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THE ETERNAL TREASURE

GOLD

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Photographs by JAMES L. STANFIELD

BOTH NATIONAL GEOGRAPHIC STAFF

ONE MORNING LAST JULY my wife fixed eggs sunny-side up in a 6-inch frying pan of pure gold. It weighed 1¾ pounds, which at the market price that day came to $2,965. As she was about to put it on the stove, she hesitated. "Won't it melt?"

I repeated something I'd read, that gold has a melting point considerably higher than that of aluminum. And something I'd heard, that unadulterated gold would make a superb frying pan because it diffuses heat more evenly than iron or copper. Also that gold is chemically more stable than either copper or aluminum or stainless steel, and therefore even less prone to impart a taste. "Come on, let's see if it's true."

Well, the eggs really were a treat. So light, so delicate, so brown and crunchy underneath. "They never turned out like that before," said my wife before the pan went into the washer. "Oh, the little crusts on the bottom of those eggs. . . ."

Too bad that pan had to go straight back to Engelhard in New Jersey, the precious metals firm that had made it for the sake of our experiment. To keep it would not only have been too expensive but also a federal offense. The Gold Regulations of the U. S. Treasury Department restrict the holding of fabricated gold to such forms and quantities as are *customarily* used. A pound and three quarters in the form of a frying pan? No way!

For a couple of years now I've been getting my teeth into gold, so to speak, on the five major continents—ever since the news of its unprecedented price rise

first spread beyond the financial pages, and neighbors started saying we don't understand it, what's all the fuss about, what's gold got to do with the dollar and Middle East oil. . . .

Now I've seen how much ingenuity and sweat go into the producing of gold, and what it means to diverse people—to European bankers, say, or to a housewife in Calcutta, or to an African king—and how deeply ingrained it is in the human psyche. After all, who ever heard of a silvery opportunity, or a heart of platinum?

How to begin? Even before starting out I could see that this stuff my encyclopedia defines as "a dense, valuable, bright yellow, and lustrous metallic chemical element" is a many-faceted thing; just look at what's done with it close to home.

Gold can be spread exceedingly thin, so thin that light will pass through. It also most efficiently reflects a large portion of the scorching infrared rays of the sun. And so it's great as a coating for office windows. People can see out, but relatively little heat will come in. This reduces the power needed for air conditioning and conserves energy. For the same reasons there's gold on the plastic visors of the airtight space helmets that astronauts wear. Otherwise their heads would get exceedingly hot.

Gold can be processed to be soluble in oil, and when such a mixture is applied to glass, and the glass is heated so that the oil burns off, what's left is a film of pure gold only five millionths of an inch thick. That's how golden butterflies and mushrooms get on tumblers, and golden words of promise on perfume bottles and jars of hand cream. The cost per item might be only a couple of cents.

Gold Abounds in the Nation's Schools

Because gold is so malleable and such a fine conductor of electricity, and because it won't corrode, a lot of it goes into tiny but dependable circuitry for pocket calculators, TV sets, and computers. A good deal of gold also disappears into people's mouths, to restore or replace teeth. It'll wear like a natural tooth.

But the biggest use in the United States, by far, is in jewelry. And guess what sort absorbs a most massive share? Class rings—every year more than two and a half million of them.

Very interesting, these customary uses of gold. But that this stuff should move men so deeply. . . .

That dawned on me in South America, at the Gold Museum in the Colombian capital of Bogotá. Visitors enter darkness that gradually lights up into a dazzle of thousands of gold objects—breastplates, tweezers, nose ornaments, fishhooks—from Indian cultures that flourished before the Spaniards came. Quimbaya, Muisca, Sinú. . . .

A French family ogles a little golden raft with ten small figures and one big one. *Extraordinaire! Fabuleux!* It's a chief smeared with gold dust in ancient ritual. Possibly El Dorado, the Gilded One, says a museum official.

"The Spaniards sought gold and spices, but when they saw

Food for an appetite that knows no limit, gold destined to be smuggled into India fills the hand of a boatman on the Arabian Gulf. Cast in Switzerland, shipped from a Middle East sheikdom, and weight-stamped for use in India, the nearly four-ounce bars symbolize mankind's fascination with and ceaseless yearning for the lustrous yellow metal.

Treasures sown by the ancients stir a gold rush in Colombia, where precious artifacts hide in seemingly countless Indian graves. Tunneling 23 feet down, a *guaquero*—grave seeker—sifts through a tomb that yields only a clay pot (**above**). Equally luckless, another strides homeward (**right**) with empty containers and a tool he uses to probe promising sites. Such a day brings no dismay to these treasure hunters. Tomorrow may bring a bonanza such as the toothy jaguar in Bogotá's Gold Museum (**below**). It would fetch perhaps $50,000 in today's booming art market.

Indians with gold ornaments they forgot about the spices." And the Indians? "They had the gold pulled off their noses and their holy burials ransacked, and learned to keep quiet about gold. If they had any, they hid it. And when the Spaniards had taken all they could from the people and the tombs, they put the Indians to work panning gold."

It became a symbol of antagonism. To this day the tribes won't talk about gold. But it is said that up in the snowy mountains, twice a year, at the time of the solstice, Indians still dance with golden masks. . . .

Quest For Treasure Leads to Graves

The Gold Museum belongs to the Bank of the Republic and pays well, so it gets hundreds of additions yearly, dug up from graves the Spaniards missed. "Gold is the curse of Colombian archeology," muses the museum man. "If those graves just had pottery, few would bother them. But what we display here fosters pride in the past. It shows that Indians who made such masterpieces were people worthy of respect. So maybe it'll lead to better treatment for the few who are left, maybe save them from extinction."

Burials are *guacas*, pronounced WHA-cas. Men who dig them up are *guaqueros*, and I go with them in the Magdalena region in the north. We search, dig, sweat, find only bones and broken pottery, complain, dig more, and then a gleam, excitement. It's a nose pendant of the Tairona culture, buried hundreds of years ago. Not bad but not big. My companions yearn for a chief or a shaman—a single hand-size chest ornament could pay each of three men the equivalent of eight years' wages! We've hit a middle-class Indian.

"We live on hope and ambition," the leader says. "I couldn't send seven kids to school working for a farmer. Now my wife is happy, we have a radio and a fan, it's progress!"

But is there no stigma on opening graves? Not when they're that old. It's an honorable occupation—and growing fast. There's a trade union now, licensed by the Ministry of Labor. A group near us hits a three-pound treasure that goes straight to the museum. From the Nariño region in the south, a ten-pound object gets away, to an art dealer in New York City.

Gold is still mined in Colombia. Around a bend in the river Telembi, which runs into the Patia that runs into the Pacific, I hear roaring, squealing, clanking. It's a dredge, four stories high. Every two seconds, around the clock, up clanks a bucket with nearly a ton of muck and gravel and maybe three-hundredths of an ounce of gold. A troy ounce, by the way, a most widely used gold measure, very close to a fifteenth of a pound. An engineer says all gold comes from hard rock originally, but nature and time did a lot of work for us, breaking up rock so that gold washes down to settle in riverbeds, so-called alluvial or placer gold.

Crrrck, a bucket's stuck. Winches screech and pull, the clanking resumes. Muck plops back into the river, gravel piles up behind the dredge. Add mercury and bits of gold stick to it. Apply heat and the mercury vaporizes, leaving the gold.

In a deep channel dug into the rust-colored riverbank, a man with a crowbar pries at a bluish gold-bearing layer. Half a dozen women stand bent over, ankle-deep in water, holding wooden pans heaped with bluish stuff to be washed. It's an ungainly stance, rear up and head down, but they work gracefully with a swift, gentle rocking of the pan, a sweep of the arm to remove a stone or slosh on a little more water. The soil washes away, the heavier gold particles remain.

Holy Virgin Glitters in a Golden Gown

Along the shallow tributaries, I see here and there a hut and a woman panning and smoking. It's better than farming, they say. At the end of the day you see the results. And gold always has a market. It doesn't spoil like bananas. Why do they keep the burning end of the cigarette *inside* the mouth? "So it won't go out in the rain." I try panning too. Could they teach me to do it well? I get a long look: "It would take a hundred years."

It rains so hard that overnight the Telembi rises 11 feet. Soon it's down again, but the channel I saw has caved in. The man will dig it out once more.

Firecrackers, bells in Barbacoas, the river town. It's the Day of the Assumption of the Virgin, the Most Holy Mary, Mother of God and Mother of men, and her image, carried through the unpaved streets, is dressed in sumptuous gold. We love her, we love to see her this way, that's the way to praise her, says the mayor, says a beggar.

"A reflection of their faith," says the bishop, come afar for this day. He thinks mining here has always been a mixed blessing—long ago dozens of rich families and thousands of

slaves from Africa, now the land wrecked and what's left is the poorest of people working in this very rich thing, gold. . . .

I can see these people are poor. Atop many a dark face of a child the curly black hair has a golden tinge, a sign of malnutrition.

Barbacoas has no newspaper or radio station, so when a new gold purchasing price is telegraphed from the capital, the mayor sends a man with a drum to read an announcement at a dozen street corners. This morning it was 1,182 pesos an ounce. That's $54. Two months ago, 1,080 pesos. Eight months ago, 780.

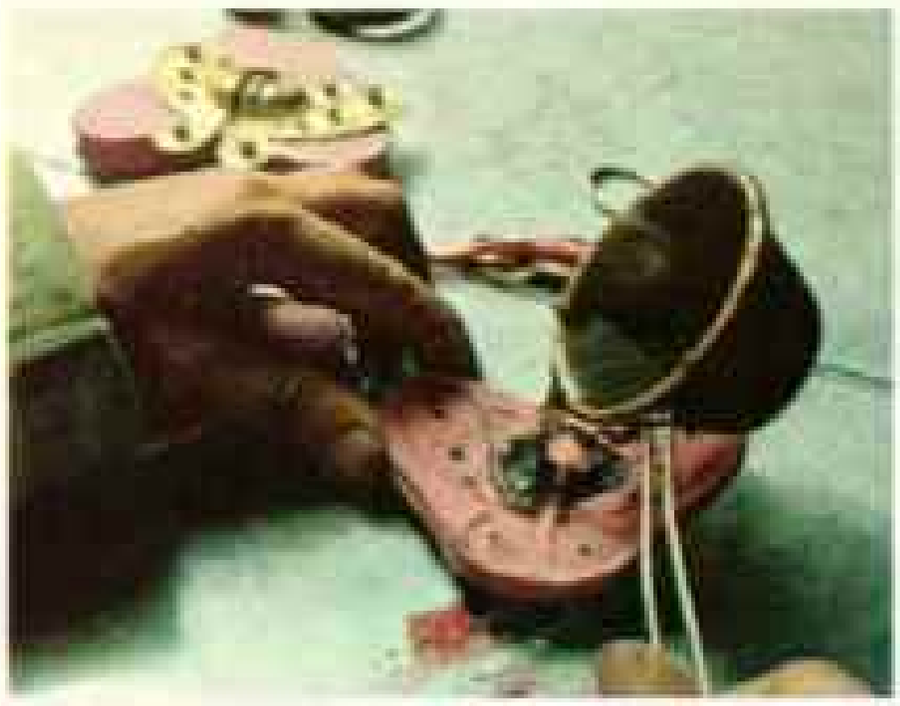
People come in dugout canoes to sell their fractions of an ounce at an agency of the Bank of the Republic. Others sell to traders who weigh less reliably but pay a little more. The bank agent says less and less is coming in. Is the gold giving out? No, it's not that. . . .

Back at bank headquarters in Bogotá I gather that Barbacoas sends very little gold now. A lot is illegally exported to Ecuador. Annual gold production figures show only what was received by the bank—not how much really was produced in Colombia that year. And so I start wondering about statistics on how much gold there is in the world.

I don't mean gold that nobody has yet extracted—because it hasn't yet been discovered, or because it occurs in such tiny concentrations that it's not worth extracting, such as gold found in seawater and in trees, in deer antlers and in human hair. No, I mean the gold mined in the past 6,000 years. Experts estimate 80,000 metric tons. A metric ton is 2,204.6 pounds.

"¡Es frio!" "¡No, caliente!" Colombian gold traders haggle through a car window in the town of Restrepo. Huckstering a figurine of dubious antiquity, a middleman who buys the finds of guaqueros insists the piece has long lain buried and thus is frio—cold. The prospective buyer suspects that it is a recently made fake and thus caliente—warm. The upshot: no sale.

1.



2.

3.

4.

5.

A goldsmith duplicates masterworks of the past

TO CREATE EXQUISITE GOLD ornaments, South American Indians employed the lost-wax process, a technique that evolved in many parts of the ancient world. Demanding patience and skill, the process rewarded its practitioners with objects of surpassing beauty.

Then came the Europeans, searching relentlessly for gold. The Indians, fearful that working with the metal would attract plunder and death, ceased producing their works of art.

Guillermo Cano of Bogotá uses the lost-wax method to cast precise replicas of pre-Columbian artifacts. Thus he re-creates ornate votive figurines of the Muisca culture (**right**), here resting in a Muisca ceramic bowl. Today Cano employs 15 artisans to meet demand for reproductions from abroad and at his two galleries in Bogotá.

In the sequence at left, a Cano craftsman reproduces an elaborate nose pendant of the Tairona people, made in the Santa Marta region of Colombia perhaps a thousand years ago.

1. Using rubbery dental paste, the worker makes two molds, one of each side of the artifact.

2. Then, for demonstration purposes, he pours black wax into a mold of one side. Normally the two molds are joined at the edges like the halves of a clam shell before the wax is poured in.

3. Prying open the mold, the artisan examines the wax casting, adding or removing bits of wax to achieve fidelity to the original.

4. Perching the casting on five hollow supports, he brushes on thin coatings of plaster, layer upon layer. After he has built a solid mold he heats it, causing the wax to melt and drain out through the supports. Then he pours in molten gold. So that it will penetrate to every part of the cavity, he spins the mold on a centrifuge—a technique probably unknown to the Indians.

5. Breaking the cooled gold casting from the plaster mold, the craftsman holds a precise replica of the pendant. A spurt of water washes away clinging plaster.

If all that were refined to the height of purity, like the gold in my vanished frying pan, it would fill no more than thirty large railroad boxcars (except they'd collapse before they could be filled, gold's so heavy), or make a 2½-foot-thick slab as big as a football field, or a cube with 53-foot sides.

I find this easier to imagine than to believe, but there's no doubt that the biggest accumulation of gold anywhere, namely 12,600 metric tons, rests on the bedrock of Manhattan, in a vault of the Federal Reserve Bank of New York. It belongs to some 80 nations that prefer to store it there. The biggest single national gold reserve belongs to the United States—8,584 tons, down from 21,530 tons in 1950. About half is in Fort Knox and the rest in half a dozen other places. The U.S. Treasury values it all at some 11 billion dollars.

Lion's Share Comes From Africa

The biggest addition to the world's gold supply—nearly four tons, or about seven cubic feet—pours out every working day at the Rand Refinery, on the outskirts of Johannesburg in the Republic of South Africa. That's two thirds of global production, says the manager, and it comes from some 50 mines—the St. Helena, the President Brand, Free State Geduld. . . . They work about four million cubic feet of rock daily, along a 300-mile arc where microscopic particles of gold lie locked way down in strips of rock called reefs, only a couple of inches or a couple of feet thick, deposited by some primordial sea.

Getting that rock up—with explosives and hoists, through passages and shafts as deep as 11,000 feet—are hundreds of thousands of men. Nine out of ten are Bantu-speaking tribesmen from all over southern Africa, so-called timber boys, pipe boys, panel boys; machine boys running pneumatic drills, assisted by spanner boys; boss boys. It's hot down there, and dangerous. A mine official says that to get these jobs they stand in line in Botswana, in Lesotho, in Malawi. He adds that the term "boy" is to be eliminated; machine boys will be called machine operators, boss boys will become team leaders. . . .

As you go deeper it gets hotter. The hotter the air the more moisture it can hold, and where I am it's 90° F. with humidity above 90 percent. That's because water is constantly sprayed to keep down the dust, and because the shaft's ventilation system isn't up to par that day. Neither is mine. My escort says, "Your sweat glands are too sluggish."

I'd like to choke him—I've never sweated so much—but I don't have the energy. At the working face, called the stope, where it's hardly high enough to sit up, and it's dark except for splotches from little lamps on hard hats, activity hums—but I'm losing interest. "That's a warning of heatstroke. Come on."

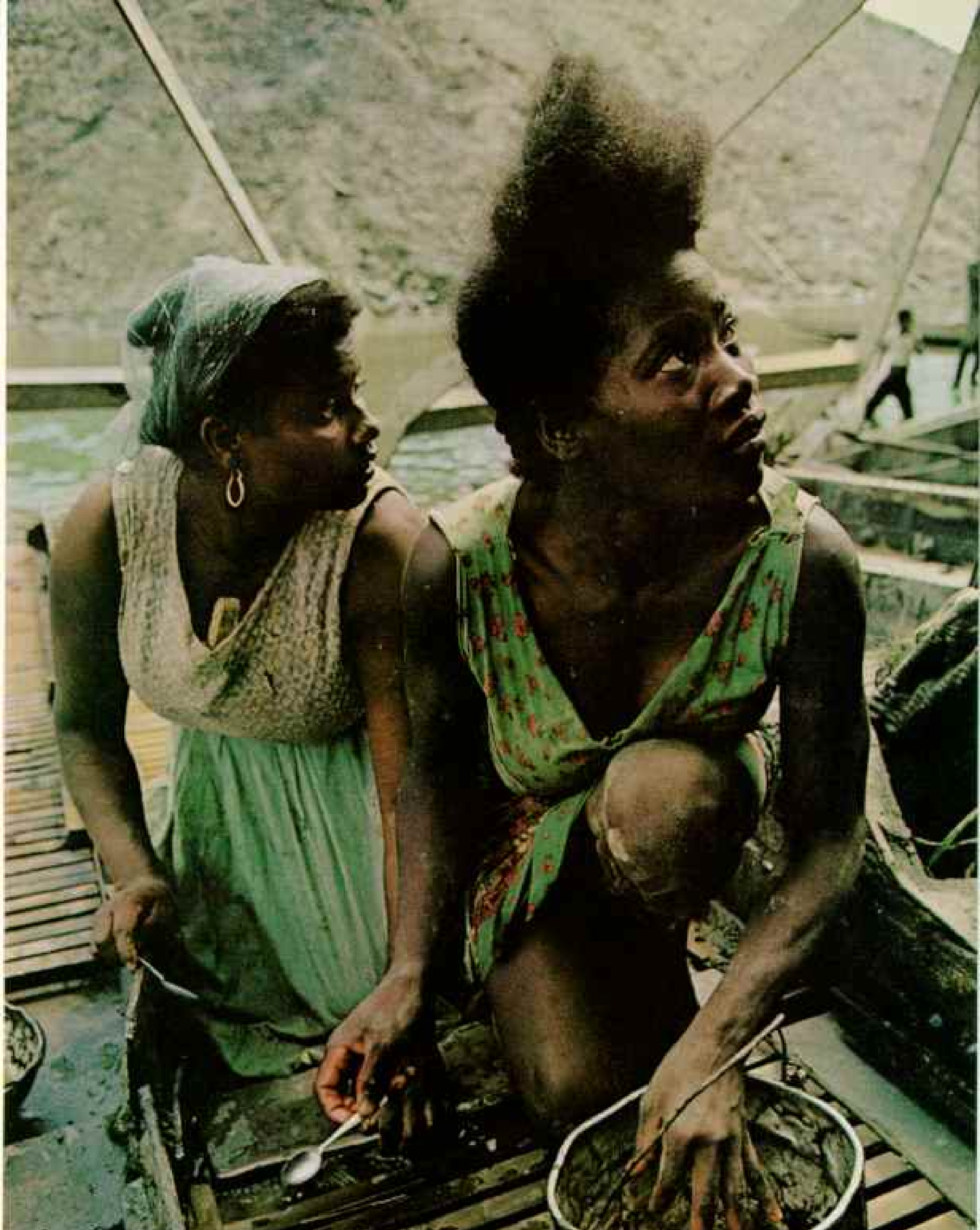
I sit under a jet of compressed air in a dim crosscut tunnel, drink water by the quart, and cool down somewhat.

So—for gold, men go deeper into the earth than for anything else, down to where the pressure on the rock can make it burst in one's face. Where rock cracked by dynamite, and held together as arches are by keystones, can suddenly become unkeyed and fall.

The planners want to go deeper yet, hoping that computers can warn of rock bursts, and that rockfalls can be reduced by using less dynamite and more of the new rock-cutting machines.

Warily watching for guards, poachers spoon for spilled wealth on a mammoth floating dredge (**right**) working Colombia's Telembi River. They seek stray particles of amalgam—gold mixed with mercury during an extraction process aboard the dredge. Long as a city block, it scoops up and processes nearly half a ton of alluvium each second.

Poacher's reward, a blob of amalgam glows dully in a woman's skirt. Later she will heat the mixture and drive off the mercury as vapor, leaving a small residue of gold.



Was that a mouse scurrying by? "Yes, we've got quite a few. They come in with the timber."

What a relief to be up again in the stinging bright sunshine on the wide-open veld. But I must go down again with the shaft sinkers, the elite who work in shifts around the clock, in the utmost rush. A main shaft being sunk means millions of dollars in expenses, and no profits yet for the stockholders.

The noise is indescribable—30 pneumatic drills going at once, at the bottom of a hole 1,300 feet deep and just 30 feet across. Then blasting and the cleanup. It's cool here, but frantic. Gigantic buckets come dangling down and gigantic steel grabbers load them, and men dodge in between, prying off loose rock. Another blast, another seven feet done, but thousands more to go. The European supervising the rock pryers isn't feeling well. That night he dies. It was a heart attack.

Price of Brides Provides Incentive

Near each shaft entrance nestles a city of thousands—a compound where the Bantu are boarded free. They go home after six to 18 months. A Mosotho from Lesotho, back for the fourth time, tells me he's already paid for six cows—they're with his prospective father-in-law as a down payment for the girl. He needs another 19 before he can marry her. He'll have those within a year because now he's a machine operator and gets a bonus for every foot drilled. What did I pay for my wife? Nothing? "Are you lucky!"

An electrician's helper from Malawi says he'd like to bring his wife a sewing machine, but how can he, the price in the trading store has doubled.

In a corner a team leader fiddles with his expensive stereo (page 22). The man from Malawi says, "He'll go home before sunset." He means that when this man goes home he'll be proud of what he's bringing back. "When I go home, I'll go after dark. Or maybe I'll put stones into my suitcase, so people will think I'm bringing back good things too."

In the strong room of the South African Reserve Bank, in Pretoria, arrive hundreds of bars of 12.5 kilograms each, nearly 19 tons in sleek bright bricks, to be added to the thousands already there (page 17). Workmen stack them in racks 30 high, swiftly, rhythmically—clunk, clunk, clunk—gold on gold, the sound of cracked crockery.

"This is no permanent store of wealth," says the deputy governor. "For us it's an export commodity. But you might say our faith is in that metal. If we have a bad wool crop, if we come on hard times, we have our gold to fall back on." And South Africa is stacking it up. The market price is $67 an ounce and rising.

Two months later, by the time I get to Zurich, it's $90. On the Bahnhofstrasse in the financial capital of Switzerland, a private banker buys most of the gold of South Africa, when available, on behalf of the Zurich gold pool—three private Swiss banks. "We buy wholesale from the producers and sell at retail, to investors and industrial users," he tells me.

He telephones a Soviet banker ten blocks away. "How are you. . . . Just wanted to see if you're doing anything today. . . . Today nothing? Well, if the stock market goes down further in America, gold cannot weaken." He hangs up. The Soviet Union is the biggest producer after South Africa—perhaps 250 tons a year, mostly from dredging in Siberia. They don't disclose how much they have.

The Swiss banker steps into his trading room—telex machines, electronic calculators, clerks on telephones in German, English, Italian, French. Telex from Frankfurt, "We buy from you 5,200 ounces. . . ."

It's time for the morning gold fixing in London. The banker picks up a receiver, a London voice comes through. ". . . some buying coming in . . . still getting figures . . . more selling than buying today . . . fixed at 91.10." Dollars, that is.

Fortunes Hang on Word From London

This is the price heard around the world. Men from the five British banking interests that constitute the London Gold Market have met and matched their far-flung clients' buy and sell orders, from Singapore, say, and Tokyo, and of course Zurich. The result is a barometer reading of world feeling about gold at 10:30 London time.

There'll be another at 3 p.m. A clerk says, "It looks calm but it's nerve-racking. You sit on a lot and the price goes down, or you don't have enough and the price goes up." A sale of half a ton, a mere 500 kilograms, can push the Zurich price down one dollar.

Down in the vault I see South African bars stamped with a springbok emblem, Russian bars with hammer and sickle. A young bank official points to a long row of boxes with gold belonging to a client; it's worth many millions

of dollars. Collateral for a loan to some government? Part of the fortune of a billionaire?

He won't tell, but he says, "Imagine, forty people working forty generations—to produce that! If you don't think the world is crazy, *you* must be crazy! And what do we do with the stuff? We move it from one room with a special floor and special ceiling to another. I mean, couldn't we employ the time in a better way than digging it up from 10,000 feet and putting it way down here?"

But at lunch, after sherbet with champagne, he says, "You know, if America had 50 billion dollars in gold in Fort Knox there wouldn't be a dollar crisis every couple of months."

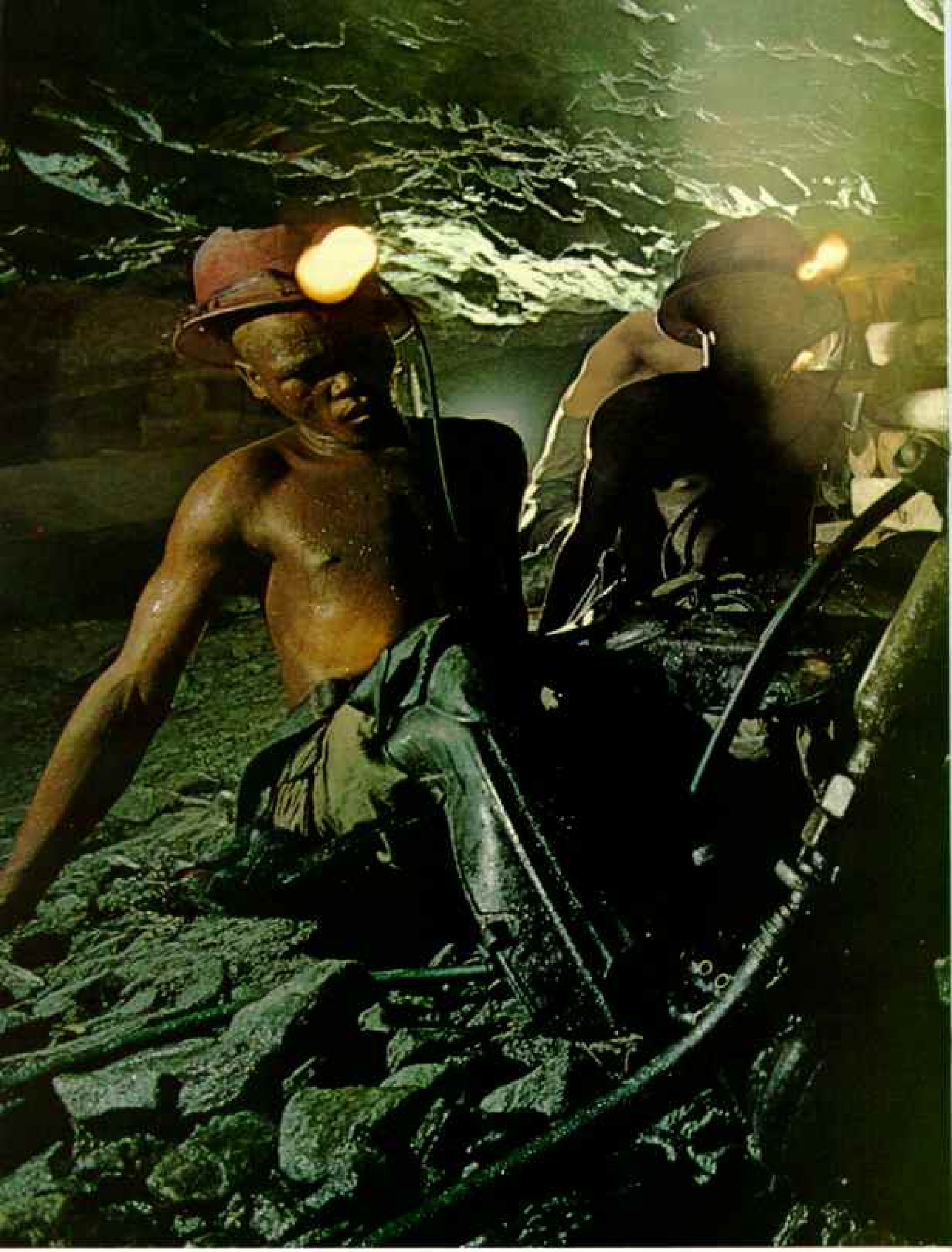
Who's crazy now? And what's 50 billion dollars nowadays? Doesn't he know that our annual federal budget alone amounts to a lot more than that?

"Exactly. A lot of inflated paper. Your inflation, your unfavorable international balance of payments—and a hundred billion dollars floating around outside your country. You don't have enough gold."

It's not that simple, but he's got a point, and that needs a pause for a little explanation.

Until recently, gold and the dollar were the backbone of the international monetary system. I've seen this symbolized in the lobby of the Washington, D. C., headquarters of IMF, the International Monetary Fund. It was a display of banknotes and their par values,

Scar from a gold mine's gorings, a mount of mill tailings 200 feet high blankets a square mile of suburban Johannesburg, South Africa. The town sprang into being in 1886 with discovery of the Witwatersrand Reef, in the world's richest gold-bearing deposit. Today some 50 mines tap an arc of reefs 300 miles long. Together they yield more than 900 tons of gold a year, two-thirds of world production.

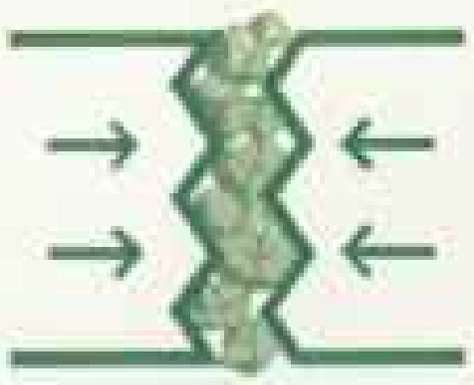


In the steaming bowels of earth, miners crouch between rock shelves 8,000 feet down to drill holes for blasting in a gold-bearing rock layer—only inches thick in places. Here a machine operator, left, and his helper guide the drill with

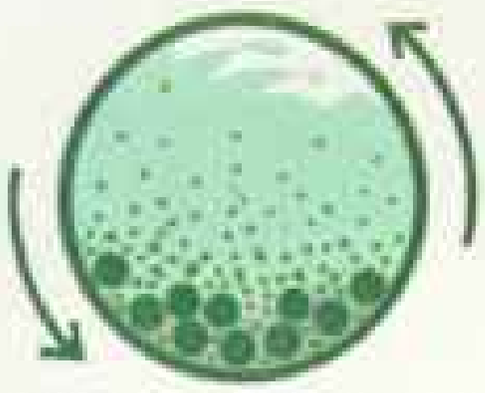
their feet. Some 375,000 Bantu-speaking tribesmen labor in the gold mines, poorly paid by white standards, usually in discomfort, often in danger. Yet many sign on year after year, eager for the pay and prestige the work brings them.

From tons of ore, a button of bullion

TREASURE-RICH REEFS of South Africa yield their hoard grudgingly. Some 2¼ tons of rock must be processed (**below**) to produce an ounce of gold and a sliver of silver.



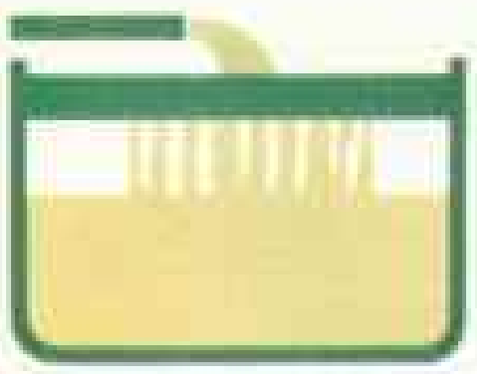
1. Like a mighty nutcracker, steel jaws shatter ore into softball-size fragments. Hand sorters discard places lacking gold.



2. After further crushing, the ore mixes with water and enters a revolving cylinder, to be pulverized by tumbling steel balls or bars.

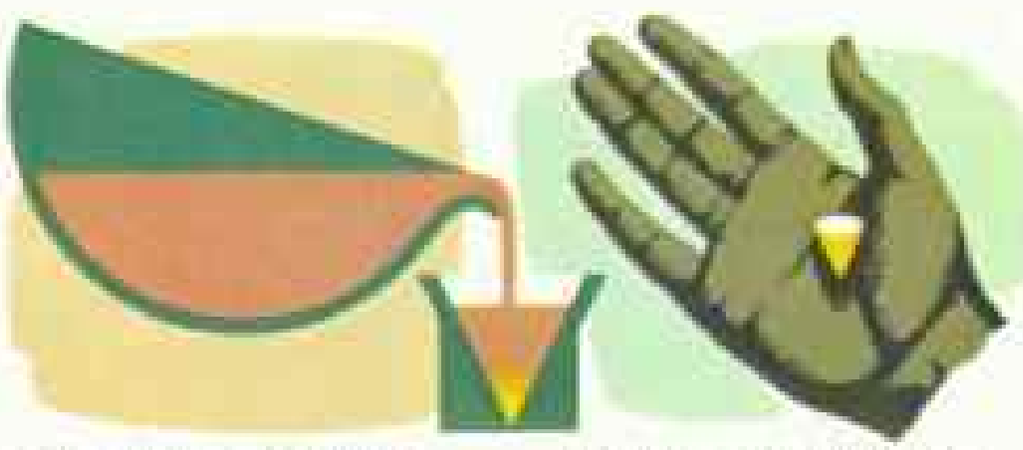
3. Air jets and mechanical arms in agitator tanks mix cyanide into powdered ore and water, called slime. This releases gold from rock.

4. The gold-cyanide solution and slime funnel into vast tanks where the rock particles slowly sink. The clarified solution is fed into filtration units.



5. Gold-cyanide solution is filtered to strain out any remaining rock particles, and then is deaerated.

6. Zinc dust added to the solution separates the cyanide from the gold, which emerges as an impure powder.



7. The gold is melted with fluxes such as borax. As the metal cools in the bottom of a conical mold, the fluxes combine with impurities and float as slag.

8. Final product: a shining "button" 90 percent gold, the rest silver. Further processing at a central refinery yields the 99.6-percent-pure gold at right.

from scores of its member countries, like this: Austria, 1 schilling = U. S. $0.0385; Italy, 1 lira = U. S. $0.0016; Japan, 1 yen = U. S. $0.0028. And then: United States, 1 dollar = 1/35th of an ounce of gold.

The world's exchange rates stuck close to these values. Any country's central bank could send any dollars it had acquired to the central bank of the United States, to the Federal Reserve, and have those dollars exchanged for gold. And so in foreign eyes the U. S. dollar was, literally, as good as gold. It was trusted.

This display has been covered up. The U. S. Government no longer redeems dollars for gold. At IMF meetings I've heard finance ministers by the score discussing monetary reform. Mention gold and some of the ministers light up, some wince. It's a hot potato. Shall gold remain at the base of the monetary system?

Afghanistan, France, the Philippines say yes. The Netherlands, Nigeria, New Zealand say no. So does the United States. It wants the role of gold to diminish. But what's to take its place? What will be trusted? Says the minister from Malaysia, "When all is said and done, gold is still gold. . . ."

The ministers will continue to meet, but for the time being the world's currencies are "floating"—each is worth what traders will give for it, from day to day. The U. S. dollar has been floating downward.

This weakness of the dollar, and a mounting worldwide distrust of paper currency generally, has been at the bottom of the recent gold excitement. So I hear one mild English afternoon in St. Swithin's Lane, from the Chairman of the London Gold Fixing. He adds that whenever the price changes by three to five dollars in a single day, there's a lot of speculation going on.

"But of course it isn't simply a question of speculation. Say you are treasurer of a corporation that operates in several countries, and you have ten million dollars in cash. You're worried that the dollar may be devalued by 10 percent; you'd still have ten million dollars, but their purchasing power in the international currency market would be down accordingly. But say you took your ten million and bought gold at 70. Then the dollar is devalued, *(Continued on page 24)*

Eloquent evidence of South Africa's bounty, 27½-pound bars weighing some 348 metric tons crowd a bank vault in Pretoria. During four months of 1973 their free-market value in dollars increased almost 100 percent—from 770 million to 1.4 billion.

Like athletes in training, mine recruits in South Africa go through a rigorous routine to prepare them for the heat and humidity of the depths. For four hours at a stretch in a heated room they step onto a block and down again, starting at 12 steps a minute. In eight days those who complete the regimen are racing at double speed, a sign that they have built up the heat tolerance necessary for working below.

Trapped in technology's nightmare, a naked research volunteer coated with black paint is bombarded by light to determine the total area of his body—a crucial factor in measuring the capacity to withstand heat. Results of the experiment will help South African gold-mine managers compute the amount of ventilation needed at different depths to maintain adequate working temperatures.

Crosscut

STOPE

Drive

Elevator shaft

Ventilation shaft

85° F. rock temperature

3,350 feet

Heat from deep within the earth's crust raises the temperature of the rock: 3,350 feet down it's about 85° F., growing hotter as the depth increases. Because of compression, fresh air pulled down for ventilation also becomes increasingly warmer.

To counteract all this heat, air is cooled deep in the mine to about 65°. But the environment at the working face can still be brutal because the humidity is high. Moisture seeps from rock joints, and water must be sprayed to keep down dust caused by drilling and blasting.

95°

5,233

Hoist rooms for second elevator shaft

100°

6,309

VENTERSDORP CONTACT REEF

114°

8,859

CARBON LEADER REEF

129°

11,350

Present depth of third shaft

138°

12,350

Planned depth

P Maine

Burrowing deeper than men have ever gone before, South Africans seek their country's golden lining

ROCK CAN EXPLODE without warning in the relentless pressure, and scalding water may suddenly burst from hidden fissures in the walls. Yet down go the shafts of South Africa's gold mines, and from them spread labyrinthine tunnels and chambers.

Farthest of all plunges the Western Deep Levels, its complex anatomy bared at left. Tapping one reef at 5,000 feet, Western Deep then dives nearly a mile farther to reach a second vein. Both reefs dip at a 21-degree angle, luring miners to 12,350 feet.

Artist Pierre Mion descended to the 10,000-foot level, encountering temperatures as high as 105° F. and low-roofed rock chambers that he could enter only on his hands and knees.

Mounds of waste rock rear mountainlike above the veld to mark the two shaft complexes of Western Deep Levels. Those of the West Driefontein mine rise behind. Thrusting above ore-reduction facilities, towers known as headgears stand atop dual shafts. Transport shafts (**red in the diagram**) house elevators that can raise and lower 120 men at a time or lift out 20 tons of rock per load. To limit the weight of elevator cables, each shaft extends down only about 5,000 feet; there miners transfer to another shaft. Air is pulled down through the elevator shafts to refrigeration plants with a cooling capacity equivalent, at the working faces, to that of one window air conditioner for every three linear feet. Used air is drawn out through ventilation shafts (**blue**).

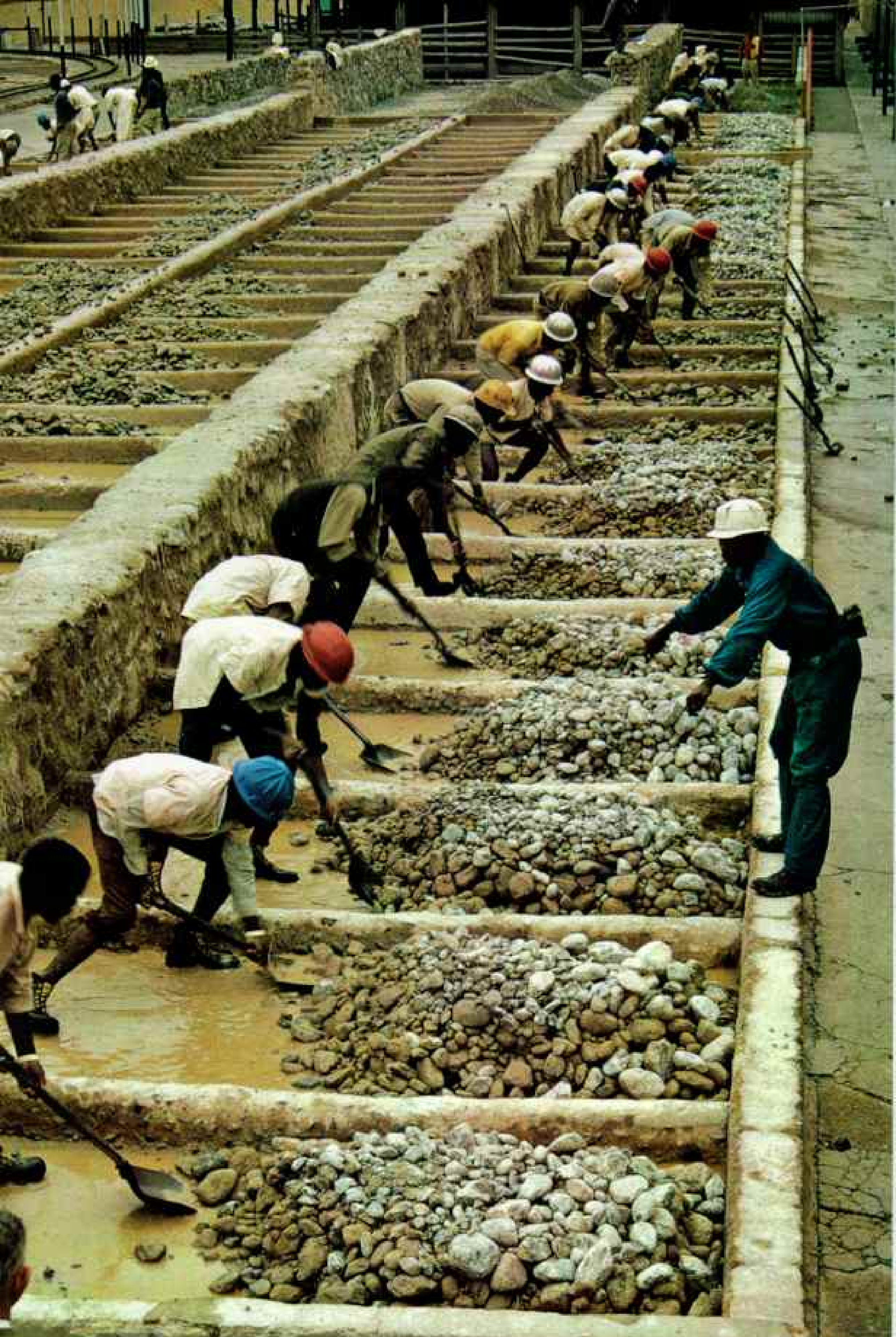
Crosscut tunnels (**green**) branch from the shafts to meet the reefs at various elevations. Making contact, they turn at right angles and, now called drives (**purple**), run along the plane of the reef. From the drives, yet more tunnels (**brown**) branch off. Those that follow the reef upward are called raises, those pointing downward, winzes.

