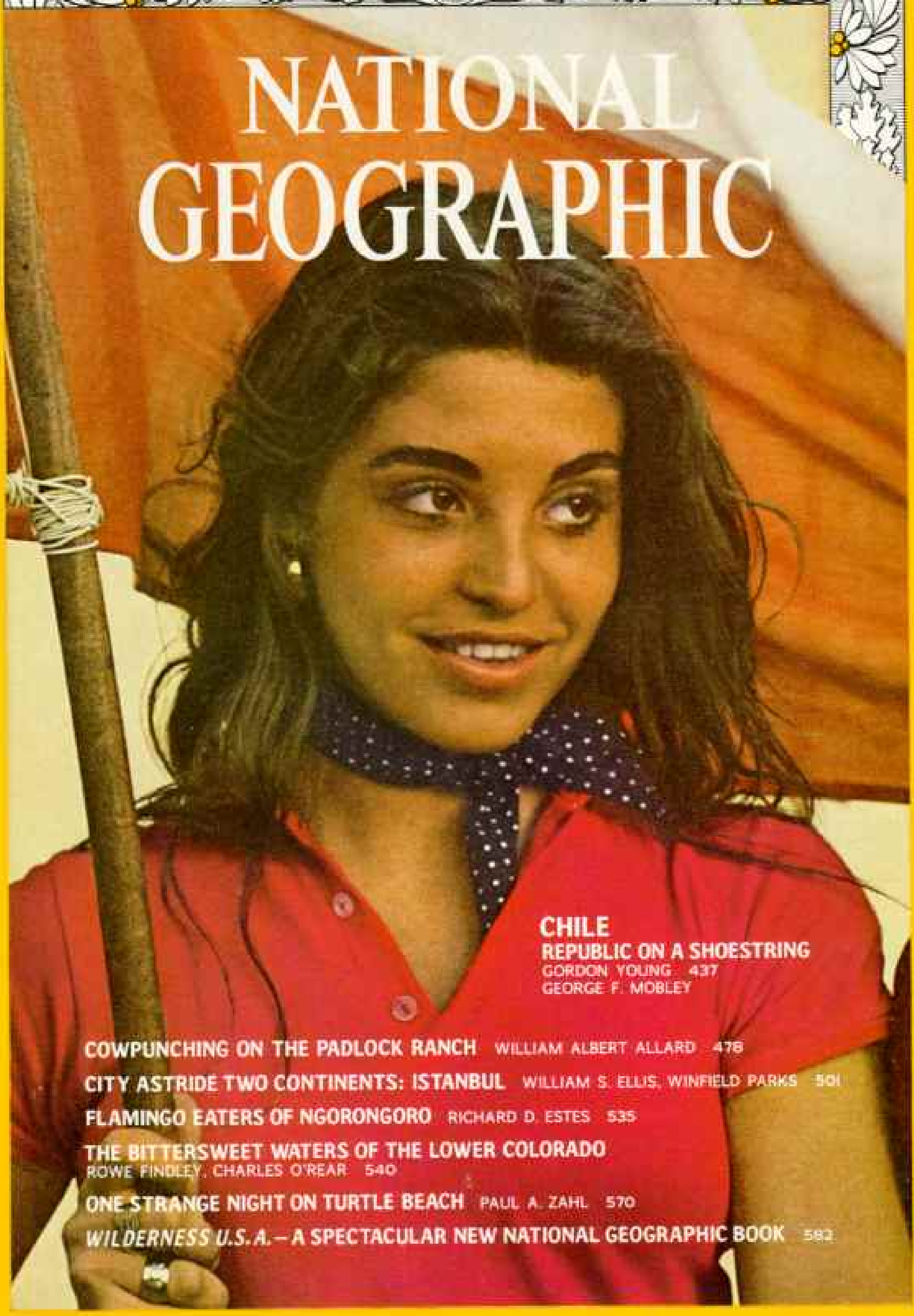
VOL. 144, NO. 4 OCTOBER 1973

NATIONAL GEOGRAPHIC



CHILE
REPUBLIC ON A SHOESTRING
GORDON YOUNG 437
GEORGE F. MOBLEY

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

NATIONAL GEOGRAPHIC

October 1973

Chile

REPUBLIC ON A SHOESTRING

By GORDON YOUNG

Photographs by GEORGE F. MOBLEY

BOTH NATIONAL GEOGRAPHIC STAFF

THEY WERE LEAVING Santiago now, those scores of foreign newsmen who had come to Chile to cover a civil war. I watched from the lobby of the Carrera Sheraton Hotel as they piled into taxis and roared off toward Pudahuel International Airport through the city's calm streets.

Only days before, those streets had echoed to the shouts of demonstrators and the muffled crack of police tear-gas canisters. Strikes and riots raged through most of October 1972, as Chile's middle class protested programs of the Government of Popular Unity.

Dr. Salvador Allende, the world's only freely elected Marxist president, headed that government. He had announced his intention to improve the lives of Chile's poor, to nationalize businesses, to reduce the power and landholdings of the wealthy, and to drive out foreign firms that controlled much of the country's natural resources.

The strikes and riots were acts of desperation launched mainly by the middle class. For the first time in this century, civil war loomed frighteningly close. Yet, that time, only rocks, tear gas, and epithets flew. Eight months later, there would be bullets.

The foreign press observed the October disturbances quizzically, noting that both rioters and police broke off action for Chile's lunch hour. A French journalist termed it the "Ice-cream Revolution," after seeing more than one demonstrator marching with a placard in one hand and an ice-cream cone in the other.

Still, I found this to be no comic-opera confrontation—not to the many storekeepers who shuttered their shops for almost a month in protest against government policies, not to the poor who supported this government that had given them new purchasing power.

Politics Reaches Even the Young

The policies of a legally elected Marxist opposed mostly with rocks and slogans rather than bullets? That has an unlikely ring. But Chile isn't a typical revolutionary nation. Its middle class is large, and the country's literacy rate is nearly 90 percent. Chileans have always been deeply concerned with politics—I've seen 9-year-old children listening carefully to political speeches—but for decades before 1972 there had been political stability.

Years ago my school geography book described Chile as the "shoestring republic," a country with an average width of only 110 miles but a length of 2,650 miles, with arid tropics at one end and penguins at the other (map, pages 440-42). The southern end is

all but roadless; the northern end virtually rainless. In between: lushness.

Santiago, the capital, is home to at least a third of Chile's ten million people. Many cities are more beautiful, but few nestle against so magnificent a backdrop: the soaring Andes just to the east, looming blue-gray tipped with white.

Soon after arriving in Santiago, I hailed a taxi and headed for the home of Alfonso Gomez Pavez, a government engineer. A Chilean friend of mine in Washington, D. C., had written Alfonso and asked him to show me the city. Looking back, it's hard to think of Alfonso as ever having been a stranger, for he became one of the most valued friends I've ever had.

He was waiting at the door. "Welcome. My house is your house, Gordon." And surely he meant it, for immediately I was surrounded by his wife, six pretty daughters, and assorted relatives who had assembled to meet this *norteamericano* journalist.

"You must come Friday to my son's engagement party," Alfonso demanded. "And let us drive over to meet my mother. And why must you stay in that hotel when we have room here?" Always my fondest memories of Chile will be of the Gomez family.

That afternoon was filled with laughter.

But Alfonso sobered when we talked of Chile's troubles, and he voiced a mournful sentiment that I was to hear many times as I traveled throughout the country, both last year and early in 1973.

"My poor Chile," he said, sadly. "What will become of her? The people are divided. We Chileans are not used to fighting each other, hating each other like this."

It was raining, but Alfonso took his sightseeing duties seriously. In his car we drove up San Cristóbal Hill to see Santiago in startling panorama (pages 448-9).

"Pedro de Valdivia founded this city in 1541," he said. "Valdivia had been proclaimed governor of what is now Chile by the Spanish crown. But the Indians—the Araucanians—were not anxious to hand over their land to the Spaniards. And Valdivia wanted more than land; he wanted gold."

Alfonso shrugged. "Perhaps he got it. He was captured by the Araucanians in 1553 and killed—according to one legend, they poured molten gold down his throat."

The rain ended as Alfonso stopped the car on San Cristóbal's crest. Then, as if arranged by a celestial stage director, the clouds parted and a rainbow appeared, one end planted in a shining, freshly washed Santiago.

We lingered, spellbound. "I am not a superstitious man," Alfonso said softly. "But I wish I could believe that the rainbow is a sign of better days ahead for Chile."

Ski Resort Booms in July and August

There are advantages to living in a narrow nation. Santiago residents can drive almost as quickly to ski slopes on the east as to magnificent Pacific Ocean beaches to the west.

With a fellow countryman, Henry Purcell, I drove one day up to Portillo. Henry is part owner and manager of this high-perched ski resort in the Andes.

"You're fortunate," he told me. "Unusually heavy snowfall has extended the season, so you can still ski in October."

Fortunate? My skiing days were twenty years behind me. But honor was at stake, so I donned rented gear and proceeded to the beginner's slope. An hour later—snow encrusted—I limped back and turned in my skis.

But evenings at the lodge were zestful times, and I wasn't the only one who limped. I spied a tall, lithe Chilean who wore a cast on his left leg. At my unspoken question, he grinned and nodded. Yes, a skiing break.

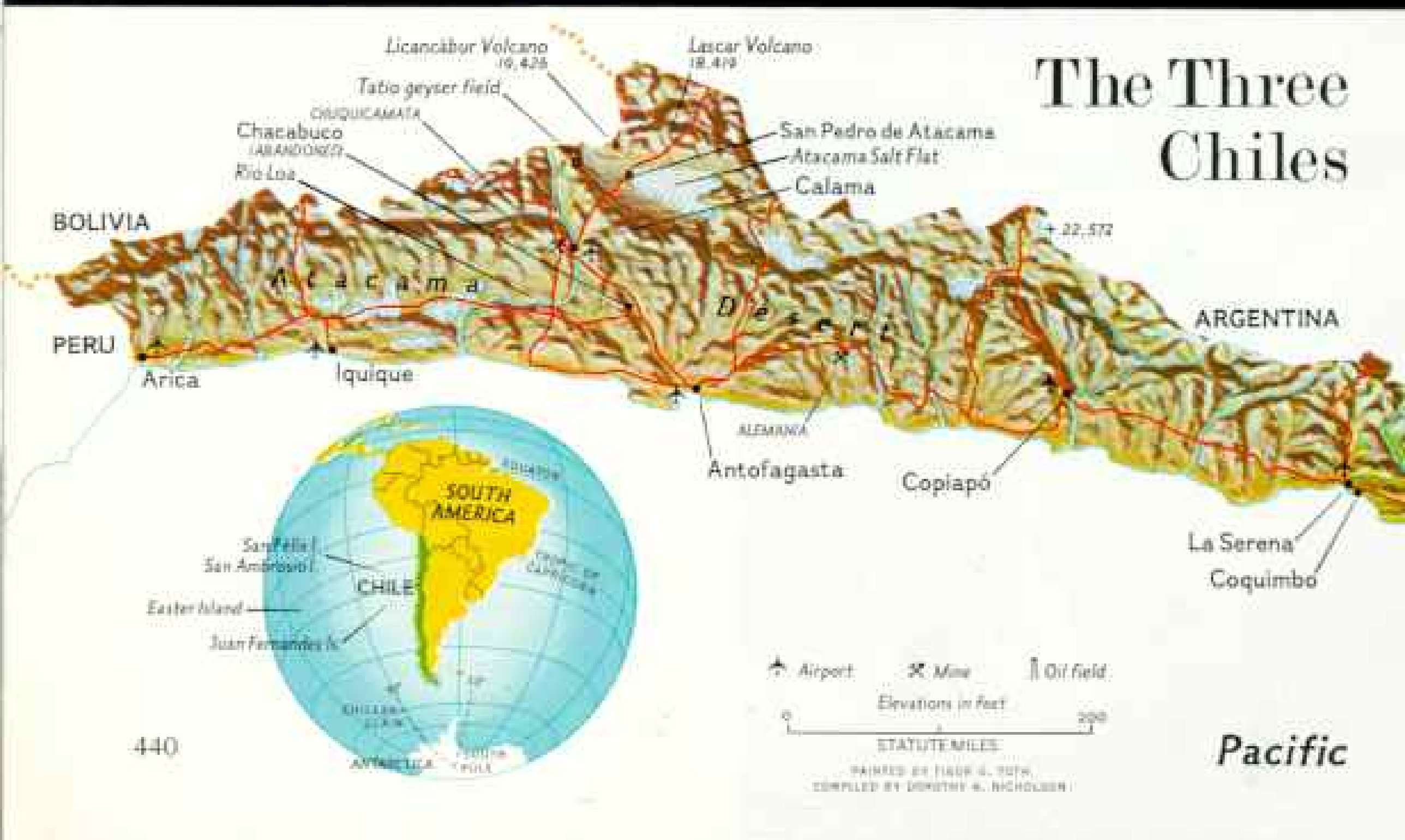
I saw him the next day—balancing on one ski as he came down the intermediate slope.

Chilean and Argentine skiers mingle on Portillo's slopes, for the resort lies within three

(Continued on page 446)

The people speak, flashing victory signs in support of posters that proclaim "Chile is and will be a country in liberty," and "No" to government reprisals. Thus employees of the Central Bank joined other middle-class Chileans in one of many protests against shortages of food and consumer goods and mounting inflation—problems they blamed on the Marxist-led regime.

The Three Chiles

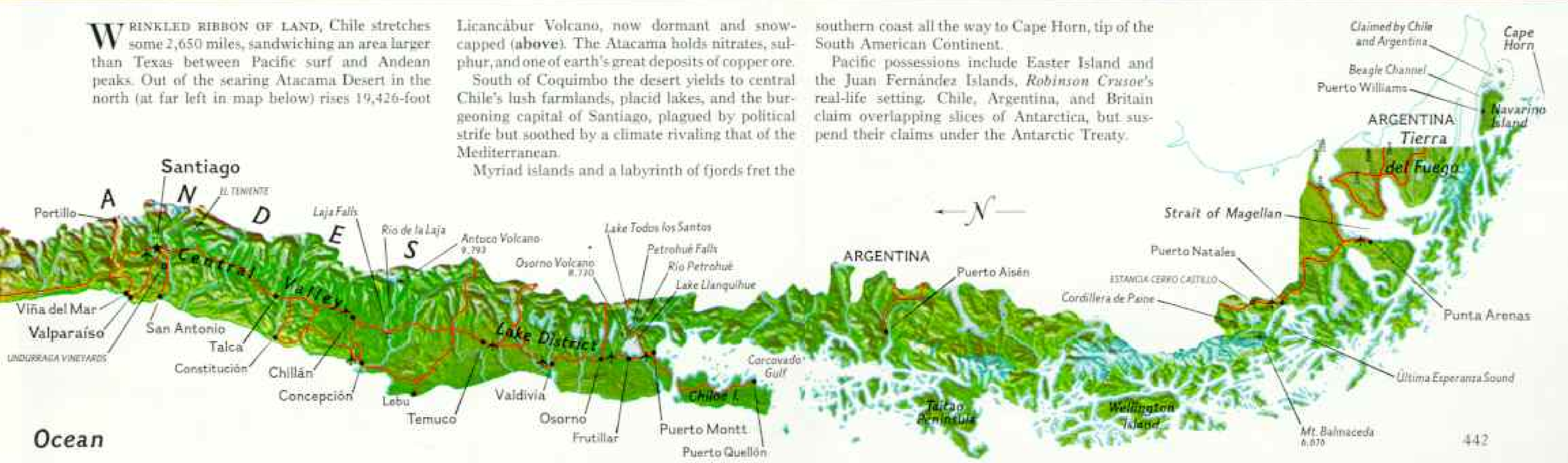


WRINKLED RIBBON OF LAND, Chile stretches some 2,650 miles, sandwiching an area larger than Texas between Pacific surf and Andean peaks. Out of the searing Atacama Desert in the north (at far left in map below) rises 19,426-foot Licancábur Volcano, now dormant and snow-capped (**above**). The Atacama holds nitrates, sulphur, and one of earth's great deposits of copper ore.

South of Coquimbo the desert yields to central Chile's lush farmlands, placid lakes, and the burgeoning capital of Santiago, plagued by political strife but soothed by a climate rivaling that of the Mediterranean.

Myriad islands and a labyrinth of fjords fret the southern coast all the way to Cape Horn, tip of the South American Continent.

Pacific possessions include Easter Island and the Juan Fernández Islands, *Robinson Crusoe's* real-life setting. Chile, Argentina, and Britain claim overlapping slices of Antarctica, but suspend their claims under the Antarctic Treaty.



Dissent takes its toll as political demonstrations, both for and against the government, become almost a way of life for residents of Santiago.

A young girl weeps (**left**), victim of tear gas in a street demonstration. Protest flared into crisis in October 1972, when truckers barricaded the capital, angered by reports the government intended to bring their jobs under state control. Other middle-class Chileans joined in a work stoppage, and the city's supplies dwindled. Motorists (**right**) push their cars to one of the last pumps in town that has gasoline.

Violence erupted when a radio station, ignoring government edicts, broadcast critical speeches. Cheering crowds pour into the streets while troops (**below**) run a gantlet of demonstrators' fires to restore order. Police silenced the station by cutting off its electricity.

Homemade from pots and pans, hard hats identify construction workers (**left**) supporting the government. One waves the Chilean flag. Upon taking office, President Salvador Allende instituted generous wage boosts to low-paid workers, financing the raises simply by printing more money. The buying spree that resulted virtually stripped the country's shelves of consumer goods. Now the black market booms and inflation soars at the world's highest rate.

"Chile wishes change without blood," cries an election poster (**above**), as a man and woman flee tear-gas fumes during a street melee. A Chilean (**left**) holds up a picture of slain revolutionary Ché Guevara, idol of the radical left. Traditionally one of the most stable democracies in the Americas, Chile long resolved her political disagreements by ballot. Today political turmoil clouds the nation's future.

miles of the Argentine border. But Argentinos arrive in smaller numbers these days. Chile's government has decreed that every foreign tourist must bring United States dollars, or their equivalent in another hard currency—and at the end of his stay, he must prove with accredited receipts that he has exchanged at least $10 per day at the official rate.

Therein lies the problem. The official tourist exchange rate is far below what the United States dollar will bring in the flourishing black market—as little as a tenth as much. In November 1972 black marketeers offered 250 escudos for one dollar. When I returned four months later, they were giving 800 escudos per dollar.

Even the official rate—the one foreigners are required to use—had climbed from 46 escudos per dollar to 70. Since then it has zoomed past 150.

So for the tourists, who must spend dollars at the official rate, Chile has become an expensive country indeed.

Why the $10-a-day regulation? I received two answers during my travels, and they reflected the ideological gap between government opponents and supporters.

A tourist guide told me that the regulation was a Marxist move to destroy part of the middle class—him. But a Marxist contended that without the regulation the hard currency, desperately needed by the government, would all end up in the black market.

Bank Clerks Banned From Gaming Tables

Tourist resorts on the Pacific Ocean are affected in the purse no less than are the ski centers. Last February in Viña del Mar, long one of South America's popular seaside playgrounds, I talked with Pablo Kulka, who manages the fine old Hotel O'Higgins.

"Foreigners, especially Argentinos, made up about 60 percent of our guests before the $10-a-day law came in," Mr. Kulka told me. "This year foreign reservations account for less than 10 percent."

By day, most of Viña's tourists are content to tan themselves on the shining beaches; the chilly north-flowing Peru, or Humboldt, Current keeps all but the hardy out of the water. But when the sun goes down, all roads lead to the huge white gambling casino.

Not everyone can pass through its portals. Employees of Chilean banks are banned, and all citizens must show papers proving they have paid their taxes. Until recently, wives needed written permission from their husbands to enter.

I displayed my U. S. passport and walked into an opulent setting that could have passed for Monte Carlo. At a polished mahogany roulette table, my small stack of 20-escudo chips (then worth about 30 cents each) rapidly melted away. The man next to me experienced no better luck—and he was paving the table with 1,000-escudo chips.

By chance, my wealthy neighbor and I found ourselves side by side later that evening on the veranda of the Hotel O'Higgins. We toasted each other with good Chilean wine and mourned our losses. Mine had been six dollars. His: *¿Quién sabe?*

He sighed, and for more than just his lost escudos. "Two years ago I owned a factory," he began. "The government nationalized it, and now I am retired. I have millions of escudos, but each year they are worth less. Inflation was 160 percent in 1972. This year it's even worse." His voice trailed off.

"We have inflation in my country, too," I said. But again, in effect, I was using 20-escudo chips to his 1,000.

"Inflation?" He snorted explosively. "I wish I could convert my escudos into those 'inflating' dollars of yours!" He turned to enter the hotel, then paused to offer some friendly advice.

"You are new to this country, so I must warn you. Many people will ask to buy your dollars, and the offers will be attractive. But such transactions are highly illegal." He waved a farewell and walked inside.

I stared out into the dark street, thinking. Four centuries ago, Spanish conquistadores marched into Chile, conquering as they came. They left an oligarchy as a heritage—a core of wealthy families with huge landholdings, and masses of poor to till their land. The haves and the have-nots.

Attempts to break up Chile's large estates had been made before the Marxists came to power in 1970. One of the first attempts was launched by Bernardo O'Higgins. The illegitimate son of an Irish father and a Chilean mother, O'Higgins played a major role in the fight to free Chile from Spanish rule. In 1817 Santiago's leading citizens named him Supreme Director of Chile.

O'Higgins's rule was short and stormy. He drove most of the Spanish troops out of the country, created the Chilean Navy, encouraged the founding of newspapers and schools.

El Compañero Presidente—"Comrade President" relaxes with his Weimaraner at Tomas Moro, his residence. The first Marxist to be freely elected a head of state, Salvador Allende vowed in 1970 to give Chile's poor a share in the country's land, wealth, and industry. He nationalized banks and accelerated the expropriation of major industries, including copper, kingpin of foreign trade. Breaking up vast estates dating from colonial times, he parceled them out to cooperatives managed by onetime tenant farmers.

Following these moves, Chile's industrial and farm production declined amid strikes and civil strife.

But opposition mounted when he interfered with the church and tried to break up the landholdings of the wealthy. Uprisings ensued. In 1823 he resigned and fled to Peru.

Chileans have not forgotten him. Somewhere in Chile there may be a town without an Avenida O'Higgins or a Hotel O'Higgins, but I have yet to find it.

Port Off-loads a Nation's Necessities

Just southwest of Viña del Mar I paused in Santiago's ocean gateway, Valparaíso. Hills tumble down to the harbor, some so steep that residents reach their homes only by *ascensores*—cable cars.

Though Chile's economic situation has curtailed imports, Valparaíso remains a busy port (pages 454-5). But virtually all incoming goods are critical necessities, not luxuries.

Chile's domain stretches far out into the Pacific. Four hundred miles west of Valparaíso lie the Juan Fernández Islands (map, page 440). Tourists may know them as the Robinson Crusoe Islands. In the early 1700's, Alexander Selkirk, a Scottish sailor, was marooned on Más a Tierra, largest of the group. He lived there alone almost four and a half years until rescued. Years later, Daniel Defoe read Selkirk's diary and used it as the basis for his classic novel, *Robinson Crusoe*.

But you must travel 2,300 miles from Valparaíso into the Pacific to reach Chile's most distant holding: Easter Island. Giant stone carvings there still puzzle scholars.

