's owner must get under her tail to push her out of the bog.'

"And we're all in the bog if we can't learn from our own history and work together as those first Irish farmers did so long ago."

LONG BEFORE DAWN they come, cattle lurching and bellowing through darkened streets, men huddled deep in oilskins, and herd dogs stiff-legging past each other with one stern eye for duty and the other out for blood. It is cattle-fair day in Dingle, as it has been monthly since the town was founded as An Daingean, The Stronghold, around 1300.

Buyers keep gentlemen's hours. Well fed

Brandon Mountain, site of a chapel of St. Brendan the Navigator.

and town-clad, they drive from their hotel at sunrise, parking their Jaguars and Rovers near the small fleet of trucks that will carry their purchases to Cork and Tipperary and Tralee. With quick eyes and all-purpose faces, they step neatly in street shoes through the rich stew of mud and manure.

The bargaining, when it begins, is brutal. The first offer is an insult—refusal a curse. Buyers are aggrieved and arrogant by turns, farmers icy and aloof. Theatrics fade as chance is weighed with need, and the final offer, spoken quietly in the ear, is accepted with a stiff-faced nod.

And then, like partners in a play, buyer and seller step apart and exchange a mighty slap of hands.

I feel the shock myself—and the need for it. Such bargaining is combat of a kind, and the blow saves honor and restores respect. Soon, a modern auction mart will replace individual sales on the peninsula. But other, deeper changes are afoot.

In Dingle's many bars, tales of outrage and betrayal rise on a dark tide of stout. Prices are bad. One man has sold a calf for £1, and paid £1.50 for a chicken at the store. "Last year I got £80 for a calf, and today the calf wouldn't pay for the chicken," he says wonderingly. The "eejits" have triumphed again.

After a long night of empty nets, bone-weary fishermen console themselves with a pint of stout in Johnnie Frank Sullivan's Bar in Ballydavid. Fish processing and trout farming help rank the fishing industry among the area's most important.

Eejits is not an Irish word, but only "idiots" with an added dash of Irish bitters. It is spoken often in discussions of the European Economic Community, which granted membership to Ireland in 1973. Political leaders firmly believe that membership benefits—including 282 million dollars in direct agricultural subsidies from more-prosperous members—greatly outweigh the disturbances caused by international competition.

But small farmers, with little capital or flexibility, find it hard to take the long view.

"Intervention Beef, now, that's the problem," says John-Paul McDonnell, one of Corca Dhuibhne's major farmers. "The Common Market countries 'intervene' by buying beef to keep prices up. There's about 150,000 metric tons in storage right now. There's less demand for calves to fatten while there's a mountain of beef in surplus."

John-Paul owns 200 acres of pasture at Emlagh, near Reask, and the handsome 200-acre Lough Farm, his birthplace, overlooking Dingle Harbour. Almost single-handed, he manages a dairy herd of 90 cows, plus beef cattle and sheep. He has installed a modern milking parlor and silage feeding system.

But the most notable piece of equipment at Lough is a giant iron pot.

"THE SOUPER'S POT, we call it," said a villager. "Protestants owned Lough in the famine time. They would make soup out of fish, barnacles, Indian meal, or anything that was handy, and they'd dole out a plate of it to anyone who'd read a verse from their Bible. Some say they helped keep the language alive—their Bible was in Irish!"

Some say many lives were saved as well, but the awesome potato famine of 1845-1849 overwhelmed all charity.

The *práta* seemed a blessing when it was introduced in the 17th century. With milk and butter, it made a nourishing diet. A family of six could feed itself for a year on 1½ acres. Population grew an estimated 172 percent in 60 years, and by 1841 more than eight million people struggled to find work or land enough to live on. Hundreds of thousands sailed for the sweatshops of England or the slums of Boston or New York City.

When the potato blight struck, starvation and disease killed a million Irish people in five years. Another million emigrated. On Corca Dhuibhne 20 died each week, and as many fled. In 1841 more than 38,000 people lived on the peninsula. Some 9,000 live there now. Every year farmers conduct a routine memorial—they still must spray their crops against *Phytophthora infestans*, the fungus that caused the blight.

