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New Orleans and Her River

MASTER PILOT Carroll Ware wore the open smile of a child as he reached overhead, closed his fingers around a worn wooden handle, and pulled down hard. A geyser of steam erupted from the half-moon mouth of the whistle and the *Delta Queen* (above) lifted her voice, the fabled voice of Mark Twain's "great Mississippi, the majestic, the magnificent Mississippi, rolling its mile-wide tide along, shining in the sun. . . ."

"Down New Orleans, they know what that sound means," said the pilot. "Steamboat comin'! The last one, but we're comin'!"

With the dignity of age, the 44-year-old *Queen* swung away from the levee at Vidalia, Louisiana, far upriver from New Orleans, where she had spent the night tied to willow trees. On the wing bridge, the voice of big Capt. Ernest Wagner boomed out:

"Hard right! Half ahead! Stick her stern in the eddy, and the river will pull us around."

With swifter tempo, the red stern wheel pounded into foaming hillocks behind us the snows and rains of a million square miles. We voyaged on a vast flood that has carried men south for centuries—Frenchmen with furs in birchbark canoes, swaggering "Kaintucks" in flatboats and keelboats stuffed with the bounty of a new land, captains and roustabouts on steamboats packed to the smokestacks with bales of cotton. Their destination was now mine: New Orleans, that city of Mediterranean mood where peoples of many cultures—French, Spanish, American, African—have created a singular way of life.

By JOSEPH JUDGE

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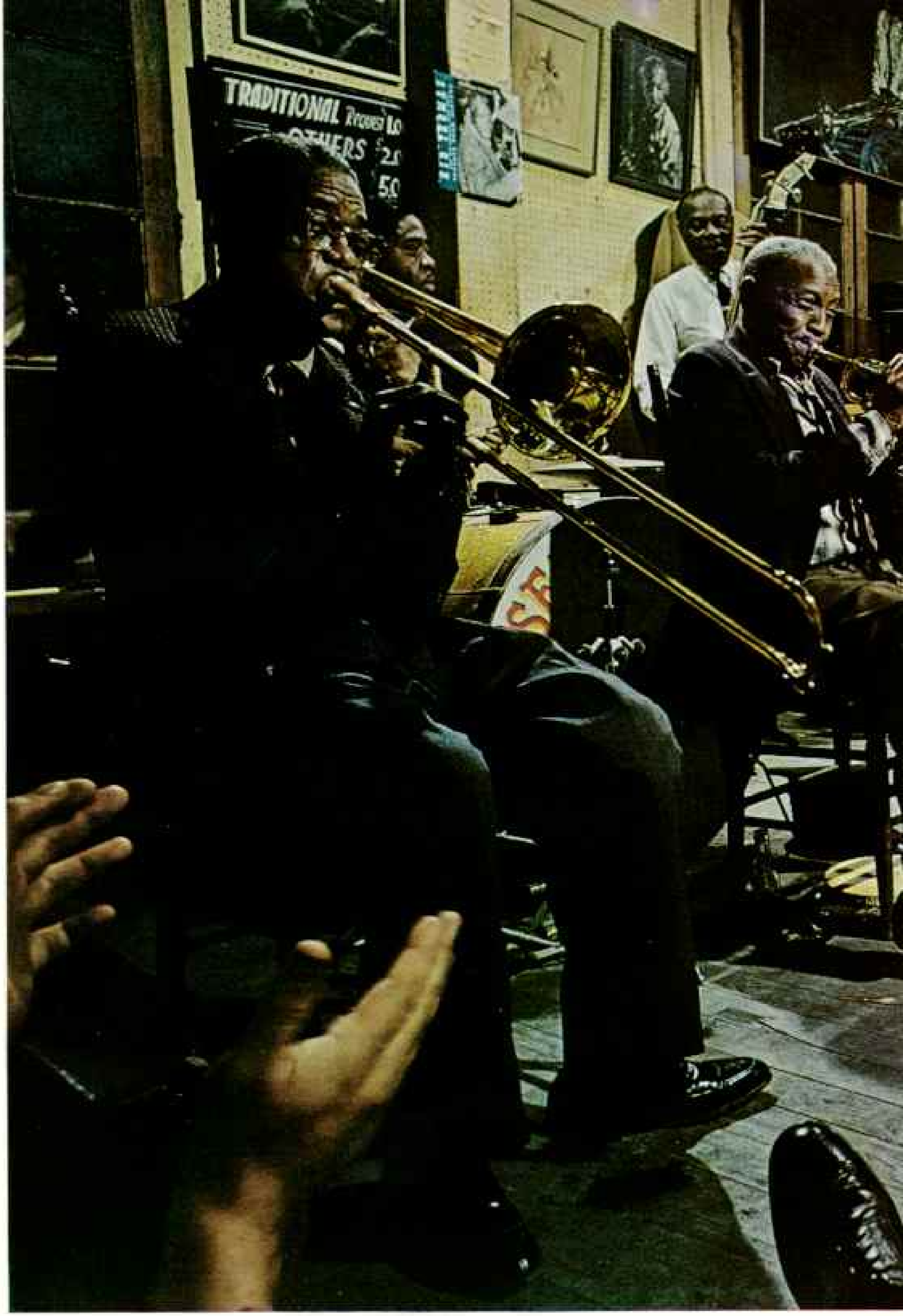


"Won't you come along with me, down the Mississippi. . . ." Clapping hands pick up the beat of traditional jazz at Preservation Hall in the French Quarter of New Orleans. A dollar bill dropped into a basket at the door buys admission,

KODACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JAMES L. STANFIELD (C) N.G.S.

and a soft-drink machine provides refreshments. This Saturday-night crowd fills benches and kitchen chairs and spills onto the floor to hear the band of trumpet man Kid Thomas Valentine. Portraits of jazz artists adorn the walls.

"We're the last one, all right," Captain Wagner said as he settled onto the padded bench of the pilothouse. "The last steamboat carrying overnight passengers on the Mississippi. And this looks like our last year. Because the *Queen* carries more than 50 people, she violates a 'safety-at-sea' law that requires all-metal construction for seagoing passenger ships. Seagoing! Tarnation, man, I can get to the levee in three minutes!"

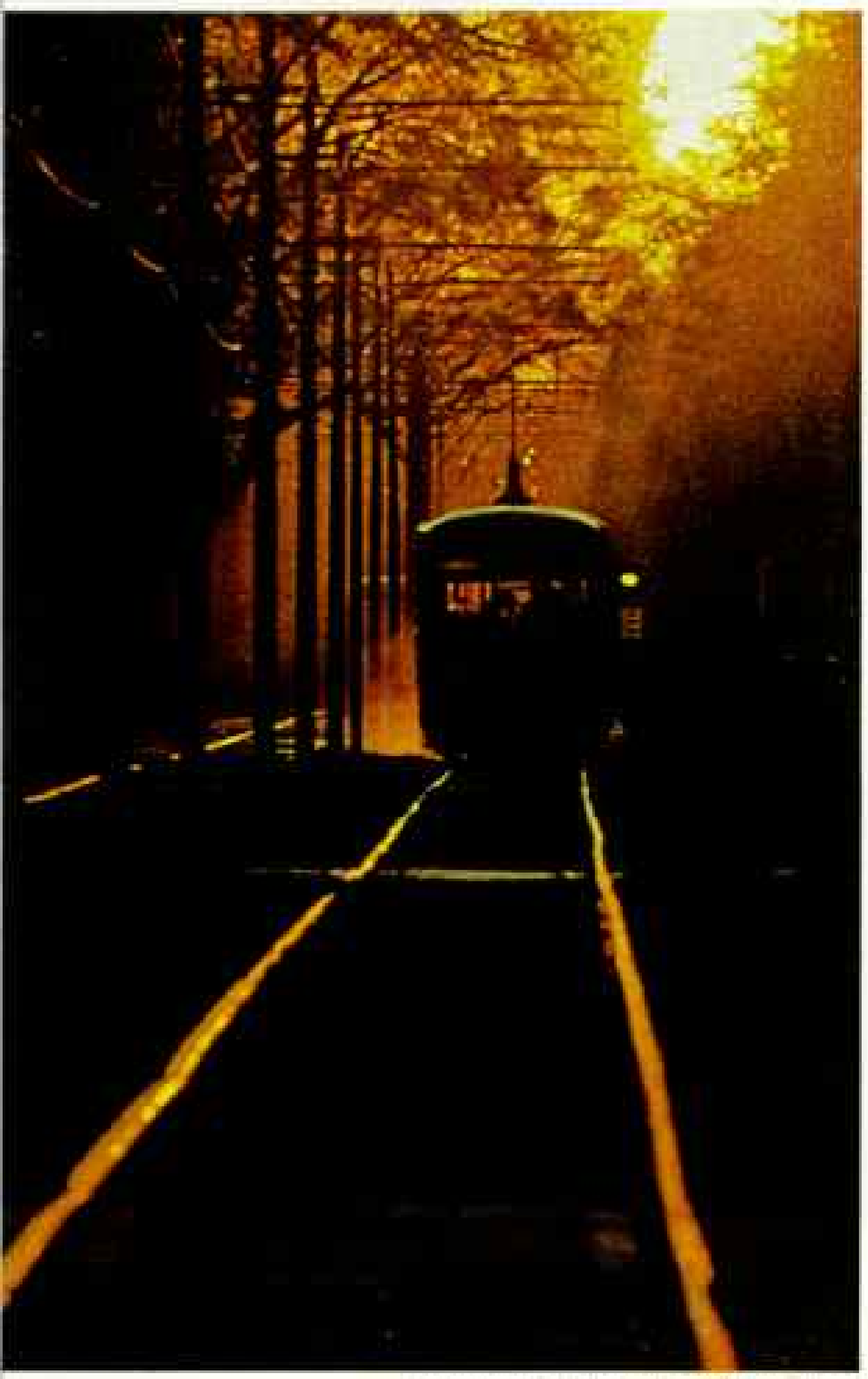
I was surprised to find Captain Ware conning the *Queen* by steel steering levers.

"I've seen those movies, too," he said. "The pilot with a cigar in his mouth whipping that big wooden wheel around with his little finger. Well, it took two or three men on the wheel of a boat like this. Stand in here."

I took his place and grasped the two levers.

"Push them right to turn right," Captain Ware said. "Head on that point yonder, and stay in your marks."

At first the *Queen* seemed to respond slowly,



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

almost sluggishly, to the pressure of amateur hands. I relaxed, tried to feel the steady rhythm of the river, and soon she was coming around gracefully, her bow sweeping grandly toward the heading.

"Feeble Voice" Claims a Majestic Realm

From our pilothouse, 54 feet above the water, we looked out on bracken and tangled woods, swirling eddies sucking at mudbanks, solemn marshes. Similar scenes must have unfolded for René Robert Cavelier, Sieur de La Salle, who reached the mouth of the river in 1682. There he planted a cross and gave a little speech; in historian Francis Parkman's phrase, the vast heartland of a great continent, the entire Mississippi Basin, was claimed for the King of France "by virtue of a feeble human voice, inaudible at half a mile."

Before us, the river swept out wide bends through a verdant country haunted with images of a romantic past. We slowed to half ahead and drifted past the live-oak allée of a plantation—a tunnel of perpetual green twilight with the glimmer of white columns at the end. Along this shore, the moonlight-and-magnolia dreams of old New Orleans were born, in grand houses with names like Uncle Sam and Nottoway and Evergreen, surrounded by miles of sugar cane.

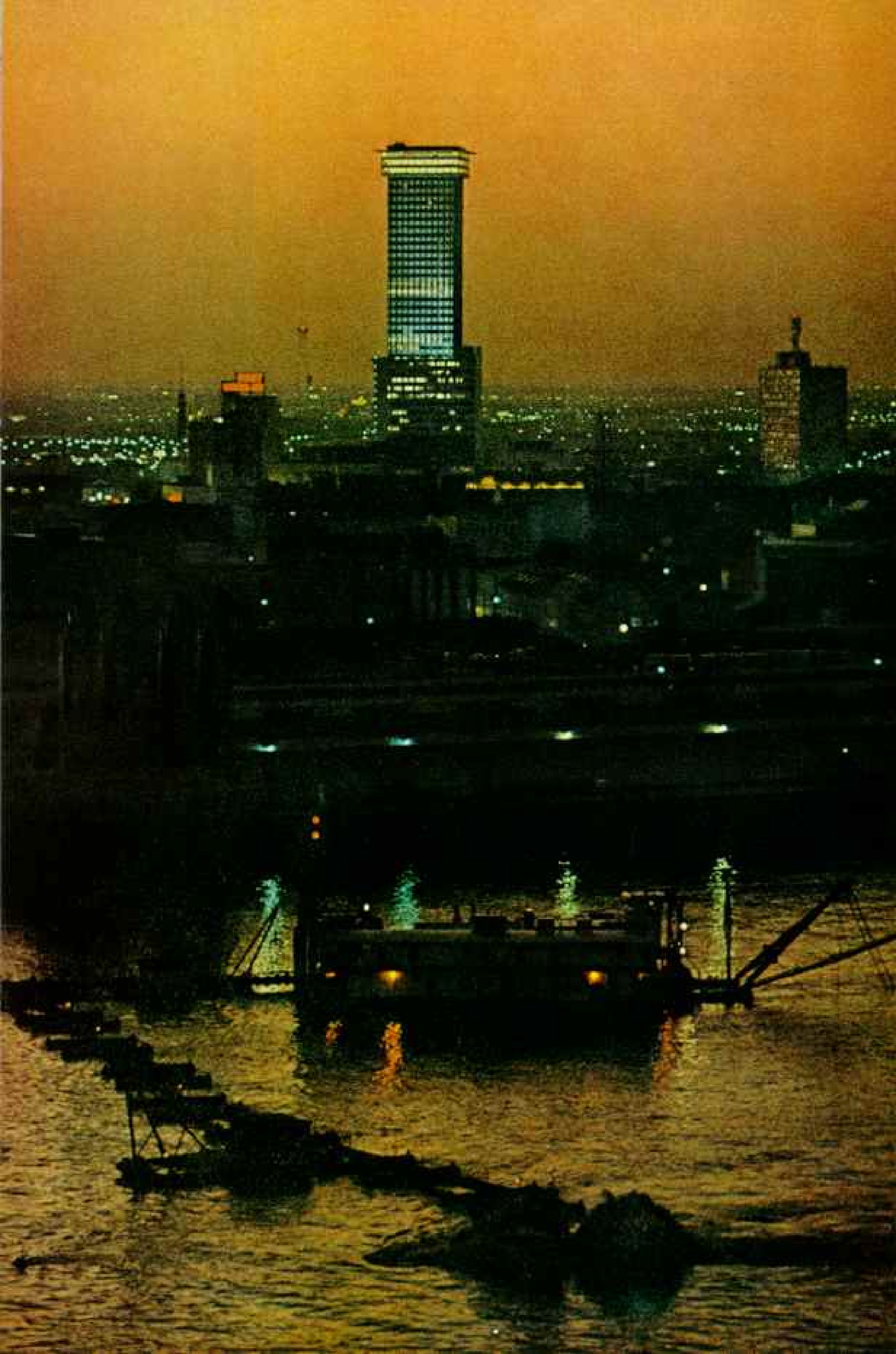
Sugar is still grown and refined, ranking only behind rice and soybeans in the list of Louisiana crops. But this delta country thrives today on oil and gas and the industries that use them. We proceeded downstream between a double rank of huge plants—Du Pont, Gulf Oil, Shell Oil, Union Carbide, Monsanto, American Cyanamid, Ethyl, Humble Oil, Reynolds Metals, Kaiser, Dow Chemical, Uniroyal, Texaco. . . .

"They call it the 'American Ruhr,'" Captain Wagner said. "It's grown up since the end of World War II."

The broad river turned south, then east,

Grande dame of the delta, New Orleans owes much of her charm to an exciting mix of old and new. Trolleys still clang along steel tracks on St. Charles Avenue, but the streetcar named Desire, made famous by playwright Tennessee Williams, is only a memory; a bus now runs that route.

Tallest of multiplying downtown skyscrapers, Plaza Tower, center, rises 45 floors. A dredge works into twilight on the Mississippi in the battle against silt that constantly threatens to choke the dock area.



as rafts of ducks scattered out of our way. On the horizon, steeples and towers sprang into view. We pounded on past miles of docks to the foot of Canal Street. There the last of the overnight steamboats gave its deep-throated landing whistle. Below decks, a voice rose above the din: "New Aaa-leens!"

And so I came last spring, as men and boats have come for 250 years, to renew a fond friendship with this dowager queen of cities.

"When Houston was a speck on Buffalo Bayou and Miami was an Indian trail," businessman Lloyd J. Cobb told me, "New Orleans had been a sophisticated, civilized port for more than a century. She knew opera and great cuisine and fashions and blooded horses and fine art and education and sin, and she was old enough and wise enough to understand all of them."

She still is. I found New Orleans the least changed of any great American city, with the least reason to change. Her stature has nothing to do with size (the metropolitan area population of 1,035,000 ranks only 28th in the country); it has to do, rather, with a state of mind. Consider:

When a famous restaurant, which looked like a barbershop, burned a few years ago, it was rebuilt to look like a barbershop.

"That," remarked a satisfied customer, "is civilization."

Social *Gumbo-Mêlé* Blends Juleps and Jazz

I lived in several places, but my favorite was a small inn on Toulouse Street, in the heart of the French Quarter, the Vieux Carré, or Old Square, that was the original city (lower map, page 158). It is still a hundred blocks of Europe in America, a grid of narrow streets in the lacy shade of ironwork balconies. The day began with steaming chicory coffee, served in the sunlight beside a splashing patio fountain, and ended to the wail of a jazz trumpet resounding from nearby Bourbon Street.

I soon discovered again all those things that create the city's unique ambience—warm air so soft it might have been washed in a rainbow; the rich odor of the wharves, seasoned with sugar, coffee, and bananas; the closeness of the blue sky, on which a majestic fleet of cumulus clouds runs before the gulf breeze; the worn look of weathered white clapboard houses, shaded by palm fronds, that stand on long avenues vanishing toward the horizon; terrain as flat as a figure in plane geometry.

I hunted up old friends and made new ones in the *gumbo-mêlé* that is New Orleans society, from the essential southern gentleman in the linen suit, cooling himself with a julep on a Garden District lawn, to the black jazzman with the hot lip eating red beans and Chaurice sausage at a restaurant called Buster's.

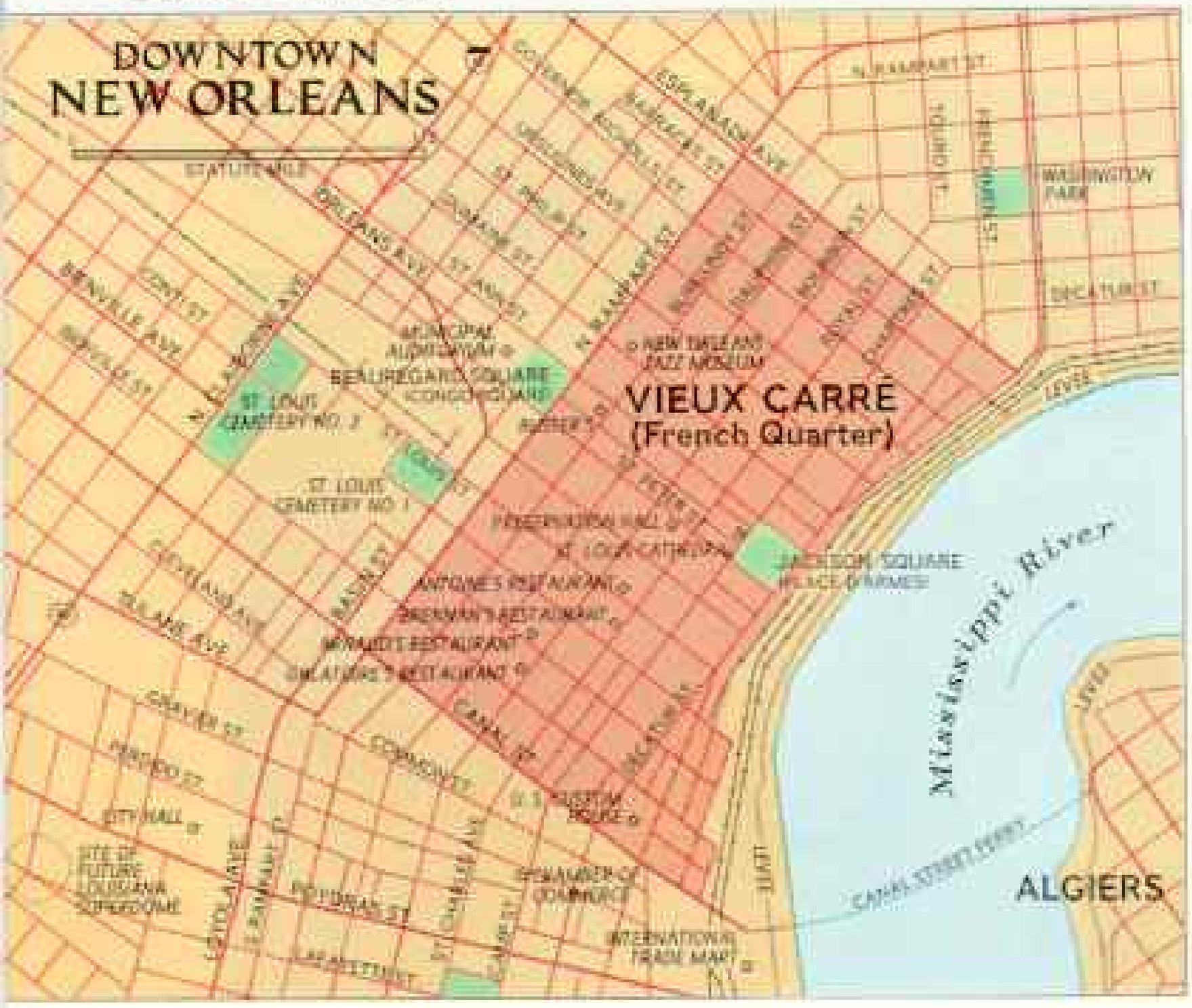
Piecing together the story of how New Orleans began, I considered the views of municipal engineer Herbert Swan: "This city stands where no city ought to be. Still, when those early Frenchmen came up the river, this was the first almost-dry spot they found."

When Pierre le Moyne, Sieur d'Iberville, led a small scouting party up the Mississippi in 1699, he paused long enough at the future site of New Orleans to kill a buffalo. It was 19 years before his younger brother, Jean Baptiste le Moyne, Sieur de Bienville, started to build a town near the Indian portage that ran from the river north to vast Lake Pontchartrain.

Mr. Swan showed me the whirring pumps at Pumping Station No. 6, one of 21 stations that constantly shove rain water out of

First black in 71 years to be elected to the Louisiana House of Representatives, Ernest "Dutch" Morial recently advanced another step: He became a juvenile-court judge, appointed by Governor John J. McKeithen. Here he holds an informal seminar at his alma mater, Xavier University.

Famed heart specialists, Dr. Alton Ochsner, foreground, and his son John head a clinic bearing their name, which treats some 88,000 patients annually. Dr. John specializes in open-heart surgery.



Ships line up on the Mississippi, awaiting berths in the city's vast complex of wharves. More than 4,500 vessels call annually at the port, second only to New York in the dollar value of its foreign commerce.

A French Canadian, Jean Baptiste le Moyne, Sieur de Bienville, in 1718 began a settlement here, named for the Duc d'Orléans, Regent of France. The river sweeps past in giant curves; one of them gives the metropolis its nickname: Crescent City.

runoff drains and into Lake Pontchartrain. At full power, the system could empty a lake three miles square and ten feet deep in a day.

I examined a profile of New Orleans. It looked like an empty pie pan; 122 miles of sharply raised levees—25 feet high on the river side and 10 feet high on the lake side—rimmed a flat expanse of land.

"Down here, we look *up* at the water," Herbert said, "since much of the city is below sea level. The levees keep the river and the lake out, but they also keep the rain in. And I mean it's rain—57 inches a year, and it comes down in intense showers, as much as an inch in five minutes. Every drop has to be pumped out. Before the pumps, people were born here with webbed feet."

During a history of floods, interspersed with plagues and fires, New Orleans has taught her children what author Harnett T. Kane* described as "a live-and-let-live attitude that drives you crazy and yet keeps you sane."

"It drives you crazy," said Mr. Kane, "at a time when urban expenditure is needed, to

*Mr. Kane wrote "New Orleans: Jambalaya on the Levee," for the February 1953 NATIONAL GEOGRAPHIC.

With a king-size splash, the *Joseph Hewes* slides into the Mississippi at the Avondale Shipyards, 10 miles upriver from New Orleans. The 438-foot-long destroyer escort honors a Revolutionary War patriot who, as a member of the Continental Congress, led in establishing the U. S. Navy. The craft goes in sideways to keep it near shore, away from shipping lanes.

With 10,500 workers, Avondale is the largest industrial employer in Louisiana. Horace Plaisance (above), a 22-year-old welder, helps construct freighters as well as military vessels.

find that property taxes, even on mansions, can be so insignificant as to be invisible. A home worth well over $100,000 might be assessed at $4,000.

"But it keeps you sane to find life so enjoyable. When a New Orleanian dines at Antoine's, for example, he wouldn't think of simply reserving a table. He calls 'his' waiter, who meets the party at the back door and escorts them to a private dining room."

The city's clannishness began when the French revolted against the rule of the Spaniards, and continued when their mutual descendants, the Creoles, turned their backs on the Americans who poured in after the Louisiana Purchase of 1803.

Power Passes to the "Kaintucks"

The Creole gentleman looked upon the roughneck, profit-seeking men from Kentucky and Tennessee and Missouri with contempt. He called them all "Kaintucks," mused over his French newspaper while sipping wine in the shade of his patio, went to the opera—and lost his city to the aggressive newcomers.

The Americans observed the Creole's

cuisine, which included frog legs, and derisively labeled him "Johnny Crapaud—Johnny Toad." Canal Street became a no man's land as newcomers hustled uptown and built "the American side," leaving the Vieux Carré to Johnny C. and his memories.

"I suppose I am among the last of the Creoles, that is, the last of those who still speak the French—New Orleans style, of course," Sidney Villeré said as we strolled the narrow streets of the Quarter. Sidney's family, seven generations in New Orleans, includes the state's second governor and a latter-day daughter who referred to her banker husband as "the American I married."

"On a summer morning, when I was a boy," Sidney said, "how quiet the streets of this old city were! The watermelon man would come along, pushing a cart and calling, 'Red to the rind! Redtotherind!' And the chimney sweeps in their top hats and used evening clothes. There was grace and charm and culture in that old way of life, and now. . . ." He swept his arm toward the thin slice of skyline visible between the balconies of Royal Street. ". . . A gumbo-mêlé. A mixture of every conceivable kind of person and society, all spooned up together. But before long, one will be missing. The Creoles say, *'Creoles pas mouri, li dessé-ché*—Creoles don't die, they dry up.' We are finally about to dry up."

Of course, they never will. Just as their words are embedded forever in the language, so their traditions of gaiety and love of pleasure, of superb cuisine, of Catholic devotion, of chauvinism and clannishness, all survive and flourish and set New Orleans apart from any other American city.

Above-ground Tombs Never Fill Up

I said goodbye to Mr. Villeré and went to call on the earliest Creoles, resting now these many years in New Orleans's famous "cities of the dead." A visitor once described a funeral

KODACHROME (LEFT) BY JAMES A. SUGAR; KODACHROME (ABOVE) AND EKTACHROME BY JAMES L. STANFIELD © N.G.S.

as "the bailing out of the grave, the floating of the coffin. . . ." They solved the problem by burial in above-ground tombs.

"Buddy" Anspacher, the custodian of St. Louis Cemetery No. 1 for 44 years, was sitting in the shade of a camphor tree when I stepped through the iron gate on Basin Street. "This cemetery has been here for nearly 200 years," he told me. "It's never been closed and it's never been full."

I soon discovered why St. Louis No. 1 has never been out of use. Most of the tombs that huddle together along little lanes have multiple vaults, which gives the place the odd appearance of being made of dozens of plaster filing cabinets. The vaults are used time and again as older burials are pushed to the rear. The bones spill down a shaft and the tomb is ready for the next generation.

When the grounds were enclosed, the wall itself became a cemetery, a hive of vaults called "ovens." One purchased for $60 in the

"When the saints go marching in. . . ." Famed trumpeter Al Hirt leads a rousing rendition of the jazz favorite at half time of a New Orleans Saints game. Part owner of the professional football team, Hirt also owns a Bourbon Street night club where he frequently performs.

Unfortunately, the Saints squad gave 77,000 spectators little to cheer about in their opener last September. Though rookie receiver Ken Burrough, No. 00, looked good (top), the hometowners lost to the Atlanta Falcons, 14 to 3, in Tulane Stadium—the Sugar Bowl. But in the next home game the Saints defeated the New York Giants, 14 to 10, and joy reigned in the stands (above left).

18th century might still be used by descendants of the original owners. Perhaps 100,000 or more have occupied, by turns, the tombs of St. Louis No. 1 and No. 2.

Between the cemeteries once stood Storyville, that infamous district of sirens and sin. New Orleans maintains a certain perverse pride in its scarlet past. I located one survivor of that era, Frank "Dude" Amacker. At 80 years, Dude looks as if he'd been carved from ebony—immaculate manicure, tailored suit, reflecting shoes. As a younger man he had been a "professor," or piano player, for "Countess" Willie V. Piazza, one of Storyville's notorious mulatto madams.

"The night that Lillian Smith stabbed Clerk Wade, I remember it like yesterday," Dude told me. "I was right there, playin' the piano. She was a jealous woman, and he was a wanderin' man. So she took herself a knife and put it in his heart. Then she put her foot on his chest and sang a song."

"Do you still remember the song she sang?"

"Sho. 'It's a Long Way to Tipperary.'"

"Tipperary? Are you kidding?"

"No. I s'pose it's the only one she knew. The only one that had any punch to it, know what I mean?"

Out of such colorful events are folk tales spun, and passed into the heritage, emerging as "Frankie and Johnny" or "C. C. Rider" or "St. James Infirmary," music sprung from the desperate lives of real people.

Trolley Clangs Into the Past

Old-time residents still call the hours after noon "evening," and it somehow made the day seem lovelier, especially when I rode the St. Charles Avenue streetcar at three o'clock in the evening (page 154). The car rocked along in the shade of trees toward Audubon Park, skirting the ante bellum homes of the Garden District. I often got off at Napoleon Avenue and walked to Manale's, where New Orleanians begin dinner by huddling at an oyster bar. Sometimes I rode on to the park, where city fathers had built a 15-foot hill to show the kids what one looked like.

On many an evening I wandered over to Jackson Square. I remember one particularly

Beat-the-heat parlay: Ice-cream bar and a bare midriff help a stroller keep cool as she shops for sidewalk art on Jackson Square, heart of the French Quarter. Called Place d'Armes when the French ruled, the park was renamed for Maj. Gen. Andrew Jackson, hero of the Battle of New Orleans.

Montmartre on the Mississippi: Long a magnet for painters and sculptors, New Orleans takes pride in the nickname. This artist sketches a visitor from India near the towers of St. Louis Cathedral.

Classic decor of the Deep South, live oaks and Spanish moss canopy boaters in City Park. Another large park honors the name of John James Audubon. The noted naturalist made many of the drawings for his *Birds of America* in Louisiana.

well: General Jackson rearing against an early moon, a girl sitting cross-legged softly playing a recorder, doves murmuring in reply, a poetess offering me both a smile and a green-and-white card for $1.00. On it were lines from poet e.e. cummings: "I thank heaven somebody's crazy enough to give me a daisy."

Most people who live in New Orleans thank heaven that time has been kinder to it than to most urban areas, despite the industrialization that has brought a new spirit of enterprise to the once-languorous delta.

One rainy Saturday—the usual day for launchings—I went out to Avondale Shipyards to watch the U.S.S. *Joseph Hewes* (DE 1078) slide sideways into the Mississippi with a kerplash and cheers from a damp throng (pages 160-61). The *Hewes* was the eighth of 27 destroyer escorts—specially designed for antisubmarine warfare—being built at Avondale, largest industrial employer in Louisiana, with 10,500 workers.

After the launch, I toured the 208-acre shipyard to watch a uniquely efficient procedure set up to handle the DE contract. The DE's midsections are welded upside down—from the deck, flat on the ground, up to the keel. The hulls are then skidded up ramps into huge turning rings that rotate the 1,200-ton sections until they are upright.

Seven Exiled to Indian Camp

Upriver from the busy shipyards, the old River Road ranges alongside the levee, inviting a casual drive through the Côte des Allemands, the German Coast, named for the nationality of its early settlers.

It was not yet dawn as I followed the east bank to the isolated hook of land known as Point Clair. On just such a mist-shrouded morning in 1894, a barge reached this lonely shore after a secret voyage from New Orleans. Below Point Clair seven passengers, including two women, were taken to a deserted rice plantation known as Indian Camp, where they knew they would spend the remainder of their lives. They were lepers.

Curb-to-curb merrymakers engulf 171-foot-wide Canal Street on Shrove Tuesday, last day of Mardi Gras revelry before the Lenten fast. This parade honors Rex, King of Carnival, who rides in splendor at its head, bestowing blessings on boisterous celebrators. Hundreds of thousands of visitors from throughout the Nation annually throng into the city for the festival season.

In the years since then, the once-dreaded colony has grown into the U. S. Public Health Service Hospital near Carville, the only institution specializing in the treatment of leprosy in the continental United States.

"Years ago," Dr. John Trautman, director of the hospital, told me, "Carville was like a prison. There was a barbed-wire fence around the grounds. Patients were seldom allowed out, were not permitted to vote, or marry, or have telephones. The mail was baked in a sterilizer. All of that has changed now, fortunately. All admissions here are voluntary and a patient may leave whenever he wishes.

"We still are not certain how leprosy is transmitted, but one way may be by direct and prolonged contact. Yet the attack rate is very low. People have been treating the disease here for more than 75 years now, and in all that time we have never had a provable case of transmitted leprosy."

Early Detection Helps Check Dread Disease

A staff member, F. A. Kanatani, accompanied me on a drive of the 337-acre grounds around the now-restored plantation home. "There are about 300 patients here on any given day," he told me. "About a hundred new ones arrive each year, and a hundred return to society. Sulfone drugs have been the key. Dr. Guy H. Faget developed sulfone therapy here beginning in 1941. If we catch an infection in time and treat it over an extended period, we can halt its progress, just as diabetes and tuberculosis can be arrested."

Farther along, we got a friendly wave from a new patient who walked very slowly. Mr. Kanatani introduced me to Father Germain LaFontaine, a Canadian-born Roman Catholic priest, one of the famous White Fathers of Africa.

"I was in Zambia for 18 years," he told me, "working among the Tumbuka and other tribes near the Tanzanian border."

Unable to take the sulfone drugs because of adverse reactions, Father LaFontaine was being treated with a drug known as B663, which shaded his skin a slight red. Without the advantage, too, of early diagnosis, he had suffered deformity of hands and feet.

He showed me the hands, now only grotesque claws, that had given so many blessings.

"I celebrated my silver jubilee as a priest shortly before coming to Carville."

Point Clair is among the areas where land is still scaled in arpents, the old French measure, about 8/10ths of an acre. The first settlers tried growing indigo, then sugar, boiling the cane juice in iron kettles to produce a thick syrup that oozed from the shipping casks. Then a

Time of make-believe magic, the Mardi Gras season begins on Twelfth-night, January 6, and ends 60 glittering galas later. Regally robed, scepter in hand, Her Royal Majesty the Mystic Queen greets guests at the Mystic Club Ball in Municipal Auditorium.

Gaudy Bourbon Street, famed for its open-door cabarets—to let potential customers have a peek at the dancers inside—throbs with activity at any time of year. But the last night of carnival brings out the biggest throngs (lower), intent on paying homage to Comus, god of revelry. Carnivalgoers awake on Ash Wednesday, humorist Ring Lardner once remarked, "feeling like Rex in a state of Comus."

EKTACHROME (ARTIFEX) AND KODACHROME © K.O.D.

Her past a gallant escort, New Orleans strives to preserve and restore the history-rich French Quarter—a hundred blocks where brick homes with lacy grillwork balconies and intimate courtyards create oases of Old World charm. The area—bounded by the Mississippi and streets named for a long-vanished rampart, an esplanade, and a canal that was never built—draws painters and secretaries, professors and gamblers, art dealers and lawyers, preachers and go-go dancers. Dapper in his derby, a carriage driver is mirrored in an antique-shop window as he awaits a fare. At right he starts his chapeaued horse on a drive around the Vieux Carré, or Old Square.

man named Etienne de Boré risked his wealth on a successful experimental system for granulating sugar.

A sugar mania seized the colony. For miles up and down the river, the heavy autumn air was thickened by the smoke of plantation mills. By 1853 there were 1,500 estates in Louisiana and some 75,000 slaves working the cane fields.

And how they lived, those barons with their sugar bowls full of gold!* Valcour Aime, a one-man agricultural industry, won a $10,000 bet from a friend by proving that every part of a sumptuous continental meal —down to the pineapples, coffee, and cigars —had been produced on his own plantation.

There remains in the New Orleans character a deep-seated nostalgia for that early era. I was told a story of a Yankee who, after the Civil War, visited one of the plantations that had escaped ruin. While sitting in the perfumed garden, he remarked upon the beauty of the southern night.

Replied an aging servant: "You should of seen that moon before the war."

Era of Opulence Crumbles Swiftly

In less than a decade after the War Between the States, the glory was gone from the lower Mississippi: bankrupt families, bewildered former slaves making their way down to New Orleans, great houses beginning to vanish in the rank growth of the subtropics.

"When my husband Clark and I found San Francisco plantation, it was so surrounded by jungle that only the dormers on the roof were visible. They shone like gold in the evening sun, and caught my eye. The place reminded us of a fort—windows and doors bolted and boarded up."

Mrs. Clark Thompson and I were sitting in the cool downstairs of the restored mansion.

The simple raised cottage of Louisiana was founded on the necessity to lift the house above the damp muck of the delta. The great homes carry the idea to a high degree of opulence and beauty. Often the living quarters are a full story above ground level; at San Francisco a sweeping veranda, like the texas deck of a steamboat, trimmed out in elaborate railings, rings the spacious, high-ceilinged rooms.

"Most people call it steamboat Gothic," Mrs. Thompson told me. "The amazing thing about this house is that no one except my

*See "Land of Louisiana Sugar Kings," by Harnett T. Kane, NATIONAL GEOGRAPHIC, April 1958.

"A closer walk with Thee," implores a brass band leading mourners in one of the city's unique funeral processions. At rites for clarinetist Emile Barnes, Grand Marshal Matthew "Fats" Houston (right) precedes the hearse. On the return from the cemetery, dirges give way to jazz.

In low, once-swampy New Orleans, tombs rise above ground. A vault in St. Louis Cemetery No. 1 (left) reputedly contains the bones of Marie Laveau, notorious voodoo queen. Visitors still chalk crosses on its sides for luck.

husband and I ever really lived in it. Edmond Marmillion, for whom it was built, had been educated in Paris and he preferred to live there, but his father bribed him home with a promise of a plantation. It was hardly finished when the terrible yellow-fever epidemic of 1853 hit, the worst in our history. More than 8,000 people died in New Orleans alone. When Edmond died of the disease, San Francisco was boarded up and forgotten about until we found it."

Slave Dances Spawned a New Rhythm

Back home in the Quarter, I followed the shifting parade of tourists down Bourbon Street, gawking at exotic dancers through doors carefully held open by hawkers. The sounds of lucid jazz permeated the air.

The basic jazz beat may have grown out of the African dances performed by slaves as they kicked up the dust on old Congo Square: *Dansé Calinda, Bou-doum, Bou-doum, Dansé Calinda, Bou-doum, Bou-doum.*

Then there were the yell songs and field hollers of the men working the cane and the docks—"Bend yo' back, tote it to the lift. White boss hollers if you ain't swift." And the blues, that mysterious, melancholy music that was pure emotion—"I woke up one morning just about the break of day, Found that my friend had took my gal away"—and ragtime, a spirited, livelier way of playing marches and minstrel tunes.

Somehow, all these things made jazz. Before the turn of the century, the first prominent jazz musician, Buddy "King" Bolden, was knocking them dead in New Orleans dance halls around Perdido Street and South Rampart Street. He was followed by Joseph "King" Oliver and Ferdinand "Jelly Roll" Morton and others. By the '20's, jazz had revolutionized popular music in America.

In New Orleans, where it had all started, the music faded from prominence as the great musicians moved north. Then, in the '50's, a jazz revival led to the establishment of Preservation Hall, a living museum where jazz is played nightly in the traditional way by the musicians who helped create it (pages 152-3). The revival began very casually, in an art gallery run by E. Lorenz Borenstein.

I found Larry Borenstein in his new art gallery on Bourbon Street. An elderly woman, her black skin a handsome contrast to her white hair and gown, sat quietly in a leather chair behind us. Larry introduced her as Sister Gertrude Morgan, a street missionary and gospel singer who also makes charming primitive paintings based on Biblical texts. She picked up two wooden blocks and began to pound them together in tempo.

"Swap your sins for righteousness," she said to me pleasantly, "while you've got the chance." She began to sing in an eloquent way, keeping time with the wooden blocks, while Larry and I chatted.

"I've always had a gallery or shop of some kind," he said, "coins, stamps, rare books, paintings, pre-Columbian artifacts. And I've always had music around. In 1952 I opened a gallery at 726 St. Peter Street, where Erle Stanley Gardner once lived. I found that I couldn't leave my gallery to hear what jazz there was left, so I began to invite the musicians in. I passed the hat among passers-by who happened to stop in. The thing just grew larger and larger. People wanted to hear the music. Allan and Sandy took it from there."

Allan and Sandra Jaffe, the proprietors who lease Preservation Hall from Larry, now live in the Spanish-style house behind the plain room where hundreds gather nightly to listen and cheer. A carriageway leads to a shadowy patio, with splashes of wisteria, rose of Sharon, and Japanese plum. Russell, the Jaffes' two-year-old son, greeted me with a smile. He was playing a toy trumpet.

Dirges Give Way to a Syncopated Beat

Allan, a transplanted Yankee from Pennsylvania, baked oysters and talked about jazz.

"Some musicologists believe that the first true jazz was played by the marching bands that escorted Negro funerals. On the way to the cemetery they played dirges, but on the way back they rejoiced that their brothers' troubles were over. They still play, by the way. I'll call you next time there's a funeral."

Not long afterward, on a bleak noon, I went to a funeral home on North Claiborne Avenue to attend the services for Emile "Melie" Barnes, a jazz clarinetist of the 1920's.