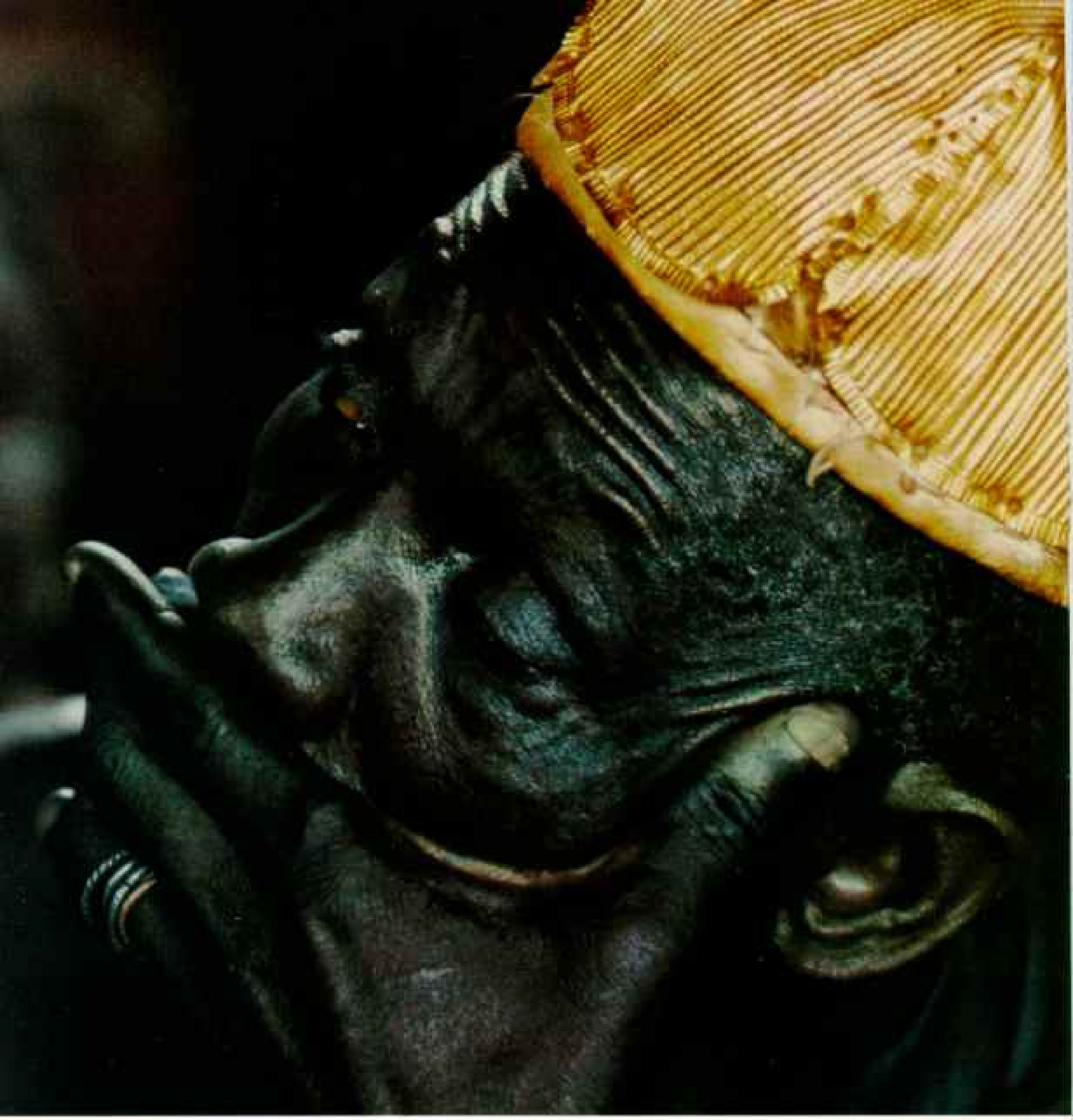
Miners drill and blast at the ore faces along the winzes and raises, excavating low-ceilinged chambers known as stopes (**pale yellow areas and below**). Crisscrossed stacks of logs and newly developed hydraulic jacks protect against cave-ins.

Part pictures, part words, handbooks (**left**) identify those who carry them as team leaders. They compose the booklets themselves, putting in reminders about techniques of shoveling, mine bracing, and symptoms of heatstroke. They write in *Fanagalo,* a bare-bones mine language devised to overcome the workers' jumble of African tongues.

Inside a hostel (**below**), a team leader who has renewed his contract 14 times chats with friends. He will take his new stereo phonograph, complete with batteries, back to his family in Botswana.

Over the wall and back again go rocks tossed by recruits learning to use shovels. Men from tribes whose women do the hard physical tasks must learn not only about simple tools but also about the concept of organized work itself.





(Continued from page 16)

as indeed it was, and now you sell your gold at 90. You end up with nearly thirteen million dollars. Have you been speculating, or have you been prudent?

"Or consider the oil-rich countries in the Middle East. Their oil revenues come in dollars, in paper money. What shall they do with it? They look for safe havens, and one of these has been gold, something that's traditional and tangible."

I also look for things golden and tangible, to cheer me up, and I find them in profusion in the British Museum. A golden tumbler and a gilded goat—Sumerian, circa 2500 B.C.—found in the 1920's by Sir Leonard Woolley at Ur, in Mesopotamia. Five sparkling golden torques—early Celtic neck ornaments—found in 1968 by Mr. Malcolm Tricker, while bulldozing near Ipswich, in Suffolk. What an unequalled medium gold has been for artisans since time immemorial, and no wonder. An English goldsmith explains:

"It's an obedient material. Clay will do anything you want, but it won't help you. It'll go dead on you if you lose control of it. But gold

Gleaming emblem of affluence, a golden cap crowns the court crier for the King of the Ashanti tribe in Ghana, once known as the Gold Coast. Still revering the metal, the Ashantis regard as their most sacred symbol the Golden Stool, a gold seat embodying the Ashanti soul.

Brass offspring of Ghana's gold, this sculpture of an Ashanti drummer once served as a counterweight for measuring gold dust. The Ashantis fashioned such figures so adroitly that the art value of some of them makes them worth almost their weight in gold.

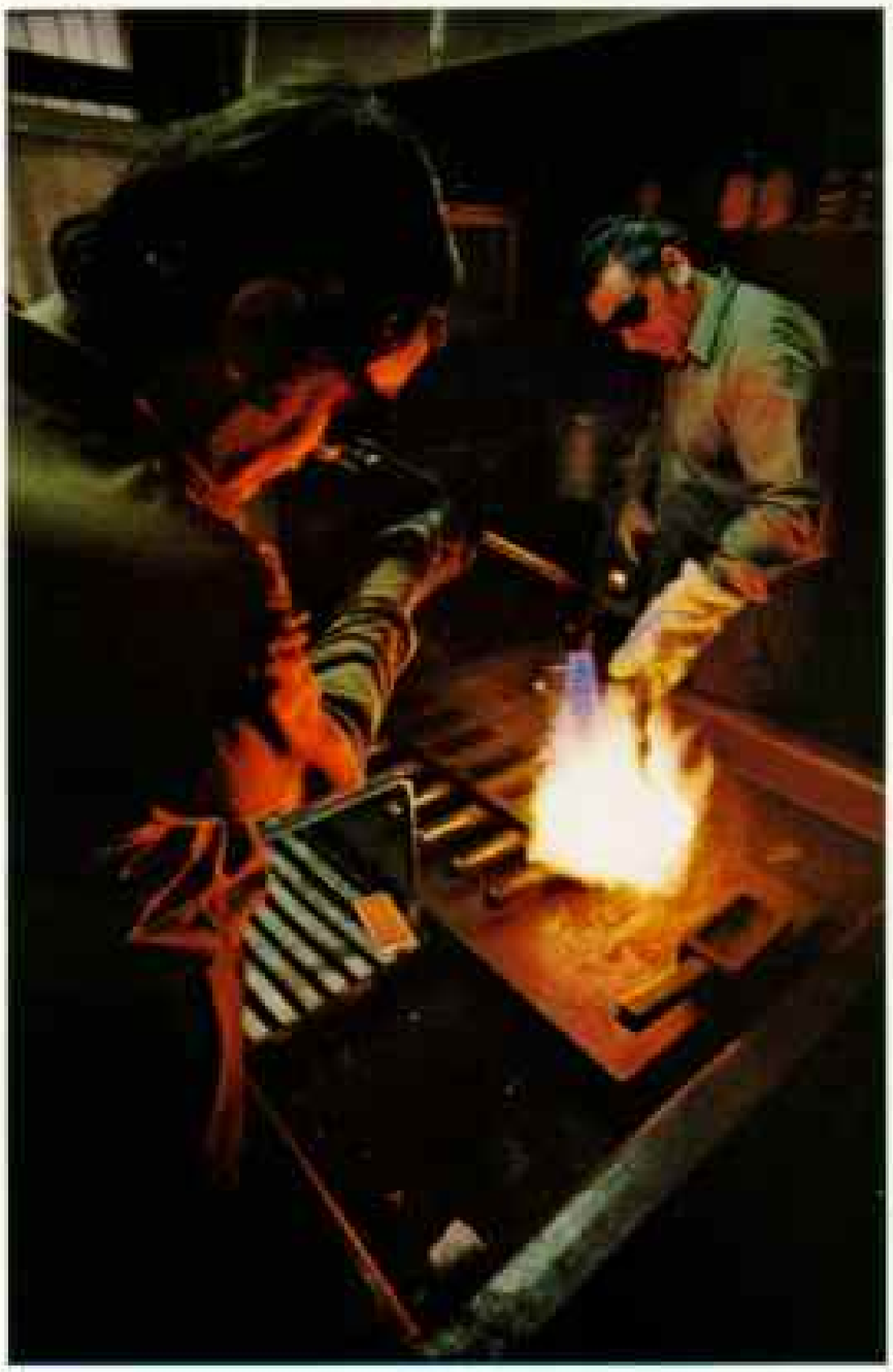
PEGGY APPIAH COLLECTION, KUMASI, GHANA

has this extraordinary quality: It's malleable but it doesn't collapse on you, it holds its shape even when softened by heat. So it has the best qualities of clay and of stone, it has personality, dignity; it's both obedient and strong, you can lean on its personality.

"Copper, by comparison, goes spongy when worked on a small scale; it breaks and oxidizes rapidly. Iron or steel absorb much oxygen and become hard and brittle. You cannot weld and then change them, you cannot soften them again. Gold isn't like that. Silver is bitchy, it does what you want but then lets you down suddenly. With gold, if you change your mind in the middle it won't let you down, you can go to enormous thinness. . . ."

In Vienna I see something that Benvenuto Cellini made for the King of France in the 1540's. Cellini called it a saltcellar, but it's a golden universe of its own, gods and flowers and the sea, animals and arms and musical instruments. It's the apogee of the goldsmith's art (foldout pages 30-32).

In Cairo I can hardly wait to see the golden coffin of Tutankhamun, the innermost of three. His burial chamber, like those of all



Africa's outpouring of gold and that of the Soviet Union, the number-two producer, flow largely to London and Zurich. At the Swiss Argor Refinery, workers process one-kilogram gold bars (**right**). Argor's output includes coins minted for Lesotho in southern Africa (**above**) and Olympic Gold Medals.

At London's Rothschild banking house, agents of five British banking concerns meet to assess daily supply and demand and to set the free-market price of gold. A flip of the little Union Jack (**below**) signals fresh orders affecting prices.

the pharaohs, was hidden and sealed; it came to worldwide attention after its discovery in 1922. The coffin I seek weighs 244 pounds, all of it beaten gold, decorated inside and out. It's the biggest thing of gold to have survived from antiquity.*

But it's not in its gallery in the Egyptian Museum. The director says he doesn't know where it is. I ask the Under Secretary of Culture in charge of Antiquities. "It's hidden away," he says, since 1967, the start of war with Israel. What—again buried in a secret place, as of old? He says yes, "because times are perilous now as they were perilous then."

Bits of Treasure Launched Wedded Life

Ancient Egyptians linked gold to the sun, to life. They put gold on top of their obelisks to reflect the rays of Ra, god of the golden sun. A museum scholar tells me that gold objects were a privilege of the rulers. But after the XVIIIth Dynasty, from about 1300 B.C., gold became more plentiful. Even among common people a newlywed couple might start out with a little hoard of three ounces or so, as a gift, or *sankh*, literally "to cause to live."

That's still the way it is, says the *wazen el dahab el omumi*, the weigher of gold for everybody. He sits behind his scales in Cairo's gold market, where donkey carts and tourists pass and ladies veiled and unveiled pause before windows glittering with trinketry.

I see golden lockets for postage-stamp-size Korans, pendants with the name of the Prophet Mohammed, nothing for men. At the big mosque around the corner I've been told that no Moslem male should wear gold. It's ostentatious and effeminate; the Prophet said so. But it's all right for a man to own gold, in any amount.

The public weigher says, "The busiest time starts in October, after the cotton crop is in, when the peasants have money."

Peasants buying gold! He's put his finger on weighty matters, of consequence far beyond Egypt: masses of moderately moneyed people wanting gold, not to trade it, but to hold it, because they trust it, as a time-honored store of lasting value. You can hide it and it won't mildew or rust away. It can't be traced, so it won't be taxed. And it won't shrink with inflation. It won't collapse on you.

If you leave gold to your grandchildren, they won't find themselves with something worthless on their hands, as they might if you left banknotes or bonds, whose value depends on somebody else making them good. Gold needs nobody's signature to make it valuable. It doesn't merely represent value, it *is* value. Should you ever need it to help you in an emergency, its quality can easily be determined, its quantity readily and precisely weighed, and someone will always be glad to take it off your hands.

I've heard that in France, where devaluations, wartime occupation, and changes in government have left little faith in paper money, the French are said to have hidden away 5,000 tons of gold, far more than is held by most governments, much of it in coins called Napoleons.

You can hear similar sentiments in the Federal Republic of Germany, where memories of postwar inflation conjure up a wheelbarrow full of money for a pound of bread. I've seen German banks offer little gold bars as "presents of lasting value."

In Lebanon, in the office of a gold dealer in Beirut, I hear that some Lebanese are selling their gold, now that the price has gone so high. "This is a middle-class country," he says, "and the middle class wants cars, TV sets, the good life." He points to a busy employee. "He just sold his wife's bracelets to buy new furniture."

If the price stays up, will people in the Middle East again buy gold? "If the harvest is good, the peasants will buy no matter what. And where the country isn't free, where there's dictatorship—say in Iraq—the well-to-do are eager as always to get gold and hide it, because they don't trust their banks. It's all smuggled in."

Smugglers Improve on Golden Fleece

Smuggling, of course, is as close to gold as —well, there's the old tale of a man who came to Iraq and in the farmyard of a friend saw a pile of newly minted one-kilogram bars, each about two pounds with the dimensions of a ten-cent chocolate bar. He asked how they got there, since importation is outlawed. His friend said, "Well, last night a flock of sheep came across the border, and under the tail of each sheep. . . ."

Right now, says the Beirut dealer, jewelry sold back to goldsmiths in Syria is melted down in Damascus, smuggled out by taxi to Beirut, flown to London or Switzerland

(Continued on page 41)

*The coffin was shown in "Tutankhamun's Golden Trove," NATIONAL GEOGRAPHIC, October 1963.

GOLDEN MASTERPIECES

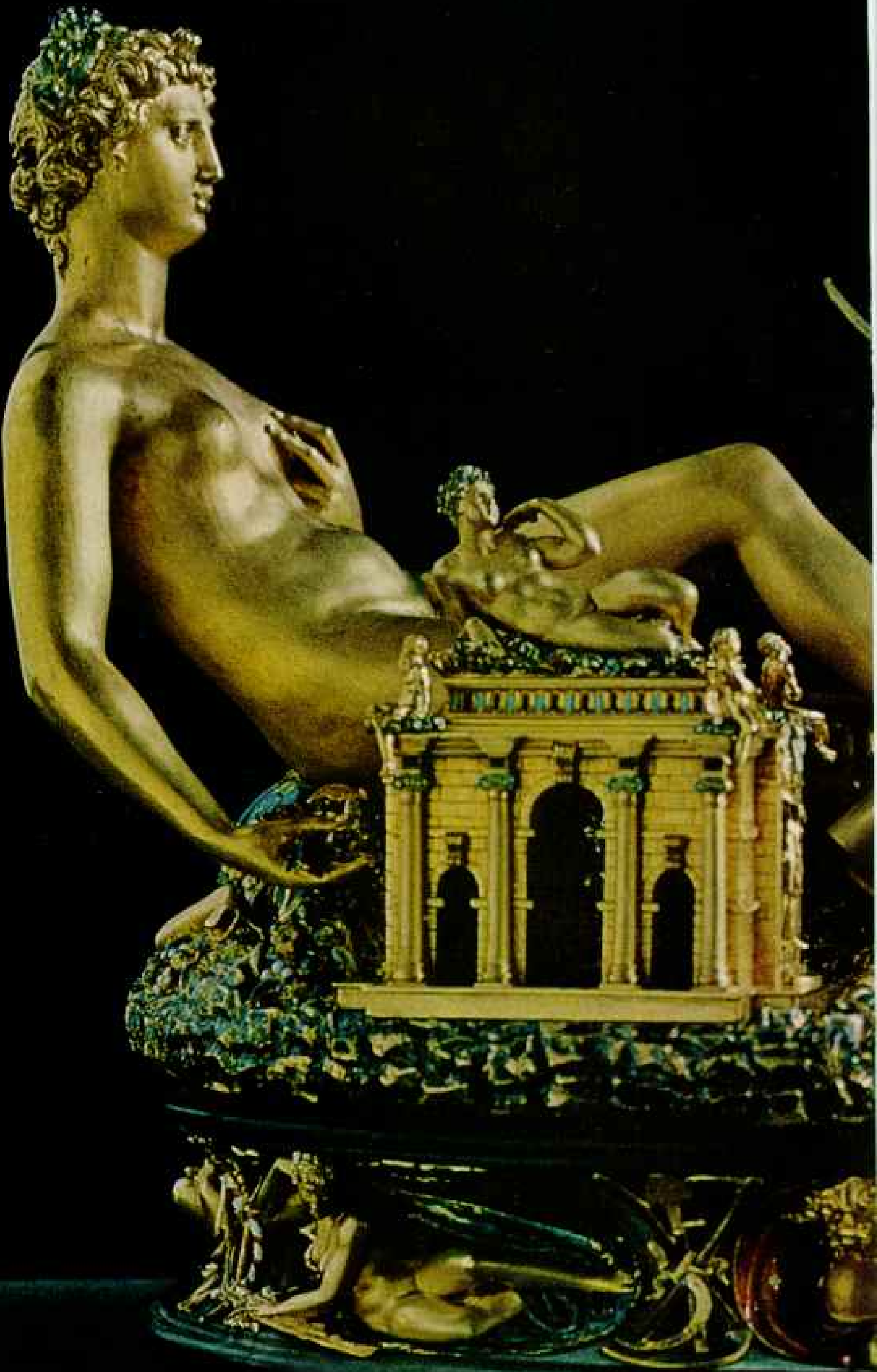
A 12-PAGE PORTFOLIO

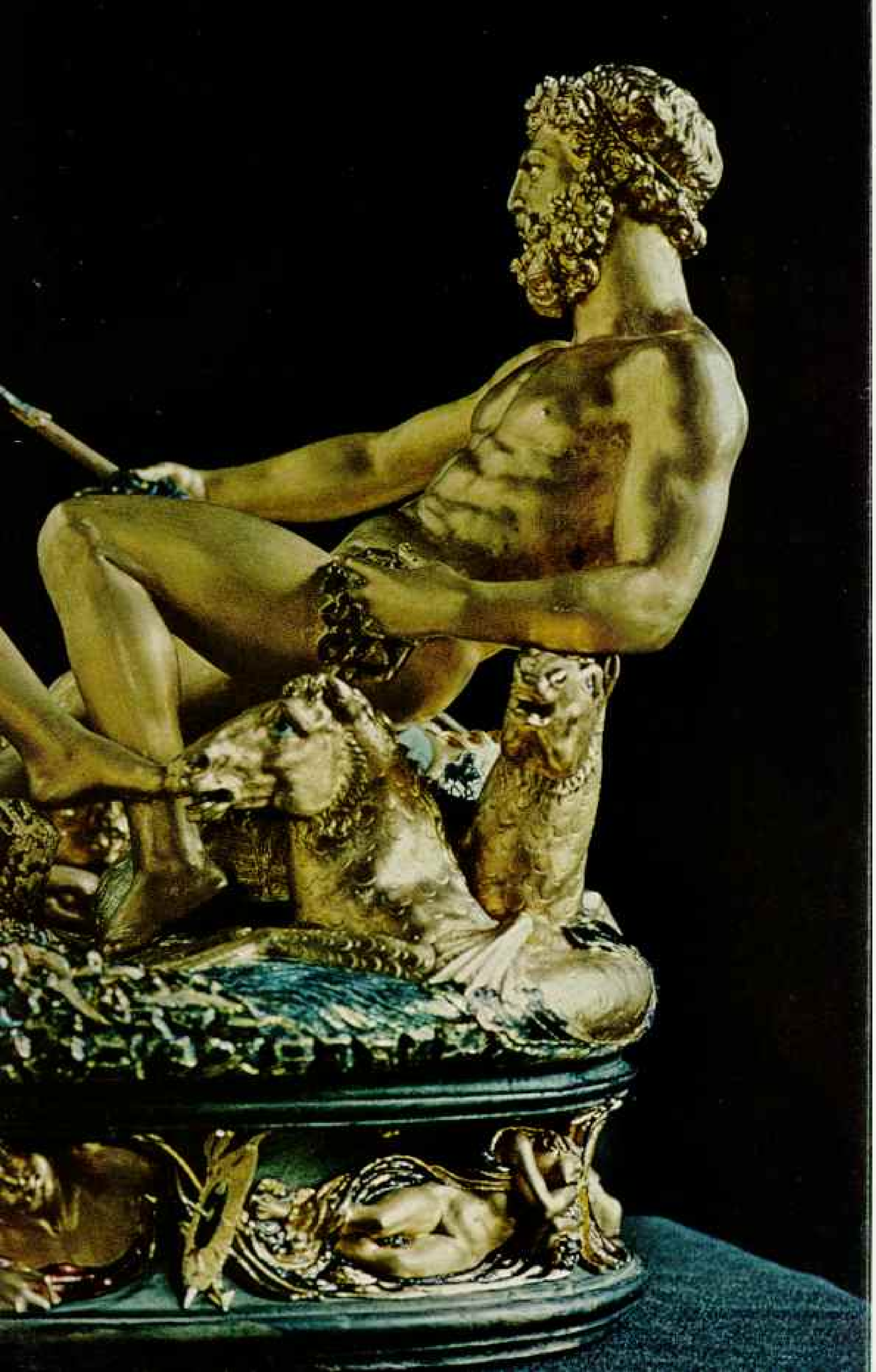
BEAUTIFUL, EASY TO WORK, AND INDESTRUCTIBLE, gold has inspired artists wherever it has occurred. Not surprisingly, goldsmithing flourished most spectacularly where raw material was abundant. Thus gold-rich Indians of Central and South America evolved exquisite works, and the plunder of their treasure by the conquistadors spawned a similar flowering in Renaissance Europe.

Radiating vitality despite its missing pieces, a figure fashioned by an Indian of central Colombia centuries ago (**left**) is exhibited in Bogotá's Gold Museum. Within the sculpture, known as a *poporo*, the owner carried pulverized seashells, which he chewed with coca leaves to trigger the plant's narcotic effect. Made by the lost-wax process and portrayed in approximately actual size, the figure is a prized exhibit among the 18,000 gold artifacts displayed at the Bogotá museum.

Latticed flanks and tiny trunk bestow delicacy on a golden elephant, shown two-thirds actual size. Crafted by an African goldsmith on the Ivory Coast perhaps 200 years ago, it was also cast by the lost-wax process. Such stylistically wrought animals of gold remain, as they have been for centuries, among the kingliest trappings of tribal royalty for West Africa's Twi-speaking Akan peoples.

COLLECTION OF MR. AND MRS. PAUL TISHMAN, NEW YORK CITY





CELLINI'S GOLDEN MASTERWORK

"THE KING . . . gasped in amazement and could not take his eyes off it," wrote Benvenuto Cellini, recalling the reaction of Francis I of France in 1543, when he first saw this celebrated saltcellar (**left**). The Italian sculptor's work, here about actual size, is among the highest expressions of the goldsmith's art.

Ceres and Neptune, deities of earth and sea, crown the cellar, reflecting the Renaissance fascination with figures from Greek myth. An Ionic temple, foreground, holds pepper, while an image of a boat on the opposite side is for salt.

Figures clustered around the gods reveal the artist's supreme skill with his delicate chisel—notably evident in the expressive face (**right**) adorning the

KUNSTHISTORISCHES MUSEUM, VIENNA

stern of the salt boat. Four "sea horses"—half equine, half fish—support Neptune; two (**above**) exchange nips. A dog peers from beside Ceres' leg (**right, center**), while on the ebony base a nude female of gold, depicting nighttime, dozes beside musical instruments.

METROPOLITAN MUSEUM OF ART, ABOVE AND LEFT

BRITISH MUSEUM

ANCIENT ARTISTRY FROM DIVERSE CULTURES

MING DYNASTY rulers of China prescribed the attire to be worn by individuals of official status. A breathtaking legacy of that era, an embroidered badge (**far left, actual size**) designed for a formal robe, glitters with gold and silver threads and filaments of peacock feathers. Depicting a lion against a golden cloud-streaked sky, the emblem marked the wearer as a military officer of the second rank.

Harmony and discipline masterfully unite in a drinking cup of the ancient Persians (**upper left**). Here the craftsman used separate sheets of metal for the cup and winged-lion figure, then joined them with a nearly invisible seam. In a delicate final touch, he ornamented the rim with a band of twisted gold wires, each only seven-thousandths of an inch thick.

As the Persians pursued their gold-vessel speciality, the Etruscans of northern Italy attained preeminence in the making of exquisite jewelry, such as this ornate 5½-inch-long earbob (**lower left**).

Imaginative Etruscan craftsmen perfected the technique of repoussé—hammering reliefs by tapping out the design from the back—and worked from the front of the object to add detail. For further embellishment, they carried the art of granulation to a point never since equaled. Making tiny gold spheres as small as 180th of an inch in diameter, they attached them to the major piece by a soldering technique rediscovered only in this century.

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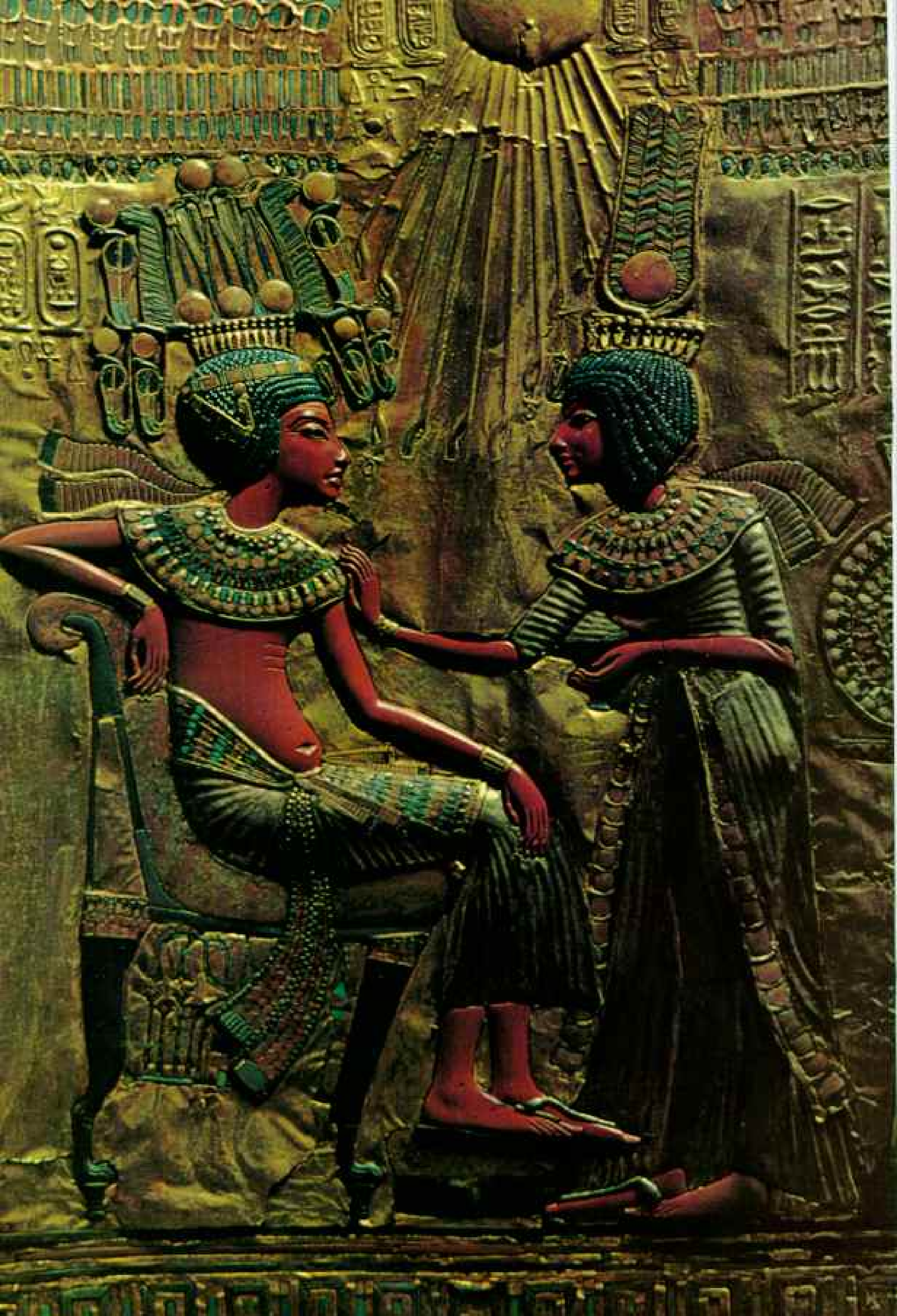


EARLY EGYPT'S SPLENDOR STILL DAZZLES THE WORLD

"GOLD—everywhere the glint of gold," exclaimed British archeologist Howard Carter on discovering Tutankhamun's tomb in 1922. The trove had been buried with the youthful pharaoh who ruled Egypt 1,350 years before Christ.

Tutankhamun's queen tenderly approaches her husband (**left**) in a scene on a wooden burial throne covered with sheet gold, silver, semiprecious stones, and glass-paste.

Face of beaten gold (**above**) adorns the second of three nested coffins that held the king's mummy.

Spreading protective wings, the slender goddess Isis guards a burial shrine door (**right**). She stands above the ancient Egyptian symbol for gold.

EGYPTIAN MUSEUM, CAIRO

GOLDEN COINS PRESERVE NUGGETS OF HISTORY

WHY, asked Theodore Roosevelt, could not United States coins be objects of art like those of the ancients? They could and should, agreed Augustus Saint-Gaudens. The versatile President and the famed sculptor agreed on the design for what many regard as America's most beautiful coin, a $20 gold piece with lady Liberty (**left, below**) in vigorous, high relief.

The relief ultimately proved the piece's undoing—bankers feared it would not stack. Only about 20 trial specimens were struck. One recently sold for $43,500, ranking it among the most valuable of gold coins. A flatter version of the Liberty design was routinely minted until 1933, when the United States ceased issuing gold coins and called in all except those held by collectors.

Rich King Croesus of the Lydians, in Asia Minor, issued the first money of gold—an oblong piece—in the sixth century B.C. Soon the Greeks began minting money in the shape of disks, striking them with exquisite high reliefs such as inspired Roosevelt and Saint-Gaudens. Romans introduced the familiar serrated edges of today's coins as a way to discourage the practice of shaving off thin slices.

Coins from times past, existing in profusion, prove priceless to the historian. Their dates yield chronologies, their distribution tells of ancient trade routes, and they bear likenesses that serve as unrivaled portrait galleries.

The chariot design on a stater (**left, upper**) minted about 350 B.C. by Philip II, father of Alexander the Great, may have commemorated an Olympic racing victory.

Intended for minting into coins, a Roman bar (**top right**) of the fourth century A.D. bears the assayer's imprint.

Portrait of Christ adorns a Byzantine coin of about A.D. 705 (**middle**).

Rarity among the rare, a Roman piece (**bottom**) of about A.D. 217 brought nearly $65,000 at auction in 1973.

SMITHSONIAN INSTITUTION (OPPOSITE, BELOW), BRITISH MUSEUM (TOP), AND BANK LEU, ZURICH

A smuggler? Not so, insists this mariner of Dubai, an Arabian Gulf sheikdom. Yet he exacted a promise of anonymity before allowing photographer Stanfield to take his picture. Shuttling the 1,500 miles between Dubai and Bombay, in good years he helps funnel some 200 tons of gold into India, a land that cherishes the metal but bans its importation.

En route to a rendezvous, a Dubai seaman sews bars into a vest. Soon, alert for Indian patrol boats, his fast vessel will slip alongside smugglers off Bombay and exchange the gold-laden vests for currency. When gold prices recently soared, business declined, but Dubai remains a leading gold-trading center.

(Continued from page 27)

to be refined and made into one-kilogram bars. Some of these are flown to the Middle East, to goldsmiths who'll coin that gold into 15-ruble pieces bearing the portrait of Czar Nicholas II. These are then smuggled through Armenia into the Soviet Union. There they are hoarded. How'll they be paid for? "Maybe with dollars, from black marketeers in Moscow."

Amazing, how gold moves despite the rules, reflecting, perhaps, what's in the human soul. A little greed, certainly, but more than that. Isn't it a great eagerness for a little security? And when irrepressible humanity thus thumbs its nose at the rule makers—no matter what their ideology—isn't gold, then, in a sense, an expression of freedom?

A prickly question. It makes me think back to Switzerland, to a private refinery where gold bars are cast in ten different sizes, as desired by different kinds of customers. Some two dozen governments restrict the holding of gold bars. "But the customer is always right," says a refinery official, "no matter what some government may say."

Transformation Triggers Changing Hues

It's a colorful thing, the metamorphosis of a little gold bar the size of a matchbox. Still liquid in a steel mold, it's a glowing orange. A few dark specks float on top—a pinch of saltpeter, to take impurities out; they're gone, and the new bar dumps from the mold. It lies there lightly honey colored, almost transparent, then brownish, a still-translucent amber, then *zsch!* It's dropped into a bath of water and sulphuric acid. There's a whiff of sulphur. Out comes the bar, yellow and shiny, the epitome of solidity.

"Not good," said a workman. He only meant the smell.

But to me that whiff conjured up something devilish—the corrupting power of gold. For example: Didn't the gold the Spaniards took from the Americas do a lot to ruin Spain? All that newly minted money brought inflation and encouraged wars. It bemused the rulers with the idea that there'd always be more. But as it turned out, there wasn't.

Enough of moralizing. On to the Sheikdom of Dubai, now part of the Union of Arab Emirates, on the Arabian Gulf. That's where those matchbox-size gold bars are arriving, by jet, from Zurich and London.

Dubai used to be a little nest of pearl fishers. Now it's a bustling hub of business, mushrooming with tall air-conditioned buildings and about to build a dry dock big enough to service the biggest oil tankers. But it wasn't oil that built Dubai, it was gold.

"Yes, gold," says a man from one of Dubai's 20 banks, "plus a policy of maximum commercial freedom to all comers and goers."

He says that in India, Pakistan, and Iran the importing of gold has long been highly restricted, and so its price there has been quite a bit above the world market. It pays to smuggle it in. "But remember, there are no smugglers in Dubai. Merchants, yes, importers and exporters. . . ." And the crews of low little wooden ships, with diesels so powerful that they can scoot 1,500 miles across the Gulf of Oman and the Arabian Sea and be somewhere off Bombay in about four days.

Gold has moved in this way to an annual value of several hundred million dollars. Now that Dubai produces oil, there's much other exporting going on, and since the gold price has gone so high, Indian orders are down—but still substantial. One means of payment is black-market dollars from all over India. The little ships bring them back by the suitcase. I've seen them being counted, in a bank, by the tens of thousands.

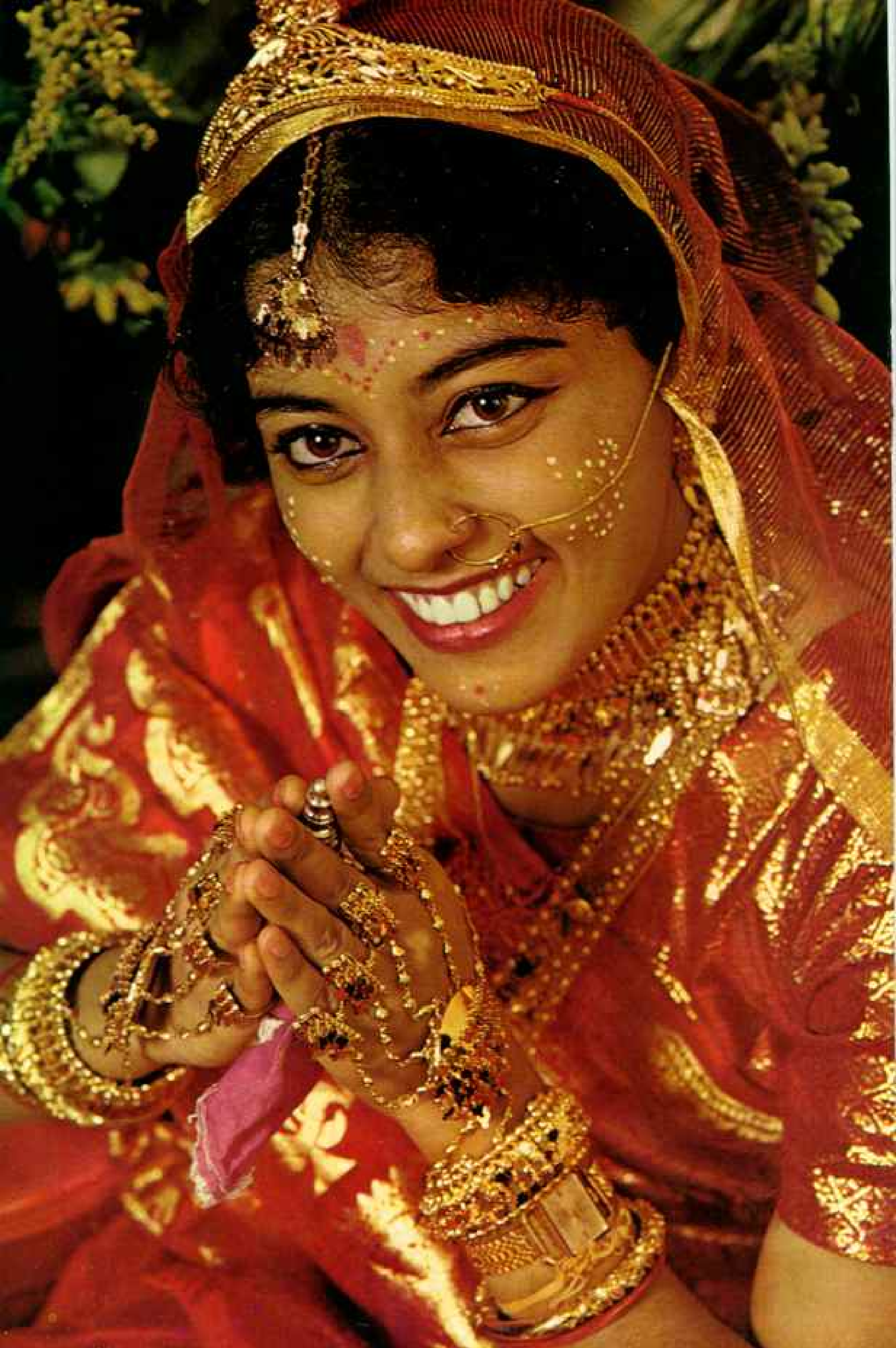
Special Garb for a Special Job

I meet one of those Dubai crews—magnificent sailors recruited from Pakistan. The third day out, on deck, they'll spread some canvas jackets with lots of little slots.