What puzzled me even more, however, was Chilean Spanish. Usually it fell on my ears in machine-gun fashion, with syllables missing. I found an interpreter in the Gomez home: one of Alfonso's daughters, 17-year-old Patricia, whose high-school English had been reinforced by a year's residence in the U. S.

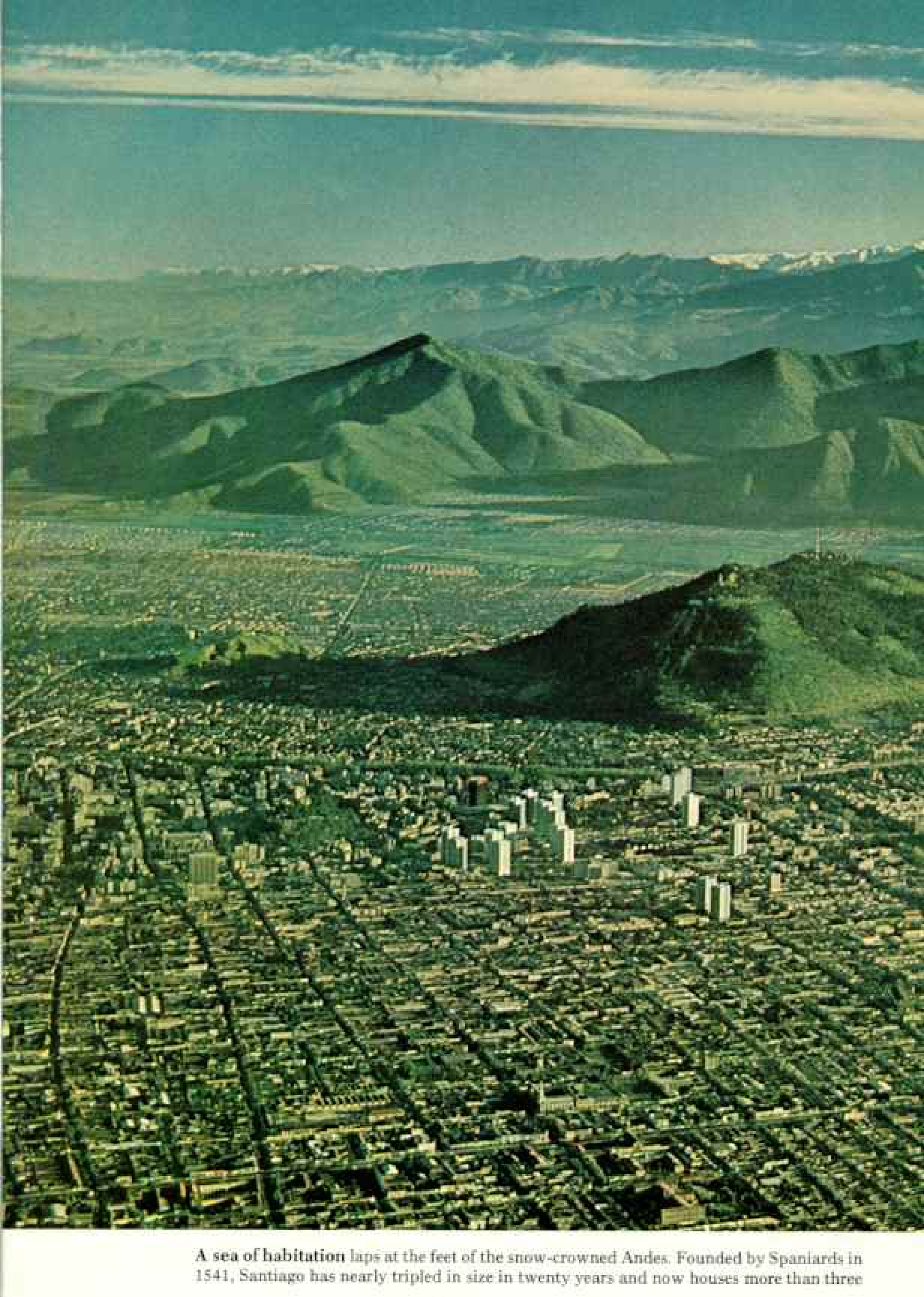
But there was a complication. I intended a trip north through the Atacama Desert. "No problem," said Alfonso. "Take Patty along, and I'll come, too, to show you CORFO."

CORFO—Corporación de Fomento de la Producción—was formed in 1939 to help the Chilean economy recover after a disastrous earthquake. A government operation, it continues to upgrade Chilean living conditions. Alfonso is a CORFO engineer.

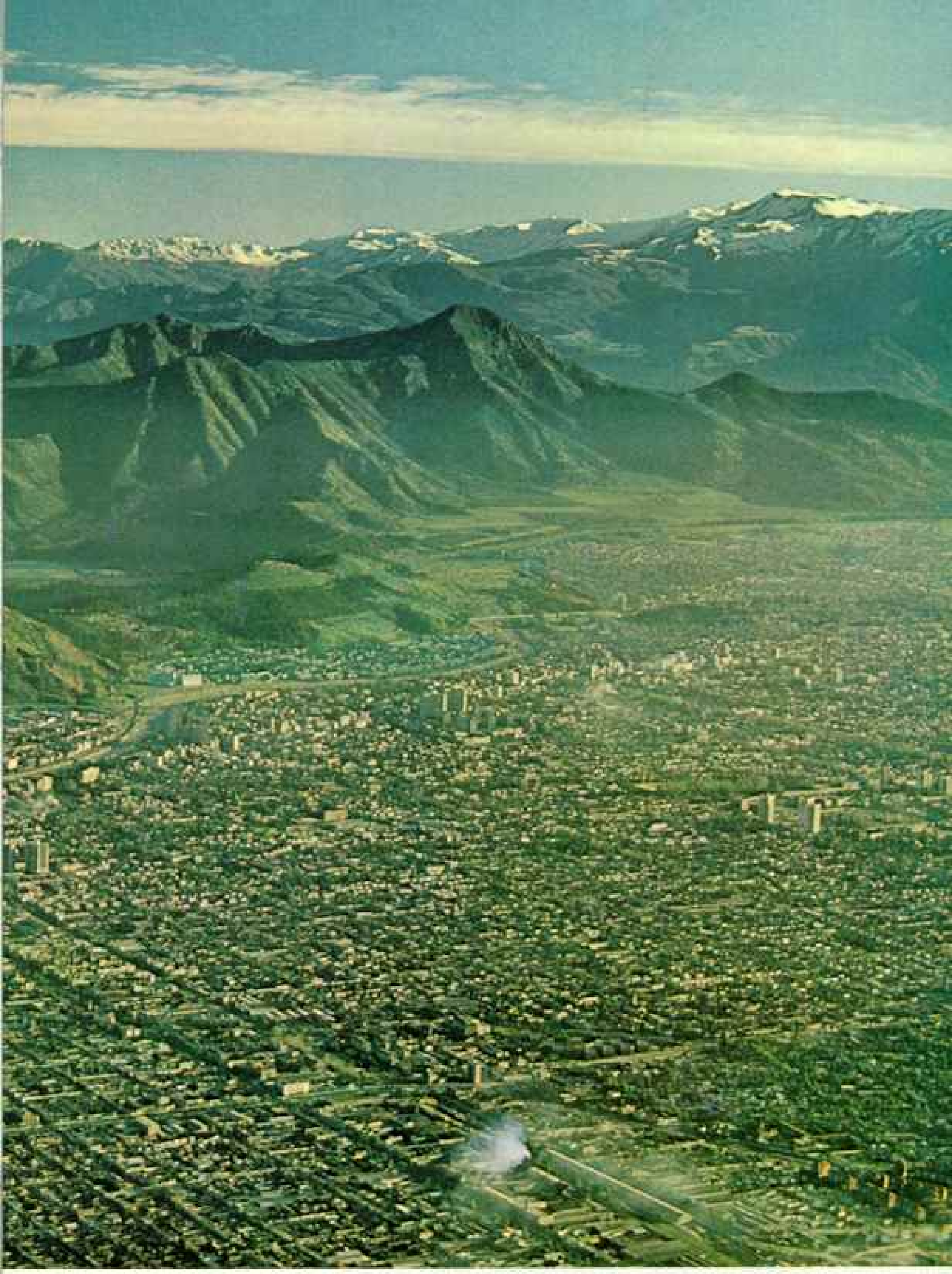
Two days later Alfonso, Patty, and I boarded a LAN Chile airliner and flew north to the city of Antofagasta, which serves the region's copper mines and is a major port for goods flowing east to Bolivia and Argentina.

There I found that virtually everything Antofagasta's 200,000 residents need must be imported. Even their water must be piped from the Andes, more than a hundred miles away. The water's high arsenic content requires circulating it through a special filtration plant.

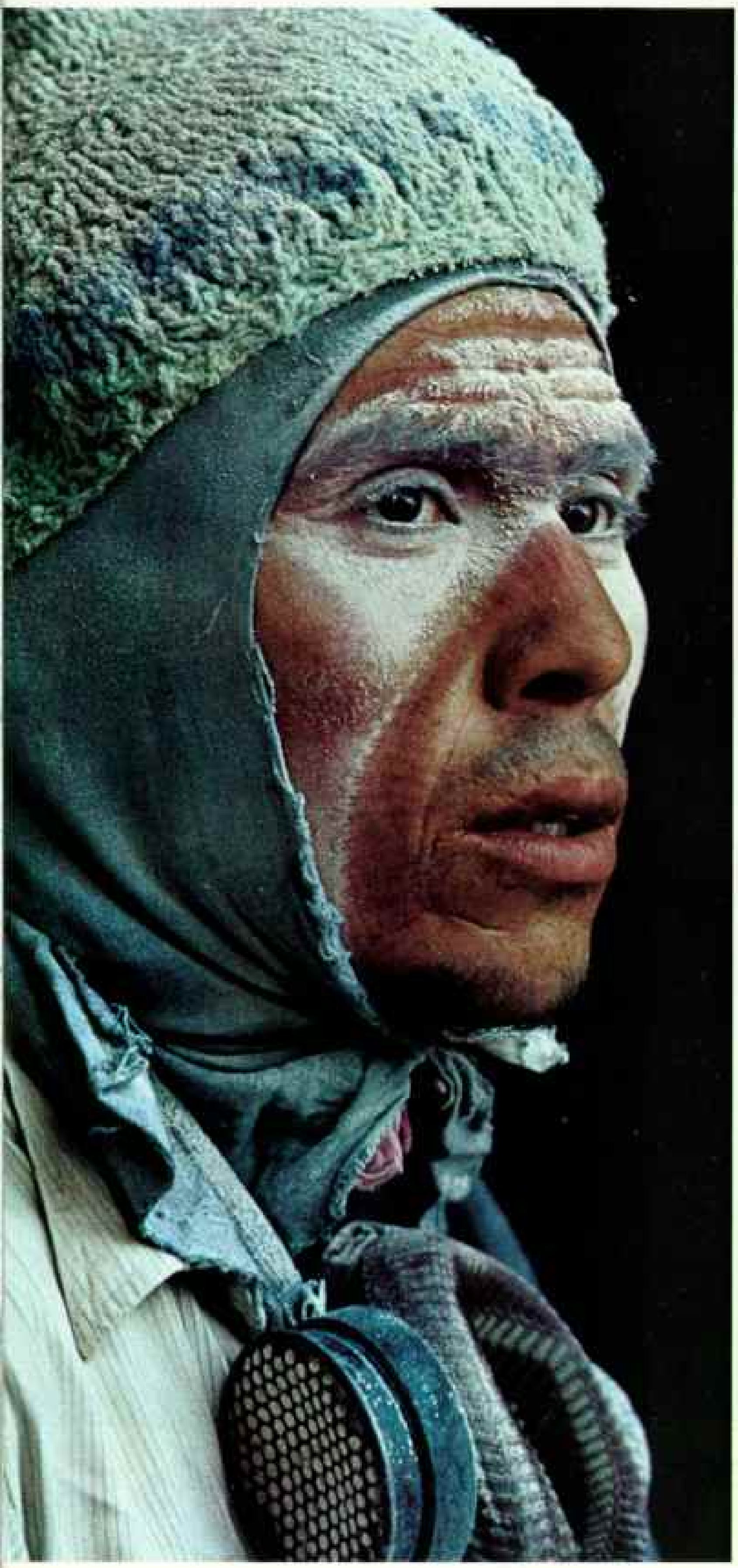
(Continued on page 454)



A sea of habitation laps at the feet of the snow-crowned Andes. Founded by Spaniards in 1541, Santiago has nearly tripled in size in twenty years and now houses more than three



million people—one of every three Chileans. Cable cars take visitors to the top of San Cristóbal Hill (center, left), where they enjoy a spectacular view from terraced gardens.



Powdered with nitrate, a miner finishes a day's work at the Alemania mine in the Atacama. A mask protects his lungs from dust. The world's chief source of natural sodium nitrate, the Atacama boomed from the 1860's to the 1920's, supplying foreign markets with the essential raw material for fertilizer and explosives. During World War I exports rose to more than three million tons a year.

Development of synthetic nitrates ended the monopoly, which at its peak produced two-thirds of Chile's total government revenue.

Scales spangle the net as a fisherman brings in anchovetas to be ground into meal for animal feed. Since 1971 the catch has declined 50 percent, due mostly to the intermittent and unpredictable wind-sea change known as *El Niño*. Southerly winds shift to the west, slowing the nutrient-laden Peru Current and allowing a warmer current from the north to split it asunder, displacing the anchovetas from their food supply of plankton.

Chile's bounteous fish harvest, second only to that of Peru among South American nations, also provides protein for the people's diet. The catch includes mackerel, tuna, bluefish, flounder, and swordfish. Shellfish abound along the coast; the Strait of Magellan yields meaty king crabs.

CARVING *fresh-fallen snow, skiers race down a slope at Portillo, one of the finest winter resorts in the Southern Hemisphere. During northern summers, Portillo lures ski buffs from around the world.*

Water—or the lack of it—holds the key to Antofagasta's future. The growing city increasingly needs more than the pipeline can supply. Once, city fathers envisioned a nuclear desalinization plant, but Chile's financial woes make that an improbable dream. Now officials talk of solar distillation. Certainly the city receives sunshine to spare.

Meanwhile, they do what they can to conserve the precious liquid. A sewage plant, now under construction, will send partially purified water to fire hydrants.

Alfonso showed me an irrigated three-acre plot where CORFO is growing vegetables. "We irrigated 25 acres here a few years ago," he said. "But so much water could not be spared; the people needed it."

If water in the city is in short supply, out in the Atacama Desert it is almost nonexistent; indeed, rain has seldom if ever been recorded in some areas. We drove northeast next morning toward the oasis city of Calama, across a moonscape of grays and tans.

Only a few miles out of Antofagasta we came to a marker attesting that the Tropic of Capricorn passed through this spot; we were entering the tropics. Dust swirled into the car, parching lips, clogging cameras, even finding its way into wristwatches.

This arid wasteland was virtually ignored until the 19th century. But in 1830 immense reserves of sodium nitrate were discovered. Peru, Bolivia, and Chile shared this desert

Stevedore smooths a truckful of U. S. corn, just off-loaded at Valparaíso, Chile's chief port, where other freighters wait to discharge their cargoes (**below**). They face delays of up to three weeks because of inadequate dock facilities. With Chilean farms producing less, the nation imports more than twice as much food as it did in 1970.

wealth for half a century—with worsening arguments, and finally war.

The War of the Pacific, it was called: Chile versus Bolivia and Peru. The conflict began in 1879. Five years later Chile had won, and the Atacama was hers. For the next four decades the mineral was in great demand for fertilizer and explosives. Nitrate provided a major part of Chile's national income.

When synthetic nitrates made from the nitrogen in the air were developed shortly before World War I, they spelled the end of the boom. Today most of the mines are silent, and the settlements around them are ghost towns.

Alfonso, Patty, and I detoured off the main road to visit one forlorn mining town, Chacabuco. More than 3,000 workers and their families once lived here. Now only an aged caretaker occupied the old company town.

Prowling Chacabuco's dusty streets, I peered through dust-encrusted windows. How austere the lives of its residents must have been, I thought.

But not entirely austere. On the square I found what must have been a saloon and dance hall. A Wild West movie company could have filmed it without a change.

We welcomed the sight of Calama, with its promise of relief from the treeless desert. There a vegetation-lined stream, the Rio Loa, wound through the oasis on its way from the Andes to the sea, and a modern CORFO-built hotel nicely ended our day's drive.

A very large hole in the ground ten miles from Calama, I knew, was bound up in world controversy. The Chuquicamata Copper Mine—"Chuqui" for short—had belonged to the U.S.A.'s Anaconda Company until the Allende government nationalized it and other mines in 1971. Another ousted firm, the Kennecott Copper Corporation, was bringing suit in European courts and attaching Chilean copper shipments, pending reimbursement for the company's properties.

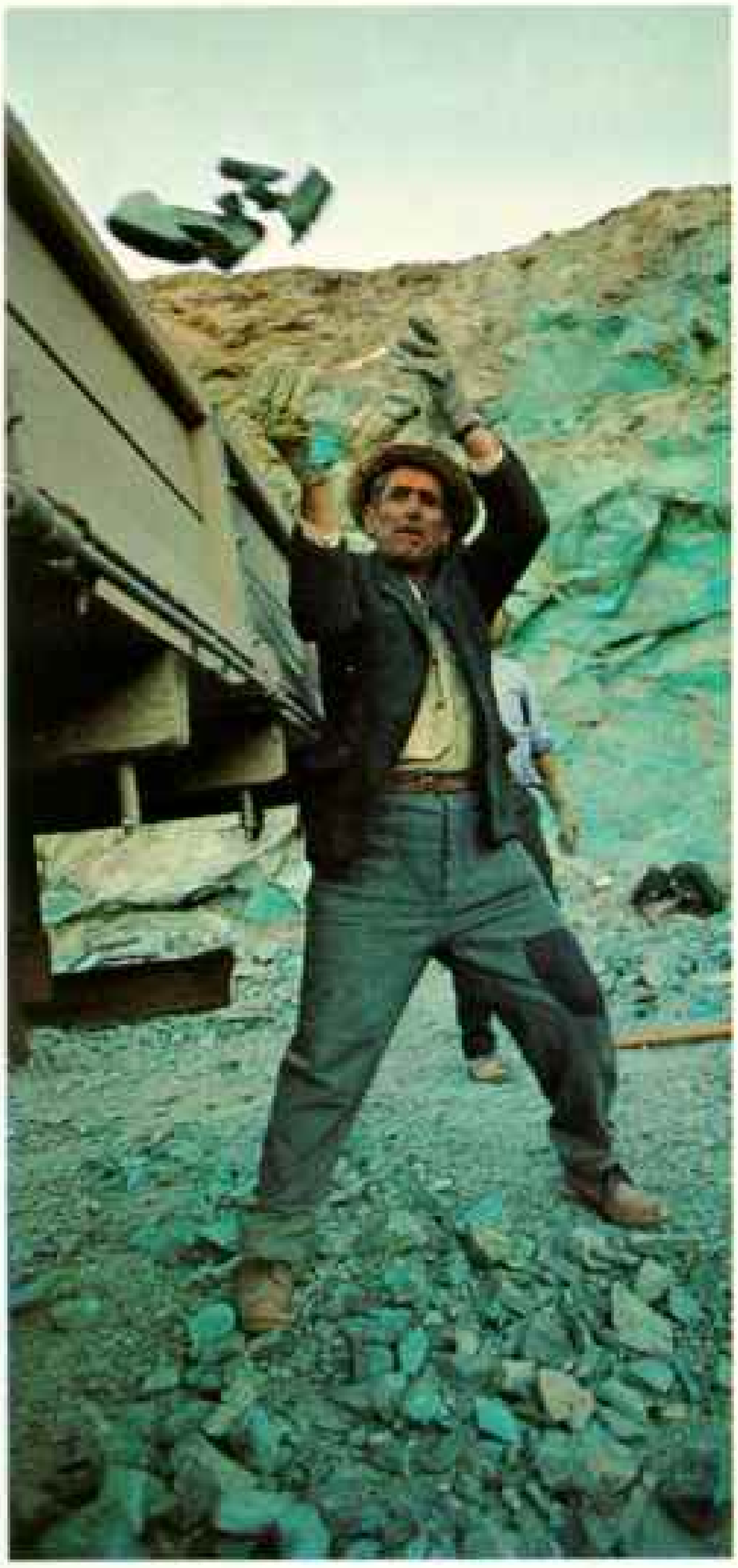
No Shortage of Hospitality

One such suit was in progress when I visited Chuqui. Not surprisingly, the walls near the mine were painted with anti-American, pro-Marxist slogans. But my Chilean hosts at the mine were careful to draw a distinction between international affairs and person-to-person contacts. I heard no diatribes against *yanqui* imperialists; instead, they made my stay as informative and pleasant as possible. Always I've found it so, in Chile. Politicians may flay Kennecott or International Telephone & Telegraph in speeches, but a norteamericano traveling through the land is treated as a guest.

Chile still managed to sell abroad as much copper as it produced. But Chuqui, with reduced capital and fewer technicians, was seriously crippled. Machines sat idle; new parts were nearly impossible to buy. As a stopgap, the Chileans had converted a mine

Steps scaled for a giant. The massive terraces of Chuquicamata, one of the world's largest open-pit copper mines, dwarf trains and a huge power shovel. Developed by the Anaconda Company and now nationalized, the mine yielded 235,000 metric tons in 1972—20 percent less than it did under private ownership. A two-month strike in 1973 at El Teniente, another major mine, forced Chile to curtail copper exports.

Meanwhile, at a small pit near Calama (**below**), a member of a 26-man government-sponsored cooperative tosses ore into a truck. Working from dawn to dusk, the men split profits and are prospering.



building into a foundry, and planned to cast any parts that could not be purchased.

"Poor Chile," Alfonso moaned. "Once we exported lots of nitrate, copper, and wine. The nitrate market collapsed. Now we have trouble with our copper. I hope the world does not stop drinking wine."

Leaving the main road at Calama, my companions and I bumped our way 60 miles to the village of San Pedro de Atacama, in the shadow of the Andes. En route we watched a distant volcano puff white clouds of steam; even miles away we could smell its sulphurous smoke.

Chile's Atacama Desert is so rich in minerals that we found them lying on the surface. At one point we stopped to stretch our legs, and in five minutes I collected a pocketful of sulphur, copper, and mica samples for my son's collection.

Storehouse of the Far Past

San Pedro de Atacama, far from the tourist path, nonetheless boasts an amazing museum, a one-man storehouse of antiquity created by Father Gustave Le Paige, a Belgian Jesuit priest. A tiny man with an impish grin, he acquired a taste for archeology during 20 years in the Congo. In the past 19 years in San Pedro, his hobby grew into dedication. Now his finds fill the museum's three wings.

I wandered through a fascinating clutter of human skulls (more than 5,000 of them), mastodon bones, and casts of dinosaur tracks. Long wooden tables lined the wall. Sitting atop them, with knees drawn tightly against their chests, were hundreds of well-preserved mummies. Father Le Paige had found them in ancient Indian graves.

"Flesh doesn't decay in this dry desert air," the priest said, "so some of those mummies date far back into pre-Columbian times."

His great hope, he told me, is that a team of trained archeologists someday will come to evaluate his finds. A humble man and an amateur collector, he would rather leave the conclusions to experts.