The Olympia Brass Band led the mourners out. At the head walked two grand marshals, Matthew "Fats" Houston and Anderson Minor, each splendid in formal attire with a wide sash across the chest. Both held black hats against their hearts and strutted in a slow, dignified way. The rest of the crowd, called "second-liners," fell in behind.

Dining at its finest requires sumptuous food and a setting of leisurely elegance, insists Chef Fernando Oca of Brennan's Restaurant on Royal Street, in the French Quarter.

On a balcony above the patio, Chef Oca prepares bananas Foster, to be set aflame with rum. Other dishes include crescent platters of eggs Portuguese and eggs Hussarde (with grilled tomato); snail omelet in the large oval dish at lower right; behind it, pompano Toulouse; roasted quail in a potato nest, at extreme right; and, at the back of the table, grillades —tender veal sautéed in Creole sauce—surrounding an island of grits.

New Orleans merits its world acclaim as a city for gourmets. Here Gallic culinary artists found seafoods, Spanish spices, and Indian herbs to concoct new delights for a host of celebrated restaurants, among them Brennan's, Antoine's, Arnaud's, Galatoire's, and Commander's Palace.

The band marched at route step—drums, trumpets, clarinets, saxophones, slide trombone, sousaphone, all wailing "Just a Closer Walk With Thee" (pages 172-3).

After about half an hour, Fats Houston gave the word to "cut him loose," the band parted, and the funeral cortege passed through the ranks to the melting melody of "Flee as a Bird." There was a moment of profound silence. Then Milton Baptiste pointed his trumpet at the leaden sky, and the first notes of "When the Saints Go Marching In" rang out like rifle shots. Pandemonium!

As though an electric shock had galvanized them, the second-liners erupted into a leaping, dancing, umbrella-twirling, hand-clapping joyous parade. Oh didn't we roll! Didn't we ramble and didn't we roll down Claiborne! A torrent of jazz swept us onward, now many hundreds of stomping, dancing people, toward the underpass of Interstate 10. There the multilane highway became an overhead sounding board, and Milton Baptiste let go with his speciality, "Whoopin' Blues," to which the second-line chorused the response, a deafening yell of "Yeah!" The trumpet

Portents of a stormy night, thickening clouds scud above a farm and a petrochemical complex on facing banks of the Mississippi. Flaming waste gas brightens the sky at the Taft plant

pealed, higher and higher, and the echo came bouncing down:

"Didn't they roll? Yeah! Didn't they ramble? Yeah!"

Didn't they bury Melic well? Man, you know they did.

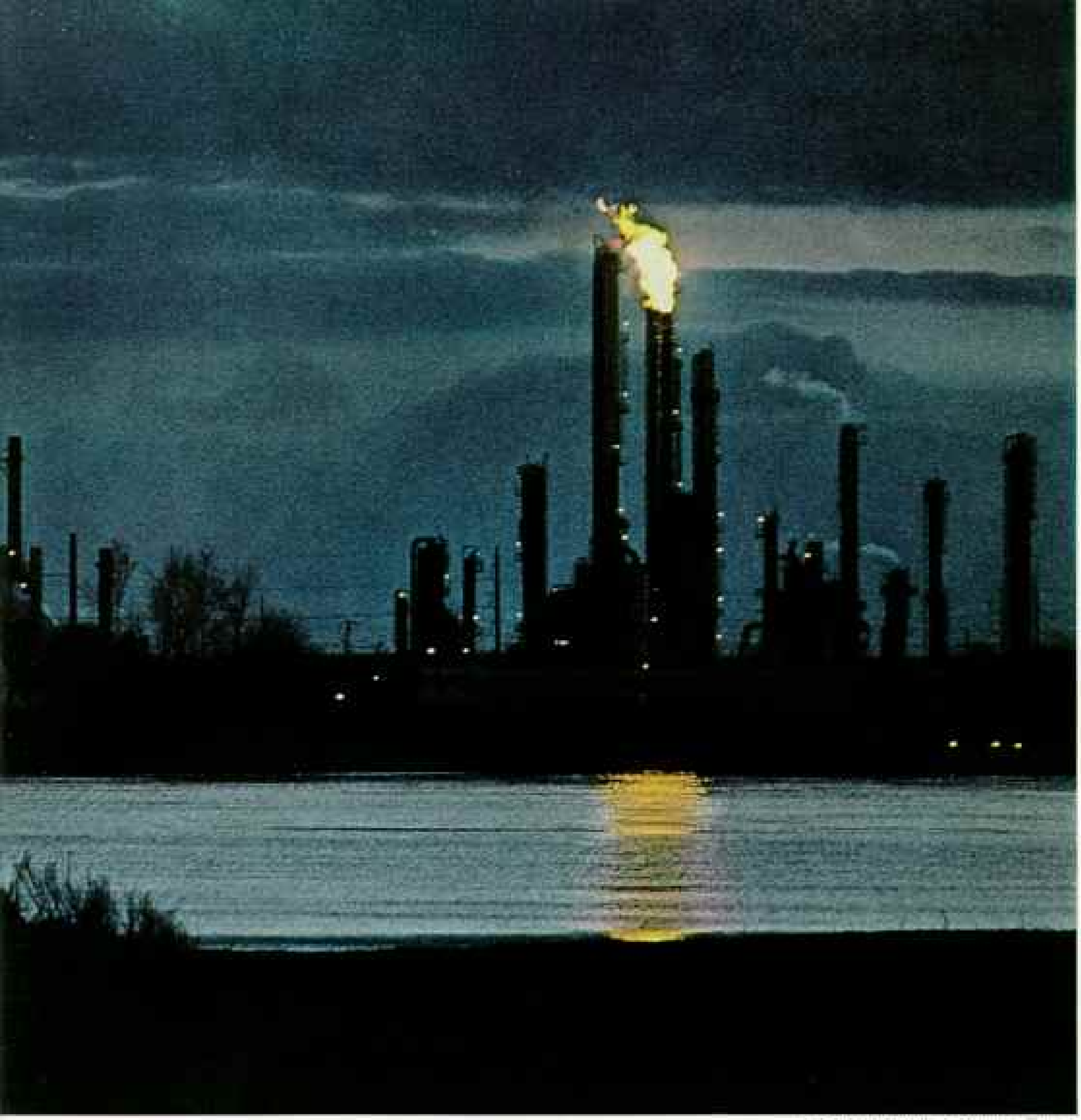
Poverty Darkens Life for Many

But life is not all jazz and jumping for New Orleans's teeming black population, a full 40 percent of the total. The streets leading off North Claiborne are dismal, muddy lanes, furnished with abandoned automobiles, and the lower Ninth Ward is as miserable a slum as one is apt to find anywhere.

The unemployment rate for blacks is twice that for white workers; 70 percent of black families live in all-black strips in which most homes were built before 1939.

In 1967, Ernest "Dutch" Morial became the first black elected to the Louisiana House of Representatives in 71 years (page 157). An articulate, intellectual man of soft good humor, Mr. Morial welcomed me to his law offices on Orleans Avenue.

"You can begin to understand this city's problems by examining its unique historical legacies," he said. "We have, for example, the legacy of Huey Long in the governor-appointed boards that actually run things in Louisiana. Their membership is overwhelmingly from the existing white power structure.



KODACHROME BY JAMES L. STANFIELD © N.G.S.

of Union Carbide, 25 miles upriver from New Orleans. In this delta area, once purely pastoral, scores of industries thrive on Louisiana's four-billion-dollar annual yield of oil and natural gas.

"History has left another legacy here, as far as the blacks are concerned. There have always been interracial quarters in the city. When the plantations were subdivided, the blocks that grew up around the 'Big House' were white, and those that grew up around the slave cabins were black, but they were right next to each other.

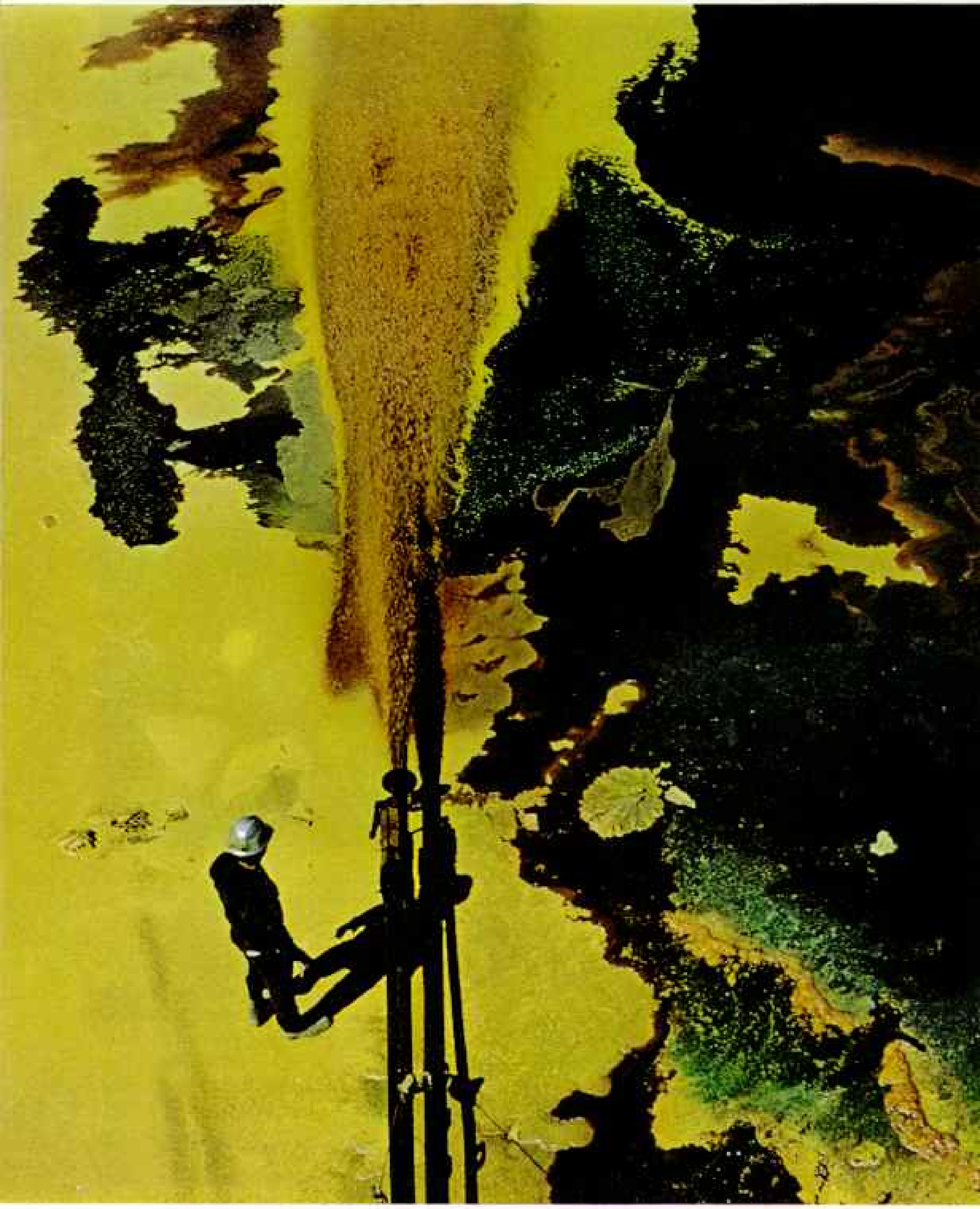
"Many of the ancestors of New Orleans blacks were 'free people of color,' artisans and shop owners; some owned slaves themselves. That tradition is not related to any feeling of inferiority.

"I am hopeful for a politics based on qualification and competency. Those changes can come about through the franchise. Why energize to riot when you can do it to vote?"

A radical minority disagrees, and a few months later a violent confrontation between police and a black militant group called the National Committee to Combat Fascism—closely tied to the Black Panther Party—left one person dead and 21 injured.

Industrial Surge Packs a Wallop

On the Greater New Orleans Bridge across the Mississippi, I saw a sign that read HUBBA HUBBA. It was an admonition to hustle that seems out of character with a place that once prided itself as "the city that care forgot." Forces of change that make traditionalists uneasy are clearly visible in the city—the



Golden gush of liquid sulphur spurts into a solidifying vat at Port Sulphur, where the Freeport Sulphur Company, world's largest producer, handles the output from five huge mines in the marshy delta area, two of them offshore. Powerful pumps force superheated water into the underground deposits; compressed air lifts the molten chemical to the surface.

Most goes to market still molten; giant power shovels load the rest onto conveyor belts that whisk it to waiting ships.

modest skyline is breaking rapidly upward, there is a drive on for a $93,500,000 domed stadium, and an ambitious plan is underway for a new port that may alter the destiny of the city.

In 1969 New Orleans handled 19,000,000 tons of export and import cargo valued at $2,600,000,000, placing the port second to New York in dollar value of foreign cargoes (page 159).

"Our situation," said Edward S. Reed, the port director, "is similar to that of Rotterdam. Both are through ports, serving vast interior areas; both stand at the mouths of great rivers. Rotterdam built Europoort; here, at the outlet for the central U. S., we are building Centroport."

He showed me plans for the $400,000,000, 30-year program to sweep all but three of the present wharves off the riverfront and replace them with modern facilities in a protected area near the Inner Harbor Navigation Canal.

A key feature of the plan is Mister Go—a new channel, the Mississippi River-Gulf Outlet, that cuts through the marshes to the Gulf of Mexico. Authorized by Congress in 1956 and opened for traffic in 1963, Mister Go cuts 35 miles off the long river trip to the gulf.

Yellow Mountain Looms Above a Green Land

One morning I took the long way, down the west bank of the Mississippi. Beside me the river began its 100-mile journey through Plaquemines Parish, a spongy fan of alluvial soil sculptured by wind and water into a million glittering fragments of swamp, marsh, and bayou (following pages).

Here and there ditches and levees have stolen a part of the cool pudding for farmland. A farmer I met near Buras solemnly assured me that each time he crossed a field of that clinging black soil he stood five feet taller on the other side.

The highest hill in this green expanse of mirrored sky and grassy island is a startling yellow—a mini-mountain of pure sulphur piled up by Freeport Sulphur Company at the collection terminal of Port Sulphur, one of the world's largest stockpiles of this jack-of-all-trades mineral, which is used in more than 32,000 different products.

"The ancients called it brimstone because it burns, and they considered hell to be made of it," Duffy Wall told me. The Freeport official and I were driving on a sulphur road, between walls of sulphur. "The mineral has always been mined and shipped in this solid form," he went on, "but here we use a mining process invented in 1894 by a man named Herman Frasch that permits us to extract it as hot liquid."

At its mines of Grande Ecaille, Garden Island Bay, Lake Pelto, and two offshore in the gulf, Caminada and Grand Isle (the largest steel island in the Western Hemisphere), Freeport pumps superheated water down its wells to melt the sulphur. It comes back up at a searing 300° F., a brown broth from Hades (left). Pushed on through insulated pipes to heated barges, it is kept hot (to keep it liquid) until delivered to the customer—up the Mississippi or across the Atlantic.

Wherever I looked below Port Sulphur, I saw trailers parked next to cement slabs that had been the foundations of homes. Hurricane Camille hit lower Plaquemines Parish such a destructive blow in 1969 that it turned hamlets like Triumph and Boothville into piles of junk. The 200-mile-an-hour winds and rampaging

Toe of the Louisiana boot, the Mississippi River Delta spreads a vast carpet of tawny marsh grass veined with waterways. An oysterman's stilted house and a

AUTOCHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JAMES L. STANFIELD © N.G.S.

solitary boat lend a hint of civilization. The tang of salt spices the air, and only flocks of gulls, terns, and cranes disturb the pervasive quiet.

water destroyed 5,000 gulf-area homes in a day. On a slightly different course, it would have devastated New Orleans.

Edward Lennox, President of the Board of Levee Commissioners of the district, had earlier described the disaster.

"A small hurricane, it was the most intense for its size ever recorded," he said. "The barometer dropped to 26.73 inches of mercury. An 18½-foot tide came ashore east of here, at Waveland, Mississippi . . ." He made a sweeping motion with his hand over a map of the region. ". . . And the storm drove water more than 20 miles into Lake Pontchartrain. These residential areas below it—Metairie and Kenner—lie below sea level. Had Camille hit a few miles west, there would have been 15 feet of water there. At least 50,000 people, perhaps as many as 150,000, would have drowned in their homes."

I learned something of the force of the storm when I stopped outside Venice and chatted with Evans Williams. He was supervising a crew working on a house tilted at a lopsided angle atop the wreckage of what used to be the J. & L. Supply Store.

"That's Newton Beauvais's house," said Evans. "The foundations are two miles up the road, toward Boothville. I don't think it touched the ground all the way down here; it was just slung by the wind."

Home and Everything in It Vanish

L. J. North came out of his nearby trailer to survey again the naked lot where his eight-room house once stood. "Camille literally broke it to pieces," he told me, "to tiny bits, and then the floods and the tide flushed the whole thing out to sea somewhere. I didn't find so much as a broken saucer. Over on the east bank of the river is what's left of 60 or 70 houses, blown across the Mississippi from this bank. Where am I going to go? I'm 57 years old. Everything I had is gone."

There are no roads below Venice. To reach Head of Passes, Mile Zero of the Mississippi, where the river branches into three long arms reaching for the sea, I hitched a ride downstream on the *Elizabeth Lykes*, outbound for South Africa with general cargo and 11 passengers. High wind and a driving rain came along.

At Pilottown, a fringe of wooden houses and a large dormitory for pilots in a wilderness of marsh, a launch churned alongside to pick up the river pilot, who had brought the ship down from New Orleans. He was replaced by a bar pilot, Jerry Fitzpatrick, who guided us into Southwest Pass, toward the Gulf of Mexico. The procedure is reversed for inbound ships (page 186).

Peril Improves Author's Jumping Skill

Now a squall blowing under a black sky raked the long channel. At the mouth of the pass, the pilot and I wished the captain a safe voyage and went over the side and down a Jacob's ladder that seemed to be made of macaroni instead of rope and wood. I grasped the flailing ladder and tried to measure the distance to the pilot launch heaving and pitching below. Timing is crucial, since a falling sea will drop the launch like a stone, and you may step into thin air. Worse yet, if the launch is on the rise and you do not accept the invitation to leap, it can scrape you off the ladder like a knife lifting a barnacle.

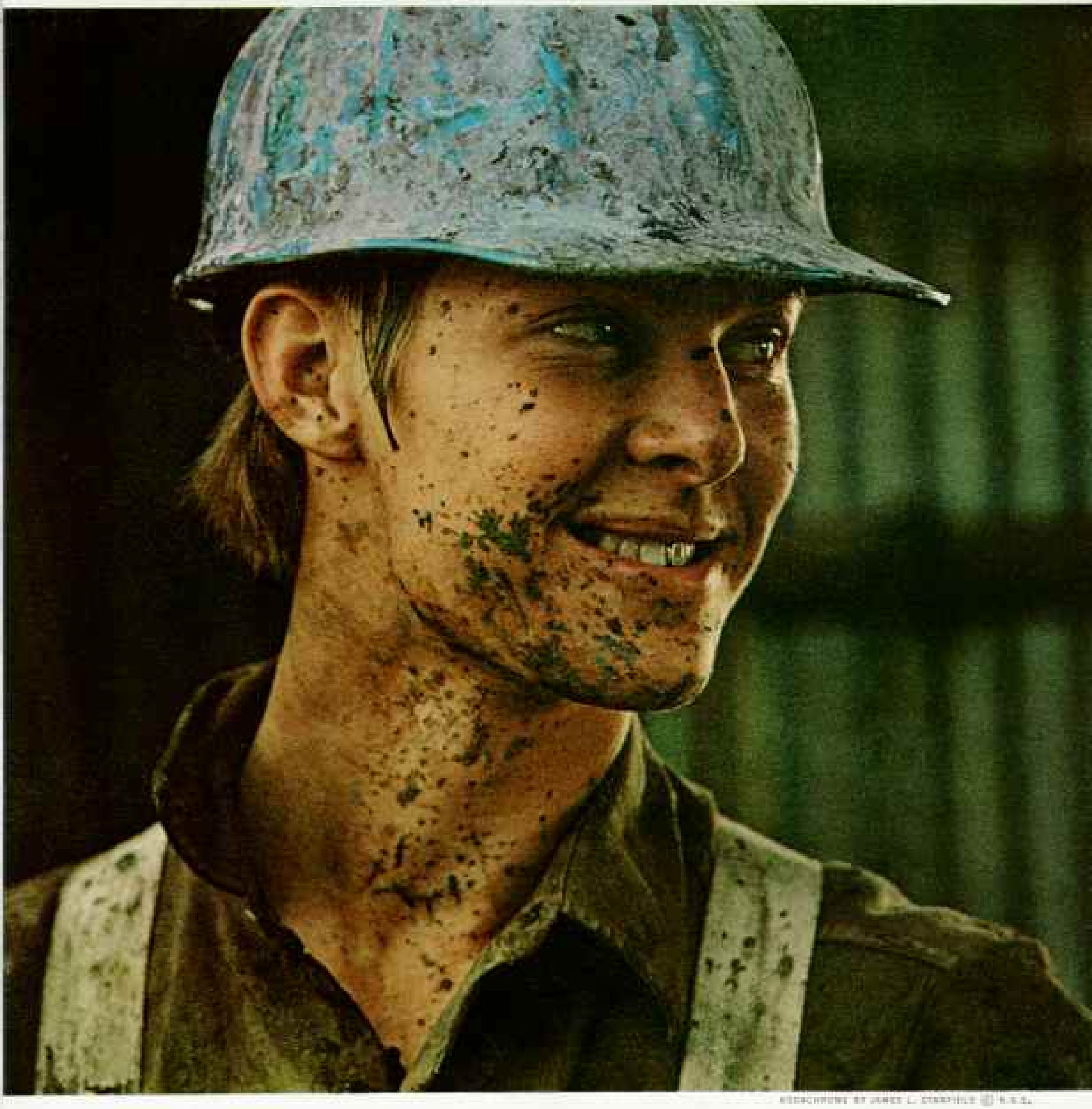
Panic prompted me to leap safely, and in moments we were pounding through a heaving sea toward a fragile box of a house that seemed to be half submerged, with its rickety wharf, in the immensity of water around. Rain and wind roared a welcome as we pushed into the sudden warmth of the pilot station.

We sat down to dinner with the half dozen pilots waiting for inbound ships to guide upriver to Pilottown. They take them in succession, each man in his turn. The timbers groaned as the sea rolled up and shook the floor boards.

A pilot's place in the rotation is indicated by a beautiful hand-carved paddle, bearing his name, inserted in the slot of a wooden "slate." The station lookout takes the paddle of an incoming pilot and slides it into the bottom slot. As ships come in and other names are inserted, his name moves up.

"My father was a bar pilot," Capt. Albro Michell said, "and his father before him.

Splashing through a watery wilderness near Pilottown, deer flee the noise of the photographer's helicopter. The herd roams a marshland that strangers regard as primeval desolation but bayou men know as a rich hunting ground. Its muskrat, mink, otter, and nutria have made Louisiana one of the Nation's leaders in production of trapped furs.



Oil-spattered face reflects the rugged life of a roughneck on an offshore drilling rig. Hundreds of steel islands in the gulf have boosted Louisiana's petroleum output until it now ranks second in the Nation only to Texas. Workers live on the platforms or on tenders anchored nearby.

Many of us are the sons and grandsons of pilots. This association had its beginnings in 1837. All the passes were blocked by sand bars then; one had only a nine-foot channel. The original bar pilots sometimes towed the ships over the sandy shallows. We work two weeks on and two weeks off. I can tell you if I will be working Christmas Day in 1995."

"Ship's outside, cap'n," called the lookout. He pulled Michell's carved paddle from the board. The pilot donned his foul-weather gear and went out.

The world of the river pilot endures; but the arrival of oil fields and gas pipes has slashed the marshlands to pieces, and the old way of life of the deep delta has vanished. So have all but a few of the men who lived it.

At Pilottown I talked to Isedore Barrois,

who had spent more than 70 years in the delta. His son Warren was building a house to replace the one Isedore had known for 45 years, destroyed by Camille.

"All a man had to do," Isedore said, "was walk out yonder with a gun, or stick a net in the water and he got all he wanted. Driftwood would bring you a house, bit by bit, when the river came up in the spring. I used to walk for miles through cut grass, flag grass, and three-cornered grass, but that's all gone.

"When I was 18, I shot over 100 ducks every day for 14 days in a row and sold them to New Orleans restaurants. Come November, we'd get to trapping otter and mink and muskrat and coon. And a seven-foot alligator would bring you $3.00. You had to make sure you kept his eyes in the water, because if they came out, he'd fight. You had to hold his mouth shut and raise him up fast and give him a good lick with a hatchet. With a pirogue, a paddle, a pole, there was nothing a man couldn't do. The way it used to be, why, it was country that God invented for himself."

Suddenly Mr. Barrois's eyes filled with tears. Warren patted him on the shoulder and said, "Don't you worry, Daddy, it'll come back." It seemed a reassurance springing from affection rather than conviction.

As Warren and I left the unfinished house, he said: "Now, there's something you ought to know. When Daddy says he used to walk for miles across the bayou, he doesn't mean walking like you and I walk, on the ground. He means walking the way he used to walk, from one bunch of cut grass to another. And when he talks about poling a pirogue—well, you and I need water for a boat but I've seen him moving on a heavy dew."

The View From Inside a Rainbow

The marshland east of Pilottown, laced with quiet channels named Main Pass, Octave Pass, and Raphael Pass, comprises the Delta National Wildlife Refuge, a 48,800-acre sanctuary established in 1935 to protect the 200,000 ducks, 70,000 geese, and other waterfowl that winter there.

During three days in that remote marshland, we got a glimpse of what paradise used to be like—and will be again, I hope. Dennis Good, a New Orleans boat dealer, brought down an airboat that swept us over the grass and in and out of the narrow bayous like a skipping pebble.

I will not forget one extraordinary moment. We were sitting silently in the boat shortly after dawn while the sun made a huge rainbow in the deep mist around us. Out of the rainbow a squadron of jacksnipe suddenly banked and veered in perfect formation, their white wing patches flashing. As if on cue, shrill whistles, pipes, booms, flutes, trilling cadenzas broke out as gallinules, coots, rails, woodcocks, and ibises joined a thundering chorus. Then geese, snows and blues, bugled like massed battalions from within the white veil before us. Never have I heard such music as I did then, blind in a blinding rainbow.

When the sun finally burned the mist away, the geese got up, and an endless skein threaded out against the horizon, fluttering blue-black clouds streaming toward Breton Sound.

"Too bad," Dennis said, "not many out here this morning."

Mardi Gras Ignites New Orleans

Carnival time brought me back to New Orleans. I called on stockbroker Darwin Fenner, former captain of the School of Design, the organization that sponsors the Rex Pageant. With his silver hair, impeccable manners, and resonant voice, Mr. Fenner is the image of the New Orleans gentleman.

"Mardi Gras," he told me, "has been called the greatest free show on earth, free because the public parades are privately financed. All of the parades and balls are paid for by the city's unique carnival societies. They are known as krewes, and most are for men, but there are a few for women. Membership is presumably secret. A visitor to the city during carnival cannot attend the traditional balls except by invitation from a krewe member."

I learned that carnival is, in fact, the keystone of social structure.* To be chosen king or queen of one of the older carnival societies is a stupendous social compliment; it is an honor that is remembered for a lifetime (pages 168-9). Family blood and achievement determine membership in the krewes; money does not count. The oldest—Comus, Rex, Momus, Proteus, Twelfth Night Revelers, and Atlanteans—are the most prestigious.

A banker told me: "A person here is judged by krewe, club, and credit, in that order."

In the years since the early krewes were formed, new ones have appeared regularly.

*See "Mardi Gras in New Orleans," by Carolyn Bennett Patterson, GEOGRAPHIC, November 1960.

This year, no fewer than 66 were to crown kings for a day. The parties begin shortly after Christmas and continue until the day of Mardi Gras, literally "Fat Tuesday" before Ash Wednesday.

I stood on Canal Street and watched until my eyes glazed as the creatures of unfettered imagination went by: Two men clad entirely in Spanish moss; four children with wings, antennae, and webbed feet; a bearded conquistador with a purple helmet; a something with gaping mouth and jeweled gills; two burly hula dancers on a motorcycle; a silver-plated woman and a shining gold man wearing little but their arms about each other; a purple tree drinking beer through a straw; an outhouse walking along dangling a Sears Roebuck catalogue behind. . . . At noon, Rex, King of Carnival, rolled onto Canal Street, to a deafening roar of delight. From floats behind him, members of the krewe rained down metallic Mardi Gras "doubloons," prized by collectors, that sparkled in the sun and caused bedlam below.

"Throw me something, mister! Hey, mister!"

That night I pressed through the dense throng to a balcony on Royal Street to watch carnival's last parade in a company that included a few dinner jackets and furs, some tweeds and pipes, some odd blue jeans, and beards and soiled T-shirts.

Below us white-gowned flambeau carriers, twirling smoking kerosene torches, strutted and pranced before Comus, god of revelry, who brandished a goblet high on his cruising float. We leaned out and beseeched the masked riders for beads and doubloons. Please, mister, please! And the riders stared back with implacable faces and flung cascades of gifts toward the throng, and the noise thundered like a waterfall, and the exultation of the hour swept every heart higher.

Churning past Louisiana's last outpost, South Pass Pilot Station, a freighter nears the Gulf of Mexico. A bar pilot guides the vessel through the narrow jetty-walled channel to the gulf, where he will debark and steer another ship upriver to Pilottown, 15 miles north. Above Pilottown, river pilots control the last 90-mile run to New Orleans.

To bar pilot Jerry Fitzpatrick, as to his father before him, the river is a way of life. "His pride in his occupation surpasses the pride of kings," Mark Twain wrote of the Big Muddy pilots in *Life on the Mississippi*.

Church Bells Toll a Fantasy's End

I followed Comus to the Municipal Auditorium, where the formal balls of both Comus and Rex were being held in separate sections. The tumult of the Quarter now seemed far away, as lucky ladies with "call-outs" whirled with their maskers to soft music. Those without the special invitations to dance sat all evening in the balcony, watching the gliding couples.

Just before midnight Rex and his Queen left their own followers and made their way to the Comus side of the auditorium. Together, from an elaborate throne, the majestic couples—more real than make-believe—reigned over New Orleans society and the dying moments of another Mardi Gras.

A chill dawn breeze was sweeping the balconies of the Quarter on Ash Wednesday as I made my way along littered streets to St. Louis Cathedral. Inside, the priest walked down the Communion rail, placing thumb-smudges of ashes on the foreheads of the faithful, intoning: "Remember, man, that thou art dust, and unto dust thou shalt return."

The bells rang out, as they have for 250 years, a flight of bronze notes starting from the high tower, and were answered by the deep-throated horn of a freighter and the scream of gulls. Beyond, the river rolled on in mystery and in silence. □

I Live With the Eskimos

ARTICLE AND PHOTOGRAPHS BY
GUY MARY-ROUSSELIERE

Indomitable challenger of a hostile realm, an Eskimo of Arctic Canada carries his *kakivak*, a fish spear, like a standard. His daughter rides piggyback atop bundled caribou-skin bedding. Clad in the style of the fading past, he characterizes the resourceful people among whom the author cast his lot 27 years ago.

KODACHROME © N.G.S.

I HAD GIVEN Alain Maktaq a small transistor radio to reward him for work he had done at the mission. To my dismay, he insisted on paying me for it.

"I caught many foxes this winter, Father," he told me, "and I have much more money than I need to provide for my family. What would I do with it all?"

This took place only a decade ago. An Eskimo of Baffin Island, in the Canadian Arctic, Alain lived in a turf hut lighted and heated by seal oil. He fed himself and about ten dependents by hunting narwhal and seal. His whole fortune consisted of some 15 dogs, a homemade sled, two rifles, 200 traps, a canoe, and an old outboard motor patched with bits of wire.

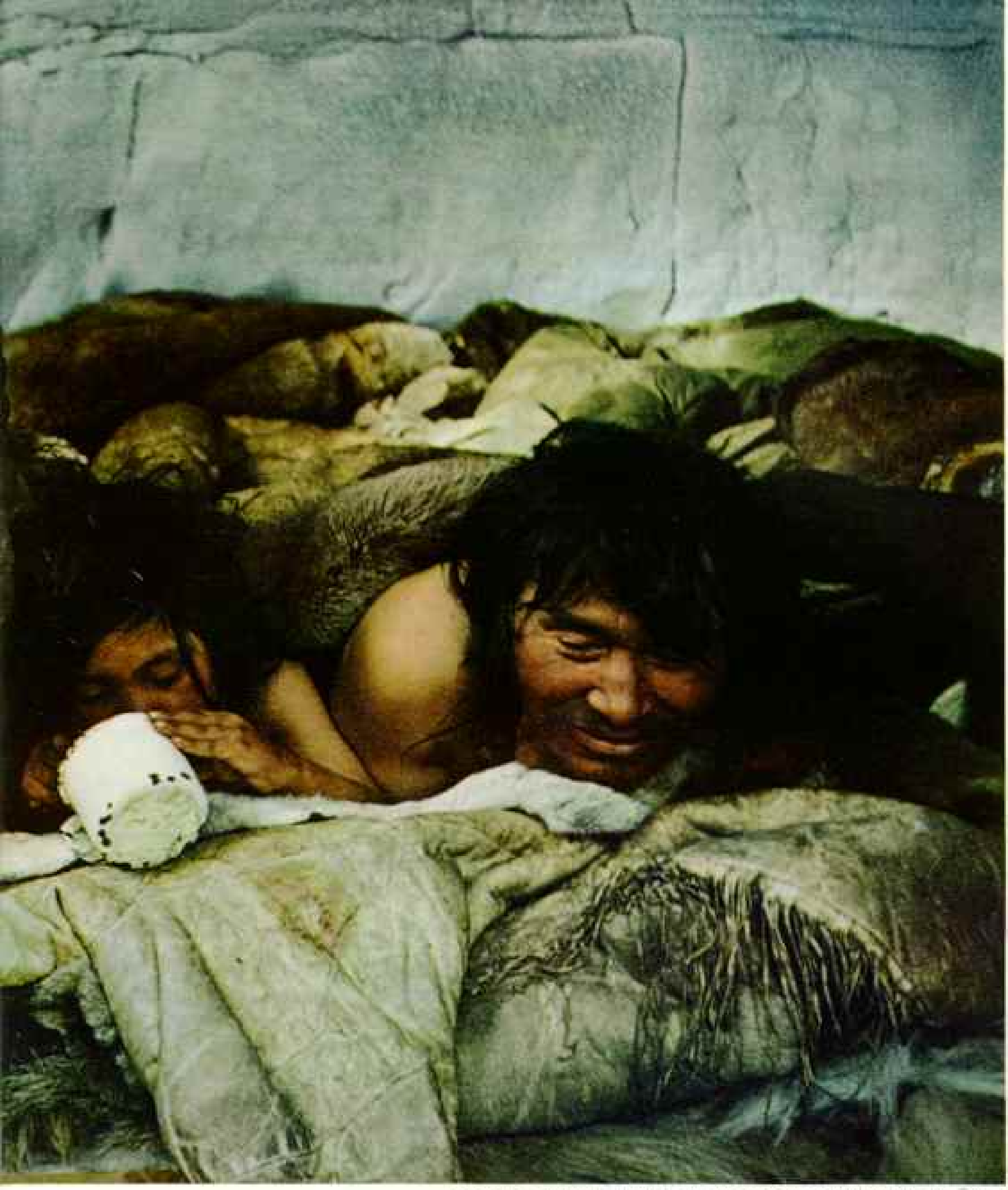
Today Alain lives in a comfortable

A woman battles morning darkness and cold with the flickering flame of a seal-oil lamp. Her husband and son lie naked beneath blankets of caribou skin. This re-enactment for a documentary film portrays a way of life that many Eskimos still recall. Today most

house built, lighted, and heated by the government. He pays a modest rent. An employee of the Government of the Northwest Territories, he has a bank account, buys a new snowmobile every year, and thinks of getting an automobile. From the south he gets meat, eggs, vegetables, and fruit.

Better than any statistics, the changes in Alain's way of life show the path followed by the Eskimos of Canada's eastern Arctic. There, for more than a quarter of a century, I have lived and worked with rewarding intimacy among the 3,000 Eskimos who inhabit northern Baffin Island and the icy mainland northwest of Hudson Bay (map, page 193).

What a wild region is theirs! Even its southernmost extremities, along the western shore of Hudson Bay, lie beyond the tree line, so that gales rage unchecked across the frigid tundra and glacier-gouged lakes.



ENGRAVING BY GUY MAES-BOUCHELLIER, A.R.C., FOR EDUCATION DEVELOPMENT CENTER, INC. © N.G.S.

have abandoned their igloos to live in houses built by the Canadian Government; oil heaters supplant primitive lamps. The settled life, with its opportunities for education and health care, transforms Canada's once-wandering Arctic people into 20th-century townsmen.

Farther north, the frozen land heaves, buckles, and soars to Baffin Island's rugged pinnacles.

It was in 1944 that I first went to live among the Eskimos, in Pond Inlet on northern Baffin Island. I came as a young Catholic missionary, only a few years out of France, hoping to learn the Eskimo's harsh language, with its subtle nuances of meaning.

Pond Inlet at the time contained 22 Eskimos and seven whites—two officers of the Royal Canadian Mounted Police, the manager of the Hudson's Bay Company store, two ministers of the Anglican mission, a veteran Arctic priest of the Roman Catholic mission, and me. Dispersed throughout the countryside around us were many other Eskimos, semi-nomads camped in groups of several families each. Traveling by dogsled, they trapped the Arctic fox and hunted the caribou and seal with rifles, managing to hold their own in one

of our planet's most inhospitable regions.

Hundreds of miles away lay other settlements I also came to know—Arctic Bay, Igloolik, Baker Lake, Repulse Bay, Pelly Bay. And between them roamed more Eskimos, each tiny band a fragile flickering of life in the frozen infinitude.

Today, after a life as nomadic as was the Eskimos', I dwell again in Pond Inlet. Its native population has grown to 390 as families have been encouraged by the government to move in from outlying camps. Prefabricated homes, colorful if boxy, line our unnamed streets (pages 210-11). A school that equals most in the "south," as Arctic folk call lower Canada, teaches the Eskimo children in English. A kindly administrator looks after the residents' needs.

Black smoke rises out at sea; it is the tanker S.S. *Manhattan*, smashing her way through the sea-ice barrier that once warded off civilization nine months of the year.* A knock at my door; it is the special constable Kayak, come to ask if I know the best model of radio-telephone for his boat. Swift indeed comes the change.

Eskimo Life a Struggle for Survival

I have always sought out the Eskimos in their igloos to learn their ways, approaching them not only as priest but as hunting companion, as amateur doctor, and as anthropologist. I have been their teacher and they have been mine. Often I have felt that I understood them well. But then, always, some small incident will convince me that I still have much to learn.

Once on a sled trip in northern Baffin Island, I stopped at the igloo of my friend Utak. As is usual in the Arctic, I offered him food—some of my biscuits. Seeing how slender was my supply, he refused, and took from his own larder a chunk of *igunaq*, walrus meat that had "cured" in a summer cache. It was streaked with vivid colors—indigo, yellow, deep green—that would have graced the palette of a van Gogh, but not the palate of the hungriest of men.

We began eating our respective meals. When I had finished, hunger unsated, I watched with growing fascination as he ate. Finally I accepted a small piece of his colorful fare. Pride forced it down, but barely.

Noting my disgust despite my best efforts to conceal it, Utak confided calmly, "I dislike this rotten meat too. But igunaq is all I have."

Traditional Eskimo life is, in truth, a struggle for existence. Neither the tundra, swept by the northwest winds, nor the mountains, still encumbered by glaciers, are inviting to man. The life of the Eskimo is a marvel of adaptation to a fierce environment.

Experience has taught him that flexibility is more effective than force in the fight for survival, that the way of the reed is better than that of the oak. Like the judo expert, he turns each threat of his relentless adversary, the cold, to his own advantage.

Lost in a blizzard, an Eskimo does not plunge ahead but—fully aware of the snow's insulating qualities—builds an igloo for shelter and waits it out. Realizing that glossy surfaces slide best on snow, he glazes his sled runners with ice. If he lacks wood to fashion a frame for his sled, here again he makes use of the cold. He soaks a seal skin in water, then wraps it around several split fish and lets the cold transform the bundle into a rigid beam.

Like the budget-wise housewife, he assigns priorities to his meager resources. He knows that, if his supply of fat is small, he can survive longer by eating it than by burning it to keep himself warm.

Nothing Insulates Like Caribou Hairs

In years past the Eskimos obtained almost all their food by hunting. This still holds true for the few who remain in the camps. Settlement dwellers, however, rely on game for only about a quarter of their diet, obtaining the rest from the shelves of alluring goods at the Hudson's Bay Company store.

Eskimos who lived on the coast relied chiefly on the seal—doubtless the most important game animal in their survival. Both coastal and inland hunters stalked the caribou, a source of meat and of skins for bedding and clothing, for its hollow hairs insulate far better than any fabric.†

At Igloolik, where winds and swift currents create ice-free channels near the island even in winter, walruses have long been the favored game. At Pond Inlet, the waters still abound with the meaty narwhal, whose tusk provides

*The *Manhattan*'s first Arctic voyage was described in "North for Oil," by Bern Keating, NATIONAL GEOGRAPHIC, March 1970.

†See "Canada Counts Its Caribou," a picture story in the August 1952 GEOGRAPHIC, and "Canada's Caribou Eskimos," by Donald R. Marsh, January 1947.