But they seldom speak of the Great Hunger. Like so many of Ireland's grievous memories, it seems to live in the moods of the land and sudden darkenings of the sky.

A THOUSAND CROWS fill the twilight with wings and voices like some vast black shattering of glass. Then, as by an order, they wheel and come to roost in Burnham Wood, claws locked on branches, heads buried under wings, silent as ancient sins.

We are silent too, chilled by the primeval echoes and trapped somehow in time. We have come on a pilgrimage of sorts, from the Holy Stone in Goat Street to the grounds of Burnham House, the graceful mansion that gazes across Dingle Harbour toward the town.

The stone is a rude lump, hollowed to catch the rain. In the days when Catholicism was a crime, legend tells, fugitive priests blessed the water for their parishioners.

At the bottom of the street the Protestant Church of St. James has lost its tower to age and neglect. A crumbling vault commemorates the family of Frederick Mullins, a British colonel who bought land near Dingle in 1666. His descendants built Burnham and ruled there as Lords of Ventry. Today it is a boarding school where young girls study lessons all in Irish. As we turn away, we hear the choir practicing for tomorrow's Mass. The hymn is to the Virgin. The distant voices seem filled with longing.

Later, in Tommy George's Bar near Ballydavid, we hear the longing note again. Micheál Ó Duláine sings for us one of the traditional Irish songs telling of pure love turned to ashes and regret:

You have taken east from me, and west;
You have taken before from me, and behind;
You have taken moon and sun from me,
And great my fear that you have
taken God from me.

Seáinín O'Sullivan is there too, and he plays a wild reel that brings four couples to the floor for a Kerry set. It is much like a square dance, with great flourishes of heel and toe. Partners challenge each other's eyes, and their energy charges the room until everyone is clapping and stamping his feet.

We salute each other then in pints of stout, with foam like spindrift and a bitter taste of charred malt.

"Sláinte mhaith," says Micheál. "Good health to you."

"Go raibh maith agat," I reply. "May it go well with you."

The evening is long, and the songs joyful and sad by turns. Irishmen drink not to forget, but to remember.

DÚN DO BHÉAL, the headline says—Your Mouth a Fortress. Below I read in English: "Silence saves lives. . . . Remember there's a war on." It is a warning, not a plea, and a great many Irishmen have suffered for ignoring it.

The man with the newspapers brings silence into the crowded bar. I am the only one to buy a copy of *An Phoblacht,* the underground tabloid of the Irish Republican Army's "Provisional" branch.

"He's already taken the collection this morning at the church gate," someone explains as the man leaves and the jovial Sunday chatter resumes. "He's just out to catch the sinners that missed Mass."