I studied tray after tray of artifacts found in ancient desert burial places (next page). Among them were pieces that seemed of African, Korean, and Italian origin. But how could a Greco-Roman pin—a mermaid holding a mirror and comb—have found its way into an Atacama Indian grave?

When I asked Father Le Paige, he gave me his elfin grin and asked a question in return:

Peering out of the past, eyes of pale turquoise dot the handle of a pre-Columbian snuff tray carved by an Atacama Indian. Father Gustave Le Paige, a Jesuit missionary at the desert oasis of San Pedro de Atacama and an ardent amateur archeologist, discovered the tray and a wealth of other treasures. His museum at San Pedro preserves mastodon bones, Indian mummies, and thousands of human skulls.

Portent of the future, the Tatio geyser field may one day provide additional energy for the power-starved province of Antofagasta. Chile sits athwart one of the world's major fault systems. Now, assisted by United Nations technicians, government engineers are drilling wells to gauge underground geothermal energy. The first well unleashed a gush of steam whose power equaled that of a locomotive.

"Could the ancients have been more widely traveled than we thought?"

CORFO's northern branch, called INCONOR, maintains an agricultural station in the outskirts of San Pedro de Atacama. We were greeted there by Francisco Araya, manager of INCONOR, who was anxious to show me his pet project—one that may someday change the face of this dry land.

"These are *tamarugos*," he said, pointing. "A tree unique to the Atacama." Trying to look impressed, I stared at a row of small thorny trees with waxy leaves (next page).

"Chile spends $80 million a year for imported beef," Señor Araya said. "Today that is a serious currency drain. By raising sheep on tamarugo fodder, very high in protein, we hope to turn this desert into an important meat-producing area."

We jolted onto the desert in a truck to visit a plot of tamarugos. The trees looked healthy, though they stood only two feet high.

"We planted these saplings 18 months ago," my host said. "For the first six months, we watered them; since then they have survived on their own."

How, on this desert, could they find water? By tapping the water table far beneath with their deep-searching roots, he replied, and by taking moisture from the air.

I could understand, now, the reason for Señor Araya's pride and enthusiasm. His project may one day make the Atacama bloom. Perhaps other deserts, too. Agronomists of other nations are watching with interest.

Spiral of Strikes, Shortages, and Inflation

When Alfonso, Patty, and I completed our exploration of the harsh Atacama, we flew back to the comforts of Santiago. Even there, I discovered, many comforts were hard to find, for the city suffered shortages stemming from strikes and curtailed imports.

Supermercados opened their doors each morning to long lines of housewives, and produce sold out rapidly. So did virtually every essential: shoes, clothing, toothpaste. "*No hay*" (There isn't any) seemed the most frequently used phrase I heard.

I asked a housewife how she managed. She smiled wryly. "Shopping takes much time now, for almost everywhere I must wait in line. And the day starts early. If I don't arrive at the market by 6 a.m., there will be little left to buy for our dinner."

Government critics and supporters offered widely differing reasons for the shortages. The critics told me that nationalization of farms and industries had seriously decreased production. And they claimed that when large, efficient farms were taken over, most of their production went to feed the new workers, and little remained for shipment to the cities. Too, factories sometimes were turned over to inexperienced managers.

But government supporters maintained that two elements created the shortages. First, lower-income families could afford former luxuries such as beef, and thus a huge new consumer group was competing for goods on the counter. Second, Chileans were hoarding virtually every type of product, aggravating the shortages.

Certainly there was hoarding—Chileans turning their rapidly inflating currency into

"Give me water," implores a sign on a flower-ringed *tamarugo* tree near La Serena, and a passing motorist obliges. Actually, the hardy tamarugo can survive on the little moisture it gleans from the ground and from Pacific fog. Agricultural teams have succeeded in nurturing groves in the arid Atacama, promising to make the desert more productive. Fodder from the trees may one day support flocks of sheep.

In sleepy San Pedro de Atacama, citizens amble homeward after a trip to the local market (**right**). Copper-mine wages lure the town's young men to Chuquicamata.

things that would retain value. A taxi driver told me how hoarding affected his life.

"If I need an engine part," he said, "I do not bother visiting the garage. It is useless. Instead, I visit the husband of my wife's hairdresser, who has acquired a supply of auto parts. If I need butter? Shoes? A certain garage mechanic can furnish them."

He opened the glove compartment to show me his own "non-inflatable currency"—cigars stacked like cordwood in there.

Shortages, inflation, the threat of continuing violence—this grim triad has beset Chile on all sides. Many affluent families have sold their possessions and fled to foreign lands.

Others—all hope not lost—have sent one member abroad to create a new life; then, if the rest of the family must flee, sanctuary awaits them.

Fishermen's Heaven in the High Lakes

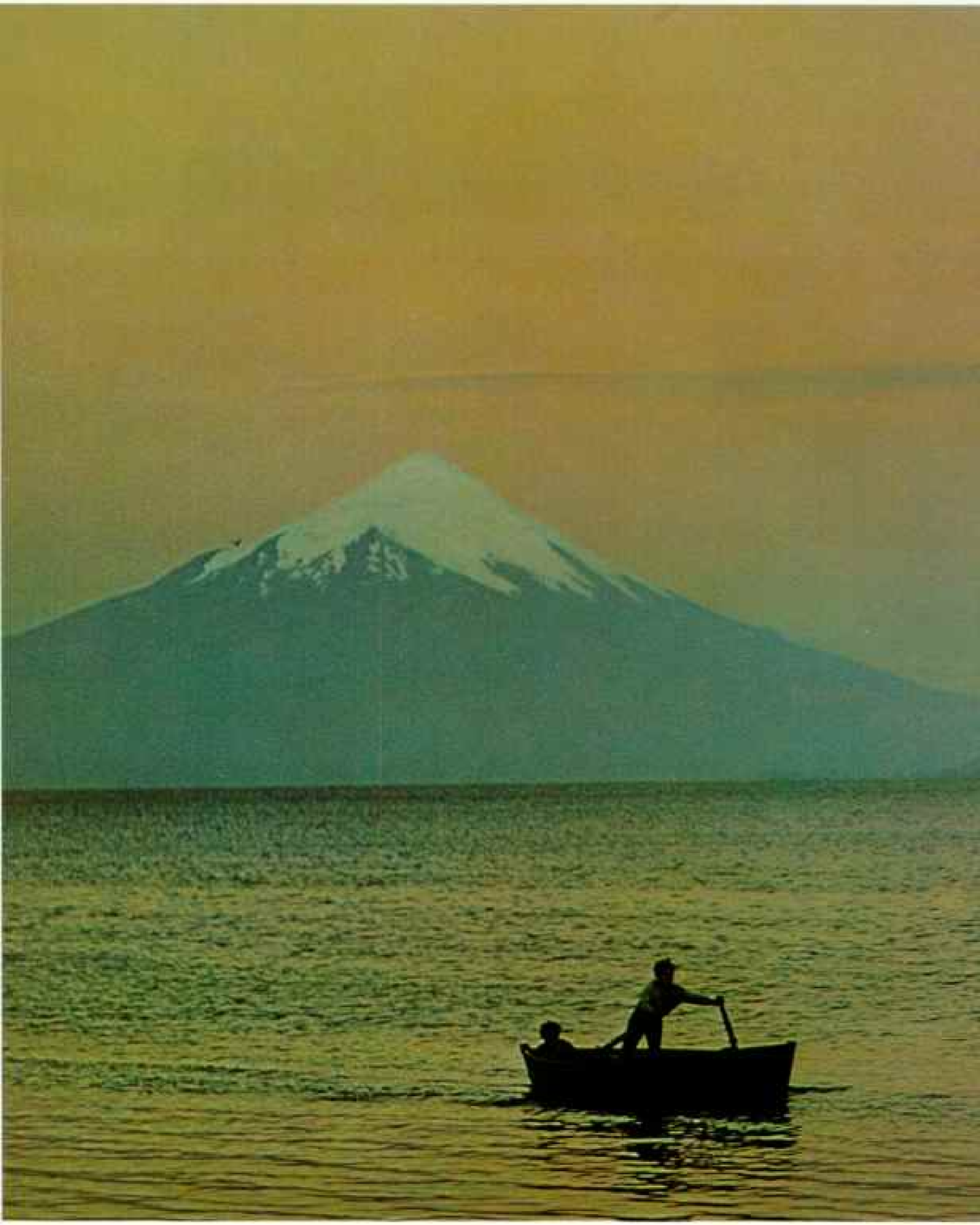
But life must go on. In summer many Chileans traditionally head for vacationlands in the south. Food is plentiful there, and big trout await anglers in sparkling mountain lakes.

I flew south one day to Puerto Montt, a gateway city to Chile's Lake District. Photographer George Mobley met me at the airport, looking harried.

"There's no point in even trying to get a hotel room," he told me. "Last night I slept in an ice-cream parlor. But I've found an attic room in a private home; the landlady has set up an extra cot there for you."

Stout fellow, George! He not only obtained a bed for me to call my own but guided me to restaurants that served beef. I had eaten my fill of *cabrito*—goat meat—in Santiago.

Much of Puerto Montt's food is grown on farms to the south. It arrives by boat, for Chile's southern thousand miles is an almost roadless mosaic of islands and glaciers. Small cargo vessels, their holds crammed and decks piled high with produce, sail in on the high tide. The ebb strands them on the damp



Dusk falls softly as a handkerchief on Llanquihue, largest of the expanses of fresh water that pearl Chile's Lake District. Beneath the beacon of a full moon rises dormant Osorno Volcano. Hidden beyond it lies fjordlike Todos los Santos, noted for its

emerald waters. Chileans and foreigners alike journey to the lakes for relaxation or to angle for the region's trophy-size trout.

bottom, for the harbor has as much as a 22-foot tidal fall. Horse-drawn carts pull alongside to ferry the produce ashore.

Thirty-five miles northeast of Puerto Montt looms Osorno Volcano (opposite), a snow-capped peak with the symmetry and grace of Japan's Mount Fuji. George and I flew low over its summit one summer evening—Chile's summer, in February—as the setting sun reddened its snowcap. How magnificent, I thought, and yet, how foreboding. For this extinct volcano reminds one of nature's many demands on Chile.

Only 13 years ago a major earthquake rocked the coast of southern Chile. Alfonso had told me about that disaster.

"It was an offshore quake," he said, "that created a huge ocean wave. Puerto Montt, Valdivia, Concepción—all were shattered by the wall of water.

"It was a national disaster," he continued. "Like the earthquake in 1939 that caused CORFO to be formed. Our mission was to help the nation recover from that terrible event."

Old photographs of Puerto Montt's main plaza reveal a desolation of shattered concrete pavement and splintered palms, with the city band shell tilting crazily. Thirteen years later, I could see that the band shell and all else had been restored.

Puerto Montt's fishermen shrugged when I mentioned the quake. "We build our lives around the sea," said one. "We must accept all her moods."

Computer Refugee Roams the World

Political turbulence, shortages, and high prices have not discouraged North American tourists. I met them frequently in the Lake District. Most were following the established tourist trail: a one-way trip from Puerto Montt through the lake area to San Carlos de Bariloche just across the Argentine border, and thence to Buenos Aires.

Early one morning, seeking a car and driver to take me into the lake country, I visited a Puerto Montt travel agency. Two U.S. tourists waited with me for the office to open. They introduced themselves as Gilbert and Marjorie Aschoff, currently citizens of the world. Gil, who sported a bushy beard and wore a jaunty Dutch sailing cap, said that he had given up his job in the California computer field 14 months earlier, and he and blond Maggie had set off to see the world.

They crossed the Sahara by Land-Rover,

roamed Africa for a year, then traveled to Rio de Janeiro. They hitchhiked south to Tierra del Fuego and now were moving leisurely north toward Santiago. I found them delightful people. So, when I arranged for my car, I told the travel agency that there would be three passengers instead of one.

Beautiful Land of the Araucanians

The customary trip from Puerto Montt to Bariloche involves alternating bus rides and boat trips—four of the former, three of the latter—for roads only occasionally skirt the lakes. It can be a tiring trip, but only the most insensitive visitor could tire of the magnificent mountain scenery along the way.

Once this was Araucanian Indian country, and their tongue-twisting names are still in use: Lake Llanquihue, Petrohué Falls. The Spanish never really conquered the Araucanians. Not until 1870, three centuries after the Spaniards arrived, did the Indians acknowledge the authority of the Chilean Government.

As we drove along Lake Llanquihue, we could see an inverted Osorno reflected in the bright blue waters. Our driver spoke up. Llanquihue's trout were so large and numerous, he bragged, that three-pounders were often tossed back by fishermen. Well, he was a tourist guide and a fisherman—two species known to exaggerate on occasion.

We paused at Petrohué Falls, where the Rio Petrohué tumbles over rock precipices and roars foaming through narrow gorges. Behind

us loomed Osorno as though placed for best effect by the Chilean Tourist Bureau. At the end of the road spread Lake Todos los Santos, where Bariloche-bound tourists would board their first boat for the 20-mile trip to the lake's other end.

Many earthly paradises have been despoiled by the throngs who came to enjoy their beauty. I was happy that Todos los Santos is not yet one of them.

After a short cruise we lolled beside the lake, yielding to indolence. To Maggie, only the Bavarian Alps could compare with this scenic grandeur; Gil and I agreed.

Actually, many Chileans in this region are of German ancestry, hardworking men and women whose forebears came here in the

Quickstepping for profit—he's paid by how much he picks—a harvester in the privately owned Undurraga vineyards hurries to unload grapes. Chile's Central Valley grows wines that rival many European and North American vintages. Most of the top-quality wines are now exported to bring in needed foreign currency.

At Fundo San Juan near Puerto Montt, a dairy farmer cuts grass for silage (**left**). His 100 acres, too few to fall under the state's land-reform program, remain in private hands. Most farms over 200 acres—the limit specified by law—have already been nationalized, including the country's largest estate, a spread of 1,300,000 acres.

middle of the 19th century to build farms and ranches and dairy herds.

Today, some of these German-Chileans have become victims of the times. The agrarian reform movement, launched under a previous administration, aims at breaking up the huge *estancias* that were a legacy of Spanish rule. Initially the ranches were purchased, then divided into plots of a few acres. The farmers assigned to those plots didn't own them, but worked them cooperatively.

The pace of nationalization increased when the Allende government came to power. In many instances, groups of farmers seized estancias, often at gunpoint. Most of those takeovers, illegal or not, have not been reversed.

One morning Gil, Maggie, and I visited a nationalized dairy farm near Valdivia. The owner had kept about 120 acres of his original 1,300. A German-Chilean, he faced his loss with wry acceptance. The fact that his former acreage was not being utilized effectively bothered him most.

"My farm used to produce 400 tons of milk a year," he told me. "Last year it produced only 40 tons. The output this year will be only about half that."

The basic problem, he said, is that workers soon lose incentive when they are assigned a plot on a nationalized farm. "At first the farmer has the impression that he will own his little plot. Actually, he is just farming for someone else—the government."

Rusting Relic of Windjammer Days

In mid-February I boarded an airliner for Punta Arenas, Chile's southernmost city. As the plane droned south, I looked down on glaciers and fjords; Norway's coast looks much like this.

Unexpectedly, though, I saw green fields as the plane descended toward the Punta Arenas airport. I stepped off the plane into a warm summer day, and into a wind almost strong enough to blow me off the exit ramp.

Starting as a penal colony in 1849, Punta Arenas thrived because of its location on a trade route. Many a windjammer put in here on her rough journey around Cape Horn. After the opening of the Panama Canal in 1914, the city had to settle for a quieter existence. Today it serves as commercial center for cattle and sheep ranchers, and for a modest oil industry that has grown up in the past few decades. Though a free port, Punta Arenas also feels the pinch caused by Chile's drastically curtailed imports.

I checked into the pleasant Hotel Cabo de Hornos and then wandered down to the waterfront. Two small coastal freighters lay at the city's single main pier, and a larger ship was moored not far off.

But what a ship! She was stained brown with rust and her topmasts were missing, but clearly she was a square-rigger—the type of windship that sailed this strait long before the Panama Canal was opened.

Now she served only as a floating warehouse, a stores ship for the Chilean Navy, local fishermen told me. I found it sad, but I was glad for the glimpse she gave me of square-rigger days.

Fractured English in Ten Days

I missed my interpreter, Patty Gomez, so I asked the Chilean Travel Office in Punta Arenas to find another. *Sí, señor*, they would send around an interpreter in the morning.

At nine the next day, someone knocked. When I opened the door, a pretty girl stood there with a solemn expression on her face and a book clutched in her hand. "My name is Patty Sepulveda," she announced.

¡Caramba! Are all Chilean interpreters pretty little Pattys?

We proceeded to the hotel coffeeshop for a planning session. In the elevator I glanced at the title of her book and winced. *Learn English in Ten Days.*

Patty's English *was* a bit fractured—I could never convince her, for instance, that "OK" was not a synonym for "Yes" when I'd ask her if something was correct or not. But she certainly enlivened my stay in Tierra del Fuego, for I virtually became a member of her family.

To Maria, Patty's 3-year-old sister, I was *abuelito*—"little grandfather." Her parents took me to farm expositions and rodeos. When her boyfriend turned up, he gazed suspiciously

Filigree of foam dissolves into mist as the Río de la Laja tumbles 150 feet. When spring melts Andean snows, the falls becomes a thundering torrent, laden with black sand from volcanoes near the river's headwaters. Daredevil observers above had to scramble over rocks along the falls' brink to get to their improbable perch.

at this foreigner who was spending so much time with his girl.

With Patty, I first visited INDAP, an agricultural association, and met Patricio Rettig Montalva, its director in Punta Arenas.

I was a norteamericano journalist; he was a member of the Radical Party. But common courtesy is a way of life in Chile. Patricio unrolled a map and pointed out the many ranches that had been nationalized in his area. He said, "Under President Allende, we have nationalized more farms and ranches in the first years than the last administration did in its six-year term."

We drove to one of the farms, or *fundos*, and met the president of the cooperative that operates it, Manuel Fajardo Alvarez.

Señor Fajardo waved an arm at the lush fields surrounding us. "Twenty-five farmers work here now. Before, there were only eleven. Here we grow celery, potatoes, and cabbage." He pointed at the metal skeleton of a greenhouse under construction. "Soon there will be three greenhouses, enclosing 150,000 square meters," he said. "They will be protected by high louvered fences, for the winds sometimes reach a hundred miles an hour."

Patty Sepulveda struggled gamely to relay those statistics to me, and in almost the same breath announced that this day was her twenty-first birthday.

My two friends bowed as one, proper Chilean gentlemen. Patricio picked a bouquet of flowers for Patty. Señor Fajardo stepped into a hatchery and reappeared with a baby chick for her. Now at the bottom of the world there is a chicken named for me: Gordito.

A little later Patty and I visited the southern headquarters of ENAP—Chile's national oil company. Its secretary-general, Peter Schiodtz Hutchison, was a Chilean of Danish-Scottish descent who spoke perfect English.

"Since oil development started here in 1950, we've drilled nearly 1,500 wells," he said. "Our 366 producing wells yield about two million cubic meters a year—12,500,000 barrels—which is roughly a third of Chile's oil needs. At present our wells are artesian—that is, no pumping is needed—but soon they'll stop flowing. Then we'll have to pump natural gas down to force the oil up."

Though much of the oil lies under the Strait of Magellan, offshore drilling is not used. Instead, oil rigs stand on the beach and drill out under the strait to the oil.

Penguins Patrol Magellan's Passage

In 1520 Portuguese explorer Ferdinand Magellan first sailed the strait that bears his name. Patagonian Indians—the "big feet"—must have watched and wondered as his ship passed by. There may have been another audience, too: penguins, solemn in formal attire.

In a chartered plane I circled an islet

Log rolls man? A worker uses his own body weight to lever a log into position at a sawmill near Frutillar. The oaklike roble wood is much sought after for fine furniture. From some 14 million acres of forest, Chile harvests a variety of hardwoods and the magnificent alerce cedar. Monterey pine, imported from its native California, thrives so successfully that it now accounts for more than 60 percent of the nation's lumber.

in the strait north of Punta Arenas. A round, white-rock island, from the air it resembled a target: a black bull's-eye ringed with white. As my plane approached, that bull's-eye moved away. It was a mass of thousands of penguins.

We kept our distance, flying only close enough to watch with binoculars as the creatures ran, in their flat-footed, ludicrous way, from the noise of our plane. Though their gait was awkward, I saw that penguins can move very rapidly if they choose.

Penguin island: It reminded me that Antarctica lies only 625 miles south of Tierra del Fuego. Chile has put its claim to a 480,000-square-mile, pie-shaped slice of that empty continent—an area 60 percent larger than Chile itself, reaching to the South Pole—in abeyance at least until the 1990's, under the multination Antarctic Treaty that reserves the entire southern continent for peaceful scientific research.

For a different kind of spectacle, Patty and her family took me to a rodeo 25 miles out the road south from Punta Arenas. At top speed, Chilean cowboys—*huasos*—galloped their mounts in figure eights, and brought them to sudden stops in clouds of dust. But I saw no bucking broncs or Brahman bulls; instead, the emphasis was on rapport between man and horse.

When a fast-moving cow bolted into the arena, two huasos pursued it. They brought it to a halt not by roping or bulldogging, but by guiding it skillfully to the padded arena wall and pressing it immobile there with their horses.