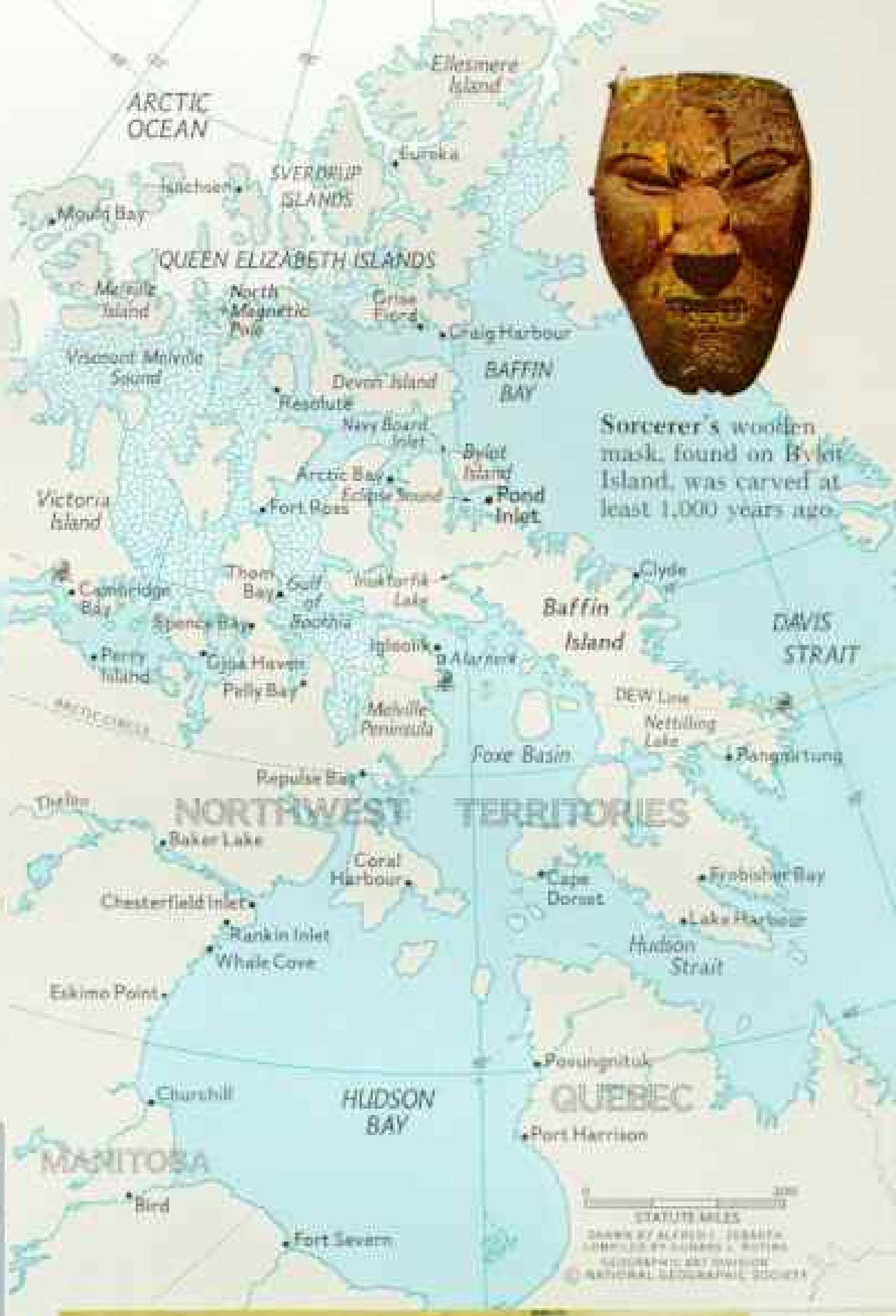
The forbidding vineyard of "Father Mary"

OUTPOSTS CLINGING to earth's frozen edge, Eskimo settlements sprinkle the desolation of Canada's eastern Arctic (right). For more than 25 years, the author has been a Roman Catholic missionary among the 3,000 Eskimos who inhabit northern Baffin Island and the northwest shores of Hudson Bay—an area locked in sea ice for nine months of the year. Of the 45,000 Eskimos scattered across the top of the continent (below), some 17,000 live in the Canadian Arctic. The rest dwell in Alaska.

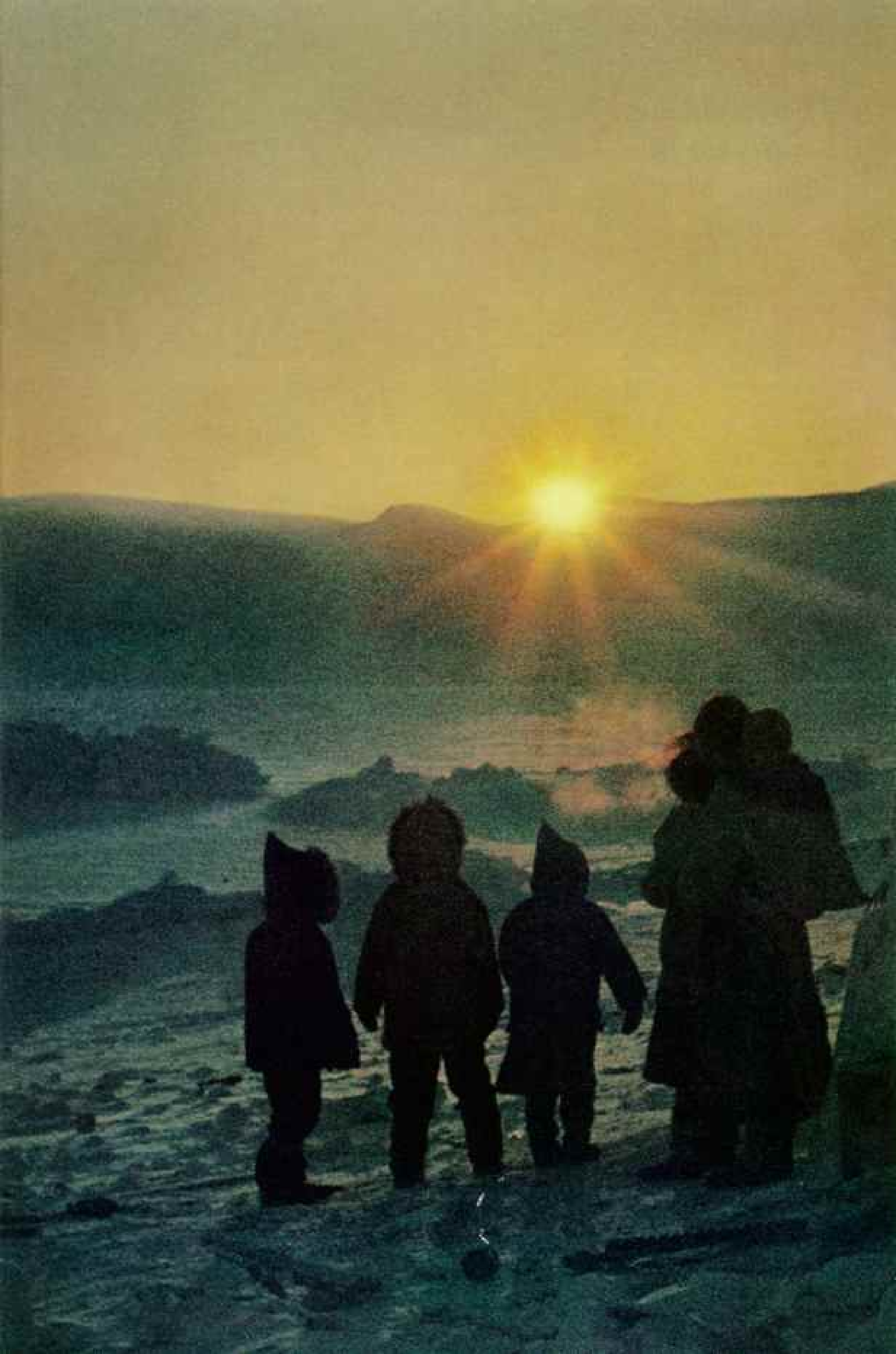
Sent to Pond Inlet in 1944 by the Oblates of Mary Immaculate, the author (below right) lived as the Eskimos did, and learned their language. To them the young French missionary became "Ataata Mari—Father Mary." Moving from settlement to settlement, he served not only as their priest but also as their doctor and teacher. All the while he observed with the eye of a trained anthropologist.

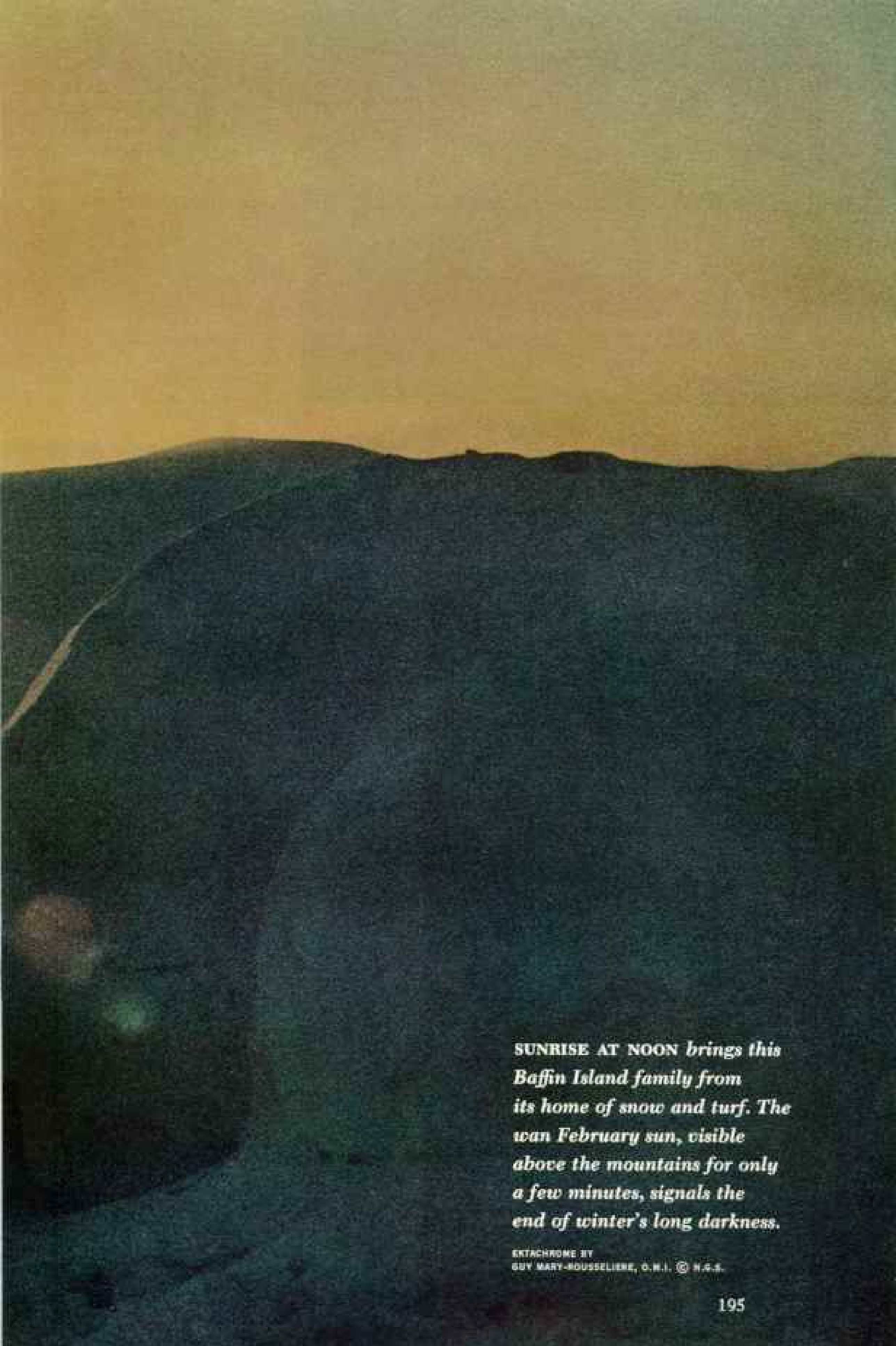
In the early 1960's Father Mary helped the Education Development Center, Inc., of Cambridge, Massachusetts, record the Eskimos' fading traditions. Several scenes from these re-enactments enrich this article. Today Father Mary dwells in Pond Inlet, where his Arctic odyssey began. There, while maintaining the world's northernmost Catholic mission, he excavates sites of early Eskimo cultures and collects legends of the past. Here he tapes the reminiscences of the venerable Kunuk in her home at Pond Inlet.

Sorcerer's wooden mask, found on Bylot Island, was carved at least 1,000 years ago.



PHOTOGRAPHS BY GUY MARY-ROUSSELIERE, O.M.I. (UPPER) AND THOMAS J. ABERT, NATIONAL GEOGRAPHIC STAFF © N.G.S.





SUNRISE AT NOON *brings this Baffin Island family from its home of snow and turf. The wan February sun, visible above the mountains for only a few minutes, signals the end of winter's long darkness.*

EKTACHROME BY
GUY MARY-ROUSSELIERE, O.M.I. © N.G.S.

Cheer melts the chill of an igloo in Pelly Bay as a naked boy frolics with his grandmother (left). Light glows through a windowpane of thin ice.

Like pool players aiming cues (below), women play *ungluktak*. The object: to poke sticks through holes in a caribou-antler spindle (visible only as a blur) dangling from the ceiling. These Eskimos gather in a *qaggi*, a great snow igloo that bands often built as they roamed in search of game.

ivory and whose skin is considered a delicacy either raw or boiled. At Pelly Bay Eskimos have always depended on the Arctic char, a cousin of the trout and salmon (pages 204-205), which they catch in weirs and with spears and nets. Here, even today, they also hunt polar bears in their dens under the snow. A hunter uses his dogs to smell out the quarry in the snowdrifts, opens the top of the lair with his snow knife, then shoots the animal. But woe to the hunter who suddenly falls through the crust into the den of an awakened bear!

With their food supply so often menaced by a cruel and capricious environment, it is little wonder that the Eskimos are well acquainted with hunger. My studies at Pond Inlet and Igloolik have revealed that many of the ancients died neither from sickness nor accident but from starvation.

Famine Follows a Migration Change

I shall never forget the January day at Baker Lake when an Eskimo named Mark Sangusak staggered into the post on foot. His dogs, he told us, had long since starved. Now his family was dying of hunger, some 40 miles to the south. The herds of caribou upon which he and other inland Eskimos depended had not followed their usual migration route. Famine shadowed the land.

We loaded my sled with supplies and left at dawn. At dusk on the second day we spied a tiny white dome nearly lost amid distant snowdrifts. Mark, who had frozen both heels the night before, jumped clumsily from the sled and hobbled forward. Ignoring the drifted snow at the igloo's door, he kicked a hole through the wall and peered anxiously within. *"Unnayut!"* he shouted exultantly. "They live!"

As I looked into the gloomy chamber, I could

Grimacing man (right) tests his strength and endurance in a round of *egeruutijuk*. As an opponent tugs at his mouth with a finger, he does the same to his adversary until one gives up.

Eskimos still enjoy traditional pastimes—indispensible when they wintered in scattered camps—whenever families get together to celebrate Christmas and other holidays of their new religion.

make out four bodies, tucked in caribou-skin blankets white with rime, curled up and huddled together with their heads turned toward the center of the igloo. The sole sign of life was their barely perceptible breathing.

Weakened by near starvation, these people had eaten nothing but one fish in nine days. Toward the last they had devoured all but their most essential caribou skins. All the while the outside temperature had been 40 to 50 degrees below zero F.

Later, as our teakettle warmed on the Primus stove and one of them found speech, his first croak was not for food but a piteous cry of "*Tipanik!*—Tobacco!"

Hunger sometimes invited a terrifying reaction—cannibalism. Such a lot befell a woman named Ataguttaaluk, who became known as the Eater of Men. In the autumn of 1904, Ataguttaaluk went with her husband, their two children, and three other Eskimos into the interior of Baffin Island to

Small face red with cold, a Pelly Bay girl peeks from a hood trimmed with dog fur. Her features reflect the Asian origin of North American Eskimos.

hunt caribou. Building a shelter, they ranged out in search of game but found none. One of the hunters weakened and died, and the others buried his body under a pile of rocks.

Qumangapik, Ataguttaaluk's husband, was the next to go. Dying, he begged the others to eat his body. They complied. As winter wore on, the others died one by one, and the survivors devoured them.

At last only Ataguttaaluk and the woman Iktukusuk still lived. They uncovered the buried body of the first man to die, and ate that. Finally Iktukusuk died. Ataguttaaluk began eating the body of her friend and had consumed most of it when an Eskimo family chanced by and brought her, emaciated but still alive, to Igloolik.

During a winter trip I passed over the lake on whose shore the harrowing episode had occurred. A sense of desolation lay heavy over it. People now call it Inuktorfik, "the place where men are eaten."

More than hunger threatened hunters and their families. How many died when storms or wounded walruses swamped their kayaks? When their sleds fell through the ice of sea or lake? Or when a shifting wind cracked the ice and bore those on it out to sea? Within my own time such accidents have claimed the lives of three of my brother missionaries in the eastern Arctic.

Once, on a walrus hunt, the ice on which I was standing began to drift away from shore. I tried to leap the widening crevice—and fell into the water. Fortunately, I was able to scramble back onto the shore ice. And because the 25-below-zero cold froze my caribou clothing almost instantly, the water did not even soak through to my skin!

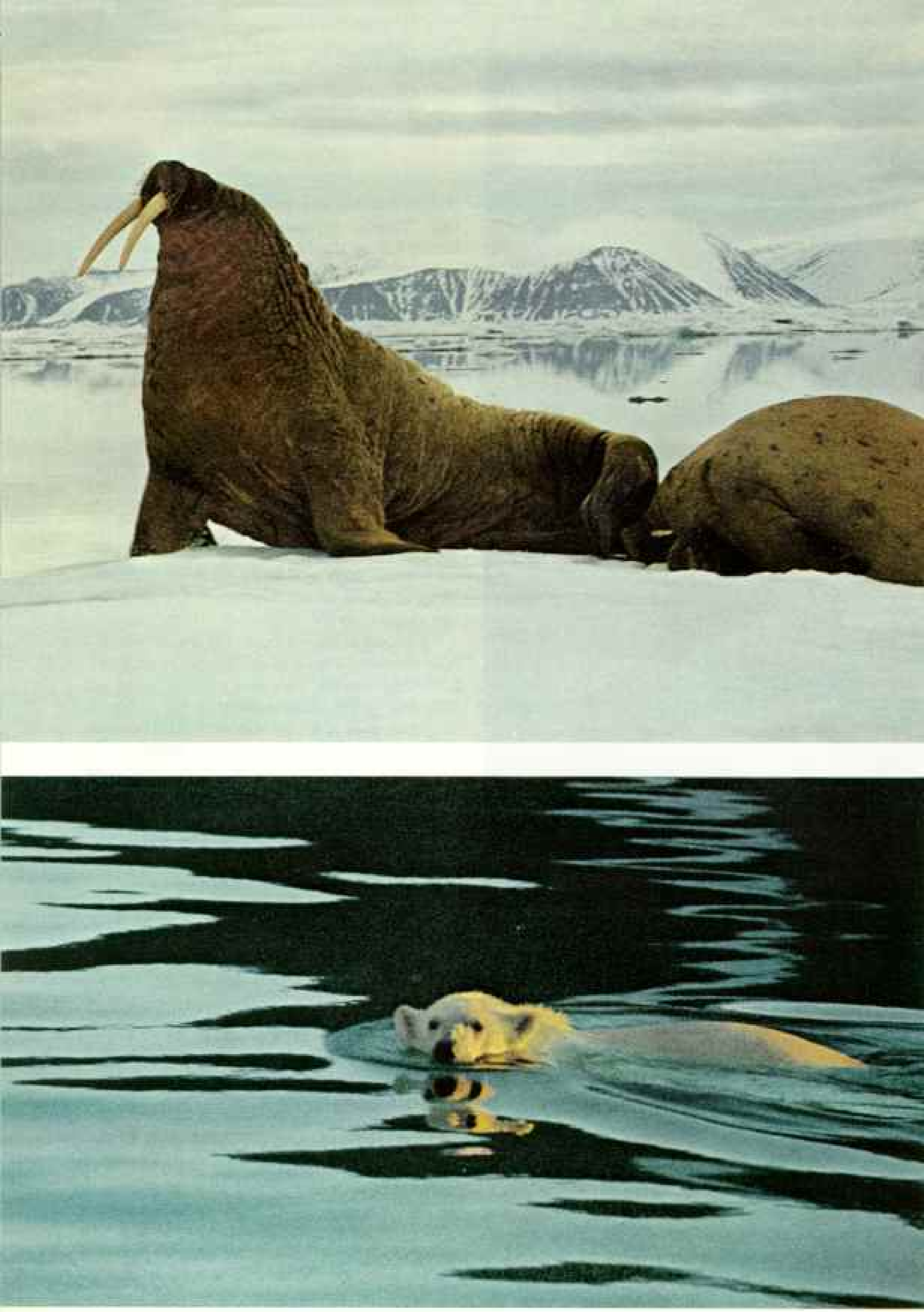
But two years later my friend Qimmerjuaq was not so lucky on the ice. The next summer's thaw revealed his body, washed ashore and half eaten by foxes.

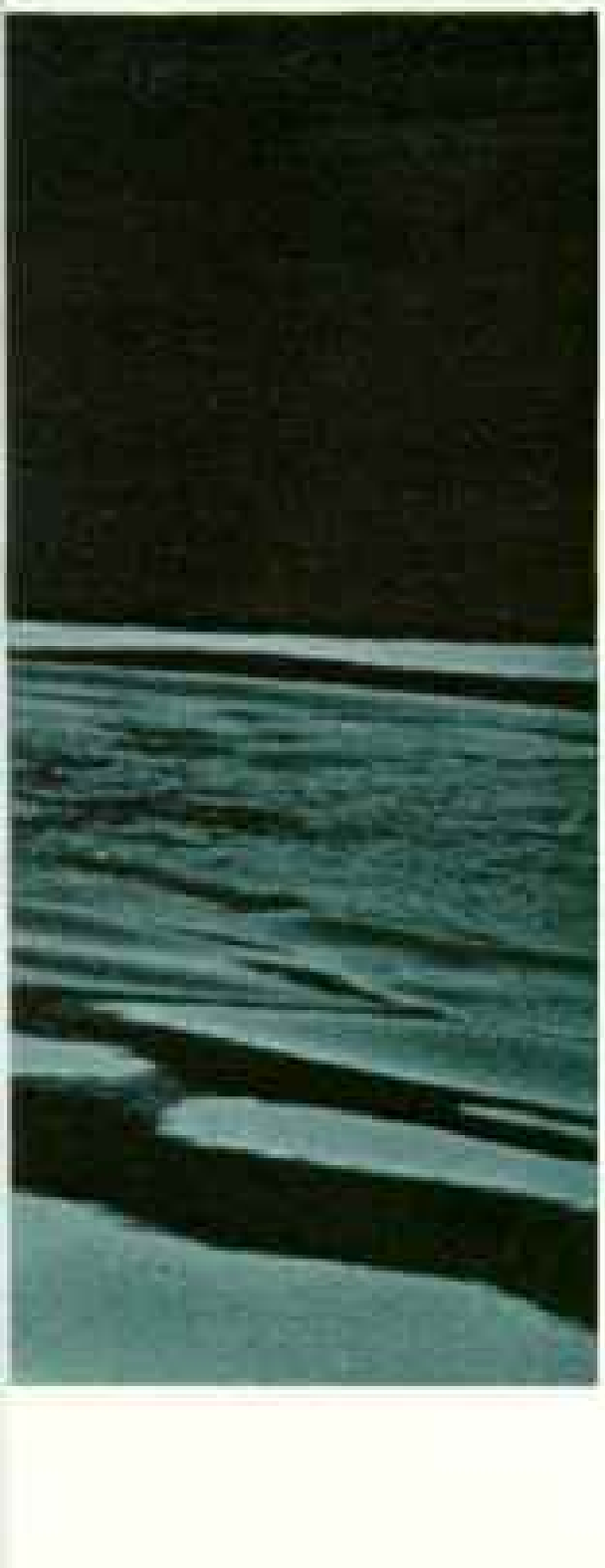
Although wind and weather always endanger the Eskimos, their animal enemies are few. The wolf prudently stays away; polar bears become aggressive only when hungry or threatened. But not long ago, these beleaguered people faced tiny enemies that troubled them even more than the big carnivores: lice.

Almost all animals in the north carry lice, from the hairy bumblebee to the narwhal and the walrus. How could Arctic man, with his rudimentary hygiene, escape such parasites?

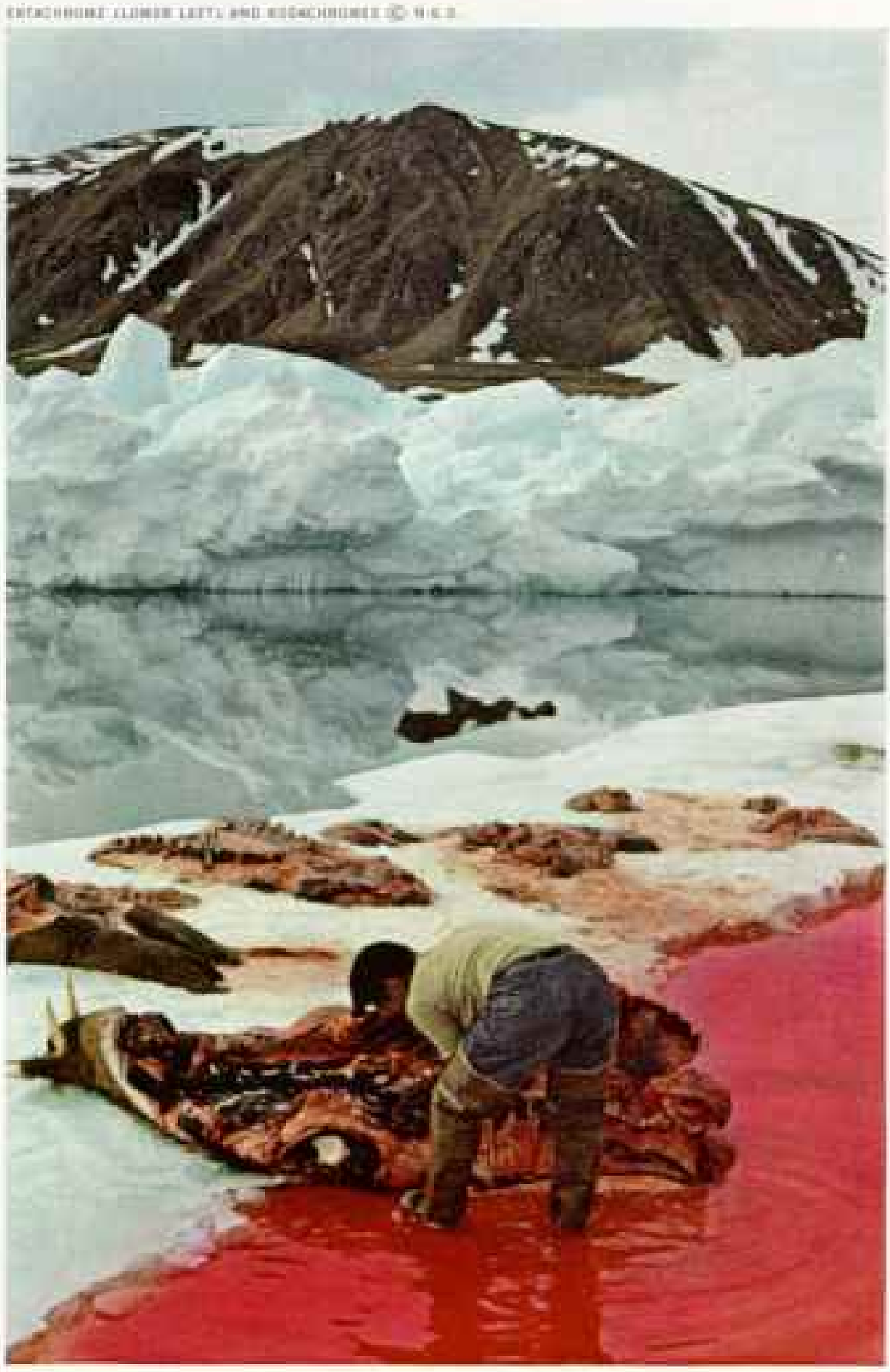
I saw children virtually eaten alive by lice, children whose heads were covered with sores. My own experience showed the louse to be no racist; he did not scorn living on the white man who dwelt with an Eskimo family. Fortunately, with progress in hygiene, the louse grows scarce in northern homes.

As if the environment were not enough,





EKTACHROME (LOWER LEFT) AND KODACHROME © N.G.S.



From icy waters, food and fur

REARING DEFIANTLY, a bull walrus stands beside a younger male, felled by an Eskimo's rifle. They float on an ice floe off Bylot Island, a favorite hunting ground for Pond Inlet Eskimos.

Awash with gore (above), the ice becomes a cutting block as the hunter dismembers a ton of meat and blubber and hacks out the ivory tusks for carving.

With bold curiosity, a polar bear off Bylot (left) looks instead of diving—an act that could cost its life. Eskimos shoot bears for their meat and coveted hides, worth some $225 at the Hudson's Bay Company store.

Most families still subsist partly by hunting, but canned foods predominate, bought with the earnings from the few available jobs and the sale of pelts and carvings, or with government allowances.

the Eskimo in bygone days had to reckon with hostile companions. Homicide, often provoked by wife stealing, was common in Pond Inlet until the end of the 1800's. I believe fear led to many of these tragedies. Men who felt threatened would act in anticipation. Sometimes, too, a killing would start a vendetta, a murderous chain reaction which would end only when one side fled.

Goblins and Spirits Inhabit the Land

In this region where the human population is small, the Eskimo's imagination peopled the tundra with all sorts of supernatural beings, most of them malevolent.

The wild land itself encouraged this. When one travels in a whiteout and grotesque ice shapes suddenly appear, when the sea ice hauntingly creaks and moans, when one sees the fairy dances of the aurora and hears the blizzard's strident whistling, it is not hard to imagine the spirits who live under the ice, the mountain dwarfs, the monsters with enormous abdomens or single eyes.

To explain the calamities of Arctic life—accidents, epidemics, famines brought by altered caribou migrations or by prolonged blizzards that prevented hunting—the Eskimo reasoned that he had offended the spirits. To minimize such offenses, he observed certain taboos. By not doing this or that, he could avert evil.

When he broke a taboo and misfortune struck, he went to the *angakkoq*, or shaman, a person considered to have supernatural powers. The shaman could determine the origin of ill fortune and safeguard a man's future.

I have heard Qipingajoq describe how he and other believers would huddle in a darkened igloo as a sorcerer performed. Invisible in the gloom, the shaman would descend into the earth, making appropriate sounds, hot on the trail of evil.

Familiar as they were with such miraculous performances, the Eskimos felt no awe when the white man brought technological miracles like the gun or airplane. After all, their shamans could kill at great distances, and since time immemorial they had flown wherever they wished, even to the moon. Today there are no avowed angakkoq, but rumors of sorcery persist.

Even in the face of misfortune, Eskimos rarely display their emotions. This is not to say they do not feel deeply, but rather that they do not believe in showing their feelings. Their anger is cold and introverted. They consider the white man, with his emotional outbursts, to be childish.

Like many Asians, Eskimos feel that they must save face. In the old days, a man would attack an enemy by humiliating him. Antagonists often assaulted each other with songs of derision, which happily provided a nonviolent release for rage. In addition, mockery could be used by the community as a whole against troublemakers. This was a surprisingly powerful sanction, sometimes driving those ostracized to suicide.

Seemingly, the Eskimos' harsh life might discourage the blooming of delicate feelings. But consider the story of Erngaut:

Widowed, Erngaut had become the wife of Utukutsuk. Another hunter coveted her, threatened to abduct her, and would have killed her husband. Erngaut loved Utukutsuk. One night she got up and dressed, singing to herself. She went to her stepdaughter, who lived in the same igloo, and gave her her cooking pot. Then she went out and shot herself, giving her life to save her husband's.

Boys Esteemed, Girls Disdained

Because survival depended primarily on the hunters, young boys, as prospective food-getters, were crucial to each family's future. They often became kings, and sometimes tyrants, of the households. I remember seeing at Baker Lake a six-year-old child suckling his mother and then imperiously demanding a few puffs from the maternal pipe.

The status of Eskimo women was usually low, and especially that of girls. Sometimes infant girls were killed, for they could be of little use to the family until grown, at which time a husband would take them away.

Judged by the standards of the outside world, all these incidents may appear strange. But I dislike generalizations.

Even so, there is one sweeping assertion

Raw fish eyes are like candy to an Eskimo. Armed with an *ulu*, the woman's all-purpose knife, this girl struggles to gouge out the eye of an already-filleted Arctic char. Parents allow their offspring to play freely with knives—perhaps because of their belief that a child named for an ancestor is protected from harm by the forebear's wisdom.

I would make: The Eskimo is incredibly resourceful. Should his sled break down miles from nowhere, he always manages to repair it with a twist of sinew or old wire. With no mechanical schooling, he does equally well with his highly sophisticated snowmobile.

An epic of Eskimo ingenuity came out of Igloolik six years ago. That winter the village learned that a large treaded tractor, still capable of running, had been abandoned at an unused radar site on the DEW line, the distant early warning system operated jointly by Canada and the United States.* When spring came, the community launched a two-man salvage expedition. Hitching their dogs to a sled, the men set forth across the sea ice in search of the tractor, more than a hundred miles away.

Finding the snow-covered vehicle at the bottom of a hill, the salvagers discovered that the glass fuel-filter chamber was broken. They carved a wooden one to take its place.

Then they found that the small gasoline motor that served as a starter for the tractor's cold diesel engine was out of fuel. Desperate, they gathered all the combustible materials they could find, then built a fire against the big engine, warming it until it thawed enough to be started by hand. Three days later the two men and their tractor made a triumphal entry into Igloolik.

Despite their ingenuity, Eskimos recognize their limitations. A whole philosophy of living is summed up in the word "*ajornarmat*," which carries much of the meaning of our phrase "that's life." This fatalistic view prepares them to accept their hard existence—and even death itself—with equanimity.

Three Keys to the Eskimos' Dispersal

No one knows when the first of these squat, swarthy men came out of Siberia to cross the Bering Strait and drift silently across the top of North America. But when the Danish explorer Knud Rasmussen traversed this entire region in the 1920's, he discovered that the Eskimo dialect he had learned in Greenland was understood along the whole route.

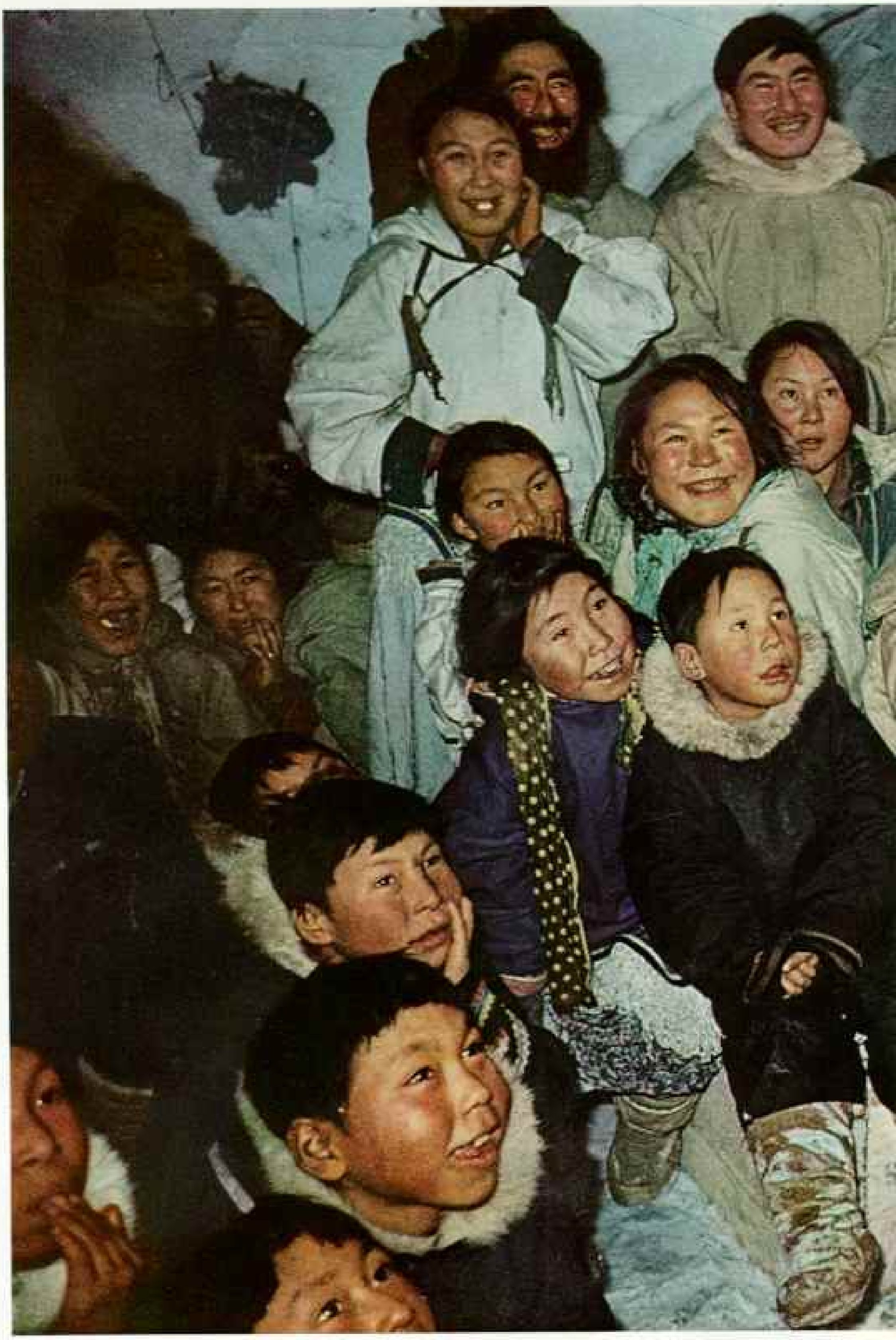
The Eskimo's mobility over so vast an area stemmed largely from three things: the dog, the skin boat, or umiak, and the igloo. At least two waves of Eskimos have come from the west to leave their imprint on the eastern Arctic land. The Thule people, from whom today's Eskimos descend, planted their

*Howard La Fay wrote of the "DEW Line, Sentry of the Far North," in the July 1958 NATIONAL GEOGRAPHIC.

Out of the deep, into the freeze: Heedless of bitter November cold, a Pelly Bay fisherman brings up an Arctic char between the caribou-horn tines of his kakivak. He attracted the fish with a hookless lure, then speared it.

Frozen within minutes of capture, two char stand tongue-high to a girl guardian (opposite). Ice-slab cache protects the catch from foxes and dogs (below).

KODACHROMES BY GUY MARY-ROUSSELIERE, © W.F. © NATIONAL GEOGRAPHIC SOCIETY



Uproarious over their own antics, Pelly Bay families watch a movie of themselves, filmed by the author in the 1950's. A spacious qaggi

KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

serves as a theater. The Eskimos' blend of traditional and contemporary clothing typifies their headlong plunge into the modern world.

culture by A.D. 1000. Before them, the Dorsets dominated the region for some 2,000 years. Archeologists today believe the Dorsets sprang from an earlier culture, known mostly by a few stone remains. For lack of a better name they call it pre-Dorset.*

Among all the Eskimos of North America, only those of Canada's eastern and central Arctic lived in dome-shaped snow igloos. Yet, because they were the Eskimos popularized more than a century ago in books by English and Scottish explorers, their snow-block houses became the enduring hallmark of all polar peoples.

It was while visiting Ataguttaaluk, the old cannibal, that I received my introduction to Eskimo archeology. I had found some stone house remains at Alarnerk, near Igloolik. Although I had assumed that they dated from the Thule period, the old woman said no—that, according to legends she had heard, they related to an earlier people. Today Alarnerk is regarded as one of the most important Dorset-culture sites in Arctic Canada.

Stone Knives More Exciting Than Radios

Each summer now, when the last snow leaves and the sun circles endlessly above the horizon, I pack up my spade and trowel. I collect a companion, usually the aged Juupi, or my trusted friend Arnakadlak, and we travel by dogsled across the sea ice to Navy Board Inlet, where we dig at a site rich in both Dorset and Thule remains (map, page 193).

My friends work tirelessly and carefully, interrupting their digging only if a seal or narwhal tempts their rifle or harpoon. Discovery of their ancestors' artifacts delights them. Though a complex camera or radio seems to them just another unexciting product of the white man's magic, they can appreciate the craftsmanship that went into making a stone implement.

Our work here and in other sites continually yields new treasures: harpoon tips, arrowheads, fragments of drums, carvings of men and animals, ivory fish lures, bow drills. It fascinates me to dig up wooden dolls nearly 1,000 years old and find them almost identical to the dolls with which modern Eskimo girls play. Thanks to the permafrost, I once found a skin plate that still held leftovers of a meal that could have been served 800 years ago.

White contact with the Eskimos in this region began in the early 1800's, when whalers started their summer incursions. These sporadic meetings brought the Eskimo an important acquisition—the rifle. It quickly replaced the bow and vastly increased the hunter's effectiveness. Occasionally he had to make his own ammunition; I have dug up bullet molds carved from soapstone.

Not until the early 1900's did white men come to Pond Inlet to winter over and trade year round. When they did, they hired Eskimos as hunters and trappers. They paid them weekly in provisions—tea, tobacco, molasses, biscuits—and these goods quickly became Eskimo essentials. Even now, Pond Inlet Eskimos call Saturday *Sivatarvik*, "the day biscuits are handed out."

Missionaries Perform Many Tasks

These years saw white Canadians dominate the eastern Arctic through the "Big Three of the North," the Hudson's Bay Company, the Royal Canadian Mounted Police, and the missions. For years the manager of the Bay store, dispensing the white man's treasures in exchange for furs, was undisputed king of the country. The Mountie represented the law of the white man. With the help of one or two Eskimo constables, he often patrolled a territory that covered thousands of square miles, and the stories of his treks by dogsled are now legends.