They'll take those little gold bars—each stamped "10 tolas"—one tola is about a third of an ounce—and sew them into the jacket slots, 100 bars per jacket (opposite). That'll be a convenient way for a man to carry about 26 pounds of gold inconspicuously. They'll roll up each jacket and tie it, and stash several of them together inside a gunnysack.

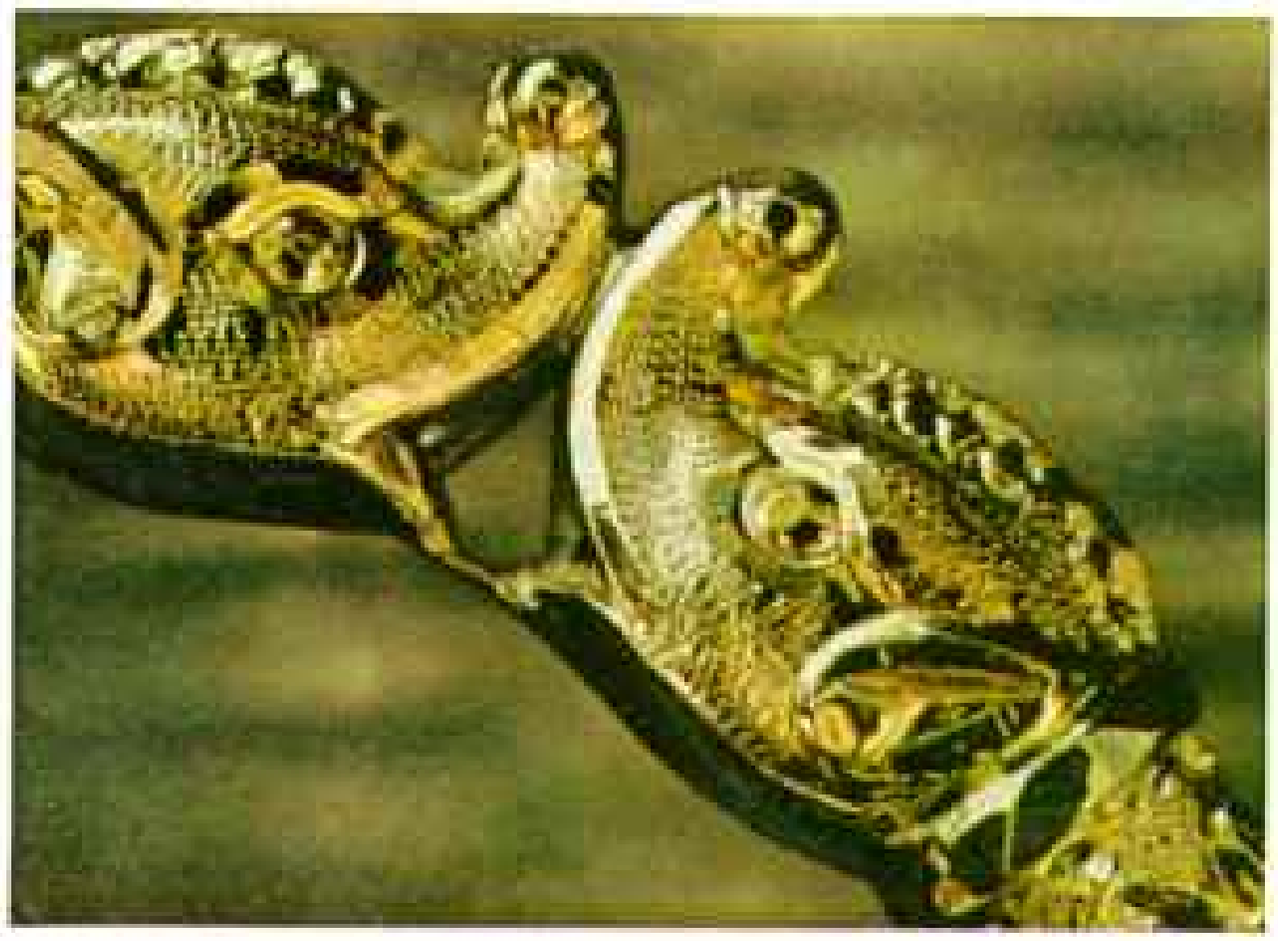
Strictly speaking, they aren't smugglers either, not if they meet a little ship from India far enough offshore, and swiftly transfer those gunnysacks. It's that other bunch that takes those jackets into Bombay, from where the gold fans out across India. . . .

I find consternation in Calcutta, capital of the Indian state of West Bengal. "A father with many daughters is cursing himself, no doubt," says a Bengali matron. The London gold price has hit $105, the local price increased accordingly—and a father who months ago arranged a daughter's wedding



Once-in-a-lifetime thrill: A bride of Bengal (**left**) glories in her hoard of gold finery on her wedding day in Calcutta. Even her face is decorated with dabs of gold dust. When the celebration ends, she will probably put away the more fanciful jewelry for safekeeping, content with the financial security and social prestige it gives.

The Indians' seemingly insatiable hunger for gold supports a thriving business among goldsmiths, who crowd shops such as this one in Calcutta (**above**). Skilled hands working with hammer and chisel fashioned a bracelet (**right**), whose motif includes two sharks meeting mouth to mouth.



for this marriage season with a promise of giving her 20 tolas of gold, expecting to pay 6,000 rupees, must now pay 9,000. As the Bengalis say, "It's pulling their tongues out."

A wedding, I am told, is unthinkable without gold for the girl, in the form of ornaments. And what ornaments! A basic set comprises ring, necklace, earrings, and two bracelets, but I am astounded by what I see sparkling on a bride in the light of the ceremonial fire: a tiara and a *tikli*, a forehead ornament, a *nath*, running from nose to ear, a pair of *ratanchoor*, from wrist to back of the hand and to all five fingers (page 42).

"She'll never wear all that again," says an uncle of the bride. "She'll keep it as a reserve, against the bad days." In India, he says, life insurance and old-age insurance are not yet widespread. The traditional insurance is gold.

Indians Favor the Purest Gold

Gold when alloyed with silver is whitish. With copper, reddish. With cadmium and silver, greenish. With iron, bluish. Jewelers rate it by degrees of purity: refined to 99.5 percent, it's rated 24 karat. A goldsmith can tell, by rubbing some off on his touchstone and adding a drop of nitric acid. The purer the gold, the less its color will change. If it isn't gold at all, it'll just bubble away.

Jewelry in the United States is usually 14 karat, or 58.33 percent, gold. In most of Europe it's 18 karat, or 75 percent. In Cairo, 21 karat, or 87.5 percent. But here in West Bengal, noted throughout India for its goldsmiths, it's 91.66 percent. That's 22 karat.

A jeweler says that in some Indian states, in Bihar and Orissa, it's 24 karat, which is rather soft and will lose its shape if worn daily. But then you simply have it remade, to a new design. Bengali ladies like to have their ornaments remade anyway, every five years or so. It's cheap.

The charges, for workmanship, profit, et cetera, add up at most to 7 percent of the gold value. (In the U. S., by contrast, it's around 80 percent. If you spend $100 for a piece of machine-made jewelry in New York, the gold you get will be worth about $18.) I see a workroom full of men quietly filing, drilling, hammering, and heating and reheating the gold so it'll remain workable (preceding page). Tiny chisels give it tiny reflecting surfaces, like cut stones.

It's bad for India to have so much capital stashed away in gold, says a man from the Gold Control Administration. It retards economic development, and so there are strict government controls. Every family with more than four kilograms is required to report it. "But the legislation is a complete failure."

How can one legislate against fears that one fine morning the government might seize all bank accounts? How, in a land of five hundred million Hindus, can one legislate against 5,000 years of Hindu tradition?

This tradition says that gold is the noblest of metals, one of the foremost among the things pure and auspicious. When a father sees his newborn child, he should touch it with gold; when a person leaves the world, on the burning pyre, a speck of gold should be put in the mouth. Wearing gold brings prosperity and luck, giving it removes one's sins. Gold kills infections, advises a distinguished doctor of Hinduism's traditional Ayurvedic medicine. "Does your body have a deficiency? Gold will fill it. Take these pills, you'll feel spring in your life."

He adds that gold is so expensive now, the common man can no longer afford such medication. I visit villages in West Bengal and administrators tell me there's a deep depression. Gold? Ten years ago the land laborers had a little, but food has become so costly, and work so scarce, that it's long gone to the richer peasants, or to the goldsmiths who are India's pawnbrokers.

Gutters Yield a Golden Bounty

Along a street of jewelry shops back in Calcutta, very early before the shops open, boys are playing football, a ricksha goes by with watermelons, people wait for a tram. But what's that? A man panning gold in the gutter! He isn't the only one. Several boys just sold him their morning's take.

He uses a cast-iron pan and water running from an open street tap (right). And the gold? A jeweler from one of the shops explains that

Panning for gold—in a gutter! An enterprising prospector, down-drain from a row of Calcutta jewelers' shops, pans for bits of precious metal swept out the doors. The dust washer's gleanings, ultimately sold back to the shops, often earn him more than he would make working in a factory.

when a customer brings in ornaments to be refashioned, they are rubbed to test them, and cut, to make sure there's no foreign matter inside. Tiny particles fall off, and are swept to the sidewalk daily.

The man in the gutter calls himself a dust washer. In a week he'll assemble enough gold to melt it into a little button, and sell it to a man who'll sell it back to the workshops. Regarding the higher gold price, he says, "I'm definitely delighted." Last week, he says, he made 100 rupees. Most factory workers make barely half that much.

I've seen only one place where gold occupies even more exalted a place than in India. That is in West Africa, in the Twi-speaking Ashanti Region in the Republic of Ghana, the land Europeans once called the Gold Coast.

There, too, a dead man should get a bit of gold, preferably gold dust straight from a river, tied in a little bundle to his loincloth before burial. But more than that, gold is at the very heart, so to speak, of the most important things there are—the things that keep men in touch with powerful spirits.

The Europeans call such a thing a fetish. The Twi word is *suman*, if it's man-made, or *bosum*, if it's not—say a piece of rock. It may be something a man keeps at home, under the bed, or it may be enshrined and known far and wide. With it must be gold.

Why? I got essentially the same answer from high and low: Because it works; Christianity is now the fashion, but we still have our own beliefs too. They've been tested and found to be true. The *okomfo*, or priest, of a most renowned bosum told me, "This bosum *is* gold."

Gold Bespeaks the King's Authority

Ghana is centrally ruled from Accra, but much of the local administration rests with traditional chiefs, and thus much responsibility still devolves upon Nana Opoku Ware II, the Asantehene, the King of the Ashantis, occupant of the Golden Stool. It embodies the soul of the Ashanti people.

He is a London-educated barrister, and when he adjudges disputes in his capital of Kumasi, or visits outlying towns with his convoy of Mercedes limousines, there are gilded sword hilts, gilded ceremonial staves, and gilded hats. And there are solid-gold symbols of his power. His sandal ornaments, representing eyes, because he is all-seeing. His ring, with a massive porcupine, a plodding and peaceful animal but fierce when angry.

And now I'm in another world, in the British crown colony of Hong Kong, and a Chinese banker shakes his head in wonderment at my African tales.

"I tell you gold is useless! It earns no interest!" He points to some charts. "If you'd given me a million dollars four years ago I could have made you ten times as much, in real estate or stocks."

He doesn't mention that the Hong Kong stock market has just crashed, that the Hang Seng Index is down 50 percent. But he does say that when the Communist Chinese threatened to take over Hong Kong in 1967, and actually cut its water supply, he immediately bought gold for his bank's account in Switzerland. When the water flowed again, he sold the gold.

Japanese Splash In a Precious Tub

I'm in Japan, my last stop before heading home. A Tokyo department store offers his-and-hers chopsticks in 18-karat gold; or an 18-karat golf putter, for the equivalent of $1,400. "A nice present for one's boss," says the salesman. A 24-karat teakettle, weighing four pounds, costs $10,000.

I've come to get into the biggest golden thing I know of—a 313½-pound bathtub in the shape of a phoenix, all 22-karat gold, in a resort hotel on the Izu Peninsula (pages 48-9). The manager says it was inaugurated eight years ago and has more than repaid its cost in publicity.

"We say a dip in the precious golden bath will add a year to your life." Two minutes cost 1,000 yen. A year ago that would have been $3.00, now it's $4.00; the yen has been floating upward.

A dozen businessmen from Tokyo are taking turns. One says, "My wooden tub at home feels softer," but he emerges looking pleased. When my turn comes I'm struck once more by a whiff of sulphur. The tub is fed by a sulphurous spring, very healthy. Another businessman emerges and says:

"How can we make an American understand how we feel about a golden bathtub? Americans do not feel as the French feel, as we feel, that gold is important."

But isn't the yen important now? It's very strong. "Yes," he says, "but we also have inflation, and it may also lose its value. Gold is stronger."

Back in the U. S., there's joy in Downieville,

seat of Sierra County in California. Gold just hit $123 an ounce! This is American gold country, here in the wild woods and the clean air of the Sierra Nevada, along the rushing North Yuba River.

Gold—the stuff that beckoned Alexander the Great to march into Persia, that made the Portuguese sail unknown seas, that made thousands rush to California, from 1849 onward, some from as far as China. Ever since, the Chinese have called San Francisco the Old Gold Mountain. In a way San Francisco is as much a creation of gold as is Johannesburg.

There had been gold rushes before, in Brazil and Russia, and there were others afterward, in Alaska and Australia, but none prompted such an outpouring of eager, self-confident men. It didn't pan out, for most of them. The real money was made by the people who sold them supplies. But it did populate California.

And what's going on right now, here on the Yuba, on Convict Flat? A retired contractor from Palm Springs is panning gold. "Hard work," he says, "but playing golf can be hard work too." His wife is helping. She's got nothing yet, but she says it's fun. Others join them with ingenious homemade gadgetry. There's one family with a little blond boy named Neil. He is 4 and absolutely will not let me see what he's got in his little pan. He scampers off. He doesn't trust me.

Spirit of 1849 Lives On

A bunch of the boys are chewing the fat at the Gold Mine Donut Shop in Downieville.

"Yeah, every nut from L.A. with $3 for a pan will be up here breaking every forest law and antipollution law. There'll be hordes."

Sixty percent of Sierra County is public land, administered by the U. S. Forest Service. Anyone can stake a claim there, provided he's found some gold and nobody has staked that area already. No matter how much gold you take out, you pay no royalty. Sounds incredible. But that's the Mining Law of 1872! And when you get on that subject, smile.

One of the boys takes me "sniping"—looking for gold where you have no claim. We hope for nuggets and get only a few little flakes, but it *is* fun. High up, where an old mining operation has left a crater full of gravel, a man tinkers with a $5,000 gadget for sifting the old tailings. It's not working. Down on the Yuba a young man in a scuba-diving suit toils on his suction dredge, designed to suck up gold-bearing gravel. It's not working either. A rock is stuck in the suction hose.

Boom! Boom! Boom! There's blasting at the Oriental Mine, but the owner says it's only exploratory. He shut down in 1969. At $35 an ounce, he wasn't making money.

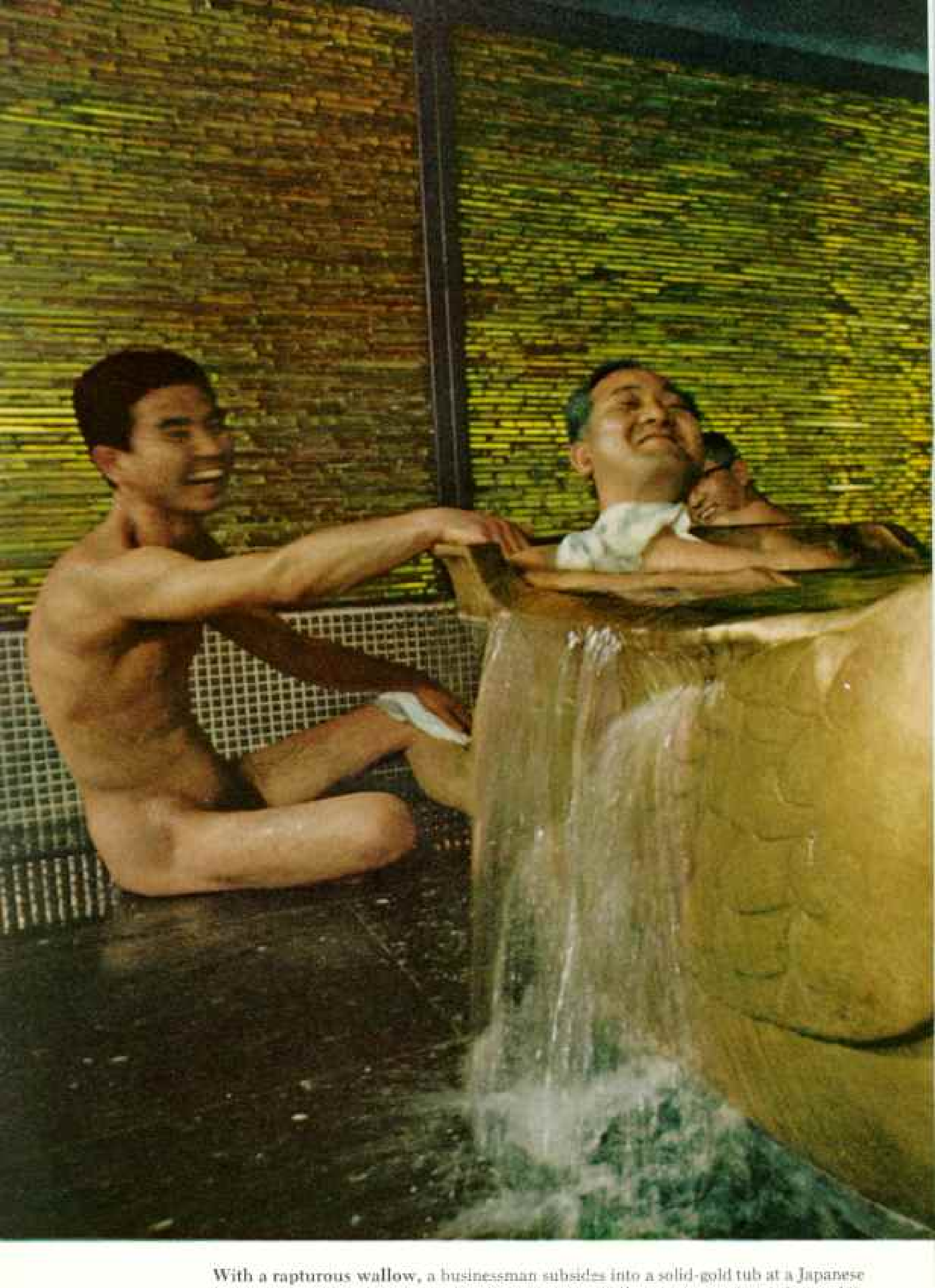
The U. S. still produces a lot of gold, ranking fourth in the world—just behind Canada—with 45 tons a year, largely from the Homestake Mine in South Dakota and a couple of smaller ones in Nevada.

The Oriental Mine is flooded now. To reopen would require pumping out water 1,000 feet deep.

"I expect a lot of little mines to start up, with two or three men," says the owner. "As for major mines? No. That takes big investment, and there's too much uncertainty. But if the price should stabilize at $150 or $160 an ounce, you'll see big things, with big companies coming in."

On Goodyear Creek I meet a man who came from Texas with a dream. He's no longer young but he's strong. He works nights at

Take one class ring, then multiply it by 2.8 million each year, and you have one of the largest markets for gold in the United States—about 15 tons a year. Here a heated hook centers the bezel, or crown, of a ring destined for a medical school. The United States' gold output amounts to only about 45 tons annually, more than a fourth of it from South Dakota's Homestake Mine.



With a rapturous wallow, a businessman subsides into a solid-gold tub at a Japanese hotel. Cast in the shape of a phoenix, it weighs 313½ pounds—perhaps the world's

heaviest gold object. Esteeming the tub for the publicity it brings, the hotel charges the equivalent of $2 a minute and assures the bathers that each immersion prolongs life.

a sawmill and most of the day he works on his claim. He's got to cut thousands of feet of timber to make a flume. That's a kind of chute to divert water from the creek so that he can get at the bottom. He says it's the only way a workingman stands a chance, a little chance, to become independent.

"If I'm lucky, I'll hit a crevice, there must be several, or just a good dip in the bedrock, that could be $30,000. If it were an untouched crack—all you got to do is find a few feet of it—you could wind up with $60,000 or more! Or if . . ." he pauses with such a longing look, "if I'd hit an old channel on the bank that's never been worked before! That could be fantastic, I could hit a million!"

After we have left, my sniping companion shakes his head. "Did you see, his tractor's broken down again? He'll never even get the flume finished before it starts snowing."

Value Fluctuations Puzzle the Pros

Now I'm home and my neighbors still have questions.

What is it, really, that gives gold its value?

I tell them what Harry Oppenheimer told me in Johannesburg. He's the Chairman of Anglo American Corporation of South Africa, Limited, and controls ten mines that produce the gold for three of every ten bars poured in the Western World. He says, "Its only real value is that people want it."

How high will the price of gold go? Or how low could it fall?

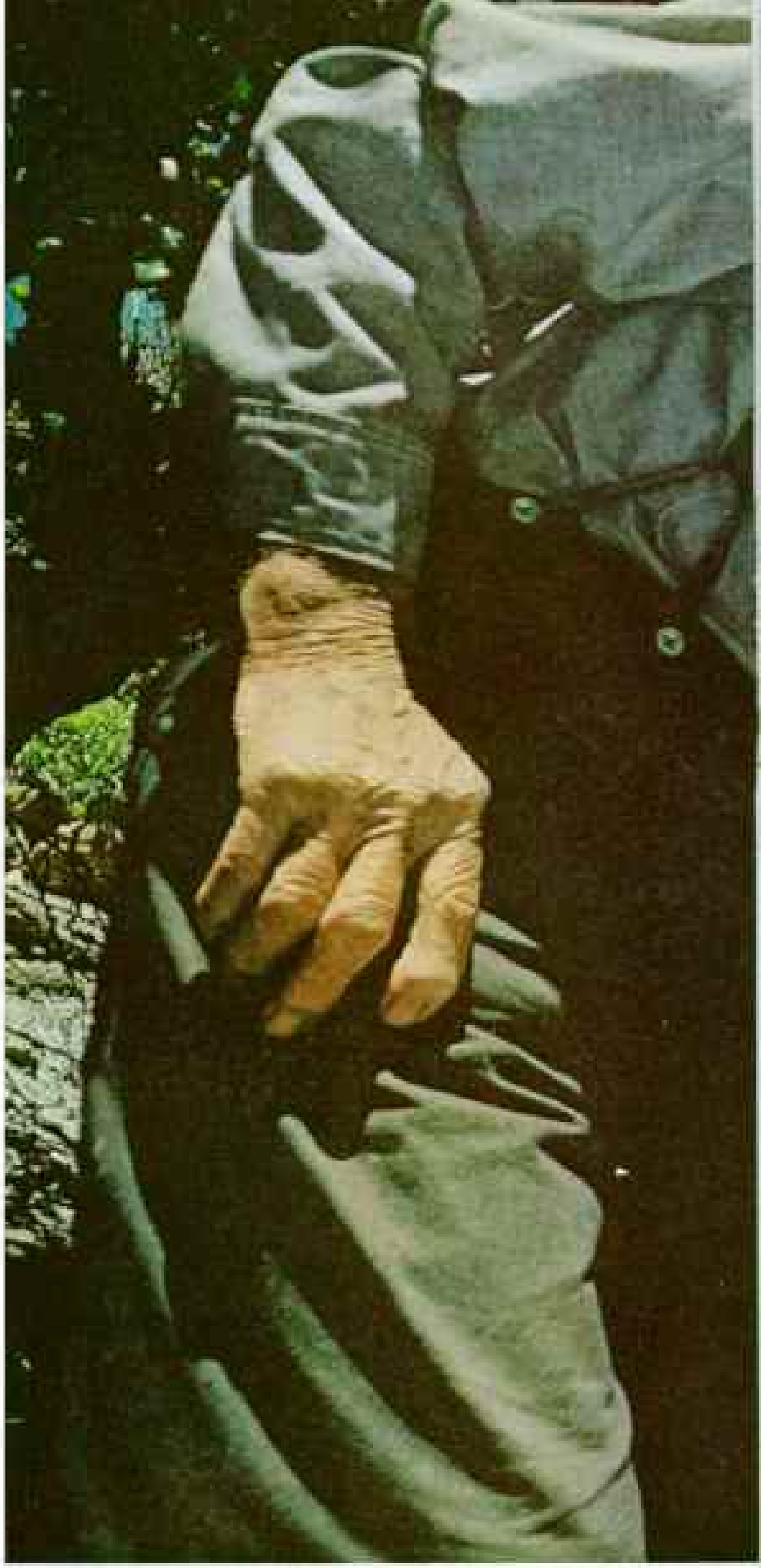
Who knows? Not one expert I met along the way made a right forecast from one month to the next. An economist in London: "Can *you* foretell prices on the stock exchange?"

No, but I'll risk two modest predictions.

One: That through the lifetime of anyone now alive, gold will be ardently wanted by people around the world. And so, at least for the foreseeable future, it will remain something of real value.

And two: That one morning my wife will ask me if I've heard that in September President Nixon signed a bill permitting U. S. citizens to hold gold in any form—so we *could* have a solid gold frying pan, couldn't we?

I'll reply no, we can't. Because that legislation also says that it won't go into effect until the President decides that private ownership of gold bullion "will not adversely affect the United States' international monetary position." And I won't even try to predict when that will be. □



"You've got color here," kibitzes Bill Smith as he peers into the pan of prospector Joe Richter. Sure enough, flakes of gold (**right**, 4x magnification) gleam against fine alluvium scooped from California's Scott River.

For Richter, panning gold in the fashion of the forty-niners has been a way of life, seeing him through but never making him rich. Today, fired by the soaring price of gold, thousands of Americans invade the gold country's abandoned camps and streams, hoping for the glint of a fleck or nugget, or maybe . . . just maybe . . . a new mother lode.

The People of New Jersey's Pine Barrens

By JOHN McPHEE

Photographs by
WILLIAM R. CURTSINGER

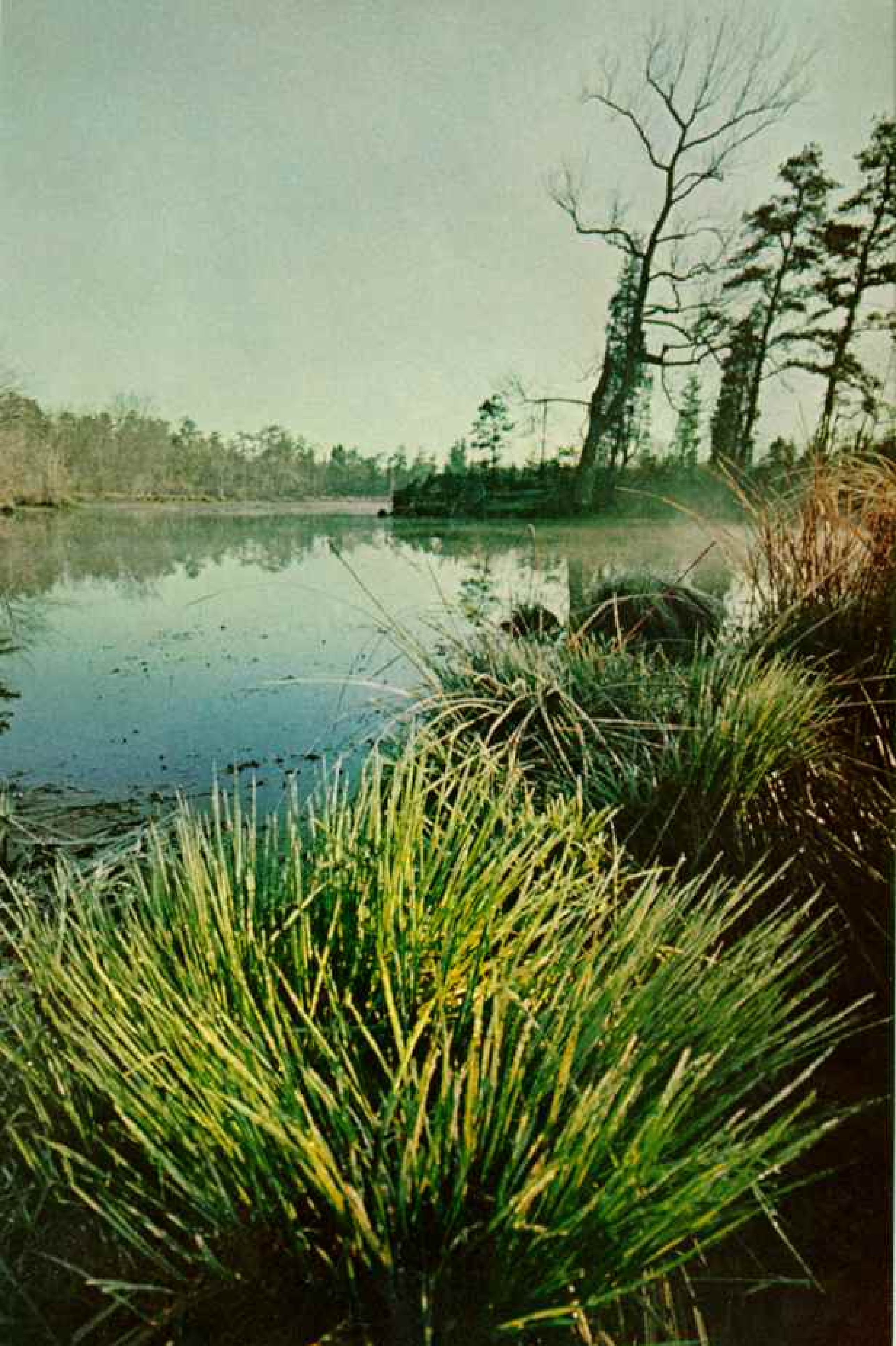
I GREW UP IN NEW JERSEY, and so did Bill Curtsinger. Our towns are many miles apart, but on a rainy day it would probably be possible to hike from his place to mine —going in and out of factories, restaurants, warehouses, bus stations, supermarkets, shopping malls, bowling alleys, and house after house—without getting particularly wet. Ours is the most densely populated state in the Union. In some parts of it there are 50,000 people per square mile.

Henry Webb lives in New Jersey. We both know him. Almost every day he goes far into the woods with his bow-bar chain saw and cuts down dead oaks. While he is doing that, Charles King, another man we know, is working in a spong perhaps ten miles away, pulling sphagnum moss. The terrain that separates these two as they work is all but unpopulated —essentially, unbroken forest.

A spong is a low, wet area—rhymes with tongue. If a low, wet area has white cedars growing in it, it is not a spong but a cripple. King pulls moss out of cripples, too—a hundred bushels a day. The implement he uses is a five-tined drag.

Fifteen or twenty miles south through the woods, Fred Brown rolls out of bed, ready to face his day. He lives alone. He does what he pleases. At 6 a.m. his dog, France, who is somewhat Labrador, licks Fred's face and ears until Fred

Dawn breaks like a whisper in an East Coast wilderness tucked between megalopolis and the sea. The rugged self-reliant "pineys" who live in the 650,000-acre oasis look askance as developers nibble relentlessly at their wildwood home.



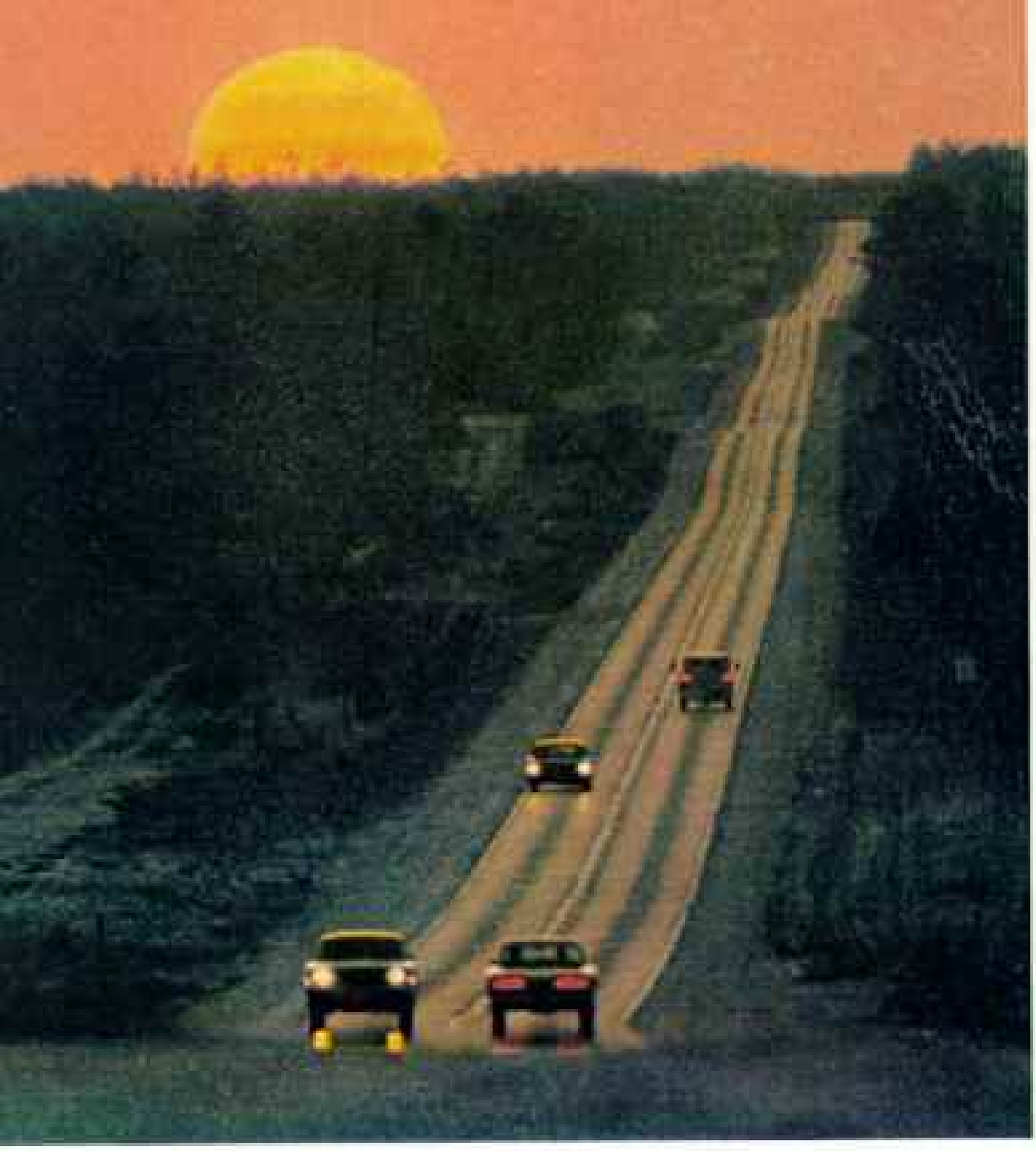
bestirs himself and lets France out the door. Then Fred makes a decision—to stay upright or not to.

Today, perhaps because it is a cold morning, he went back to bed. Now, toward noon, he pulls on his trousers, his jacket, his crepe-soled boots, picks up his ax, goes out and chops wood. His cabin—his shanty, he calls it—stands under pines on the edge of a broad complex of bogs. The wood he splits goes into an iron stove that heats the shanty. Ladling water from a bowl, Fred starts a pot of coffee. He fries a hamburger, over propane. He has no electricity. He breakfasts on the hamburger and an entire raw onion. A solidly built, active man, his eyes quick with interest in the events of his surroundings, he appears to be near 70. He is 86.

A piney all his life, Leroy "Brownie" Green, 72 and nearly bedridden, smiles shyly from his window in the almost empty village of Sim Place.

Early settlers called his region the Pine Barrens because of the deep sandy soil that made the pine-covered land almost worthless for farming. In the 18th century the area boomed with the discovery of bog iron that helped arm rebelling colonials in the War for Independence. The Revolution drew privateers to Pine Barrens estuaries, and its forests offered haven to homeless Tories and deserting Hessians, some of whom found work in the busy smelters. Ironmasters forged the metal into nails, kettles, stoves, even tombstones. When the iron industry moved west with discovery of Pennsylvania's ore, the pineys tried their hands at making glass and paper. These industries collapsed in the late 1800's, and the people learned to live off the forest itself.

What these people have in common is the space that separates them, for they live in the central Pine Barrens—650,000 acres of forest, incongruous in place and time. East of Philadelphia, south of New York, the region got its name when it was ignored by the agricultural economies of the 17th and 18th centuries. Its soils, little more than deep sand, were then worthless. Bypassed by the big transportation alleys of modern times, the Pines, as they are frequently called, have remained in large part intact, and their value—economic value, hydrological value, psychological value—has quietly risen beyond assay. The Pines are exactly halfway (and on a beeline) between Boston and Richmond. A thousand square miles of wilderness, they are the epicenter of the eastern megalopolis (map, page 57).



Hurried by a poster sunset, oblivious to the wilderness that flanks them, beach-bound city folk ride a ribbon of concrete between Philadelphia and the Jersey shore. Here in the northern part of the West Plains pitch pine and blackjack oak stand no higher than three to ten feet instead of the normal thirty to fifty. One explanation for the dwarfism: Frequent devastating fires may have inhibited growth. Coarse sand gulps the yearly precipitation, leaving layers of tinder-dry leaves and needles that spread over thousands of acres. At times fires rage unchecked, even through cedar and hardwood swamps that cover 10 percent of the Pines.

Lightning starts only a few of the 400 fires each year, 20 to 30 of which are major. Arson accounts for an alarming number. In one 1971 fire, 20,000 acres burned in six and a half hours.

I love to take people to the Pine Barrens—people from, say, Georgia, California, Illinois, South Dakota, even some people from New Jersey—to show them what is there. The woods are trellised by two-track sand roads, cut through by charcoal burners and others years ago, and you can drive along for half an hour or so and then climb a hill and go up a fire tower and look around. What you look out upon is 400 or so square miles of forest—virtually nothing visible made by man. Again and again reactions are the same. "I had no idea. It's really unbelievable."

Then you move on 15 or 20 miles through the woods and go up another hill and another fire tower and the view—to the eye unfamiliar with the configurations of particular swamps and uplands, stream courses, cripples and spongs—appears to be exactly the same, another 400 square miles of wilderness barely overlapping the first.

"Good heavens, how big *are* these woods?"

This is always a heady moment if you happen to have been born, as I was, somewhere between metropolitan Trenton and the Bayway Refinery. The answer is, "Well, about the same size as Grand Canyon National Park."

Few people live in the Pines, about 15 per square mile overall, mainly clustered in hamlets and small towns. They are a stable, indigenous, regional group. A high percentage descend from forebears who came here before or during the Revolution.

Out in the bogs Bill Haines stands above a water gate with a tall ice hook in his hand. He will lift the gate and start a flow into the next bog. Dark eyebrows, silvery hair, a strong and

Wild land in the city's backyard

A megalopolis sprawling from Boston to Richmond counts 40 million inhabitants. All are but a few hours' drive from the Pine Barrens' quiet towers and near-empty acres.

Atlantic Ocean

PINE BARRENS

Delmarva Peninsula

Circles show relative populations of metropolitan areas.

0 30 STATUTE MILES

The Pines' thick forests spring from a porous platform of sand that lies as much as 250 feet deep in places. It holds a vast reservoir of water, enough to supply a city the size of New York.

Only a thousand-square-mile core around Chatsworth retains the timeless mood of the Pine Barrens, a sandy region whose timber and marshlands once covered a fourth of New Jersey. Within the wilderness heart, the state preserves some 185,000 acres in forests and refuges, leaving nearly 380,000 acres of private lands vulnerable to developers.

Brown shows built-up areas.

o Abandoned town

0 30 STATUTE MILES

Delaware Bay

NEW JERSEY DELAWARE

weathered handsome man, he might have starred in Westerns. His home address is Hog Wallow; and these are his Hog Wallow cranberry bogs, arranged in a gravitational pattern at least as complicated as the terraced pools of the Alhambra.

He looks up into the high-pressure weather system above him, and says, "I wish it would lay there for a month and not move. Sometimes it does." Under the blue October sky, 20 million cranberries have drifted into the corner of the bog at Haines's feet. Surely no red is more beautiful than cranberry red, and here is an acre of it, floating to harvest (pages 62–3). Haines has about 700 acres of bogs. He is the biggest thing in cranberries in this part of the world. He also owns about 10,000 acres of the forest, including lakes and streams. Owning and preserving the forest is the only way to protect the sources of the water in the bogs.

Night-flying moth drowses on an arethusa, one of 20 species of orchids that bloom in the Pine Barrens. Botanists marvel at the Pines' galaxy of flora, including the creeping foxtail, a vinelike plant with explosive spores once used in flash photography and in certain fireworks.

ELSEWHERE IN THE WOODS, Dick Stewart is working on his swimming pool. His what? His swimming pool, something all but unheard of here. He is building it himself. He is 47. He is the Municipal Clerk of Woodland Township, and he is irritated with what he calls "the outside image of the people of these woods as primitives who have pointy ears." What is good enough for the forest of towns in this state must surely

be good enough for the towns of the forest. So there is Dick Stewart, under his pines, pargeting his pool.