Huasos dress in Spanish fashion, with flat, broad-brimmed black hats and dark trousers

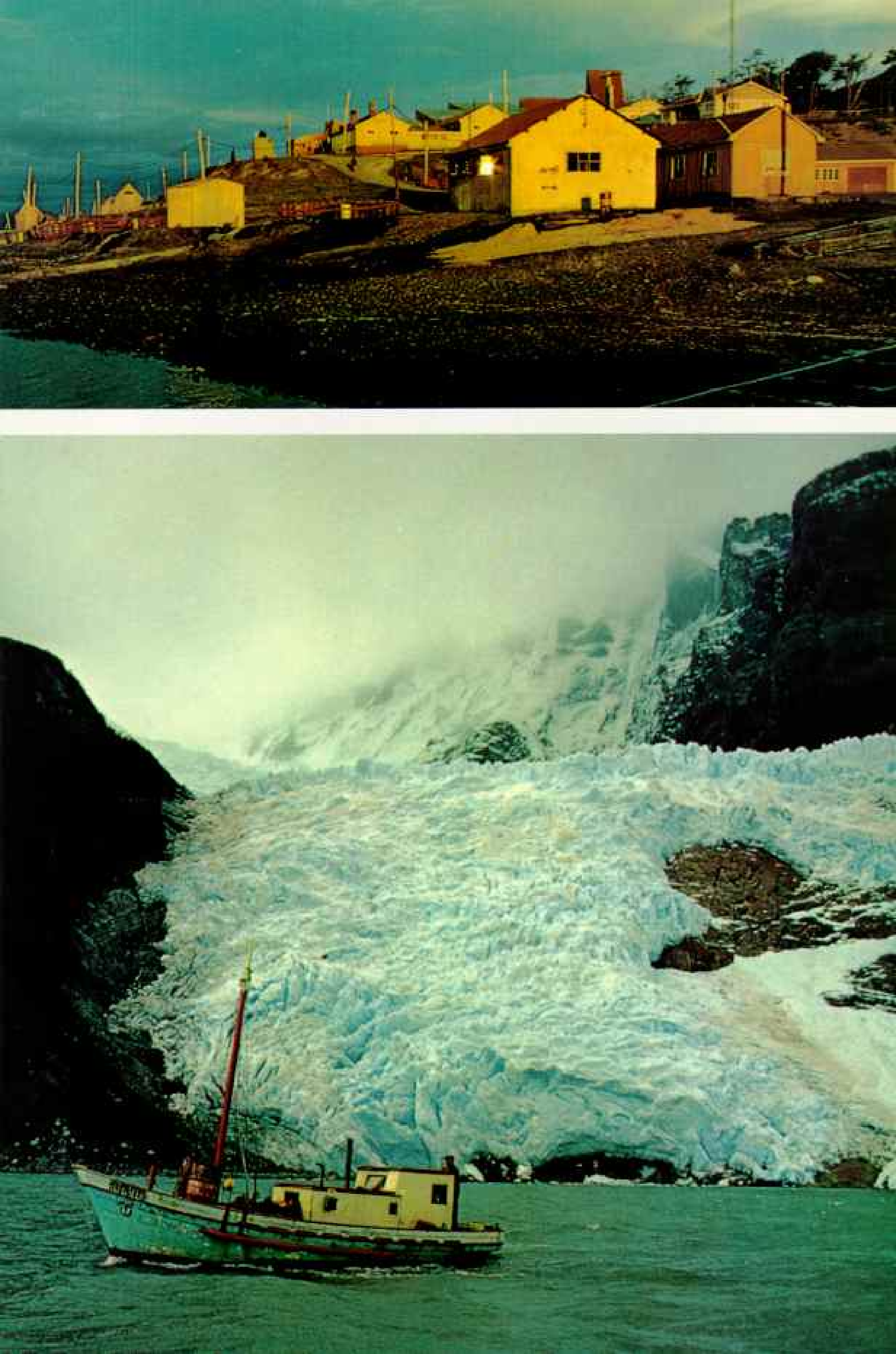
(Continued on page 477)

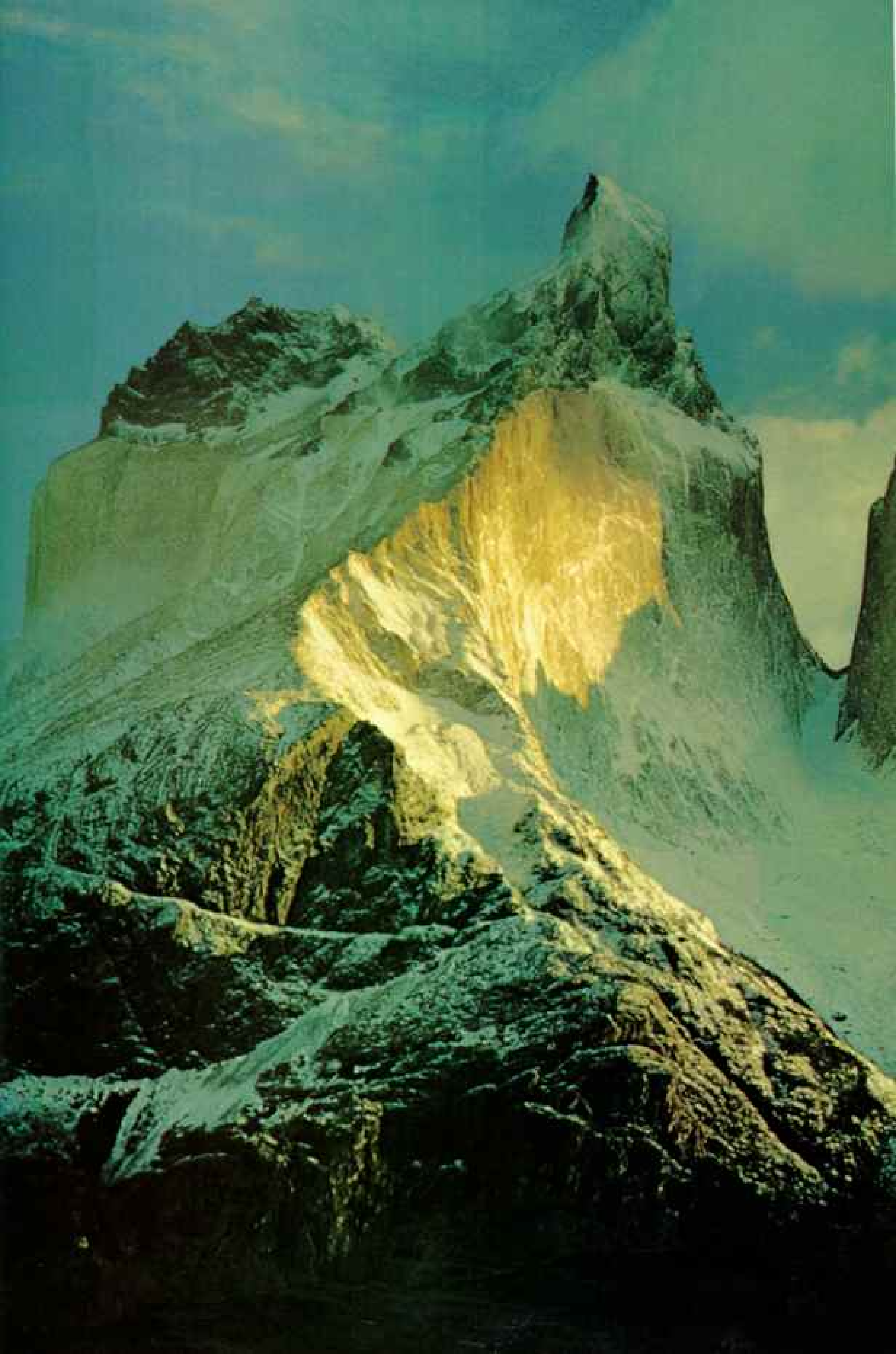
After a day in the saddle, he prefers to stand. An *ovejero* (**below**) takes a break from shepherding 7,000 lambs from the Estancia Cerro Castillo to the slaughterhouse at Puerto Natales. The hub of the ranch (**right**) provides housing, a store, a cantina, and even a gym for the 200 men needed on the 260,000-acre sheep spread. Taken over by the government in early 1971, the estancia is now run by a *presidente* elected by the hands.

Survivor of a vanishing species, a half-grown pet guanaco peers from a ranch-house doorway in Tierra del Fuego. Guanacos, cousins of the camel, llama, alpaca, and vicuña, once roamed the entire Andes. Eager for their fleecy hides, hunters hounded the animals nearly to extinction.

Late-afternoon sun gilds a town at the toe of the world, Puerto Williams (**upper right**). It supplies Chilean naval ships patrolling the Beagle Channel.

For the fjords and islands stretching north hundreds of miles, the weather is highly unpredictable, with rain, wind, snow, and only occasional sun. Here, Chileans contend, the four seasons can occur in a single day. Spring and summer williwaws whip the coast with awesome violence. Creeping down the slopes of Mount Balmaceda in the Patagonian Andes, a glacier dies in Última Esperanza Sound (**right**).





CHALLENGING RAMPARTS *rule the sky in southern Chile. Hurricane-force winds and precipitous flanks keep all but the most skilled mountaineers from the Cordillera de Paine's summits.*

Crooning to her pet lamb, a girl of Puerto Williams brings to mind the poetry of Chilean Nobel Prize-winner Pablo Neruda: "In Chile now . . . the dark mysterious girls are singing . . . the sun is touching every door and making wonder. . . ."

and jackets. But each wears a distinctive, brightly colored manta, like a small poncho, over his shoulders. He presses huge spurs flat against the horse, to guide it. Reins seem less important than spur and knee pressure and the shifting of weight in the saddle.

Marxist Rule Faces Test by Ballot

Chileans love the rodeo arena—but the political arena compels them far more. One day I came upon a U. S. visitor who was equally interested in the political situation. He was Dr. Thomas Greer, Professor of Humanities at Michigan State University.

A forthcoming election would determine whether President Allende's coalition would gain or lose seats in Chile's Chamber of Deputies and Senate. Marxists and their supporters held slightly more than a third of the seats in both houses. Should they lose seats, the opposition would gain enough power to veto President Allende's program—or even to bring impeachment proceedings against him, as some Chileans had threatened.

Dr. Greer spoke of the furious campaigns that were under way. "These are exciting times," he said. "Here is the only freely elected Marxist president in the world, about to face a legal test of his support."

He gestured toward a newsstand that displayed some of Santiago's 13 daily newspapers. "I'm impressed by the freedom of this election," he said. "Many of those papers are filled with violently antigovernment statements. No other Marxist government would allow such freedom of expression."

The crucial election was at hand when I left Punta Arenas. Agricultural association director Patricio Rettig, by now a good friend, came to the airport to see me off. "I will tell you this about the election," he said. "When the votes have been counted, the Popular Unity Coalition will be stronger than ever."

Back in Santiago, I found that the lobby of the Carrera Sheraton once again echoed to the sound of many languages, for the world press had returned. The city vibrated with tension. Buses filled with troops in riot gear were stationed at strategic corners. And so were police trucks with their swivel-mounted water cannon—*guanacos*, the people called them, after an Andean relative of the camel known for its spitting accuracy.

I accompanied Alfonso Gomez to the polls, and discovered that the army was taking great pains to ensure the election's honesty. A soldier at the gate stopped me, pointed to a red pencil protruding from my shirt pocket, and told me to conceal it.

I did so, and gave Alfonso a puzzled look.

"The soldier thought your pencil might be a signal—a sort of 'campaign button' indicating that you supported the Marxists," he said. "Signals are not allowed here."

Alfonso voted—which way, I do not know. And then we drove to his home for a farewell dinner; this was my final evening in Chile.

There had been much violent talk before the election: talk of bloodbaths to clear the air, alarms both from Marxists and rightists that the other side would start a civil war to halt an election they knew could not be won. Yet it had been a day without violence. Did peace prevail because of the machine guns?

I asked Alfonso this, and he shook his head slowly. "We talk much about politics in Chile," he said, "but you must understand us: we are legal-minded people. Consider our president. Has a Marxist ever before come to power through the vote?"

Chile Searches for Peaceful Answers

My taxi to Pudahuel Airport twice had to detour because of shouting throngs. The votes were still being counted, but both sides were in the streets anticipating victory.

It turned out that Patricio Rettig was right. The Marxists made gains in the legislature, small ones—only a few seats—but significant because they overcame the threats of blanket vetoes and presidential impeachment.

Other threats remained: more riots and strikes, the possibility of civil war, or a toppled government. By now they may have become realities. Already, since my last visit, there has been at least one abortive coup attempt by an army unit.

With an empty treasury and a divided people, Chile faces grim years ahead. In my talks with hundreds of Chileans, none offered reason to believe that the nation's economic problems would soon improve. And nowhere did I find "neutral" Chileans; there seemed to be no ideological middle ground where left and right could meet and work together.

Still, some unenvisioned miracle may come to pass. After all, stability, hospitality, and fairness are basic to Chilean nature.

Chile is a land of sincere people who—whether they believe in the present government or oppose it—are trying hard to build a better nation. □

Cowpunching on the Padlock Ranch

ARTICLE AND PHOTOGRAPHS BY
WILLIAM ALBERT ALLARD

Sun-burnished tide of Herefords heads for summer pasture in Wyoming's Bighorn country. To record a rugged and still romantic way of life, author Allard rode with the men of a 390-square-mile spread that raises 1,000 tons of meat a year to help satisfy the nation's appetite for beef.

Sunrise signals another workday (**above**) as a cowboy "tops off" his frisky horse—settling down an animal brimming with early-morning energy.

RIDING a bald-faced black horse, wagon boss Floyd Workman trotted ahead to open gates in the barbed-wire fences that seemed to sprout like never-ending vines across southern Montana's rolling grassland.

Behind him the freshly painted chuck wagon gleamed beneath an open sky. The bed wagon followed, and strung out beyond that ran the horse cavvy, flanked by half a dozen cowboys. Bays and sorrels, blue-roans, buckskins, grays, and paints—sixty horses with flowing manes and flaring nostrils, moving with fluid grace. They seemed almost to float at times, the way a horse can when free of rider and restraint. Like school kids on a field trip, they played and halfheartedly bickered, kicking and nipping at each other, all the while moving on at a slow lope.

It was the first of June and time to round up the cows and calves from winter ranges and push them into summer pastures. It was branding time on the Padlock cattle ranch.

The Padlock is the parent ranch of four ranch companies owned and operated by the Homer Scott family, with headquarters in Dayton, Wyoming. The companies run more than 10,000 head of cattle on a quarter of a million acres extending from the foothills of the Bighorn Mountains in northern Wyoming to within a few miles of the Yellowstone River in southern Montana.

Where Grass Once Brushed the Stirrups

Covered with what Walt Whitman called the "handkerchief of the Lord," the wrinkled Montana hills were green with new grass and alive with the yellows and blues of blossoming wild flowers and sage. It was a beautiful sight on a fine spring morning. And it made me wonder how it must have looked to those who trailed the first Texas longhorns into the Northwest just after the Civil War, when the wild grass grew stirrup-high in a seemingly endless country. In those days a man could ride as far as his shadow fell, never having to open a gate or honor a fence.

But the vast stretches of western range that were once free and open have been fenced for years. Pickup trucks have replaced most of the wooden-spoked, iron-wheeled chuck wagons that once roamed from Texas to the Canadian border. The Padlock is one of the few outfits that still run a horse-drawn chuck wagon during spring branding.

"But good wagon cooks are getting hard to find," said ranch manager Dan Scott, "and so

are men who know how to harness and drive a four-horse team. And working out of a wagon means living on the range in tents for a month or so, with damn few nights off to run into town for a beer. But there are still a few men who want to live that way. Most of them are young and single. As long as we have that kind of cowboy around, we'll probably keep our wagon running."

When we reached our campsite on that first day of roundup, Floyd Workman helped Hank Kamerzell set up his wood stove in the cook tent (page 485). Hank had already placed his bed a few feet away from the stove.

Old Hands Don't Rile the Cook

A bald-headed, wiry man of 78, Hank is partially deaf and has a hot temper. Beyond Hank's hearing Floyd laid down the law for the younger hands who might not realize that the cook rules the wagon. "OK, boys," he said, "that area right around the stove is off limits. Nothin' irritates old Hank faster than gettin' in his way. Don't be goin' in there grabbin' somethin' to eat until he invites you in. And for God's sake don't sit on his bed."

Floyd, who is 51, has cowboyed all his life and has a certain look that tells you that. Except for a white brow hidden beneath a sweat-stained hat, his face is tanned, weathered from years in the sun and wind. There is a bit of a stoop in his stance and an easy grace in the way he mounts a horse. Even on the hottest days his shirt sleeves are buttoned at the cuffs, and the yellow string of a Bull Durham tobacco pouch forever dangles from a breast pocket. His callus-hardened fingers can effortlessly roll a cigarette on horseback riding into the wind. His brown leather chaps aren't fancy, but stained and scuffed from countless brandings and from chousing cattle through the brush. He's a real cowboy.

Floyd and I sat on a wooden bench by the chuck wagon and talked while "Praise the Lord, I saw the light," slipped out through the tent flaps from Hank's transistor radio.

"Old Hank's a good one," said Floyd. "Hard to get along with at times, but he cooks good. And I'll say this for him, too—he's clean. I've seen some you'd pretty much have to wear a

Author Bill Allard first saw the romance and hardship of ranch life through his camera lenses as he illustrated *The American Cowboy in Life and Legend*. The 211-page book is available from National Geographic Society, Washington, D.C. 20036 for $4.25, plus 50 cents for postage.

Branding draws a bellow as cowhands burn the Padlock mark across a calf's face

and ribs. A two-gun inoculator stands ready to vaccinate against ailments known as blackleg and red nose. Castration of males and dehorning round out the calves' day of trauma.

blindfold to be around. There was one who never wore a shirt and had the dirtiest undershirt you could imagine. Never would take a bath. He used to spit on the griddle to see if it was hot enough. Made a man hesitate a bit at breakfast. But old Hank's a good one."

The afternoon grew late. Wood was cut for the cookstove and a supply of water brought from a well. Vern Torrance leaned against a tent pole, rolled a cigarette, and said out of the deep experience of his 59 years, "I wish it was the end of this sonuvabee—instead of just the beginning."

I knew what he meant. I'd been on other brandings, and I'd wrestled calves that wear you out as they struggle in dust that chokes your breath. Not the least bit glamorous, it's hard, sweaty work. And in the five weeks between the coming day and early July, this crew would have to rawhide 45,000 acres, gather 3,000 cows, and brand their calves.

Throughout the country it was the start of a lot of hard work for cow crews covering the 900 million acres on which America's 122 million cattle graze. The beef industry claims more than 100 million head; the rest are dairy cattle. This is in contrast to the situation just after World War II, when almost a third of the cows raised in the United States were dairy types. Since then, there has been less

Lariat finds its target as wagon boss Floyd Workman selects a roan for a day of separating calves from their mothers. Forty pickup trucks help Padlock hands oversee 10,000 animals, one for each 25 acres. But horses continue to be essential on the broken, largely roadless landscapes of the Wyoming-Montana border.

demand for butterfat products and a much greater demand for beef. In 1953 the United States consumed 78 pounds of beef per capita; today it's 116 pounds.

That jump in demand is one of the reasons for the high cost of beef. Weather can be another. On the swift, cruel wind of a blizzard, great financial losses can come to a rancher overnight, and these mean still higher prices to the consumer.

Last winter 250,000 head of mature cattle died in bad storms. At the Padlock a three-day April blizzard killed 200 new calves, each worth more than $100 at birth. But the Padlock's losses were slight compared to those of outfits in southeast Colorado, where 50 to 60 percent of some herds were killed. For young ranchers with small outfits and large debts, it was the end.

As manager Dan Scott told me, "No quick fortunes are made in ranching. During the Korean war the price we got for our feeder cattle skyrocketed. Then in six months it fell from 40 cents a pound to 23 cents a pound on the hoof. A lot of people were wiped out. Prices stayed low for about fifteen years, but our costs continued to increase—all of them have at least doubled.

"Now beef prices have come back up, and for about the last year they've kept pace with operating costs. But most ranchers are afraid of another big drop in cattle prices."

Ranks of the Cowboys Grow Thinner

The high demand for beef has not swelled the ranks of cowboys. Although not vanishing, the part-mythical, often romanticized man on horseback is getting rarer. In the decades following the Civil War, the peak of the cowboy era, an estimated 40,000 men made a living working cattle. Now there are perhaps only half that many. And most of today's cowboys depend almost as much on pickup trucks as their grandfathers did on saddle horses. Some ranches even use helicopters to move cattle.

Along with 40 pickup trucks—some of them equipped with two-way radios—the Padlock uses two airplanes to check pastures during roundups and in severe winter conditions. Yet, with all this modernization, the Padlock still utilizes horse-drawn sleds to feed cattle in remote areas during the winter, and throughout the year it still depends primarily on three crews of cowboys and a herd of 200 horses to raise its cattle.

A cow crew usually is six or seven men, but more are hired for the busy summer months. Floyd Workman's branding crew had 12 men. Five, including Floyd, were at least 40 years old, with plenty of cowpunching behind them. The rest were in their late teens or early twenties, still learning cowboy skills.

After supper every evening the horses—all geldings, as in most outfits—were driven into the camp corral. Each man had five or more horses in his string, which he would ride in rotation, never using the same horse on two consecutive days, so that he always had a fresh mount.

Sure Moves Mark a Master Roper

The first afternoon the older cowboys caught the mounts they would use in the morning. Then Floyd stepped into the corral to catch horses for younger hands. Before the roundup was over, they'd be getting their own. But for now an experienced roper was needed, because roping horses can be almost an art. And Floyd was a master at it.

The stubby remains of a Bull Durham cigarette dangling from his lips, he shook out a broad loop in his rope and slowly stalked across the dusty corral, looking for a white-footed sorrel with a burr-tangled mane. The horses eyed his approach and, with their ears flattened back, suddenly whirled away, crowding wedgelike into a corner of the corral and burying the white-footed sorrel deep among them. They stood with bodies tensed, their heavily muscled hindquarters turned toward Floyd.

He closed a step or two. For a moment they held fast. Then, in an explosion of pounding hooves and flashing legs, they came apart, some dashing to the other end of the corral. For but a second the sorrel was exposed. He knew it and made his move. Floyd made his.

The horse feinted left, then rolled back on his hocks and broke to the right. Swiftly, smoothly, Floyd cast the rope, his wrist turning downward at the moment of release like a baseball pitcher throwing an overhand curve. The open loop fell softly on target. With a jerk Floyd threw his weight on the rope, and it made a zipping sound as the loop tightened around the sorrel's neck. His role in the drama completed, the horse dropped his head slightly in resignation, waiting to be led away.

It gets late early in a cow camp. Most of the crew slipped into their bedrolls before

dark. Far to the west, rain clouds were building up like purple satin pillows. Beneath them, outlined against a narrow strip of yellow sky, naked ridges stretched across the horizon.

Near the edge of camp the dusky silhouettes of ash and box-elder trees marked the twisting flow of a gentle creek. Not ready to sleep, I wandered for a while along its banks. It seemed so quiet, I thought, until I really listened. Because there were many sounds, though there was no noise.

From the branches of an ash tree a solitary bird sent out high, thin single notes. Humming insects swarmed around cattails that parted the water in murmuring ripples. From somewhere on the opposite bank something entered the stream with a soft splash. Horses coming down to water nickered low in their throats at the faint rumble of distant thunder.

The whispers of the stream seemed to echo the words of a young man I'd met who had left New York to become a cowboy. "What I like best about this country," he had said, "is that if I'm mad at something or get to hating somebody, I can go out along a ridge or down along a creek and forget about it all."

Alone, I walked back along the creek to the end of dusk and met the night.

Predawn Meal Starts a Long Hard Day

"Roll out!" are harsh words at four in the morning. But there was no escape from Floyd's shout. We had to gather the day's cattle before the sun climbed high enough to drive them into the brush, away from the heat and the flies. So with yawns and groans and some gravel-voiced swearing, we groped about the tent, searching for our clothes. Like crippled birds we hopped one-legged in the darkness, pulling on boots that were damp and cold with morning.

Hank had been up for several hours, and the air was sharp with the aroma of breakfast. We walked to the cook tent, our boots swishing, spurs jangling through the dew-heavy grass. It was too early for conversation, and we lined up silently for bacon and eggs, biscuits with honey, hot cakes drenched in syrup, and steaming coffee. It was a good breakfast and would carry us through the seven or eight hours that might pass before we returned to the wagon.

We rode away from camp at sunrise, and after a while Floyd scattered the riders, spreading us out to round up cattle inside a

Boss of the cook tent, Hank Kamerzell wrangles pies from the oven of a wood-burning stove. A horse-drawn chuck wagon, one of the few left in the West, hauls his gear from camp to camp.

As midday heat and flies drive cattle into thick brush, ending roundup and branding for the day, Floyd Workman and Harold Smith pause for coffee (**left**). Afternoon may be spent moving camp to another location or gathering firewood and water.

Night vigil begins at a snow-dusted cow camp where two-year-old heifers give birth for the first time. Some of the thousand animals penned in two 50-acre lots nearby will need aid in delivery; a few abandon their young. Older, experienced cows drop their calves unattended on the open range.

Playing stork to the stock, a ranch hand carries an abandoned calf to the barn for adoption by a cow that has just lost her own. To overcome the suspicions of the new mother, who identifies her baby by smell, a deodorizing compound may be sprayed on the orphan, or the hide of the dead calf may be draped over the body of the live one.