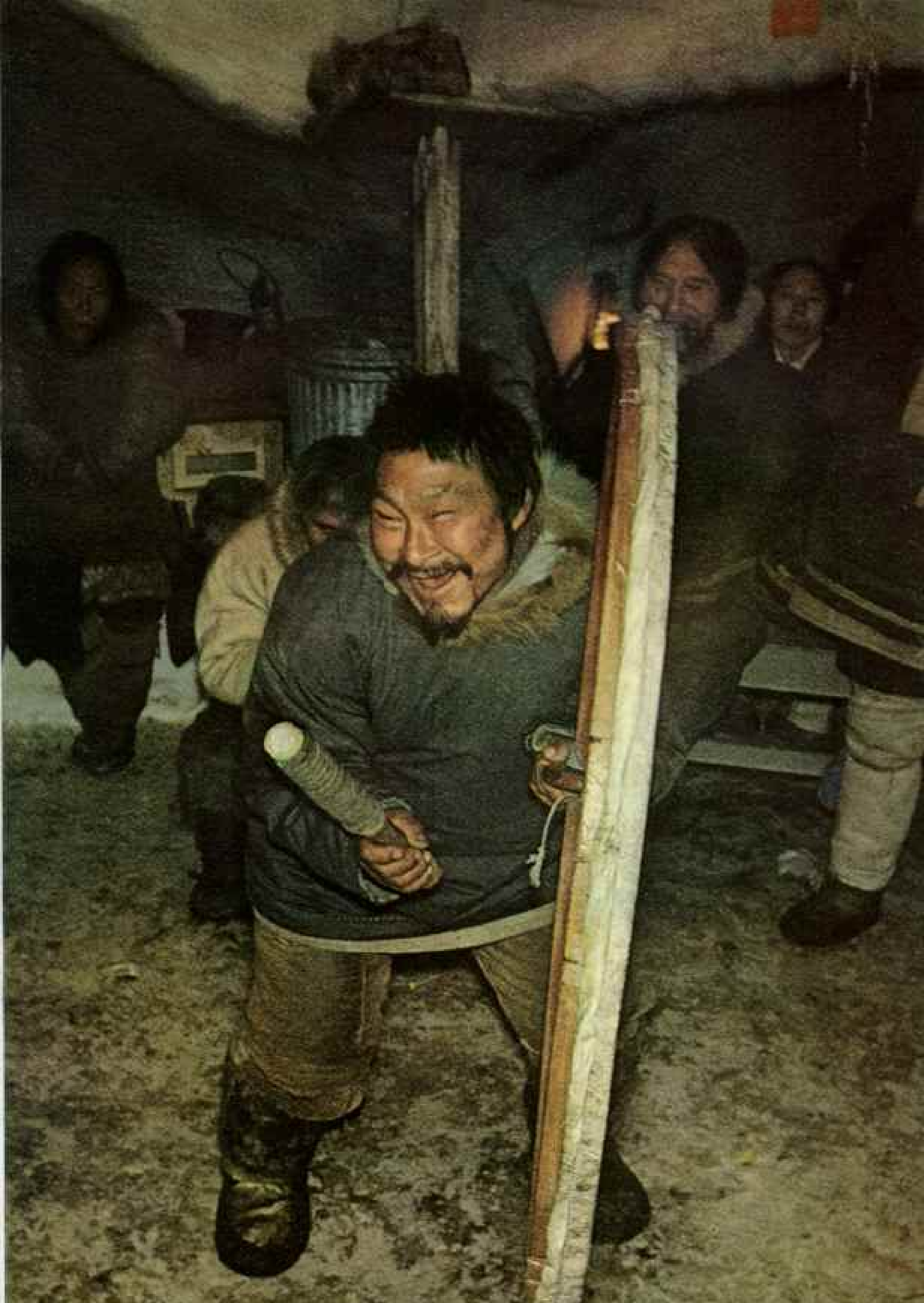
We missionaries have been reproached, as were the Bay managers and the Mounties, for having had a paternalistic attitude toward the Eskimos and bringing them an alien ideology. Whether or not this criticism is deserved, the missionaries today help lead the fight to save Eskimo culture. Two denominations, the Anglican and Roman Catholic, have been most active in the eastern Arctic.

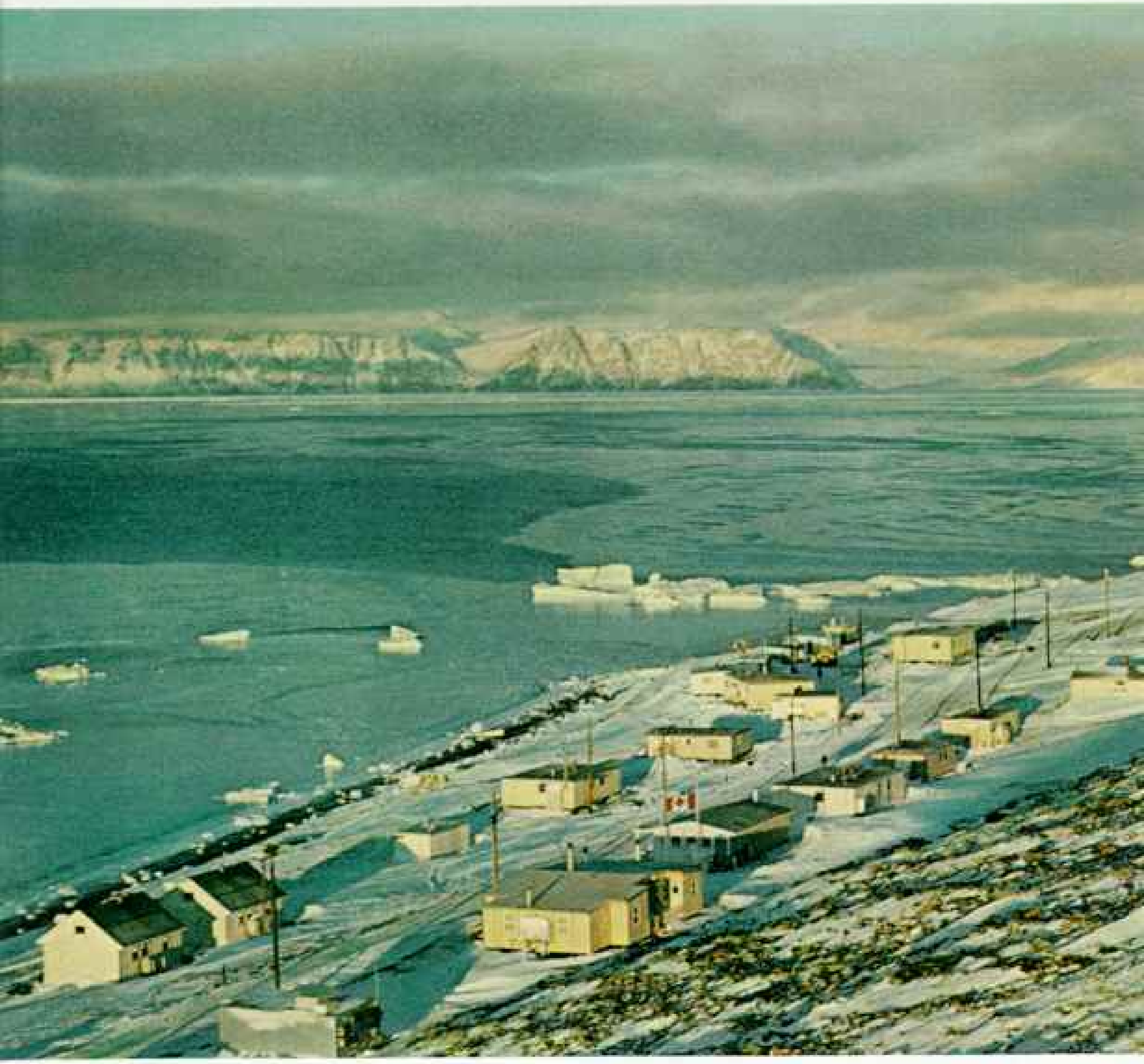
In the endless drama of life in this faraway region, we missionaries played numerous roles. Often we were lay doctors. Not only

*See "Vanished Mystery Men of Hudson Bay," by Henry B. Collins, GEOGRAPHIC, November 1956.

Pounding a pie-shaped drum, Jakupi Qinggoq dances during Christmas festivities at Pelly Bay; women around the snowhouse wall sing an accompaniment. To sound his unique Eskimo instrument, Jakupi twists it rapidly so that his drumstick strikes first one side of the rim, then the other, vibrating the taut membrane of caribou skin.

KODACHROME © N.G.S.





were we distinctly nonprofessional as diagnosticians; our patients often had difficulty describing their ailments, which they sometimes attributed to evil spirits. An Eskimo treatment for such illnesses involved changing one's name in order to confuse one's suspected tormentor.

One Sunday in Repulse Bay I learned of a man who was said to be critically ill. Rushing three miles to his igloo, I got him to tell me of his affliction, which he felt was caused by an evil creature gnawing at his entrails. A few questions revealed that all the man needed was a good dose of laxative. Ever after, he was convinced that I had saved his life.

For a while we missionaries were also teachers to neighborhood children. Let me emphasize that there has been little illiteracy in the Arctic for decades. Most people can read and write in Eskimo, using a syllabic alphabet introduced by the missionaries.

For several years at Igloolik, when supply ships failed to come and the Bay store closed down, missionaries ran a community store, stocking it with goods brought by dogsled from Arctic Bay, a 300-mile trip. Our customers seldom tarried. When the temperature is 40° below zero, one browses little in an unheated store.

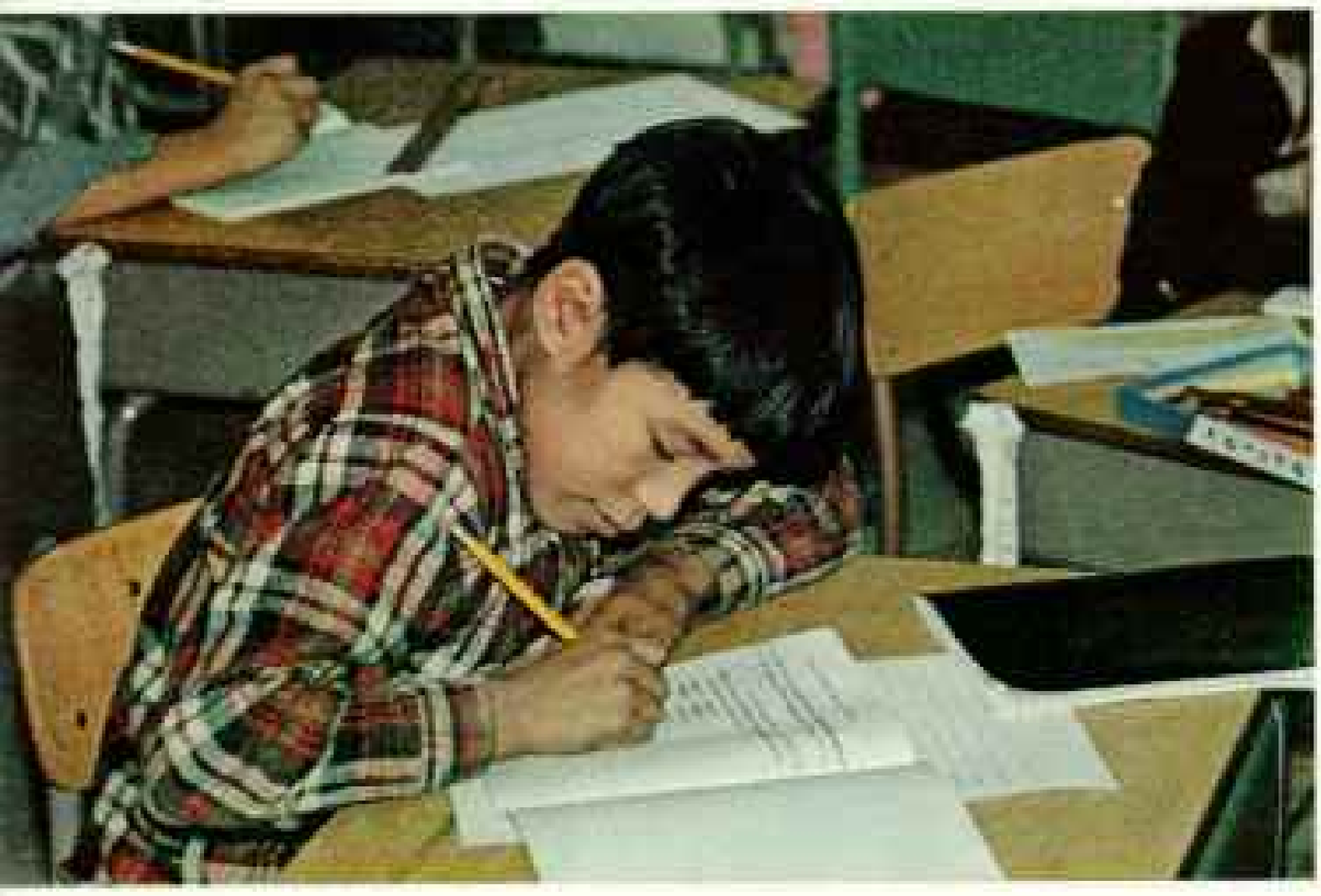
Since it would have been hard to find a single dollar in the region, we paid the Eskimos for their furs in matches, each representing 50 cents. They in turn divided the matches into piles: so much to buy ammunition, so

Shivering wedge of civilization

A GLEAM in slanting sunlight, neat houses line the main street of Pond Inlet, home of 390 Eskimos and 40 whites. Beyond blue Eclipse Sound, glacier-laden Bylot Island rears its mile-high mountains.

Typical of modern Arctic settlements, the town embraces a government administrative office, Royal Canadian Mounted Police headquarters, Hudson's Bay Company store, electric generating plant, two churches,

EXTACHROMES © NATIONAL GEOGRAPHIC SOCIETY



and a garage. Tracked vehicles distribute water and heating oil and pick up garbage and sewage.

In the spacious red school at far right, children study through seven grades. A third-grader writes a neat lesson in English (left). Beyond the school stands a modern clinic, where a mother weighs her child (above).

much for biscuits, so much for tea, tobacco, molasses.

By the 1950's the influence of the Big Three began to decline as the Canadian Government took control of the Arctic. Now most of the population centers have an administrator, often a former Bay employee or Mountie, who looks after the Eskimos' welfare. Each settlement also has its elementary school and staff of teachers, and these have truly wrought a revolution in Eskimo country.

Twelve years ago an official counted 60 camps scattered across Baffin Island, each holding 10 to 75 semi-nomadic people. To provide education for the camp children, the government built schools in strategic locations such as Pond Inlet, with dormitories for pupils whose parents still preferred to roam.

But the Eskimos were too attached to their children to entrust them to others. Little by little the parents drew nearer the school and slipped into settlement life. When, in 1966, the government started building prefabricated houses for all in the settlements, it gave the final touch to the transformation of the Eskimos from semi-nomads to townsmen.

Outside Contacts Bring Medicine—and Sickness

Modern medicine has also come to Eskimo country. In the 1950's and '60's a Canadian Government vessel would anchor annually off the coast, and its helicopter would ferry patients out for X-rays and eye and dental checks. The villagers called the ship *Mattarvik*, "the place where one gets undressed." Now airborne medical teams drop in year round, nursing stations are everywhere, and the government flies expectant mothers to a big hospital in Frobisher Bay.

But a secondary problem arises from this increased contact with the outside: Whereas the once-a-year medical call brought in only one cargo of flu germs annually, today's frequent visits continually replenish the supply. In one other respect the state of the Eskimos' health has worsened in recent years. Their teeth are deteriorating. In bygone days they used their powerful jaws as extra hands. I have seen men unscrew bolts with their teeth when fingers failed. Now, thanks to imported foods and the children's new passion for sweets, the new generation's teeth have been drastically weakened.

Dental hygiene spreads, although somewhat erratically. Once, as I camped with an Eskimo family near Arctic Bay, I watched the mother fish from her flour-bag purse a toothbrush and tube of toothpaste. She gave her oldest son the brush and an enormous dollop of paste. I rejoiced in this evidence of hygienic progress. But then he passed the brush to his younger brother, who imitated him. The brush made the rounds of the entire family.

Some settled Eskimos still live largely from hunting and fishing. Although a few own dogs, most now travel by snowmobile (page 215)—a revolution in Arctic mobility rivaling the rifle's impact on hunting.

Naturally the snowmobile has its disadvantages. Metal grows brittle in the grim cold, and breakdowns

Grinning and grunting, Pond Inlet women join in a tug of war during the community's spring games. To form sides, those born in autumn and winter months take the name of ptarmigans; their spring-summer opponents are ducks. The festival also includes harpoon throwing and sled and snowmobile races.

Cocked like catapults, sleds of baleen speed children down a slope. The youngsters salvaged the strips from a dead whale. Widely used until half a century ago for stiffening corsets, whalebone lured fleets of whalers to the Arctic; the crews gave many Eskimos their first contacts with the white man.

are frequent; a $1,000 vehicle may last but one winter. Unlike the hunter's dog, his snowmobile cannot sniff out the breathing hole of a bear or seal. And accidents are a constant hazard, as I learned in 1963.

It was November in Pelly Bay, and I was helping prepare a film about traditional Eskimo life. One day I was driving my snowmobile, pulling a sled carrying a cameraman and his equipment, when a whiteout almost blinded me. But the land was flat, and I thought it safe to go on.

Suddenly the ground dropped out from under the snowmobile and I crashed down into a deep gully. With dogs this would not have happened; I would have seen them drop into the ravine and had time to stop the sled or leap free. I was unhurt—but then came the sled I had been towing. It slammed into my shoulder like a battering ram.

An Eskimo following the same trail with his sled and dog team carried us to a nearby camp. While the Eskimo struggled through the snow for four and a half hours to get help, my feet began to freeze. Massaging restored circulation and four months in a hospital knitted the torn shoulder. But no more do I travel blind in a snowmobile.

A number of Eskimos find full-time jobs in the settlements. In Pond Inlet, one is the school janitor, another a mechanic. Others are garbage collectors, and fuel and water distributors. Even the elderly Qumangapik has found suitable employment. A law says all dogs must be tied up, and Qumangapik shoots the strays. In many a village children have been killed by roaming dogs.

More and more men find jobs helping the growing influx of prospectors who rush to exploit the Arctic's long-hidden treasures of oil, iron, lead, and zinc. Some men make carvings out of soapstone, whale bone, or ivory, while the women sew sealskin mittens and boots.

Business is budding among the Eskimos, in the form of cooperatives. These sit well with a people who traditionally shared the fruits of the hunt. They range from Pond Inlet's fledgling venture, which markets handicrafts, to the burgeoning Pelly Bay cooperative with its general store, bakery, coffee shop, self-service laundry, and tourist camp.

With these forces of change afoot, I look forward to the day when the administrators and other officials will all be Eskimos. Elections came to the eastern Arctic in 1962, and since then the inhabitants have balloted with gusto for territorial and federal officials.

PHOTOGRAPHS (ABOVE) BY GUY MARY-RUSSELIERE, O.M.I.; BOOMERANG BY TERRY PEARCE © N.G.S.

Taking their traditional toll from the sea, Pond Inlet hunters drag a plump seal toward their sled. The animal's 150 pounds of meat and blubber will feed men and dogs; its pelt may bring as much as $20. The rifleman carries a white cloth that he held before him as camouflage while he stalked his quarry on the ice.

Hitched behind a snowmobile (above), a family embarks on a 300-mile trip from Pond Inlet to Igloolik. Fast and fashionable, snowmobiles have all but replaced dogs.

A host of busy civic groups flourish, and these give training in leadership and self-government. In Pond Inlet, for example, men and women meet regularly as members of the community council, the co-op association, the rent-setting committee (often a scene of intensive lobbying), the movie-selection committee, and the PTA.

Since 1960, when the Eskimos were granted the "right to alcohol," drinking has clearly become a major problem in the Arctic. We in remote Pond Inlet, however, having no liquor store, must order ahead and pay air-freight rates to fly in alcohol. The drinking problem shrinks when beer costs $27 a case.

I remember reading that a 19th-century naval officer, taking possession of a Pacific island, said of the natives: "Let us create needs for them; then they will not be able to get along without us."

In some ways this is happening in the Arctic. If the white men were to leave one day, a large part of the population would be incapable of surviving in a country where their ancestors were able to live for thousands of years.

When we speak of the traditional Eskimo, we evoke one of two very different concepts: the image of man uncorrupted by civilization, or that of a savage lagging millenniums behind the white man.

Ever at odds with the elements, narwhal hunters drag their canoe over a floe during August breakup in Eclipse Sound. Their outboard motor quickly brings them within harpoon range of the

These two images breed opposite attitudes: "Let us leave him alone and not change him," or "Let us fashion him as soon as possible after our own image." I stand somewhere between the two positions. It seems to me that although evolution is inevitable, it can be selective. Already I see encouraging signs of increased respect for Eskimo culture among government representatives in the north.

Was the Eskimo of earlier times happy? I will answer with an anecdote.

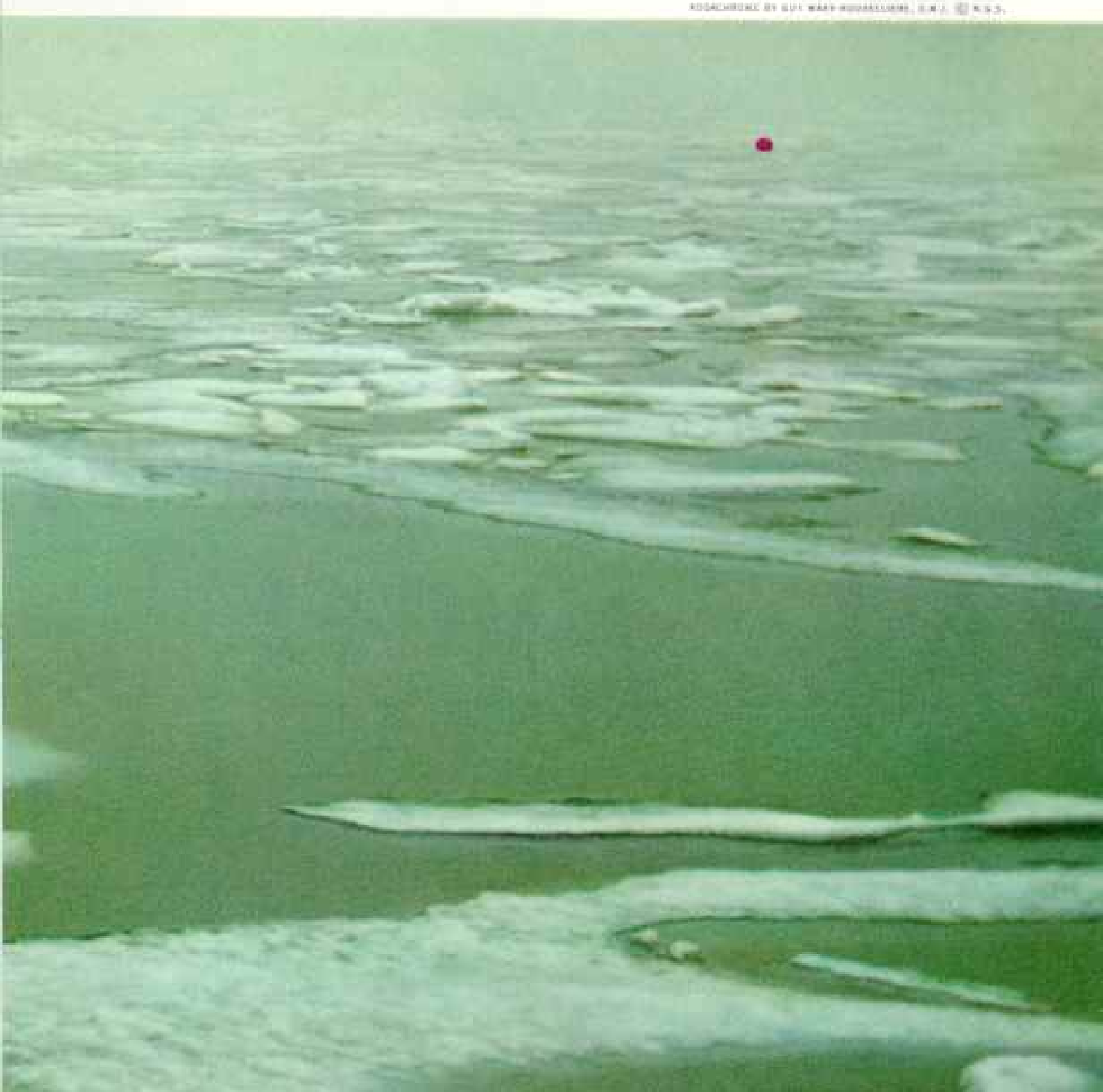
Two years ago I recorded the childhood recollections of Atuat, an old Eskimo woman from Arctic Bay. The life she described was not at all attractive: murders, famine, old people devoured by vermin or dying of the cold. . . .

Yet, Atuat finished her story by describing the games of her childhood and crying out:

"Ah! We really had a lot of fun and we were happy. The kids today don't know how to amuse themselves. . . ."

I believe it would be a mistake to see in this comment merely an old person's idealization of childhood memories. The Eskimos probably were happy, enjoying life. After difficult periods they appreciated the good times all the more. In Eskimo country, the bitterness of the struggle for life has always heightened the sweetness of living. □

sea mammals, whose tusks now fetch $10 a pound. Though modern ways bring benefits, the Eskimo will always have to contend with a land where peril lies as near as the blizzard at the front door.



Screened by daisies, a kangaroo finds refuge

Australia's

By ALLAN C. FISHER, JR.
SENIOR ASSISTANT EDITOR

PHOTOGRAPHS BY
THOMAS NEBBIA

MAGNIFICENT BEACHES rim much of the coastline of Australia's state of Victoria, but to my mind the finest is Ninety Mile Beach. As the name implies, it stretches 90 miles, empty and pristine, part of it along a narrow peninsula separating the Gippsland Lakes from the sea. There, one memorable night when the Southern Cross blazed overhead like a great brooch on a velvet canopy, I wandered the strand with three Australian friends.

The tide was full, the moon not yet risen, and the waters of Bass Strait rushed at us in long rollers out of the darkness, only to ebb down the sands in a froth of frustration. Perhaps incongruously, considering the loveliness of

in Kulkyne State Forest, one of Victoria's eight-score nature preserves.

Pacesetter State, Victoria

the night and our happy isolation, we talked of gas and oil and coal and the strong new tide in the affairs of Victoria. While we talked, we stared southward into the unrelieved blackness of the strait, as if something palpable and compelling held our eyes.

Oil Rigs Tap Offshore Riches

Something quite compelling did lie out there, though in mid-strait and far from view. Beneath huge platforms standing in the sea, wells thrust deep into primeval ooze of the submerged Gippsland Basin and siphoned off natural gas and oil. These wells tapped rich fields, their full extent not yet known.

The prevailing west wind blew strong and intrusive on our cheeks, as if reminding us that to westward lay the Latrobe Valley, another locale that had been much in our talk. There, ponderous stripping machines in vast open pits mined one of the world's largest deposits of lignite, or brown coal, a continuous seam 30 miles long, 5 to 10 miles wide, and 200 to 600 feet thick (page 221).

Only a day earlier in the Latrobe Valley, I had toured three vast, ugly, but supremely functional electric power plants, all fed by the brown coal (pages 232-3). They produce nearly 90 percent of Victoria's electricity. It seemed that everywhere I looked giant stick-men strode across the land, draping from skeletal arms the wires that carried man's

lightning into the marts and homes of a rapidly expanding state.

No matter where one goes in Australia, or to whom one talks, the subject of economic growth inevitably comes up. Since World War II, Australia has emerged from pastoral simplicity to become a highly industrialized nation. Today nearly a third of the labor force works in manufacturing, as against only a tenth in agriculture. Perhaps more than any other state in the Commonwealth, pacesetting Victoria has been caught up in the dynamics of this changing land.

Murray Graham, a solicitor and one of the men with whom I strolled beneath a strand of stars on Ninety Mile Beach, characterized his home state succinctly and well when he said, "You might call Victoria the mini-giant among Australian states."

Its area of 87,884 square miles, slightly larger than Utah, comprises less than 3 percent of the Australian Continent; only the island state of Tasmania is smaller (maps, pages 226-7). Yet Victoria supports a population of 3,440,000, more than a quarter of Australia's 12,550,000 people. It produces nearly a third of the nation's manufactures and a fourth of its farm output.

Green Gateway to an Arid Land

Much of Australia is severely arid and flat. But in thousands of miles of travel throughout Victoria I found its terrain varied, its climate more equable than the often savage heat of the continent's interior. Victoria, whose various districts enjoy a range of from 10 to 60 inches of rainfall, averages more precipitation than the rest of Australia. Mountains clothed in noble eucalyptus forests rise in the east and southeast. The well-irrigated northern and central sections produce bountiful crops, notably fruit. The rolling west supports sheep, cattle, and grain, and the coast west of Port Phillip Bay resembles Oregon's in its wild, rugged beauty (pages 248-9).

Yet Victorians tend to cluster in the metropolitan area of Melbourne, the state's handsome and prideful capital. Some 2,370,000 people, two-thirds of the state's total, live there, making Melbourne second in size only to Sydney among Australian cities.

Industrial awakening can mean blight as well as blessing. But my Australian friends remain optimistic. They point out that 5,238 acres of the Ninety Mile Beach area, including the sands I trod, have been set aside as The Lakes National Park. Moreover, little Victoria boasts 22 other national parks and scores of state forests and reserves. No industrial boom can touch those key areas.

Farmer-Premier Seeks New Businesses

Meanwhile the state confidently pursues its future under the firm leadership of Sir Henry Bolte, Premier of Victoria for the past 15 years (page 224). When he isn't politicking, Sir Henry farms—an avocation that is still a political asset in Victoria. Though the premier looks and talks like a tough-minded industrial executive, he plays the role of farmer to the hilt; his constituents often say, "He's right off his turnips, Sir Henry is."

Actually the premier, architect of a business-oriented administration, is the most indefatigable of Victorians in the pursuit of new industry and commerce. Under him the state seizes every opportunity for growth, resulting in a seemingly insatiable demand for both capital and workers.

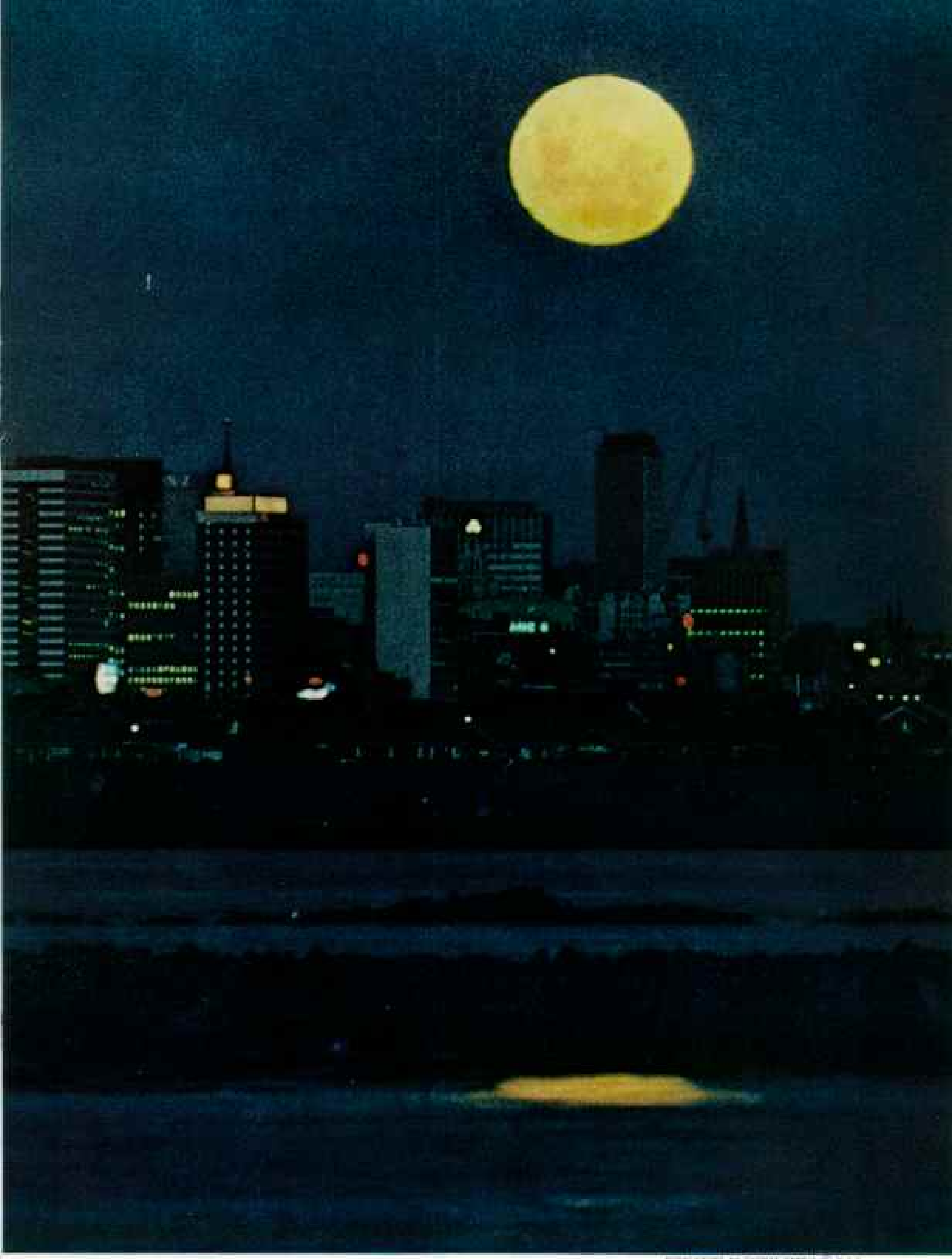
Among Australians, Victoria in general and Melbourne in particular have the reputation of being conservative. When I mentioned this to Sir Henry, he not only acknowledged the fact but embraced the description—provided one accepted his own definition of conservative.

"Savings in Victoria are far greater per capita than in any other state, and the average pay is higher," he said. "This is because we have the most modern industries, requiring skills that command the highest pay.

"And Melbourne—this city is the accepted financial hub of Australia. Every bank but one has its head office here, and nearly every life insurance company. If anyone floats a large bond or stock issue, it is done through

Constant rain from revolving sprayers guards one of the world's largest lignite deposits against fire. The colossal excavator scrapes away overburden and mines the soft brown coal beneath; from such open cuts in the Latrobe Valley flow 23,000,000 tons a year. The fuel feeds a state-owned power complex that makes briquettes and generates most of Victoria's electricity. "But it mucks up the scene," say some Victorians, expressing concern about polluted streams and permanently scarred landscapes.

Upstaged by a January summer moon, Melbourne lifts its skyscrapers beside the Yarra River. More than two million people—two-thirds of the state's population—live in the quiet, orderly metropolitan area, one of the first in the world to see suburbia develop as a way of life. Victoria's capital reflects the overriding concerns shared by



most Australians: avid interest in home ownership, an intense pleasure in family and nature, and near-fanaticism about Australian Rules football. Melbourne is Victoria's main port, transportation hub, and industrial center; the state government tries to persuade businesses to move inland, but the drive meets with little success.

City on the go

HOMEBOUND COMMUTERS sprint toward the Flinders Street Station, focal point of downtown Melbourne. Their hurry reflects the pace of Australia's financial center—headquarters of banks, insurance companies, and a stock exchange that traded 1½ billion shares last year. Clerk with binoculars (above) relays prices from the exchange board.

Overseeing an economy still developing, Sir Henry Bolte (below), Premier of Victoria for 15 years, seeks more industry, more European immigration, and an increase in foreign investments.

EKTACHROMES © N.G.S.

underwriters here. It's like going to Wall Street in New York.

"That helps explain why Victoria has the reputation for being conservative. You can't handle large sums of money without being conservative—conservative in the sense of being sound. Otherwise you don't have the money long."

The premier paused a moment, then voiced a cardinal principle of his administration: "We would hesitate to do anything here to injure an investment."

Sir Henry's administration encourages new business ventures with tax incentives, technical advice, assistance in finding sites, and numerous other inducements. As always, Victoria finds itself in direct competition for

new industries with its archrival, the state of New South Wales.* So far Victoria has more than held its own in that contest.

Rival Cities Joust for Prominence

The rivalry is equally intense between Melbourne and Sydney, the capital of New South Wales. One hears rumors that San Francisco and Los Angeles don't always see eye to eye, but their differences are as the billing and cooing of doves compared to the feeling between Australia's two biggest cities.

Numerous differences are discernible even to an outsider. Sydney often seems gay, breezy in manner, fast paced. Melbourne tends to be sedate, serious, slower paced, but with much dignity and Old World charm.

Melburnians take matters of civic recognition very seriously. Consider the city's new airport, opened July 1, 1970, and built at a cost of $50,000,000 in Australian money. ($1 Australian, expressed $A1, equals $1.12 U. S.) Earlier, intercontinental flights landed at Sydney; Essendon, the old Melbourne airport, couldn't handle the big jets. The anguish of such second-rate status was not to be endured. Victorians besieged the Commonwealth Government in Canberra until they got the money for their dreamport.

Officially it is called Melbourne Airport, but it lies in a district long known as Tullamarine, and that's what most people persist

*See "New South Wales, the State That Cradled Australia," by Howell Walker, GEOGRAPHIC, November 1967.

What swims like a fish, lays eggs like a bird, and gives milk like a mammal? The duckbill platypus, as every Australian child knows. The Sir Colin MacKenzie Sanctuary at Healesville, where this duckbill swims, raised the first *Ornithorhynchus anatinus* ever bred in captivity.

in calling it. Tullamarine, an aboriginal word, means "child of the district."

By any name this new airport is assured the sweet smell of success. Officials estimate that by 1975 it will bring into Melbourne $A140,000,000 worth of business annually.

West Gate Bridge, another big local project, suffered a severe setback last October. A span of this long crossing of the Yarra River collapsed during construction, killing more than 30 workmen. But if I know Melburnians, they will lose no time rebuilding.

City Follows Art, Music—and Football

London has always mixed its architecture to good effect, and Melbourne does the same. In the inner city many contemporary structures co-exist amicably with 19th-century buildings, some in classic Georgian style. Deciduous trees, rather than the somber gray-green or bluish eucalyptus so common to Australia, shade the broad streets and avenues. The total effect is markedly European.

The Melbourne Stock Exchange built one of the new contemporary buildings, perhaps figuring the modern look suited its reputation as a real swinger among exchanges. Western Australia, in particular, is enjoying a mining boom, and some mining stocks go through mad gyrations on the Melbourne exchange. Everyone wants to strike it rich with a new Poseidon, the stock that sold for 60 to 70 cents a share three years ago, and during my visit soared as high as $275 a share. Poseidon found a huge nickel-ore deposit.

But Melbourne's most striking building is the National Gallery of Victoria, a huge rectangle of reinforced concrete faced with bluestone blocks and surrounded by a moat. This description may sound grim, but clean simplicity of line gives the building much appeal, and the moat relieves the austerity.

Melburnians enjoy family outings, and the gallery is always crowded on weekends with parents and children. So too, in summer, is the Sidney Myer Music Bowl and the sloping lawns that surround it in the Botanical Gardens. There, concert audiences of 70,000 are not uncommon. The late Sidney Myer, a Melbourne businessman, left funds for the great "floating" acoustic canopy.

Only football, the consuming passion of so many Australians, draws bigger crowds than the music bowl. More than 100,000 fans often jam the vast amphitheater of Melbourne Cricket Ground when major professional teams clash. They play under Australian

Victoria

SMALL IN SIZE, Victoria looms large on Australia's production and population charts. The Utah-size state offers its citizens economic stability in a diverse setting of irrigated orchards, grassy plains, snow-covered mountains, lonely beaches, calm suburbs, and bustling city. On the state badge (left) a crown acknowledges allegiance to British royalty; stars of the Southern Cross also appeared on a flag hoisted during Australia's only revolt—a rebellion of gold miners at Ballarat in 1854.

AREA: 87,884 square miles. **POPULATION:** 3,440,000. **CAPITAL:** Melbourne (pop. 2,570,000). **CLIMATE:** temperate. **CURRENCY:** Australian dollar equals $1.12 U. S.

Rules, incorporating refinements that bewilder an outlander like me; the action that results, however, is gratifyingly quick and violent. Melburnians are so fanatic about the game that they are building a stadium to accommodate an ear-numbing 157,000 people.

Metropolitan Melbourne anticipates a population of some 3,700,000 by 1985 and 5,000,000 by the turn of the century. State officials say frankly they wish it were otherwise. They would like growth to be better distributed around Victoria, and the state provides many incentives for businesses to locate away from Melbourne. Nevertheless, the projected figures seem inevitable.

Geelong, whose population of 120,000 makes it Victoria's second largest city, lies only 45 miles southwest of Melbourne. It prides itself on a strong identity of its own, but inevitably the two cities will meet and merge, at least in the physical sense.

Victoria a Child of Another State

It isn't something Victorians like to think about, but the state and its capital are offspring of New South Wales. Sydney, Australia's first settlement, dates from 1788 and the establishment by the British of a penal colony. Not until 1835 did anyone get around to settling in the Melbourne area. In that year two rival syndicates moved into Port Phillip Bay in a land grab unauthorized by officials of New South Wales, who had jurisdiction over the area. These syndicates merged and became so successful that their community—named Melbourne after the British prime minister, Lord Melbourne—won a grudging official blessing.

Even in those early days the Melbourne-Sydney relationship was decidedly chilly, and in 1851 the colony of Victoria split from New South Wales and became a separate state.

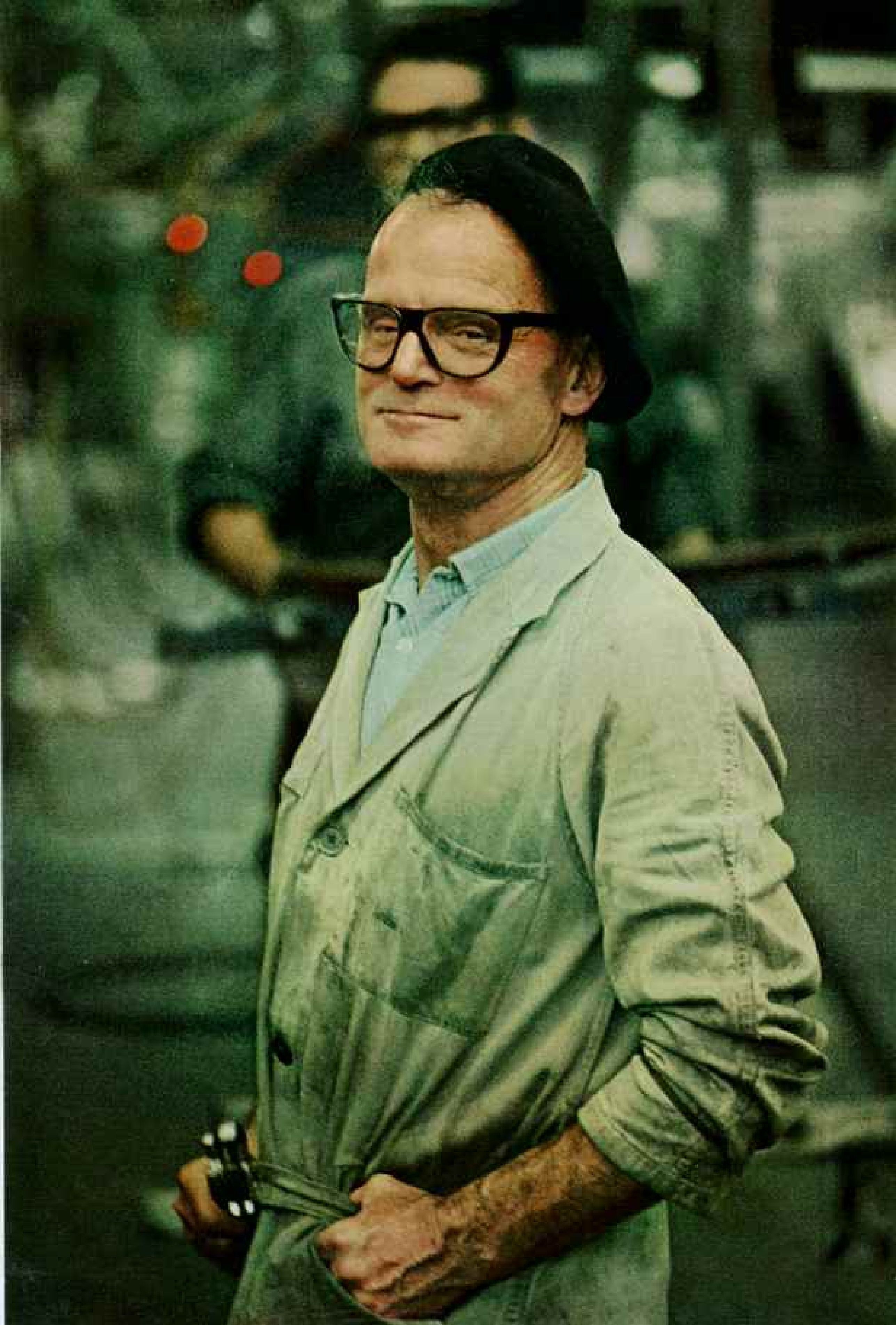
A year before the founding of Melbourne, John Batman, one of the syndicate leaders, had tried to obtain a land grant on Westernport Bay, but the authorities wouldn't permit settlement. If he had obtained his grant, Melbourne might have grown in the Westernport area, rather than on Port Phillip Bay. Only the boot-shaped Mornington Peninsula separates the two bodies of water (map, page 226).