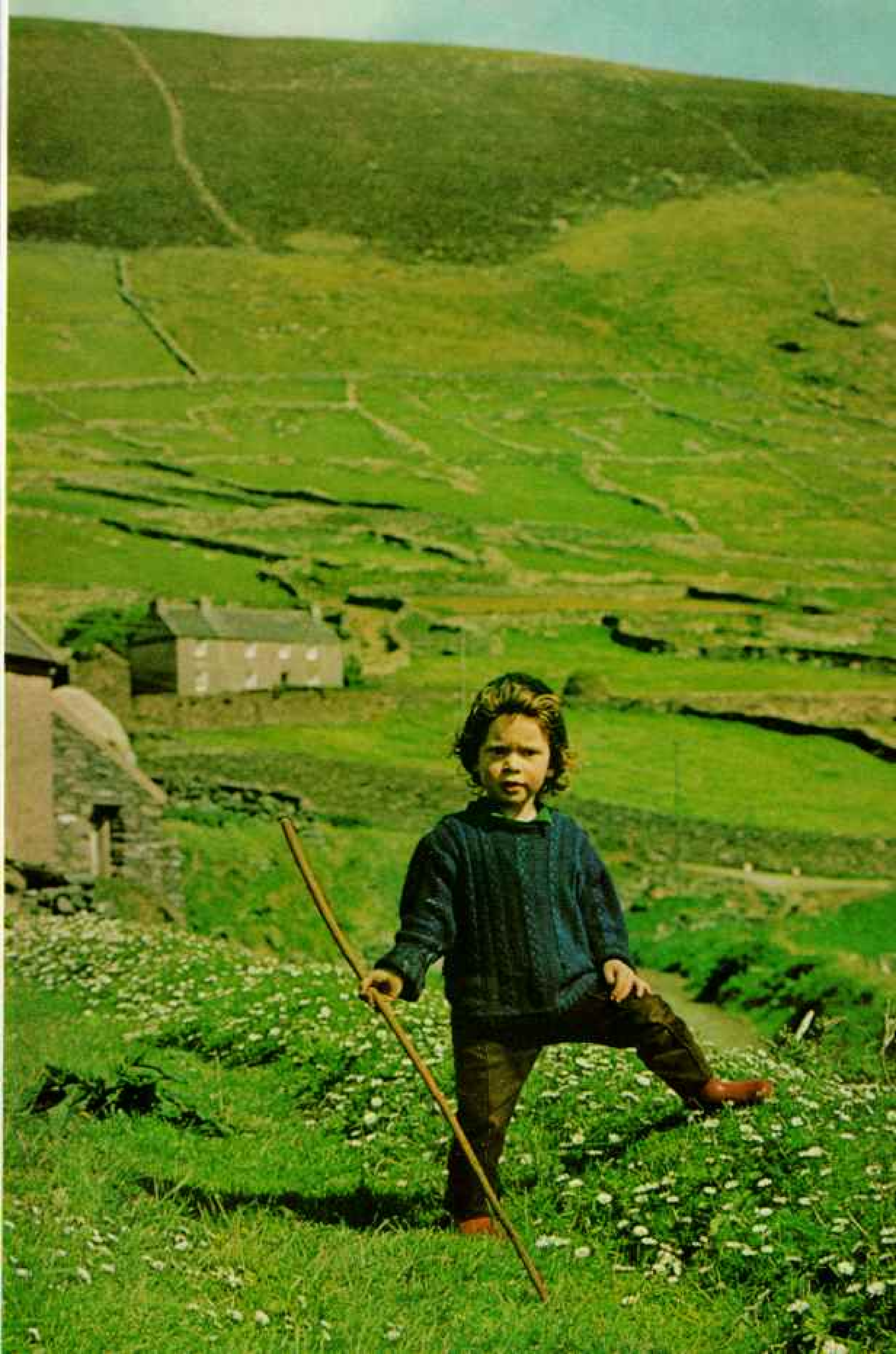
The war has been "on" for 60 years, as the I.R.A. reckons history. It began in 1916 when the British crushed the Easter Rising of the Irish Republican Brotherhood and executed 16 of its leaders.

A Corca Dhuibhne man, Thomas Ashe, became one of Ireland's greatest martyrs, fighting the only successful battle of the Rising, and then dying after a hunger strike in a British prison.

Five years of vicious guerrilla warfare followed. In the south more than 750 Irishmen and 600 Englishmen died. Riots killed 455 in the north, where dominant Protestant settlers had battled Catholics for 300 years.

A peace treaty brought independence for the 26 southern counties in 1921, leaving the six northern counties of Ulster still loyal to

Master of the meadows: By the time Christy Fitzgerald grows up, his future may lie not in farming or emigration, but in one of the industries lured to Dingle by government grants for factory construction. By attracting business to the countryside, Ireland aims to stem the centuries-long export of her young.



England. Voters endorsed the treaty three to one, but the Irish Republican Army swore never to accept partition of the land. Bloody civil war left 665 more Irish dead in 1922. More than 70 dissident leaders were executed by the new government.

The war was particularly savage in Kerry and Cork. Men were burned alive in Tralee. And Michael Collins, another hero of the Rising, was killed by the I.R.A. near his home.

Today the I.R.A. is torn by bitter disputes. The "official" wing condemns violence against unarmed civilians. But "Provos"—Provisionals—continue the bombing and assassination that have killed more than 1,000 civilians and 350 others since 1969.

One page of *An Phoblacht* carries a simple notice: "In proud memory of Volunteer Tony Ahern, Cork Command... who died for Ireland at Roslea, Co. Fermanagh, on May 10, 1973, aged 17 years...."

The war goes on. In public, men prefer to guard their tongues.