Nursemaid in chaps, cowboy Jack Sams bottle-feeds a newborn calf in a barn stall warmed by infrared lamps. In addition to milk fortified with vitamins, an injection of caffeine may help perk up the bedraggled youngster. Despite attentive care, in the spring of 1973 Padlock lost 10 percent of its calf crop—worth more than $100 a head—mostly due to exposure during one severe storm.

15-mile circle. Within a few hours we had several hundred cows and calves gathered in a small, temporary corral.

Branding irons were heated over a butane fire to a red-hot glow. Two men on horseback roped calves by the hind legs and dragged them toward the fire. Working in teams, the others wrestled the calves to the ground. Each calf was branded on the ribs and across the nose (pages 480-81), given inoculations, and the males were castrated. Calves showing horns were dehorned, not only to prevent injuries from fighting but also because hornless animals are easier to handle in the chutes at shipping time.

Free to return to their mothers, calves stumbled away from the branding irons bawling in pain and fright, bloody-headed from the dehorning. But these were strong, healthy calves, weighing almost 200 pounds. They would survive this day and soon be scampering across summer pastures.

The morning was hot and the young hands were like athletes struggling through the first day of spring training. Muscles quickly grew tired. One calf wrestler had been bloodied from a kick in the jaw. Another had been kicked in the groin and sat crumpled against the fence like a pile of dirty clothes, his head cradled in his arms.

Test for a Cowboy's Sense of Humor

We were headed back to the wagon by noon. Sweat lathered the necks of our horses and they threw their heads nervously, bothered by nose flies. Floyd looked over at a cowboy riding a flea-bitten gray. "You know something?" he said. "If we'd branded 270 calves today instead of just 170, it probably would've taken all the fun out of it." Hungry, hot, and aching for a rest, the young man silently looked at the wagon boss with eyes that were dust-rimmed and weary. A big grin broke over Floyd's face, and we loped for camp, leaving tawny plumes of dust behind us.

The calves we'd been branding had been born several months earlier on the open range at the north end of the ranch where the older cows are grazed. Young heifers calve at the south end in calving sheds. I'd spent a few days there in late March. Winter was still hanging on, as it does in Padlock country, and snow blanketed the pastures holding 2,500 two-year-old heifers, full-bellied with their first calves.

Each hour two cowboys rode through the drop pastures, driving heifers ready to calve into the shed. If they didn't give birth within an hour or so after being put into a stall, the cowboys would pull the calves for them. Calves born out in the snow were quickly brought inside along with the cow.

Some Heifers Don't Take to Motherhood

Chilled calves were warmed beneath infrared lights (page 487), and those in a weakened condition were injected with caffeine as a stimulant and camphorated oil to head off pneumonia. While I was at the calving shed, a number of the young cows seemed hesitant about nursing their first offspring.

"Two-year-old heifers are not always instinctively good mothers," said the Padlock's cow boss, Charlie Dunning. "That's why we calve them in these sheds. Some have their calves in the pasture and just walk away from them. If the weather's bad, the calves can quickly catch pneumonia and die. And every calf counts. At the end of a year these calves will represent a large part of our cash crop.

"That's why right now is the roughest time for my cow crews. They put in fourteen hours a day for six weeks without a day off."

But cowboys seem blessed with an extra measure of good humor to get them through the rough spots. One evening, after riding all day in a cold, wet snow squall, the men sat drinking coffee beneath the yellow glare of a bare bulb in the calving shed, waiting for the night crew to arrive. Soggy gloves had been hung to dry over a coal-burning stove, and the smell of wet wool lingered in the air.

"You know," said Claude Fahlgren, "it's sure a lot different calvin' them older cows up at the north end of this outfit. With them a man can just sit in the sun and have a smoke. They'll take care of themselves. But these dummies—why, hell—you gotta be right there to

Narrowed gaze and leathered features of Vern Torrance, who tucks away cigarette "makin's," recall the 19th-century buckaroos portrayed by Western artists Charles M. Russell and Frederic Remington. Although the trail drivers' danger and glory have both diminished with time, the cowpuncher's hours on horseback in harsh weather, searching the vastness for steers, still tell in his face.

Old Paint is a Piper Cub for cow boss Charlie Dunning, who searches for strays during fall roundup in one of the Padlock's two airplanes. After spotting a bunch, he writes their location on a paper bag, weights it with a rock, and drops it to riders below. Aerial scouting also reports empty water tanks and gates left open by hunters.

Finishing school for maturing beeves, the Padlock feedlot, streaked at center by sun-reflecting power lines, holds some 5,000 cattle that are fattened on a grain diet. A few fine specimens of the new generation will stay on as brood cows to replenish stock. Others remain until they reach market size—about 1,100 pounds—at 15 to 18 months. The rest are sold at half that weight to commercial operators who feed 500 to 50,000 head at a time. Thus begins a beef-handling process that affects the quality of meat reaching the consumer, and the price he pays.

Pests, disease, and weather losses add to ultimate costs. Wild-eyed and wringing wet (**below**), a cow emerges from a dipping vat filled with a solution that repels flies, ticks, and lice.

take it out for 'em, and show 'em what to do with it. There ain't nothin' dumber than a two-year-old heifer—except two of 'em."

That day reminded me of words spoken years ago by the father of a friend of mine. "Son," he said, "if you're going to be a cowboy, let me give you two pieces of advice: Stick to herding steers—never work for a cow-and-calf outfit. And never work for a man who has electricity in his barn. You'll be up all night."

When I left the shed, the nighthawks were getting into their long yellow slickers and checking the flashlights they would use to cut the darkness as they rode the pastures, midwifing the young heifers. Outside the door two saddle horses with white-frosted rumps stood droop-headed, reins tied to the top rail of the corral. Bathed in light that fell from a yard lamp, melting snow ran down from their saddles in glistening rivulets along the stirrup leathers. It was not a good night to be a cowboy for a cow-and-calf outfit.

Before the spring roundup was over, my sons, David, 8, and Scott, 12, came out from our home in Virginia to be with me on the wagon. I wanted them to experience a way of life that might be gone forever before they were men.

For a week they rode with us. Each evening they sat by the wagon listening to the inevitable debates over who makes the best boots and saddles, and they heard much about how it was in the old days.

"Forty, fifty years ago," Vern Torrance reminisced, "you could take a string of horses and ride a couple of hundred miles and never worry about havin' a place to eat and sleep. When you felt like stoppin' for a while, you could always count on turning your horses

out on somebody's grass for the night. Now you can't hardly ride beyond your own outfit, because nobody's gonna offer to put you up. You'll be lucky if they let you water your horse. That's just the way people are today."

Sky-high Price for a Pair of Woollies

My sons heard about ranches wiped out by too many years of not enough rain, too much snow, plagues of grasshoppers, and bad prices; of good outfits and the men who rode for them; of good horses and some that might have been the best if lightning hadn't killed them. They heard true stories that were stranger than fiction, told by men who could weave them out into the stillness of evening as smoothly as they rolled the "makin's" of a cigarette to savor them by.

"Man I worked with on one outfit had a pair of bright-orange wool chaps," recalled Harold "Smitty" Smith. "Orange woollies, they were. Another fella on the outfit took a real likin' to those chaps. Decided he had to have 'em. Finally traded the man. Gave him his wife and twenty-five dollars. He sure liked them orange chaps."

My oldest son laughed at that story and probably thought Smitty had made it up. Of course, my son has never seen a pair of orange woollies. I saw a pair of green ones once. They were beautiful.

While we were at the branding camp, range detective George Cunningham often stopped by during his rounds. A retired lawman from Billings, Montana, Cunningham was hired by the Padlock several years ago to cut down cattle theft.

With 450 miles of fences to keep up and hundreds of gates to be closed, the Padlock finds it difficult to maintain an accurate count

Branding can hurt both ways. Strain marks the face of this calf wrestler, who risks blows from wildly flailing hooves. The young cowboy is Peter Rakestraw of Philadelphia, a student in psychology. The Padlock's June roundup crew usually includes a few collegians.

Ambushed by fatigue, drovers who hit the trail at 4:30 a.m. catch a midday snooze while waiting for the chuck wagon to catch up. Lush spring grasses will nourish their herd in the Bighorns.

of all cattle all the time. "We make partial counts now and then," said Cunningham, "but our only complete inventory is in December. So if cattle are stolen in February, the thieves might have ten months to hide or sell them.

"Poachers and hunters can also be a problem. Many are careless and leave gates open. Some of these pastures contain 30,000 acres. If just one or two gates are left open, it can mix up the cattle. And every year a few of our animals are shot. Some are killed by accident and some by hunters who don't get a deer and decide to butcher a beef. Unless you're right on the scene when they shoot, it's hard to stop that kind of loss.

"We're more concerned about rustlers who make it a big business. Their method is to get a bunch of cattle in a semitruck and to head east into areas where there's no brand inspection. Possession becomes the law.

"But the large-scale rustler usually depends on an inside man, someone who knows the ranch's operation and where the cattle will be at certain times. One of my jobs is to check out the backgrounds of new men hired. We've had a few that were let go because of a suspicious past. This approach seems to be working. Our losses are way down."

According to Dan Scott, hiring a range detective has been a successful investment. "We've had years when we've been short 300 cows. But now our unexplained losses are down to maybe 40 animals a year—some, we know, through natural causes, such as creek drownings. Our detective is primarily a deterrent. Professional rustlers respect the fact that we've got a professional detective out there looking for them. The word gets around."

Making Hay—10,000 Tons of It

With branding coming to a close, the farming operation was in full swing. The Padlock cultivates 5,000 acres of hay and grain to fatten the young animals on its feedlot and to supplement the winter-range diet. With a 40-man crew, 16 tractors, and motor-driven sprinklers, the highly efficient feed factory gets as many as three cuttings a year off the same field. Since the disastrous blizzards of 1886-87, which killed up to 90 percent of some herds in Wyoming and Montana, ranchers have relied on hay to carry their cattle through winter. Last year the Padlock raised 10,000 tons of it.

The feedlot is where the yearling heifers are artificially inseminated with frozen bull semen. "We can improve the quality of our herd faster and cheaper with artificial insemination," feedlot manager Jerry Rankin told me. "Some of the bulls that produced the semen we're using are worth $100,000. We buy the best semen for about five dollars an ampule, but we don't have to buy the bull."

Two-thirds of the Padlock's basic herd are now white-face Herefords. The remainder consist of a Hereford-Angus cross, known as "black baldies," and two- and three-way crosses of Hereford, Shorthorn, and Angus. Sometimes these are also crossed with one of the larger European breeds—Charolais or Simmental.

Better Breeding Means More Beef

"Crossbreeding is one of the trends in ranching today," Rankin said. "Crossbred cows are more fertile, give more milk, and are better mothers. And crossbred calves show what we call 'hybrid vigor,' which means faster growth."

After the calves are weaned, at eight months, the Padlock selects the best heifers to replace their own ten-year-old cows. The remaining heifers and steers are sold to other ranches and feedlots. I asked Jerry how they judge which animals are best.

"The ideal calf today is a long, straight animal," he said. "We strive for leaner cattle. The market isn't for 20-ounce steaks anymore. The housewife wants leaner cuts with less waste. Slaughter grade used to be 1,200 to 1,300 pounds. Now it's 1,000 to 1,100.

"We used to graze steers out on grass until they were two years old, and then they'd spend five months in a feedlot. That's become economically impossible for most commercial ranches. Now they go to market at 15 to 18 months. The goal in ranching today is to raise earlier maturing cattle through breed improvement. Ranchers are tightening their belts. We can't always buy more land. But with better breeds we can raise quality beef in shorter time and on less grass."

The time to send that beef to market comes with September and stretches to November. In the fall roundup, the steers that were fattened on summer grass are shipped to market by truck or rail. Then the calves are weaned and trucked to the feedlot, and the herd is moved to winter pastures.

I rode with foreman Chet Gupton's crew in October. It started to snow the night before we were to trail 1,100 steers 12 miles to the

shipping pens. By dawn trees that had been golden with autumn were sculptured in winter white. The drive was wet and cold, and the men rode hunched under heavy coats and slickers. Visibility was poor, and the snow balled up under hooves, slowing the horses. The three cow dogs we had were worth another half-dozen cowboys as they chased wandering steers back on the trail.

Watching men do a job from horseback that couldn't have been done any other way reminded me of a friend from Nevada. Once, after we had trailed a herd for three days in steady rain, I asked him whether he thought cowboys would ever be replaced by machines. "Bill," he replied with a smile, "they ain't found one yet that will take as much abuse as a cowboy."

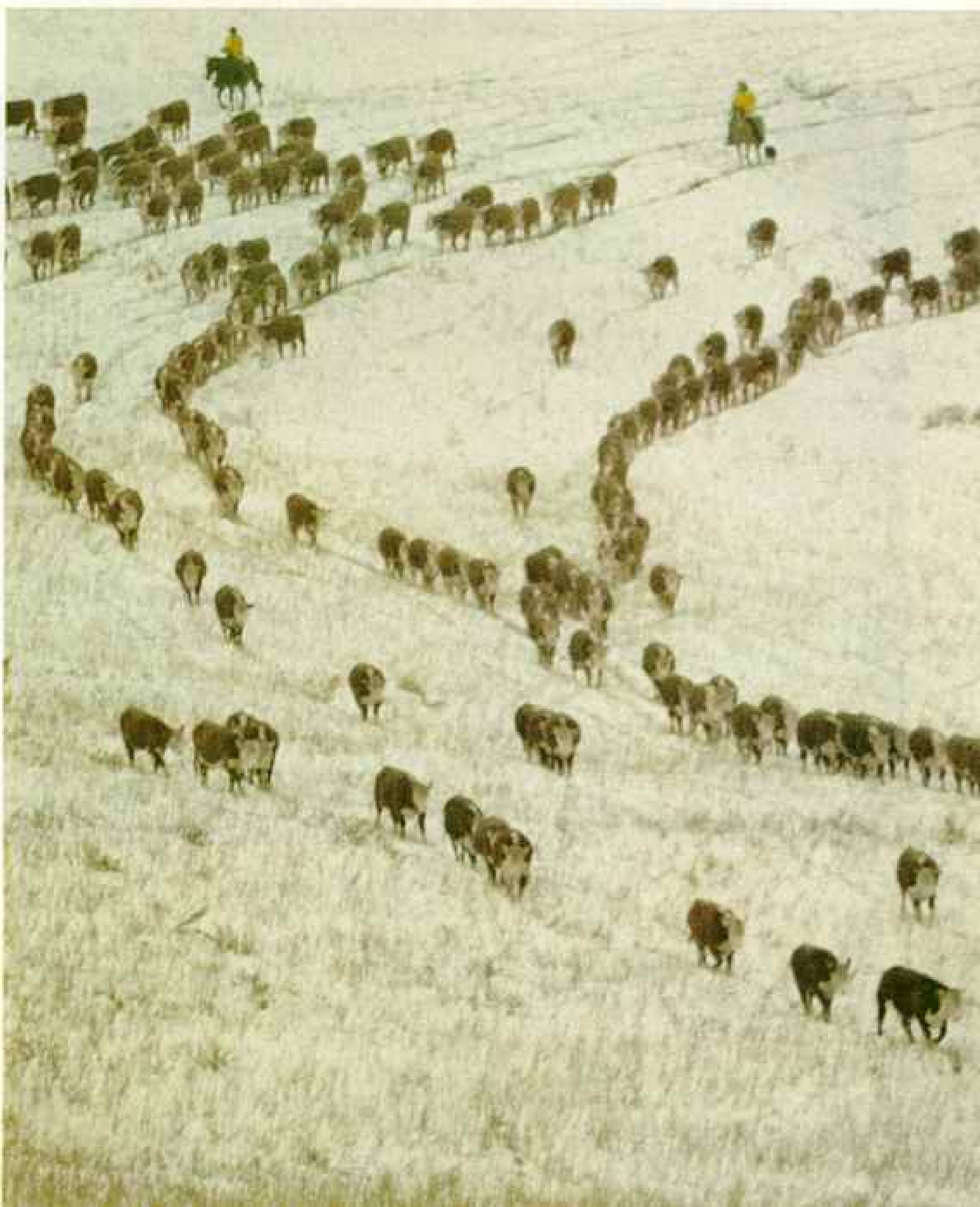
I think cow boss Charlie Dunning would have agreed with my Nevada friend. When I asked him whether the cowboy has a future in modern ranching, he replied, "You bet! The cowhand represents one of the highest forms of skilled labor, and we need him. Especially in this kind of country, where a lot of the work must be done from horseback. But good hands are getting harder to find. It takes about three years for a man to become a reliable hand. Out here it takes an experienced man two years just to learn the country.

Tough cowboy, tender father. Jack Cooper helps daughter Callie fix a broken doll. Cooper, who oversees 30,000 Padlock acres, lives with his family in relative isolation. Fingers that can build a loop to rope a calf or string wire to mend a fence must also be prepared to repair toys and tend to cuts and bruises. Five of Cooper's ten children still live at home, and two of his sons remain loyal to cowboying, despite the attractions of higher wages and less lonely work in cities.

"The wages have to get better—that's all. Thirty years ago a single man made $35 a month with room and board. A good saddle cost him $90. Now he gets $300, but a good saddle costs $600. Our married men get $350, a house, and beef. We're willing to pay them more because they're more likely to stay. But you have to put a married man in a pretty good camp that's not too hard on his wife and not so remote that his kids can't get to school.

"There must still be some romance attached to being a cowboy," he continued. "Because

Threading a snow-covered field, a herd heads for shipping pens and a truck ride to commercial feedlots. They plod a mere 12 miles, about one day's travel in the great 19th-century drives, when millions of longhorn cattle walked out of Texas on three-month journeys to Kansas rail terminals.



it sure doesn't take a person long to figure out there are easier jobs. But it's a way of life that can't be matched. Just simple, basic values, I guess. There's satisfaction to be found in the independence of a cowboy. Living in fine country and doing a job well with a good horse and maybe a dog. There's a lot of pride in that."

I asked Hank Scobee, a cow-crew foreman on the north end of Padlock, why ranch work appeals to him. "Well, hell," he said, as if I should know, "there's always a variety of things to do. A man might go out one day and rope a calf, or maybe doctor a sick cow. Or he might be throw'd from his horse. He rides five, six horses, and each one's a little different. That's the spice of life. That's better than knowin' what you're gonna do each day and then comin' home to have a beer and watch television. I wouldn't like that."

Before leaving the Padlock, I stopped to say good-bye to Jack Cooper and his family at their place 20 miles off the main road. In the summer he and his dog and his horse take

Enduring partnership: A cowman and his horse appear brush-stroked by snowfall as Ray Hammond lights a cigarette. Mechanization thins cowboy ranks, but as long as men are willing to withstand heat, cold, and loneliness to produce beef, the herder on horseback remains a living legend.

care of 30,000 acres of Padlock range by themselves, covering 35 to 40 miles a day, checking the cattle and the fences. The Coopers have ten children between the ages of 1 and 24. Five of them still live at home.

"We've lived in several remote cow camps since we were married," said Mrs. Cooper. "But somehow none of the children ever arrived at a time we couldn't get to the hospital. And we've never had any real emergencies. Oh, we get snowed in now and then for a while, but nothing serious. We wouldn't trade this kind of life for anything. We have all the room in the world here. I love to read and sew; and Jack paints Western scenes when he has time."

"Which isn't very often," Jack added.

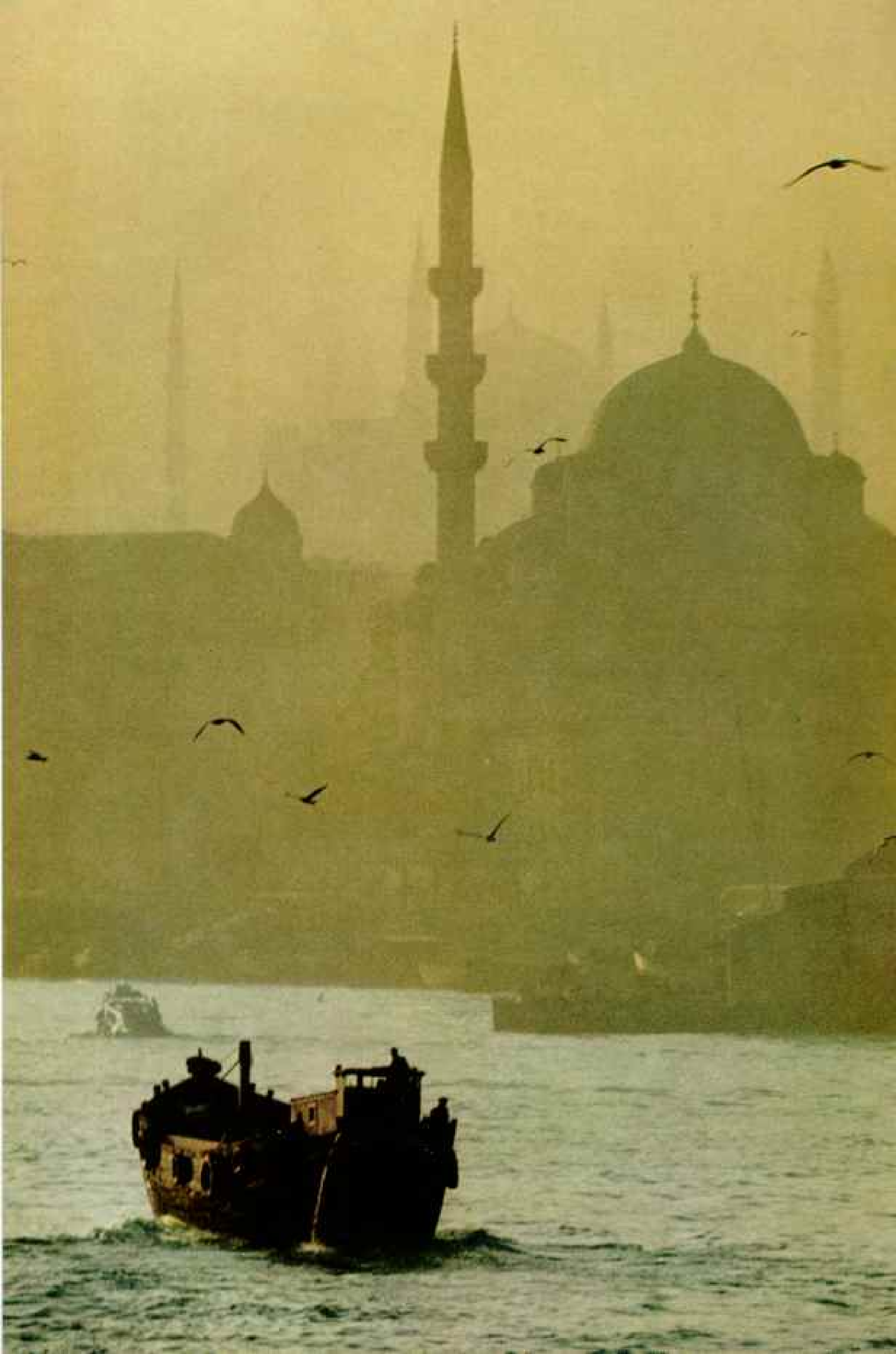
Cooper is also a leather craftsman and makes excellent saddles for other cowboys. His own gear is old and worn. "I've used the same saddle and chaps for 20 years," he said. "They earned my living and raised my kids. I guess that's why I still use them," he said, smiling. "I don't have time to make new ones for myself, and I can't afford to buy them."