In a very real sense Westernport Bay has just been discovered—thanks to its deep water and soft bottom. It will take ships up to 48-foot draft, and the channel could be dredged deeper. The narrow entrance to Port Phillip Bay, called The Heads, is floored with rock that limits draft to 38 feet. Big tankers and other huge modern ships can't enter and go up to Melbourne—but access to Westernport is easy and safe.

Now the area is the hottest industrial property in Australia, with land prices soaring. A large refinery, a petroleum-products fractionation plant, and a fertilizer plant all have been built recently. One of the biggest steel mills in the world is under construction.

Yet everyone is adamant that no ill must befall 39-square-mile Phillip Island, a famous tourist attraction in the mouth of Westernport Bay. It offers fine beaches and seascapes, but wildlife is its major lure. Want to watch thousands of fur seals basking on sea-lashed rocks (pages 230-31)? Peer at koalas as they browse on eucalyptus leaves in the roadside trees? See fairy penguins on parade at dusk? You can do it all at Phillip Island.

Automobiles roll out of the General Motors-Holden factory at Dandenong at the rate of 200 a day. Jigmaker John O'Dowd (right) emigrated from England 19 years ago to join a labor force that still seeks more workers. Drawn by tax benefits and such skilled labor, 150 foreign companies have settled in Victoria in the past decade.

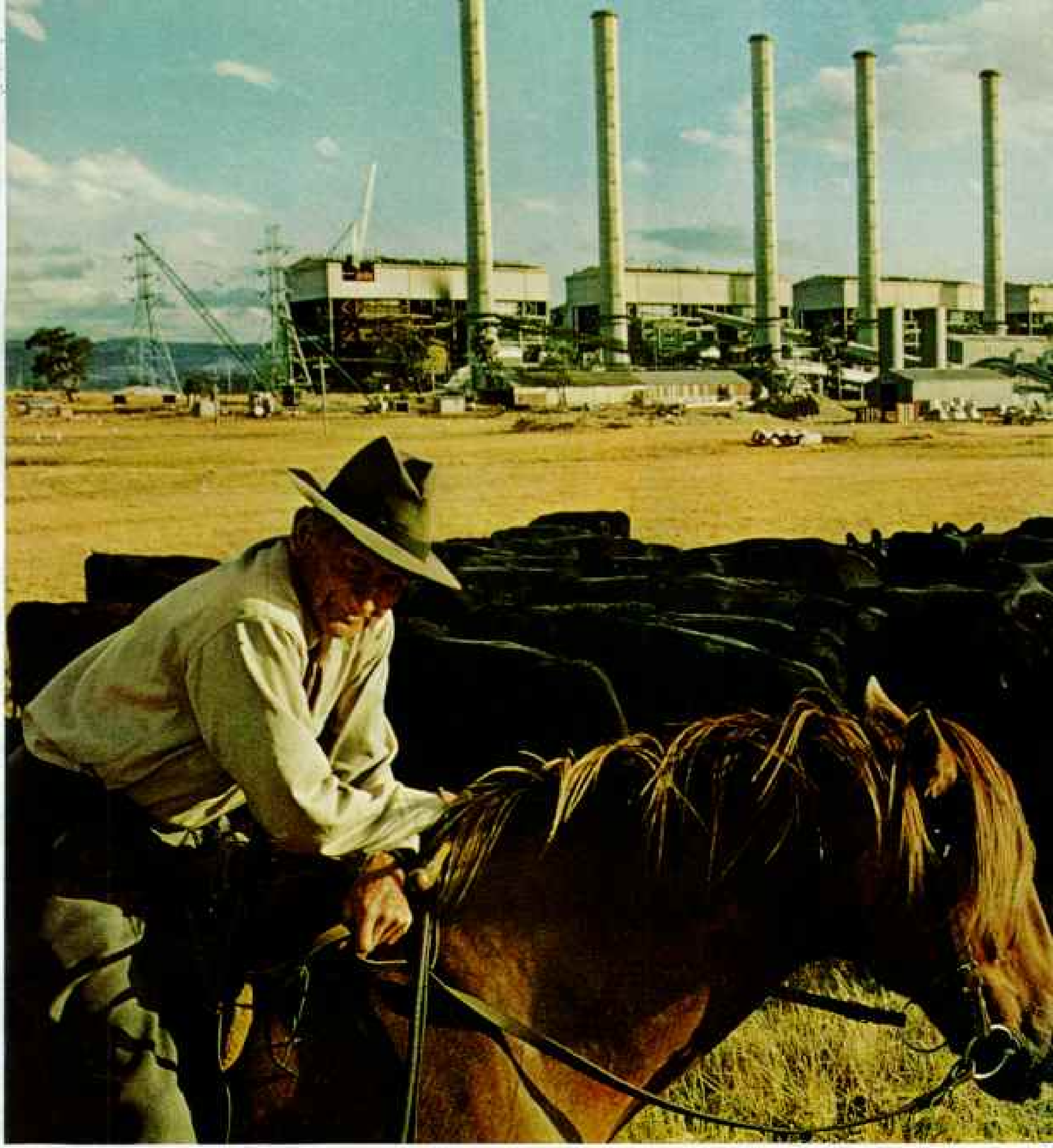


PHOTOGRAPHS BY THOMAS NEBBIA © N.G.S.

With a cast of thousands, a seal spectacular unfolds off Phillip Island. A mile away at a visitors' center (above), a spectator scans the colony of Bass Strait fur seals. Estimates set the population at 5,000.

An easy two-hour drive from Melbourne, the island holds not only seals, but also koalas, short-tailed shearwaters, and fairy penguins. Each night, oblivious to floodlights and human watchers, the little penguins parade up the beach after a day of fishing in the sea.

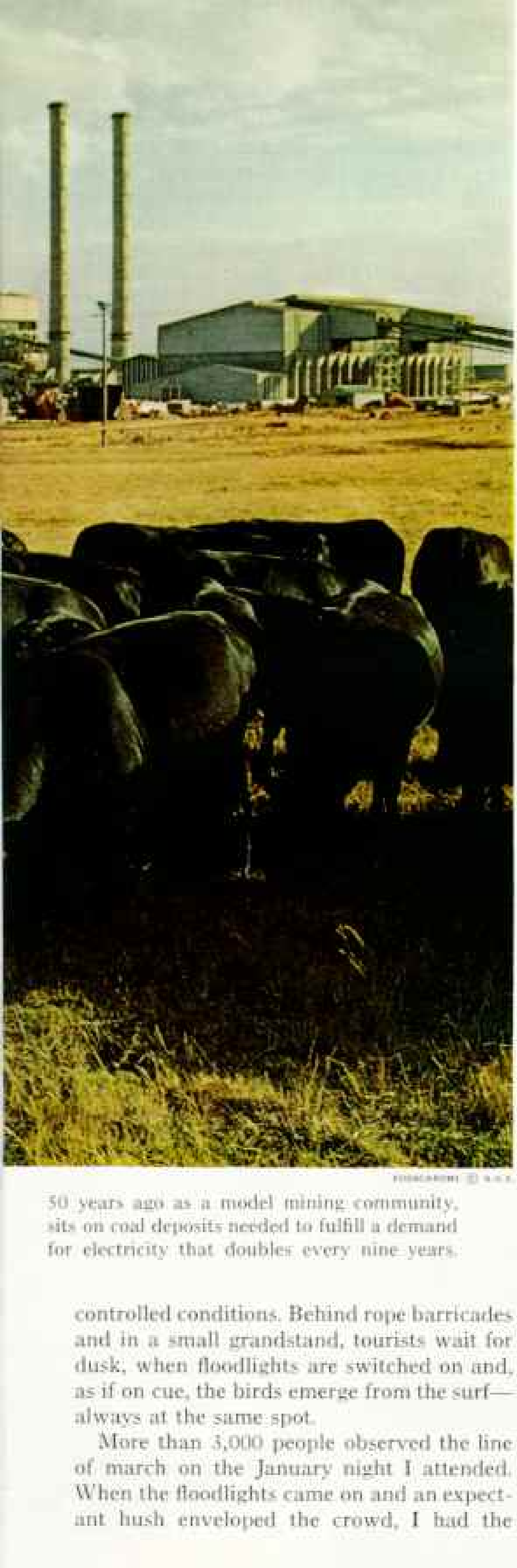
Hop-along hazards roam the fairways of the Anglesea Golf Club, south of Geelong. Kangaroos usually bound off at the sight of men, but these have become so tame that golfers often must shoo them away before making a shot.



New neighbor on the old range: The coal-burning Hazelwood Power Station rises on pastureland near Morwell, previously owned by Alfred Ronald, who retains grazing rights for his Aberdeen Angus herd. Facing displacement, the nearby town of Yallourn, built

The fairy penguins, only some 12 inches in height and the smallest of all penguin species, star in one of the most unusual shows I have ever seen. They nest in sandy burrows among the dunes at Summerland Beach, and each evening at dusk the adults waddle ashore after a day's fishing, their little bellies distended with the catch, and promenade to their nests, where they disgorge partly digested fish to feed their young. Thousands of people stand along their line of march to watch the parade.

That may sound disruptive to the penguins' home life, but it really isn't. The 10-acre nesting site back from the beach has been fenced off by the Victorian Fisheries and Wildlife Department, which admits onlookers only to the beach itself, and under strictly



50 years ago as a model mining community, sits on coal deposits needed to fulfill a demand for electricity that doubles every nine years.

controlled conditions. Behind rope barricades and in a small grandstand, tourists wait for dusk, when floodlights are switched on and, as if on cue, the birds emerge from the surf—always at the same spot.

More than 3,000 people observed the line of march on the January night I attended. When the floodlights came on and an expectant hush enveloped the crowd, I had the strange feeling of being at a Hollywood premiere, with the stars due to appear momentarily. And soon they came, usually in groups of eight to ten, all in formal dress and some so gorged they had trouble walking. The floodlights didn't seem to bother them (flashbulbs do and are prohibited). On and on they waddled, occasionally stopping to rest but paying no attention to the humans, until they reached the dark dunes behind the beach and the haven of their nests.

More than 5,000 penguins live on Phillip Island at the peak of the November-December breeding season, in the austral spring. Not all of them live at Summerland Beach, however, and tourists rarely see more than a few hundred at a time.

Albert Harmon West manages the reserve, and I asked him what his biggest worry was. "Foxes!" he exclaimed. "They will kill penguins simply for enjoyment—the filthy devils. I remember a night when one fox killed 26 of them." However, that particular fox has departed this life, assisted in the process by Mr. West. I left the reserve reassured.

Victoria Vies for New Manpower

Phillip Island will remain untouched by Westernport Bay's industrialization, but this is probably not true of isolated French Island, lying farther inside the bay. There is talk of connecting the island to the mainland by a causeway, to open it to development. A new petroleum fractionation plant provides the raw materials needed to make ammonia, chlorine, caustic soda, and other products, and a petrochemical complex manufacturing them seems an inevitable part of the Westernport scene—possibly on French Island.

Sir Henry Bolte predicts a city of 100,000 people at Westernport by the year 2000.

Throughout Australia the demand for more and more workers must be met in large part by immigrants, and Victoria woos them as determinedly and successfully as it does foreign investors. In 1969 the nation took in 185,000 new Australians, the majority British, and Victoria got 27 percent of the total.

Under Australian law the Commonwealth Government establishes policies, provides funds and assistance, and retains responsibility for immigration. State governments handle reception and welfare of sponsored British immigrants.

"We see that British migrants get accommodations," said William J. Dunne, Victoria's acting immigration chief. "That is what

sponsorship means—a place to live. We don't have to guarantee a job. By and large, however, we get a job for everyone who comes.

"Many already have jobs before they get here. An industry may come to us and say, 'We want to bring in 20 pipe fitters and joiners.' We review their case files for approval, and we meet all these people at the airport or the ship when they arrive" (pages 240–41).

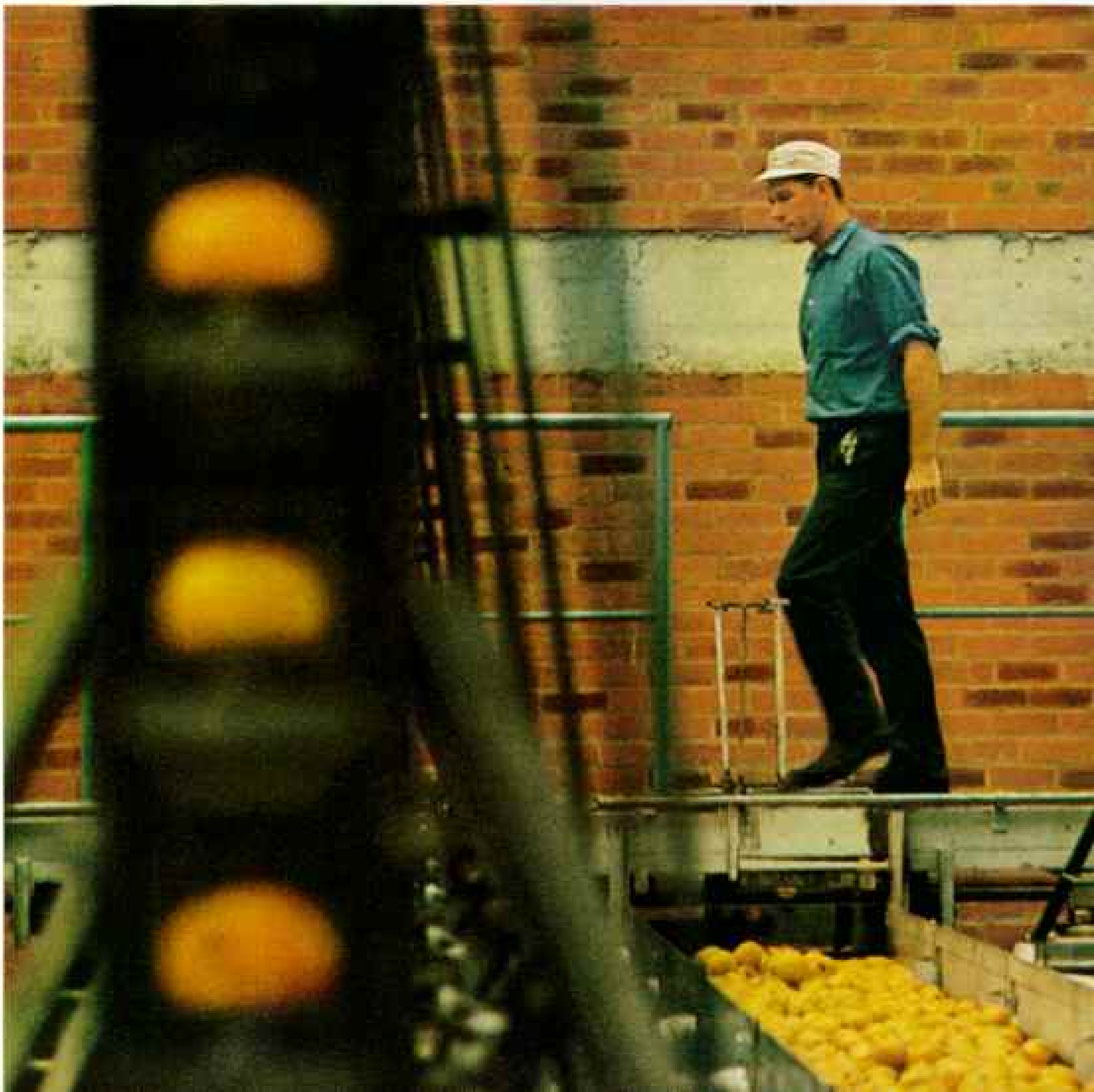
Hostels Welcome New Australians

Many of the immigrants go directly to hostels run by the national government. There they may live a year if they wish, but the average stay is only 17 weeks. Each hostel provides food as well as lodging—all free until the family breadwinner gets a job, after which modest charges are levied.

Midway Hostel, one of nine in Victoria, occupies the site of an old ammunition depot in Melbourne. No one would call it attractive, even though the government is tearing down the squat army barracks and replacing them with new accommodations as fast as it can find the money. On the day of my visit 719 immigrants lived there, most of them in tiny two-bedroom apartments. I didn't see anyone who looked middle-aged; indeed, more than half the residents were under 15.

"The name Midway signifies the halfway stage between the old life and the new," said Roy Rawson, hostel manager. "We can accommodate as many as a thousand people. Right now 17 different nationalities are represented here, but a large majority are British—we just had two boatloads in from England.

Untouched by human hands, fresh peaches move along the canning line to a mechanical pitter, parer, and canner at the Shepparton Preserving Company plant. When irrigation was introduced 60 years ago, Goulburn River growers formed this cooperative



"You won't find any men around; they're all out working. We can find jobs for the men in about three days' time."

In the dining hall I sat and chatted with a number of young mothers, who seemed optimistic and eager to begin new lives.

"We thought of the children; that's one reason we did it," said Mrs. Margaret Ward, mother of three and newly arrived from Buckinghamshire. "It would give the children a better chance and a more outdoor life.

"We wish now we had come sooner. My husband is a design draftsman, and he got a good job here easily. We should have come when we first got married."

Her reason for migrating proved typical. So did the reason given by Mrs. Joan Davies from Birkenhead, England.

"It was partly the housing situation. We have three small children. When we left England, we had been married seven and a half years and had been on the local council's waiting list for public housing all that time."

Mrs. Davies's husband, formerly a truck driver, had found a job as a security patrolman, and in Australia his chance of getting a house of his own is good. Nearly 80 percent of Australian families own their homes.

Success Story Covers Only 23 Years

A group of the women listened with rapt attention as I told them the success story of my friend Frank Kastanek, who came to Australia from Czechoslovakia 23 years ago and is today a wealthy and honored man (page 241). Frank began life in his new country as a sheepherder, became a butcher, and finally bought a struggling meat-packing firm in Melbourne. He built it up until today it ships mutton and beef all over the world.

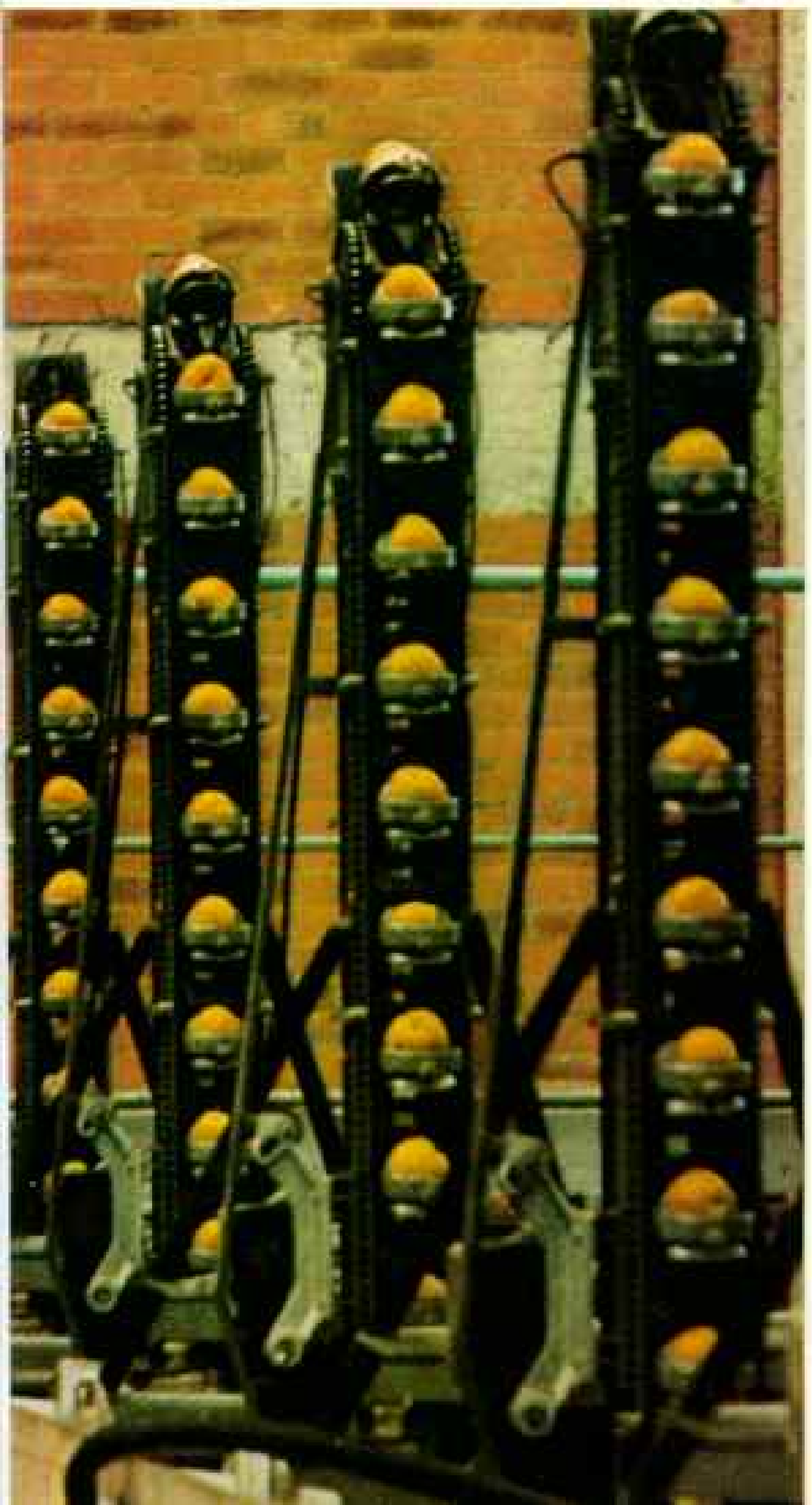
In the rugged bush country near Narbethong, about 50 miles northeast of Melbourne, Frank bought three run-down farms totaling about 1,000 acres. People told him he could never raise cattle there, but he got a chain saw and bulldozer and hacked pastures from the gum-tree forests. With his own hands he rebuilt a sagging old manor house. Today the three farms comprise showplace Tarnpirr, an Angus cattle stud; the once-decrepit house is a mansion filled with art treasures.

Acceptance among scions of the old English-speaking families does not come easily to immigrants, but Frank won admission to that most exclusive of clubs, the Pups, an organization devoted to charitable works and traditionally limited to 25 Melbourne businessmen. Seeing-eye dogs for the indigent blind . . . college scholarships for orphans . . . help for the crippled—you name the cause, and the Pups have given quiet, generous help.

I know because I'm a Pup, thanks to Frank and other Pups who are also members of your Society. They wanted to honor their magazine, so they made me the fourth honorary member—and the only non-Australian—since establishment of the club in 1948. Two months earlier Prime Minister John Gorton had also been made an honorary member—the third.

One day Frank Kastanek drove me to the highest spot on his property. There we looked out over magnificent hills dark with gum trees and a valley green and verdant with open fields. Frank is a mustachioed little bull

to can and market peaches, pears, and apricots. The company ships 80 percent of its hundred-million-can annual pack overseas.



of a man with the gentlest of souls, and as an American I was touched by what he said in his heavily accented, halting English.

"It is hard country for newcomer, but you can succeed here. I compare it to the America of 200 years ago. When I get big problem, I ask, 'What would American pioneer do?' and I always find answer. Yes, he did not have modern technology, but he applied common sense to his problems. Your people have been big inspiration to me."

Gazing with emotion-filled eyes over his property, Frank added, "I came to Australia with only toothbrush. But this is the land of the future. It's a wonderful country.

"They said when I bought this place, 'You are a sucker.' But I did it. I cleared the land, and at night I studied U. S. farm publications. These told me what to do. But it has been so very hard. Sometimes I ask myself, 'Why you do this thing?' If I had to start all over again, I don't think I would have the courage."

Frank also credits NATIONAL GEOGRAPHIC with igniting his passion for art. He was fascinated by the article "Masterpieces on Tour," by Harry A. McBride in the December 1948 magazine; it described priceless paintings—many of them exhibited in the United States—that Allied troops had found in salt mines and warehouses in the wake of retreating Germans. Frank became an avid collector and now owns one of the foremost private art collections in Australia.

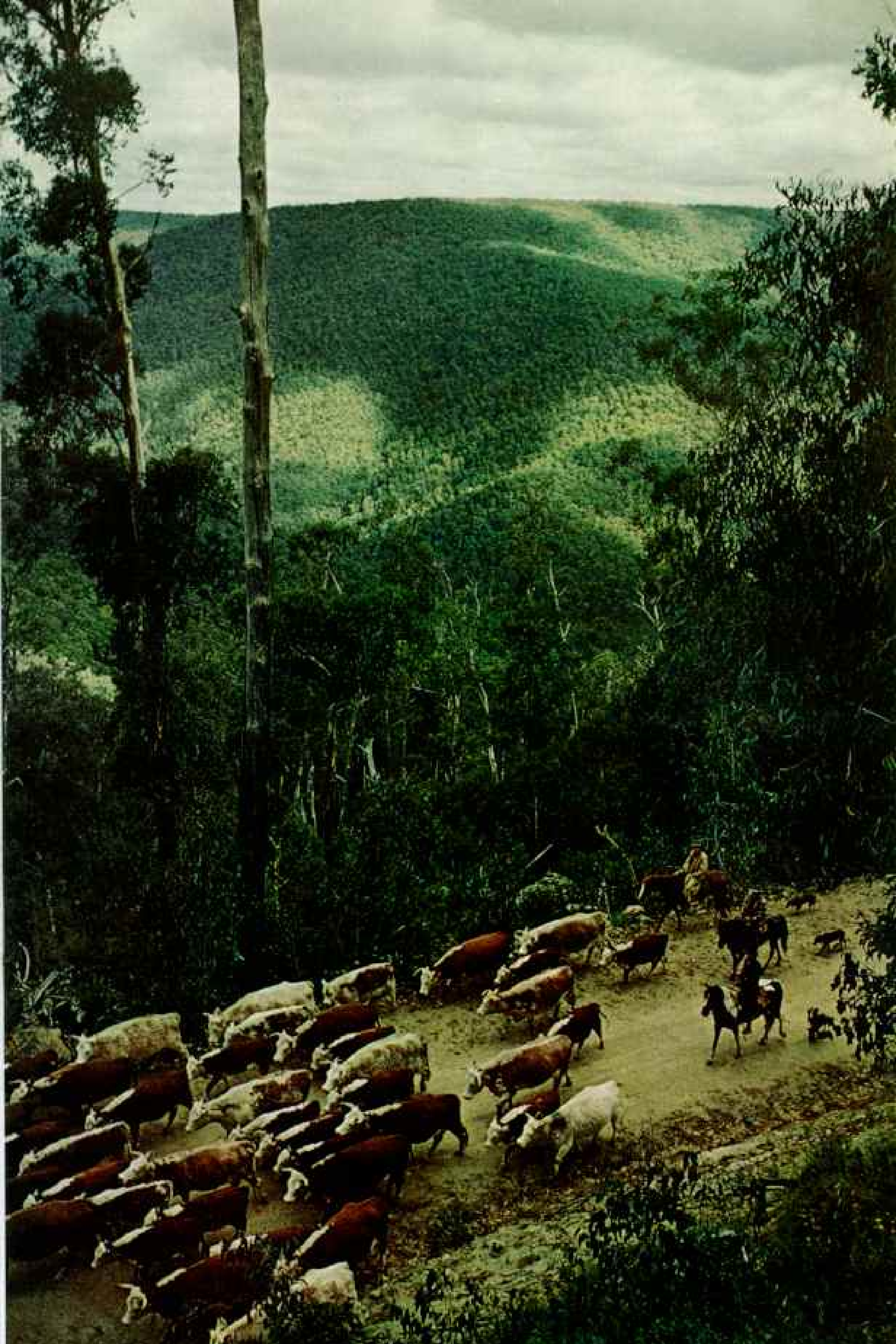
Giant Ferns Grow on City's Edge

Tarnpirr lies just beyond the lush Dandenong Ranges, which begin only 20 miles from the center of Melbourne and are an asset of incalculable value to the city. They receive almost double the annual rainfall of the coastal plains, resulting in some of the noblest trees on earth and a profusion of giant ferns. Ferntree Gully National Park, 931 wooded acres at the foot of the Dandenongs, is virtually an outer suburb of Melbourne.

The nationally famed Sir Colin MacKenzie

On the trail to payoff, drovers head feeder cattle down the High Plains (right) of 6,516-foot Mount Bogong for auction at Omeo. After a summer on the moist pastures of the state's highest peak, the stock here passes shimmering eucalyptus groves. Weary 18-year-old Peter Faithfull (left) helps his father muster their animals from those of other ranchers in a herd of 5,000 that graze together in the unfenced highlands.

As synthetic fabrics depress the price of wool, many ranchers reduce their dependence on sheep and increasingly turn to beef cattle. The demand for hamburger in the United States, Great Britain, and Japan has kept prices up. Of the quarter-million tons of beef and veal Australia exports, Victoria contributes almost a fifth.



Sanctuary, a wildlife refuge near Healesville, is only 36 miles from the city. This sanctuary, named for a prominent Australian anatomist, covers 432 acres, most of it a bushland reserve. But 78 acres comprise a unique zoo, devoted entirely to Australian birds and animals. Some 220 species are on display, attracting more than 400,000 people a year. There tourists meet the world's only egg-laying mammals, the platypus (page 226) and echidna. They also see several kinds of kangaroos, most famous of the nation's 150 species and varieties of marsupials, or mammals that raise their young in pouches.

Koalas, those leaf-eating little teddy bears? Yes, the sanctuary has them, of course, plus such star attractions as wallabies, wombats, emus, lyrebirds, bowerbirds, cockatoos, parrots, eagles, and giant lizards.*

Running an all-Australian sanctuary eases his job, says V. C. Mullett, the director. "Exotic foods for exotic animals, and tremendous quantities of meat and fish—that's what a formal zoo has to provide," he pointed out. "Here the foods needed are all native and not difficult to obtain, and we have no big carnivores in Australia."

Cockatoo Banned for Using Bad Language

In the aviary housing the cockatoos, a raucous lot, Mr. Mullett paused to say thoughtfully, "These birds will talk to people—sometimes not too choicely. We had one—my, what a vocabulary! Can't imagine where he picked it up. We had to give him away."

Unfortunately, many visitors never venture beyond Healesville into mountains where giant eucalypts more than 300 feet tall grow. I enjoyed driving among them on the dirt side roads—quite passable in dry weather.

One day photographer Tom Nebbia and I sought out a lovely, too-little-visited spot called Cora-Lyn Falls. The waterfall itself seemed unremarkable, but the path to it led us through virgin woodland where only the maniacal cries of the kookaburra, a bird more often heard than seen, broke the stillness. Tree ferns towered above us, and over them soared the great trees, their stringy bark peeling off in long fronds. Hansel and Gretel would have found it an alien forest, but they would instinctively have loved it.

The Dandenongs form a part of Australia's Great Dividing Range, a band of highlands not far inland that extends along the entire east and southeast coasts (map, pages 226-7). On the seaward side the rainfall is ample, but the range keeps moisture from the interior. In the northeastern part of Victoria, many mountains reach altitudes of 4,000 to 6,000 feet, and winter snowfalls are often heavy. Victoria's lowlands, however, rarely get snow.

In the 1850's and '60's gold miners sought their fortunes—and many found them—throughout these mountains; in winter they traveled on crude skis and sometimes amused themselves by organizing races. Today the area increasingly caters to skiers. In summer the campers move in, often sharing high

Mice on a rampage

*See "Strange Animals of Australia," by David Fleay, GEOGRAPHIC, September 1963.

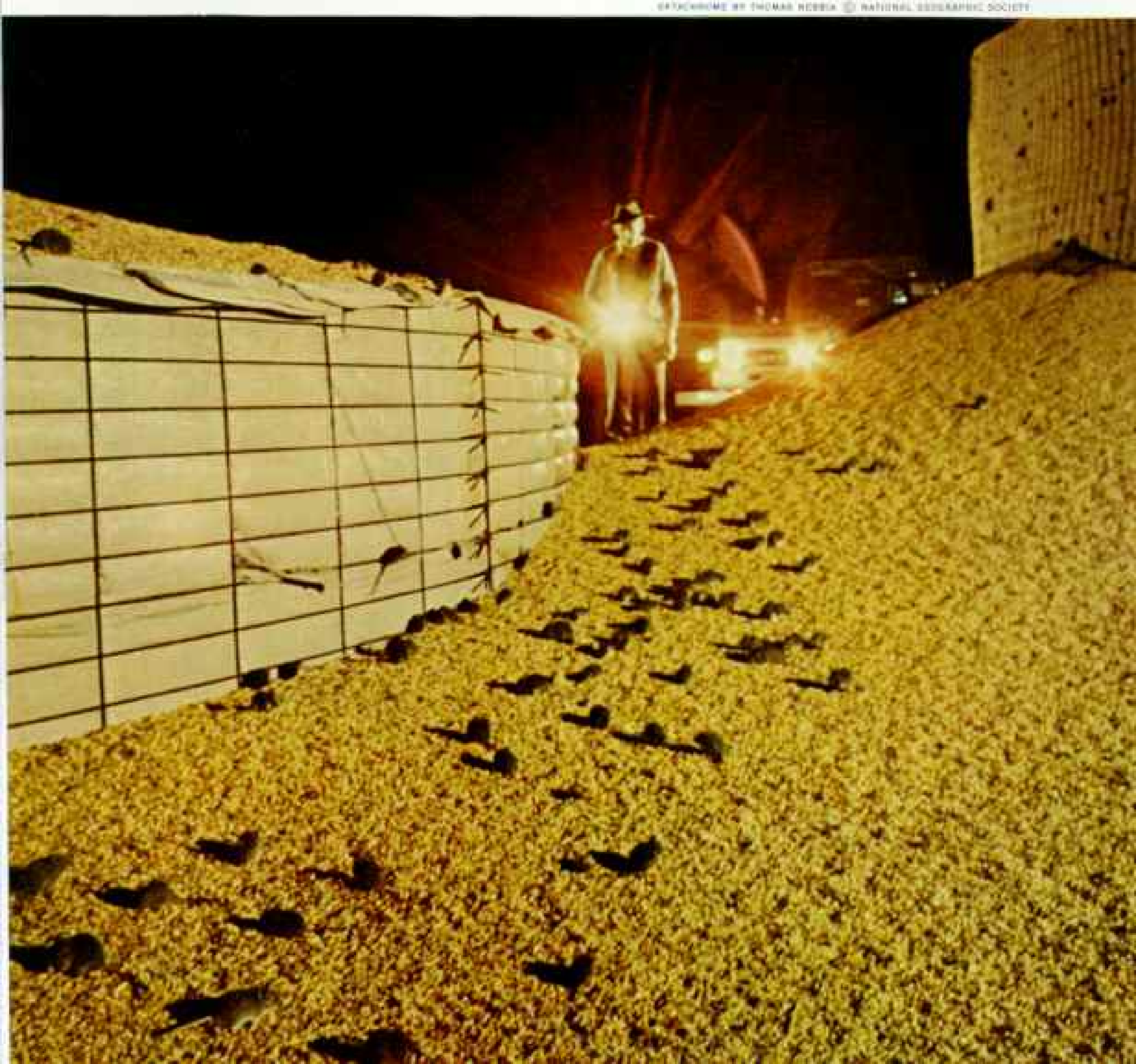
unfenced pastures with cattle driven up from the lowlands.

The scenic forest drive alone is worth the trip to one of the old gold towns, Walhalla. You find that nothing much remains of a boomtown that once counted 4,500 people, hub of an area that yielded 100 tons of gold. But there is a little no-frills hotel run by a genial former navy man named Phil Mouritz. Phil pours out a lot of conversation with the beer at his pub, and both are good.

However, I prefer water—provided there is enough to sail on. And eastern Victoria, in marked contrast to its mountains, provides some beautifully sheltered sailing waters in the Gippsland Lakes. A narrow entrance connects lakes and sea, and there, at a town appropriately called Lakes Entrance, one of Australia's largest fishing fleets has its base. The myriad inlets and protected coves, the low-lying shores, reminded me of the Chesapeake Bay, home waters to this sailor.

For two days I poked about the Gippsland Lakes, finding them virtually undeveloped. There are several small hotels and modern motels, but nothing like the commercialization one might expect. The atmosphere ashore is relaxed, and my entertainment consisted

LIKE A PLAGUE of Biblical times, hordes of rodents ravage wheat stored in the open near Ouyen. The common house mouse has taken to the bush and multiplies rapidly in periods of high rainfall and large grain surpluses, as in 1917, 1932, and 1947. Last year the mice of Victoria, New South Wales, and South Australia again reached plague proportions. Once normal times returned, cannibalism, disease, and natural enemies again reduced their numbers. 239



To a land of promise come Italian immigrants on the liner *Australis;* relatives and friends wave from the dock (below). Welcoming newcomers with temporary housing and assistance, Victoria lures about a fourth of Australia's 185,000 annual arrivals. Once almost entirely British, immigrants now come in growing numbers from continental Europe. Czech Frank Kastanek (right) began as a sheepherder in 1948; today he owns a meat export business and collects old masters.

of beach barbecues with sailing companions and pleasant hours spent yarning with Joe "Bossy" Bull, owner of a local shipyard. Joe's men were building a 34-foot cruiser. It was pleasant to smell the aromatic chips of New Zealand kauri and see an honest wooden boat take form in the old way.

Eastern Victoria has an old seafaring tradition, and Joe knew the story of virtually every wreck for the past 100 years. Many ships met their end trying to round Wilsons Promontory, southernmost point of the Australian mainland. This gaunt peninsula is now a national park, a place of magnificent beaches and sentinel rocks where the surf smashes in with a deep booming noise reflected and amplified by the many crags and cliffs. Though I visited the park in February's idyllic summer weather, it was not crowded —a reflection of Australia as a whole.

Costs Soar as Newcomers Move In

The offshore oil discoveries, however, have brought a population explosion to Sale, one of the lakes-area communities. The town (whose name rhymes with vale) became a support point for the offshore operations and took the impact of a big gas and crude-oil processing plant built nearby. Overnight—or so it seemed—the town's population jumped from about 6,000 to 9,200. Among the newcomers were Americans, since Esso Standard Oil, in partnership with Australian interests, made the oil and gas finds.

The predictable happened: House prices and rentals rose higher than an offshore tower; a housing shortage developed. Esso helped by guaranteeing profitable leases to several home builders, who began subdivisions; other building contractors, seeing the demand, moved into the newly profitable Sale home market.

Pat Clancy, then Sale's mayor, was a man beset by money problems. "We have spent a million dollars on new sewage lines, and the end is not in sight," he told me. "We must have new wells for water to meet city needs, and another million for new roads. Yet Sale is already at its borrowing limit."

Wild wings in the sunset, ibises rise from Middle Lake. The marshy sanctuary north of Kerang shelters 10,000 of the birds, both the common white and Australia's own straw-necked variety. Some 250 species of birds have been counted in this area.

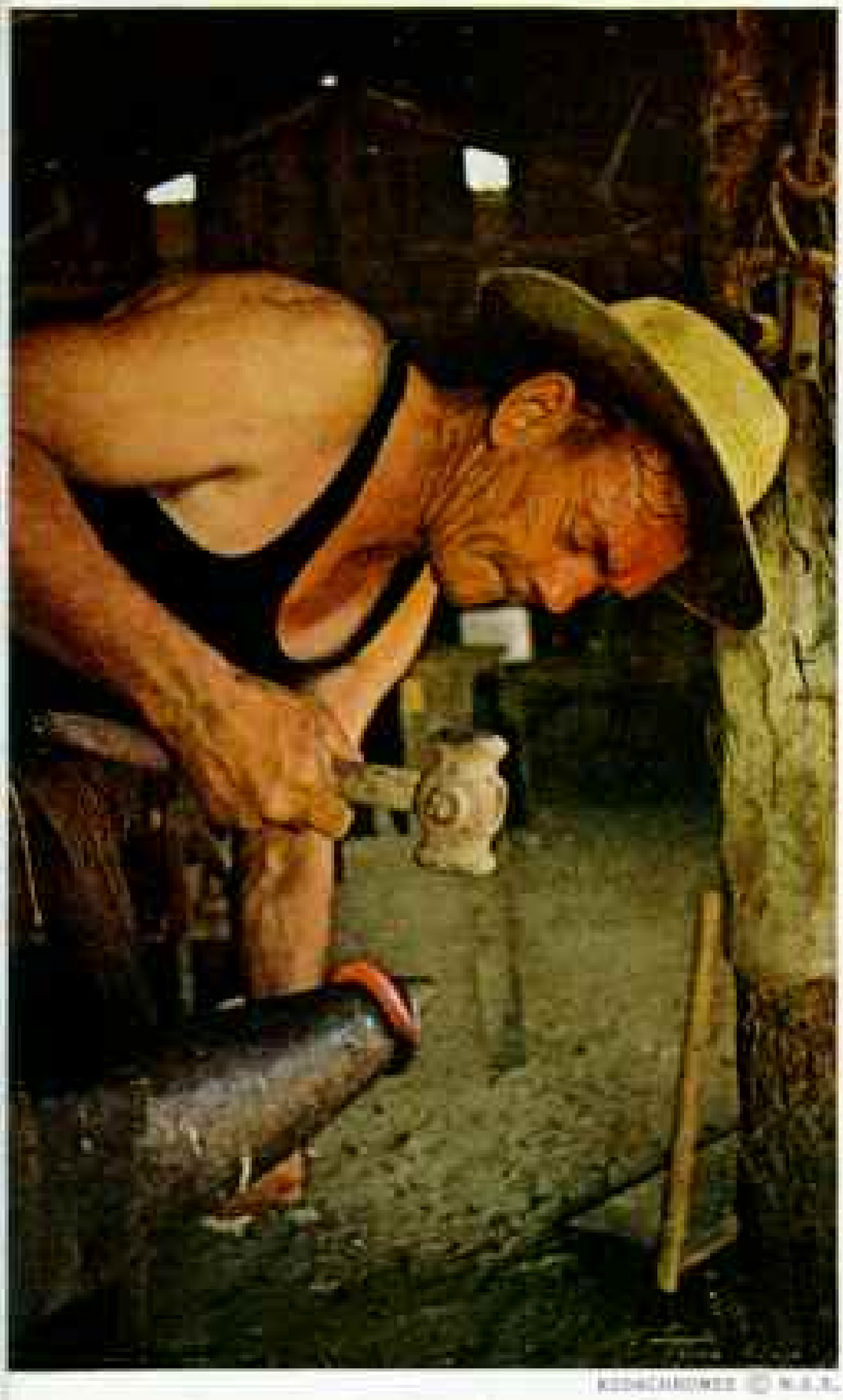
KODACHROME (FOLLOWING PAGES) BY THOMAS KOBBÉ © N.G.S.