THE LAND OF THE YOUNG lies in the west. Tir na nÓg, the Irish legend called it. Brendan, the sixth-century navigator-saint of Ireland, sailed in search of it from Brandon Bay on Corca Dhuibhne. He may well have reached America. Stripped of mystic prattle added by later admirers, his logbook describes land and vegetation that can be matched along Columbus's route.

Since then many have left the bay for America. Villagers in Brandon and Cloghane boast more relatives in the Bronx or Springfield, Massachusetts, than they do next door.

Moira Normoyle is one of the few to make the round trip. She returned in 1970 to build a modern guesthouse. Now she dispenses hospitality to fortunate travelers with the aid of her four daughters, Anne, 11, Mary, 9, Brenda, 7, and Patricia, 6—a formidable collection of smiling Irish eyes that instantly steals this half-Irish heart away.

It is easy to see why Moira came home. The Bronx offers no such amenities as a view of Brandon Mountain, one of Ireland's highest at 3,127 feet. From our guesthouse window we watch the slow peregrinations of the tides, and see dawn's light turn mist to mystery (pages 570-71) while pony carts clatter past toward the creamery.

The small black car that whizzes by contains a successor to St. Brendan. Father Dennis Leahy, a curate of Castlegregory Parish, has worked five energetic years to reverse the twin declines of population and Irish speech. Recently, through his efforts, the Gaeltacht was officially enlarged to include the villages on Brandon Bay's western side. The new status means government funds for the self-help handcraft industries he started to give young people local jobs.

"It's time we worried about jobs and homes as well as souls," he says, and whizzes on.

At the head of the valley called Mullagh, we find Patrick Moriarty in a hurry too. He will talk to us if we don't mind going up the mountain with him after sheep. He is 82. Keeping up with him is hard enough, and I have little breath for talk. He relents, and we rest for a few minutes on the rocky hillside.

"The poorest land in Ireland," he says, "and the hardest living, too."

He is right. Perhaps it explains why his face seems hewn from that same rock. But he has a smile, as well, that forgives the land its barrenness and us our ignorance.

Farewells are difficult. We leave Corca Dhuibhne on a gray day. There is little pleasure in the journey.

But some days later, flying home, I recognize its shape below, each bay glittering in turn as the jet draws sunlight across Brandon and Dingle, Ventry and Smerwick, and Blasket Sound. Brandon Mountain seems an inconsiderable hill to have made my legs ache so, and the land itself too small to contain so large a world.

I watch the peninsula and islands recede and blend slowly into the haze.

Suddenly they are gone, and we fly westward over the eternal geography of sea and clouds that is the meeting ground of memory and expectation. □

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2

3

AL GIDDINGS

The guns have garlands in Truk Lagoon

EXPLORING A SUNKEN GARDEN. Dr. Sylvia Earle finds marine life abloom on a gun of a Japanese ship, one of dozens sunk in Truk Lagoon by U. S. warplanes in 1944. The marine biologist, who told GEOGRAPHIC readers in 1971 of her two-week sojourn in an undersea laboratory in the Caribbean, returns to our pages next month with photographer Al Giddings in a study of the Truk wrecks in the Pacific. Let your friends share such adventures. Nominate them for membership below.

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Polaroid

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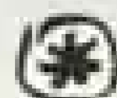

July 4, 1776

Thirteen Colonies — united in seeking freedom and justice — fifty-six patriots each determined that a new nation would that day be conceived — to be thereafter free to chart its own destiny.

The spirit, the atmosphere, the full embodiment of that historic era is recaptured in a series of thirteen paintings, each masterfully executed by the internationally famed artist, Charles Linnett of Boston. He recreates in an apt setting of that revolutionary period the high points and pivotal figures of each colony's contributions to the birth of our great nation.

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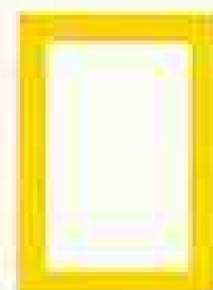

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According to EPA estimated mileage results, the Aspen wagon got 30 MPG on the highway and 18 city. The coupe and sedan got 27 MPG highway and 18 city. All were equipped with a 225 Six and manual transmission. (Your actual mileage depends on driving habits, condition of your car, and options. In California, see your Dealer for mileage results.)