A Good Place to Settle Down

It was dusk when I left. Jack was going out to milk the cow. His youngest son and daughter tagged behind. A tiger-striped cat made long, stretching leaps along the corral rail as it followed us to the barn. The air was cold and clean, filled with the promise of winter, and Jack milked the cow while the little girl hugged up against him.

We walked back and the children went inside, carrying the milk pail to their mother. Jack and I stood for a moment in the yard, talking about his life and mine. We both live with our work: his in the meadows and mountains that surround his home, mine with my cameras and wherever they take me. We said good-bye at the white wooden gate that led to his house, its windows flushed with light, warm beneath a darkening sky.

"If you ever get discouraged in your travels," he said at the end, "think of us. We're pretty happy here." □



Istanbul

THE CITY THAT LINKS EUROPE AND ASIA

By WILLIAM S. ELLIS

Photographs by WINFIELD PARKS

BOTH NATIONAL GEOGRAPHIC STAFF

THE ENGINE DIED (spewed oil like a geyser) at noonday in the Sea of Marmara, so the old Turk pulled on the oars until the 17-foot boat rounded Seraglio Point. We came then in silence to the place where the view of Istanbul draws a hosanna of emotion.

Before me was the old section of the city, sprawling over the hills and tumbling down to the water in a grand spillage of glories from the past: The six minarets of the Blue Mosque, arrayed in the haze like rips in a gray and gauzy veil hanging from the heavens; Hagia Sophia, lemon-colored and no less imposing than when it stood as the most important edifice in all Christendom; Topkapi Palace, where, swathed in the raiment of regal pomp, Ottoman sultans sat on golden thrones to chart the business of empire.

The boatman cursed the idle engine and resumed rowing. Soon we moved into the Golden Horn. As we docked, I noticed that the famed estuary was heavy with pollution, a sluggish and slimy waterway possessed of nothing so alive as its place in history. Yet later I would watch as the light of the setting sun fell on the waters to flush away all the ugliness—to fashion flawless brocade, it seemed, out of oily rags.

Istanbul is the only major city to lie in two continents, and the five-mile-long Golden Horn cuts through the heart of the European side. Across the Bosporus lies the Asian section of the city. Between the Black Sea in the north and the Sea

Veiled by morning haze, Yeni Mosque towers beside the Golden Horn, ancient port of the fabled city on the threshold of two continents. Once an empress of far-flung empires, Istanbul thrives today as Turkey's cultural and commercial heart.

of Marmara in the south, this onetime capital of three empires—Roman, Byzantine, and Ottoman—stretches out to embrace a festival of diversity (map, page 514).

I walked through a cabbage field, seeing no one, hearing nothing, for there was only green and rolling emptiness for many miles around. But I was in Istanbul. I stood on the Galata Bridge over the Horn and let myself be caught up in the most emphatic surge of human movement I have ever witnessed. That too was Istanbul. I encountered Gypsies with dancing bears, and Spanish-speaking Sephardic Jews whose ancestors fled the Inquisition nearly 500 years ago. I jogged in the shade of chestnut trees along the charioteers' course of the great Roman Hippodrome, and climbed a steep hill in an underground railroad, an antique marvel called the Tünel.

And on a March morning freshened by a clean and bracing wind from the north, I stepped onto the nearly completed Bosporus Bridge and walked from Europe to Asia.

Vital Link Renewed at Last

King Darius the Great of Persia was the first to link the two continents with a span across the Bosporus, thus allowing his invading force of some 70,000 troops to move across the strait from Asia. He lashed his galleys together, creating, in effect, a bridge. That was in the sixth century B.C., and only now, with the official opening this month of the new bridge, has the link been reforged.

A Russian freighter, empty and riding high, passed through the shadow of the 3,342-foot main span of the suspension bridge (pages 514-15), fourth longest in the world.* Vessels on the Bosporus, unlike those on most waterways, pass starboard to starboard; so, moving north, the freighter kept close to the European shore. Seen from my position 200 feet overhead, the vessel was all stack and deck and crewmen taking the sun.

"The bridge's clearance will allow for passage of the largest ships afloat," explained William C. Brown, British designer of the 34-million-dollar structure. Good thing, too, since the fabled strait carries a varied and heavy load of traffic. In summer the cruise ships pass through one after another, all white and flag-bedecked and bright with the blue-blazer finery of the good life at sea. Tankers, trawlers, warships—these also join the procession until, on almost any given day, Istanbul is awash in the full richness of international maritime flavor.

*The first three, in length between supports: New York's Verrazano-Narrows Bridge, San Francisco's Golden Gate, and the Mackinac span in Michigan.

Ferries Delayed for Days by Weather

The storied ferryboats are there too, puffing back and forth between the two continents. No service has been more vital to the well-being of this city of some three million persons.

"I've been 20 years along the Bosporus on ferries, and before that 20 years as a seaman on the Mediterranean and Black Sea," Temel Nail Karademir said, ringing for half-astern to bring the 980-passenger ferry into position for docking. This was the first of 18 stops on a trip that would cover 15 miles.

Short and slim and with a shine on his blue serge uniform attesting to his long service as an officer, Captain Karademir told me that his ferry, the *Yalova*, was 20 years old. "Six years ago she was converted from a coal burner to oil," he added. "Speed? No need for much of that, but if necessary she will get us along at ten knots."

The *Yalova* is a vessel of considerable class and character, full of good woods and gleaming brass. "I have few problems maneuvering her in the traffic," the captain said, "except occasionally when we come upon six ships lined up side by side. The current in the Bosporus poses a bigger problem. In one stretch it can run as high as seven knots."

While the *Yalova* provides passenger service only, other ferries carry more than five million cars back and forth across the Bosporus each year. Waits of three or four hours for boardings are not unusual; indeed, when ferry service is canceled because of weather conditions, the wait may be as long as three days. The new bridge and its connecting highway around the inner city are expected to offer a measure of relief.

(Continued on page 507)

Cradling an artillery shell, a veteran relives her youthful role as an ammunition carrier. After the Allies defeated the Ottoman Empire during World War I, Greek armies invaded Anatolia. Kemal Atatürk led his people to victory over the invaders, then founded the Republic of Turkey. This woman marches at a ceremony honoring the nation that on the 29th of this month celebrates its fiftieth birthday.


SUBESİ
1

Vision conjured by a jinn, Istanbul floats in mist as the first rays of morning spotlight the Asian district. Beyond the Bosporus lies Europe, where the 17th-

century Blue Mosque, left, counterpoints the magnificence of 1,400-year-old Hagia Sophia, once the major church of Christendom, then a mosque, now a museum.

Istanbul, however, is likely to remain a city strangled by traffic. "The bridge will ease the problem for several years, I think," a commuter on the Bosporus told me. "After that the city will be right back where it is now. The day is coming when one car too many will be jammed into the streets and all the traffic will stop for good. Yes, that day is coming, and the sooner the better."

Like many others in Istanbul, he stands in fear of the cars—mostly vintage models of American make. For in no other city, probably, have so many pedestrians been run down by so many 1953 De Sotos.

This motorized turmoil is most intense on and around the Galata Bridge, one of two bridges (a third is under construction) across the Golden Horn. But, then, it is here that the life of Istanbul bubbles over in a great and colorful flow of character.

It is not yet six a.m., but a man is standing on the bridge holding three dozen balloons. They rise high on their strings and are barely visible in the ashy light of dawn. Soon another man appears, carrying a 15-foot-long cypress tree on his back. At six-thirty, a vendor no older than 15 spreads a piece of canvas on the walkway of the bridge and starts to stack pairs of yellow rubber gloves. A short distance away, a rowboat sets out for a crossing of the Golden Horn with a cargo of a hundred soccer balls.

A young Gypsy with a scruffy bear in tow on a nose-ring leash steps out of an alleyway.

"The bear's name is Tarzan, and I paid 1,000 Turkish liras [about $70] for him," Ismail Bulgur tells me. "The police do not like dancing bears, so when they come I must run—and that is not easy to do when you take the animal with you. If I get caught, the fine is 100 liras, and the bear is attached. The zoo here is full of attached bears."

City Wakens to a Homely Symphony

The sun is up now, and its rising has been like the lifting of a baton before a master chorus of city voices. Horns and whistles, the cries of vendors and calls to prayer, the clatter of horses on cobblestone and the flap of a thousand pigeons taking sudden flight, tinsmiths beating charcoal-burning stoves out of old cans and a blind beggar-musician singing folk songs of the Anatolian village he left long ago—I hear all this and more while taking tea in an open garden behind Yeni Cami—the New Mosque—at the southern end of the Galata Bridge.

All around me there is an endless parade of *hamals*, men who carry things on their backs —things like ten tricycles lashed together,

To steam, perchance to dream: Luxury for an Istanbulian is in the 100° F. heat of a Turkish bath. The Romans built the city's first public baths. This marble retreat rose in the 16th century, a design of the architect Sinan, who created hundreds of glorious structures for the Ottomans. Basement boilers produce the steam, and holes in the dome release excess heat. A hundred public baths reserve separate hours or rooms for women. In bygone days, marriage contracts assured wives an allowance for bath money.

Istanbul's fanciest workboxes belong to its proud shoeshine men. Crafted in a local factory, the brass cases may cost as much as $100. This owner adds pictures and plastic flowers. Several hundred *boyacis* set up their glittering stands at train and ferry stations, charging 7 to 20 cents. Even a poor man of Istanbul prepares for Sunday outings with a bath, a clean suit, and a shine.

crates of produce, sewing machines, refrigerators, and sofas. It is said that a hamal once delivered a piano to a hotel after conveying it for several blocks along crowded sidewalks. Many of the hamals are young men from the country. Bent low and with bills of lading clutched between their teeth, they move through the streets from morning to night, glad to be in Istanbul no matter what the cost in hardship.

There are others in the city who make a living at less honest labor. They are the rogues of Istanbul, a fraternity of men with boundless charm who operate on the border of the law. One poses as a doctor, with a practice limited to the taking of blood pressure.

He seldom starts his rounds before ten in the morning. It was about that time when he approached my table in the garden behind the mosque. As he drew closer, I noticed that his shirt cuffs were frayed, and when he turned, the holes in the heels of his socks rode up, revealing little half-moons of skin. He introduced himself and said I didn't look too well and didn't I think I should have my blood pressure taken.

"How much?" I asked.

"Two liras—14 cents."

Stage for perpetual motion, the Galata Bridge funnels the vitality of Istanbul across the Golden Horn between the Old City, foreground, and the

He retrieved the blood-pressure machine from his black satchel, wrapped the band around my arm and started pumping. With only a cursory glance at the gauge, he pronounced my health as "perfect," and added, "I only come here to do this when I am free to get away from my duties at the hospital." He then went from table to table, never once making any diagnosis other than "perfect health"—even in the case of an old man who was gasping for breath.

Istanbul's most legendary rogue, a man known as Osman the Pheasant (because of his colorful dress), has been in retirement for some years now. He is remembered for having sold a trolley car to a merchant after convincing him that he owned the Istanbul public-transportation system. He also once sold a clock tower, having assured the purchaser that persons could be charged a fee for setting their watches by the clock.

It is now rumored that Osman the Pheasant may come out of retirement just long enough to sell the new Bosporus Bridge. He has sold the Galata Bridge several times. The 60-year-old, quarter-mile-long structure on massive pontoons (below) links the old and new of European Istanbul with a passage of

New. Taxis and buses line up at Eminönü Square, hub of the Old City. Ferries shuttle passengers across the Bosporus to Asia, at far right.

Man power moves the goods. Nowhere in Istanbul do peddlers and porters cross paths in greater variety than around Galata Bridge. Loud cries of vendors—an estimated 50,000 thread city streets—almost drown out automobile horns as the men advertise their wares. Here with his shop on his back, a rug seller displays a fanciful version of life in the Sultan's harem. Nearby, a bread seller hoists a table full of *simit* for all to see . . . and smell. He claims the sesame-flavored rolls are so fresh they burn the hand.

Trucks are expensive, and narrow streets often prevent their passage, so small shops

depend on human carriers, called *hamals*. The men gain prestige and greater fees by the size of the loads they bear, and almost anything may be seen atop men's backs.

Boxes of leather shoes, a major city product, travel from factory to store. A sewing machine, itself loaded with goods, rides to a new home. Leaning tower of tricycles weighs down a hamal, who balances the plastic toys on a leather cushion slung from shoulder straps. A back-bending load of books heads for Istanbul University or to the shops of booksellers, familiar haunts to Moslems, who have always respected learning.

Istanbul, the City That Links Europe and Asia

humanity that tramples to dust the ordinary and dull. Here can best be heard the echoes of the city's past, a fire storm of history going back more than 2,500 years.

At first the city was called Byzantium, after the legendary Byzas, leader of the Greek colonists who established the settlement around the middle of the seventh century B.C. An earlier settlement had been made on the Asian side of the waters, and, so the story goes, Byzas and his followers were guided to the more desirable location—on the magnificent natural harbor of the Golden Horn—by the oracle at Delphi.

Commerce flourished in the city after its capture by Constantine the Great in 324. This new capital of the Roman Empire eventually became the wealthiest, most civilized, and most beautiful city in the world. Of its resources, impossible to estimate, Gibbon would write, "From every province of Europe and Asia the rivulets of gold and silver discharged into the Imperial reservoir a copious and perennial stream." Clearly, the life and destiny of Europe and much of the world would hereafter feel the influence of this queen city of medieval Christendom.

Stolen Horses Grace Venetian Shrine

The city fell to the Fourth Crusaders in 1204, and among the treasures carted away in one of the most shameful sackings of all time were the four bronze horses that now grace St. Mark's Cathedral in Venice. Two and a half centuries later, the Ottoman Turks took Istanbul (called Constantinople then), and it remained as capital of their far-flung empire until establishment of the modern Turkish Republic exactly half a century ago.

Of all the emperors and sultans and warriors whose names are part of this long history, one is better remembered and more revered than all the rest. And it's not Mehmet II, the Conqueror, whose forces stormed over the walls after a siege of nearly eight weeks and took the city in the name of the Ottomans and Islam. Nor is it Emperor Justinian, who dedicated 320,000 pounds of gold and the labors of 10,000 men to build Hagia Sophia, and who was so overwhelmed upon seeing the fruit of this great effort that he cried out, "O Solomon, I have surpassed thee!" Emperor Constantine the Fifth? Certainly not that bloodthirsty tyrant, who allegedly enjoyed seeing the noses of his victims stacked high on a plate.

Rather, the man to whose memory Istanbul and all Turkey pays homage is Mustafa Kemal, the blue-eyed soldier-statesman who eventually received the name Atatürk, which means Father of the Turks. There are few rooms in the city without his picture.

A proposal by the Allies of World War I to carve up the remnants of the Ottoman Empire touched off the 1919-22 War of Independence. Atatürk and his followers defeated invading Greek forces and successfully resisted domination by the Allies. Then Atatürk was elected first president of the republic. Some who fought at his side still gather in their old uniforms, wearing the medals they earned (page 503). Often they bring treasured weapons with them. Now and then, with arthritic pain eased by prideful memories, they march through the streets in a parade.

One of the old men, Feyyaz Polat, closed the door behind him and then did what many elderly men do upon entering a coffeehouse in Istanbul: He walked deliberately to the stove to make certain that the fire was properly banked and not likely to go out during the time he would be in residence at his favorite table. He removed his army greatcoat and straightened the medals on the jacket of his khaki uniform.

"I fought with Atatürk in central Anatolia," the old man said, squeezing the ends of his moustache. "I served for three years in the cavalry. I didn't know Atatürk personally, but we were together."

Traditions Lose to a New Regime

At 73, Feyyaz Polat receives a government pension of a little more than $20 a month. The one wound he sustained during the war was not serious. "A Greek soldier cut my finger with his sword," he said. Reaching for his cane, he rose from his chair and said, "I'll take a walk now. That's all I do these days—walk and sit, walk and sit."

The old soldier put on a black cossack hat before leaving. In his younger years he probably wore a fez, but Atatürk abolished the traditional headgear as part of his wide reforms to modernize the young republic. He also scrapped the Arabic alphabet in favor of the Latin, encouraged the emancipation of women, and, although the population of Turkey is about 99 percent Moslem, gave a secular status to the state.

Because of the city's close ties with the imperial past, Atatürk always distrusted Istanbul. He moved the capital to Angora, now known as Ankara. He could do nothing, however, to alter Istanbul's role as Turkey's leading center of population, commerce, education, and culture. Though stripped of its lawmaking functions, the city continues to sit as the tiara on this ancient land.

Istanbul Invaded by Rural Folk

"Can anyone deny that Istanbul is the greatest city in Turkey, when 58 percent of the national industry is centered here and in the surrounding regions, when 52 percent of all commerce in the country is based here?" asked Dr. Fahri Atabey, squaring his shoulders against the back of his chair. "When 90 percent of the 800,000 to 1,000,000 foreign visitors who come to Turkey each year spend most of their time here? Besides, the most beautiful women in all Turkey are in Istanbul."

Dr. Atabey is a physician and mayor of the city. He has problems, he said, not the least of which is working in harmony with the 102 members of the city council. "All act like members of the opposition," he sighed. "But let me tell you about more serious matters, such as the great influx of people into Istanbul from the countryside."

Stamped with the strength and dignity of Anatolian peasantry, they arrive at the rate of more than 150,000 each year. The men, fingernails darkened by the dirt of fields that failed, fan out to the factories in search of work. The women try to make homes of the shacks erected overnight, while the children stake out new arenas for play.

One of the large settlements of newcomers is in the new section of European Istanbul, just a few blocks from the city's biggest hotel. There I talked with a man who had arrived in Istanbul two months earlier.

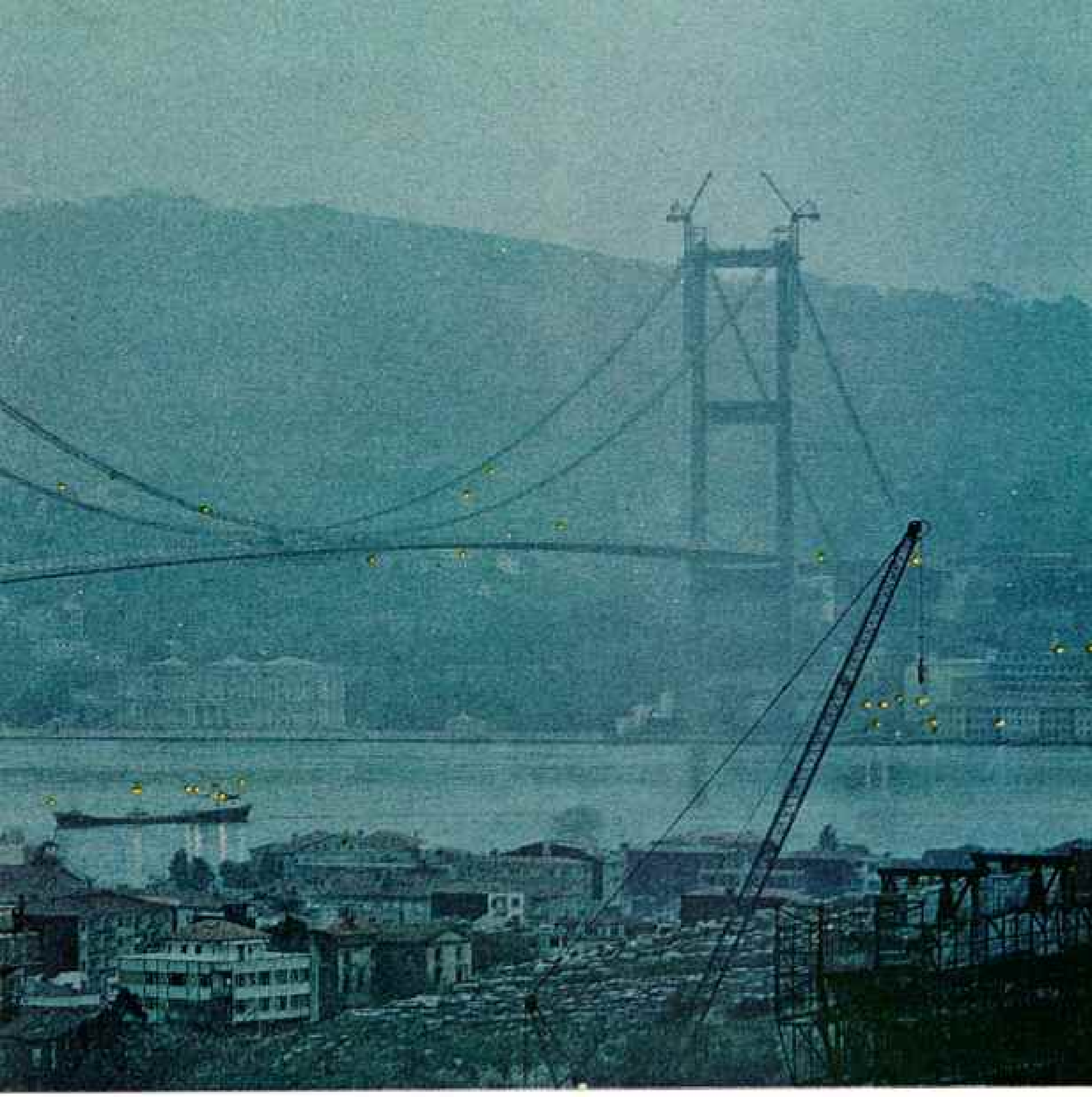
"My village is more than 200 miles away, but I walked most of the way here," he said. "My wife, four children, and wife's mother came with me. It is lonely for us now, but

(Continued on page 517)

Quickening steps echo along a cobbled lane as day begins in the Old City. Merchants put on display their cane stools and tinware and wait for customers. One man carefully feeds trash into a fire; in the past uncontrolled flames have swept away whole districts.


EUROPE
ASIA
Bosporus
Golden Horn
Galata Bridge
Bosporus Bridge
Seraglio Point
Sea of Marmara
Istanbul
Technical University
Beyoglu
Topkapi Palace
Hagia Sophia
Blue Mosque
Sirkeci Station
Istanbul University
Aqueduct
City Walls
Selimiye Barracks
British Colonial Cemetery
Hippodrome
Uskudar


U.S.S.R.
ROMANIA
BULGARIA
Black Sea
Istanbul
Ankara
GREECE
TURKEY
ANATOLIA
Athens
SYRIA
Mediterranean Sea



Incomparable crossroads, a new bridge leaps the Bosporus from Europe, foreground, to Asia. Three and a half years in the building, the 3,542-foot suspension span—only three, all in the United States, are longer—officially opens this month. It marks the first bridging of the historic channel since King Darius of Persia lashed boats from shore to shore during a campaign in the sixth century B.C.

Eight hundred years later, Rome's Emperor Constantine selected the peninsula (**map, far left**) for his capital. Furs, timber, and slaves flowed in from Black Sea ports; grain and textiles from the Mediterranean. Raw silk traveled overland from China. Ships brought spices of the Indies, gems from Ceylon, and gold from Africa. Crusaders marveled at "so rich a city . . . rich palaces and mighty churches." Constantinople—crown of the Byzantine Empire—became the wealthiest city in the world.

Coveting it for years, Ottoman Turks finally breached the massive western walls in 1453. They embellished the city with mosques and palaces, baths and bazaars, creating a fitting capital for an empire that stood for nearly 500 years and spread almost as far as ancient Rome's.