But Mayor Clancy, an accountant by profession, seemed cheerfully certain that his town would cope. The problems might be great, but so was the spur to the local economy—and no one was knocking that.

Drive inland from the seaboard areas, as I did on a two-week swing through northern and western Victoria, and you will see the landscape become progressively drier. Only in the extreme western part of the state does the terrain take on the parched, bleak look of Australia's great central desert, but rainfall in much of Victoria must be heavily supplemented by irrigation.

Shepparton's main claim to fame is the Shepparton Preserving Company, widely known in Australia as just plain SPC and one of the largest fruit canneries in the world. Touring the ultramodern plant, I was amazed at what you can do to fruit without ever touching it with human hands: sort it, pare it, core it, slice it, wash it, cook it, sweeten it, and finally can it (pages 234-5).

My visit coincided with pear harvest time,



KODACHROME © N.G.S.

Re-creating pioneer days, Kel Lancaster shapes horseshoes in a blacksmith's shop at Swan Hill Folk Museum. Visitors also see such locally invented farm machines as a roller to break the native scrub, called mallee, in clearing fields for wheat.

Broad face of plenty, the rich red earth of western Victoria yields the state's major crop—wheat. The federal government purchases the harvest and markets it. Because of low prices and recent surpluses, farmers planted less wheat last year.

and I toured orchards where pickers moved from tree to tree with the methodism of bees. All the growers, I learned, owned shares in the SPC, a cooperative.

Kerang Protects Its Helpful Ibis

As you drive northwest from Shepparton toward the Murray River, the dependence upon irrigation becomes ever more noticeable. Near Kerang the large flow of irrigation water feeds a number of small lakes, and in one of them, called Middle or Second Lake, as many as 100,000 ibises gather during the breeding season. Indeed, at any time of the year ibises may be seen systematically searching the fields near Kerang for insects. As protectors of crops, ibises were considered sacred in ancient Egypt. They don't have quite that status in Kerang, but the ibis is the municipal symbol, and local conservationists watch over the colony with dedicated enthusiasm.

Alan Johnson, the local shire, or county, engineer, led a group of us by boat into the labyrinthine waterways of Middle Lake.

Lignum bushes and rushes choked large areas—much to the satisfaction of the birds, which had beaten down the tops of the vegetation for nesting sites. We saw thousands of ibises, their white bodies looking like snow atop a squat forest. Our outboard engine bothered them, but when we shut it off and poled our way through the shallows, the big birds did not take wing unless we ventured quite close (pages 242-3).

"There are two species here, the white and the straw-necked ibis," said Peter Disher, a vice president of the local field and game association. "We get a few glossy ibises, but I haven't seen any lately. These birds normally do not migrate, although ibises I have banded have been recovered more than 2,000 miles away in New Guinea."

Peter pointed out many other water birds: spoonbills, cormorants, black swans, black ducks. "The lake is a state sanctuary," said Peter, "and the entire area attracts birds. I have a personal count of 243 species; all told, 255 have been identified in this area."

Boomerangs Bring a Spot of Trouble

At Swan Hill the Victorian Government supports an unusual exhibition, a showplace where the people of a young nation can see how their forebears lived when the nation was even younger. You enter the Swan Hill Folk Museum through an old paddle-wheel steamer, the *Gem*, which serves as gateway, restaurant, and office for a pioneer village reconstructed on the banks of the Murray. Once the old *Gem* plied the river; but now it floats in its own little bywater.

Bank, store, blacksmith shop (page 244), newspaper office—to an American the little village seemed strikingly familiar, a tintype or a movie set from his own frontier past. I watched Ed Shore fashion a bowl on an old lathe, and Hilton Hamilton Walsh instructed me in the art of throwing the boomerang.

Hilton's mother was an aborigine, his father an Irishman—a combination guaranteed to produce someone interesting. He showed me his boomerangs, with their turns and beveled edges so essential to control. And while he threw them and they curved back, as if on call, to drop at his feet, Hilton talked.

"These things got me in a spot of trouble last New Year's Eve," he said in impeccable British-accented English. "You might say I had done a little imbibing, a bit of wine, y' know. So at midnight I began throwing my boomerangs around the town clock tower. I had an appreciative audience—until the police came. Well, I knew of no law against an aborigine throwing his boomerang, so I kept shouting, 'Show me the book that says I can't do it.' Bless me if they didn't cart me off and put me in one of those little rooms at the station house."

But only briefly and in hospitable fashion; until the red of the wine had faded, as it were.

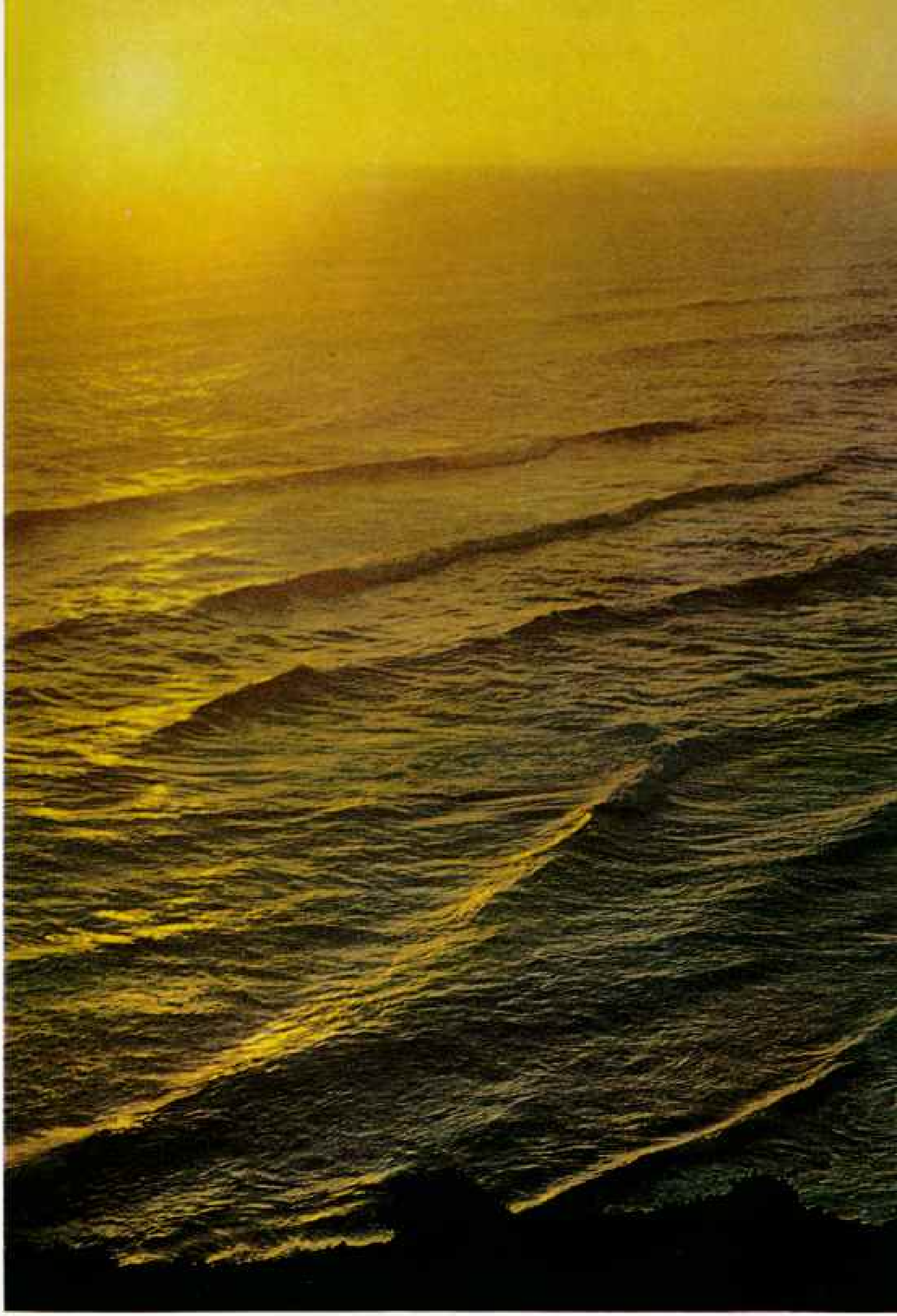
City Rises From "Howling Wilderness"

Driving on to Mildura, I entered an area that a journalist in 1887 described as "a Sahara of hissing hot winds, red-driving sand, a howling, carrion-polluted wilderness." Too bad that chap didn't hang around long enough to see the miracle wrought by irrigation. That same year, 1887, two brothers, George and W. B. Chaffey, moved into the area from California, obtained a land grant, and laid out a city. They also introduced life-giving water, lifted from the Murray River by pumps that George designed and which remained in service until 1959.

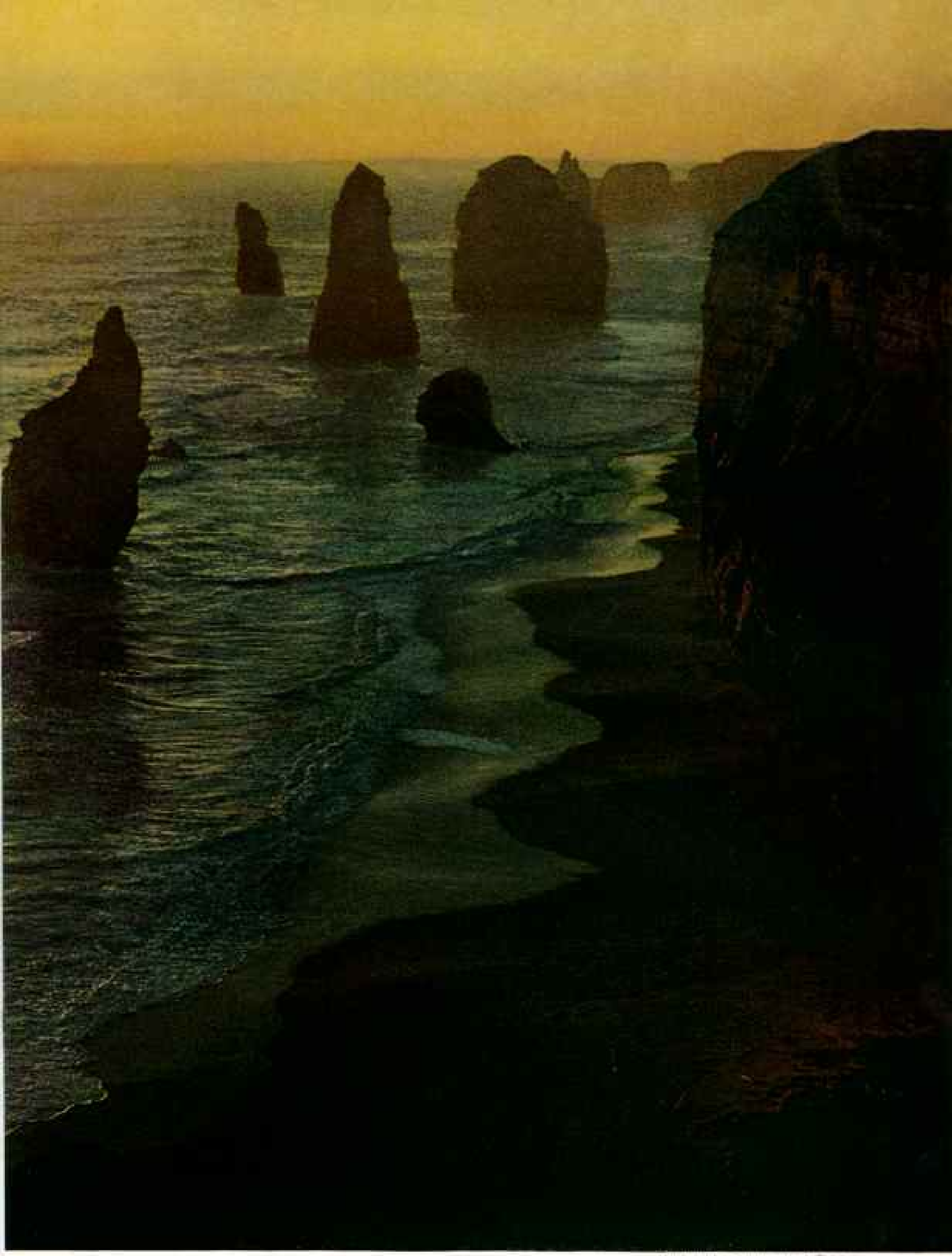
Today Mildura is one of the handsomest provincial cities in Victoria. Most of Australia's inland towns have a deadly similarity—a broad main street divided down the center by a planted area, and a crosshatch of uninteresting side streets. Mildura, however, is a lovely garden ablaze with flowers, a place of pleasant homes, and a resort area for golf, tennis, and excursions on the Murray.

Fragrant jungles of citrus trees surround the city, and I found the grapefruit growers reveling in a bonanza. The demand for the fruit—and the price—had reached all-time highs. And all because of Sir Henry Bolte. The premier, who is—or was—rotund enough

Wool launched a thousand fortunes for early Victorians, but offers less opportunity today. Here among overflowing bales at the Dalgety Wool Store in Melbourne, buyers judge the fineness, strength, uniformity, and length before bidding begins. Disgruntled by low prices and drought, some small farmers marched on Melbourne last year to show "that we cockies are still about." To meet the national problem, the federal government granted a 30-million-dollar subsidy.



Carved by the restless sea, rocks called the Twelve Apostles extend along the shoreline of Port Campbell National Park. The author found Victoria's parks filled with beauty and solitude. Warned of "overcrowding" at 120,875-acre Wilsons



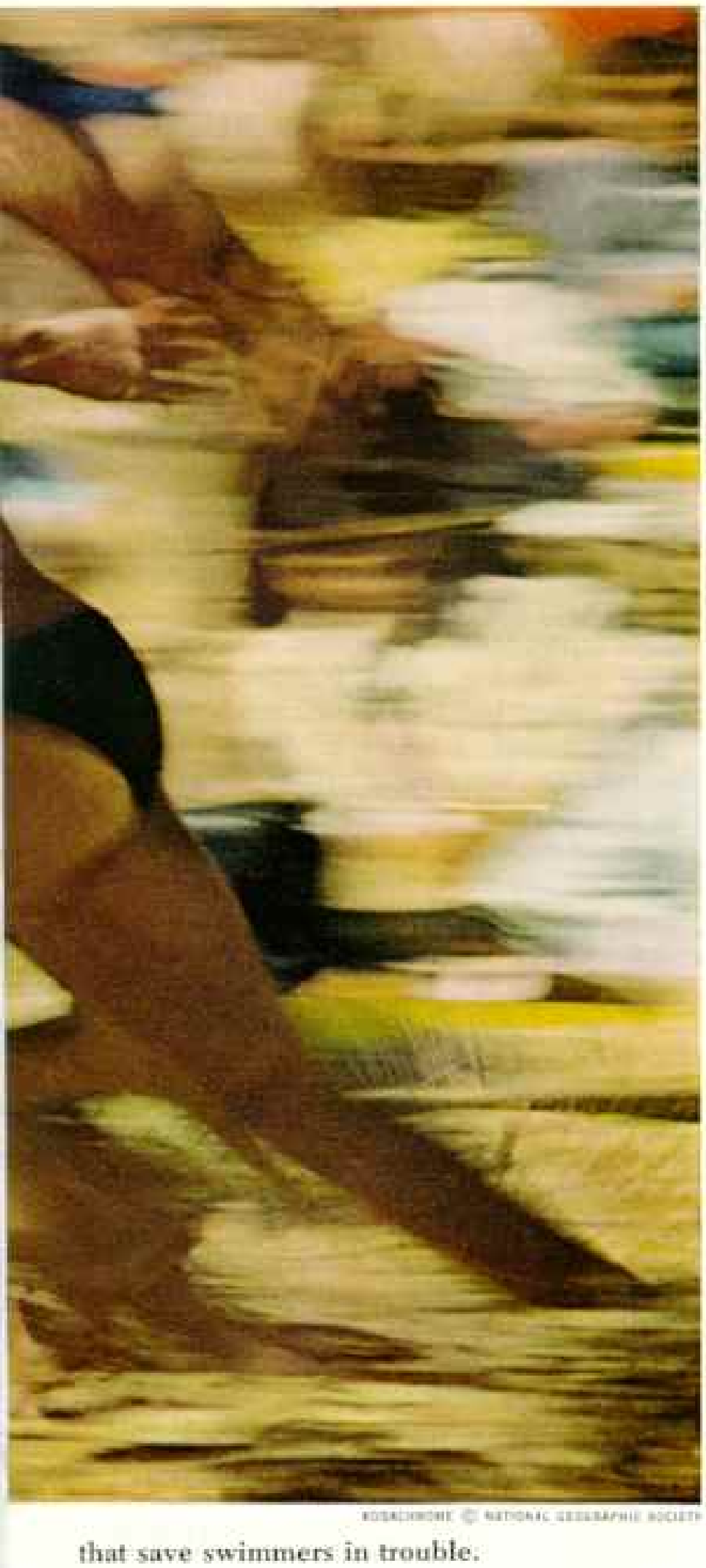
PHOTOGRAPHY BY THOMAS MORRIS © M.E.A.

Promontory National Park, he arrived to discover only 500 visitors sharing the vastness with him. Such preserves save the quality of a land that Melbourne poet Bernard O'Dowd called the "last sea-thing dredged by sailor Time from Space."

Charging toward the surf, lifeguards at a Barwon Heads beach carnival test techniques

to be called "Puddin'" by a few irreverent journalists, had innocently told a reporter about his new diet, one featuring grapefruit morning, noon, and night. He said he had lost 14 pounds. That was enough for Victoria's weight watchers. Grapefruit suddenly became the hottest commodity in the state.

Mildura's fruit once rode to market aboard paddle-wheel steamers plying the Murray River with produce and passengers. Only one paddle-wheeler remains in commission, the venerable *Melbourne*, and she is strictly an excursion boat. *Melbourne* used to be a winch boat, one that pulled logs and other snags from the river channels. Capt. Alby Pointon, a stocky little river veteran, bought the old lady in 1964 after she had lain a deserted hulk for 23 years in Echuca. Lovingly and knowingly, Alby restored her and made her into a sightseeing vessel based at Mildura.



KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

that save swimmers in trouble.

We had a great run on the river, Alby and *Melbourne* and I. There were no passengers, so Alby let me take the wheel. I had spoken jauntily of my own 36-foot sailboat, but the big old paddle-wheeler, pushed along at five knots by her original steam piston engine, answered the helm as obstinately as a hard-mouthed horse.

"You're too used to that ketch," said Alby severely. "Here, stand to one side, grab a spoke of the wheel, and lean on it with all your weight. Like this." And *Melbourne* turned to his knowing touch as sweetly and surely as my *Andromeda*.

A foray into southwestern Victoria along the Great Ocean Road takes one into country as different from the Murray Valley as coastal California is from the Sacramento Valley. The road runs from near Geelong to Portland, and you are never long from the sight, sound, and smell of the sea. Around every turn, it seems, one finds a new headland, a new gleaming beach, and always the vast blue expanse of what Australians call the Southern Ocean. It is a drive to be taken slowly and savored. Stop and watch the surfers atop the foaming combers. Stroll the soft sands. Linger in the little towns with the salty names: Barwon Heads, Aireys Inlet, Apollo Bay, Port Campbell, Port Fairy.

I lingered longest on a desolate stretch of road near the Twelve Apostles, towering rock pinnacles that the relentless waves cut away from sheer cliffs (pages 248-9). Near them, high atop a lonely headland, I found a tiny graveyard containing seven victims of the wreck of the *Loch Ard*, a vessel that went down on June 1, 1878. The bodies were buried near where they washed ashore.

Hometown of Eight Million Sheep

Portland, western terminus of the Great Ocean Road, is the only port of refuge for ships for many miles along that magnificent but severe coast. It also claims the distinction, before Melbourne, of being Victoria's oldest permanent settlement (page 253). Edward Henty led his family and crew ashore there in November of 1834, and unlike an earlier landing party, that of William Dutton in 1828, Henty's remained. With impartiality, or perhaps frugality, Portland erected a single waterfront monument honoring both events.

They say of Hamilton, northeast of Portland, that 8,000,000 sheep reside within a 70-mile radius of the town, and this is purported to be the most concentrated sheep population in the world. I believe it. Everywhere I looked, mobs of sheep grazed dispiritedly in pastures burned brown by summer sun.

It used to be said, "Australia travels on the sheep's back." The nation's economy no longer stands or sprawls on the sale of wool, but wool remains a very important business (page 247). That fact was impressed upon me when I visited Nigretta East, W. M. Moodie's sheep stud near Hamilton. Mr. Moodie also owns

Nigretta South and leases a third sheep station. Together they form a domain of 7,000 acres supporting 10,000 Corriedale sheep and 3,000 polled shorthorn cattle.

Mr. Moodie breeds prize sheep whose blood lines go back to 1874, and silver trophies crowd every mantel and table in his large house. We inspected some rams awaiting shipment to Red China, and then we drove and drove through his parched pastures. The weather had turned so dry that Mr. Moodie had been forced to truck hay into the fields as supplemental food. But that's life in rural Australia, where water is gold.

The Grampian Mountains to the north afforded relief to my spirit as well as my eyes. They rise abruptly and spectacularly in sharply tilted sandstone peaks of more than 3,500 feet. Jagged, fractured, bizarrely eroded, they look from a distance like rogue waves endlessly breaking. Seeking out the dirt back roads over and between the mountains, I chanced upon a herd of emus, big ostrichlike birds, the first I had seen in the wild outside the Kulkyne State Forest near Mildura.

Gold Miners Mount a Bloody Revolt

My route back to Melbourne took me through Ballarat, a place famous, or perhaps notorious, as site of the only armed rebellion in Australian history. Every Aussie schoolboy knows the story of the Eureka Stockade. In 1854, angered by chaotic conditions in the gold fields and inept administration, a group of miners swore allegiance to a new Australian flag and built a stockade against an expected onslaught by government troops. It came. Five soldiers and 22 miners were killed before the 128 remaining rebels surrendered. They won acquittal at their trial, and many of their demands were granted.

Today Ballarat, with a population of 60,000, ranks as the second largest inland city in Australia, after Canberra. No city in the nation is more conscious of its history—and not just because of the Eureka Stockade. Rich strikes at Ballarat fired the gold rush of the 1850's that did so much to open up Australia's interior. By 1868 some 300 mining companies operated in the district. From rich alluvial deposits and quartz veins, miners dug more than a hundred million dollars in gold.

Time and feverish diggers eventually exhausted the gold, but the city relives its days of glory in the Ballarat Historical Park. Still unfinished, the park features a reconstructed mining village and old mining equipment.

For years Ballarat has also lured tourists with a begonia festival, and this colorful civic frolic was at its height during my visit. But it conflicted with an even bigger bash, Melbourne's annual Moomba Festival, so back to the capital I went. Moomba is an aboriginal word meaning "let's all get together and have fun." That's packing a lot into one word, and Melbourne packs a great deal into its two-week celebration: plays, concerts, lectures, sports events, balls, and a mammoth parade.

Traditionally, a fireworks display on the banks of the Yarra River provides the finale. As the glare of rockets reddened sky and waters, it reminded me of my own country's Independence Day celebrations, and I remembered a conversation about the similarity between Americans and Australians that I had held with the eminent Lord Casey.

Brisbane-born Richard Gardiner Casey, Baron of Berwick, is a former Minister of External Affairs and, more recently, Governor General of Australia. From 1940 to 1942 he served as his country's first minister to the United States. Now 80, he is retired from public life.

"Our two peoples are much alike, a most extraordinary phenomenon, and very real," he said. "There are no two nationalities in the world that get on so easily and so well. That fact has been reinforced in my mind many times since my first visit to the United States in 1913. It isn't an easy thing to explain. We are both pioneering people from pioneering stock, but that doesn't explain it. Perhaps it's partly because we are both a free and easy people; we take others as we find them."

Those words came back to me often as I traveled about Victoria. I took Victorians as I found them—and I found them and their state very good indeed. □

Where Victoria began in pioneer austerity, the good life prevails; the state's first permanent settlers arrived at Portland in 1834. "To be 'one of the mob,' to accept one's environment and get on with the job, to be friendly with one's neighbors," wrote Donald Horne in *The Lucky Country*, "these are notable Australian characteristics, part of the Australian genius."

The Crab That Shakes Hands

By CLARENCE P. IDYLL, Ph.D.

Photographs by ROBERT F. SISSON
NATIONAL GEOGRAPHIC PHOTOGRAPHER

THE FOG WAS PATCHY and only a light drizzle enveloped *Dauntless*, our 94-foot crab boat. We rolled gently in the waters north of Unimak Island in Alaska's Aleutian chain.

"Unusually good weather today," remarked Anton Isaksen, the Norwegian-born skipper, as he squinted at the sky. It was summer; I watched the traps clatter menacingly onto the deck, and could only wonder what crabbing must be like when the wind blows cold and the seas rise. For as Tak Miyahara, general superintendent of Wakefield Seafoods, Inc., the firm for which *Dauntless* was crabbing, had told me, "One thing dominates this fishery. It takes

IN NEAR-FREEZING DEPTHS *prowls a ten-legged monster, its thorny shell an armor for meat prized by gourmets. Legs of this ten-pound king crab, off Kodiak Island, Alaska, span three feet. Declining catches worry both fishermen and marine biologists.*

EKTACHROME BY CHARLES R. NICKLIN, JR. © N.G.S.

place in one of the coldest, foggiest parts of the ocean, and some of the best fishing comes in winter, when the weather's at its worst."

We were after Alaska king crab, that huge crustacean of the icy seas whose leg meat, tender and delicious, has won gourmet acclaim and sparked the storybook rise of an American industry. From practically nothing in the 1940's, it has grown until today the value of Alaska's king-crab harvest totals about 40 percent that of the lucrative salmon.* For some parts of the state, such as Kodiak Island, it has become a mainstay of the economy.

North Sea Doomed by Savage Winds

The king crab, *Paralithodes camtschatica*, ranges over a broad sweep of subarctic ocean from the northern tip of Vancouver Island into Bristol Bay and to the edge of the Bering Sea pack ice—sometimes beyond. The range extends also along the Asian coast from the Sea of Japan north to the Sea of Okhotsk, and along the Kamchatka Peninsula.

The species does not range uniformly over this immense reach, and commercial fishermen work only in relatively small stretches. Main areas of abundance off the Alaska Peninsula lie near the Aleutian Islands, in the eastern Bering Sea, around Kodiak Island, and in Cook Inlet (map, page 264).

Winds of 120 miles an hour or more sometimes sweep these seas in winter. Ice sheathes the ships and snaps lines. Even in milder seasons crab fishing can be dangerous, and many a king-crab boat has been lost.

"Last year?" said Captain Isaksen in answer to my query about recent disasters. "Four boats that I can think of right off. The last was the worst; three men lost their lives. The skipper, Ed Grabowski, was a good friend of mine. He was one of the best crab fishermen too. It happened in December—a bad storm with winds far above 100 miles an hour. I turned *Dauntless* back when the wind got up to 70 miles an hour.

"We were running for shelter when our radio blared out the most feared message a seaman can get: 'Mayday! Mayday! We are breaking up on Cape Sarichef!' There was no name, but I knew that Ed had taken the *North Sea* to that vicinity.

"We discovered his boat wrecked on the beach after the storm. Ed and two crewmen were killed. The fourth man was found on the beach with a broken leg, nearly dead from exposure and shock."

I turned to the activity on deck. We had just come on a line of traps—pots, as Alaskan fishermen call them—that *Dauntless* had set out before picking me up from my flight into Dutch Harbor.

Returning to the string had been no small feat, even with the electronic aids on the bridge. An ability to navigate with great precision is one of the most important skills king-crab fishermen must have. Otherwise they would waste much valuable time searching the misty Bering Sea for the colored inflatable plastic buoys that mark the traps. Knowing exactly where they are and how to bring the ship back to them through fog or storm are matters of great pride for a skipper.

Hydraulic Hauler Raises Heavy Traps

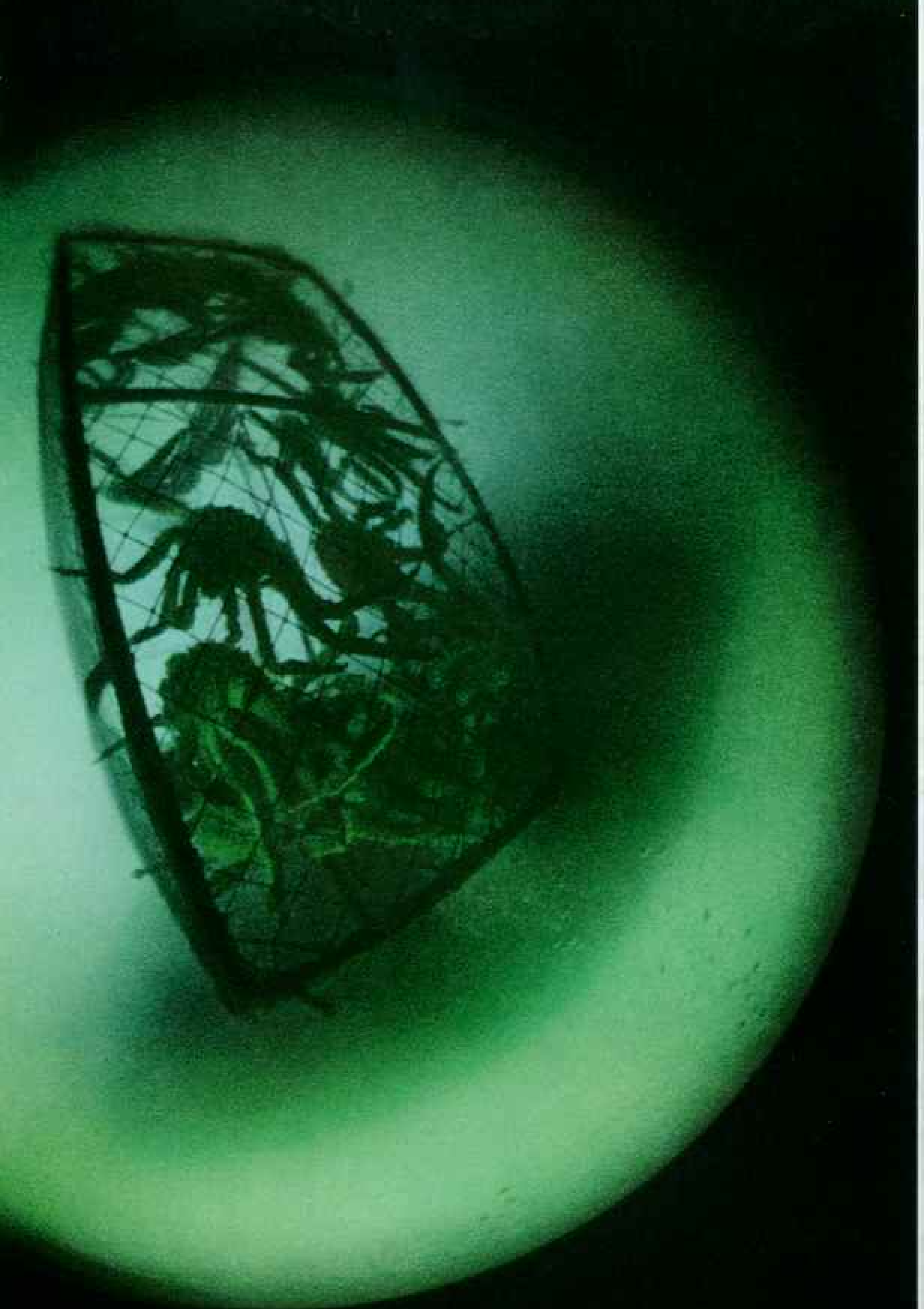
"We have 114 pots in the water here," Anton said. "They're 7 feet square and 2½ feet deep—welded steel-rod frames covered with heavy nylon mesh. And they weigh 700 pounds. Even with a hydraulic line hauler, lifting them is heavy work."

We were fishing in about 40 fathoms—240 feet—of water. The line hauler raised a trap (page 259), while a hook, thrust into its rope bridle, guided it over the rail onto an inclined grating. A tangle of crabs tumbled down the trap's tilted floor, spilling onto the deck when the access door was opened.

Long spindly legs supported each roundish,

*The author, Chairman of the Division of Fishery Sciences at the Institute of Marine and Atmospheric Sciences of the University of Miami, wrote of "The Incredible Salmon" in the August 1968 GEOGRAPHIC.

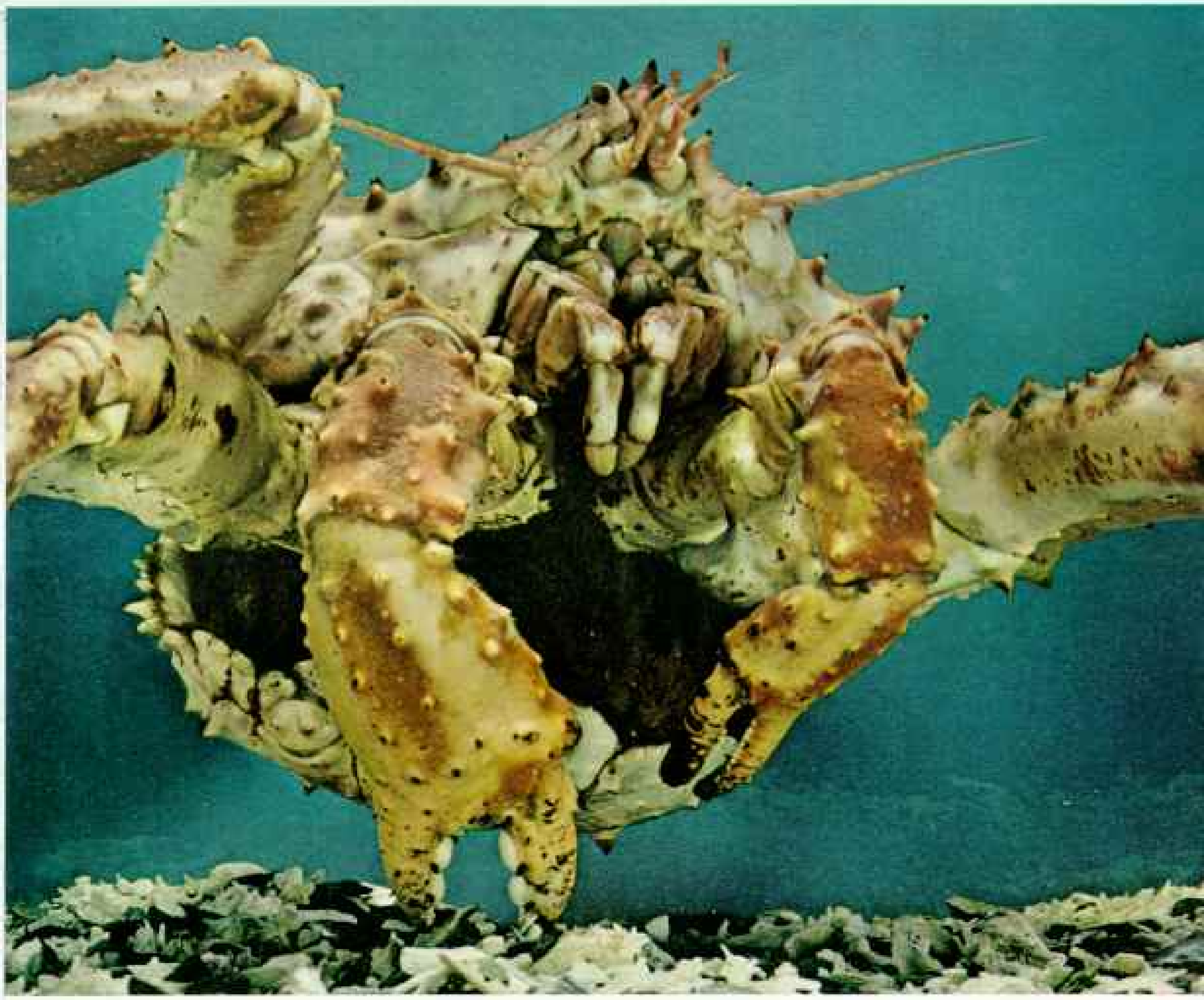
King crabs still "shake hands" even after capture. Years of experience have taught Guy C. Powell how to carry them without having his fingers crushed by their claws. A research biologist for the Alaska Department of Fish and Game, he gathers these specimens off Kodiak Island for the department's research program. From his left hand dangle two adult males, one of which shakes hands with a female; the male in his right hand also grasps a mate. Handshaking coincides with the molting stage of the female, affording her the protection of a male during a period when predators—including others of her own species—would attack her in her vulnerable soft-shelled state.



EXTACHROMES BY JOSEPH RYCHETNIK (ABOVE) AND, WITH A FISHEYE LENS, BY BATES LITTLEHALES © N.G.S.

BITTER COLD OF THE BERING SEA *harries fishermen as they winch up a king-crab pot. Today's average: 30 "keepers," male crabs measuring seven inches or more across the body. Five years ago, 50 per pot were common; some contained as many as 250. Despite the drop, high prices keep crab fishing lucrative.*

LIKE AN ELEVATOR, *a pot (left) rises toward a waiting boat off Kodiak Island. Lured by halibut heads and herring, the crabs walked up a ramp and dropped into the cage, made of steel rods and nylon mesh.*



knobby body. Eyes stood like black beads on the ends of short stalks. Sharp black-tipped spines studded the formidable armor of the dull, purplish-red backs; the undersides were almost white. Four pairs of legs were visible instead of the five most crabs show; a fifth pair, much smaller, lay folded out of sight beneath the undershell. The foremost pair ended in wicked claws (above).

The crabs tried to walk, but without the buoying support of the water they made heavy weather of it. On the sea bottom they move much more rapidly. Oddly, they travel diagonally—not sideways as do familiar crabs of the seashore, nor straight ahead as do most other crustaceans.

Unlike the blue crab of the Atlantic or the Dungeness of the Pacific, *Paralithodes* is not a true crab but belongs to a separate group that includes the hermit crab. It grows to heroic size. The largest recorded king crab had a leg spread of just under five feet and a weight of 24¼ pounds; specimens three feet across and ten pounds in weight are not uncommon.

High Prices Offset Declining Harvests

On *Dauntless*'s deck, crew members seized the largest males in the catch and tossed them down a stack to big salt-water tanks occupying most of the midship and forward sections of the boat. Male crabs of less than the legal seven inches in body width were released overboard. So were all the females, distinguishable by their smaller size and underside shell formation.

Fortunately for the fishermen, king crabs move rather slowly once out of the water. Otherwise many a hand would be badly mutilated, for the king crab's great claw can

Hatchlings' debut

COMBINING BALLET with belly dance (left), a female helps her young emerge. For 11 months she has incubated as many as 400,000 in a brood pouch under her abdomen. Now, poised on tiptoe, she shakes the dark mass within to help the larvae escape from ruptured egg cases. Close-up (below) shows two infants—tiny tailed creatures about 1/32-inch long—as they float free.

Dark eyes of about-to-hatch larvae (right) stare from the straw-colored eggs—their natural hue when removed from the shadow of the female's pouch. An amphipod, a tiny crustacean, rides atop the pile.

RESEARCHWORK BY ROBERT F. HIXON © N.G.S.

20 TIMES LIFE SIZE

crunch halfway through a broomstick or break a finger.

"Not as good a catch as I'd hoped," said Anton. "Only 14 'keepers' in the pot. A few years ago, when fishing was better, we wouldn't even dream of leaving our pots down if we got as few crabs as that. I've moved on to more promising locations when catches *averaged* 50 keepers a pot. Now we're happy if we average 30."

I was to hear more about this decline. Meanwhile Anton went on about the rosier days.

"On several occasions I've seen 250 in a single pot. I couldn't understand how they could all crawl in, they were so tightly packed.

"But those days are gone forever, I guess. If it weren't for today's higher prices, we'd be in bad shape. As it is, we do O.K."

Indeed they do! Demand for this delicacy is so strong that there is not nearly enough to go around, and the retail price is high. In markets near my Miami, Florida, home, I've paid more than $4 a pound. And to buy a whole frozen king crab for display at a fancy buffet costs $30—on special order.

Rewards High—but So Is the Investment

Although the fishermen's share of the profits equals only a fraction of those prices, the skillful and hard-working can make incomes surpassed in few other fisheries, I learned from Lowell Wakefield, head of the company that bears his name. He, more than any other man, has been responsible for the remarkable development of the industry.

"The fishermen this year are averaging about 25 cents a pound," he said. In 1968, several of the boats landed a million pounds of crabs or more. Their crewmen each took home $25,000 to $40,000 for eight to ten

months' work. The skippers and boat owners, with luck and sound management, earned even more.

But the investment is high. A new boat like *Dauntless*—with its three kinds of depth sounders, two types of radar, automatic pilot, and other highly efficient equipment—would cost $425,000 or more. Annual overhaul may be $25,000. Each trap costs about $300, and a big boat may fish 150 of them.

Besides facing constant danger, the crewmen labor long and hard for their money. The routine aboard *Dauntless* was rugged: The men were on deck by 5:45 a.m. and got few breaks except for meals until decks were washed down, often as late as 11:30 p.m. When daylight failed, the ship used halogen iodide lamps to illuminate the ocean for three-eighths of a mile around. Sleep was snatched in night-time hours, while *Dauntless* moved on to the next fishing ground.