Mink live here as well, and otter, deer, raccoons, opossums, the gray fox. Pine snakes. Milk snakes. Corn snakes. Rattlesnakes. Bass. Pickerel. Catfish. Fifty billion mosquitoes. *Hyla andersoni,* ventriloquist tree frog, is found almost nowhere else but here. He is green, has a purple stripe down his side, looks like a state trooper, and goes *wonk wonk* in the dead of night. The curly-grass fern, a rare fern, was discovered here. Twenty kinds of orchids grow here, and all sorts of insectivorous plants—thread-leaved sundews, pitcher plants.

A couple of areas—some 15,000 acres—are forested with the same species of pine and oak that live in the Pine Barrens as a whole, but in these areas, known as the Plains, the trees are only three to ten feet high. The dwarfism has never been successfully explained.

Dozens of species of birds live in the Pines. The pine warbler. The prothonotary warbler. The nighthawk. The bald eagle.

"What state is this?"

"New Jersey. You'd better believe it."

Such conversations can go on and on, sometimes, against the winds that sail through the fire towers. Fire itself is an absorbing theme of the Pines. Some of the most dramatic and

Delicate as spun glass but a deathtrap for the unwary, a round-leaved sundew grips a struggling ant. One of several insectivorous plants that thrive in the bogs, the sundew will extract nitrogen and protein from the insect's body.

extensive forest fires in the United States occur here when the vegetation is in the cured stage and the wind is blowing. The forest duff becomes very dry because rain is imbibed quickly by the sandy ground. Pine needles are rich in resins. Living oak leaves are extraordinarily dry.

So when a fire rises, crowns, and runs away, fire trucks and other apparatus will sometimes be called in from all over the state, and the United States Army will turn up as well, but the efforts of man are not always enough to control the flames. Some years ago a fire that started on April 20 burned across the north part of the woods and was not pronounced out until May 1. It burned 75,925 acres of land.

The trees, for the most part, come back rapidly after a fire. Sprigs shoot forth through charred bark. Some of the trees are green in a few months. Fires, over the years, have been so frequent and so prodigious that species resistant to fire have been selected by the forest: pitch pines, for instance, and various oaks. The pitch pines are known here as old Jersey bull pines.

Gleaning a bonus, Daniel Bush picks cattails from the tidal marshes rimming the Pines. A carpenter by trade, Daniel turns to the land only for spare-time income. He gathers 9,000 cattails on a good spring day and sells them to florists for $6 a thousand.

Blueberries ripen in summer (**above**). People of the Pines long harvested the wild fruit—commonly called huckleberries—that flourished in the undergrowth of the forest. Then, beginning some sixty years ago, jumbo hybrids were developed; cultivated blueberries are now a major crop. ROBERT S. ARKIN, LEFT

THE WATER THAT FALLS on the Pine Barrens goes down into an aquifer that contains the equivalent of a lake 75 feet deep with a surface area of 1,000 square miles. It is water with the purity of melted glacier ice. You could drive a 12-inch pipe 30 feet into the ground and bring up a million gallons a day.

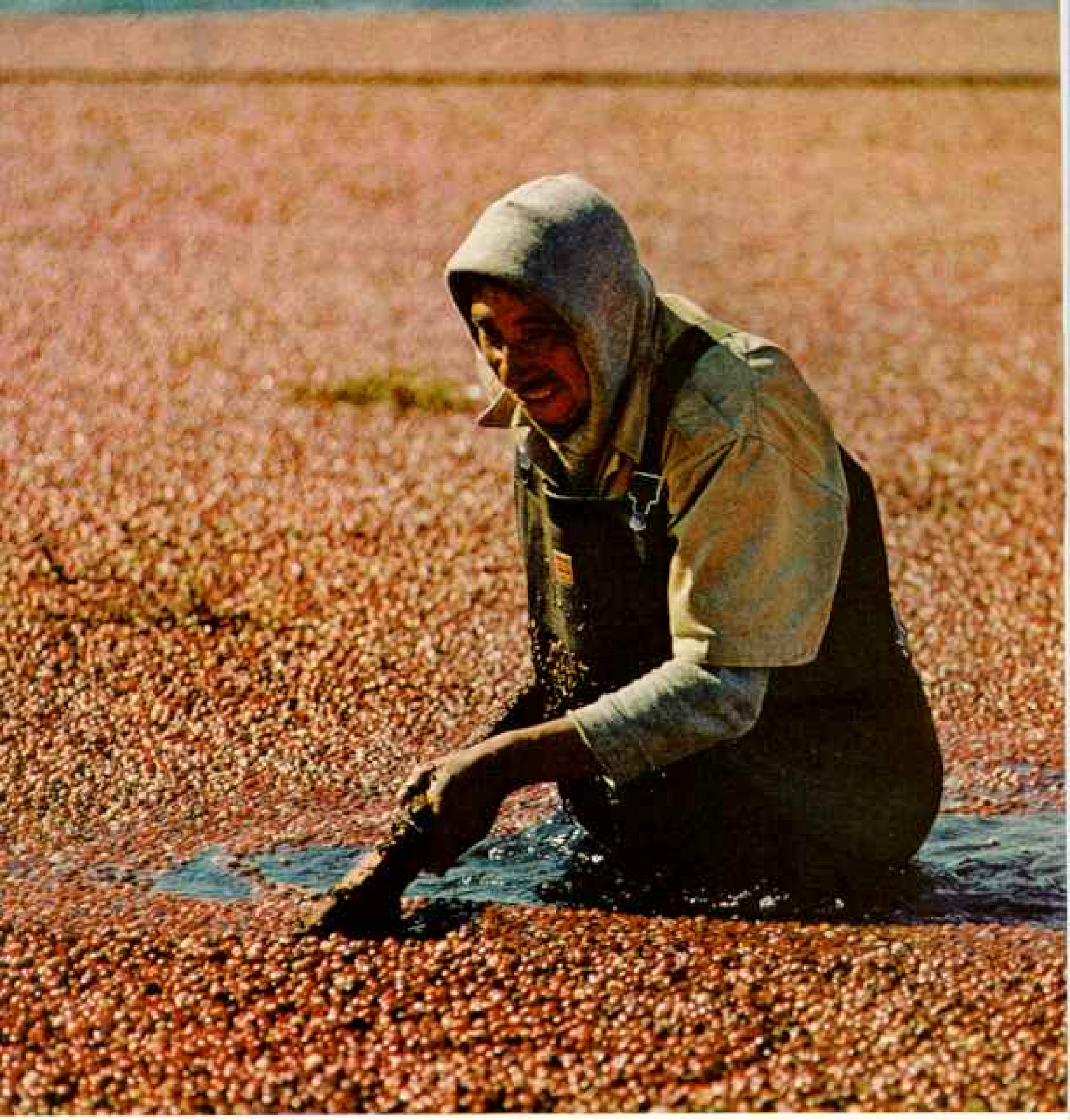
There are no exotic streams in the Pines, no rivers that rise in the mountains and come here bearing the worst of Allentown or Scranton. The Pine Barrens are on a low dome of land between the Atlantic Ocean and the Delaware River, and all the streams that flow here rise here. They are pure and potable, and their annual runoff could more than meet the needs of a city of eight million. They are narrow, fast-flowing, tortuous rivers—the Mullica, the Batsto, the Oswego, the Wading River—and there is, by a wide margin, no better way to go through the woods than in canoes (page 66).

It is possible, out on the rivers, to get away from everything but the red maples, the white cedars, the old Jersey bull pines, and the bullbats that dive in the night. It is possible to distance oneself from the circumscribing cities by a dimension greater than miles, as Bill Curtsinger and I did, not long ago, with three friends from Georgia.

We stopped first in one of Bill Haines's bogs to poach a bucketful of cranberries (he didn't care), and then we went on downriver to a campsite where we baked bread in a reflector oven and ate the bread with pork chops and cranberry sauce. The wine was not local, but it was good, as Pommards go, and the moon was in the branches of the trees.

On the river, from time to time, our visitors noticed what appeared to be minor oil slicks, iridescent blue, and they reacted with disgust. Small motors can pollute small rivers. Outboards are not much used in the Pines though, and this was a natural phenomenon, not a pollutant. The "oil slicks" were films of iron oxide, leached out of the sand soils, which, not far below the surface, are rich yellow with ferrous material.

The oxide films drift into the sandy banks of the streams, and in a remarkably short time, in much less than a century,



Hip high in a crimson sea, Vidal Yanez (**above**) steers a bobbing harvest of cranberries toward a conveyer at Hog Wallow. Other workers drive a fleet of beater machines (**right**) that separate the buoyant cranberries from their stems. The berries then pop to the surface and drift downwind in shallow basins bordered and dammed by sand roads (**above right**).

With 700 acres under cultivation, Bill Haines's bogs at Hog Wallow are the largest cranberry operation in New Jersey, which ranks third nationally in production, behind Massachusetts and Wisconsin.


GEN'L STORE
PEPSI

they form a hard composite that is known as bog iron. No one mines it anymore, not since coal and iron were found close together in western Pennsylvania in the middle of the 19th century. But until then nails and flatirons, kettles and stoves were made in great quantity in the Pines. Out of the Pine Barrens came cannonballs for Washington's army and the cannon that Decatur took to Algiers.

ONE ROAD through the woods carried so much freight that it was, in places, divided. It may have been America's first dual highway. Stagecoaches used it—the Philadelphia-Tuckerton run—and taverns lined the route, selling potent fluids with names like metheglin, mimbo, and cider royal. The Tuckerton Road, as it was called, still runs through the woods, and appears much as it did two centuries ago, for it has not been improved.

You will have to go a long way, though, before you'll get a drink of mimbo (rum and muscovado sugar). The taverns are gone, of course. So are the small towns that surrounded them. Furnace towns and forge towns were spaced through the woods once, and they had schools, clinics, picket fences, many houses, and a few mansions. Generations were born and generations died in these towns, and they are gone now, some so completely that it is possible to stand in the middle of them, in the deep forest, and not know that they were there. Vestiges do remain—a cellar hole, a fragment of a foundation, glassy blue pebbles of slag—along sand roads that once were streets. They will move you, these vanished towns—Washington, Mount, Quaker Bridge, Martha.

When the last furnace blew out, the people tried with temporary success to make things other than iron, notably paper and glass (the first Mason jar was made in the Pine Barrens). As the 19th century approached its end, though, the Pines' industrial era ended, too. Towns began to crumble and disappear; and the families that remained were soon quite cut off from the urban societies around them, and, in custom and livelihood, they became the inhabitants of a separate world.

They became—as many of them are now—shy and self-sufficient. They lived on the offerings of their forest. They worked at different things through the seasons, and a yearly cycle evolved. In winter they made charcoal. In spring they pulled moss, shipping it off to florists in the cities. Sphagnum moss was used to keep flower stems moist. In summer the people of the Pines knocked wild blueberries, which they called huckleberries, into baskets that hung around their necks. In the fall they gathered wild cranberries, and, where the bog iron had been dug out around the edges of the streams, they planted wild cranberries as well. When they were hungry for meat, they shot deer. As Christmas approached, they gathered pineballs—pinecones—for sale in New York and Philadelphia, and boughs of pine and laurel.

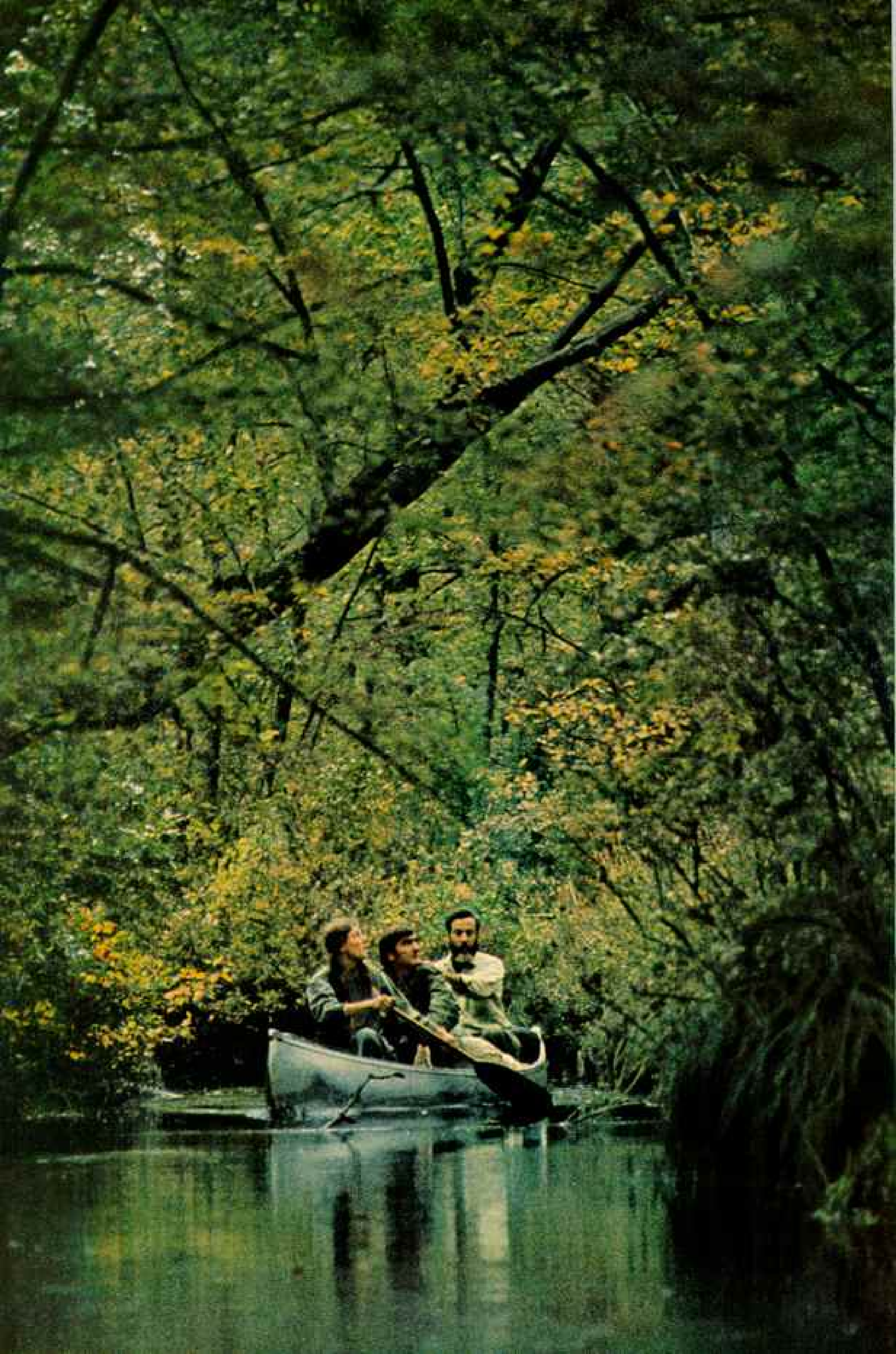
In recent years the old Pines cycle has diminished in practice, but aspects of it remain, and characteristics formed by it stay on in the nature of the people, not only in their self-sufficiency but also in their restlessness (a yearning not to be tied down to any one thing) and in the sense of security they

Fiddler in the Pines, George Albert (**above**) entertains all comers with country music on Saturday night in Waretown.

Bastion of custom, Buzby's General Store (**left**) remains a social center where Chatsworth men drop by for a newspaper, a cup of coffee, and some yarn swapping.

"Years ago," says storekeeper Kathy De Petris, "everyone used to shop here for everything from Model-T parts to horehound drops. Now they drive to the supermarket in Mount Holly, 25 miles away. I guess it's not so far any more."

ROBERT E. SMITH, LEFT



feel—and often express—in the knowledge that they can always draw a living from the woods. Most people now have jobs outside the Pines, or they "work for the state highway" or for blueberry and cranberry growers, or the state forest fire service, or the division of fish and game.

CHARLES KING, who lives with his family in the village of Chatsworth, says that he knows of only three or four of his neighbors who, like himself, "work the woods" full time anymore. His yearly cycle runs from moss and cattails in the spring to huckleberries in summer, then back to moss in the autumn, and pinecones all through the winter.

A small, slender man, King gathers many tons of wet moss each year, hauling it in his pickup to nurserymen outside the Pines, who use it to wrap seedlings. Sphagnum moss is magical, in its way. Squeeze it, and acidulous preservative water rains out of it. It was used to bandage wounds during the Revolutionary War and as recently as World War I. Squeeze it again. More water comes out. Try again. Still more. You cannot squeeze it dry. King gets fifty cents a bushel for it. His truck will hold a hundred bushels.

He sells the cattails and pinecones to a company that makes decorations. To reduce expenditures over the years, he has taken his share of venison from the woods, and now and then he shoots a wild duck. He does not leave the woods to do so. "Ducks from tidewaters taste like fish," he explains. He wants to be sure that what is on his table is a Pine Barrens duck.

King grew up in the Pines, and, with the exception of some years in military service and in a civilian job at Fort Dix, has never lived anywhere else. "I've never had thoughts of it. Never. I don't want to live anywhere else but the woods. I've been all around, and I've never seen anywhere I'd rather live than here. I've seen Tennessee, New York, and Miami Beach. I've been to Natal, Karachi, and Ascension Island."

In a very important sense Bill Haines also works the woods. And he is a straightforward outdoorsman with the stuffing coming out of the old jacket he wears, but the scale of his activity is different. He produces a thirtieth of all the cranberries grown in the United States.

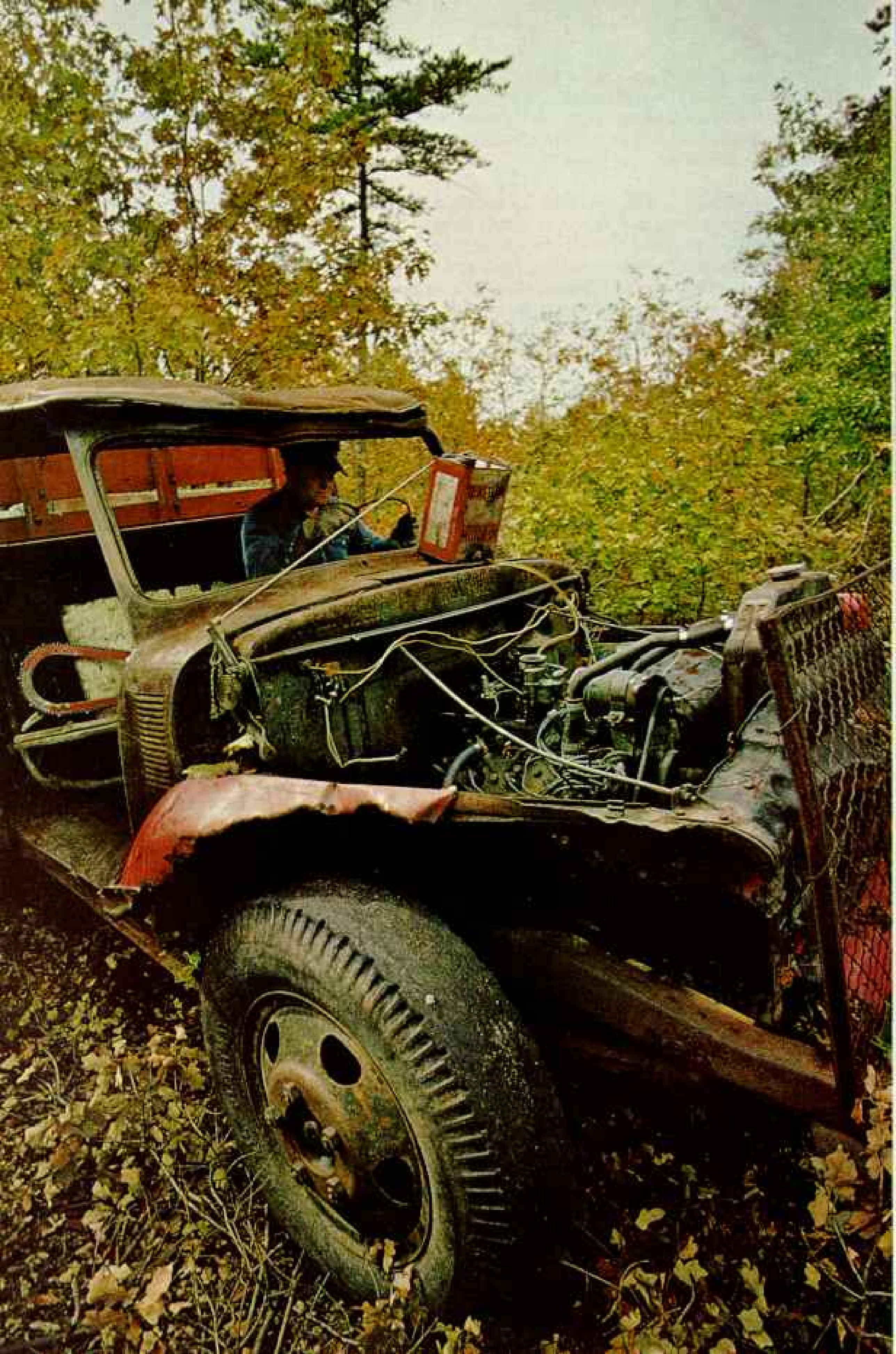
His packinghouse is a marvel of ingenious machinery that he devised. The problem is how to separate the cranberries from their leaves and bits of vine and other detritus. (Every time I have poached berries from the bogs, it has taken at least half an hour to perform the separation by hand.) Haines uses jets of hot air pulsed by blazing gases.

He uses rubber belts and gravity—a gantlet for cranberries rolling through. At the far end, they roll clean. Then they go through the "bouncer." If a cranberry will not bounce, it is a bad cranberry; so the whole lot is lifted by conveyor to the top of a series of seven louvers, and released. The falling berries have seven chances to hit a louver, bounce, and fly through the air into the world of commerce. Most of them hop like neutrons, like basketballs. (It is possible to dribble a cranberry.) Those that don't make it fall in shame, rejected.

Until recent times cranberries were harvested by hand, with multitined scoops that are now sold in antique shops.

Lost in the spell of autumn, canoeists paddle the Batsto River, one of many unsullied streams fed by the vast underground reservoir. Beavers build dams, otters pursue pickerel and catfish, and both stay out of the way of 50-pound snapping turtles.

Leaning like the pines, Rub Severs of Tabernacle walks along a sand road. Mazes of such roads, some cut in colonial times, once bore stagecoaches and highwaymen's loot. Familiar paths to pineys, they confound outsiders.



The process was slow and inefficient. Half the cranberries stayed matted in the vines of the dry bogs. Then some forgotten Leonardo noticed that cranberries underwater float like mines in a harbor, like balloons on a string, held by their vines.

The "beater" was invented, a whirling drum of gasoline-powered skeletal iron. In bogs flooded a foot or so deep, men began walking behind these machines in long lines, each drum overlapping the path of the one in front of it by half—a strange, wading trek. With extremely high efficiency, the whirling iron knocks the berries free; they bob to the surface by the tens of thousands and drift downwind (page 63). Stevens, Jersey, Howes, Early Black—Haines knows them by name. A truck arrives at a corner of the bog, inserts a conveyor into the water, and draws up the cranberries like a mastodon with a straw.

The weather is crucial at such a time, for the air temperature often dances around the freeze line, and water levels have to be just so or the grower can lose the crop in a bog. On his kitchen table, Haines has a radio that receives nothing but news of the weather. Bill Curtsinger and I sat there with him one day listening to the weather and eating cranberries over vanilla ice cream. Haines, his wife, Sally, and his children eat cranberries on steak, pancakes, roast beef. They make cranberry sandwiches. They use cranberries in salads, and they bake them into bread and muffins. "Oh, yes," Sally remembered to tell us, "I nearly forgot. We eat them with turkey, too."

Raking the wetlands with a five-tined drag, Charles King harvests highly absorbent sphagnum moss. Before the arrival of plastic substitutes, King sold his moss in bales for use by florists as packing material. Now he gets 50 cents a wet bushel from nurserymen, who use it to protect delicate roots against drying.

Jury-rigging reaches a new height with Henry Webb's truck (**left**), a 1952 Ford with a gravity-feed gas "tank" perched above the engine. Maneuvering on bald tires, Webb and his wife prowl the Pines to harvest fire-killed trees, mostly oak, which he cuts up to feed suburbia's fireplaces.

THE CULTIVATED BLUEBERRY was developed largely in the Pines. Haines grows blueberries as well, on a more modest but nonetheless significant scale. Bog and forest, his land lies in the core of the woodlands, and he worries about the future. New Jersey has a ten-year-old Farmland Assessment Act, an attempt to keep farm taxes low and encourage the preservation of farmlands, but even so the assessment of Haines's land has multiplied in 20 years by a factor of 10.

He told us, "It's serious, really. Taxes are rising so much that speculators may soon be the only ones who can afford to hold land. If taxes stay high, it'll sure be developed. Used to be you had an old house down here in the woods you could

"Progress" drives a wedge into the forest along route 72 with a new mobile-home park and a gravel pit. Scythe strokes of bulldozers (**right**) scrape yet another road. To thwart such proposals as a jetport and city of 250,000, conservationists lobby fiercely for a state master plan. But hundreds of thousands of forested acres may vanish while the battle rages.

hardly give it away. But you can get a good price for it now."

When people ask Bill Haines, as they frequently do, to sell off a bit of land for development purposes, he says, "Sorry. That sort of thing looks junky." He is 52. The Pine Barrens have been the milieu of his life and he likes them the way they are, the way they were when his grandfather began turfing out the Hog Wallow bogs and planting cranberries toward the end of the 19th century. Like Garfield DeMarco, the second biggest cranberry man around, Bill serves on the Pinelands Environmental Council, a group created in 1972 by the legislature to make recommendations about lands the state might buy and to review the development plans of others.

The council consists of environmentalists and local officials as well. The state owns something like 165,000 acres of the pinelands and the council's immediate priorities include 8,000 more, including large parts of the dwarf forests. But that leaves roughly 500,000 acres vulnerable to the pressures of population, commerce, and taxation. Much of it—5,000 acres here, 14,000 acres there—is now in the hands of speculative syndicates, awaiting, as they have for many years, a time of bonanza.

Smaller pieces are going now, mainly on the peripheries but some toward the center of the always contracting forest. Signs appear along the paved and unpaved roads. "400 Acres Sale." "18 Acres." "Green Acres Estates Building Lots $10 a Month." The council can to some extent discourage such development. Unchecked, it will eventually end the forest.

What Bill Haines fears most is a major highway, the sort that would bring whole towns with it and finish the Pine Barrens forever. On the drawing boards of dreaming engineers are plans for the most direct route possible from New England to the South: Across a bridge from Connecticut to Long Island, across the mouth of New York harbor by bridge-tunnel, straight south through the center of the Pines, and on across Delaware Bay and into the Delmarva Peninsula. "A highway in here would split it in two," he said. "That's the worst thing that could happen to the Pines."

"I DON'T CARE what they put in here. The more the merrier. If there's people here, I can do business with them. Don't make a bit of difference to me. Let 'em come. The richer they are, the better." This is Fred Brown talking, programming his future. It is irrelevant that he is approaching 90.

I have known Fred seven years—since he and I collaborated on a book called *The Pine Barrens*. His love of the Pines is undeniably deep, almost as deep as his pragmatism. He removes the lid of his stove and drops in three pieces of green oak.

"Don't you know any better than to burn green oak, Fred?"

"Oh, well. My gracious. Start it with dead stuff. Yes. Start it with dead stuff, then put the green oak on when you get a coal. A little dead oak is all right to start it with. When you get a coal, throw the green right on it. It'll throw out three times as much heat as dead wood. Anybody with a brain knows that." The temperature in his living room—which contains a bed, a kitchen table, and two easy chairs—rises quickly to 95°.

Fred opens a medicine cabinet that is nailed to a wall, and removes his shaving mug. On the shelves of the cabinet are

Mute cry of alarm, a poster in the front yard of Mrs. R. Janet Holmes of Sooy Road near Chatsworth, expresses her concern for the future. Leisure-Towne, a retirement complex nearby, will ultimately house 8,000; while another senior citizens' village of 5,000 homes is on the planning boards.

baby powder, toothpicks, camphor ice, cream deodorant, and five kinds of cologne, including Russian Leather and Avon Bravo. His old house may be falling apart, tar paper peeling off the exterior walls, but he is not.

He was a cranberry broker for 37 years, selling berries to canneries in peripheral towns, going around first in a horse-drawn wagon, later in a Model T. He worked the woodland cycle, too—moss, blueberries. He raised seven children. He has lived alone since his wife, Elizabeth, died 25 years ago.

"Do you wish you had electricity in here, Fred?"

"Certainly. I'd rather have it than this here propane. If I could have the electric turned in here, the first thing I'd do is get lights. Then a refrigerator—you can set anything in there and it don't spoil. Then an electric saw for cutting wood. Green wood."

His face is covered with lather.

"Would you want television, Fred?"

"Anything that's fake don't interest me."

HE TELLS A STORY about his friend Charlie Loveland, hunting geese by Beaver Run. "He was in by Beaver Run that comes out of the Plains and empties into the Wading River. It starts out of the Plains where there's a hill and a valley and a little spong. This was fifty years ago anyhow and he was using a muzzle-loader. He was wadding the paper down on the powder with the ramrod when he saw a flock of geese coming along, so he lifted the gun and shot the ramrod right out at a goose. The ramrod went right straight through the goose. The goose landed in the creek. Charlie pulled the goose out of the creek and the ramrod had a pike on the other end of it. Sounds like a lie, don't it? Sounds like a lie. Sounds like a damned lie. I used to laugh when Charlie told it. Charlie sat there smoking his pipe, he'd get mad."

Fred is a loyal friend. He used to go around with some regularity to Reevestown Cemetery near Warren Grove and pour whiskey on one friend's grave, an older man who died when Fred was 25. "Hell, that was the old man John Bowers. That was the old man John Bowers that lived over to Sim Place. He was an old man, he was. For some reason, he liked me. One day he said, 'By Gud, Fred, if I die I want you to come to my grave and pour me down a drink.' He did die. He did die. He died. He was buried in the old cemetery by Warren Grove.

"One night I was with Lizzie when I passed there, and I started to go into the cemetery and she said, 'What ails you?' and I said I was going to John Bowers' grave. She went with me, and I poured down old John Bowers a drink. Just then an old-fashioned pine pheasant jumped into the air from behind the gravestone. My hat flew off. My hat flew off, from fear. Elizabeth was unafraid. She said, 'That's once you got it, Fred Brown.' That's once you got it, Fred Brown."

He wipes his face clean, and returns his mug, brush, and razor to the cabinet. His story has raised in my mind a picture of John Bowers' grave, which I visited once. A small juniper, about six feet high, was growing out of it. Beside the juniper was a rock of bog iron. "John Bowers Died October 19, 1912. Aged 81 Years." A pine pheasant is a ruffed grouse.

With everything handy, Fred Brown dines royally in his tar-papered cabin on the edge of Hog Wallow, his favorite place in the whole world. The 86-year-old widower says, "I cut cedar, I growed cranberries, I pulled, I expect, two or three hundred carloads of moss. The developers? Let 'em come. People bring money."

Mouse who came to dinner feasts on a bit of bacon left on Fred's propane stove. His dog, France, part Labrador retriever, graciously tolerates such small, unexpected guests. With no electricity, Fred counts on gas for cooking and a wood stove for warmth. Layers of rugs, often six deep, help keep out the cold.

Now Fred's dog France returns from his morning rounds. Fred bends over so that France can lick his face, but France apparently doesn't care for the scent of Avon Bravo. "You know whose dog he is?" Fred asks. There are times when Fred is confoundingly enigmatic, and a virtual transmitter of metaphysical waves. One can feel them coming. And this is such a time. "You know whose dog he is? He's God's and mine. He belongs to the three of us."

"Why do you want people coming into these woods, Fred?"

"To be honest with you, I quit working two years ago. I've got enough money to keep me as long as I live, providing I die tomorrow. You can't make money where there ain't nothing. You got to get where it is to make money."

"Then why don't you get out? Go where it is?"

"I love it here. I can do as I damn please. I love the woods. I could live in a $65,000 home on Telegraph Road, but I love the woods."

"Is there *anywhere* other than the Pines that you would live?"

"No, sir. No, sir. No, sir. I don't even like it down around Cape May. I never been nowheres where I liked it better than I do here. I like to walk where you can walk on level ground. Outside here, if I stand still, 15 or 20 quail, a couple of coveys, will come out and go around. The gray fox don't come in no nearer than the swamp there, but I've had the coons come in here, the deer will come up. Muskrats breed right here, and otters—fish otters—sometimes.

"I was to Tennessee once. They're greedy, hungry, there, to Tennessee. They'll pretty near take the back off your hand when you lay down money. I never been nowhere I liked better than here. You don't think I made my living in these woods, do you? Chicken feed is what I made in these woods, but I love

Skittering in sun-sparkles on a Pine Barrens pond, a fisher spider walks the water without breaking its surface tension during a search for food. The female protects her eggs in a silken sac that she carries with her until the spiderlings are ready to emerge.

it here. Here's where I want to live. I could live on Telegraph Road, but I love it here."

"Where is Telegraph Road?"

He gave me a pitying look for my ignorance, and he said, "Virginia."

FRED BROWN particularly admires Henry Webb, the woodcutter—perhaps because (like Fred) he is an especially cheerful man, perhaps because he is religious (Fred is religious, too), or perhaps because Henry has made such an exemplary success of the work of the woodland cycle. For all Fred's promotion of modernity—when he is in his bring-on-the-asphalt, business-will-follow mood—he obviously savors his identity with the Pines as they are. Henry Webb has been particular proof to anyone that a person can still make a living from the woods.

Henry makes his living on cattails in the spring, blueberries in summer, cordwood the rest of the year, and he is not a native. He's from Bayou Casotte, Mississippi. He has lived in the Pines for 18 years. He gets $6 a thousand for his cattails and as much as $45 a cord for his wood.

"There is a quick buck in the woods if you want it," he says. "I make more money here than anyplace I've ever been, and I'm my own boss." In Texas he once picked cotton. In Florida he picked oranges. He actually enjoyed his work in the fields and groves, but not as much as his work in the Pines. For ten years, on a permit, he has been working the same state forest in essentially roadless terrain.

He has a 1952 Ford truck with a flathead V-8 engine and bald tires. A big oak fell on the truck once and removed the windshield. Gasoline from chain saws leaked into the cab one day, flashed, and destroyed the cab with an inferno so intense that the plastic on the steering wheel dripped like wax. Glassless, gutted, no headlights, no doors, the truck is so rusty that it appears to be crumbling into the ground more than rolling over it. Standing on the bulkhead that separates the driver from the engine is a two-gallon can that is both gas tank and fuel pump, gravity feed. The gas runs down a tube into the carburetor. Needless to say, this vehicle has no license plates. Much of the front bumper, bent 90 degrees, projects forward like a lance.

Henry Webb in blue dungarees, blue shirt, work gloves, and an engineer's cap, somehow makes this thing move through the woods like a bulldozer, a tank, collecting cordwood all the way. He splits it at home, then sells it in Haddonfield, Mount Holly, Camden, Beach Haven, even as far away as Trenton.

On such work he and his wife, Martha, raised ten children. One of them died in an automobile accident near home a few years ago. After that, as Henry worked in the woods, he always felt the boy near him, and he would look up to see no one there. When the house was empty, Martha found that she could no longer stand to be there alone. So she began to work with Henry out in the Pines, stacking wood, piling it on the truck. They are never apart anymore. "We stick together like glue," she says. "It's still the easiest place to make a living either one of us ever went yet. If you can't do one thing, you can do another."

As if stirring the water, a damselfly (**top**) hangs onto a strand of bayonet rush. Sticky stalk of the thread-leaved sundew traps a bug (**above**). The carnivorous plant, growing in the sandy bogs, gradually absorbs all but the skeletons of the insects it captures.


love

SCOTT F. SMITH

Spreading the good word, 4-year-old Larry Anderson rocks joyfully in a pickup pulpit. Larry's father, Wilbert, and the truck's owner, Jackie Wills, haul pinecones to market in the fall, earning $3 a thousand for their wild harvest.

Voicing hunger pangs, a young swallow flaps untried wings (**left**). Like all wild creatures in the Pines it faces an uncertain fate as megalopolis probes ever deeper into its fragile domain.

They have given up on pinecone gathering, because the price of pinecones has not kept pace with inflation. "Where it used to cost me three or four dollars for a suit of clothes, it now costs seven, eight, nine, ten dollars for a suit of clothes," Henry explains. "And they still pay you the same money for pineballs."

ONE SUMMER DAY a heavy storm moved in over the Pine Barrens, and lightning struck Dick Stewart's swimming pool. No one was hurt. The pool, which was nearing completion, was severely damaged.

Dick Stewart once worked the woodland cycle. In a sawmill he cut cedar by day into shingles and boards, and in the evening he would go out and knock six or eight dollars' worth of huckleberries. He works now for the state school on route 72.

Not a tall man, he is a little overweight, amiable and businesslike, with wet-combed dark hair. He likes to go around the house barefoot in a T-shirt and paint-spattered blue jeans, a practice of which his wife vociferously disapproves, apparently because she thinks he gives a misleading image of a resident of the Pines.

Three or four years ago he and his wife built themselves a new house out of 13,000 bricks, with a bay window. Suburban in character, it may be a kind of suggestion of things to come. "We're the next prime target for developers," Dick Stewart says. He is in a position to sense such trends. For 27 years he has been Clerk of Woodland Township, where Chatsworth is, the center of the Pines.

A developer, for example, has applied for approval to put up 5,000 dwelling units on 1,100 acres in the northwest corner of the township, to sell in the $16,000 to $37,000 range. A mobile-home impresario wants to create a park for 800 trailers elsewhere in the township. The reactions of the township committee, Stewart says, are mixed.

When the big storm came, there were two storms, actually. "Two storms came together and they hung right over here with thunder and lightning for two hours," Dick said. Close by the Stewarts' new swimming pool stood a particularly tall old Jersey bull pine. Billions of electron volts streaked like a snake down the big tree, killed a wisteria bush, and jumped to the pool. Reinforced U-blocks shattered. Coping blocks shattered. Pieces of the parge coat popped into the air. The pool was a big one—18 by 38 feet. The lightning searched out and destroyed three of its four corners.

"I'll tell you what that storm done," Fred Brown told Bill Curtsinger and me later on. "That made in the west, that storm. Then it went from the west over to east, over the ocean. Then it turned and came back—and whenever any storm does that it will be the awfullest one ever was. I've seen five or six in my lifetime, and every one was bad. Lightning. Lightning. Sometimes it'll run down off a tree and blow the ground all to the devil for 50 yards."

Unless the state—"state" in the larger or smaller sense—does something effective and comprehensive quite soon, a great deal more than lightning is going to be tearing up the ground in the Pine Barrens, and over a breadth of not 50 but 50,000 yards. □

THE HMONG OF LAOS

No Place to Run

ARTICLE AND PHOTOGRAPHS BY W. E. GARRETT SENIOR ASSISTANT EDITOR

THE HMONG used to say the world reached only as far as a man could walk. The old chief in the jungled mountains of northern Laos knew I had come from beyond his world. But he could see I enjoyed his stories—and he liked telling them.

He had come from China as a boy. "Why," I asked, "and how?"

It was dark in the windowless house at Nam Phet, but I caught a twinkle and the flicker of a grin—the same mischievous expression that betrayed my own grandfather when he was about to tell a whopper.

"We were slaves. To escape we made a big cloth—3,800 Hmong stood on it. A good spirit made a big wind and blew us out of China into Laos."

In truth, he admitted, they had fled on foot.

China was their ancestral home. For centuries the Hmong farmed its river valleys, but, bullied by Han invaders from the north, they began a southward wandering that continued for four thousand years. The Chinese contemptuously called them Miao—"barbarians." In Laos, they are Meo—with the same connotation.

"We accept neither label," said government official Yang Dao, the first of his people to earn a Ph.D. "We have always called ourselves Hmong, which means 'free men.' When you write about us, use our real name."

I promised Yang Dao I would. It's a small enough courtesy to pay this proud and independent people hounded by a devastating war they never understood, a war that decimated them, a war that once again made flight their way of life. They are pawns in the power struggle that has wracked Southeast Asia, and their ceaseless battle for survival has reached a crucial phase.

Farmer Turns to Nurturing People

"Runnin' and dyin', runnin' and dyin'," intoned my old friend, Edgar (Pop) Buell, as he welcomed me back to Laos this past year. "That's all the Hmong have known. And now there's no place to run."

The Indiana farmer came to the Hmong 14 years ago to teach modern methods of agriculture, but a Pathet Lao attack drove him from his experimental farm into a new job—feeding, housing, and nursing refugees. To the Hmong he became Tan Pop—"mister sent from above" *(Continued on page 83)*

With little to cling to except each other, Hmong girls reflect the uncertainty of a people driven from their homes in the protracted war for Laos. The Hmong were forced to flee their mountain villages and to take sides in the conflict. Crack Hmong guerrillas became the undeclared muscle behind U. S. foreign policy in this Southeast Asian nation. Now a precarious peace has come with the 1973 cease-fire, and the Hmong, driven out of their hilltop isolation, find themselves thrust into the mainstream of Laotian life.

Scorched earth of the Hmong heals with the balm of new growth (**above**). A rugged and independent people, about 350,000 of them make up roughly 10 percent of Laos's population. They traditionally settle near the summits to grow corn, rice, and opium poppies. Crops are fertilized by the ashes of trees felled and burned to clear the forest, but monsoon rains soon leach the thin soil. The Hmong must continually relocate their villages.