Commuting between continents

LIKE 100,000 other Istanbulians, Burhanettin Sezeroğlu lives in Asia and works in Europe. He breakfasts with his wife and children (**above**) in a middle-class suburb. Then he drives to a ferry stop to catch a breezy ride, braced with a glass of tea (**upper right**). The new Bosporus Bridge lies too far north to change his route. At the Galata Bridge terminus, a *dolmuş*—a "stuffed" cab of group riders—takes him to his jewelry shop in the Covered Bazaar (page 519). As customers show interest in a purchase, Mr. Sezeroğlu serves them tea (**right**), fetched at a moment's notice from a nearby shop.

Jewelers help buttress the city's economy, since Turks traditionally choose jewelry for gifts. Istanbul's goldsmiths mix copper with imported gold, giving a reddish hue to their bracelets, pins, earrings, necklaces, and rings.

I have cousins who will soon be joining us."

He has found work in a textile factory, he told me. "Where I come from, there is little for a man of my age, 28, to do to make money," he added.

As he talked, his wife washed clothes outside the one-room lean-to structure in which they all lived. Inside, his mother-in-law was frying fish on a wood-burning stove.

"It is impossible to stop this movement of people to the city," Dr. Atabey said. "Everyone is free to seek a better life and choose the place they wish to live. But we are responsible for providing them with municipal services. Water, for example. In Istanbul the average daily consumption of water for each person is 35 gallons. In many other cities it's about twice that."

Telephones That Try Men's Souls

Istanbul has long been burdened by a shortage of potable water. Even as I waited to talk with the mayor, I could look out a window of the modern City Hall to see, just across the street, the impressive remnants of a Byzantine aqueduct completed in A.D. 378 for the purpose of bringing fresh water to the city from outlying streams and springs.

Mayor Atabey said that the supply is now being increased through the construction of dams and other measures. "We are now working to complete projects calculated to meet water demands in the city up to the year 2020," he said. Other troublesome problems, he added, are traffic, the need for a 13 to 15 percent yearly increase in the supply of electricity, and faulty telephone service.

As is the case in many European and Asian cities, Istanbul's telephones are instruments of torture. They have been known to cause brave men to weep. To actually complete a call on the first try is like winning the national lottery.

"Sewage disposal is a very serious problem," Mayor Atabey told me. "Up until the time I was elected to office in 1968, all sewage lines were ending in rivers or the sea. The rest of the city was using cesspools. We now have the plans to correct this, and we have started to make the improvements."

What the city intends to do is pump and disperse sewage into the lowest depth of the Bosporus. The strait has three levels of water, with the top one running north to south, that is, from the Black Sea to the Sea of Marmara. The bottom one runs in the opposite direction while the middle is fairly stationary. Thus, the sewage will flow north.

A week later I accompanied the mayor on a trip to Beykoz, administrative seat of one of Istanbul's 14 boroughs. Located on the Asian side, toward the Black Sea, Beykoz is an old and picturesque settlement of fishermen. It has a movie house, a street of shops, and some excellent restaurants that sit on stilts out over the level banks of the Bosporus. In Ottoman times several of the sultans spent their summers in the area.

The Beykoz borough has a population of 80,000, and is divided into 15 subdistricts, five of which are more or less given over to the undisciplined and unsightly sprawl of squatters' shacks. The settlements are called *gecekondus*, or what may be loosely translated as "birds that come to roost during the night." Even after finding work, newcomers to the city seldom leave these hastily built dwellings; instead, they add on to them until it is now possible to determine with some degree of accuracy the age of a settlement by the size of its structures.

"How can I make roads in such a country?" Mayor Atabey said as our car wound around a sharp and steep curve. "How can I bring water up such hills? How can I collect the refuse?" He ordered the car stopped. Walking into a coffeehouse, he was quickly surrounded by constituents petitioning for roads, water, and refuse collection. The mayor said he'd do what he could.

Asian Istanbul Retains Rural Charm

After leaving Mayor Atabey, I drove south along the Asian side of the Bosporus and the Sea of Marmara for more than twenty miles. I passed many *yalıs*, the centuries-old wooden houses, some with as many as forty or fifty rooms, in which the wealthy of the city spend the summer. Not so long ago the Asian shore had few residents other than the summer visitors. Now about 25 percent of Istanbul's total population lives there permanently, with a rise to 40 percent expected within the next ten years or so.

Still, Asian Istanbul has remained rural and relaxed. It is a place where Judas trees bring a purple blush to the land in spring, where there are hills to climb for inspiring views. A farmer reins his horse to a stop when he feels the wrench of his hand plow against a rock—and, resting, he looks down on the Bosporus from the heights to marvel at the

Earning at an early age, a sad-eyed violinist and a tambourine-tapping friend entertain along the Passage of the Flowers, a lively street packed each evening with café- and bar-goers. During the day these youngsters may attend school, which is free and officially compulsory until the age of 12.

Moustached by metal powder, an apprentice tinsmith (**bottom**) pauses at the door of a tiny factory along a street of metalworkers near the Covered Bazaar. He spends years learning how to beat, cut, and embellish tin for household containers and decorations.

Eastern ancestor of the West's shopping malls, the 500-year-old Covered Bazaar is one of the world's largest. Its 4,000 shops offer everything from rugs and typewriters to hairpins, gold rings, and tailor-made suede suits—even coat hangers sold by an elderly hawker. Sellers speak enough of a dozen languages to deal with almost any tourist. The government sets a price ceiling on most items, yet haggling still rages. "Matching wits with a customer brightens one's life," confided a jeweler.

perfect furrow being laid open in the wake of a missile-carrying warship.

No landmark on the Asian side is more conspicuous than the Selimiye Barracks, an immense structure built in the early 19th century. Square-sided, with an open courtyard in the middle, the barracks now serves as headquarters for the 1st Turkish Army and the Martial Law Command in the Istanbul area. (The city has been under martial law since the leftist-inspired terrorism and student unrest of 1971.) I went there to see but one of the hundreds of rooms.

Brave Lady of the Crimean War

Accompanied by a sergeant, I walked more than 150 yards through a corridor as majors with briefcases rushed past. Less sensitive to time were the two privates chipping paint from the walls.

We came to the entrance of one of the corner towers of the barracks. I was then directed up a spiral staircase to a small room on the third floor. It was here that an Englishwoman set up headquarters from which to conduct one of the most heroic and determined campaigns in the history of medical care. Her name was Florence Nightingale.

The room has been kept much as it was when this most famous of all nurses was there during the Crimean War (1853-56), when England and France teamed with the Ottomans to successfully thwart the expansionist plans of Russia's Czar Nicholas I. It was a war in which many died, not only of wounds but also of hunger, disease, neglect, and cold. But for the ministrations of Florence Nightingale and those who worked with her, the toll would have been much higher.

And now, sitting in her chair, at her desk, I could reflect on the results of this gentle woman's work: The creation of nursing as a profession, and inspiration for establishment of the Red Cross.

Few tourists visit the room, for it is set in the midst of current and sensitive military activity. A short distance away, however, is another Crimean War historical site, this one open to the public. It is the British Crimean Cemetery, where many of the war dead rest, including some of the heroes of the Light Brigade, immortalized by Tennyson.

At Üsküdar, largest of the Asian settlements by the Bosporus, I waited for the ferry to Europe. An hour passed, and the long line of cars and trucks waiting to board had moved less than twenty yards. Ninety minutes. Then, after two hours, I lost track of time, except to know that it was long enough for me to have been approached by 19 vendors. Their offerings ranged from steering-wheel covers to inflatable rubber Santa Claus dolls.

Later that day, as I wilted on the hot belly stone of a Turkish bath, a friend explained how it is possible to board a ferry without waiting. "There are two ways of doing it," he said. "By getting married or by dying. We have a tradition in Istanbul of letting newlyweds and funeral processions proceed immediately to the head of the line."

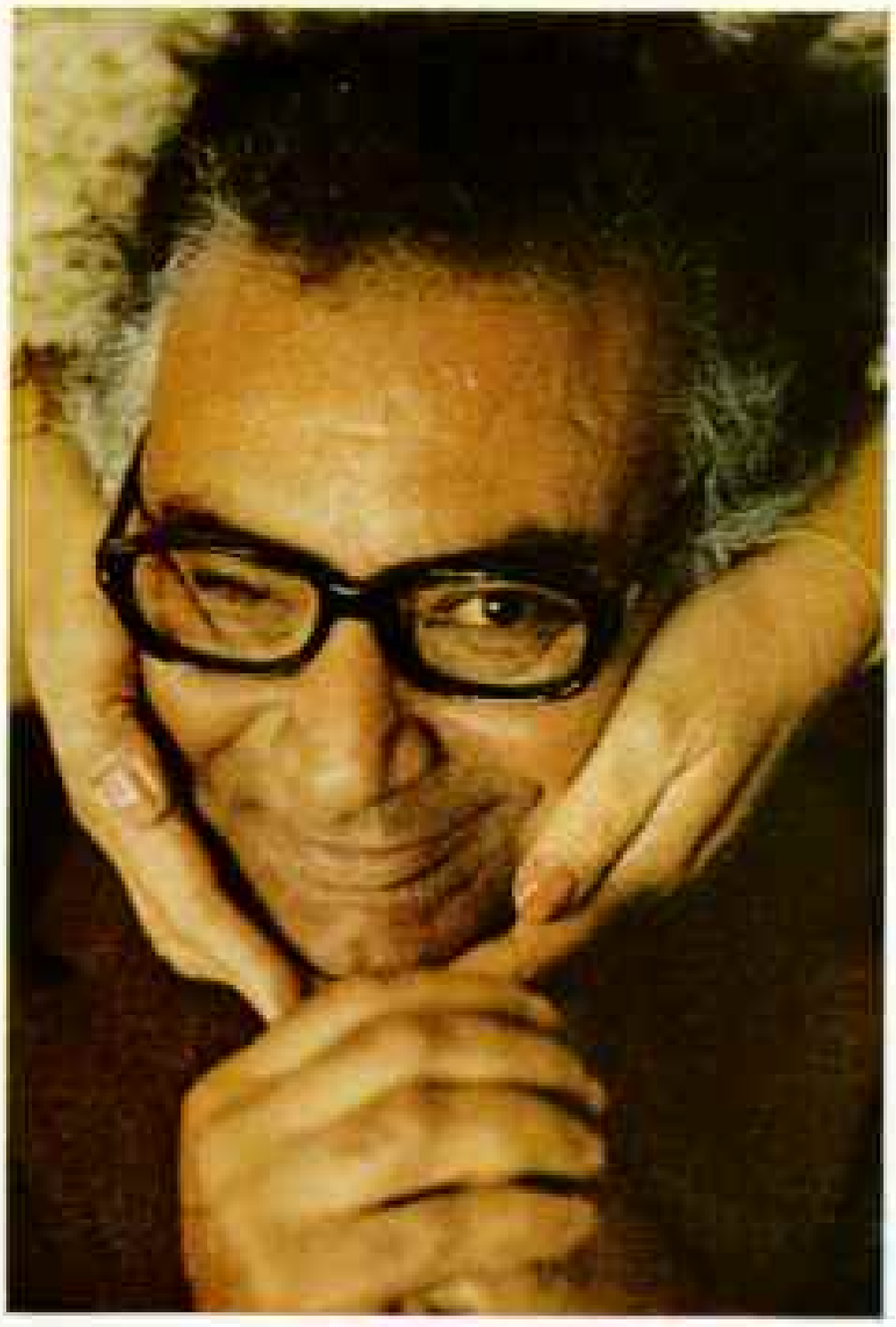
Squalid Facade Belies a Rich Interior

Although there are a hundred Turkish baths in Istanbul, I had sought out this one because of its age and history. It took an afternoon of prowling through the old section to find it. From the outside it appeared to be nothing more than a squalid building chilled by the musty air of abandonment. Upon entering, however, I found a chamber of marbled splendor through which space swirled and soared. I shouldn't have been surprised. It is a glory of Istanbul that the city is full of doors leading not, as it would seem, to coal bins, but, lo, into castles.

Çinili Hamam (Tiled Bath) was built in the 16th century for Barbarossa, grand admiral under Süleyman the Magnificent. He is remembered for having defeated Andrea Doria, the Genoese admiral, in a naval engagement. The bath lay in disuse and semi-ruin for many years, until the current proprietor, Çetin Karatün, restored and reopened it. The restoration was carried out under the supervision of the Turkish Government, for this bath was designed by Sinan, the greatest of all Ottoman architects.

First a slave and then a soldier, Sinan was

"***Güle, güle*—go cheerfully.**" An embrace and traditional words of farewell speed a friend on a long-anticipated train trip to West Germany—and a chance to work. Turkey has a reservoir of unemployed men and Western Europe has jobs to spare, though some applicants must wait years for a work visa. Savings sent home by Turks—more than $730,000,000 last year—are their nation's major source of foreign exchange.



Backstage drama finds some singers nervous, some elated, as the Istanbul State Opera rehearses Franz Lehár's *The Merry Widow*. Opera gained popularity here in the 1840's. Christians and Jews were the performers, because custom barred Moslem women from the stage. Atatürk opened almost all occupations to women, and Turks now fill most roles in the city's well-attended plays and musical productions.

Warm hands of a friend cradle the face of writer Yaşar Kemal. Born in a country village, Kemal worked as a proofreader and reporter on an Istanbul daily. Switching to fiction, he won fame with his novel *Memed, My Hawk*, a poignant tale about the plight of landless villagers.

Daughter of a pasha, niece of a grand vizier, Aliye Berger has won influence in a new aristocracy—the arts. After her Hungarian husband died, she studied engraving in England. Now the villagers of Side inspire her drawings of housewives, fishermen, and sponge divers. On the walls of her apartment, which is heated by a ceramic stove, Mrs. Berger displays favorite works.

National Geographic, October 1973

appointed Royal Chief Architect by Süleyman the Magnificent. He designed hundreds of buildings, and many of them, such as Çinili Hamam, continue to stand today as a legacy of the man's genius.

"There were 350 baths in the city at one time," Karatün told me. "There are about eighty of the old ones still in operation, along with twenty or so new ones. Business is good. We get between 150 and 200 customers a day."

Why Men Endure the Belly Stone

Çinili Hamam, like all classic Turkish baths, is divided into three sections—the reception and dressing room, an anteroom to the bath to ease the shock of the sudden change in temperature, and the steam room itself. In the latter is a large marble platform called the *göbek taşı*, or belly stone, where the patrons lounge in the delicious agony of sweating out last night's demons (page 506).

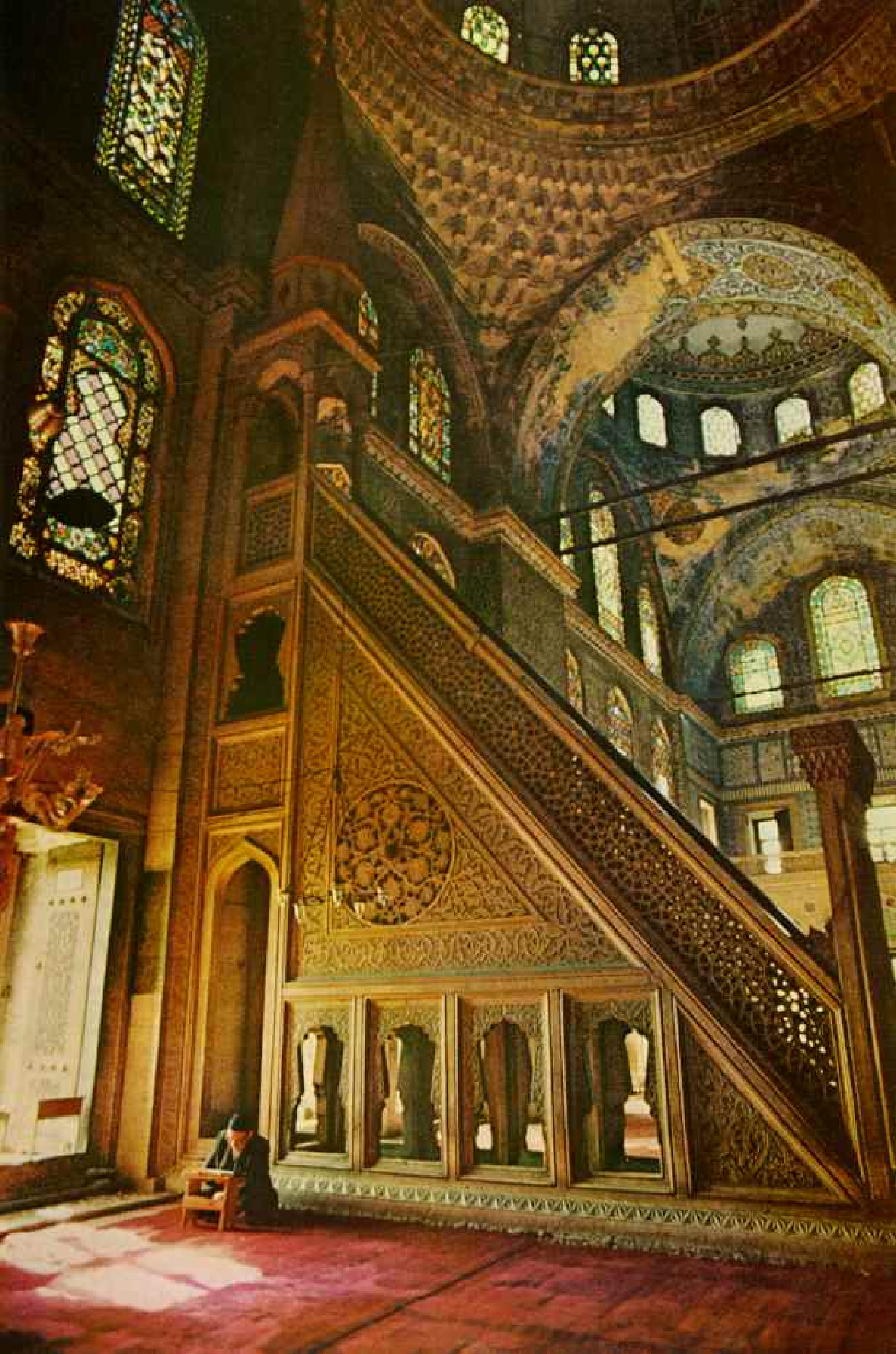
"Actually, the Turkish bath is not good for a hangover," Karatün said. "Its great benefit is making you feel light, after which the sleep comes very good." Sticks of light poked through openings in the domed ceiling. Marble columns in the steam room glistened with droplets as the temperature rose to 100°. An hour of this, followed by a thumping massage, left me rubbery but relaxed.

As I was leaving, Karatün handed me his card, and for the first time I learned that he is president of the Turkish Bath Owners' Association. I thought how wonderful it must be to hold such an esoteric title, to preside over meetings of men dedicated to the preservation of this ages-old health aid. May the belly stone never cool, I said. He thanked me in the name of the association.

Onetime capital of Christendom, long a bulwark of Islam, Istanbul treasures a dual heritage. Christ in mosaic (**upper left**) shines in Hagia Sophia, where Eastern Orthodox patriarchs crowned Byzantine emperors.

Invested in 1972, Ecumenical Patriarch Demetrius I (**left**) presides at St. George's Church, center for the city's 20,000 Greeks. Nowadays, candidates for the post must be approved by the Turkish Government.

The great imperial mosque (**right**), completed by Sultan Ahmet I in 1616, is called the Blue Mosque because of its azure tiles. From the towering pulpit, an imam delivers the sermon every Friday.



Conditioned by spy thrillers, both films and books, I came to Istanbul with a notion of the Turkish bath being a staging area for much of the city's intrigue: shadowy meetings in the bath between the overweight foreign agent and the weasel-like traitor with secrets to sell. I found none of this, but the spy game was indeed played with zeal in Istanbul up until the end of World War II.

Although the embassies were in Ankara, much of the undercover activity was in Istanbul. Among the spies was one with the code name of Cicero, an Axis agent employed as the British ambassador's valet. He and the others are gone now, but not forgotten, especially among the old waiters at the Park Hotel. Foreign agents preferred the Park as a base of operations because, for one thing, they could sit on the balcony there and count the enemy ships passing through the Bosporus. The cable office was kept busy night and day, transmitting so many messages in code that when one made sense, the dispatcher had trouble understanding it.

Of course nothing in Istanbul has been more closely identified with spying than the Simplon-Orient Express. From Paris it came, moving across the face of Europe for three days before terminating at Sirkeci Station, near the Galata Bridge. It was a train trip of high adventure, much of which spilled out into the streets of Istanbul with the disembarking passengers—the courier for a diamond cartel posing as a professor on sabbatical from a university in Sofia, the flaxen-haired German woman suspiciously fluent in Arabic, the Viennese art broker with an inventory of forged masters.

Money Flows Home From Western Europe

Today a different drama is being staged at Sirkeci Station. Young men from Istanbul and throughout Turkey gather there several times a week for transportation to Germany and well-paying jobs (page 521). There are now nearly 800,000 Turks working in Western Europe. The money they send home constitutes Turkey's largest foreign income.

I went to Sirkeci on a Saturday morning and found it crowded but strangely quiet. Those waiting in line before the ticket windows, I later realized, were too apprehensive about the journey to engage in much talk. Few had ever been out of Turkey before. Clutching their plastic suitcases, they filed into the cars and sat in silence with their fears.

But they return with a sense of confidence bordering on bravado. The ill-fitting suit is gone, replaced by one of stylish cut. Now it's lighters instead of stick matches for their cigarettes, restaurant meals instead of snacks at the corner kebab stand.

"In one more year of work in Germany I will have saved 40,000 Turkish liras [about $2,800]," Ali Baş, a 29-year-old carpenter, told me. He was back in Istanbul on vacation after two years in Germany. "I will return to Germany and work there another two years. Then I hope to come back and buy my own carpentry shop, and maybe a car."

Turkish Moslems Shun Market Meat

Ali Baş works in Hannover. There he lives and socializes with other Turks. "We buy a sheep and make our own kebab," he says. "We are afraid to buy the meat at a market because it might be from the pig." As he talked, he paused now and then to greet old friends with a sort of rakish air. He summoned a shoeshine boy, and when a man who sells cologne by the squirt stopped by the table, he ordered the most expensive scent.

Most of the unemployed in Istanbul terminated their formal education short of high-school graduation. Children between the ages of 7 and 12 are required by law to attend school, and those who aspire to a university degree have some of the finest higher educational facilities in all Turkey in their city. These include Istanbul University, the Technical University, and Boğaziçi Üniversitesi—Bosporus University.