In the ship's big holding tanks cold sea water circulated constantly. The two on *Dauntless* can carry about 12,000 crabs and keep them alive for a month.

Normally the ship delivers its cargo to freezing plants ashore about once a week—more often if the fishing is good. Most of the king crabs taken by U. S. fishermen go to market frozen.

Color Changes as Incubation Progresses

Emptied of crabs, *Dauntless*'s traps were rebaited with halibut heads and plastic containers full of pieces of frozen herring. King crabs have a fussy preference for fresh food. But they eat a wide variety—such bottom dwellers as other crabs, brittle stars (pages 264-5), sea cucumbers, and sand dollars, as well as assorted morsels that fall from above.

When ready, the heavy traps were raised over the rail by the hydraulic lift and dropped into the sea amid a welter of foam. They would stay on the bottom for two or three days to attract more crabs.

Before flying to join the *Dauntless*, I had talked about the life and migratory habits of the king crab with two of the Nation's leading authorities: Dr. David T. Hoopes, who heads research at the National Marine Fisheries Service Biological Laboratory at Auke Bay, Alaska, and Guy C. Powell, a scuba-diving biologist for the Alaska Department of Fish and Game in Kodiak (page 257).

"The king starts its existence," Dr. Hoopes explained, "as one of a mass of fertilized eggs carried by the female in a pouch formed by the horny 'apron' of her abdominal flap [page 260]. She may lay from 50,000 to 400,000, depending on her size."

At first the eggs resemble caviar, both in size and color. But they change to deep brown and finally to a golden straw during the approximately eleven months of incubation.

"At hatching time the adult migrates to shallow water," Dr. Hoopes continued. "She raises herself on her long legs, drops open her flap, and shakes her body about. The tiny larvae pop out of the eggs and float free."

Hatchlings Go Through Many Phases

The baby crabs bear little resemblance to their parents. For six weeks to two months they swim freely, changing shape in successive molts, and growing until finally they turn into recognizable king crabs with bodies a sixteenth of an inch across. In the last larval stage they drop to the bottom, to remain there the rest of their lives.

"I have seen what looked like a million or more little crabs congregating in a long row at a depth of 30 feet just 10 miles from the city of Kodiak," Guy Powell told me. "And sometimes I've seen thousands of tiny crabs clinging to colonies of hydroids like ornaments on Christmas trees."

I suspect Guy has met more king crabs socially than any other man. One of the most rugged individuals I have known, he spends a good part of the year diving in water 40 to 60 feet deep—where the temperature seldom goes higher than 43° F. and often drops as low as 36°.

For two or three years the juveniles stay in shallow water. In the first year they shed their shells some eight times and grow to approximately half an inch across. After two years and perhaps four additional molts they have

More like mosquitoes than crabs: Two weeks old, these baby kings in the third larval stage measure less than a sixteenth of an inch across. The crabs go through six larval stages. In the first five the tiny creatures swim about; in the sixth they begin to crawl on the ocean floor. Far less than one percent survive the perilous planktonic stages in which they fall prey to a multitude of enemies.

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

increased to an inch or more. Then they begin to exhibit one of the strangest behavior patterns known among animals.

Two- and three-year-old crabs collect in aggregations called pods—vaguely spherical clumps as big as basketballs or even umbrellas. They stand on each other's backs, commonly facing outward, waving their antennae at the world (pages 270-71).

"Once I swam down to a huge crowd of crabs that had been spotted from the air," Guy said. "They stretched a quarter of a mile along the beach, out to a depth of 30 feet, and appeared to be pods lined up end to end.

"On another occasion I followed one pod for 45 days, watching the same crabs every day. They moved from water a foot deep out to 60 feet before I lost them. The pod was beachball-size and included more than 500 two-year-old crabs, both males and females."

Pods may contain 3,000 individuals. They disband to change locations or to feed, then reassemble. Apparently the behavior serves for group protection, as fish schooling is believed to do; lone crabs would be picked off easily by such predators as halibut, sculpins, other crabs, or octopuses.

Crabs May Live a Quarter Century

After three or four years of shallow-water existence, king crabs move offshore. They live in water 120 to 240 feet deep in summer, migrating to 600 feet or more in winter.

"Up to about seven years, the age of a crab can be determined accurately from its size," Dr. Hoopes said. "They grow fairly regularly

Realm of the king crab, shown in brown, stretches across the northernmost Pacific Ocean. Japanese, Soviet, and U. S. fishermen exploit this cold-water bounty. Americans use only traps. Russians and Japanese capture the crabs mostly with tangle nets (below). Concrete weights and glass floats hold the 8-foot-high, 150-foot-long nets upright, linked together in rows 5 to 10 miles long and 1,500 yards apart. Some fields extend over 160 square miles.

Munching daintily, a 2- to 3-year-old king crab grasps a brittle star with handlike claws in a marine research laboratory at Auke Bay. Biologists tag and release the animals to determine their growth rates and migratory habits.

at first. After the fourth or fifth year, males molt once a year, and increase approximately an inch per molt. Beyond that, age becomes more difficult to tell; at age six or seven, some males molt only every two or three years."

In the Bering Sea crabs reach the legal size of seven inches after seven to ten years. Some achieve a great age—18 years in a few known cases, perhaps a maximum of 25.

Watching crabs molt is a fascinating experience—if you have the patience. From the first telltale sign to the end, the process may take days. In fact, GEOGRAPHIC's Bob Sisson sat in front of an aquarium at the Auke Bay laboratory for three weeks, sometimes 15 to 18 hours a day, and once for a full 24 hours, before he got the photograph at the top of the two following pages.

A week or two before molting, the color of the king crab changes from dull red to dark brown, and the individual becomes inactive. A new shell has begun to develop inside the old, and a slippery, colorless substance forms between the two. About three days before the molt, the abdomen begins to swell.

Big Crabs Lose Shells in 20 Minutes

Gradually the area between the abdomen and the carapace splits, and ever so slowly, first the legs, then the body, head, and eyes of the crab ooze backward out of the opening. It takes ten minutes or so for a small crab to shed its shell, perhaps 20 for a big one. Left behind, the cast-off shells slowly disintegrate.

After they reach maturity at five or six years, the crabs make annual excursions into

In a courtship lasting 18 days, patience wears thin

AN ADULT MALE (below) grasps a female while waiting for her to molt. Occasionally he picks her up and bounces her on the aquarium floor, apparently trying to speed the process. As soon as she sheds her shell, they will mate. Some males molt only once in two to three years.

With considerably more patience than male kings exhibit, photographer Sisson "crab-sat" for two weeks in a laboratory at Auke Bay to film an adolescent (right) backing out of its shell. Its vulnerability will slowly decrease as its spines harden, then the new body shell, and finally the legs—a two-week process.

ILLUSTRATIONS BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT F. SISSON © NATIONAL GEOGRAPHIC SOCIETY

shallow water for mating and spawning. Males precede their future mates, moving slowly in schools over the bottom. Presently the females arrive, and one of the most extraordinary courtships in the animal kingdom begins.

A male searches out a female that he senses is preparing to molt and claims her by grasping her front legs with his stout claws (left). Thus the two stand face to face, "shaking hands" until the female casts her shell. Only then does mating take place.

"Sometimes a male clasps a female for two or three weeks, especially during the early part of the mating season," Guy Powell told me. "The male seems determined not to lose his mate, and hangs on grimly. If he wants to move, he carries her over his head like a circus performer as he scurries along."

He may bounce her against the bottom as if to encourage her to molt. She folds her legs and waits docilely for her shell to split. After she has molted, the male deposits sperm across her oviduct openings. Eggs are cast and fertilized and remain clustered on tiny hairs covering small appendages under the female's abdomen.

2,000 Miles of Nets Supply One Floating Factory

It is during their spring spawning trek into the shallows that the crabs can most easily be caught. U. S. commercial fishermen in the Bering Sea set traps along migration routes. Japanese and Russian fishermen take the crabs with tangle nets.

Each net measures about 150 feet long and 8 feet high. They are anchored in strings of 20 to 35—weighted at the bottom and buoyed with glass floats at the top—to form a barrier that snares the crawling crabs (painting, page 264). Strings may be linked together in lines 5 to 10 miles long and in 20 parallel rows 1,500 yards apart. One field may cover 160 square miles of bottom. And a factory ship, with its fleet of net-laying vessels and "picker"

DETACHROMES © N.G.S.

Factory afloat: Japan's *Koyo Maru* (left) mothers a fleet of "picker" boats. Fishing every day, sometimes in gale winds and six-foot waves, the smaller craft take crabs from long tangle nets (painting, page 264)—prohibited to U. S. fishermen—and deliver them to the factory ship for processing of the succulent leg meat. As the king-crab population has declined, quotas imposed by the U. S. Government for those caught in continental waters have been lowered twice. The Japanese now supplement their hauls with the more abundant but smaller snow crabs. In the *Koyo Maru*'s assembly-line operation (above), snow crabs are dismembered for cooking.

boats, may tend eight to ten fields at once—perhaps as many as 2,000 miles of nets to intercept and entangle the crabs.

With the help of the National Marine Fisheries Service and the U. S. Embassy in Tokyo, I had arranged to visit a Japanese factory ship working in Bristol Bay. My friend Captain Isaksen guided *Dauntless* through a soft gray blanket of fog in search of *Koyo Maru*. At last a bright-green spot on our radar screen signaled her location; smaller blips showed a covey of accompanying boats.

"She has 15 of them to set out and pick up the nets," Dave Cunningham informed me. Dave was then assigned as a federal observer aboard *Koyo Maru*. He had been on Japanese ships for several seasons in the Bering Sea under terms of a king-crab fishing agreement between Japan and the U. S.

At slow throttle we crept along until one of her 40-foot-long flat-bottomed picker boats took shape in the mist. The men of her crew stood on deck, five on each side of a long table, picking the catch from the tangle nets with little metal hooks.

Quotas Revised to Protect the Species

"The men stand there all day," Dave said. "Twice a day the boats return to the factory ship to deliver their crabs. Fishing goes on nearly every day."

Amiable grins from the fishermen greeted us, and moments later we were being hoisted in an enormous wicker basket onto the deck of the *Koyo Maru* (left).

Our guided tour of the ship had a dreamlike air about it—hordes of men scurrying about in incredibly crowded surroundings; mountainous piles of reddish-brown crabs next to forests of upright bamboo poles for net drying; bright-red crab legs piled in bright-blue plastic baskets; clouds of steam from on-deck cooking vats obscuring the scene briefly and blowing away again; processing lines and freezing units and canning machines busy in the quarters below.

The Japanese have been taking king crabs much longer than have U. S. fishermen. The operation I witnessed had developed from an earlier fishery established off the Japanese coast in the 1880's. Factory ships replaced land canneries as fishing moved farther offshore; they found new king-crab grounds in the eastern Bering Sea as early as 1930.

Their arrival stirred alarm among American salmon men, who thought the Japanese were after their fish. But the realization that

another valuable seafood existed in the depths touched off a new American industry. In 1959 the Soviet Union joined in the Bering Sea crab fishery.

The Soviets have copied the Japanese system—except that women make up about a third of a Russian factory ship's complement. They work in the processing plants and as waitresses, cooks, doctors—even as librarians and beauticians. Possibly because of their presence, the Soviet factory ships are more comfortable, and life is much easier than on Japanese vessels.

In 1968 the United States declared Alaska king crabs to be "creatures of our continental shelf" and therefore its property. Japan and the U.S.S.R. have been allowed to continue fishing in the Bering Sea, but under quotas that limit the quantity of crabs they may pack each year. Because of dwindling populations, the quota has been lowered twice, and the Japanese in particular are feeling the squeeze.

One response has been to turn more and more to the snow, or tanner, crab—a relative of the spider crab, smaller and with more spindly legs than the king crab (pages 268-9). Snow-crab flesh is popular in Japan, but relatively unknown to U. S. palates.

Scientists Ponder Declining Catches

Fishermen, officials, and biologists are concerned over the future of the U. S. king-crab fishery, whose catches have declined steadily from a peak of 159 million pounds in 1966; the 1969 catch amounted to only about a third of that.

Much evidence points to overfishing, but scientists do not know with certainty that this is the case. The sharply reduced catches of recent years could be the result, at least in part, of natural fluctuations in the numbers of crabs. Research on the problem is being intensified. In the meantime, the State of Alaska has imposed stringent regulations on the fishery—including the periodic closing of some fishing areas—to protect one of the country's most valuable and interesting marine resources. □

Togetherness protects a species: Just as fish run in schools so that some may survive, young king crabs join in pods. Here 700 to 800 2-year-olds, about 1¼ inches wide, crowd together in Auke Bay. The pod breaks up to feed, then begins to reassemble in the distance.

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

Titicaca, Abode of

BY LUIS MARDEN CHIEF, FOREIGN EDITORIAL STAFF PHOTOGRAPHS BY

the Sun

FLIP SCHULKE BLACK STAR

THESE INDIANS say that their ancient ones hold it to be the truth that for many days the world was in darkness, and while they were all in blackness and obscurity, there rose from this island of Titicaca a resplendent sun. For this reason they hold the isle to be a sacred place, building there a temple in honor of the sun.

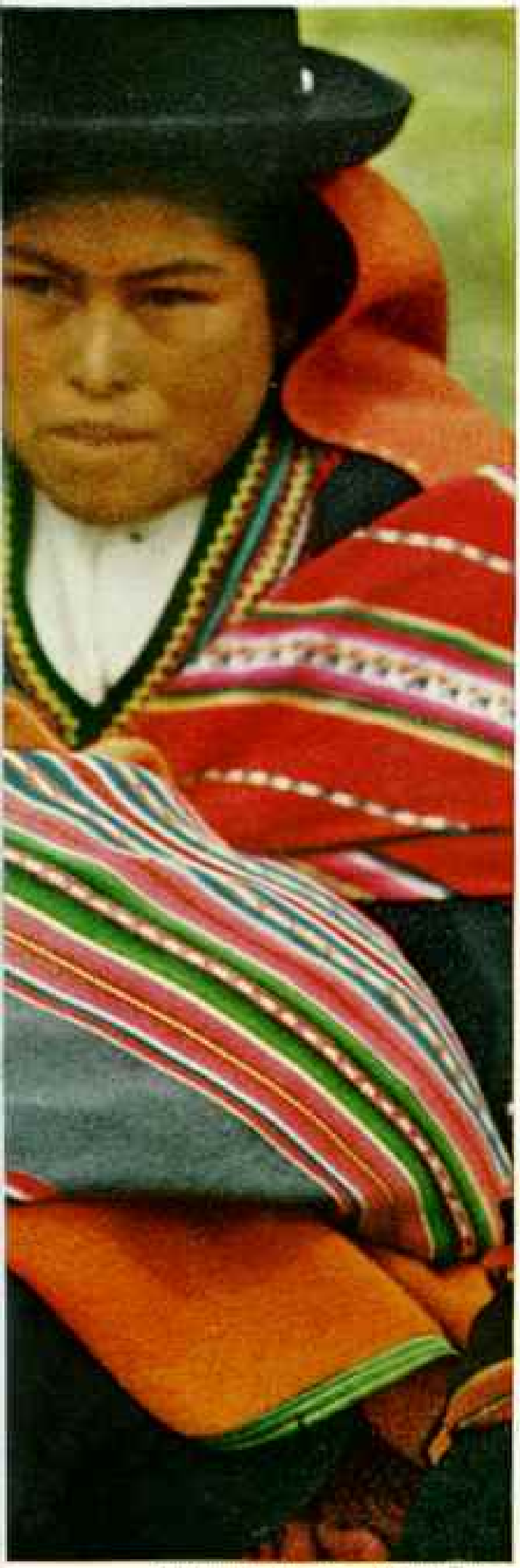
PEDRO DE CIEZA DE LEÓN, 1553

IN THE BLACKNESS of the night a bird whimpered, and a cold wind, cutting as the edge of a flint knife, furrowed the leaden waters of Lake Titicaca. Beyond the far shore the dark serrations of the Andes rose sharp against a lightening sky. Almost imperceptibly the sky paled to primrose, then warmed to saffron, silhouetting a hilly island couched like a crouching puma on the horizon. From its rim a finger of light shot toward the zenith. Then, suddenly, an effulgent star burst above the island, flinging its golden points across the sky.

Inti, the Sun, had once more returned to his children of the high Andean plateau.

Garcilaso de la Vega, son of a Spanish father and an Inca princess, in 1609 also recorded the legend:

Our Father, the Sun, seeing that men lived like wild animals, took pity on them, and sent to earth a son and daughter of his, in order that they might teach men the knowledge of our Father the Sun, and that they might know how to cultivate plants and grains and make use of the fruits of the earth like men and not beasts. With these



Shy but flirtatious, an Aymara Indian girl of Lake Titicaca plays peekaboo behind her bowler hat—traditional headgear on the Peru-Bolivia border. Paintbox-bright colors of her costume sing out against the bleakness of the Andean high plateau, which cups the waters of Titicaca nearly 2½ miles above sea level.

Four centuries before the Spanish arrived, the Incas conquered the area, raising their own god—the sun—above a pantheon of local deities. On a hilltop overlooking the lakeside town of Copacabana, Bolivia, the morning sun (above) transfigures a pinnacle of rock; the Incas may have used it for astronomical observations.

orders and mandate our Father the Sun placed his son and daughter in Lake Titicaca.

Thus the first Incas came to earth on an island in Lake Titicaca, to found what was to become one of the most advanced civilizations of pre-Columbian America.*

Titicaca, nearly 2½ miles above the sea in the Andean highlands on the border between Peru and Bolivia, has been described as "the most remarkable body of water in the world" (pages 278-9). Its clear waters wash over a score of enigmas that draw scientists and scholars to its wind-swept shores.

Hail and Rain—and a Pounding Heart

To stand on Titicaca's shore and watch the sun re-enact the Inca legend, I went by way of Arequipa, a white stone city 7,700 feet above the sea. From Arequipa a standard-gauge railroad climbs to Titicaca, at 12,506 feet.

Sitting in the comfortable buffet car, I had felt almost no difference in altitude, but when we debouched onto the rain-swept Altiplano and stopped at Crucero Alto, at 14,665 feet the highest point on the line, I tried my mountain legs on the platform. My heart raced and blood pounded in my ears, I felt curiously lightheaded, and the dry, rarefied air burned my nose and throat.

When we drew into Puno in the dark, the passengers ran through rain and hail (I could only walk) for the shelter of the station. But by the time we emerged onto the cobbled street, the hail had softened to slushy snow.

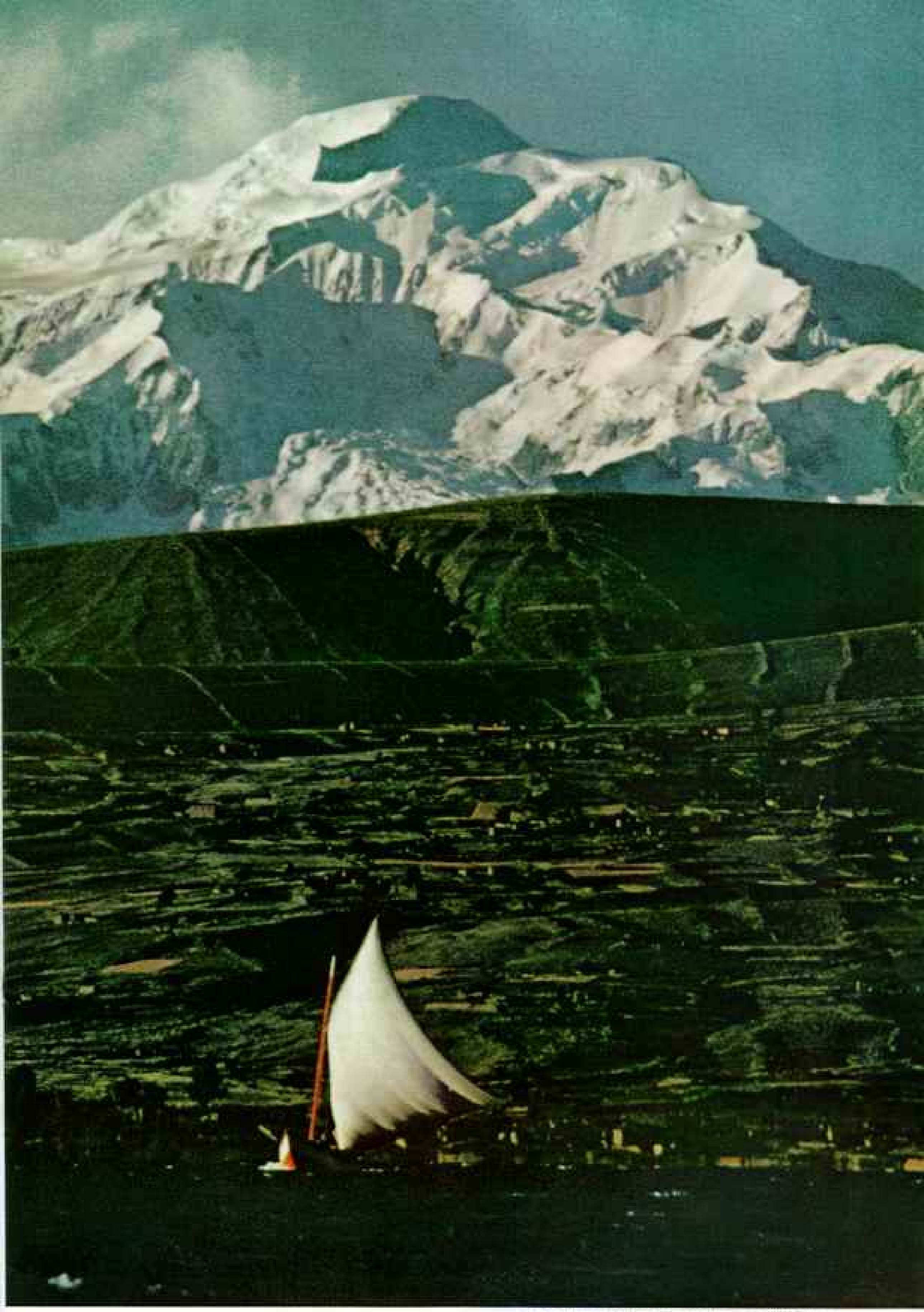
Puno's tile roofs, narrow streets, and iron-grilled windows recall southern Spain. Metropolis of the lake, it is a town of about 32,000.

People of the Altiplano divide themselves into two classes: pure Indians and *mestizos*, those who have an admixture of European

*See "The Five Worlds of Peru," by Kenneth F. Weaver, GEOGRAPHIC, February 1964; and "Peru, Homeland of the Warlike Inca," by Kip Ross, October 1950.

White-robed monarchs of the Cordillera Real, a towering spur of the Andes, feed the mountain streams that sustain Lake Titicaca. Incas channeled the icy waters through irrigation canals on neatly carved terraces stepping down to the lake. Today's Indians still cultivate the eroding benches, but have all but forgotten irrigation methods.

The wind-powered ferry shuttles people and automobiles across the choppy Strait of Tiquina, separating the lake's two main segments. Steamboats and hydrofoils also ply Titicaca—highest of all navigable lakes.



PHOTOGRAPHS BY LUIS MARDEN, NATIONAL GEOGRAPHIC STAFF © N.G.S.

blood. Of the Indians, the Aymara seem to have been the original, or at least the older, inhabitants of the lake region. The Quechua, who speak the language of the Incas, probably descend from peoples transferred to the lake by the Incas, after their conquest of the region early in the 12th century.

Inca Origins Lost in Time

Who were the Incas, and where did they come from? No one knows. Until recently they were thought not to have had even a rudimentary written language, and thus their history can be traced over little more than 400 years.* When Francisco Pizarro landed in 1532, the Inca empire was embroiled in civil war, so that a handful of Spaniards were able to take over a realm that stretched nearly 3,000 miles, from Ecuador into Chile.

At that time the name Inca did not refer to a race or nation of people. "The Inca" meant king or ruler, and by extension one of his ancestors or relatives.

Today's Indians, short, dark, and barrel-chested, throng the open-air stalls of Puno's market. The men wear wool trousers and a long poncho, and the *chullo*, a kind of crocheted or knitted wool bonnet with a pointed tasseled top and long ear flaps against the cold (page 289). The women wear short flaring woolen skirts, perhaps three or four, one over the other, and black, brown, or gray bowler hats (pages 272-3 and opposite). On special festive occasions they may put on as many as a dozen skirts, a sign of affluence.

When I walked through Puno market with a native-born friend, my heart thumped and my chest heaved in the thin mountain air. My friend looked at me speculatively. "You know," he said, "I am not a man like you."

He was right; the fact that he had been born on the shores of Lake Titicaca had made his chest deeper and his heart and spleen larger. His bone marrow manufactured many more red blood corpuscles than mine.

The late Dr. Carlos Monge, a Peruvian physician who pioneered in Andean high-altitude medicine in the 1920's, believed that the dwellers on the Peruvian and Bolivian high plateau were a well-defined variety of man. He held that thousands of years of adaptation to the hostile climate of the Altiplano had made Andean man a kind of superman, one able to withstand the rigors of oxygen-poor air, temperature extremes, and strong solar radiation at high altitudes.

In 1928 Dr. Monge described a disease he called "chronic mountain sickness." To learn more about it, I sought out a Puno physician

*Last year a German and a Peruvian scholar reported they had deciphered primitive word signs from Inca geometric motifs long thought of only as ornamentation.

Fervor reaches a peak as costumed revelers gyrate past Puno's cathedral during an annual procession honoring the Virgin of Candelaria. Long-nosed masks with beards and mustaches poke fun at Spanish churchmen and administrators who ruled here for nearly three centuries.

Stomping as she whirls, an Aymara dancer swings a tin fish—an age-old symbol of both Christianity and Indian religions. Among the Indians, elements of Inca and pre-Inca rites have fused with Christian beliefs in a religious mosaic. Some Indians still worship the old gods, performing ancient rituals at dawn on sun-etched hilltops above Lake Titicaca.

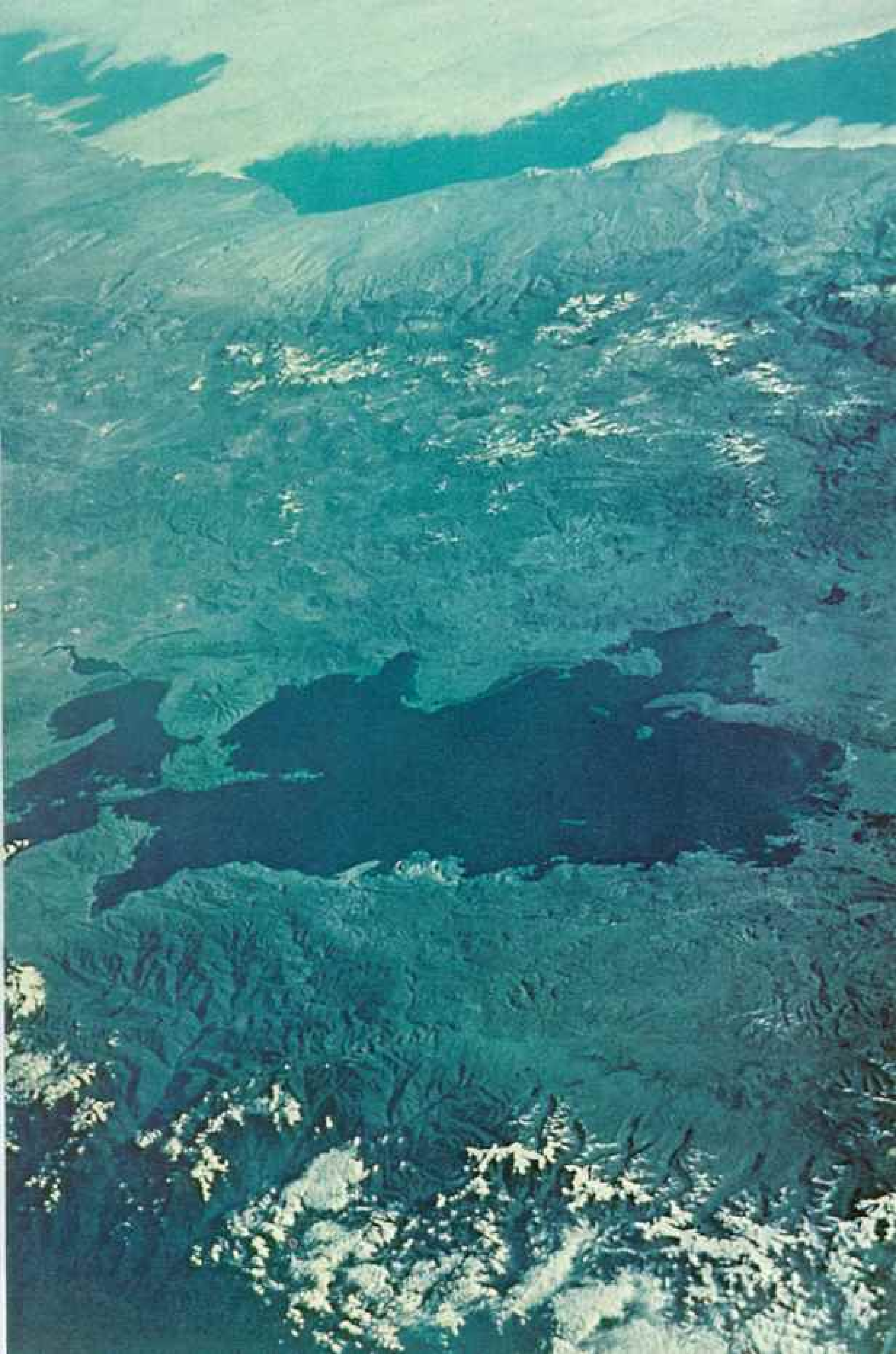
Tears of a nameless god flow down the cheeks of a stone figure from Tiahuanacu, a pre-Inca city that stood near Lake Titicaca more than a millennium ago. Its art often exhibits this "weeping god" motif. Scientists dispute whether the lake has slowly receded since Tiahuanacu was built. The ruins today lie ten miles inland.

Cloud-high Titicaca brims across 3,200 square miles. In South America, only Lake Maracaibo is larger.

Space Age view: As though echoing the Inca meaning of Titicaca—"rock of the puma"—the 122-mile-long lake, as seen from 170 miles up, suggests a mountain lion about to pounce on a rabbit.

Lake Titicaca's outlet, the Rio Desaguadero, flows from the head of the rabbit. Evaporation, speeded by intense sunlight and dry atmosphere, helps balance inflow from rains and melting snows.

Photographed by U. S. astronauts from Gemini 9, this panorama looks northeast to southwest, across the Andes to the Pacific.



"A victim of severe altitude sickness suffers acute cardio-respiratory distress," Dr. Alfonso del Castillo told me. "He is short of breath and lightheaded, feels nausea, and has headaches and a galloping heartbeat.

"Normally, lowlanders who move up here adapt over several months. The body produces more red blood corpuscles to capture the scarce oxygen molecules. You, for example, probably have about five million red corpuscles per cubic millimeter in your blood, normal for a sea-level man. If you stay here on the Altiplano long enough, you should acquire at least half a million more."

At the end of two months in the high Andes, I found Dr. del Castillo's prediction fulfilled; my red count had increased by 800,000.

Boiling Point Drops as Cooks Go Up

The sea-level housewife who moves to the Altiplano must learn to cook all over again. The boiling point of water drops about one degree Fahrenheit for every 550 feet of altitude, so that in the vicinity of Titicaca water boils at 189°. A Puno housewife told me she cooked a soft-boiled egg twice as long as down on the coast. "And if I put the normal amount of leavening in bread or cake dough,

it would blow up like a balloon," she said.

Not only living beings, but also air-breathing machines are affected by height. Internal-combustion engines lose efficiency at the rate of more than 2 percent for every 1,000 feet of altitude. Thus at Lake Titicaca motor cars and powered boats lose some 30 percent of their rated horsepower.

There were steamships on Titicaca before the first railway reached Puno 100 years ago. The *Yavari* and *Yapura*, iron-plate vessels more than 100 feet long, were fabricated in England in 1862, taken apart, and shipped to Peru. Mules carried the pieces up mountain trails, and the vessels were reassembled on the shore at Puno. They are both still afloat.

Today three steamers ply Titicaca's 122-by-47-mile waters. The biggest, the *Ollanta*, 2,000 tons and 250 feet long, was built in England in 1930. She was unloading Bolivian zinc ore when I visited Puno.

A railway spur runs to the lakefront pier. Steam cranes clatter, diesel locomotives hoot piercingly and send palls of greasy smoke into the clear upland sky, and gulls wheel and cry overhead. Puno wharf has all the characteristics of a normal seaport except one: the smell of salt water.

A drop of wine, the touch of a flower, and strewn confetti bless new potatoes during a rite to assure an abundant harvest. Andean Indians were first to cultivate the potato, native to the Americas.

Like windowless beehives, sod dwellings of ancient design ward off ice-edged winds at a Quechua community near Huancané. Villagers step to the music of flutes.

KODACHROMES (ABOVE) AND OPPOSITE BY FLIP SCHULKE, BLACK STAR © N.G.S.

Floating world of the Urus

BOUNTIFUL AND BUOYANT, totora reeds from Titicaca's shallows supply the Urus with material for homes and boats. Reeds even provide the "ground" these fisherfolk walk on, since they live on floating islands (above). As bottom layers rot, the Indians spread new layers on top.

Seated on the spongy surface (left), an Uru woman grinds barley for making gruel or mush.

Like the Aymaras, the Urus fashion boats of totora (below). Norwegian anthropologist Thor Heyerdahl theorizes that their ancestors may have learned the art from ancient Mediterranean mariners who crossed the Atlantic in similar boats of papyrus. Aymaras from Titicaca helped Dr. Heyerdahl construct a seagoing craft to test his theory (see the January 1971 GEOGRAPHIC).

PERUVIANS CARVED FURIES THE HORIZON ON THESE DOORKNOBS BY LEO MARRIN © N.G.S.

DAYACHROMES BY FLIP SCHULKE, BLACK STAR © NATIONAL GEOGRAPHIC SOCIETY

I walked along the docks with Capt. José Beltrán, master of the *Ollanta*. As we talked, the evening whistle blew, and the waterfront chatter subsided into utter silence. The captain, a sensitive and literate man, looked at the stilled port and softly quoted, "*Son mas tristes los muelles cuando atraca la tarde*—Saddest are the docks when the evening makes fast," from Chilean poet Pablo Neruda.

We boarded the *Yapura*, and our footsteps rang loud on her old iron plates. The long, narrow-beamed vessel still looks seaworthy.

"Ah, but she's a witch in a sea," said the captain. "Rolls her scuppers under."

When the afternoon wind pipes up on the lake, steep, vicious seas make up quickly, and prudent small-boat skippers stay in port.

Isla del Sol, the legendary birthplace of the Incas, lies far out in the lake, 40 miles beyond the arms of land that protect Puno's outer bay.

Lured by legends of submerged Inca ruins, French oceanographer Jacques-Yves Cousteau sent divers to Lake Titicaca in 1968. An aquanaut (left, above) explores an eerie forest of totora. Another (left) surfaces with a bounty, not of gold but of frogs. Foot-long *Telmatobius culeus* (above) inhabits the shallows in great numbers. The Aymara Indians consider the creatures taboo and never eat them.

Efforts of Cousteau and others have yet to confirm tales of a drowned Inca city in Titicaca's depths.

Counting back from the time of the last Incas, the legendary—but probably real—founders, Manco Capac and Mama Ocllo, seem to have appeared about A.D. 1100. How the Incas began their meteoric rise to power is unknown, but they became, like the Romans, conquerors and lawgivers, brilliant engineers, and stern but just masters.

Wherever they conquered, the Incas left the local culture intact, exacting only tribute and worship of the new god, the sun. Theirs was a benevolent dictatorship. Scrupulously they looked after their subjects, and no one went hungry or unclothed, but nothing was left to free will. In fact, the Inca empire fulfilled the classic definition of a totalitarian state: Everything not prohibited was compulsory.

Bread a Rarity in Floating Villages

Sometime in the remote past, when the first Aymaras settled Lake Titicaca, they found a people called Urus living on floating mats of totora reed among the dense reed brakes.

"Whole villages of Urus were to be found in the lake living on their rafts of totora," wrote Jesuit Father José de Acosta in 1590. "It would occur to them to move . . . so that looking for them today where they were yesterday, not a trace of them or their village could be found."

The Urus are still there, choosing to live the old way instead of on land. Early one morning I went by motor launch to a settlement one hour out of Puno (pages 282-3).

I carried with me two large bags of bread, a delicacy to the water-borne Urus, who make no bread and live mainly on fish and water birds. As Father Acosta recorded, they also eat totora, pulling it up by the roots and chewing the peeled blanched portion of the stem.

As we approached the channel in the reeds leading to the village, I could see the weed-carpeted bottom. The clear water felt relatively warm. Absorbing the heat of the sun, Titicaca maintains a temperature near the surface of 52° to 56°. The temperature stability of such a vast body of water—3,200 square miles—has a tempering effect on the local climate.

We rounded a bend in the channel and entered a lagoon, where twenty huts of dried totora clustered around a one-room school of galvanized iron sheets. Floating on a raft of oil drums, the Seventh-day Adventist school was towed out from Puno in 1963.

When I stepped "ashore," the matted totora undulated underfoot like an air mattress.

The schoolteacher, *Profesor* Carlos Velásquez, an Aymara from the mainland, told me the "ground," made of cut bundles of totora thrown on the water, was 6 to 7 feet thick.

Señor Velásquez took me into his classroom, where children on wooden benches were copying letters from a blackboard.

"All the Urus have Aymara or Quechua blood now," the professor said. "There are no pure-blooded Urus left.

"Everyone, from the Incas to the Spanish conquerors, has despised and neglected these people. It has taken me seven years to win their confidence, but now they are beginning to talk to me." He pointed to an old man who sat just outside the door, with his sightless face turned up to the sun.

"That blind one tells me that the Urus always took care to paddle or pole gently, so as not to waken their goddess sleeping in the reeds. He calls her Ahuicha, grandmother. But now the noise of the outboard motors of 'those of the land' has driven her away."

Huge Trout Once Filled Titicaca

Canoe-shaped reed boats called balsas, made of lashed bundles of totora, moved all around us. At an Uru's invitation I stepped aboard a newly launched one. The boat dipped and bobbled nervously.

"A balsa is like an untrained horse," said the builder. "She goes here, she goes there; she bucks, she whirls. You have to use a firm hand to teach her how to go."

When we left the Urus' settlement, we became lost in the maze of channels, and found our way out only by following a swimming wild duck to the open water.

Like all alpine lakes, Titicaca holds a limited variety of animal life. Father Acosta noted that it held only two kinds of fish, a catfish and a big minnow. Fish furnish the lake dwellers with one of their few sources of protein, so it was natural to want to introduce bigger fish into the lake. Someone thought of trout. In 1939 the first lot were released; they multiplied prodigiously.

Releasing carnivorous trout into Titicaca, which swarmed with unaggressive small fish, was like turning wolves into a vast pasture filled with sheep. Within a few years the astonished and delighted Indians began catching giant fish of 25 pounds and more. Word of the big trout spread, and fishermen came from all over the world to try their luck.

The world's record rainbow trout, caught in an Idaho lake in 1947, weighed 37 pounds. On Titicaca I was told of a fish that weighed about 36 pounds, caught on the Bolivian shore in 1952. And much bigger fish have been taken in nets.

In 1961, a Canadian mining engineer had an idea. Since trout were so plentiful, why not can and export them?

Don Augusto Parodi of Puno, partner in that first venture, told me how it began: "We opened a cannery at Chucuito, imported gill nets, and subsidized fishermen. There was no closed season and no limit. The trout averaged a foot and a half, but sometimes reached 40 inches and almost 40 pounds."

Soon the cannery was shipping 500 cases a month to Europe. When three other canneries opened, the price of trout soared beyond the reach of the local people. Eventually the golden harvest dwindled to a trickle. By 1968 there were too few trout to make canning profitable, and the canneries closed down. But good fish can still be taken on rod and reel.

Incas' Gift to the World: *Papas*

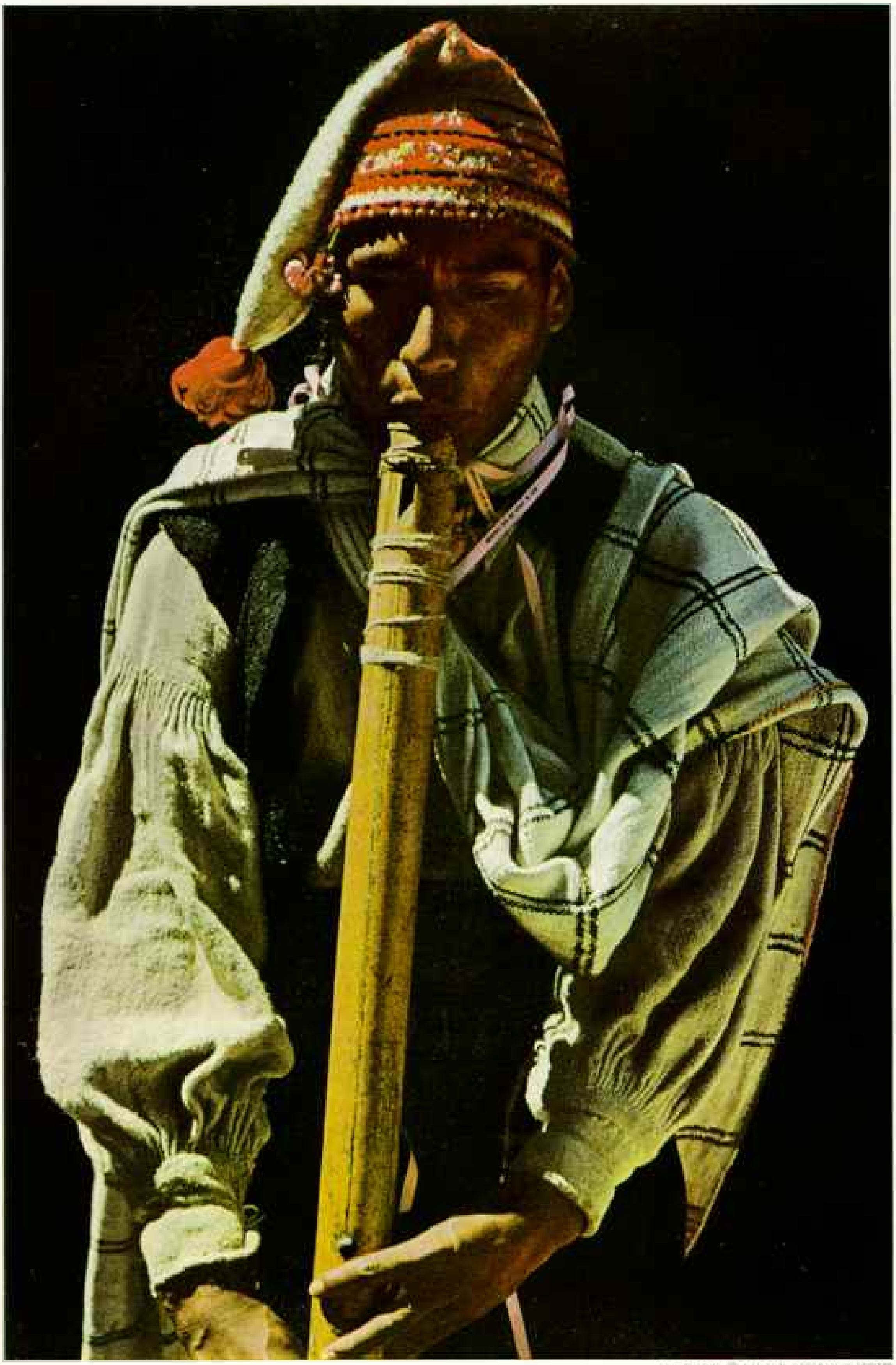
The treeless hills that cradle Titicaca rise in stone-faced steps, like contour lines on a topographic map (pages 274-5). Everywhere the Inca advanced, he built these *pata pata* to conserve topsoil and increase arable land.