Now bomb craters also scar the land (right foreground), pitting the ridge below a Hmong outpost. As war swept their homeland, nearly a third of the Hmong found themselves in Communist-controlled areas. Many sought refuge in the lowland territory of the ethnic Lao, who scorn them as "primitive." Yet in this prejudice lurks a measure of uneasiness, for the Hmong prize hard work and ambition—the sinews of political success.

Piping the day's finale, a Hmong plays his homecrafted *khene* above the village of Teu La—a moment of peace in a war-ravaged life.

The long march from China

WHEN CONFUCIUS pondered the effects of rebellion on social order 2,500 years ago, he might have been thinking of the Hmong, a wary tribal people who refused to submit to Chinese rule. "Meo," from the Chinese name for the Hmong, connotes "barbarian," but their own name means "free men."

Originally lowland rice farmers, the Hmong gave ground slowly to the relentless expansion of the Chinese. They migrated southwestward, becoming mountain dwellers in southern China.

Beginning in the mid-19th century, scores of Hmong clans seeped into Indochina. Today about a million Hmong live in North Viet Nam, Laos, and Thailand. Some 2,500,000 remain in the People's Republic of China.

—a gift from the spirits, who loom large in every aspect of Hmong life.

More than 120,000 Hmong refugees, Pop told me, now depend upon American supplies for survival. Most live in lowland jungle ghettos. They suffer from tropical diseases against which their mountain-dwelling past provides no immunity. With the Pathet Lao controlling at least two-thirds of the land area, the Hmong truly have no place to run.

For several reasons—including clan divisions and political rivalries that stemmed from French colonial days—Hmong fought on both sides in the struggle for nominally neutral Laos. Some 100,000 cast their lot with the Communist-led Pathet Lao; the remaining 250,000 sided with the pro-Western Royal Lao Government forces.

30,000 Hmong Dead in 14-year War

In the late 1950's, when trouble loomed, people like the superstitious old chief at Nam Phet naturally looked to the spirit world for help. Messianic myths spread through the hills. One prophesied that Christ would come to the Hmong in a jeep, wearing American clothes and handing out modern weapons. No savior came, but the weapons did.

The Soviet Union and China supplied the Pathet Lao Hmong and the North Vietnamese reinforced them. The U. S. Central Intelligence Agency armed and advised a secret army—mostly Hmong—that supported the government. For 14 years warfare ebbed and flowed through their homeland. In the end, America's Hmong allies lost.

In the debris of defeat 30,000 Hmong lay dead; the survivors had been driven from their homes. In one province not a village still stands. To translate the disaster into American terms, imagine a holocaust that wiped out 18,000,000 of us and forced the remainder of the population to flee to Mexico.

"Toward the end, 10- and 12-year-olds were sent out to fight," Pop Buell told me. "They didn't live long enough to learn fear."

When I first met the Hmong 13 years ago, they still lived in relative peace. The roadless isolation of Laos's mountain jungles created a cultural deep freeze where customs changed slowly. A score of primitive peoples lived in the foothills, but if you endured the climb to the ridges and peaks above 5,000 feet, you found only the "kings of the mountains"—the Hmong.

A few thousand feet of vertical movement

"**Pocketa-pocketa**" goes the umbrella for a Hmong boy playing helicopter with his mother's sunshade. Until the past few years, umbrellas were one of the Hmong woman's few store-bought luxuries. They remain her basic cosmetic aid, since fair skin confers status—especially over the darker Lao Theung, whom the Hmong consider inferior.

enabled villagers to enjoy climates as varied as those of Maine and Florida. On lower slopes they grew oranges and papayas; at the top of the same mountain, peaches and apples.

Although they came originally from China, they differed from the Chinese. They were shorter and their eyes showed less epicanthic fold, or Mongolian slant.

Men of other tribes took coolie work in the towns, but never the Hmong. In a country almost submerged in tropical lethargy, the Hmong stood out for their drive and energy —qualities that did not endear them to other Laotians—as well as for their incurable optimism. Like most mountain people, they were fiercely independent.*

Friendly Approach Pays Dividends

If you came to a village in peace—as I had in 1961—they extended unaffected hospitality and a great deal of curiosity. Two boys—inspecting a white person for the first time—curiously stroked my arm hairs. Suddenly one grabbed a tuft and tugged. I never knew if he wanted a souvenir to show the other kids or just felt devilish.

The women, also curious but shy, remained at a distance. Men, amused by my clumsiness with their finely crafted crossbows, persisted until they taught me to hit a leaf at fifteen paces. I scored better with their homemade flintlock muskets. In the evening they brought out corn whiskey as potent as mountain dew anywhere—and no better.

Then war engulfed their mountains like tongues of consuming lava.

When I returned to Laos last summer, a cease-fire had finally ended the fighting, and a coalition government, drawn equally from the Pathet Lao and Royal Lao factions, would soon be formed. I took advantage of the truce to revisit the Hmong.

Nothing so exemplified their essential optimism as the words of Dr. Yang Dao. "We have

*The diverse cultures and peoples of Southeast Asia were covered in a special map supplement distributed with the March 1971 GEOGRAPHIC.

Finery confronts the author as Hmong women ask to be photographed. The unmarried ones may need all their wiles to snare husbands, for the ranks of Hmong youth have been decimated by the war. Polygamy, which had been declining, may revive because of the shortage of men.

What you wear is what you're worth in this Hmong family's banking system. As a mother adjusts the silver ornaments on her daughter, she literally balances her accounts (**above**). The rich keep their excess in silver bars, which they bury for safekeeping.

A silversmith clangs his chop, or hallmark, into ingots he has cast (**below**). Men often refer to an eligible Hmong girl as a three- or four-bar woman —the bride-price she will command.

made more progress in 14 years of war than we could have in 50 of peace. Our economy has been destroyed, but the trouble has taught us what we can do."

Hmong military leader Maj. Gen. Vang Pao reinforced this claim. A farm boy with four years of village schooling, Vang Pao became the government's military commander in northeastern Laos, despite the widespread prejudice against the Hmong.

Although depressed by the eventual defeat of his forces, the general believes that the Hmong earned new status in Laos.

"Before the war we were right here," he said, tapping the sole of his combat boot. "Right here." He spat it out.

"Where are you now?" I asked.

Grinning, he drew his hand across his knee, "About up to here."

Instant Dentist Sets Up Shop

I saw the pinnacle of Hmong optimism while passing through a settlement of refugees. One of them, after watching a Chinese dentist at work, had bought some equipment and hung out his shingle. His courage in undertaking this new profession was exceeded only by that of his patients.

Thousands of years of adversity—running and dying—seem to have bred this will-to-live optimism as a tool of survival. From the first reference to the Hmong in a Chinese text 4,257 years ago, they appear in chronicles only in troubled times—and are usually branded the troublemakers.

In 1775 the Chinese, then consolidating the Manchu Empire, discouraged insurrection among the freedom-loving Hmong by displaying the severed heads of their leaders in baskets. In the past century, tens of thousands fled into Laos, to escape persecution by the "sons of dogs," as the Hmong contemptuously call the Chinese.

The 1953 People's Republic of China census listed 2½ million living there. Official reports say they have been integrated into Chinese society. Those who came to Laos in the 19th century continued to drift southward, often fighting as they moved. In 1921 French forces crushed a Hmong uprising. In the aftermath, a chief told a French priest:

"They say we are a people who like to fight, a cruel people, enemy of everybody, always changing our region and being happy nowhere. If you want to know the truth about our people, go ask the bear who is

hurt why he defends himself, ask the dog who is kicked why he barks, ask the deer who is chased why he changes mountains."

Dr. Yang Dao concurred with that half-century-old defense of his people. "We fight when attacked," he said. "But we are not cruel, and we move only because we have to.

"When the Hmong came to Laos, they took to the mountaintops for three reasons. Earlier arrivals had already occupied the plains. The Hmong, few in number, did not want trouble. Besides, the cooler climate in the high country was more like their temperate homeland. Mountaintops are easier to defend than the fertile plains, and the Hmong valued liberty and dignity more than easy living."

To visit isolated Hmong villages, I joined Father Luke Bouchard—known as Father B, the Walking Priest of Laos—on a visit to remote regions of his vast parish. John Everingham, an Australian journalist studying the Hmong culture, joined us.

A helicopter "inserted" our party into the mountains 75 miles from the Laotian capital of Vientiane. Another aircraft would pick us up four days and five villages later at Air Strip 258, a landing area in the jungle. John and I were landed first, while Father B went on to deliver fingerlings to a fishpond only a few minutes away by chopper, but several days on foot.

Thanksgiving Rite for a Baby's Health

The unexpected presence of strangers in the village of Teu La must have seemed propitious to the local spirit doctor, or *tu-ua-neng*. Within minutes of our arrival he has seated us alongside four men in the gloom of a Hmong house. We become part of an animist ceremony already under way.

Wearing no sign of authority, and dressed in the Hmong's traditional black shirt and flaring trousers, the tu-ua-neng practices his art by the light of a single oil lamp.

He mixes spoonfuls of rice with a clear liquid, apparently an offering. Then he pours a tumbler of the liquid and extends it to the man on my far right. The man stands, utters a few words, and gulps it down. From the darkness a sort of amen chorus of ten chanting men rises and sits again three times. Their voices resound eerily in the hut.

John, who speaks with them in Lao, says that the service is to thank the spirits for healing a sick baby. Man by man, the glass and the ritual move down the line.

As the tu-ua-neng drifts to another world, so does my imagination. I am back in my childhood, at Communion in a Baptist church. Deacons stand before the pastor and one by one down tiny glasses of grape juice while a choir sings songs of faith.

My turn. I rise, say a short prayer for the baby, and tip up the glass. The Baptists' gentle grape juice represents the blood of Christ. This raw Hmong whiskey could warn of the fires of hell.

John's turn ends the ceremony. The baby's mother serves bowls of rice, boiled pork, and boiled vegetables.

Speak Gently if You Bang Your Head

Missionaries claim a few converts, but most Hmong, including many of the nominal Christians, perpetually contend with superstitions and an infinity of ubiquitous spirits called *dan*.

A provoked trail spirit may sprain your ankle. Pity the hunter who forgets to smear blood on his crossbow after a kill. If a bird flies into your house and roosts, it is a warning to move. Most house spirits are friendly, but if you curse as you bang your head on the door, the spirit of the threshold may retaliate. By mounting the crossed hind legs of a sacrificed dog over the door, you may placate the spirits.

A pregnant woman of another clan who enters your house by the front door poses a serious spiritual problem. A male relative must subsidize a full-blown apology—including a pig sacrifice. If the woman had used the back door, no problem. Sickness results when evil spirits lure the soul from the body. Death comes if it fails to return.

The "cure" varies little regardless of the disease. A tu-ua-neng pays a house call. He chants with the ardor and the exaggerated gestures common to faith healers anywhere. All the while a black mask over his head closes out this world (page 95).

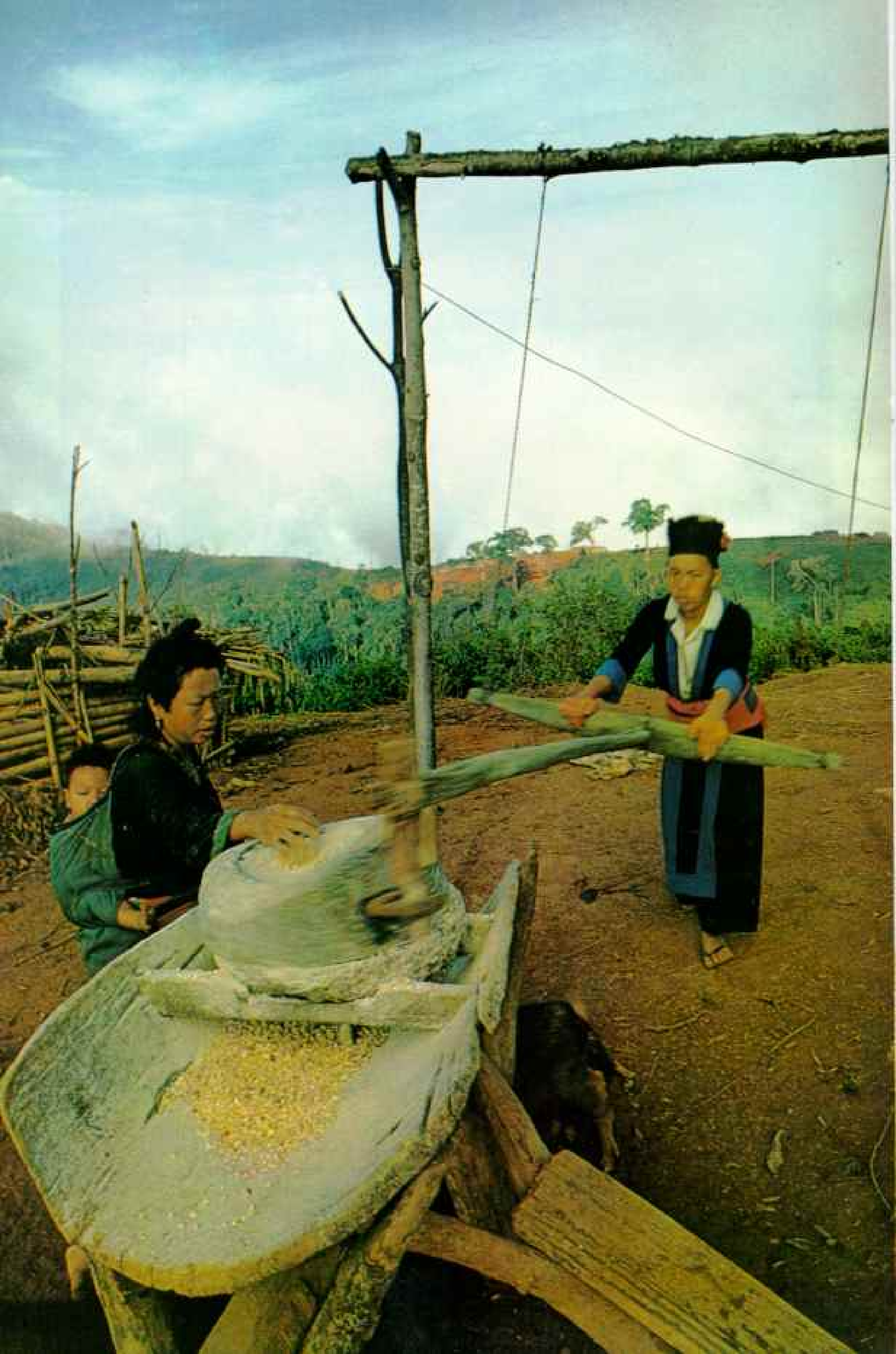
Jangling a ring of noisemakers with a clippety-clop rhythm, he "rides off on a horse" to find the soul. Along the way the tu-ua-neng gathers a posse of friendly spirits; one of these may bring field glasses, another an airplane. The villains may be lurking at the bottom of a pond, in the clouds, or far beyond China.

Once the spirit doctor meets them, excited haggling ensues. Leaping, dancing, sweating, he is driven by a trance that defies exhaustion. Tirelessly he *(Continued on page 92)*

Misted in the half-light of secrecy, the airfield at Long Tieng (**left**) served as field headquarters for the rescue of U.S. pilots downed over North Viet Nam. It was also a secret base for CIA-Hmong operations in northern Laos. Maj. Gen. Vang Pao (**above**) led the Hmong guerrilla army that proved to be one of the few combat units with any success in the losing campaign against the Pathet Lao. He once tried, without success, to proclaim an independent Hmong nation —anthem, flag, and all.

War leader or warlord? Patriot or puppet? No one label fits Vang Pao. He tours a refugee village with wives number six, five, and one. All are Hmong women who have adopted Laotian dress.

"War is difficult; peace is hell," laments General Vang Pao, who must turn now from the battlefield to the booby traps of politics. Out soliciting support from his potential constituents in a Lao Theung village (**above**), he drinks rice wine from a communal crock.



Village hawkeye fires his gun (**above**) and then shows the flintlock action to John Everingham (**right**), an Australian journalist. Such crude but effective weapons are based on 18th-century European designs. They have no stocks, however; the guns are mounted on pistol grips. These homecrafted arms are disappearing with the deluge of U. S. and Russian rifles, which sell for as little as $15 each.

Daily grind in a life just above subsistence includes milling corn (**left**). The Hmong make bread with it to supplement their staple, rice. Corn also provides fodder for stock and for distilling a gullet-searing whiskey they gulp down by the glassful. JOHN EVERINGHAM

bargains for the captive soul. Finally, the spirits demand a sacrifice—a pig if the family can afford it, a chicken if not.

An assistant dispatches a chicken or pig and burns paper "spirit money" on the carcass. With luck the homeward journey from the vale of the spirits requires only another hour or so, long enough to cook the sacrifice.

Family, friends, and tu-ua-neng then sit down to a pork or chicken dinner, hoping the patient will recover. More and more the patient does, partly because on family altars you will now often find bottles of antibiotics among the holy artifacts. It would be a foolish tu-ua-neng who turned his back on such powerful allies.

Father B gave me an indication of the pervasive role of such rites in Hmong life. "Eighty percent of the pigs you see will end as sacrifices in spirit ceremonies."

House Building Follows Strict Rules

Though Hmong eagerly accept new ideas, villages as isolated as Teu La preserve the old culture intact. Houses share a suburbia-like sameness: all built on the ground with a dirt floor and no windows. Inside: a stove and an open fire pit, family bedrooms along one wall, the guest bed—a bamboo platform—at the end of the living area.

In Teu La 20 such houses hunch just below the ridgeline. No ceremonial or public building or even a shop punctuates the uniformity. Markets? The nearest is several days' walk away.

Chong Houa, 33-year-old headman of Ban San Phu, has explained the rationale of the traditional village layout: "We must build every house so you can see a distant mountain from either the front or back door. It is our rule.

"Before building, we dig a hole a few inches in diameter. In it we place as many grains of rice as there are people in the family. If the spirits move the grains during the night, another site must be found."

Presumably a neighbor wouldn't dare jostle the grains to preserve his view.

Hmong women don't like to be photographed in

Ten little pigs chow down on a barnyard banquet. Hmong women cook up nutritious slops by boiling corn and cobs, banana stalks, rice hulls, and squash. Expert livestock raisers, the Hmong slaughter most of their pigs for sacrificial feasts to appease the spirits. Fortunately, enough weddings, funerals, and other ceremonies occur to keep pork in the diet.

BACHRACH & SINGH

their work clothes. When one of the young men in Teu La asked me if I would photograph his sister the next morning dressed in her good clothes, I agreed.

All night a monsoon rain attacked Teu La. Clouds still wreathed the village the next morning, but outside our door the muddy hillside shimmered. Dozens of self-conscious mothers and young girls stood waiting to have their pictures taken. The boy must have been brother to every woman in town. Many wore colorful sashes and blouses with delicately embroidered collars. A few had massive silver necklaces (pages 84-5).

Moments after birth every baby receives a simple necklace to warn the spirits that he's not a slave and belongs to a family.

The women's silver necklaces reflect family wealth. The more prosperous wives have five-bar models—made from five of the heavy silver bars called "Meo money," used in the opium trade (page 86).

John, with his camera, helped me fulfill my promise. Father B would see that prints reached the village. The farewells had a come-again warmth.

Afoot, the Forest Becomes a Nightmare

The first few minutes on the trail leading north snake through a crop of corn ten feet tall, truly higher than a Laotian elephant's eye. Cucumber and sweet-melon vines twine along the ground. Patches of papaya and pineapple edge the field.

Heaven knows how many times I've flown over these Annamite mountains. From the air, the tropical foliage softens peaks and valleys into a gentle prettiness.

But now I'm walking, and it's raining, and it's not pretty. The slopes loom as a moist, mammoth terrarium, a fearsome, lonely place, almost impassable except where the trail cleaves its way.

On what had seemed from the air to be gentle inclines, the trail plunges down slimy, precipitous walls and staggers up exhausting ascents. My cleated boots become muddy anchors compared to the muscled toes of our barefoot Hmong guide.

I plop gracelessly into the mud, often. Once John clutches a shrub for support and draws back a hand bloodied by thorns. Groves of bamboo ambush the trail, and snares of vine seek to scramble my steps. The constant tepid wetness softens the flesh of the feet and erodes the will to walk.

Hmong measure distance in time, not miles. As our leader glides effortlessly, it's obvious his hours stretch miles longer than mine. I stare the hours away, watching my feet automatically fall into the tracks ahead.

Such Southeast Asian trails have known other treads than mine. With a small twinge of guilt, I reflect that I am healthy, that before me lie welcoming villages. But some of my countrymen—captured soldiers and airmen—have suffered these jungle trails before, as have thousands of Hmong refugees. They have been sick, wounded, hungry—with enemies as their sole companions.

Great View—if You Could See It

A year before, the Communists arrested my companion, John Everingham. Assuming him to be a downed American pilot, they marched him to their village and placed him in an 8-by-8-by-5-foot box. Tired of being stared at through the cracks, he covered himself with his poncho. But a guard asked him to uncover. "After all, these people walked a long way to see you," he said. Two days later they let him out. After 29 days, verifying he was a journalist, they freed him.

As we slog through the mists, Father B aggravates my misery by repeatedly pointing out that "on a clear day there's a magnificent view from here."

By the third day my legs complain no longer. Now the vastness, initially so oppressive, assumes a monumental quality. Hardwood trees three centuries old rise like columns of the Parthenon, disappearing a hundred feet above us into their own green canopy. Gibbons chatter down at us. Underfoot, colonies of termites fuss at the hopeless chore of keeping the jungle floor clean.

According to Father B, we are five hours from the next village, but unexpectedly the trail widens. A giant tree, freshly felled, lies beside the trail. A lone Hmong shapes table-size planks with an adz.

Just ahead we look down on eight shining new houses in a fresh clearing. They were built by refugees recently arrived.

At the village the headman's wife eyes with scorn the cold rice we carry, and serves a bowl freshly steamed from her meager larder. Those who observe the Hmong diet need have little fear of being hobbled by gout or of finding their arteries clogged with cholesterol: Steamed rice and boiled vegetables are served morning, noon, and night.

Infrequently, chicken, game, or pork may enrich the menu. Salt is scarce; food is occasionally spiced with chopped hot chilis. Dairy products are virtually nonexistent.

Our expedition cut a swath through the local chicken population. Because villages received us as honored guests, a chicken accompanied most meals. On every occasion the head—a delicacy—was awarded to me. Protocol requires sucking out the brain. I am certain that Father B, not partial to this treat, used his fluency in the language to enhance my importance. Thus did he assure that I, not he, received this singular honor.

The villagers we met were refugees, but their flight followed the centuries-old pattern of Hmong migration. First, scouts select a village site by tasting the soil. If it is sweet on the tongue (because of its lime content), they know that they will be able to grow excellent opium poppies, as well as rice and corn.

Hmong are said to plow with fire and plant with the spear. After completing their houses, the villagers will slash down much of the jungle we had traversed. Then they will "burn the mountain" by setting fire to the slashed jungle. Smoke from thousands of fires will blanket northern Laos, as it has each spring for centuries. Through the pall the sun will glow like a dull orange ball until monsoon rains flush the air.

On the sloping fields men will punch holes with a dibble stick. Women and children will follow, sowing seed. So steep are the slopes that occasionally the farmers must tie themselves to stumps to keep from falling.

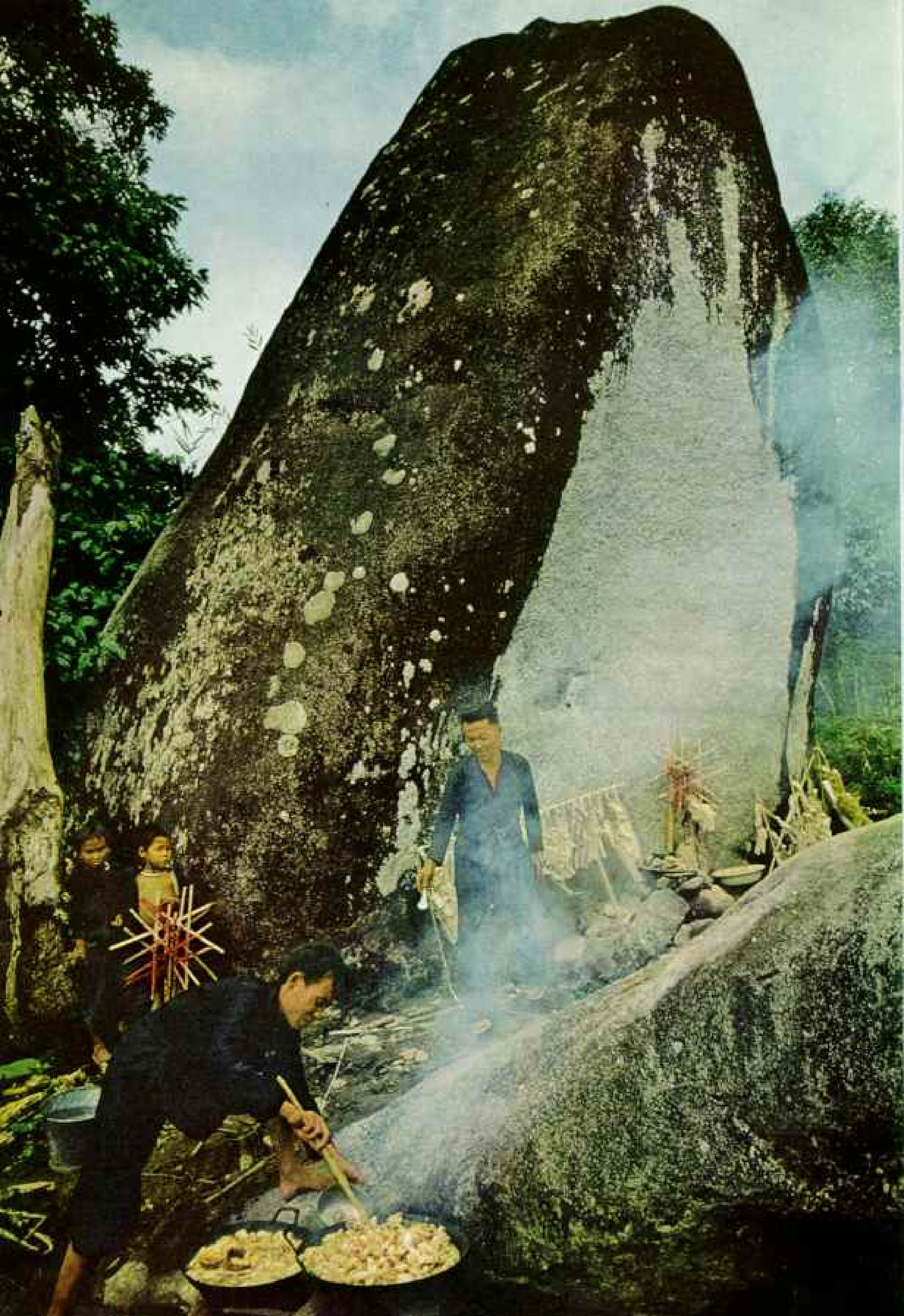
Fertilized by the ashes of the burned forests, two or three crops will be harvested before warm monsoon torrents leach the minerals from the thin topsoil. Then the Hmong must abandon the field and burn a new one.

As our party continued to wind toward Air Strip 258, the sky cleared. A rainbow arched to the Mekong River, 3,000 feet below—the spirit of the sky bending down to drink, according to Hmong legend.

A string of jagged ridges and fingerlike outcrops of limestone jutted a thousand feet above the valley floor, like the landscapes in Chinese paintings. As we dropped lower, the sun glared on the blackened fields. You didn't have to be a Hmong to feel nostalgia for the cool mountain summits.

We kept our rendezvous at the airstrip. Aloft, the airplane retraced the route of our four-day march in a few minutes. Another

Masked rider of the nether ranges, a village shaman rounds up benevolent spirits to ensure that an imminent birth will be successful. Jangling his ring of disks to a galloping beat, he spurs himself into a trance. Once he has found the spirits, he strikes a bargain for their cooperation, usually the sacrifice of a pig. The ceremony continues as the pig cooks. Finally the spirit doctor and his fellow villagers sit down to a pork dinner.



half hour and we landed back in the city of Vientiane (map, page 82).

My trek through the mountains had provided depressing insights into the plight of the Hmong and into their wasteful slash-and-burn system of agriculture. We had walked through the fields of four villages, green with young rice shoots and crisscrossed by thousands of blackened logs that would have been worth hundreds of dollars each.

Later when I flew over areas crowded with refugee villages, the scene previewed the effects of population growth. After only a few years of deforestation these hills lie as scarred and scabbed as a dog with mange.

At the normal pace, which sees 400 square miles burned each year, all forests in Laos will be destroyed in a century. The lush jungle grows with weedlike speed, but Dr. Warwick Forrest, an Australian adviser to the Department of Waters and Forests, told me: "It would take a thousand years to regrow those virgin forests. The trees take only three or four hundred years once they start, but they come at the end of a long ecological cycle that begins with grasses and low brush."

Resettlement Hinges on Cooperation

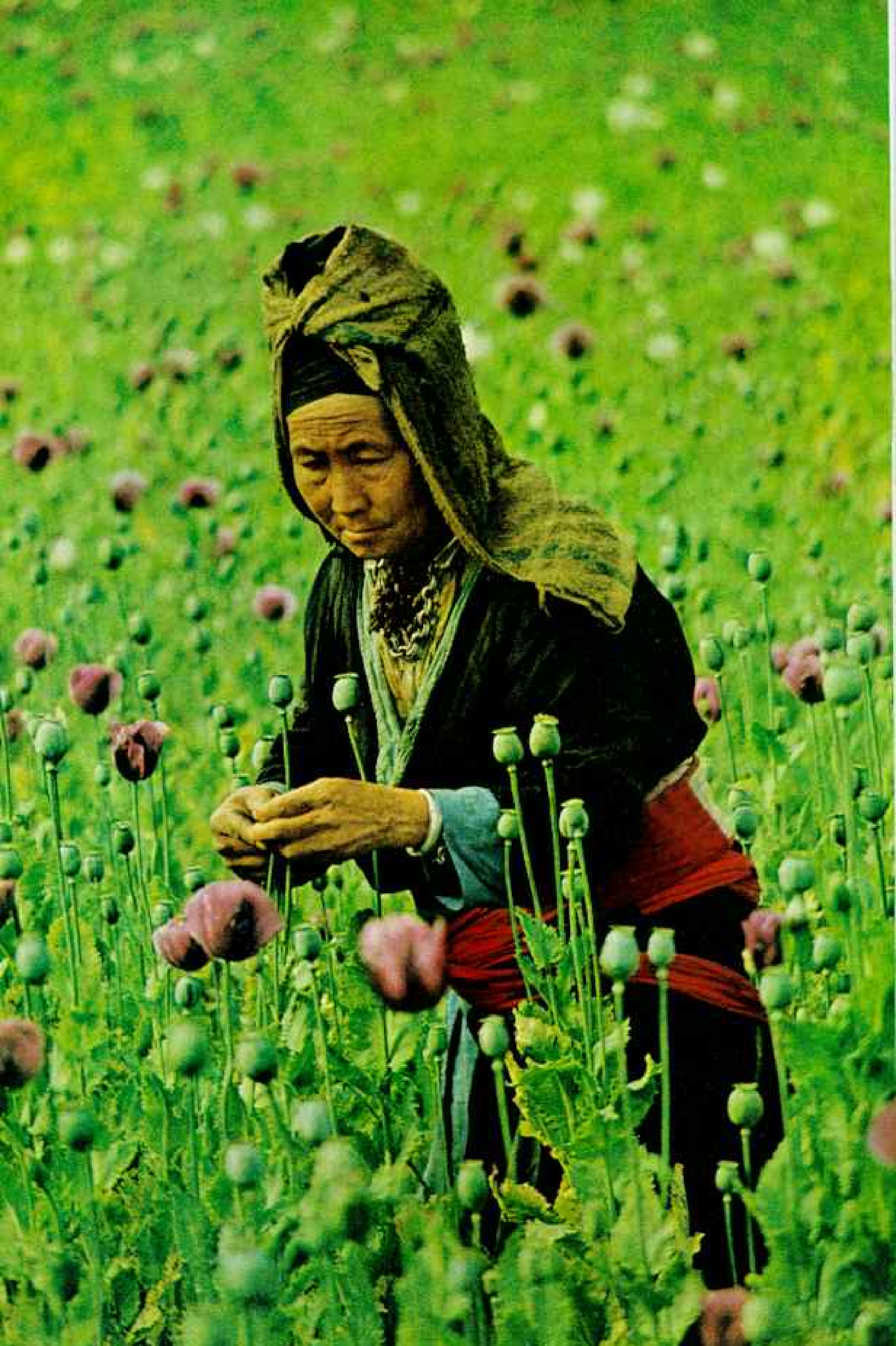
The Hmong's principal spokesman, Maj. Gen. Vang Pao, deplores the traditional method of agriculture. "In one year," he told me, "a single family will chop down and burn trees worth perhaps $6,000 and grow a rice crop worth only $240. Our people must come down from the mountains. We must demand our share of the fertile, irrigated land."

He envisages moving some of the Hmong refugees west toward the Thailand border. More than 1,000 already have been successfully settled in this area on irrigated paddy land. But resettling more will require unprecedented cooperation among the Hmong, the government, and the Pathet Lao, who control much of the area.

"We have no problems with the Pathet Lao we can't resolve," Vang Pao said. With customary optimism, he feels that in peace many of his people can return to the mountain homes they lost in war. As we toured refugee villages by helicopter, he politicked with all the finesse of a ten-term congressman. Wearing a bright blue flight suit decorated with military unit patches, an American flag on his left shoulder, and a Laotian flag on the right (page 89), he listened sympathetically to the problems of the refugees.

Something was very wrong when Edgar (Pop) Buell, a retired Indiana farmer with 14 years among the Hmong, landed with the author at Phu Pha Daeng. Three children had died in three days and two more were desperately ill. Villagers blamed 200 nursery plants brought by Gary Alex of the U.S. Agency for International Development in the hope of encouraging alternate crops to opium. Buell examines one of the sick children (**above**), while Gary radios the helicopter to evacuate them to a hospital. Diagnosis: a mosquito-borne virus. Prognosis: both would live.

The spirit of the big rock brought death, insists the village shaman (**opposite,** center). It had taken offense at the plants Gary had put on its sacred ground. When the plants were removed, the exorcism began. Lattice-like ritual signs are smeared with pig blood, and the pig cooks while the shaman performs healing rites.



JOHN EVERINGHAM (LEFT)

Ooze from these opium poppies may end as heroin "mainlined" into the veins of young Americans. Opium has been illegal in Laos since 1971, and production has fallen from about 100 to perhaps 20 tons a year. Yet the poppy may still be grown by registered addicts, and opium still finds its way into illicit trade. To this Hmong woman it means the family's only cash crop and perhaps relief from the infirmities of age. The Hmong countenance addiction only among the old, sick, and dying.

The youthfulness of this addict, sucking his pipe in a dreamy stupor (**above**), is unusual. The young man plans to enter the detoxification center in the Laotian capital of Vientiane. There methadone treatment offers the hope of cure, as reflected in the face of another addict under care (**left**).

The general invited me to go back with him to his headquarters at Long Tieng. Built in 1961, this base with its 4,420 feet of runway had served as the secret headquarters for CIA operations in Laos.

Larger-than-life portraits of President Nixon and the King of Laos greet visitors entering Vang Pao's house. Offices occupy the lower level, while the upper story serves as living quarters for the general and his six wives. Two wounds attest to his combat experiences, 26 children to his prowess as a family man. I met three of his spouses; the others were in Vientiane.

Usually Hmong men restrict themselves—or are restricted by wife number one—to one wife. The war and its resultant decimation of the male population, however, brought an increase in polygamy.

Furthermore, the custom of levirate marriage obtains; upon the death of a husband, his eldest brother has first option on the

widow. Should she not marry a brother-in-law, tradition obligates her family to return part of the bride-price.

Occasionally a first wife will importune her husband to add another mate or two to help with the work, for Hmong wives labor around the clock. They cook, keep house, tend children, pound rice, grind corn, and till the fields. Polygamy, by bringing help, offers their only taste of "women's lib."

Because of the Hmong's general poverty, the headman of one refugee village attempted to limit the price of brides to four silver bars. But an attractive girl who dances well and sings cleverly will still fetch more. Virginity holds little moral or economic value. Generally, young people select their own mates after an intense courtship, usually begun during the New Year festival.

Many Hmong fear such traditions will disappear with gradual integration into the Lao culture. In 1966 General Vang Pao tried unsuccessfully to proclaim an independent Hmong state. Later he reversed his field and now maintains that the Hmong's future depends upon full integration into Laos.

For the past two years Vang Pao has brought Hmong and other hill-tribe leaders to Long Tieng for a two-week course of intensive study. The seminars include political briefings as well as lectures on subjects as varied as the technological revolution, astronomy, and Laotian history.

"Right" Answers Are All Wrong

I attended one of the seminars and acquired a keen appreciation of the problems besetting this effort to wrench the Hmong into the Space Age. I watched as Lt. Col. Vang Geu tried to explain eclipses with chalk drawings showing sun, moon, and earth passing in orbit. His audience of wary old farmers, steeped in Hmong superstitions, paid him little heed. They already knew what causes eclipses: A frog spirit attempts to swallow the moon, but always fails because his mouth is bigger than his throat.

A student asked the lecturer if the guest—meaning me—knew the reason for lightning.

Thinking that he wanted me to explain it, I tried. "It's like the spark a jeep battery makes," I said. "The cloud is one terminal—the ground is the other."

Wrong, he announced triumphantly. "It's the spirit of the sky showing his anger."

They were testing me. Did I know why lightning hits a man?

"He stands upright like a radio antenna,"

RAGHUBIR SINGH

Milk of life, shroud of death combine outside the hospital at Ban Xon. The child in the yellow sheet has died of malaria, a disease that strikes 80 percent of Hmong refugees as they settle in low-altitude villages. The average Hmong life-span is only 35 years; child mortality is 50 percent.

I answered, "and provides a contact for the spark going to the ground."

Wrong again! A man who tastes mother's milk will be killed by lightning.

The Hmong who had asked the questions spoke again. "Mr. Garrett," he said, "needs to do more research." The class laughed.

I knew he was right—I had come to learn about Hmong and they were teaching me.

The old chief in Nam Phet had been one of my teachers. After joshing me about the flying carpet, he had told me the truth. "Our clan came to Laos to grow opium. We had to, because Chinese opium growers, fearing our competition, cut down all our poppies."

Nam Phet lies in the Golden Triangle—contiguous areas of Burma, Thailand, and Laos (maps, page 82)—famous as the source of approximately 70 percent of the world's illicit opium. Since opium provided a fourth of France's income from its Southeast Asian colonies, the French welcomed the Hmong into Laos. With them the immigrants had carried a supply of small gray seeds, identical to those that give poppy-seed rolls their name. French experts offered advice on better poppy production. The hardworking Hmong eventually produced 90 percent of Laos's total opium output.

Poppy Fields Breed Good and Evil

Normally in Southeast Asia, produce must be backpacked for days to reach market. It is a race against spoilage. Opium, which does not spoil, makes an ideal cash crop. For many a farmer, the decisive consideration is this: A pound of opium commands the same price as a quarter of a ton of rice.

Many Hmong smoke opium occasionally but not to the point of addiction. Society does condone addiction among elderly people. Instead of enduring a painful decay, with the help of opium they slip away in peaceful euphoria. On the other hand, a young addict is regarded as a disgrace to his family. One father ordered his son to stop smoking. The young man tried and failed. The father then told him to kill himself. He did.

The products of the poppy possess vital pharmaceutical properties. As with its derivative, morphine, opium masks pain; like paregoric, also made from it, opium cures diarrhea. But refine the beautiful poppy into heroin, and it becomes a sociological disaster.

A 1972 United States Government report estimated that Laos produced 100 tons of

From helmet to turban, hats worn by women and children give distinctive touches to each group of Hmong. The necklace of the boy (**opposite**), attached at birth, proclaims his freedom from slavery and his membership in a family, and advises his three-spirit soul that it should remain in his body.

Chopper: dead-right nickname. A schoolchild's drawing of a helicopter gives a grisly warning (**left**) of what could happen to two curious boys who edge dangerously close to a craft settling on a mountain pad (**right**). The pilots always keep their rotors turning, and the blades remain an almost invisible blur. More than twenty Hmong have walked into them over the past twelve years. Yet these casualties are few considering that, at the height of the war, Laos's 400 airfields handled thousands of takeoffs and landings each day.

opium a year. A kilo (2.2 pounds) that a Hmong farmer sold in that year for $50, when processed into heroin would have brought $20,000 at retail in New York.

Laotian officials controlled much of the traffic that supplied opium and heroin to American troops in Viet Nam. But in 1971, under pressure from the U. S., the Laotian Government declared opium illegal.

This abrupt about-face has bewildered Hmong farmers. To begin with, they feel no more moral responsibility for drug addiction than a tobacco farmer does for lung cancer.

French and Laotian officials had encouraged cultivation of poppies for more than a century, and eagerly purchased all the opium available. Now, suddenly and incomprehensibly, a Hmong becomes a criminal for doing what he and his fathers have always done.

Brutal enforcement of the new law last year left the Hmong bitter. In Teu La farmer Tsia Schoong told me with tears in his eyes, "Both my wives were working in the poppy field, with our babies on their backs. A cloud fell out of an airplane. They became like they were drunk."