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"For the first 12 months of use, any Chrysler Corporation Dealer will fix, without charge for parts or labor, any part of our 1976 passenger cars we supply (except tires) which proves defective in normal use, regardless of mileage." The owner is responsible for maintenance service such as changing filters and wiper blades.

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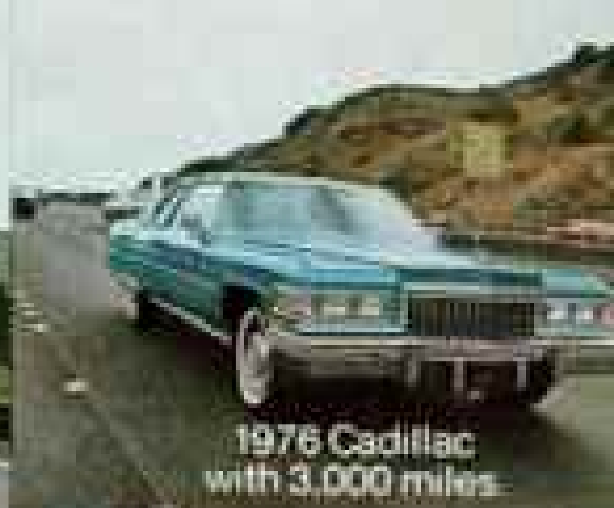

October 14, 1975. The Sausalito Handicap.
How did Lincoln Continental's ride hold up after 30,000 miles?

68 out of 100 Cadillac owners agree. A 1976 Lincoln Continental with 30,000 miles has a better ride than a new 1976 Cadillac.

There's only one way to find out how the riding quality of an automobile will hold up over 30,000 miles: drive it 30,000 miles and see for yourself.

We drove this 1976 Lincoln Continental 30,000 highway miles. Then an independent testing company set out to measure its ride against a very tough competitor—a brand-new Cadillac with just 3,000 break-in miles.

We called this unusual test the Sausalito Handicap.

One hundred Cadillac owners from the San Francisco area test-drove and test-rode both cars over the identical route.

And after 42 miles of highway driving and riding, 68 Cadillac owners out of 100 said the 1976 Lincoln Continental—the car with 30,000 miles—had a better ride than the brand-new Cadillac!

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NOTE TO PHYSICIANS:
The complete report mentioned above was published in the "Journal of The American Dietetic Association" Volume 62, February 1973.

With the world's oil and gas running low, where can we turn for energy? To coal? To uranium? What else? What energy sources offer the greatest near-term promise, the fewest problems?

Coal is already our leading source of electrical energy. Fortunately, it is abundant, readily available. We are researching ways to liquefy and gasify it affordably, to power cars, heat homes. True, burning coal can foul our air. Mining it—from both deep and surface mines can disrupt the land, can pollute our streams. But we are solving these problems. More complete solutions are being researched.

Meanwhile, some people see uranium as our most promising fuel. Nuclear plants do not pollute the air. They produce no noxious odors. The sites are clean. They have the potential to yield enormous energy from small quantities of fuel.

True, our nuclear history is short, the technology young, power awesome. But, present safety records are good, and safeguards elaborate. The risk so far seems acceptable.

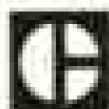
We should continue to apply and improve our nuclear technology: developing breeder reactors that could insure centuries of energy from known fuel reserves. That could consume present fission wastes. Ultimately we may unlock the limitless energy of fusion.

But realizing full nuclear potential will take time—more time than the world's known supply of oil and gas will allow. So we must continue to refine our coal technology. To develop affordable petroleum substitutes. To make coal cleaner, less disruptive. To buy time to research other energy forms: winds, tides, the sun, geothermal heat.

Coal may not be the ultimate solution. But it can keep things humming until that solution comes.

Caterpillar makes machines used in the development of energy, whatever the form.

There are no simple solutions. Only intelligent choices.



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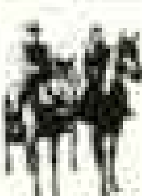

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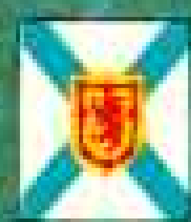

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