Maize, or Indian corn, the staple of pre-Columbian America, will not grow on the Altiplano. Instead, the Andeans grew a tuber unknown to the Spanish invaders, but which was to prove more valuable to Europe than all the gold and silver of Peru (page 281).

"They supplant the lack of bread with some roots they call *papas* and which produce under the earth. . . ," noted Father Acosta.

Thus the world learned of the lowly tuber that would feed unborn millions: the potato. And centuries before today's technology hailed a "new" method of preserving foods, the Incas practiced freeze-drying.

Melancholy as the moaning wind, a haunting melody flows and ripples from a Taquili Islander's flute. His people, Quechuas dwelling on Lake Titicaca, pride themselves on their exquisite weaving as well as on their exceptional honesty. Visitors need not fear having their belongings stolen; any islander caught stealing must leave Taquili, never to return.



KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

Practical priest: Father Gene Speichinger, from Jefferson City, Missouri, teaches Quechuas of Titicaca how to run a cooperative chicken farm.

Toiling as one, family members plow a potato field on the Copacabana Peninsula. Such sustained physical labor

In 1609, a chronicler described the process: "To keep potatoes from rotting they leave them out many nights to freeze. After they have been repeatedly frozen they tread gently on them, to press out the moisture they contain. When they have been well squeezed, they are placed in the sun until they are thoroughly dry. In this manner the potato keeps for a long time, and it changes its name to *chuñu*."

In Puno marketplace I had seen piles of small white spheres slightly smaller than golf balls and dry and light as bits of cork. Many times I ate reconstituted chuñu in soups and stews, or simply boiled. They tasted as good as fresh potatoes.

Toward late April the rains ended and the sky cleared to a brilliant blue. Fresh green dusted the brown hills, and on the shore the fields turned yellow and orange-red with ripening *quinua*, a small grain that at this altitude replaces wheat. And all around Titicaca fields of green barley rippled like waters of the lake under the stroking of the wind.

In Peru scientists found the highest cultivated plot of land in the world: a field of barley at 15,400 feet, near the mining town of Poto. At that altitude the grain never ripens; the Indians grow it for cattle forage.

"Sheep of the Indies" Browse on Moss

Andean shepherds live much higher—as high as 17,000 feet above sea level. Here no food crop will grow, and herders who live in such places must bring their food up from a lower altitude.

The Indian "cattle" that feed on moss and lichens at these great heights were new to the

PHOTOGRAPHS © NATIONAL GEOGRAPHIC SOCIETY

in the rarefied atmosphere 2½ miles up would be virtually impossible for most lowlanders. Highland Indians have developed larger-than-normal lungs, heart, and spleen, plus extra red corpuscles, enabling them to work in the oxygen-thin air.

Spanish conquerors. "There is nothing in Peru of greater value and utility than the cattle of the land, which our people call sheep of the Indies, but the Indians in their tongue call *llama*," wrote Father Acosta.

Scientists trace the llama to a little protocamel that roamed the plains of North America in the Eocene Epoch, about 53 million years ago. The protocamels wandered west to Asia and Africa, to become today's two-humped Bactrians and one-humped dromedaries, and southward to the Andean region, where they evolved into the four American cameloids: llama, alpaca, guanaco, and vicuña.

One day I drove north from Puno on an asphalted road that runs almost as straight as a crossbow shot to Juliaca (map, page 278). Beyond Juliaca the road degenerates into a rutted, stone-strewn track. Here I met a caravan of llamas, laden with brown-striped sacks. I stopped to talk to the two drivers, who were taking potatoes they had bought in town up to their huts near 16,000 feet.

The llamas—caramel, black, and spotted—wore tassels of bright red wool sewn to their ears, and stepped round us daintily. They stared at me, not insolently as camels do, but with an air of poise and self-confidence, as equal to equal, pursing their lips as if saying, "O-o-oh!"

A llama carries a load of 75 to 100 pounds, and if you try to make one carry more, he will kneel like a camel and refuse to budge. If you persist, he will throw back his head and, like a camel, spray you with green spittle.

I learned to distinguish the alpaca by its bigger head, shorter, thicker neck, and long heavy fleece. The guanaco is nearly extinct

Highway into yesterday, a remnant of the 10,000-mile road network built by the Incas skirts Lake Titicaca's hill-hemmed shore. Fast-footed couriers stationed along the roads at 1½-mile intervals could relay news and messages at a speed of 150 miles a day. On these now-crumbling stones, richly attired Inca nobles once paraded on their way to worship at the Isla del Sol on the far horizon, where, according to tribal myth, Inca civilization began.

in Peru, though wild herds still roam the Argentine pampas, and the small, gazelle-like vicuña is in danger of disappearing from the face of the earth.

The vicuña's tragedy is that it bears the finest wool in the world. In colonial times it was hunted to near extinction. The Incas forbade the killing of vicuñas. Every four years they held a *chacu,* an animal drive in which 20,000 to 30,000 beaters drove all the game from a wide area to a central corral. There the predators—foxes, wildcats, pumas, and bears—were killed, but the vicuñas were sheared and set free again. Only the Inca and his nobles might wear the fabric woven by the Virgins of the Sun from the silky wool.

Here in the northwest corner of the lake I was in Quechua-speaking country. On high-spined Capachica Peninsula, one of two arms of land that enclose the bay of Puno, lived the Incas' master weavers, who worked the wool of vicuña and alpaca into *compi,* a cloth, says Father Acosta, "as lustrous as silk."

Today the best knitting and weaving comes from Taquili, an island about four miles from the tip of the peninsula. I went there one morning in a motor launch with Jerry Gray, a Peace Corps specialist in agriculture and animal husbandry who manages a hacienda for the government. Jerry, a blue-eyed, mustached Montanan who wears a curled-brim Stetson, piloted the launch just outside the beds of totora skirting the peninsula. The sun blazed from a sky of intense cobalt, and Titicaca, as changeable as a chameleon under differing lights, sparkled like a sapphire.

At the island a flight of stone steps led 500 feet up the hill to a settlement. Halfway up we met two men who wore long stocking caps of wool hanging down on one side to the shoulder, like Sicilian peasants (page 287). They were knitting a pair of caps shaped like the ones they wore, but so closely knit that the weave was almost invisible—"you cannot perceive the individual thread in the whole fabric," said Father Acosta. Worked into the design were multicolored, exquisitely detailed figures of birds, men, and flowers.

One man had the aquiline, convex nose of the ancient stone carvings, and his right cheek bulged with a *picchu,* or wad, of coca. I asked the man why he chewed coca. He replied, "It gives me strength to work, and I don't feel cold, hungry, or sleepy. Besides, it tastes good."

Perhaps. The dried green leaves he offered me tasted like a mouthful of astringent green tea. The leaves contain cocaine, and are chewed with bits of alkaline *llipta,* solidified ash of quinua stalks, added to the quid.

Within a few minutes my mouth grew

numb, my tongue felt twice its size. My heart beat faster, and I felt as though I had drunk a cup of strong black coffee. But the most curious effect appeared when I rinsed my mouth: the cold water felt burning hot.

Drug Changed Hands When Empire Fell

Coca once was a stimulant for the privileged, used by the Inca and his nobles. With the fall of the Inca empire, the common Indians, to forget their misery as virtual slaves of their Spanish masters, took to chewing coca. Ever since it has solaced, narcotized, and, some say, brutalized literally millions of people on the Andean plateau.

From the top of Taquili I looked out over the main, or "big lake," an unbroken expanse of shimmering blue. Beyond the far shore, hanging wraithlike in the thin air, glimmered the snow peaks of the Eastern Cordillera, rising above 20,000 feet. At a point on the mainland directly opposite, the invisible boundary between Peru and Bolivia came ashore.

When later I followed a track eastward round the lake to Moho and beyond, I found the frontier deserted. A stone wall climbing the slope on one side of the road marked the boundary. Eight llamas, alone and untended, emigrated every few minutes as they cropped the scant roadside grass.

One night at eight I sailed from Puno wharf for Bolivia, and the departure was as near as

The last straw? Not if the llama has his way. "Camels of the Andes" refuse to budge if loaded with more than they consider fair—75 to 100 pounds. This shaggy fellow enjoys a snack in the open-air marketplace at Ancoraimes.

Craft of her ancestors wins a livelihood for a poncho-knitting Aymara girl at a cooperative run by the Maryknoll Sisters in Juli. Garments of rough llama wool and finer alpaca find ready buyers among tourists and exporters.

might be to the beginning of a sea voyage. I stood on the *Ollanta's* bridge with Captain Beltrán, listening to the hiss of steam, clank of cranes, slap of waves, and creak of tautening hawsers as the black-sided steamship rose and fell.

At dawn I again stood on the bridge to watch the first flush of sun warm the snows of the Andes. We had passed through the Strait of Tiquina into the smaller arm of Titicaca and were nearing the port of Guaqui.

From Guaqui I traveled by narrow-gauge railway to the Bolivian capital of La Paz, thence by jeep back to the Strait of Tiquina.* I crossed Tiquina by car ferry to drive to Copacabana, where a statue of the Virgin believed to have curative powers draws pilgrims from all over Latin America.

Conqueror Recalled as Only a Transient

The peninsula of Copacabana points toward the Isla del Sol across a narrow strait of blue water. To the Incas, this was the supreme place of their empire.

I wanted to see the sun rise from the Isla del Sol as the early Incas saw it so long ago, and I made an arrangement with a launchman in Copacabana to meet me on the foreshore two hours before dawn. When I walked down the steep cobbled street in the silence of the night, a three-quarter moon flooded Titicaca with a white radiance, as if all the silver ever mined in Peru had been melted and poured into the lake.

We pushed off in the moonlight. Overhead the sky burned with stars, unwinking in the transparent Andean air. I asked the boatman his name and he answered, "Rufino Pizarro. People ask me if I am related to someone called Francisco Pizarro. Would he be the one who was killing Spaniards?"

He did indeed, in the civil strife after the conquest. But to the boatman, an Aymara, the man who conquered the land of his ancestors was merely a transient across the timeless landscape of the Altiplano.

As we emerged from the lee of the peninsula and pitched to the chop rolling in from the "big lake," the moon set, turning to yellow gold as it touched black bars of cloud.

In darkness we landed on the precipitous shore of the Island of the Sun. Stumbling and slipping, we climbed a rubble slope to the first of the ancient terraces that rise like a gigantic flight of stairs to the top of the island.

Near the crest of the slope Pizarro pointed. "The House of the Inca," he said, indicating a rectangular pile of stone that had fallen into ruin where its back rested against the hillside. One still-standing doorway pierced the front wall. Like all Inca doorways, this was trapezoidal, narrower at top than bottom. The House of the Inca—scarcely two arquebus shots from the shore, as the Spaniards measured the distance—looks southeast across the narrow strait, and through the slot of the doorway we could watch the sun rise.

Titicaca, originally the name of the Island of the Sun, was later given to the whole lake. In Quechua the word means literally "rock of lead." But in Aymara the word means "rock of the puma."

The puma figured in early religious cults, but the most startling support for this interpretation of the name Titicaca came from a totally unexpected source—space.

I carried in my knapsack a photograph of Titicaca made from one of the Gemini spacecraft, 170 miles above the earth (pages 278-9). When I showed it to Pizarro, he pointed:

"Look! The Puma!"

I stared. The outline of the main lake startlingly resembled a leaping puma, with outstretched claws and open mouth, about to seize a fleeing rabbit, the smaller arm of the lake. The likeness was astonishing.

Drops of *Pisco* for Pacha Mama

The sky lightened, and then suddenly, between the dark lump of a distant island and the tip of Copacabana Peninsula, the sun burst forth in amber splendor, greeted by the mewing cries of gulls.

I glanced at Pizarro. His dark face was expressionless. Either the sun, still worshiped by some on the lake, had lost its meaning for him, or he kept his feelings well hidden behind the wall of silence Andeans have erected between themselves and intruders.

From a flask I poured two small cups of *pisco*, the white grape brandy of Peru, and handed one to Pizarro. As I raised the cup, I felt his eyes on me. Remembering, I spilled a few drops on the dusty ground. Pizarro almost smiled.

"It is good," he said, "to remember Pacha Mama, Mother Earth, and to thank her for her bounty." □

*See "Flamboyant Is the Word for Bolivia," by Loren McIntyre, GEOGRAPHIC, February 1966.

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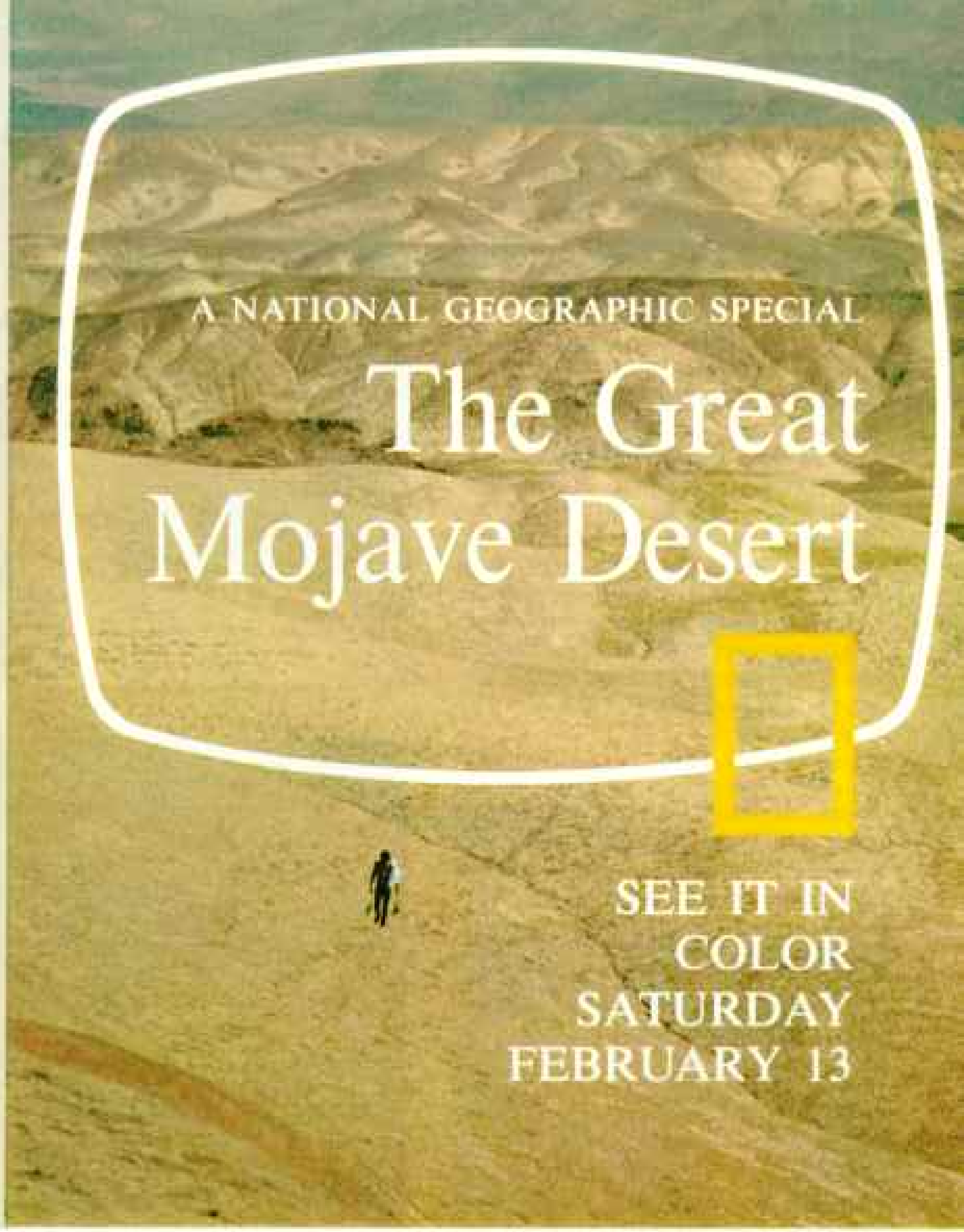
*See neighboring states

SOLITARY HIKER TRAMPS THE SANDS OF DEATH VALLEY NEAR SALT CREEK. PHOTOGRAPHED BY WINFIELD PARKS © N.G.S.



"Land that supports no man"

THUS INDIANS OF OLD characterized the desert. What a misnomer for the Mojave! A bitter, inhospitable realm, true, but it pulses with life. Tour this fascinating region on Saturday evening, February 13, 1971, when the National Geographic Society presents "The Great Mojave Desert," third in its 1970-71 series of color TV documentaries.

See the amazing variety of wildlife of Death Valley, including the kangaroo rat, which can live a lifetime without drinking water. Poke through mining towns turned ghosts, such as Bodie (below). Step inside Scotty's Castle, a prospector's dream mansion come true. Sail on dry lakes, chase wild burros, camp with Basque sheepherders, and attend a one-woman ballet.

Narrated by Joseph Campanella, the hour-long program is produced by the Society in association with Metromedia Producers Corporation (MPC). Sponsors are Timex Watches and the Foundation for Full Service Banks.

Baby burro gets food and water from desert plants. Some 1,300 of the animals roam Death Valley.

Past knife-edged sand dunes, Colin Fletcher hikes near Stovepipe Wells in Death Valley. Author of *The Man Who Walked Through Time* and *The Thousand-Mile Summer*—a log of Mojave travels—Mr. Fletcher revisits the desert in this Geographic special.

Heeling to desert winds, sailors skim across the sands of El Mirage dry lake.

Modern-day prospector Billy Varga, here with his wife Melody, probes for tungsten at his "Spanish Mine" near Randsburg. He and his crew dynamite tunnels in quest of a mother lode.

Tear out this page and keep it near your TV set as a reminder.

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WASHINGTON, D. C.

Organized "for the increase and diffusion of geographic knowledge"

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THE NATIONAL GEOGRAPHIC SOCIETY is chartered in Washington, D. C., in accordance with the laws of the United States, as a nonprofit scientific and educational organization for increasing and diffusing geographic knowledge and promoting research and exploration. Since 1890 the Society has supported 627 explorations and research projects, adding immeasurably to man's knowledge of earth, sea, and sky. It diffuses this knowledge through its monthly journal, NATIONAL GEOGRAPHIC; more than 27 million maps distributed each year; its books, globes, atlases, and filmstrips; 30 School Bulletins a year in color; information services to press, radio, and television; technical reports; exhibits from around the world in Explorers Hall; and a nationwide series of programs on television.

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In this age of affluence, we have more of everything. Including more trash. 182,000,000 tons a year. And what to do with it is a real problem.

Burning it produces smoke and fly ash. Open dumps breed insects and disease.

Many cities bury their problem. It's cheaper, cleaner, more efficient and healthier.

And waste burial, or sanitary landfill, is a good way to turn low value land into a community asset. Los Angeles County reclaimed an abandoned strip mine with sanitary landfill.

The result is the lush, 87-acre South Coast Botanical Garden.

Find out what you can do in your community. Write for the free booklet, "What can you do with refuse?" to: Caterpillar Tractor Co., Dept. 718G, 100 N.E. Adams St., Peoria, Illinois 61602.

Or ask your local Caterpillar Dealer to show you the film, "The trouble with trash."

You have a lot to gain.

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

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You've changed. We've changed.

For 1971, we bring you the biggest Chevrolet ever.

And we bring you the littlest Chevrolet ever.

Caprice. Totally changed. With more ride, more handling, more luxury and more security than you've ever known in a Chevrolet before.

Best of all, we still give you Caprice at a Chevrolet price.

And if the most inexpensive expensive car ever built is out of range, we give you the most inexpensive Chevrolet.

Our new Vega.

It's the little economy car that does everything. And does it well.

You'll do well to see them both. At your Chevrolet dealer's now.

Chevrolet

Countdown on the Methuselahs of the Pacific

GIANT Galapagos tortoise, perhaps a century old, becomes a bench for Jan MacFarland and her three-month-old daughter Bennett. With National Geographic Society aid, Jan and her biologist husband Craig are making a survey of these reptiles, brought to the brink of extinction by human and animal predators. Two members of the dwindling population meet in a grazing area (lower right).

Craig measures eggs (below) at the Charles Darwin Research Station on Santa Cruz, where tortoises are raised to restock herds there and on other islands of the Galapagos group, which lies 600 miles off the coast of Ecuador. Dr. William G. Reeder of the University of Wisconsin directs the study.

Invite your friends to share in sponsorship of such important research projects and to learn about the scientists' discoveries through the pages of NATIONAL GEOGRAPHIC. Nominate them for membership below.

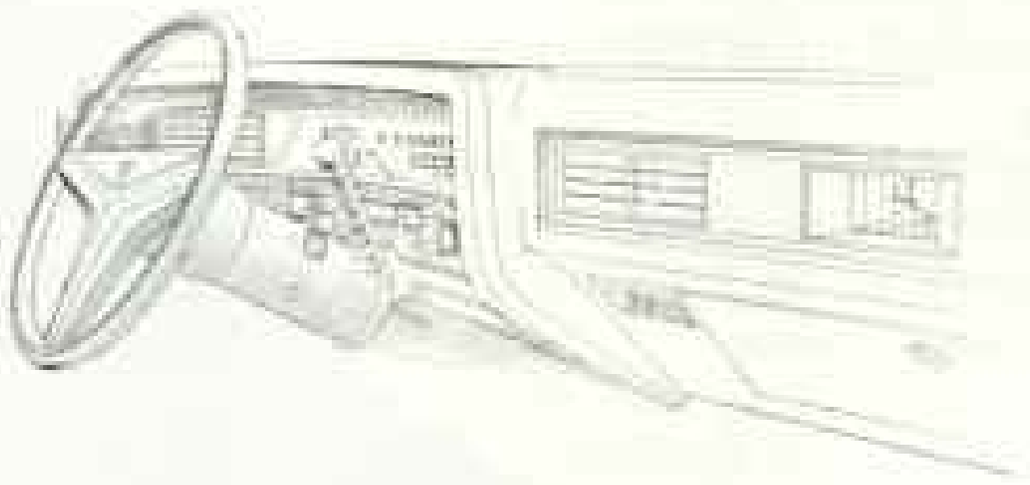
EKTACHROME (ABOVE) AND KODACHROME (BELOW) BY CRAIG MACFARLAND;
KODACHROME (LEFT) BY JAN MACFARLAND © N.G.S.

1971

1971

Your second impression will be even greater than your first.

Even though you might already be impressed by Cadillac's remarkable new beauty, you can't fully appreciate its extraordinary newness until you have been in the driver's seat.



You immediately begin to sense the uniqueness of this Cadillac when you place yourself behind the wheel. You'll find entry has been made remarkably easy, thanks to its new door-sill design. The richly upholstered lower profile seats offer new, contoured comfort that will delight and surprise even the most loyal of Cadillac owners.

A completely redesigned instrument panel shows proper concern for you and your front-seat companion. The panel's many controls are readily at hand, and gauges have been carefully positioned and canted for easy reading.

Turn the key, and Cadillac's renowned V-8 performance stands ready to serve . . . with a smoothness and quiet never before known to the American luxury automobile. That power, incidentally, is delivered just as reliably with the new no-lead, low-lead fuels. And, as you take to the highway, you are gently reminded that a number of power assists are at your disposal: variable-ratio power steering, pioneered by Cadillac; power disc brakes at the front wheels; the incomparable smoothness of Turbo Hydra-matic transmission and the pleasant convenience of power windows. All are standard equipment, as you might expect of Cadillac.

To make your driving even more enjoyable, Cadillac offers a Dual Comfort front seat (standard on the Sixty Special Brougham

and available on DeVille models) which provides individual adjustment for both you and your passenger. There is an available Automatic Climate Control, a highly sophisticated and reliable heating and air conditioning system that controls interior comfort with the simple setting of a dial. And you may choose to order Automatic Cruise Control which enables you to select your road speed with the touch of a fingertip.

Cadillac's marvelous selection of radios is also available, including this year, a combined AM/FM pushbutton stereo system with eight-track cartridge—an instrument capable of providing sound of amazing tone and fidelity. And, there is a new lamp-monitoring system to remind you that driving lights

are in working condition, as well as to warn you of the fluid level in the windshield washer.

The 1971 Cadillac . . . by any standard the finest possible example of the modern automaker's art.

Why not discover for yourself why the new Cadillac is the world's finest automobile. Do it today . . . at your authorized Cadillac dealer's.

GM
MARK OF EXCELLENCE

Cadillac Motor Car Division

Cadillac

Shown opposite is the 1971 Coupe deVille.

You won't believe

It's the world's largest collection of believe-it-or-nots.

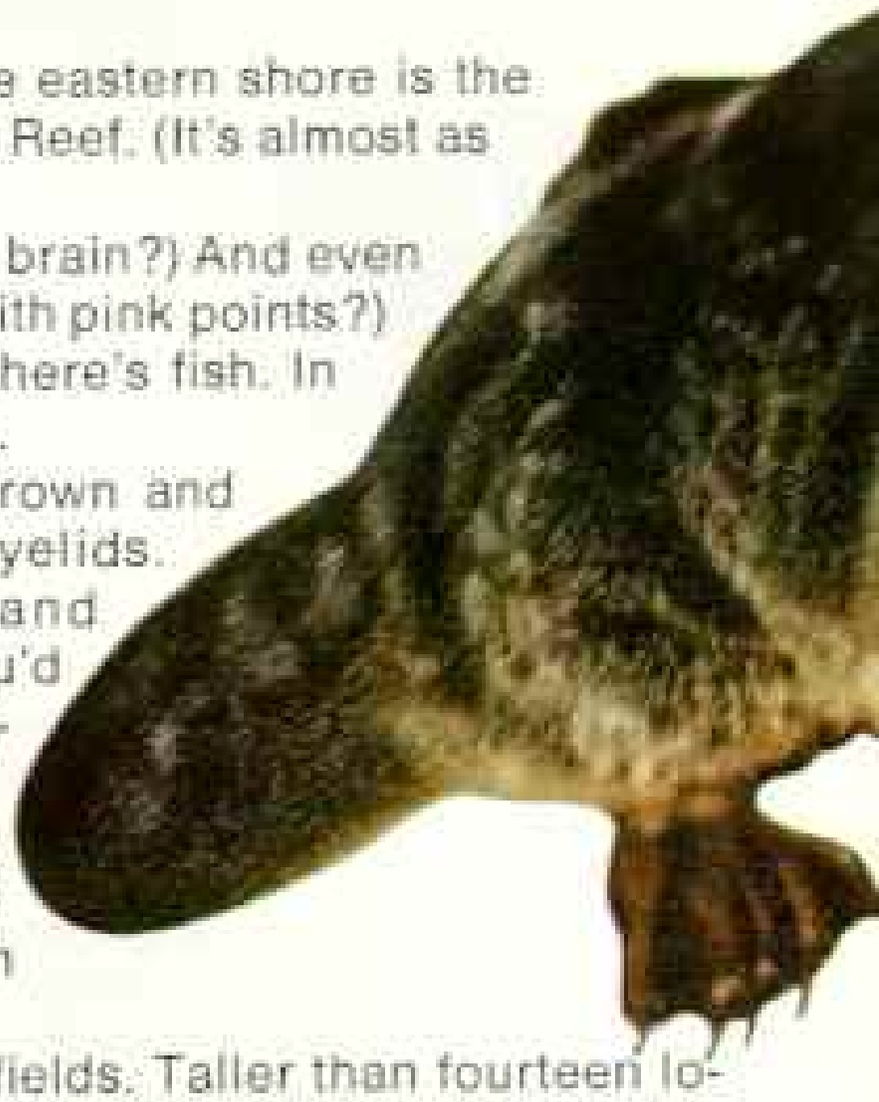
A whole country filled with incredibles.

Incredible even before you get there. Because just off the eastern shore is the longest stretch of living coral in the world. The Great Barrier Reef. (It's almost as long as the entire East Coast of the United States.)

Coral in every conceivable shape. (A mushroom? A human brain?) And even inconceivable colors. (Taupe with powder blue tips? Or red with pink points?)

And where there's coral, there's fish. In equally inconceivable colors.

Orange with blue dots. Brown and white stripes with purple eyelids. And some such a bright and shocking shade of blue you'd swear they had batteries under their scales.



Coming into the Sydney harbor you'll see the most spectacular opera house in the world.

Bigger than nine football fields. Taller than fourteen locomotives. And more expensive than a lifetime subscription to the Met for a million New Yorkers.

And then there's the cassowary.

A bird that doesn't fly but wears a crash helmet on its head. (Handy for running through jungles.)

You probably won't get to see him running through the jungle, but you can see him running through places like the Lone Pine Sanctuary, just outside of Brisbane.

They've got a lot of weird animals there.

The kangaroo. (He really does run like he has springs in his feet.)

A bear that isn't a bear. The koala. (He's really a marsupial, like the kangaroo.)

And another bird, the emu, that doesn't fly either but eats almost anything he can get his beak on. (Like your raincoat, if you're not careful.)

But the ultimate Australian Incredible has got to be the platypus. Part mammal. (It

Australia.

suckles its young.) Part reptile. (It lays eggs.) And utterly improbable looking.

It has webbed feet but a furry body. A rubbery radarlike duckbill. And a furry, ruddery tail.

The best place to see one is in the platypusary (that's right, platypusary) in Healesville, near Melbourne.

150 years ago scientists laughed at it and said it was a hoax.

The platypus is having the last laugh because now they think he's the missing link between mammal and reptile.

A missing link between modern man and prehistoric man was just discovered out in the outback. (That's the vast desert area out in the center of the country.)

Primitive stone carvings that date the carvers back as far as 100,000 years ago. Or more. Which is earlier than even the Aborigines. (Up until now everybody thought the Aborigines were the first Australians.)

You can also see the world's biggest rock, carved or otherwise, out in the outback. Near Alice Springs.

One solid mass of sandstone that changes from pink to bluish brown to orange to a real red depending on how the sun feels that day.

Coral reefs and electric fish. An opera house that looks like it could fly. And birds that never will. Non-bear bears and funny looking animals.

You've got to see them to not believe them.

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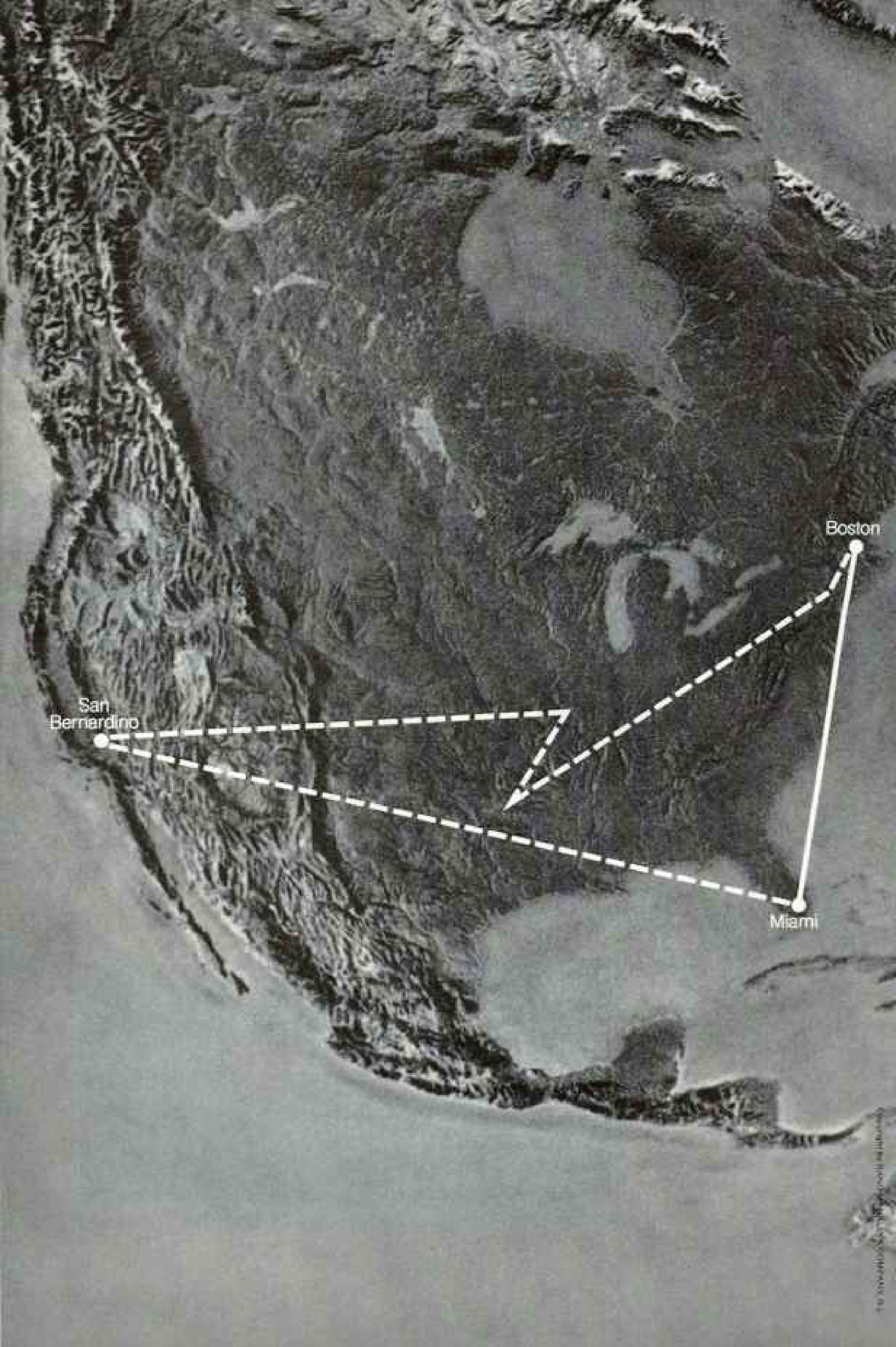
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But the drilling went on for good reason. Holland had very little domestic oil and urgently needed more energy for industry.

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There's a similar story in industry. About 65 per cent of Holland's larger factories have already converted to the new fuel.

But Holland isn't alone in feeling the effects of Groningen. Over four thousand miles of pipeline now allow Holland to export gas to Germany, Belgium and France, where it runs

things that ever happened to Europe.

steel mills, power plants, breweries and even heats sidewalk cafes.

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SUBTOTALS	$ 89.63	$112.50
TOTAL	$202.13	

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Repair hood, replace molding and lock panel	14.28	8.10
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TOTAL	$219.53	

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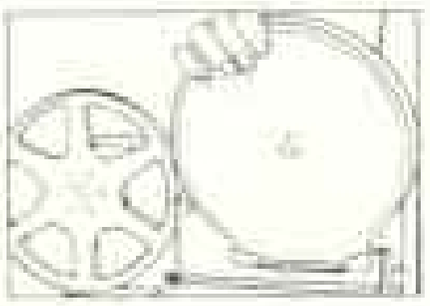

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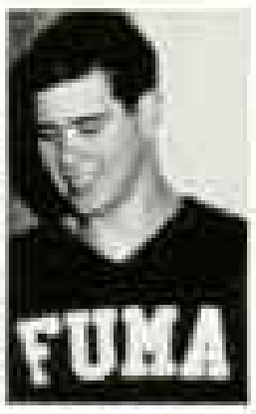

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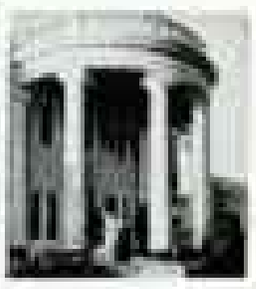

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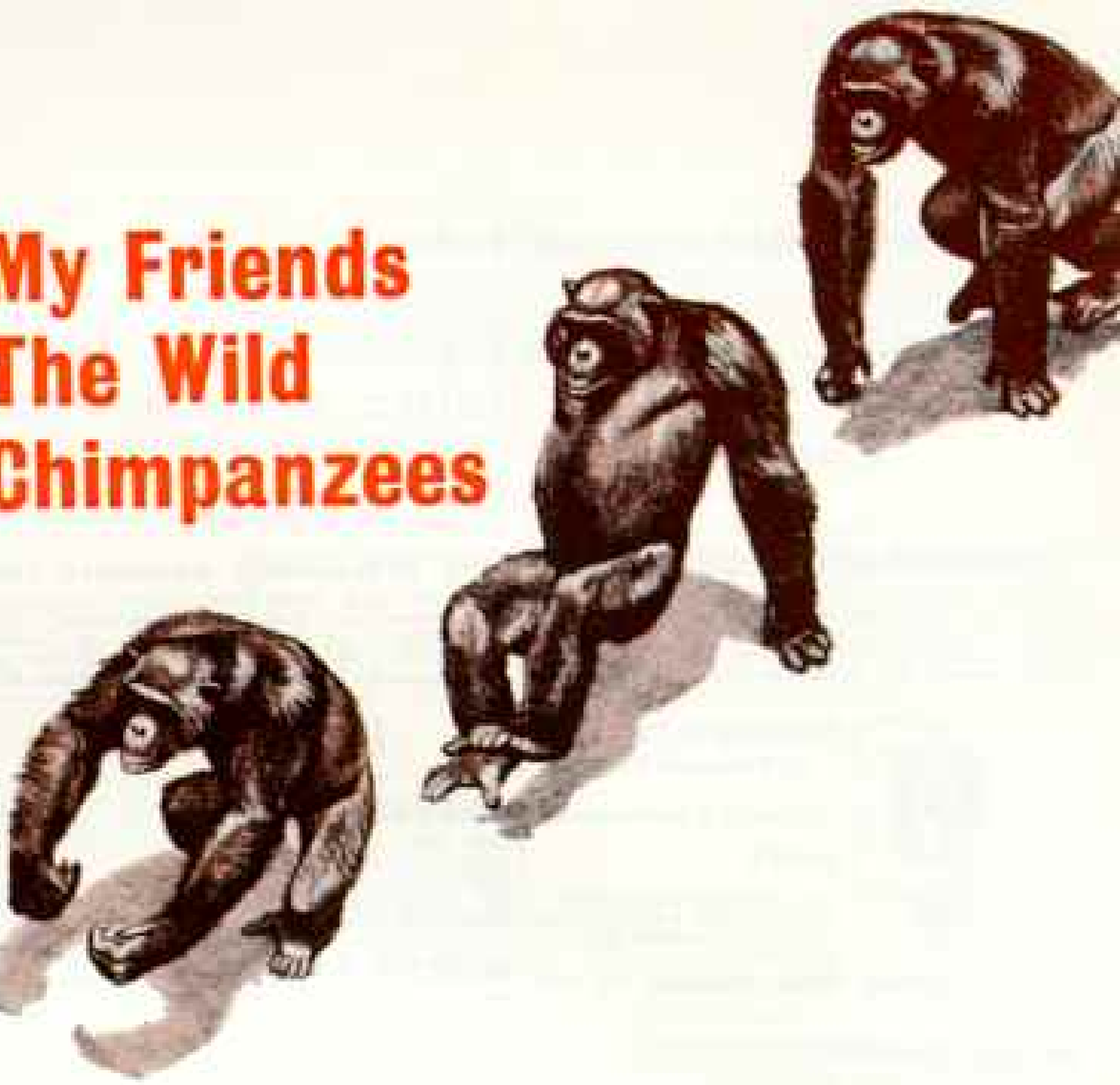
My Friends The Wild Chimpanzees



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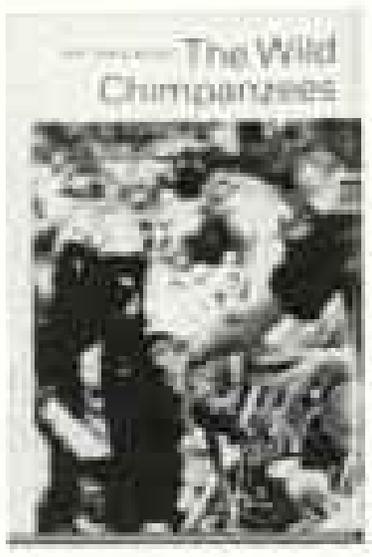

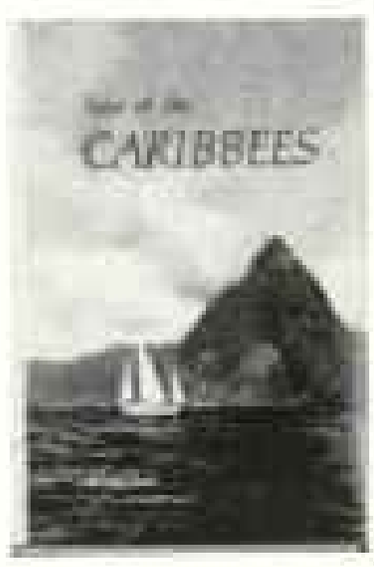

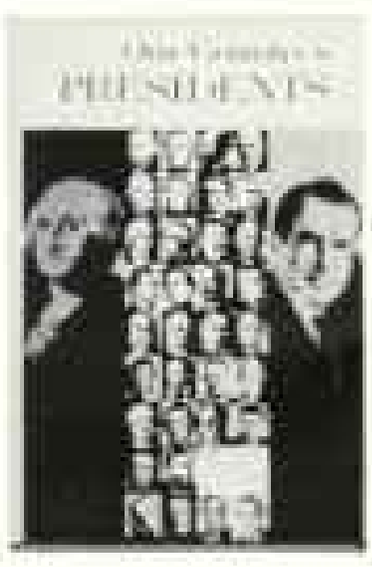

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