The poppy crop withered and died; so did all the vegetables and banana trees, and all the dogs and many of the pigs.

Little Eu Schoong, one month old, refused his mother's milk and died four days later. Two other babies who were in the field also perished. Hmong in four nearby villages told similar stories and reported twelve more deaths from the lethal spray.

Their leaders requested damages from the Laotian Government, but no one would admit authorizing the spraying. One report claimed a mold killed the poppies. An American official said it might have been frost.

"Who was responsible for this?" I asked General Vang Pao.

"Your ambassador sat where you are," Vang Pao replied. "He told me the Americans didn't do it. I couldn't look into his heart. I didn't see the planes with my own eyes.

"All I know is the Hmong blame me. For years I have been telling them to stop growing opium because the Americans don't want them to grow it. Opium is America's number-one enemy, the Communists, number two. My passion is that my people should be free of opium, but I did not do this."

Roads May Bring an Alternative

"Build us roads," a Teu La farmer told me, "and we will sell rice or pigs. We realize the dangers of opium, but now it is our only source of money."

Teu La may never have a road, but both the Royal Lao Government, with help from the United States, and the Pathet Lao are constructing a network of them elsewhere that could revolutionize the nation's economy. Even the Ho Chi Minh Trail could become an artery to new markets.

One highway program in the area, however, may serve other than economic purposes. In the colonial era, Westerners drew national boundaries in Southeast Asia with

Rice away! Workhorse C-46 drops its payload on a wartime run (**above**). Continental Air Services now has taken over Air America deliveries of food, tools, and medicines to refugees in inaccessible areas. A refugee woman (**far right**) grins her appreciation for mats, picks, and cooking pans.

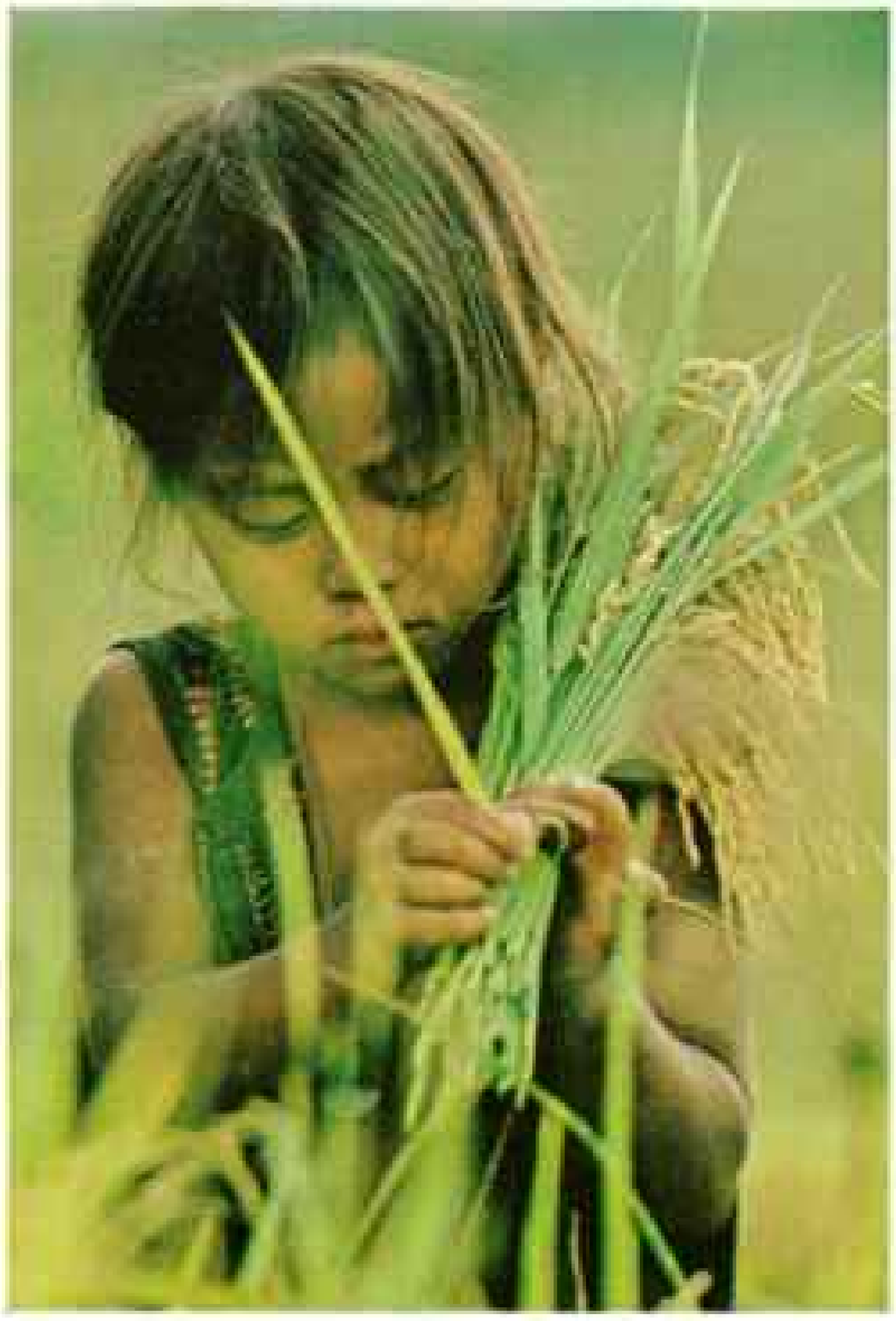
New roads and a bridge thread the jungle ghetto of a refugee village (**right**). Laos hopes to end airdropping in a year with a major road-building program.

Helping find new paths, Lyteck Lynhiavu (**above**) epitomizes the Hmong of the future. Here he inspects beef cattle on his ranch near Vientiane.

One of a growing number of educated young Hmong, Lyteck puts survival first. "We know what fighting means—that the Hmong are the ones to die." Trained in France, he is an official in the Ministry of the Interior and has assisted in government negotiations with the Pathet Lao.

Lyteck advocates the integration of all ethnic groups, the Hmong included, into one nation. "We must be proud of being Hmong, but we must learn to be proud of being Laotians," he says.

Turning silver into plowshares, members of a 60-family cooperative in Ban Phon Ngam pose in front of one of the two tractors they bought with the women's jewelry. Some 1,000 Hmong families benefit from the $5,000,000 U. S. AID Nam Tan irrigation project, growing two crops of rice annually (**below**). They have adapted well to lowland life, built more substantial homes, and vastly improved their standard of living.



little regard for local realities. Many of the boundaries are ignored. But when the Chinese built a 250-mile road from the vicinity of Dien Bien Phu to the Mekong River, it became a very effective border, one that neatly amputates 15,000 square miles from northern Laos. Pathet Lao troops, supported by hundreds of Chinese antiaircraft guns that can reach to 68,000 feet, defend this road.

Despite the flurry of highway construction, Laos still has more airstrips than miles of paved road. A wartime legacy, when planes transported and supplied the irregulars in the jungles, these strips—often little more than slashes of raw earth on mountainsides—provide the only access to many villages.

Gary Alex, an agricultural advisor from the U. S. Agency for International Development who was working in remote northern mountains reachable only by helicopter, invited Pop Buell and me to join him on one trip.

Beside the landing clearing stood a structure new to Hmong villages—a school. Until 1960 the Laotian Government had not provided schools for the Hmong, and even threatened to expel a missionary group that did.

As we landed, not a single pupil troubled to glance at the helicopter. None of them had ever seen an automobile, but the war had bred familiarity with aircraft. Often they spell the difference between life and death.

Plants Blamed for Deaths of Infants

I witnessed one such drama. Gary Alex received a cryptic radio message from an assistant in the village of Phu Pha Daeng. He needed help—immediately. In that particular village Gary maintains a nursery where he

experiments with plants aimed at replacing opium as the Hmong's sole cash crop. Danger apparently threatened his collection of ginseng, cardamom, coffee, and mushrooms.

Pop Buell's years in Laos have left him with an acute sensitivity to his surroundings. Soon after we landed, even before the helicopter had angled away into the distance, he said, "Gary, you've got trouble, all right. I don't know what it is, but you've got trouble."

From a nearby house we could hear the muffled cadence of funeral drums. Inside we found a young mother standing beside the body of her dead baby. Tenderly she brushed away flies from the child as she sobbed a chant of farewell—over and over and over. The father boiled opium on an open fire for men of the clan who lay smoking, clustered around three oil lamps.

The baby, we learned, had been the third to die in three days. As we spoke to Gary's assistant, who had come to meet the helicopter, a group of worried villagers approached us bearing two more infants obviously close to death. Speaking into the walkie-talkie he carries, Gary recalled the chopper. Within minutes it returned and settled long enough to take the sick babies aboard.

At the hospital 15 miles away, doctors diagnosed their ailment as dengue fever—an acute infectious disease transmitted by mosquitoes. Both infants recovered. But back in Phu Pha Daeng we had, indeed, encountered trouble, brought on by the diagnosis of the spirit doctor called in to treat the babies.

Gary's assistant had placed some 200 potted plants from their precious nursery stock in the protective shade of a huge rock outcrop.

The spirit doctor had declared that the presence of these plants had offended the spirit inhabiting the rock. Babies would continue to die until the plants had been removed.

So the Hmong villagers had removed them, placating the spirit (page 96), but the incident set back Gary's program to replace the poppy crop. Gary knew replacing opium would be difficult, but hadn't suspected that even the spirits would oppose him.

Despite their prolonged ordeal, the Hmong lot is improving, largely because of friends like Doctors Charles (Jigs) and Patricia McCreedy Weldon, an AID husband-and-wife team dedicated to preventing malnutrition and disease.

"Each time the war forced a move," Pat told me, "as many as 10 percent of the people died. The majority were already weakened by diseases, and the exertion killed them.

"Up in their mountains malaria was almost unknown. Now it infects 60 to 80 percent of the refugees. None of the 116 Hmong villages where we work is free of it. Think of this just in terms of nutrition. One malarial chill consumes 5,000 calories—that's a lot of rice."

Hmong Have No Time for Dreams

The U. S. AID program presently supports some 370,000 refugees in Laos, a third of them Hmong. But with the cease-fire, no one can be sure how long AID will be permitted to operate in Laos.

Lyteck Lynhiavu, a young Hmong leader, assured me, "We won't starve even if all the Americans leave." He works tirelessly to see to it (page 107). Weekdays, he is an official in the Ministry of the Interior; on weekends he helps refugees clear and develop 20,000 acres of jungle. Already their mulberry trees feed Japanese silkworms, and soon their beef herd will help feed Vientiane.

I asked Lyteck why virtually no Hmong become artists. "The Hmong dream only at night," he replied. "An artist must dream all day, and we don't have time."

And the Hmong don't have much space either. As I left Laos, Pop Buell told me, "When there was trouble in the old days the Hmong used to say, 'There's always another mountain.' But not anymore."

"What's the answer?" I asked.

"Bill, if anyone offers you a solution out here and he's speaking English, pay no attention. He probably doesn't even know the problem." □

Fire of learning glinting from their eyes, Hmong boys concentrate on an arithmetic lesson in a crudely hewn schoolroom. By learning to read and write Lao, Hmong youth can aid their people and their country as it moves from being only a cluster of minorities to maturity as a cohesive nation.

Future plans unite past enemies as a government carpenter and a Pathet Lao officer study a schoolhouse blueprint drawn by U. S. AID. When the Pathet Lao overran the village of Pak Hao, the project came to a halt, but the local chief prodded the government to send back the carpenter. Such cooperation, here photographed for the first time, may herald better times as killing gives way to learning and building.

Newfoundland Trusts in the Sea

By GARY JENNINGS

Photographs by
SAM ABELL

Soul and muscle of their island, fishermen haul a net stretched between pitching dories. Home port for these men is Canada's eastern outpost—a rugged bulwark thrust into the North Atlantic.

OFF THE TIP of Newfoundland's Cape St. Mary's looms a vast half-dome of rock that has been a nesting ground of gannets since prehistoric times. The birds cluster and cling to every least ledge and cranny. They would be much less crowded if some of them would spread off the dome and onto the crags of the cliffs behind; the dome is separated from those cliffs by a crevice only a few yards wide. But that crevice means that the dome is of the sea. The cliffs are of the land, and the gannets will have nothing to do with the land.

Through all its history the island of Newfoundland and its people have been just like that. It is separated from the rest of North America by no more than the 11-mile-wide Strait of Belle Isle, but that is enough to make Newfoundland "of the sea," disdainful of the mainland and its landlubbers. In these parts, any lazy good-for-nothing is called an "angishore" (hangashore)—a man too spineless to leave the land and dare the sea.

The "Newfies" even tend to turn their backs on the 43,359 square land miles of their own island, about the area of Tennessee. Comparatively few settlements dot the "barrens" of the interior. Of the total population of 540,000 (smaller than Nashville), 90 percent live along the 6,000 miles of landwash—the filigree shoreline of bays, coves, inlets, and islets—their houses and themselves looking forever out to sea (map, pages 116-17).

Fisherman's Day Begins Before the Sun's

In the little outport of Salvage, the houses all face the sea, but they were dark and silent when I trudged down to the landwash in the slowly yawning oyster light of an August dawn. I sat down on a warped and weathered dock while, one by one, doors opened in awakening houses. Out came the fishermen of Salvage, bulky in oilskins, heavy sweaters, and thigh-high boots, carrying lunch pails and teakettles, off to their day's work.

Down to the dock where I waited came the Handcock brothers, Harold and Edwin, the latter's grown son Frank, and their extra hand, Job Feltham. They said, "Good marnin', bit chilly, isn't it?"

Then, all of us too sleepy to say more, in silence we boarded the *Nettie & Joyce* and cast off. The diesel chugged softly, and our boat joined the dim silhouettes of three or four others slowly ghosting out into the morning-misted cove.

The *Nettie & Joyce*—"'er's named for two of our little maids," meaning daughters—is a 45-footer of 12-foot beam, entirely hand-built by the Handcocks themselves. It has a small cabin forward, containing bunks and midget stove for boiling the kettle, a deep open well amidships, and the wheelhouse aft. The boat is of the type still called a long-liner, from a time when the crews of such boats fished with lines and hooks. The *Nettie & Joyce*, like most long-liners nowadays, uses gill nets, set in deep water one day and picked up the next.

Nets Bring a Bounty From 160 Fathoms

Once outside the Salvage cove, Harold opened the throttle and we thrummed past the three Shag Islands and across the waters of Bonavista Bay. Frank, Job, Ed, and I snugged down in the cabin for a "cup o' switchel," as they call strong tea, and the fishermen talked shyly in the presence of an outsider from upalong. (An "outsider" is any off-islander, including even other Canadians. "Upalong" is anywhere on the continent west of Newfoundland.)

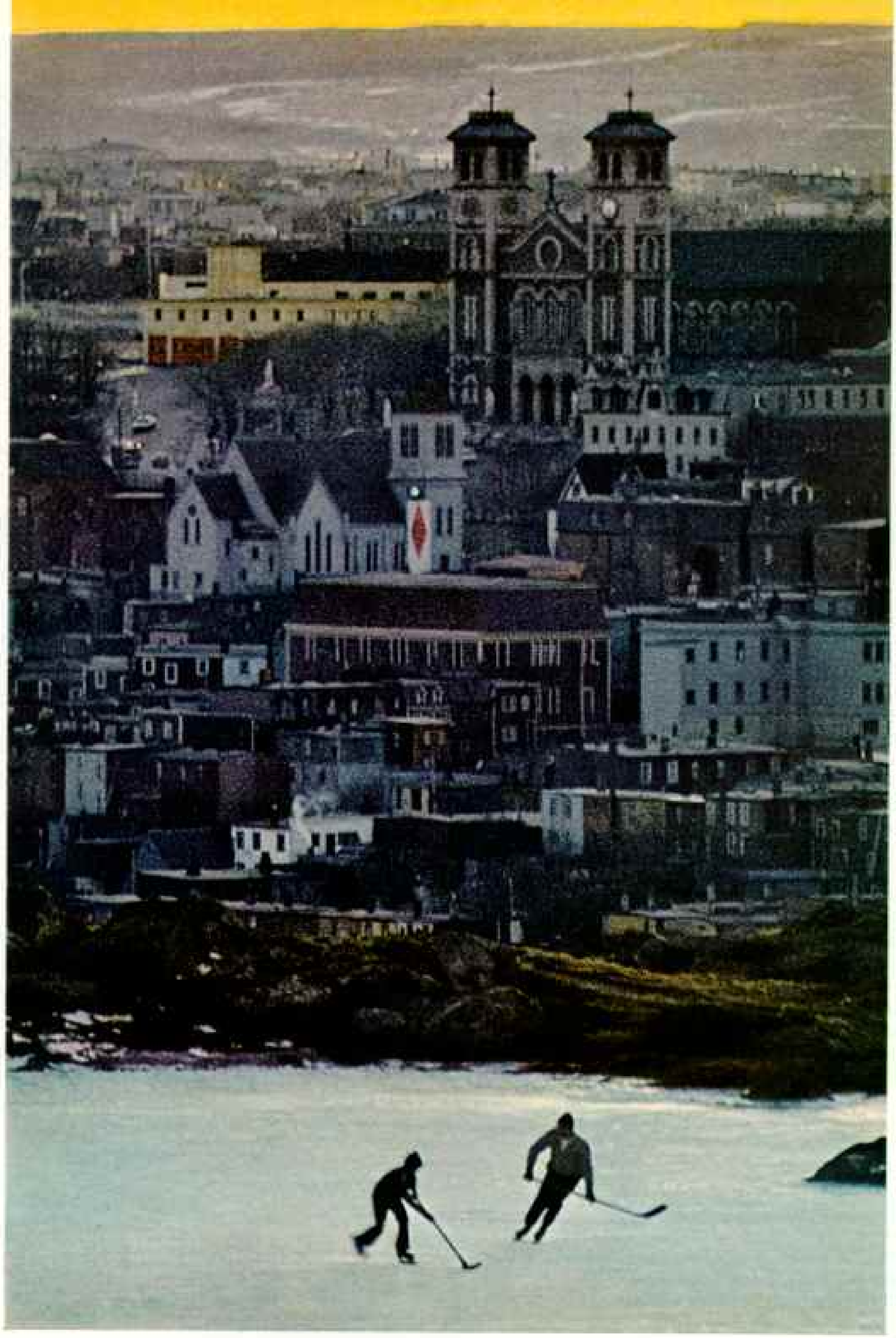
An hour out from Salvage we were on the netting ground. It was incredible to an angishore like me that in all this featureless North Atlantic Harold had steered us straight to a pink plastic float no bigger than a medicine ball. Job leaned out with a boathook and lifted the float's line inboard across a free-spinning roller—an old hot-water boiler mounted horizontally on the gunwale.

The line coming across the roller was passed across the deck to Frank, who looped it around the "gurdy." This is a winch ingeniously homemade from the rear axle and wheels scavenged from an old car. Hydraulically powered by hoses from the boat's engine, it is strong enough, say the fishermen, "to haul th' bottom right out o' th' ocean."

A gurdy has to be powerful. Just one fleet of gill nets full of fish can weigh more than a ton. The nets are set in fleets of seven or more tied in series. The Handcocks have 150 nets; each one costs $50 and lasts only a single six-month season.

Frank threw a gear lever, the gurdy gripped the line, and, after a long quarter of an hour, the first net came up from 160 fathoms, burdened with fish. They were dragged, most of them alive and flipping, around the gurdy and into the gloved hands of Frank and Harold.

The men worked quickly, disengaging the



JOUSTING ON THE ICE, hockey rivals play beneath the evening sky of St. John's. Newfoundland's capital embraces a bustling harbor, extensive business district, and a university, making it the island's cultural and commercial center as well. Young people, escaping the insular life of far-flung villages, have swelled the population to 130,000.

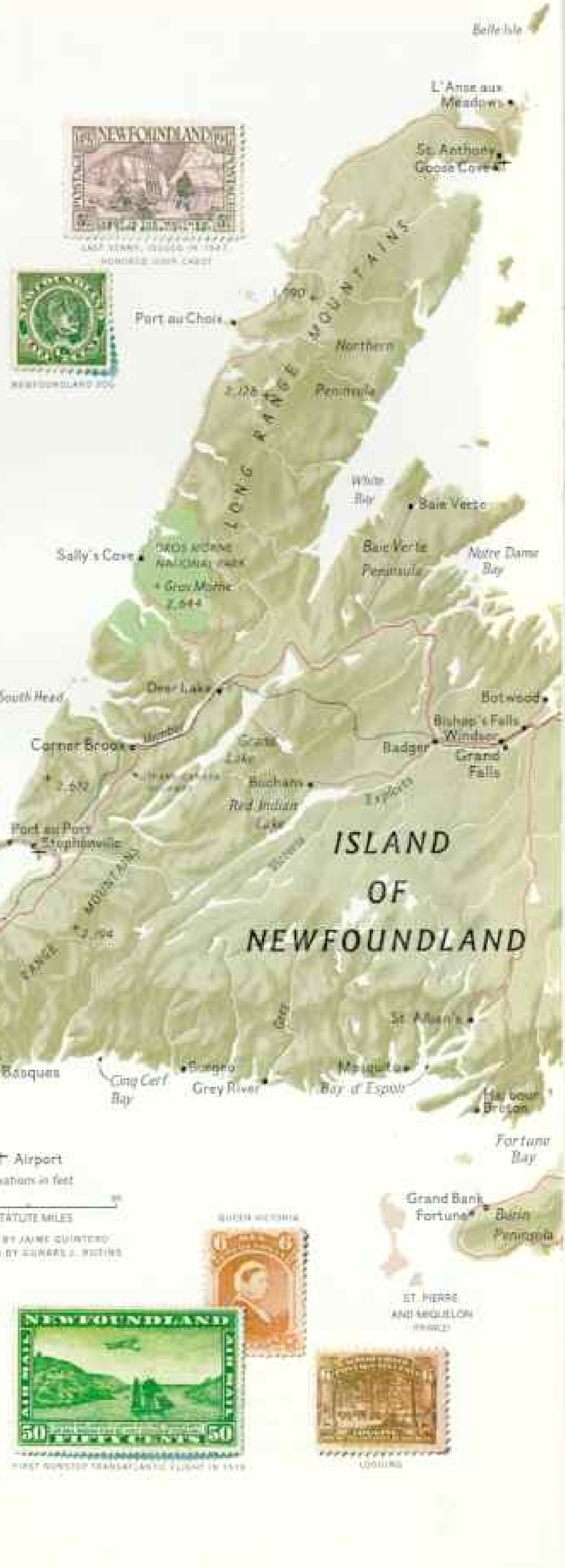
Gateway to Canada

LACED WITH BAYS AND COVES, often washed by fog, Newfoundland lies between the Gulf of St. Lawrence and the growling North Atlantic. Here the sun first touches Canadian soil and here Europeans—Vikings in rakish longboats—first settled on Canada's shores.

John Cabot rediscovered Newfoundland in 1497, and Sir Humphrey Gilbert claimed the entire island for England 86 years later. Hordes of fishermen followed and settled her granite coasts. Even today most islanders cling to the seaside in isolated villages called outports.

But Newfoundland works hard to overcome the remoteness of her people. Television is beamed to distant homes, and newly paved roads thread the forested interior, realm of the black bear and caribou, salmon and trout.

Newfoundland, joining with mainland Labrador, became Canada's youngest province in 1949. Until that time she issued her own stamps, which commemorated her history, resources, and rulers.



fish from the net, tossing them into the deck well, or "devil's kitchen," then passing the net on behind the wheelhouse. There, Ed and Job just as quickly untangled its seemingly hopeless snarl and folded it on the afterdeck as neatly as packing a parachute, ready to be payed out at a new location. All this was going on, mind you, while the boat wallowed and pitched to the heavy sea swell.

The fish were mostly four to ten pounds each, but some ran up to thirty—cod, turbot, and flounder, with occasional lovely colored but ugly rosefish. All these went into the hold. The only things thrown overside were the frequent stingrays, whip-tailed sea rats, blobs of jellyfish, and hundreds of crabs.

I backed away from the net in horrified surprise when there came flailing aboard a black-and-buff creature as long as myself, gnashing fearsome teeth. It was built like a moray eel and spotted like a leopard.

"A wolffish," grinned Harold, and he nonchalantly toppled it into the hold. "Some people call it an ocean catfish."

"You're keeping that monster?" I asked. He was—and later I found out the reason. In some parts of the world it finds a market as frozen fish sticks.

Late in the afternoon, when the fifth fleet of nets had been stripped of its catch and set out anew, the Handcocks called it a day. The four men had hauled in and payed out again two long miles of net, and had manhandled about two and a half tons of slippery fish. Harold swung the *Nettie & Joyce* around and pointed her for home.

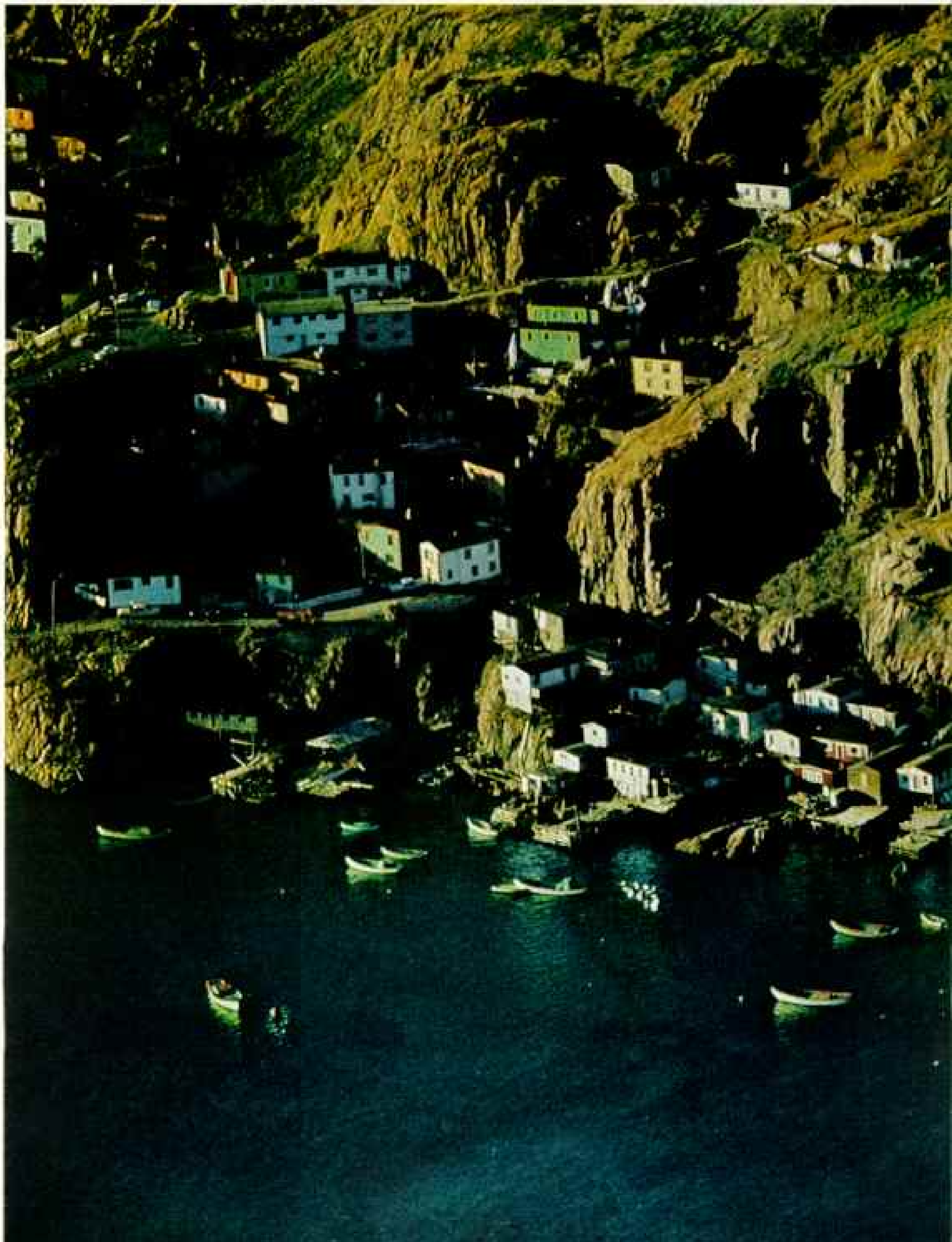
Glaciers Helped Shape the Island's Destiny

Newfoundland's ocean orientation was determined in large part by the Ice Age. When glaciers crunched across the big island, they scoured it down to bedrock and swept much of its topsoil and boulders 200 to 300 miles offshore to help form the great undersea shelf, south and east of Newfoundland, that is known today as the Grand Banks. This shelf became the favored home ground of myriad sea creatures of many kinds.

After John Cabot reached Newfoundland in 1497, he sailed back to Europe with a report that "the sea there is swarming with fish, which can be taken not only with the net, but in baskets let down with a stone." European fishing fleets flocked to this treasure.

But there is some evidence that Basque fishermen were taking cod here even before

ANCHORED IN ROCK, the wooden houses of a fishing community cling to the Battery, a sharp-toothed headland at the mouth of St. John's Harbour. Actually a part of the capital, the settlement largely escapes the hustle of city life. Fishermen set out each spring and summer morning in



search of fat-flanked cod—the fish that fed Catholic Europe for centuries. It still nets a good price: as much as 13 cents a pound.

Scorning the life of an "angishore" (hangashore), wool-sweatered fishermen dare the wave-rocked bay and coastal waters in dories, skiffs, and four- and five-man long-liners, hand-jigging for cod or hauling gill and trap nets from many fathoms down. Heavy trawlers with crews of 10 to 15 scour the stormy waters of the Grand Banks.

"The fish are runnin' every day," as one old hand puts it, "and so are we."

STINGING ICE AND WINTER'S GLARE assault a hooded figure drawing water from a snow-covered well on the Northern Peninsula (**above**). Even the simplest task can be trying in the bitter cold. Crackling in the wind, the bright pennants of Teresa Bromley's laundry freeze stiff almost the instant she hangs them out (**opposite**).

Cabot. The Vikings fished off Newfoundland even earlier, about A.D. 1000, from settlements at the northern tip. And recent archeological finds on the west coast reveal that the earliest known of all Newfoundland's fishermen, some 1,800 years before Christ, were the Indians now dubbed Maritime Archaic.

Ninety-five percent of the province's population are descendants of British fishermen and seafarers, many from the maritime shires of southwest England. Others trace ancestry back to France or the Channel Islands. Among this largely fair-haired posterity of Devon or Jersey, a long-forgotten Eskimo or Indian gene will occasionally show itself in olive

CARDY COCHRAN

skin and almond eyes, especially along the coast of Labrador.

Although the island's mountains, forests, bogs, and barrens have disclosed numerous animal, vegetable, and mineral treasures, the surrounding sea continues to be the most dependable resource. So, while the province's modern 10,000-student Memorial University teaches every subject from medicine to the arts, it emphasizes studies related to the sea. A College of Fisheries offers a curriculum that ranges from net mending to a three-year course in marine electronics—all tuition free for Newfoundlanders.

The island's fisheries and fishermen are divided into two broad categories: inshore and offshore. The offshore grounds are those in the open ocean more than a day's voyage away—on the Grand Banks or off Labrador—which are worked by heavy craft with large crews that stay out for a week or two at a time. The typical offshore craft used to be the sailing schooner. Now it is the diesel trawler dragging nets of complex design and vast extent; some of these open out underwater to the size of blimps and gulp up thousands of fish in one two-hour drag.

The inshore fishing grounds are coastal and bay waters worked in one-day sorties: out at dawn, in at sundown. The long-liner is the

most efficient fisher of these waters, but thousands of Newfoundlanders still go out each sunrise in little open boats. From these cockleshells they may lay nets, or set out lobster pots, or simply jig with a handline and heavy metal lure for the young tomcod that feed in sheltered waters. A skilled jigger can easily take a couple of hundred fish a day.

A motor rather than oars now powers most of the small boats. Though the net is often store-bought, the craft itself may still be hand-built by its owner, who sets out hand-made lobster pots of wood. Even the anchor may be a home-made "killick," a wooden-fluked cage enclosing a heavy boulder.

I found the small-boat fishermen most numerous in the outports along the south coast, where fish plants and roads are scarce. (An "outport," by the way, is any settlement "out" of St. John's, the original port.) Unlike the Handcocks of Salvage, who have a handy local plant to buy their catch, many south-coast men have to "make" fish—that is, preserve their own. Since the cod lends itself best to this process, some of the fishermen here simply throw away other kinds of fish, including such valuable edibles as halibut, mackerel, and flounder, perhaps three-quarters of their catch.

I watched the men make fish precisely as their ten-times-great-grandfathers had, cleaning each one by hand, throwing the liver into a malodorous cask to rot down into cod-liver oil. Then the womenfolk took over. The fish were washed, salted, and put in kegs to pickle in the shoreside "stage," or shed, and spread out on "flakes" to dry in the sun (page 131). Finally they would be weighed and held in the quintals (112-pound lots) of Cabot's time to await the arrival of the fish company's collection boat to buy them.

Outports Preserve Linguistic Treasures

There are 800 outports along the landwash of Newfoundland, with populations ranging down to near zero, many so isolated that time has overlooked them. In these outports I found that little has changed—the labors, speech, traditions—since they were settled three and four hundred years ago.

Many Newfies still give their words a distinctive twist that recalls the speech of England's rural shires back to Elizabethan times. Once, when I asked at Jean de Baie how to get to Rushoon, I heard, "Ah, then, me bye, fra yoi [from here] I'lows ye go be way of. . . ." I soon got used to being addressed as "me bye," meaning boy (here "boy" means buoy) and to understanding topsy-turvy directions: the Grand Banks are "up south," Labrador is "down north."

Along parts of the eastern coast the dialect is flavored with a brogue that Irish immigrants brought over in the 19th century. I asked at Trepassey how to get to Patrick's Cove: "Sure 'tis th' aisiest thing in the wurrold. . . ." And in the west, around Port au Port, I heard in the dialect a trace of pidgin French, a relic of Acadian French from Nova Scotia. In the process many Anglicized their names from such as Benoit, Chaissons, and Aucoin to Bennet, Jesso, and O'Quinn.

Where the Turr and the Tickle-ace Play

The place-names bestowed in Newfoundland by foreign sailors, and even some of the English ones, have been slurred and Newfieized. Baie d'Espoir—"bay of hope"—has inevitably become Bay Despair, Cinq Cerf (five stags) is often Sank Surf, Barren Head has become Bareneed.

Many common thing-names, too, have been transmogrified. It took me awhile to realize that the seabirds here called stearin, turr, and tickle-ace are the birds known elsewhere as tern, murre, and kittiwake.

Like the outports, Newfoundland's biggest city sits by the ocean—on the Avalon Peninsula, the southeastern corner of the island. This is St. John's, capital of the province (which includes Labrador on the mainland, more than twice as big as the island). St. John's counts 130,000 people in its metropolitan area, nearly a fourth of Newfoundland's population.

It is a historic city; its first permanent residence was erected in 1528, during the reign of Henry VIII. In 1583 Sir Humphrey Gilbert landed here to claim the entire island for Queen Elizabeth I, as England's first overseas colony.

In its early days, St. John's was governed each year by a different Fishing Admiral—the captain of the first ship to arrive at the start of the fishing season. In more recent times, and for good reason—St. John's being the farthest-east city of North America, just 1,600 nautical miles from Ireland—Marconi received the first transatlantic radio signal here in 1901. In 1919 British aviators John Alcock and Arthur Brown launched their plane from here to Ireland on the

first nonstop flight across the Atlantic.

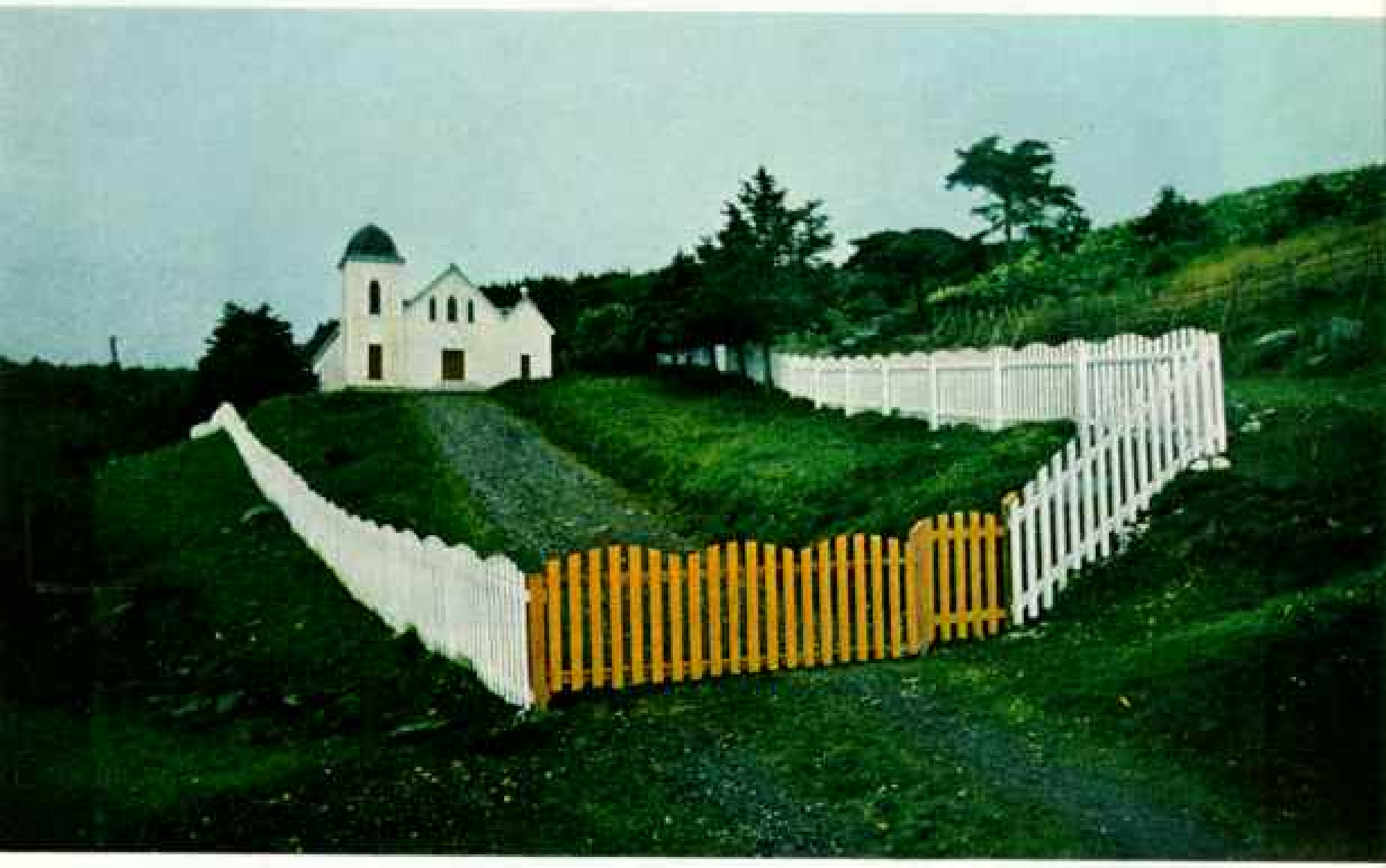
While St. John's "manufactures nothing but paper work," as a government official there confided to me, the island's second largest city in fact manufactures the paper to do it with. Until 1923 Corner Brook was just another outport on the west coast, with some 300 inhabitants; then came an embryonic paper mill. Today Corner Brook is the island's most modern and attractive city, with 30,000 people. The Bowaters Newfoundland Limited mill, one of the world's biggest, employs 3,000 people in the plant and on the six million acres of forest to which it has logging rights. It harvests 500,000 cords of spruce and fir a year; fed into the mill, they come out as 400,000 tons of newsprint, destined mostly for the United States.

Thirty miles northeast of Corner Brook I came to Deer Lake, a favorite jumping-off place for sportsmen. From here guides and bush planes take them into the wild interior in pursuit of a variety of wildlife.

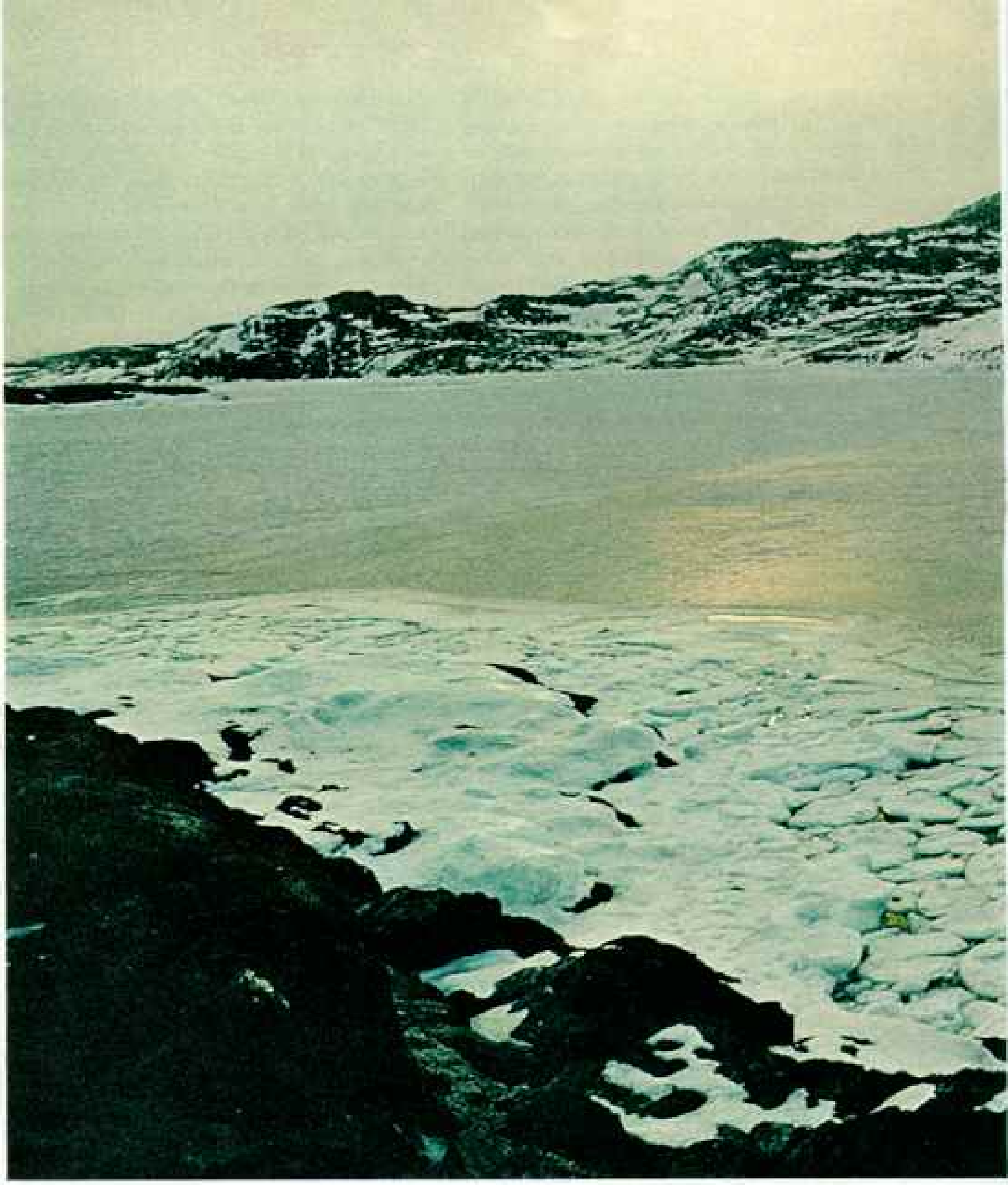
The island has no snakes, skunks, or poison ivy, and its wolves have long been exterminated. What it does have is trophy game —moose, caribou, black bear—upland game like the ruffed grouse and ptarmigan, and many species of ducks and geese. Trappers take beaver, otter, muskrat, fox, lynx, and rabbit.

For 33 feet back from each bank of every stream in Newfoundland, and for 33 feet around every lake and pond, the land is by law a public right-of-way. The waters thus hospitably made accessible—and they are liberally pooled over the island's surface—contain brook, brown, and rainbow trout, and salmon, both landlocked and migratory.

(Continued on page 128)



WHITEWASHED HAVEN in the dark of an approaching storm, the Roman Catholic church in tiny Patrick's Cove peers toward the sea. Many secluded hamlets, whose populations often branch from single family trees, bear men's names. Jerrys Nose peeks from a west-coast shore and Clarke's Head overlooks Gander Bay. According to local legend, Joe Batt's Arm won its name from an English sailor who jumped ship here in the 18th century and decided to settle near the spot where he broke an arm.



ENGULFED IN A TRACKLESS LANDSCAPE, hunters strain against their boat as they manhandle it homeward across a frozen sea. Hefting muzzle-loading guns of their grandfathers' time, these hunters spent the day seeking fish-eating murres among broken patches of ice.

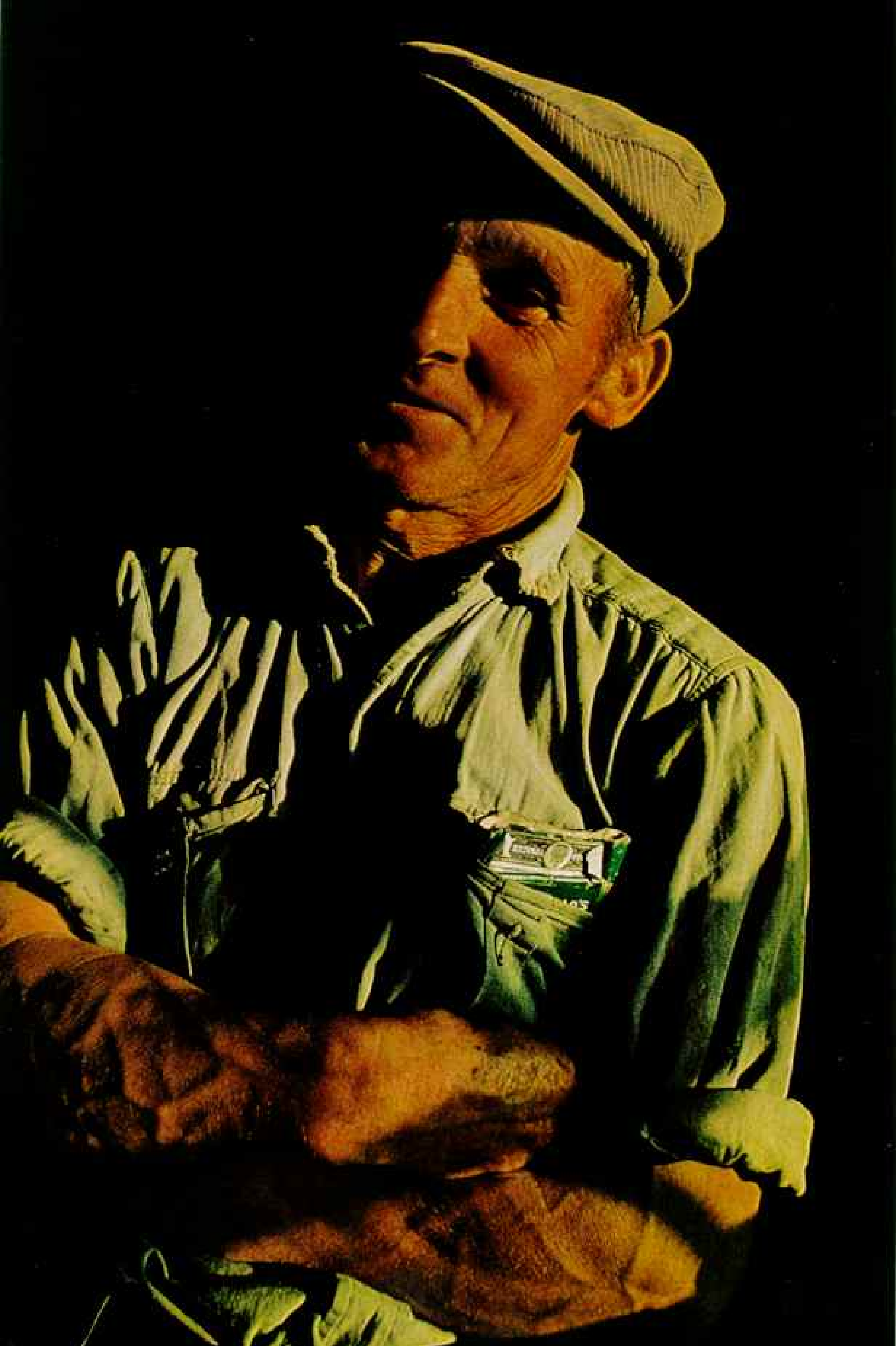
In a final rite of Newfoundland's hunting heritage, sealers wrestle the quarter-ton carcass of a hooded seal (**left**)—the last one killed on the 1971 hunt—to their mother ship. Stung by growing charges of brutality and endangerment of sea mammals, the Canadian Government has banned commercial whaling and severely limited sealing.

In earlier days the rumbling breakup of harbor ice sent great sealing fleets scurrying north. Their crews went out on shifting floes to club and skin whitecoat pups by the hundreds of thousands. Not only public opinion opposed them: Sealers ran the risk of drowning in sudden gales or of being stranded; they earned only a few hundred dollars for a season's labor.

"MY FATHER had his farm here before he died, and so did grandfather; I couldna' leave them."

His arms muscled by toil on land and sea, Francis Power reminisces in the afternoon light of Brigus South with daughter Bernadette. Each day he puts out before dawn to empty his nets, returning by midday with ample time for the hens and vegetable garden. "And sure it's hard enough work," he agrees, "but she does all right for me."

Shy and polite around foreigners from "upalong"—the mainland—the children of Newfoundland clown and laugh among themselves. They often seem community property, bouncing from kitchen to kitchen or piling into a neighbor's skiff for a jaunt to the fishing grounds.



Some animals that weren't native to Newfoundland have been introduced, not so much for sport as to provide more protein in the islanders' diet. Caribou were always on the island—there are some 20,000 today—but moose were not, until several of them were imported around the turn of the century. From those few animals, all of Newfoundland's moose herds are descended. Today there are forty to fifty thousand moose on the island.

Another variety of big game, delight of deep-sea sportsmen, is Newfoundland's hard-fighting bluefin tuna (the current record: 879 pounds), found in the northern and eastern coastal waters. As many as six hundred of them are caught annually, mainly by U. S. fishermen. The numerous charter boats, getting $125 a day, enjoy a thriving business in the August-September season.

I spent a day pretending to be a rich sportsman on Sid Thistle's elegantly appointed boat, *Zip II*. The season before, Sid's clients had boated 16 fish, of some 600 pounds apiece, but this time out we had not so much as a strike. During our day on the waters of Notre Dame Bay, however, I learned some odd facts about the sport.

For example, there was the baitfish Sid impaled on the murderous-looking hook—a

CRYSTAL ICING of a "silver thaw" glitters on a bush in Harbour Grace. The freezing rain can buckle trees and power lines beneath its frosty weight, but heralds warmer days to come.

Spring arrives in Newfoundland in April or May, banishing memories of winter snows with bursts of violets and crocuses and promises of summer days that linger till ten at night.

mullet that he had imported all the way from Florida at a cost of $2.25. It seemed to me an extravagance, but Sid explained. Tuna like to follow the roiling wake of a boat, but a bait-fish like mackerel soon shreds in that turbulence. The Florida mullet is tougher and can be trolled all day without falling apart.

The sea's biggest game, of course, is the whale, and until Canada last year banned whaling, some 200 Newfoundlanders made a living by hunting the great mammals. Before the ban began, I visited the Arctic Fisheries Products Company at Dildo and helped oil-skinned workers winch two just-caught fin-back whales up onto the bay-side ramp. A male and a female, they were each barely a foot or so over the legal minimum of 50 feet and weighed about 40 tons apiece.

Whale Disappears in Half an Hour

The men clambered all over the two shining black leviathans, wielding flensing lances. Quivering white slabs of blubber, each as big as six mattresses, were hoisted into the two-story-high cooker that rendered them into oil. Then the flensers hacked away the whales' red meat, and a tractor shoved the bed-size chunks across the ramp and into the plant.

Though the whales had been split open at sea so the wash of the water would cool them on the way into port, the meat still steamed on the factory floor. Other workers cut it into manageable slices, then minced it to stew-meat size, to be frozen into 50-pound blocks. The whales' great heads and skeletons were fed into power saws, and eventually would be ground into meal. Half an hour after a whale was dragged onto the flensing ramp, it had totally disappeared. Here at Dildo, 225 whales—the maximum allowed by law—used to disappear each year.

And for what? Whalebone is no longer used for corsets or for anything else. There is no longer any great demand for whale oil; it is now used chiefly to lubricate delicate machinery. The sole other product of the whale is its meat—the Dildo plant processed six to seven million pounds a year—and almost every ounce was sold in Japan, where it has been human fare for centuries.

A few "arctic steaks" were cut off each cetacean and sold locally for about 25 cents apiece. The best eating, manager Bill Barrett told me, was the steak from an unborn calf. "It tastes like milk-fed veal. We find a calf inside a female now and again—had a 16-footer not long ago." But now whale ramps are empty, and whalers seek other work.

With all its bountiful provender of game and fish, Newfoundland ought to have the best food in the world. But many a fisher family won't eat a crab—"Us've untangled too many thousand of the hateful leggy things from our nets!" Until recent decades most lobsters went to the pig troughs rather than onto dining tables. And it is just in the past five years that government-sponsored projects have taught fishermen in a few outports how to trawl for shrimp and dredge for scallops.

An example of the food a traveler encounters in any but the best big-city restaurant is the eternal and infernal "specialty of the day" at every roadside diner—the hot turkey sandwich. I judge it to be composed of pelican, flannel, and warm mucilage.

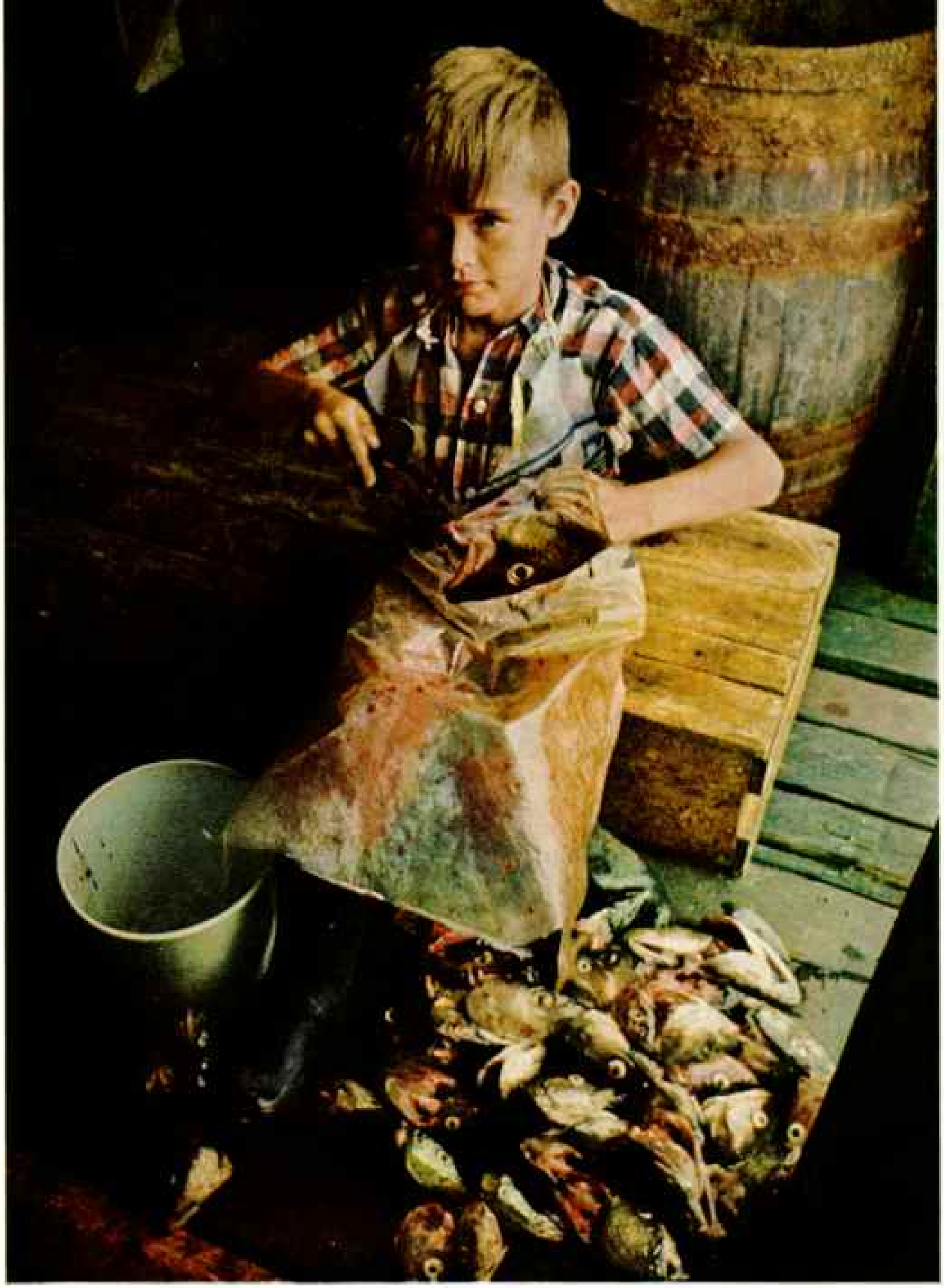
Home cooking is, happily, better than the restaurant variety. In the outport home of Mr. and Mrs. Marcus Moss, where I lived for a while, we dined sumptuously on native dishes like "flipper pie" (made of seal meat), salmon smoked over blackberry twigs, moose soup, "rounders" (baby cod, salted and dried whole like kippers, and boiled for breakfast), massive bannocks of home-baked bread, and the uniquely Newfie "fish and brewis." The fish is, of course, cod. The brewis is sailor's hardtack softened in hot water and sauced with the drippings and crisp "scrunchins" of fried salt pork.

Island Delicacy: Fried Cod Tongues

Another island dish is cod tongues. Until recently nobody marketed these commercially, except boys who lurked at the fish plants to snatch the cod heads before they went down the scupper holes with the offal. They cut out the tongues and sold them for a few cents apiece to housewives. The tongues, sliced and fried, resemble scallops, but have a delicate flavor all their own. Now they can be bought in the island's supermarkets.

A tasty morsel from the land is the blueberry, found growing wild in the island's bogs. This is one of the few agricultural products that the province exports to the outside world. The berries ripen in August, and whole families sally forth with buckets to pick them. What they don't keep for their own use they sell to a freezing plant, which packs them for export. Even thus haphazardly harvested and marketed, the island's blueberry crop is

(Continued on page 134)



"COD TONGUES, sor, best ye ever ate!" Nimble-fingered Craig Chafe slits the fleshy morsels from discarded fish heads, earning as much as 60 cents a pound for the delicacy. Taken straight from dockside and fried in local butter, the tongues have a taste resembling scallops.

Despite abundant game and seafood, outport fare can become tedious in winter, when salt beef and fish predominate. But canned vegetables, fresh-baked bread, and patridgeberry jam add variety and zest.

TUCKING FISH IN FOR THE NIGHT, George Leaman spreads a cover over his "made" cod to protect their split and salted sides from rain and fog. Pole-and-brush drying "flakes" like this once carpeted the shores of Petty Harbour, but most fish are now shipped fresh to mainland markets. Change comes hard to George, who shakes his head as he eyes the harbor filled with fewer boats than yesteryear. "The young fellers, now, they just won't follow ye out anymore."

DANCING COMPANIONS with ink-splashed wings, a pair of gannets (**below**) stretch toward their nesting rock in a bird sanctuary on Cape St. Mary's. Rising 150 feet from the ocean surf, the gannets' home is [illegible] off from the main island by a thin channel the birds seldom cross, for they would rather crowd their rock than dally with the land.

Takeoff is simple: a short waddle to a ledge and then a spread of feathery pinions to catch a helpful updraft. Once back, however, finding a parking space can be tricky, with a gannet to each square yard of rock (**right**). As latecomers settle in, the low squabbling cries of displaced birds blend to a querulous mutter.

More than 200 species of birds are found in Newfoundland. Razor-billed auks, kittiwakes, and bright-plumed puffins flock on the coast, while ptarmigans, ospreys, and geese frequent the interior. Stern-eyed bald eagles haunt the wide island skies.

WARM TONES of Brahms and Beethoven fill an empty church as a young violinist practices for the annual Eastport Summer Festival. Drawing artists and craftsmen from all over Newfoundland, the festival provides a focus for growing talents and gives audiences a taste of mainland and native arts.

Outporters are used to creating their own entertainments, gathering on winter nights to mend nets, dance, or nurse a keg of duty-free rum smuggled from the French-owned islands of St. Pierre and Miquelon.

worth more than half a million dollars a year.

The traveler in Newfoundland is likely to be dismayed by the high cost of everything, including those villainous hot turkey sandwiches. The reason is that the province has to import 80 percent of all its commodities. This gives Newfoundland the dubious distinction of having the highest cost of living in all Canada, while having at the same time the highest unemployment rate—a crippling 12 percent—and a per capita income of only $2,500, two-thirds the national average.

But the Newfoundlanders have been enduring their hardscrabble life these four hundred years. As an indication of what life is like: In many an outport I found one establishment emblazoned "General Store and Entertainments." If the community was a fairly prosperous one, the entertainments consisted of a pool table and a jukebox; if not, they consisted of a couple of pinball machines.

In only two outports did I find a movie house, each of them showing a ten-year-old movie on a screen of wrinkled canvas silvered with blotchy radiator paint. Television—even the poorest homes now have it—must have come as a godsend to Newfoundland. (Programs are broadcast from St. John's, Grand Falls, Corner Brook.) For more riotous social life, an outport may stage an occasional net-knitting contest, while fairs may feature competitions in fish cleaning and filleting.

Rumrunners Salted Down Their Cargo

The fishermen of the south coast do have one interestingly different diversion. They smuggle home the occasional keg of duty-free rum or some perfume or cigarettes from the French island of St. Pierre just 11 miles across the water.

In earlier times, including the Prohibition years in the United States, rum-running was a big business in Burin outports, and it inspired some daredevil dodges. Sgt. Percy Matthews of the Royal Canadian Mounted Police, who commanded a five-man patrol boat working out of the port of Fortune, told me:

"Lord, they were clever in the old days. They'd smuggle kegs of rum across from St. Pierre inside of big bags of salt. If a patrol boat moved in on 'em, they'd just heave the bags overside, and they'd go right to the bottom. No evidence, you see. But a while after, the salt'd dissolve, the kegs'd float up to the top of the water again, and the boys'd be there waitin' for 'em."

The government is trying nowadays to bring some of the more backward settlements into the 20th century. It is impractical to provide for every far-flung outport such amenities as paved roads, electricity, and schools (teachers receive "isolation bonuses" for serving in such places)—not to mention recreational and cultural facilities. So, with the help of the Department of Regional and Economic Expansion, the province is attempting to gather the populations of scattered outports into centralized communities.

I visited the village of Come By Chance on the Isthmus of Avalon, where the program is moving the fisher families who used to live on a sprinkle of islets in upper Placentia Bay—even moving their old houses on barges. The notion is that these families will benefit from the modern conveniences ashore, while their menfolk can give up the chancy trade of fishing to become steady-salaried workers in Come By Chance's oil refineries, which process Middle East petroleum.

But I found that this notion is not greeted with wild enthusiasm by all the families concerned. They'd like to enjoy the "citified life," right enough, but they're not too keen on becoming angishores, and numbers of them have refused to budge from their islets. As one official told me, "The resettlement centers are like heaven. Everybody wants to go there, but not just yet."

Of all the newfangled novelties that have affected the Newfoundlanders' traditional ways, the automobile has been the most rapturously embraced. I was astonished, when I first arrived, to see so many cars that were so gleaming new. Then I found an explanation: Newfoundland has had a paved road all the way across the island only since 1965—its extension of the Trans-Canada Highway.

Before then, vehicles could get from St. John's in the east to Port aux Basques in the west only by being hoisted onto railroad flatcars. The 547-mile journey took a day and a half.

As for travel elsewhere in the interior, "No more'n a few years ago," a man in a hamlet told me, "my sister took sick in th' dead o' winter, and we 'ad to get 'er to 'ospital in Grand Falls. By dogsled we took 'er, a 'undered and twenty mile over snow, through a night and a day. But she was saved, thanks be."

So the automobile arrived with a rush. In 1960, five years before the cross-island highway's completion, motor vehicle registrations totaled 61,000. In 1973, eight years after the highway opened, registrations were around 145,000, more than double, and the increase was mostly in private cars.

For the first time Newfoundlanders can travel their own island with ease. On the highway they drive from coast to coast in less than twelve hours (and, by the way, without glimpsing a single billboard), or stop to swim, cook out, or camp in parks adjoining the road on an average of every 30 miles. The island has 15 recreational beaches, 46 provincial parks that range from six to 5,000 acres, and two vast national parks—Terra Nova in the east and Gros Morne in the west.

Dirt Roads Lure the Adventurous

The new highway has accelerated a branching out of access roads that reach into almost every corner of the island except the still-trackless south coast. Many of these roads are dirt, chokingly dusty in dry weather, mud pudding in the wet. Any road is a nightmare to negotiate in one of Newfoundland's dense white fogs. But at least the roads exist now and they didn't before.

For example, to get to St. Anthony, the island's northernmost town, I endured 270 miles of washboarded, tooth-loosening gravel road up the Northern Peninsula. But before 1962, I couldn't have got there at all except by coastal steamer or bush plane.

Besides being a good place to view icebergs offshore in midsummer, St. Anthony is notable as headquarters of the Grenfell mission, whose four hospitals and 14 nursing stations tend the health of outporters along the 2,000 miles of northern shores and the boondock-dwellers, including Eskimos, on the coasts of Labrador. The mission, supported by government and private funds, also promotes educational services and cottage industries. While the chief output of the modern 170-bed hospital at St. Anthony is some ten babies a week, it can also handle any emergency short of open-heart surgery.

Just a few miles north is L'Anse aux Meadows—the grassy cape where, a thousand years ago, the Vikings set a colony called Vinland.* I found little to see there but the foundation outlines of their longhouses, ember pits, and saunas—and the dreary surrounding flatlands of cold and windswept muskeg. It made me wonder why, if the

*"Vinland Ruins Prove Vikings Found the New World" appeared in the November 1964 GEOGRAPHIC.

FURROWED PROFILE outlined by a flaming match, a carpenter takes a break (**right**). Many Newfoundlanders ignore the high-paying jobs of a "citified life," preferring their traditional trades and the isolation of an outport home. A solitary fisherman's cottage keeps watch on Placentia Bay (**below**), awash in the glow of its kitchen window.

The government, however, is helping the scattered outporters move to modern growth centers near the mines, refineries, and fish-processing plants that lend an industrial base to the economy. Whole communities have moved, bringing many families within reach of electricity, schools, and hospitals.

Norsemen had gumption enough to sail unknown seas all the way to this island, they were willing to settle down on the most appallingly inhospitable part of it.

I drove south again down the peninsula to Port au Choix, where a burial ground of the Maritime Archaic Indians was discovered in 1967. Charcoal found in the graves has been dated at approximately 1800 B.C. Objects buried with the bodies—lances, harpoons, and fishhooks of whalebone, walrus ivory, and caribou antler—show that the Indians were fishers and hunters of sea mammals. The most striking artifact is a miniature killer whale, gracefully carved from stone. The killer whale being a skillful seal hunter, this stone was probably a fetish to lend the Indians its magic help in their pursuit of seals.

Anthropologists have not found any connection between these Maritime Indians and any other known tribe. They vanished, and a succession of peoples appeared, including the Dorset Eskimos. These also vanished from Newfoundland, to be followed by the Beothuck Indians of recorded times.

In the 1500's the peaceable Beothucks welcomed the first English settlers on the island, and lived to regret it. The white man's diseases took a toll, and systematic obliteration was carried out by the English and by Micmac Indians provided with muskets. The last Beothuck, a woman named Shanawdithit, died in St. John's in 1829.

Farther down the Northern Peninsula, near

ARCHING RIBS of Newfoundland timber frame the work crew of the Fogo Island Shipbuilding Co-operative. The men perch in smooth-bellied skiffs and the hull of a long-liner fashioned by hand

on their small isle off the northeastern coast.

Not all Newfoundland's forest products end so proudly. Giant pencils of balsam fir and black spruce collect at a Grand Falls paper mill (**right**). Pulp and paper companies own logging rights to 13 million acres, nearly half the island's interior, producing more than 700,000 tons of newsprint every year.

Sally's Cove, I found on the rocky beach the rusted hulk of the coastal steamer *Ethie*. Although she foundered in a storm in 1919, she is still celebrated in song and story. When the 400-ton vessel began to break up, the captain drove her toward shore until the ship grounded. He threw over a lifeline attached to a breeches buoy, and a dog swam out from land and carried the line back. Everybody aboard—some 120 souls—reached shore.

The *Ethie* is not by any means the only wreck to be seen on the island's coasts. The hulks range from fishing craft of every size to victims of Nazi U-boats.

Storm's Sudden Fury Stirs Local Pride

Newfoundlanders like to brag about the unpredictability of their weather. "It'll ne'er be the same twenty mile from here nor twenty minutes from now." Shortly after I arrived on the island, a freak gale eluded the weathermen and struck without warning. The Newfies bragged about that, too, though it caused two large trawlers to collide and one to sink, taking five crewmen with it.

When I remarked to a retired fisherman that I'd heard of six shipwrecks during just my first week on the island, he snorted, "Lard, in my time there'd've been *sixty* in a week!"

Back in the interior I visited Buchans, a village inhabited entirely by miners and their families. It grew up around the extensive mines operated by the American Smelting and Refining Company, which for more than forty years has been bringing up from two-thirds of a mile below the surface some 1,300 tons of ore a day. The ore consists mainly of lead and zinc, but also contains appreciable quantities of silver and gold.

There are nine other mines on the island, and they produce everything from asbestos and gypsum to iron and fluorspar. Mining is actually Newfoundland's most profitable industry. Although it employs far fewer people than fishing, mining earns seven times as much money for the province.

"Even so," a geologist told me rather wistfully, "the people consider mining a not-quite-respectable occupation. It's all right in good times, but at the slightest quiver in the

economy, the shutdowns and layoffs begin. Newfoundlanders prefer to put their trust in the sea. It's always there."

And as long as the sea is there, many Newfoundlanders will continue to be reluctant to rely on the soft jobs, the safe jobs, the salaried jobs on shore. The island might well be richer, better fed, and have a bigger share of civilization's amenities if there were more farms, factories, mines, and office buildings, and if all the islanders laid aside their oilskins for overalls and white collars. But that will probably never come to pass.

For look you now—

On a bright Saturday in August, I came to a tiny outport where the Anglican flag, bearing the Cross of St. George, hung at half-staff at the community's one church, and where the circuit preacher was making an unscheduled visit. The occasion was the funeral of an old fishing captain who had died peaceably in bed, which is not a thing to be counted on among fishers of the deep sea.

Listen to the voices:

"Would o' been 97 next week, would old Cap'n Arthur. But 'e took a bad fall whilst mowing 'is grass."

"A fisherman all 'is working life, 'e was. Skippered a schooner on the Labrador till 'e were nigh 70."

"It was Cap'n Arthur I shipped with, me first time out, 44 year ago. On the French shore we went that season, and I mind I caught me 25 quintal of fish all on me own. Eleven year old I was then."

"They that go down to the sea in ships," the preacher recited, "that do business in great waters; These see the works of the Lord, and his wonders in the deep."

Under the towering cliffs of the headland, in the white-picket-fenced little graveyard that overlooks a quiet cove of Bonavista Bay, the captain's coffin was lowered that final fathom beneath the waving sedge grass. The scrape of the shovels was echoed by a faint noise of hammering from down in the cove below. There, at the edge of the landwash, three very small boys were knocking together slabs of driftwood into a rude raft, happily hurrying to set to sea. □

LONESOME BEACON on Conception Bay, the lighthouse on Bell Island guards a rocky bluff. A single 100-watt bulb, reflected and magnified a hundred-fold, casts its beam many miles to sea, guiding fishermen safely to their beds.

More than 7,000 wrecks lie on the Newfoundland coast, smashed on her headlands or ripped by unseen shoals. Often only a broken spar comes ashore to tell of a ship's fate.

But the heart and spirit of Newfoundland still reach for the waters around her. As one graying fisherman explained, "I've never wanted for anything, nor boots nor bed nor food. The sea's been good to me."

Aha! It Really Works!

By ROBERT F. SISSON

NATIONAL GEOGRAPHIC NATURAL SCIENCE PHOTOGRAPHER

"HE PICKS UP THE PELLET, puts it in the water, and does *what?*" I asked incredulously. The voice on the telephone repeated. At the Miami Seaquarium a green heron uses fish-food pellets as bait to catch its dinner.

"You must have been out in the sun too long," I told Warren Zeiller, the Seaquarium's managing curator.

"It's true, Bob. He picks the pellet up, puts it in the water, and if fish don't come boiling up right away, he takes that same pellet upor downstream to try his luck again."

Warren's word was not to be taken lightly, so I headed immediately for Miami.

Passing the tanks where the killer whales and porpoises perform, ignoring the channel where sharks battle over fish carcasses, Warren led me to the Seaquarium's Lost Islands. Water birds, peacocks, and iguanas wander these man-made bits of land tucked away among the mangroves, palms, and breadfruit trees along Biscayne Bay. Sea turtles and tropical fish swim in the channels that surround the islets. Warren stopped by a curving concrete retaining wall, leaned over, and pointed to a crow-size bird with a greenish-blue head and russet neck standing at the water's edge. Scattered on the ground around the bird were dozens of pellets, which are sold at vending machines for a nickel a handful so visitors can feed the fish.

"There!" Warren said. "Watch him put the pellet in the water. See him strike out and get that fish? Now do you believe me?"

At the end of a week the Seaquarium people asked how I was getting along with "my" heron—and so I had come to think of him. I was getting along fine, but needed help in trying to learn how my heron had begun this novel way of getting his daily supply of fish.

I called my good friend Dr. Arthur A. Myrberg, an expert on animal behavior at the Rosenstiel School of Marine and Atmospheric Science of the University of Miami, and asked him to come see my green heron.

"This seems to be a case of learned behavior," Art said. "Animals learn through repetition, often requiring many trials. Rarely, learning may occur after only one or a very few trials. Such a sudden comprehension of relationships has sometimes been called the 'Aha experience.' "

I can just hear my heron saying to himself the first time he picked up a pellet, dropped it in the water, and then caught a fish—"Aha!"

THE FIRST PERSON who noticed my heron using bait was Capt. Charles Buie, skipper of the Seaquarium's collecting ship, as he strolled the grounds one morning. The bird has a mother and smaller brother that also fish with pellet bait, he told me, but not with the same frequency—which leads me to believe that my heron discovered the technique and the other members of his family are learning from him. In one scientific journal I found a brief 15-year-old report of a green heron fishing with bread, but I know of no photographic record until I made these pictures.

Here is a typical sequence: I am barely set with my cameras when the heron picks up a dry pellet from the island (**above**) and carries it in his bill down to the edge of the water.

As he comes closer, his walk takes on the slow-stealthy-sneaky manner typical of most herons. Reaching the channel, he pauses and seems to survey the water for the best fishing spot (**above, right**). Then, slowly his neck stretches out and out, as if made of elastic, and ever so gently he drops the bait in the water (**below, left**).

Now the fisherman in him really takes over. Hunkering down between two rocks (**below**), he stays as still as a statue; his eyes never leave the pellet as it bobs in the water.

His manner is so deliberate, his guile so amusing, his consistency so amazing, that I can't help speculating that my heron should be added to the list of tool-using animals. And —though experts may cringe—I can't stop believing that he is a thinking creature.

ALMOST FASTER than the eye can see, the heron strikes at his quarry (**above**). He sometimes misses, but not often. Captain Buie told me that one afternoon, within a 25-minute period, he saw my heron bait and catch two dozen fish—missing on only two occasions.

The heron grips the fish in his two-inch bill (**right**), then turns it so he can swallow it head first. Often after eating he will dip his bill in the water, then raise his head and shake it vigorously as if to help the morsel down.

One afternoon I found my heron intently watching a school of fish. He was the picture of despair. He would feint with his bill, but knew they were just out of range. I threw a pellet on the ground just to his left. He turned, looked at the pellet, looked at the fish, then picked up the bait. He carefully placed it in the water just short of the fish. In their rush for the food, they inadvertently pushed it and themselves shoreward toward him. Like lightning, he struck. After gulping down this catch, he retrieved the bait, which had drifted downstream, and placed it once again within his range.

HUNGRY FINGERLINGS (**below**) risk capture when they swarm around the heron's bait. The heron himself keeps a lookout for a four-foot-long American crocodile that cruises the channel. Occasionally the croc sneaks underwater, intent on the feathered fisherman. But when danger comes within a few feet, my heron flies away with a loud, scolding "skeow!" □

How to Catch a Passing Comet

By KENNETH F. WEAVER ASSISTANT EDITOR

PAINTING BY DAVID MEITZER

Photographer's feast during the Yule season, capturing the new comet Kohoutek calls for a time exposure and a steady tripod. Using a film with ASA rating between 64 and 160 (DIN 18 to 23), set the lens aperture wide open, focus at infinity, and expose for ten seconds to two minutes.

As shaking terrors from his blazing hair,
A sanguine comet gleams through dusky air.
—TASSO, "JERUSALEM DELIVERED"

THE GREEKS called them *komētēs*, the "long-haired." Like most men since the beginning of recorded time, they regarded these rare celestial apparitions as omens of evil. As recently as 1910, when Halley's great comet last appeared, charlatans sold special pills to protect the fearful.

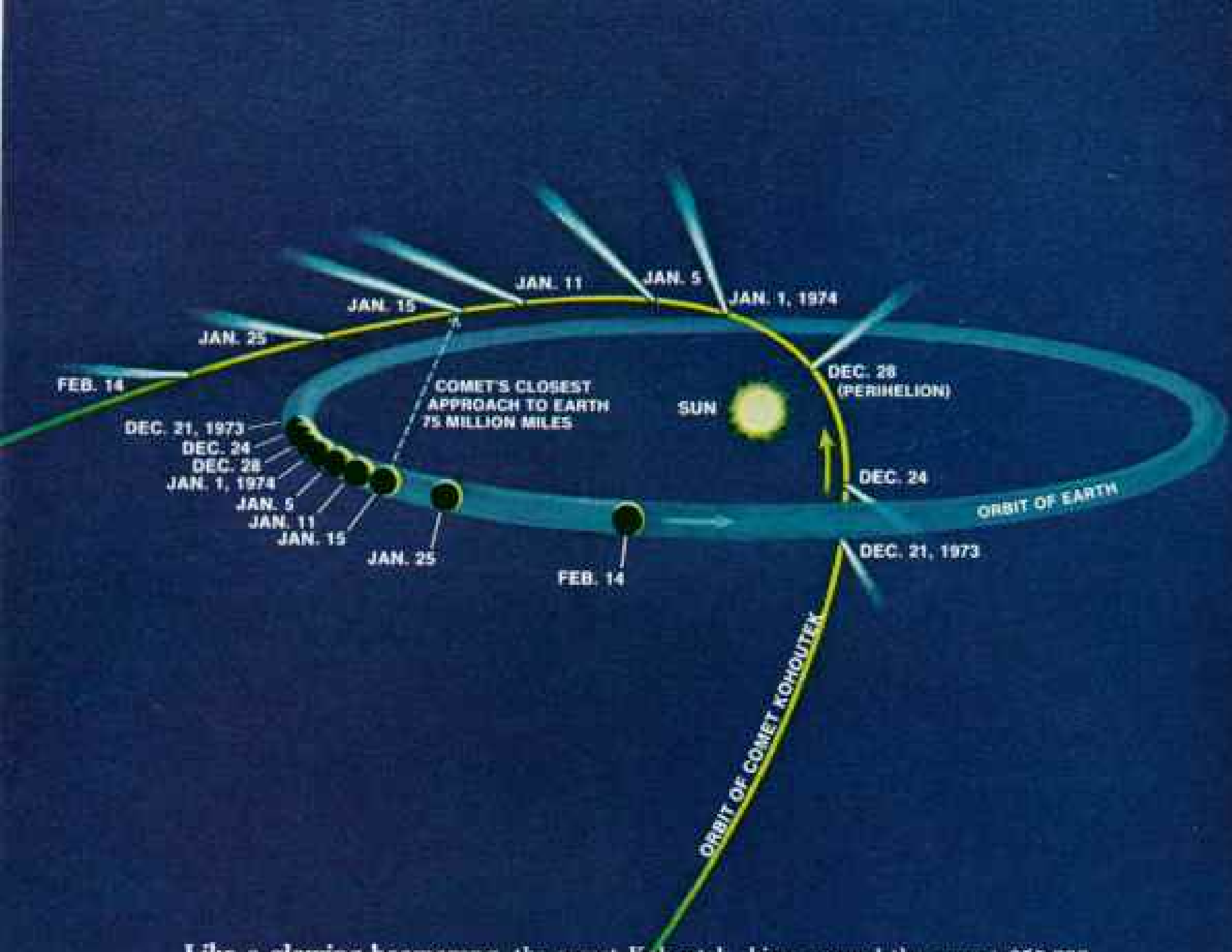
Today the newest of comets, Kohoutek, brings not terror but joy to millions who see in its bright gleam a reminder of the Christmas star. And for scientists it is an occasion for intense excitement. Before Kohoutek fades away in another few weeks, on its hurtling passage back to the fringes of our solar system, it will have been examined as no comet has ever been examined before.

Plans call for observations by major telescopes around the world; from aircraft, rockets, and balloons; by Mariner 10, on its way to Venus and Mercury; and by the Skylab III astronauts in orbit around earth.

Rarely do scientists have more than two or three months' warning of a new comet's approach. This visitor was discovered quite early by accident last March 7 at the Hamburg Observatory. A Czech astronomer, Luboš Kohoutek (pronounced KAH-hoe-tek), was searching for an asteroid when he spotted the faint smudge on a photographic plate.

Quickly astronomers made calculations. Kohoutek's comet was apparently a big one, with a solid core some 25 miles in diameter. It would come within 13.2 million miles of the sun, closer than most. And it would not reach this close point, called perihelion, for 9½ months after discovery.

But, most important, Kohoutek appeared to be a "fresh" comet, unlike those that reappear every few years. Dr. Brian Marsden, of the Smithsonian Astrophysical Observatory, believes that on this orbit Kohoutek has come on a two-million-year journey from a thousand times farther away than the outermost planet, and that its orbits have never



Like a glowing boomerang, the comet Kohoutek skims around the sun at 250,000 miles an hour, passing within a mere 13.2 million miles. As the space traveler approaches, its wispy tail grows ever longer, pushed away from the sun by the solar wind and the pressure of sunlight itself. The painting above shows the position of the comet relative to the earth during the period of greatest visibility. PAINTING BY STAFF ARTIST WILLIAM H. BOND

December 21: Look to the southeast before dawn. Comet head rises about 6:25 a.m. EST (in Washington, D. C.; time varies elsewhere with latitude and location in time zone). Tail quite short. Sun rises at 7:23.

Dec. 24: Tail lengthens, comet brightens, but viewing difficult and dangerous to the eyes as comet approaches sun. Comet head rises 6:50; sun rises 7:25.

Dec. 28: Perihelion; comet passes closest to sun and rises and sets with the sun. Viewing hazardous; NEVER look directly at the sun.

January 1: Striking display follows sunset (4:56 p.m.) as comet tail extends straight above southwest horizon. Comet head sets 5:55 p.m.

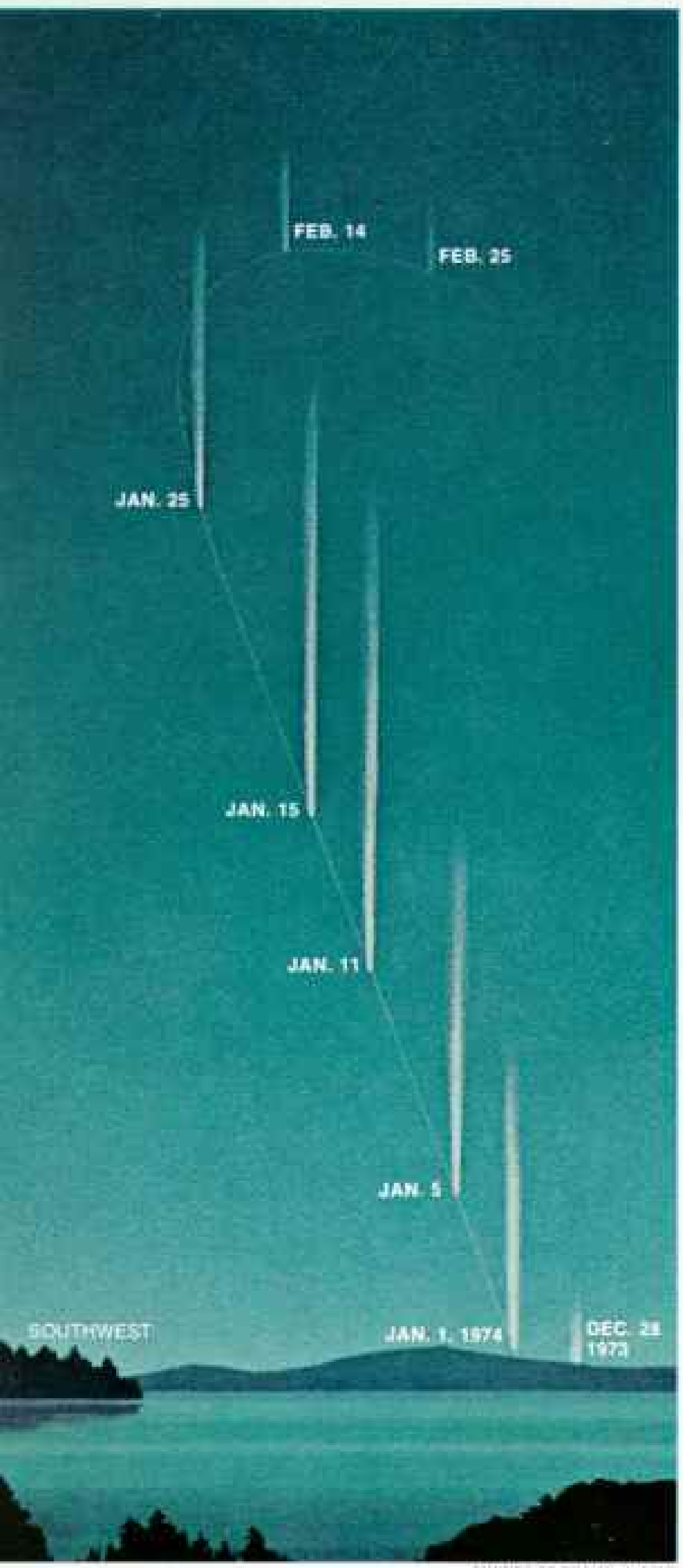
Jan. 5: Comet aligned with Venus and Jupiter. Waxing moon lightens sky and may interfere with viewing. Sun sets 5:00; comet head 6:40.

Jan. 11: Comet tail dims somewhat, but reaches maximum length. Sun sets 5:06; comet head 7:45.

Jan. 15: Comet passes closest to earth (75,000,000 miles) and each day is seen higher above horizon after twilight; moon is waning. Sun sets 5:09; comet head 8:25.

Jan. 25: Comet can still be seen with naked eye, but is fading rapidly. Tail is shortening. Sun sets 5:20; comet 10:00.

February 14: Comet approaches highest altitude above horizon in the night sky. Binoculars or telescope needed. Sun sets 5:43; comet head 11:20.



PAINTING BY WILLIAM K. BOND

Pennants hanging in the southwestern sky show Kohoutek's apparent size and changing positions an hour after sunset on various dates as it speeds outbound into the depths of space. After gracing the Christmas sky and emblazoning New Year's, this brilliant visitor will not pass this way again for 75,000 years.

before brought it close to the sun's heat.

Thus, by current theory, this "dirty snowball" of frozen gases and dust is an unaltered sample of the material left over when our solar system condensed 4.6 billion years ago. Hence the scientific excitement.

Orbits of some 600 comets have been traced. None came really close to earth; chances are vanishingly slim that one ever will. Occasionally earth passes through a comet's path, and showers of shooting stars result, but we will not cross Kohoutek's tail.

During December, watchers have seen Kohoutek as an early-morning object, seeming to hang motionless in the southeastern sky before dawn, yet daily appearing closer to the sun. By perihelion, on December 28, the comet may be bright enough to be visible in the daytime, but it will be all but lost in the sun's glare. During that time, any attempts by others than astronomers to see it —especially with binoculars or telescope— would be extremely dangerous to the eyes.

Kohoutek comes into its full glory about New Year's, when it has swerved around the sun and started on its long outward journey. Then it becomes an evening object clearly visible at twilight low on the horizon, somewhat south of west, in the company of the two bright planets Venus and Jupiter.

By a combination of circumstances, the best viewing should come between January 10 and 20, even though the comet is actually growing dimmer. The tail will reach its longest on January 11. And each successive evening the spectacle will appear higher in the sky and remain visible longer after sunset. Also the moon, full on January 8, will rise later each following evening and thus interfere less with viewing the comet.

Comets have a way of doing the unexpected. They sometimes flare, change shape, split in half, even fade prematurely. Odds are against such fates for Kohoutek, but predictions are nonetheless always uncertain.

Best estimates suggest that Kohoutek should become at least as bright as Venus (magnitude −4), possibly even as bright as the quarter moon. Its feathery, wispy tail—made of gas and dust blown off the frozen core and reflecting the sun's light—may stretch as much as 20 degrees across the sky, 40 times the apparent diameter of the moon.

So Kohoutek offers us a splendid Christmas gift—a lovely spectacle and a bonanza of scientific information. □

WATCH "JOURNEY TO THE OUTER LIMITS" ON MOST OF THESE ABC TELEVISION STATIONS

(Canadian and some U.S. stations may schedule the program on another date. Check your newspaper.)

ALABAMA
Birmingham WABC (6)
Dothan WTVY (18)
Huntsville WAFG (48)
Mobile WEAR (3)
Montgomery WKAB (32)

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Anchorage KIMO (13)

ARIZONA
Phoenix KTVK (3)
Tucson KGUN (9)

ARKANSAS
El Dorado KTVE (10)
Jonesboro KAIT (8)
Little Rock KATV (7)

CALIFORNIA
Bakersfield KERO (17)
Fresno KJEO (47)
Los Angeles KABC (7)
Palm Springs KMIR (42)
Sacramento KOVR (13)
San Diego KFMB (39)
San Francisco KGO (7)
San Jose KNTV (11)
Santa Barbara KEYT (3)

COLORADO
Colorado Springs KKTV (11)
Denver KMGH (9)

CONNECTICUT
New Haven WTNH (8)

DELAWARE*

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Washington WMAL (7)

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Gainesville WCJB (20)
Jacksonville WJKS (17)
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St. Petersburg WTSP (10)
Sarasota WXLT (40)
West Palm Beach WPBF (25)

GEORGIA
Atlanta WSB-TV (2)
Augusta WJBF (6)
Columbus WTVM (9)
Savannah WSAV (22)

HAWAII
Honolulu KITV (4)

IDAHO
Boise KIDO (2)
Idaho Falls KIFI (8)
Twin Falls KMVT (11)

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Decatur WAND (17)
Harrisburg WSIL (3)
Moline WQAD (8)
Peoria WMBD (19)
Rockford WREX (13)

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Fort Wayne WPTA (21)
Indianapolis WLWI (13)
South Bend WSBT (28)
Terre Haute WTHI (38)

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Ames-Des Moines WOI (5)
Cedar Rapids KCRG (9)
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Bangor WABI (7)
Portland WMTW (8)
Presque Isle WAGM (8)

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Baltimore WJZ (13)

MASSACHUSETTS
Boston WCVB (5)
Springfield WWLP (40)

MICHIGAN
Battle Creek WUHQ (41)
Detroit WXYZ (7)
Flint WJRT (12)
Grand Rapids WZZM (13)
Traverse City WGTU (29)

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Austin KAUS (6)
Duluth WDIO (10)
Minneapolis KMSP (9)

MISSISSIPPI
Biloxi WLOX (13)
Greenwood WABG (6)
Jackson WAPT (16)

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Columbia KOMU (17)
Joplin KODE (12)
Kansas City KMBC (9)
St. Joseph KQTV (2)
St. Louis KTVI (2)
Springfield KOZL (27)

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Billings KULR (8)
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Kearney KHOL (13)
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NEVADA
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Austin KVUE (24)
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Green Bay WLUK (11)
La Crosse WKBT (19)
Madison WKOW (27)
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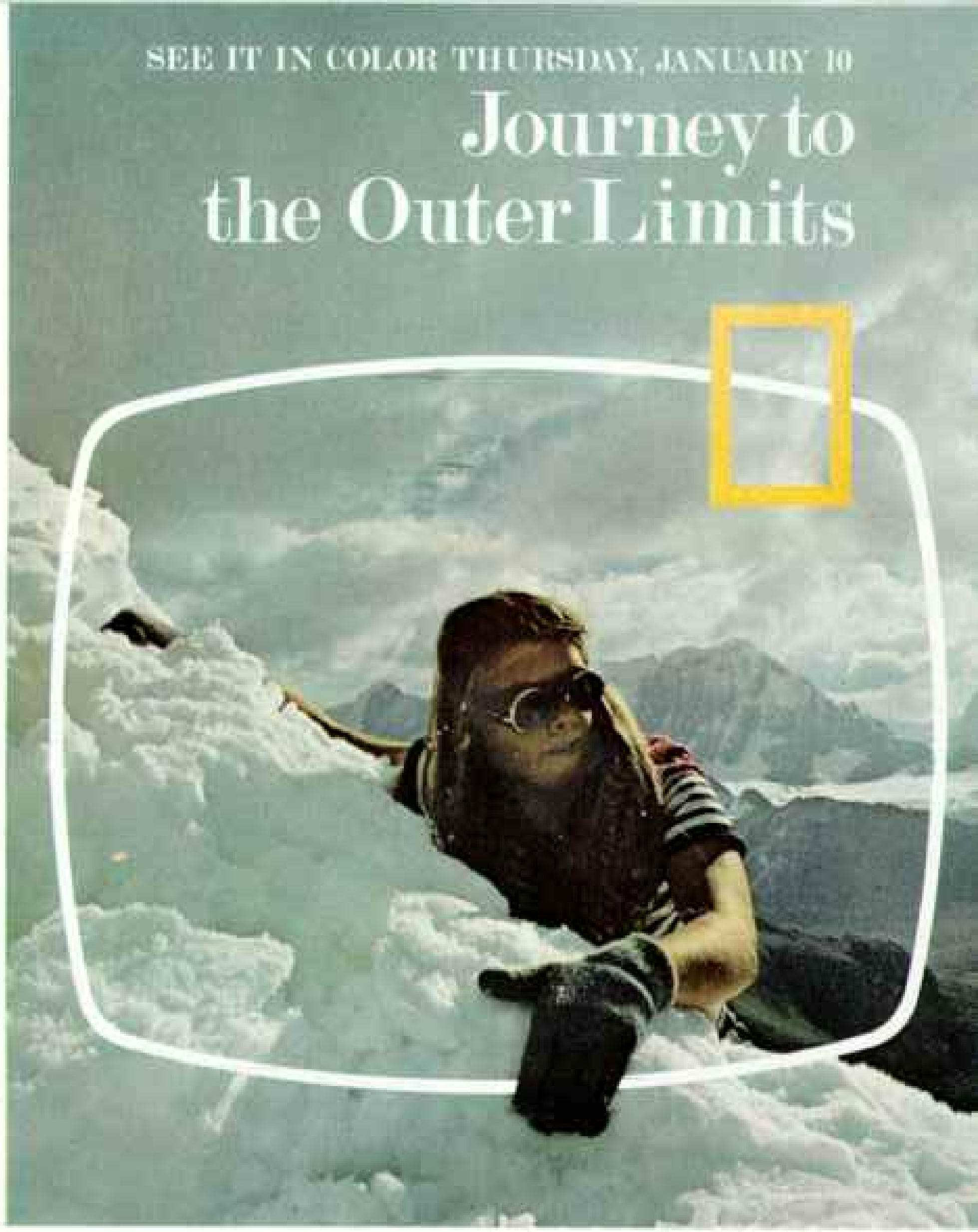
*See neighboring states

REACHING FOR NEW HEIGHTS, 19-YEAR-OLD AMANDA CABOT STRIVES TOWARD THE SUMMIT OF PERU'S SANTA ROSA PEAK.

JONATHAN WRIGHT

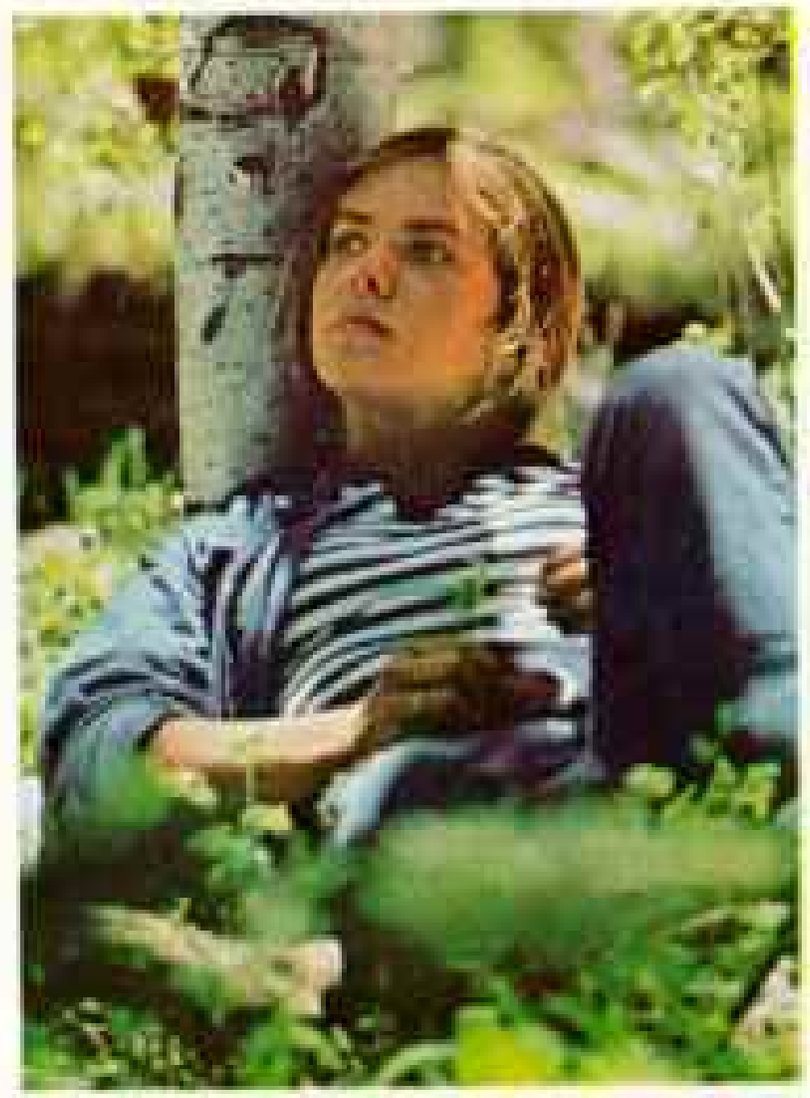


Challenging nature to find themselves

CITY-BRED TEEN-AGERS tackle the wild outdoors in the National Geographic Society's first television documentary of 1974. Tune in ABC-TV on January 10 to learn how the Colorado Outward Bound School teaches debutantes and the disadvantaged alike to discover their inner capabilities by meeting nature's challenge.

Early in their training, students struggle with a rope bridge on a Colorado hillside. Upon arrival they learn to work together, linking arms to ford a rapid. Each student also experiences the perils and satisfactions of living alone for three days in the wild (**below**).

Finally come the joy and exhaustion of scaling Peru's 18,715-foot Santa Rosa (**left**), an icy climax to this six-week training period. Leslie Nielsen narrates this drama, produced in association with Wolper Productions. Sponsors are Western Electric and the St. Regis Paper Company.



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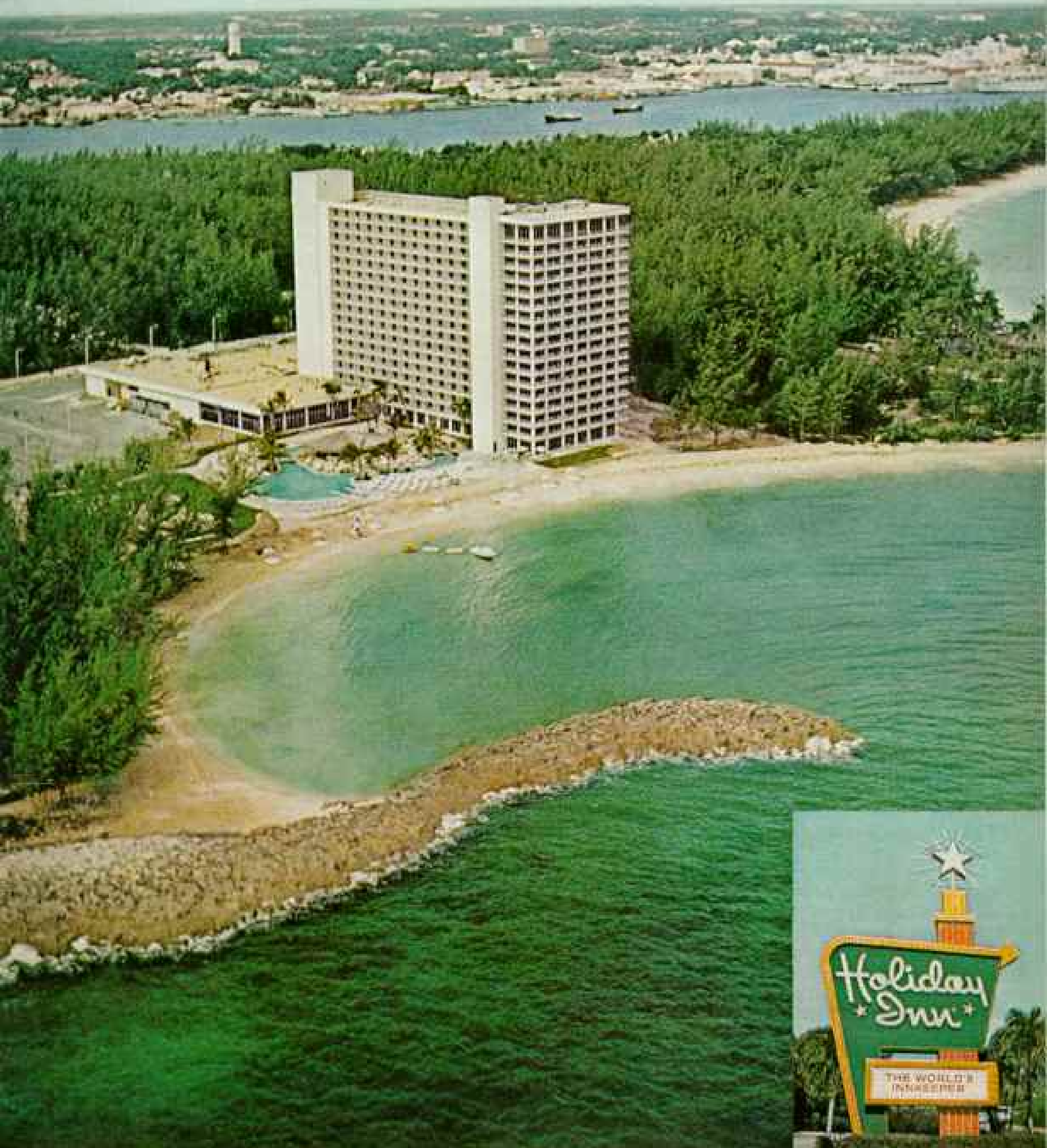

From Calcutta ...

Report on Elizabeth Dass...

CHRISTIAN CHILDREN'S FUND, INC.

CALCUTTA, INDIA - CASEWORKER REPORT

TO NAZARETH HOME, CALCUTTA

NAME: ELIZABETH DASS NATIVE PLACE: CALCUTTA

DATE OF BIRTH: APRIL 12, 1964 ORDER OF BIRTH: THIRD DAUGHTER

HEALTH: FRAIL, THIN, WALKS MR WITH DIFFICULTY. PROTEIN DEPRIVED

CHARACTERISTICS: GENTLE, QUIET, COOPERATIVE. SPEAKS CLEARLY AND IS OF GOOD MIND. WILL BE ABLE TO LEARN ONCE HEALTH AND STRENGTH IX ARE RESTORED.

PARENTIENISCONDITION: FATHER: DECEASED.

MOTHER: MALNOURISHED, RECENT VICTIN OF XAK SMALLPOX. WORKS IN A MATCH FACTORY.

INVESTIGATION REPORT:

ELIZABETH'S FATHER USED TO BE A STREET CLEARNER. DIED FROM TYPHUS. HER MOTHER IS VERY WEAK FROM HER RECENT ILLNESS- INDEEDIT IS REMARKABLE SHE IS ALIVE AT ALL. ONLY WORK AVAILABLE TO THIS WOMAN IS IN A MATCH FACTORY WHERE SHE EARNS TWO RUPEES A DAY (26¢) WHEN SHE IS STRONG ENOUGH TO GET THERE AND WORK.

HOME CONDITIONS:

HOUSE:

ONE ROOM BUSTEE (HOVEL) OCCUPIED BY SEVERAL OTHER PERSONS BESIDES ELIZABETH AND HER MOTHER. HOUSE IS SO SMALL COOKING IS DONE ON THE FOOTPATH. BATHING IS DONE AT A PUBLIC TAP DOWN THE ROAD. PERSONS LIVING WITH THEM IN THIS HOUSE ARE NOT OF GOOD REPUTE. AND THE MOTHER FEARS FOR ELIZABETH.

SISTERS:

MARIA DASS, DECEASED OB SMALLPOX
LORRAINE DASS, ALSO DECEASED OF SMALLPOX
(ELIZABETH FORTUNATELY ENTIRELY ESCAPED CONTAGION)

REMARKS:

ELIZABETH WILL CENTAINLY BECOME ILL, PERHAPS WILL TAKE UP THIEVING, MAYBE EVEN MORE TERRIBLE WAYS OF LIVING. IF SHE IS NOT REMOVED FROM IM PRESENT HOME CONDITIONS. HER MOTHER IS WILLING FOR HER TO GO TO NAZARETH HOME AND WEEPS WITH JOY AT THE HOPE OF HER LITTLE SX DAUGHTER BECOMING SAFE FROM THE WRETCHED LIFE THEY NOW HAVE.

STRONGEST RECOMMENDATION THAT ELIZABETH DASS BE ADMITTED AT ONCE.

Elizabeth Dass was admitted to the Nazareth Home, and when this picture was taken, she was already doing better. Her legs were stronger ... she was running with the other children, learning to write her own name.

Every day desperate reports like this reach our overseas field offices. Then we must make the heartbreaking decision—which child can we help?

For only $12 a month you can sponsor a needy little boy or girl from the country of your choice, or you can let us select a child for you from our emergency list.

Then in about two weeks, you will receive a photograph of your child, along with a personal history, and information about the Project where your child receives help. Your child will write to you, and you will receive the original plus an English translation—direct from an overseas office.

Please, won't you help? Today?

Sponsors urgently needed this month for children in: India, Brazil, Philippines, Indonesia and Guatemala.

Write today: Verent J. Mills

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I wish to sponsor a ☐ boy ☐ girl in (Country)_____

☐ Choose a child who needs me most. I will pay $12 a month. I enclose first payment of $_____. Send me child's name, story, address and picture.

I cannot sponsor a child but want to give $_____.

☐ Please send me more information.

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State_____Zip_____

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NG 7810

LUCILLE H. GARRETT (ABOVE) AND JOHN EVERINGHAM

Southeast Asia's other faces

"THEY HAVE BEEN our silent allies for 14 years, yet few Americans know anything about them," says Senior Assistant Editor W. E. Garrett of the Hmong mountain tribesmen of Laos.

To tell the story of these fascinating people, Bill Garrett returned to Laos on his eleventh Asian assignment for NATIONAL GEOGRAPHIC. He talked with Hmong leaders like Maj. Gen. Vang Pao (**above left**), and visited mountain villages (**left**) and war-refugee centers. His story begins on page 78.

Another photo-report from the infamous opium-growing Golden Triangle of Southeast Asia will soon show you a unique culture in backcountry Burma—a people who build their houses over a lake, row with their legs, and weave some of the world's finest silk.

Bill Garrett brought two things home from his Asian journey: greater understanding, and malaria—one the prize, the other the price.

Share such "on-beat" reports with friends; nominate them below for membership.

Readers of the National Geographic are invited to

Enjoy collecting a stirring panorama preserved for future generations.

- At a surprisingly modest cost, you can receive beautiful First Day Covers for each new commemorative stamp issue of the United States.
- Each First Day Cover will be individually addressed and sent automatically to the name and address you designate.

WHAT IS A FIRST DAY COVER?

The United States regularly honors the important men, events and places in its history through the issuance of official U.S. commemorative postage stamps. When a new stamp is to be issued, one, and only one, post office is officially designated to provide . . . on one day only . . . the authentic "First Day" cancellation. The specially designed envelope bearing the new stamp, cancelled on the exact date of issue at the officially designated post office, is a First Day Cover.

First Day Covers are fascinating collectors' items. As you can well imagine, the combination of a historic stamp, cancelled on the first day of issue, at an officially designated post office on a specially designed envelope results in a collector's item of the first order. One that has been prized by collectors like Dwight D. Eisenhower, George C. Marshall and Franklin D. Roosevelt, plus others with the foresight to preserve yesterday and today for tomorrow.

The best time to obtain these prized collectors' items is when they are issued. This is now made easier than ever by the Postal Commemorative Society.

Postal Commemorative Society members receive everything they need to build and maintain a personalized "mint condition" collection of U.S. First Day Covers. For each cover issued, the Society provides an exclusive custom designed display page, especially made for the member's personalized album.

# of U.S. history. To be treasured now and

First Day Covers combine art and history in a tribute to our American heritage. Eisenhower . . . The Battle of Bunker Hill . . . the writing of the Star Spangled Banner . . . the landing of astronauts on the moon . . . such are the subjects chosen by the United States for commemorative postage stamps. Nothing trivial or unimportant or dull is ever chosen for national honor.

Further, the post office chosen for a first day of issue usually bears particular significance to the subject commemorated. For example, a first day cover of the Eisenhower stamp was one cancelled at Abilene, Kansas.

The nation's leading artists and designers are called upon to portray the subjects chosen. Such commissions naturally are highly prized, and bring forth the best efforts of the artists involved.

Membership in the Postal Commemorative Society makes it possible to easily collect First Day Covers as they are issued. The Society will guarantee your receiving a personally addressed First Day Cover of every U. S. commemorative stamp issue. All details of arranging for your First Day Covers to be sent to you will be handled by the Society.

Commemorative stamps normally are issued by the United States at the rate of about 15 a year. You will receive up to this many issues at a basic cost of just $12.00 per year plus an annual membership fee of $7.50 (total yearly cost of $19.50).

As a member, you will also receive the Society's exclusive display page for each new issue. Each beautiful, specially designed page is die-cut to hold the First Day Cover, and contains a full description with all important historical information about the subject of the commemorative issue. *These pages are available only to members of the Society.*

Becoming a member now brings you an important collector's bonus at no additional cost. The Postal Commemorative Society makes available to its members a handsome collector's album with the member's name hand-embossed on the cover. This album, specially designed to hold the Society's display pages, makes it possible for members to keep each new First Day Cover in "mint" condition. *It is yours free, if you join now!*

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NG3

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*Connecticut residents add $1.27 tax. Make check or money order payable to Postal Commemorative Society.

CAPT SCOTT'S ANTARCTIC EXPEDITION 1910

A scrap of wood—crude epitaph to South Pole struggle

1910. The date is clearly marked on the scarred piece of packing crate. Some mittened hand pried loose the board and flung it aside. And there it lay in the Antarctic until another hand, years later, picked it up and entrusted it to the Society to preserve, a memento of polar exploration's heroic age.

The heroes of that age bore the names of Robert E. Peary, Roald Amundsen, Ernest Shackleton, and Robert Falcon Scott. Struggling on foot through uncharted miles of ice and snow, they broke trail for future explorers, who would come in Sno-Cats, jet planes, and nuclear submarines.

In 1910 Scott sailed for Antarctica. His objective: "to reach the South Pole, and to secure for the British Empire the honour of this achievement."

Shackleton had tried to win the honor the year before, but the bull-strong Irishman fell 112 miles short. That same year Peary had planted the Stars and Stripes at the North Pole. Would he now aim for a polar grand slam? Scott heard that "the Americans are going."

Instead, it was the Norwegians who challenged him. Amundsen tersely cabled: "Am going south."

Amundsen! Scott underlined the name in his diary.

First to sail the icebound Northwest Passage, Amundsen had set his sights on the North Pole. Peary beat him to it. "This was a blow indeed!" the Norwegian wrote. "I resolved upon a coup." The race for the South Pole began.

Amundsen—like Peary—traveled on the ice with dogs, using them for dog food as well as for transport. "I figured out," Amundsen stated, "the precise day on which I planned to kill each dog. . . ."

On December 14, 1911, eight weeks after leaving base camp at the Bay of Whales, he unfurled Norway's flag over the South Pole.

Scott also used dogs. But he relied mainly on unproven tractors and ponies to haul supplies over the ice. Both failed. Many of his dogs died. So men strapped on harnesses and pulled sledges up tortuous Beardmore Glacier.

On January 17, 1912, after a strength-sapping march of 78 days, Scott and four companions reached the Pole. They saw sledge tracks and paw prints in the snow, the Norwegian flag flying.

"Great God!"

Scott's diary shouts his disappointment. "This is an awful place and terrible enough for us to have laboured to it without the reward of priority. . . . Now for the run home."

Run? It was a crawl—slow, painful, desperate. One man, "nearly broken down in brain," died. Another, frostbitten, disappeared in a blizzard. A blinding gale pinned down the others. Helpless, their food and fuel gone, they holed up in a tent and awaited the end.

Scott poured his remaining strength into letters and his diary.

His last words: "For God's sake, look after our people."

Inspired by the heroism of Scott, men continue to seek new heights of valor—in Antarctica, on Mount Everest, in space, undersea. Readers discover their deeds unforgettably chronicled in the pages of NATIONAL GEOGRAPHIC.

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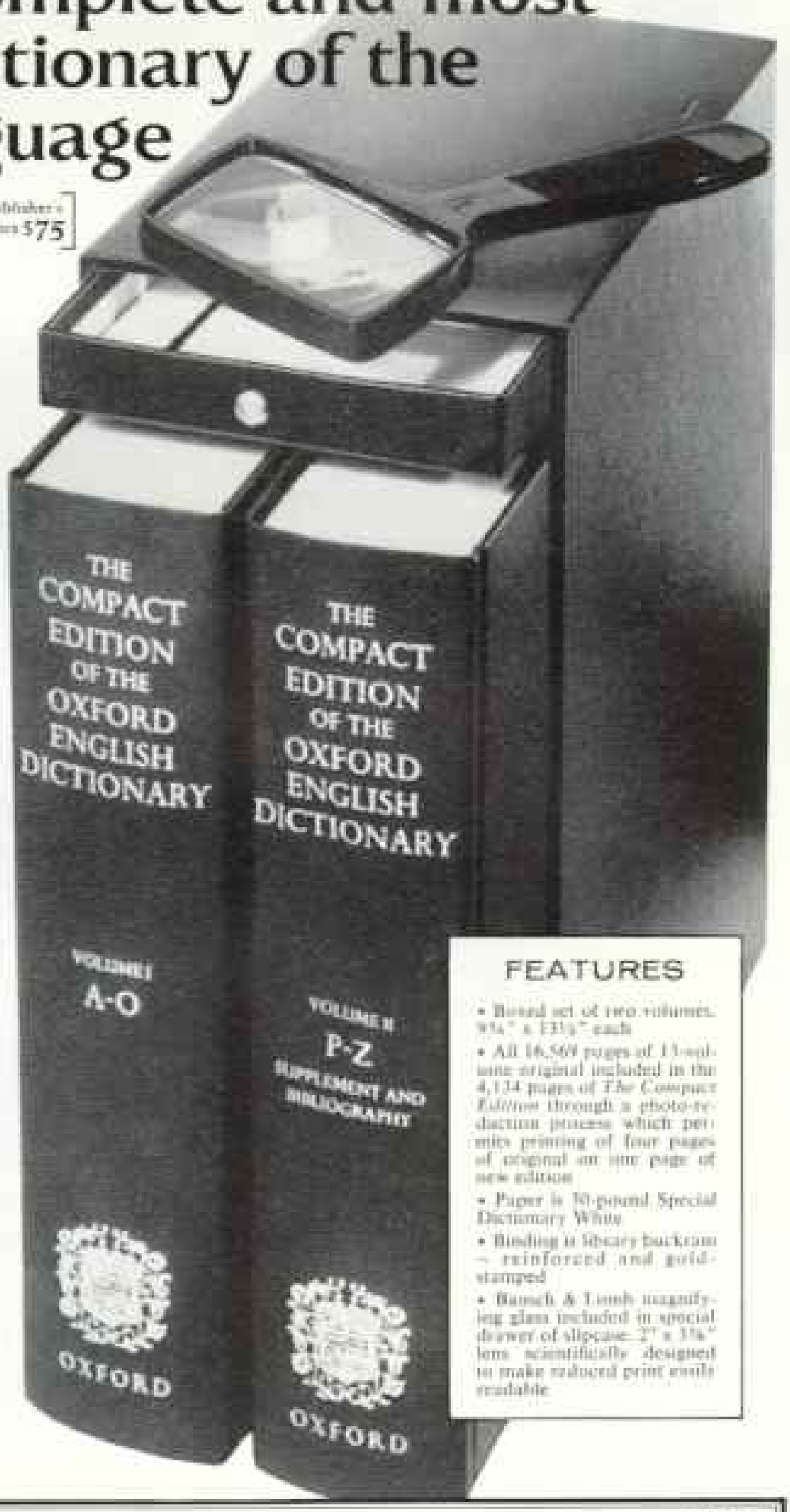

THE OXFORD ENGLISH DICTIONARY is generally regarded as the final arbiter of the meaning, origin, history and usage of words in the English language. Until now, it has been available only as a thirteen-volume set, priced at $350. Now, through the combination of an ingenious method of micrographic reproduction and a fine Bausch & Lomb optical lens, every single one of its 16,569 pages, fifty million words and close to two million illustrative quotations appears, in easily readable form, in the two volumes of *The Compact Edition*.

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"*Adirondack Winter*" by Norman Rockwell

Norman Rockwell

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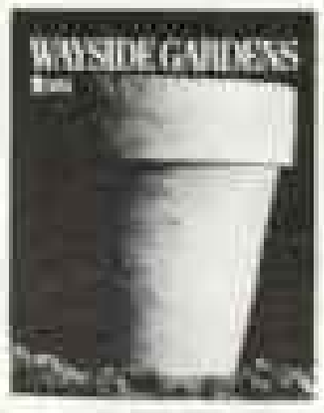

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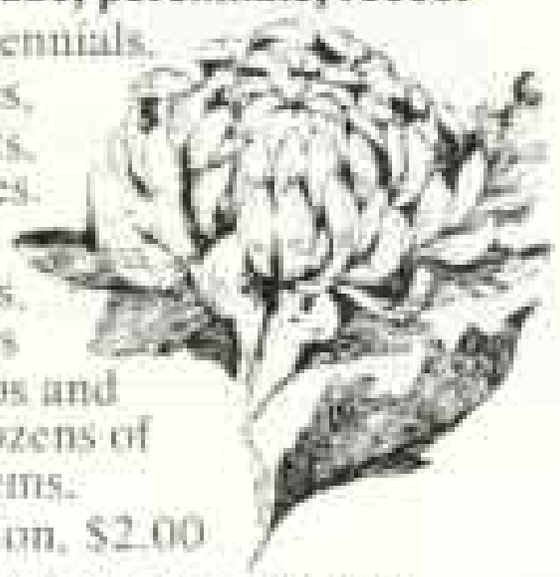

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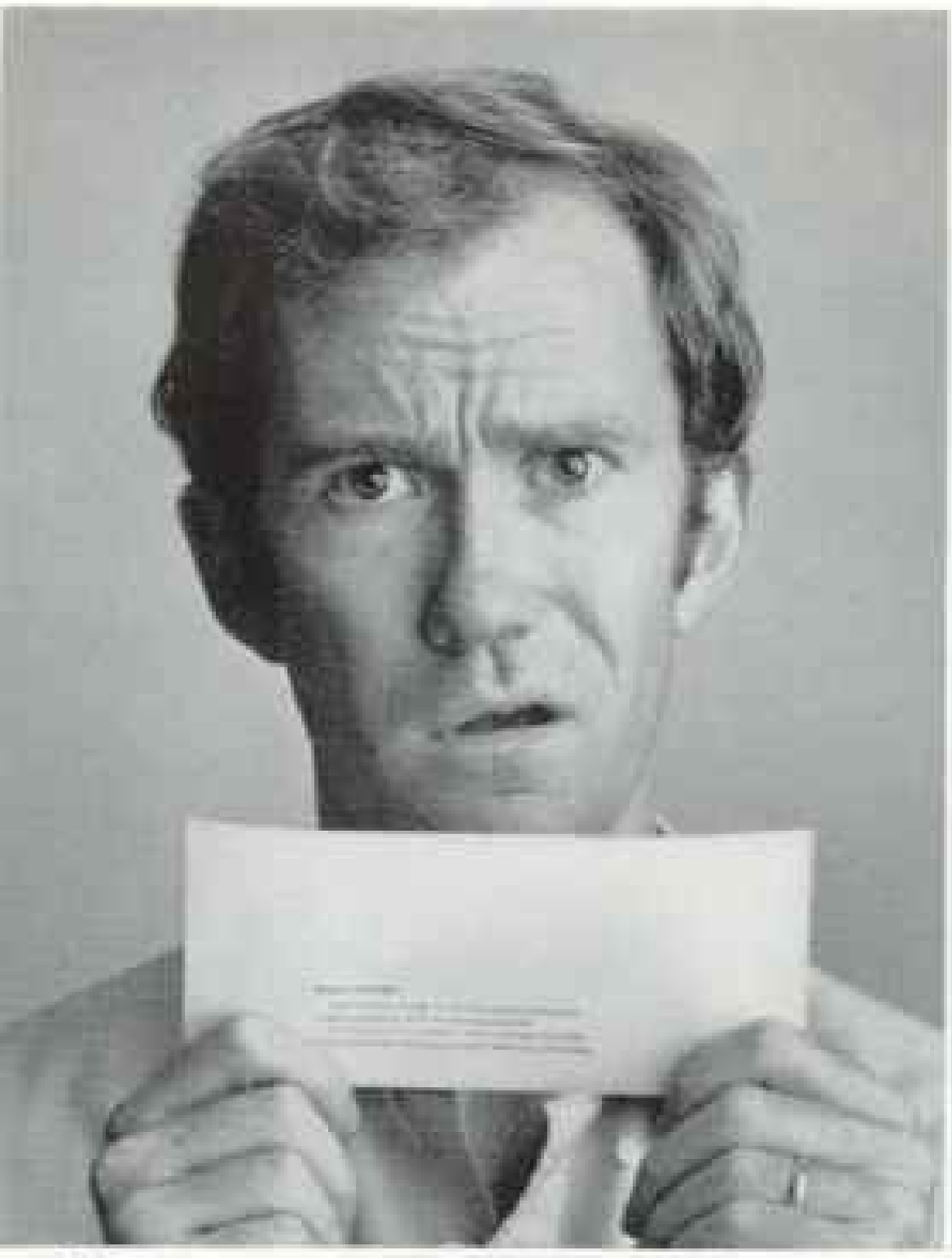

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