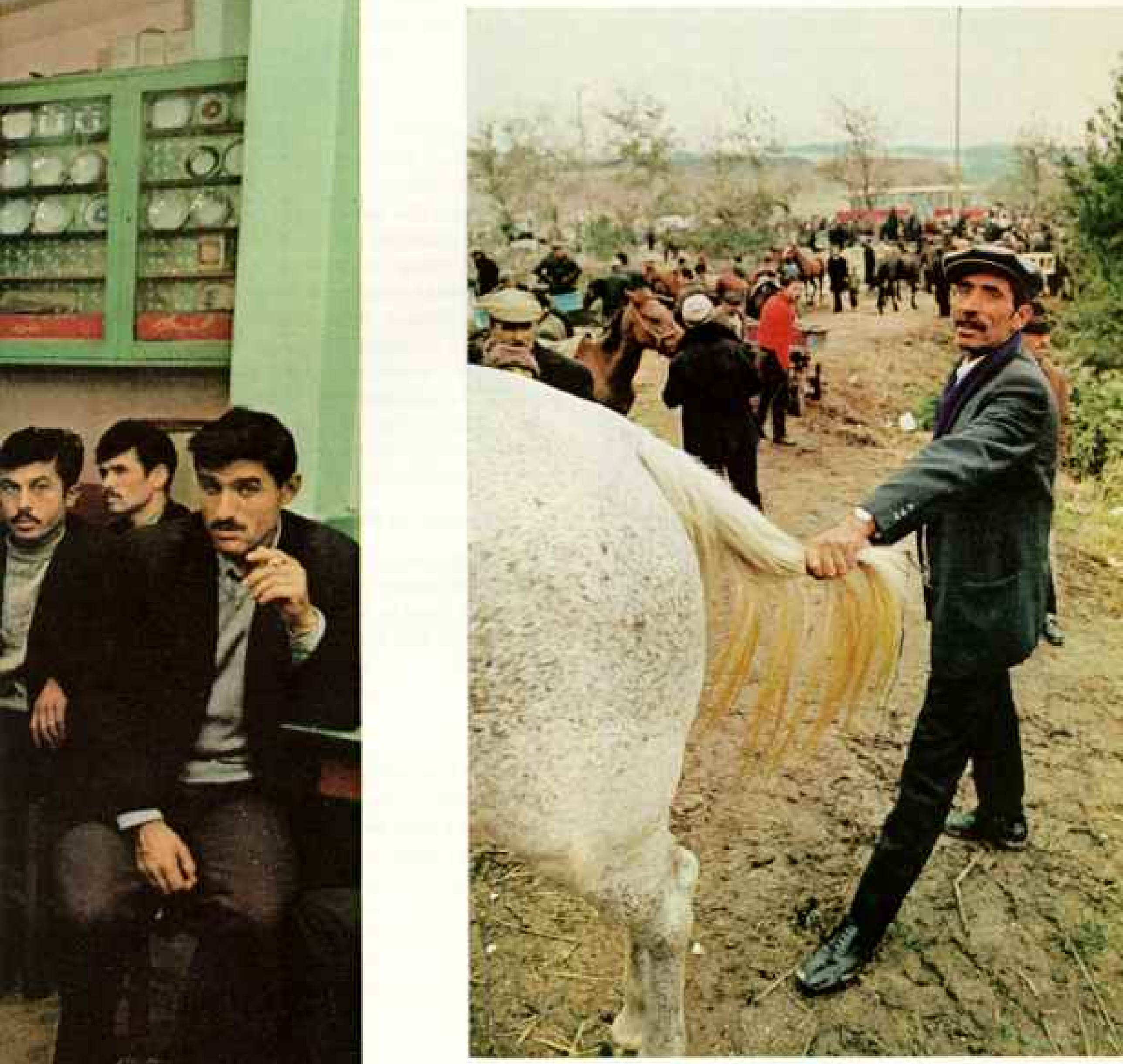
Until 1971, when the government nationalized all private universities and colleges in the country, Boğaziçi was known by the proud name of Robert College. Opened in 1863, it was the first American institution of higher learning abroad. The campus sits on the European heights rising from the Bosporus. Walking there, I could look down to see Rumeli Hisar, the fortress built in 1452 by the Ottoman conqueror of Istanbul, and a greensward where sultans picnicked.

Robert College has not completely disappeared from the scene, however. A secondary school once affiliated with the institution has taken the name.

The route from Boğaziçi's campus to the Galata Bridge carries through Beyoğlu, the new section of European Istanbul. Here can be found all the modern shops, the cinemas, luxury hotels, and the imposing buildings

Treasure now theirs, bejeweled belts worn by sultans dazzle Turkish farmers in Topkapi, formerly the Ottoman palace and now Turkey's leading museum. As Ottomans swept into Persia, as far as Morocco, and to the gates of Vienna, they won immense fortunes in booty and tribute. A highlight of the museum collection is this 86-carat diamond (**right,** actual size).

The once-forbidden precincts of Topkapi, known to Europeans as the Seraglio, open to outsiders the setting for Ottoman intrigues: the sultan's bedroom, eunuchs' apartments, women's quarters, and even kitchens that prepared some 6,000 meals a day. To break with the extravagant past, Atatürk in 1923 moved the capital 200 miles away to Ankara.



Such a fine horse, obedient and strong! The owner of an animal used to pull freight wagons and to plow fields bargains at the Wednesday horse market outside the Old City walls. Gypsies have long camped near here, amid the ruins of the fifth-century brick fortifications raised by Emperor Theodosius II. New neighbors now surround them; 150,000 people from the country arrive each year, and many raise makeshift homes on the city's outskirts.

Still a man's domain, the enormously popular coffeehouse gives city workers a convivial place for conversation, card games, and backgammon. Arabs introduced these houses to Istanbul in 1555. Recently many customers have switched to tea because coffee, an import, is too expensive. This shop near the Spice Market sells 1,000 glasses of tea a day.

that served as embassies in the days before establishment of the republic and the removal of the capital to Ankara.

Beyoğlu's main street is called Istiklâl Caddesi, a thoroughfare through which swarms of people move from morning to night, spilling from the sidewalks into the streets. Here sellers of black-market cigarettes hawk their products in croaky whispers, while waiters stand in the doorways of restaurants reciting the specialties of the menu. Here, too, young men gather on corners to taste the sweetness of vapid leisure.

One such corner is where Istiklâl Caddesi intersects Çiçek Pasaji, or Passage of the Flowers. Only there are no flowers on Çiçek Pasaji. Rather, this street—an alley, really—is where Istanbulians by the thousands go each night to drink beer and eat great and varied quantities of food. Bodies are pressed in until there is room for only the slightest movement, but an empty beer barrel sent rolling down the alley by the foot of a waiter somehow manages to get through. A dwarf goes from table to table doing handstands, while a woman sings of lost loves in a voice of cutting shrillness. A poet stands on a chair and begins to recite his latest work, but no one listens. Word is passed along that the mussels are especially good tonight.

By midnight the Passage of the Flowers is deserted except for a few stray cats drawn by the lingering aroma of seafood.

One Way to Drive Off Evil Spirits

Generally, persons in Istanbul of middle-class means prefer to shop along Istiklâl Caddesi rather than in the old section. When they do go across the bridge to make a purchase, they usually head for one of two places: the Spice Market or the Covered Bazaar. The former is a place of wonderful smells, where bins are stacked high with edible roots and sacks overflow with colorful powders.

"I am still a doctor to the uneducated," Ismet Aydın told me from behind the counter of his small shop in the Spice Market. "They come to me for help in making them well." So he prescribes *kantaron çiçeği*, an herb "good for the stomach." You boil it in water, Aydın explained, and then drink the water. And for those with fears, he has snake skins to be burned as incense guaranteed to drive off evil spirits.

Ismet Aydın has had his shop since 1949. His father had it before him. "It's like a kingdom," he said, "father to son. Only my son isn't much interested. The young people today are looking for the good money. We educate our sons, and then they go off to some other country."

An old man sitting in the rear of the shop

Latest building boom in the city's 2,500-year-old cycle of demolition and reconstruction finds concrete apartments (**above**) mushrooming atop hills throughout the metropolis. Often the new structures replace weathered pine mansions, or *köyks*, built by 18th- and 19th-century merchants and now falling into disrepair (**right**). Preservationists hope to save the best of this wooden architecture, but space is so precious that prospects seem dim.

nodded and muttered, "For sure, for sure."

Istanbul's Covered Bazaar is one of the world's largest covered markets. Spread over 50 walled and roofed acres, it houses 4,000 shops, at least 500 of which specialize in gold jewelry. There are rings to be purchased in the bazaar for $5,000, and kebab skewers for a nickel.

"This was first an Ottoman suq, dating from 1461," I was told by Temel Keskin, director of the Bazaar's Merchants' Association. "It has been damaged by fire several times, and by an earthquake at least once."

About 400,000 persons pass through the bazaar each day, Keskin said. Many get lost as they prowl the 83 streets in search of an exit. I did. After purchasing a hand-carved meerschaum pipe from a merchant who bills himself as "Goldfinger," I set out through the labyrinth of narrow streets. An hour later I turned a corner to find myself, alas, once again at Goldfinger's shop. I suspect that there is at least one person in the bazaar who has been there for years, searching, ever searching, for a way out.

"The bargaining is intense in the bazaar, but the merchants are basically very honest," one of the goldsmiths and shop owners told me as he polished a precious stone. "Several years ago an American tourist lost $20,000 in traveler's checks on one of the bazaar streets. They were found and returned to him."

City Graced by Hundreds of Mosques

Because of such landmarks as the Covered Bazaar, the old section of the city acts as the fulcrum for Istanbul's enduring greatness. It was there, for example, that man built some of his finest temples: Hagia Sophia, first a church, then a mosque, and, since 1935, a museum; the Blue Mosque, with its exquisite tiles (pages 504-505); and the Süleymaniye Mosque, to my way of thinking the most sumptuous of all the more than 500 Moslem places of worship in Istanbul.

Designed by famed architect Sinan, the Süleymaniye sits atop one of the seven hills on which the city was built. Connected with this mosque were several schools, a kitchen where the poor of the city could fill their stomachs, a hospital, and a faculty of medicine. It was, in short, a city within a city, a complex of divinely inspired beauty.

Viewed from a distance, the Süleymaniye Mosque looms over its surroundings like a many-domed mountain. Approach it, and the grandeur swells until, up close, it reaches out to engulf the soul.

And Istanbul has not forgotten its Christian past. Following the Ottoman conquest of the city, almost all traces of Byzantine art were hidden behind layers of plaster for nearly five centuries. Then, with the coming to power of Atatürk, scholars were permitted to uncover the mosaics and frescoes. The most successful of those efforts was carried out at Istanbul's Kariye Mosque by experts of Harvard University's Dumbarton Oaks Center for Byzantine Studies.

Formerly known as the Church of St. Saviour in Chora, Kariye was decorated by mosaic masters in the 14th century. The artwork included 18 panels depicting the life of the Virgin Mary. Although small compared to Hagia Sophia, where other mosaics and frescoes have been uncovered, Kariye stands as a jewel box of Byzantine religious art.

Harem Ends With a Mighty Splash

Meanwhile, experts in another field have been working since the 1920's to restore parts of the imperial harem of Topkapi Palace. In 1971 some of the 400 rooms of the harem were opened to the public.

Topkapi is a sparkling, sprawling memorial to the opulence of Ottoman royalty. Here are housed the famed jewels of the sultans, which include an 86-carat diamond (page 527). Showcase after showcase full of priceless Chinese porcelains fill one large room in the palace complex. White, blue, and red tiles from İznik in northwest Anatolia line the corridors and chambers.

In the harem the ghosts of Topkapi bring to the mind's eye a picture of concubines at leisure, hundreds of them sitting around wondering who would next be *gözde*—literally "in the eye" of the sultan. The work was not without its hazards. Legend has it that Ibrahim the Mad, a 17th-century sultan, once ordered the 1,001 members of his harem trussed, weighted, and thrown into the sea.

Late one evening I walked to a place on the palace grounds where I could look out over the water and wonder if this was where the terrible splash occurred. Certainly, it was peaceful now. Traffic on the Bosporus had slowed with the approach of night, and the Golden Horn was at glassy rest.

In the distance, the new Bosporus Bridge appeared thin and taut, a finely tuned string on this Stradivarius of cities. □

Drawings well-done bring smiles of satisfaction to youngsters in a public school, where uniforms ease distinctions between wealth and poverty. Atatürk viewed secular education as a keystone to progress and separated schools from their former position as adjuncts of mosques. Today Istanbul's schools help show the way for all Turkey, now entering a second half-century of change.

The Flamingo Eaters of Ngorongoro

By RICHARD D. ESTES, Ph.D.

FOUR TIMES the spotted hyena loped into the shallows of Tanzania's alkaline Lake Makat and then sloshed ashore, a flamingo gripped in her jaws. She ate each one as I watched, fascinated. This was hyena behavior I had never previously witnessed or seen in photographs, despite years of study of African wildlife.

I first saw Ngorongoro Crater, where Lake Makat lies, in 1962 during a 2½-year study of wildebeests, sponsored by the National Geographic Society. At that time there were only a few thousand flamingos here. A decade later I found half a million crowding the six-square-mile lake.

I had heard reports that hyenas, which recent research shows are not just scavengers but also efficient hunters,* were preying upon the huge flocks that had migrated to Lake Makat from breeding places outside the crater. Supreme opportunists, the hyenas near the lake had quickly learned to partake of this movable feast.

*Biologist Hans Kruuk described his remarkable studies of hyena behavior in the July 1968 NATIONAL GEOGRAPHIC, with photographs by Baron Hugo van Lawick.

JACKAL TAKES KILLING

MASSED FLAMINGOS run and flap in colorful chaos as a hungry attacker (**above**) plows into their midst. The hundred-pound hyena charges the flock as she would a herd of wildebeests—flushing the healthy ones and capturing any that are clumsy, injured, or sick. Only birds in the hyena's path act greatly disturbed; others flap a short distance or stride on stilt legs toward deeper water. After each chase the flock re-forms in the shallows, as if heedless of the hyena's presence. Like armies of wildebeests or shoals of fish, flamingos seem to feel safe in a crowd.

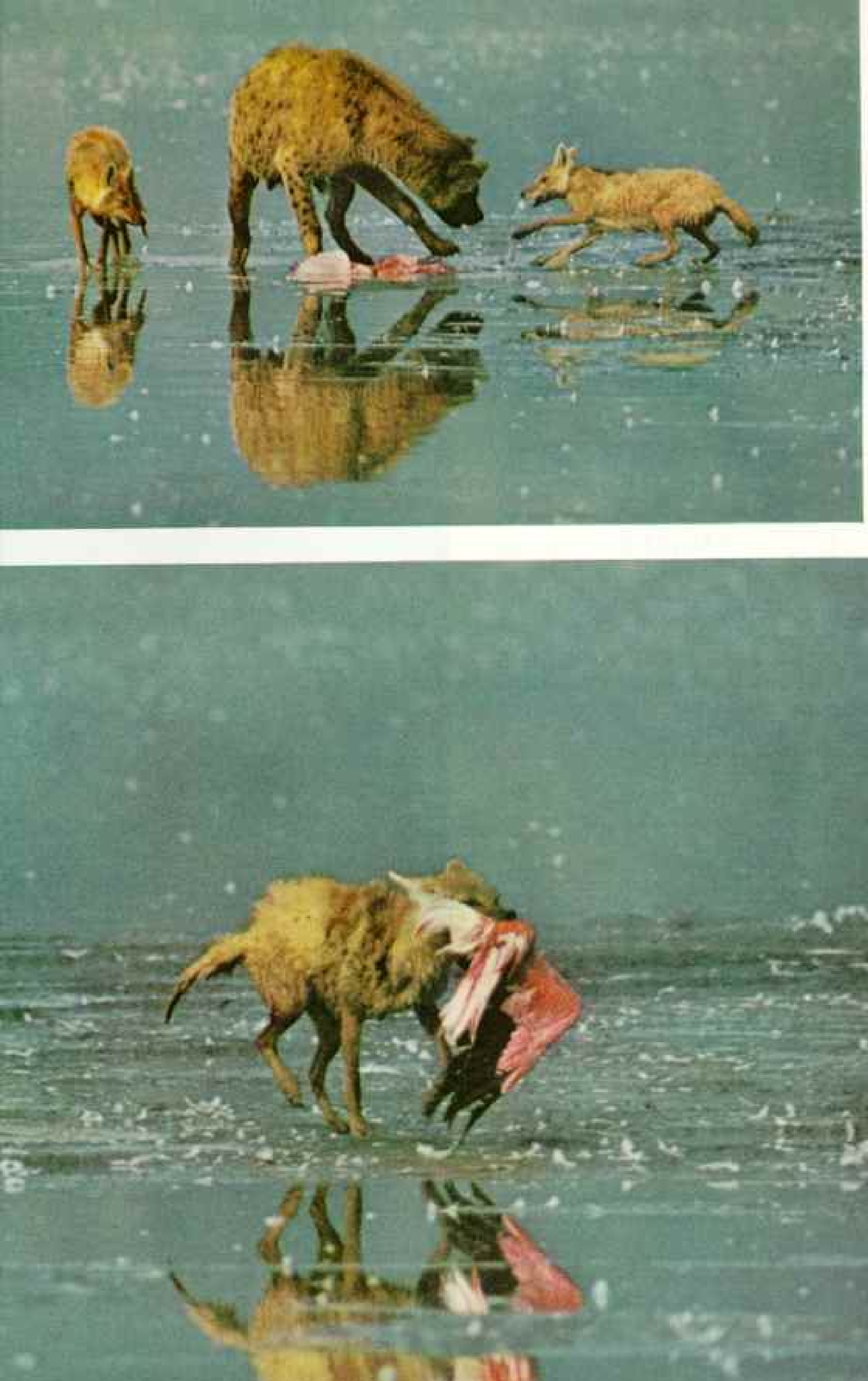
Each time the hyena beaches another bird, she finds a pair of golden jackals (**left**) waiting to steal the spoils.

The Flamingo Eaters of Ngorongoro

SKILLED SCROUNGERS, the jackals flank the hyena and move in from opposite sides (**right**). When she lunges at one, the other tries to grab the prey. The equally wily hyena refuses at first to be drawn out of position. But finally she takes two steps toward one tormentor, then turns to see the other making off with most of the kill (**below**).

Powerful and tireless, Ngorongoro's hyenas typically hunt at night, most often bringing down wildebeests and zebras on the crater's nearly treeless plain. After a successful attack, members of the same clan usually gather to share the kill, whooping and "laughing." But flamingo hunting seems to be an individual daytime enterprise. Baron Hugo van Lawick, the renowned wildlife photographer, told me of having seen successful chases nearly every morning for many days.

By learning to exploit this easily obtained but temporary bonanza, the hyena displays an amazing ability to capitalize on any new opportunity that comes its way. Although some of my colleagues may disagree, to me this striking versatility, together with its comparatively great numbers, has made the spotted hyena perhaps the predominant large African predator. □



The Bittersweet Waters of the Lower Colorado

By ROWE FINDLEY
SENIOR EDITORIAL STAFF

Photographs by
CHARLES O'REAR

CRYSTAL DROPS OF SNOWMELT give the river birth, high in the Rockies of its namesake state. Nourished by tributaries from Wyoming's Wind River Range and Utah's Uintas, it grows to muscular youth. In vigorous midcourse it cuts mighty canyons through desert plateaus in its rush toward the sea.

Then, along its final 400 miles or so toward the Gulf of California, the Colorado becomes a different river.

Once those final miles were the most ripsnortin' of all. Here the full-grown river broadened out in wide valleys, looped in great bends, and stampeded over everything in its path during unpredictable floods. Then, beginning with Hoover Dam in 1935, man began to harness that brute power; today a series of dams holds back the lower river and turns it out to water towns and industries and millions of desert acres (map, page 546).

Now, in its last 70 miles, the feeble river is reduced to a trickle, in size comparable

Sluicing through wind-driven dunes, the All American Canal carries the tamed and dutiful waters of the lower Colorado westward toward California's Imperial Valley. Prodigious thirsts of farms, cities, and industries virtually dry up the mighty river before it finds the sea.

THIS SURVEY INCLUDES A NUMBER OF PHOTOGRAPHS TAKEN BY MR. O'REAR FOR THE ENVIRONMENTAL PROTECTION AGENCY'S "PROJECT DOCUMERICA"

to its infancy, and in quality merely brackish drainage from salt-plagued irrigation projects. For all practical purposes, the Colorado River no longer reaches the sea.

Billion-dollar Price Tag on Benefits

"For its size it's the most utilized and controlled river in the world," Edward A. Lundberg told me in his office at Boulder City, Nevada, a man-made oasis overlooking Hoover Dam's Lake Mead. As Director of the U. S. Bureau of Reclamation's Lower Colorado Region, he speaks authoritatively, for 950 men and women under his supervision operate a complex of eight dams and reservoirs, with their many gates and turbines, that have harnessed this river. He ran a hand thoughtfully over his graying hair and added, "The Colorado is also one of the most beneficial to man. In one way or another, it serves 15 million people."

In dollar benefits, farm products alone total half a billion dollars a year. Add some 57 million from direct water sales by the Metropolitan Water District of Southern California, which distributes to cities from coastal Oxnard, California, to Tijuana, Mexico. Add 21 million from electric-power marketing, and a whopping 250 million from recreation, and you see that the lower Colorado supplies nearly a billion-dollar annual flow of wealth.

"As a result it's been fought over more than any of our major rivers," Robert E. Farrer of Phoenix commented. Each of the basin states has a body in charge of its share of the Colorado. In Arizona it's the Water Commission, which Bob Farrer serves as principal staff engineer. He handed me a weighty volume labeled "In the Supreme Court of the United States, STATE OF ARIZONA, COMPLAINANT, v. STATE OF CALIFORNIA (and others)."

"It was one of the classic water disputes of all time," he said. "Lasted twelve years. The proceedings fill more than a hundred volumes. Southern California kept using more and more water from the river, and Arizona finally sued to protect its allotted share. In 1964 the court ruled. Arizona won."

Now the United States and Mexico are in contention over the Colorado, a dispute that has flared repeatedly over a dozen years. Indian reservations seek more water under a "reserved right" argument recognized by federal courts. Developers build more houses to attract more people to use more water, while environmentalists warn that the river's supply is already overdrawn.

I got this story firsthand recently during

Big ol' swimmin' hole, the emerald river serves thousands of fun seekers before the canals sap its flow. Dams clarify and stabilize the stream that once alternated between brook-size trickles and red-mud floods. Here, seen from Arizona, homes and recreational vehicles in California crowd to the water line along a 12-mile-long hodgepodge known as the Parker Strip.

3,000 miles of wandering along the river from Lake Mead to the Gulf of California, and across the Imperial, Coachella, and Mexicali Valleys' mosaics of cotton and carrots, sugar beets and alfalfa, citrus and dates.

Everywhere, I looked for the people whose lives are bound up in the river—the dam supervisors who send the water into canals, the ditch riders who turn it into the fields, the cattle feeders, rodeo bronc riders, speedboat racers, lettuce farmers, lemon packers, cotton growers, conservationists, real-estate salesmen, Indians, Mexicans, and gringos.

Below Hoover the once-wild river now settles and clears behind its dams, in a series of sky-mirroring stairsteps; less than half its course still churns up the reddish silt that gave it its Spanish name. Raw boomtowns that built the dams—Boulder City for Hoover and Bullhead City for Davis—have mellowed and prospered; now they help run the river's new plumbing system. Older cities—Yuma, Blythe, Needles—fatten on better farming, tourist appetites, a sprinkling of industry.

Mosaic of plenty amid a wasteland, checkerboard fields of California's Imperial Valley slope down to the Salton Sea, 235 feet below sea level. In this infrared picture, green alfalfa and cantaloupes show red, mature sugar beets are tan, harvested cotton fields brown, and ripe wheat stays golden.

Irrigating with brackish water from the Colorado, some 50 miles away, valley farmers gross more than $300,000,000 a year. To help prevent salt buildup in their soil, they have installed 17,000 miles of underground tile gutters that funnel saline drainage into deep ditches. The one at lower left empties into the New River, center, born 68 years ago of the same disaster that created the Salton Sea. In 1905 the Colorado flooded, overwhelming irrigation works and cutting channels across the plain. After 20 months trainloads of fill finally corralled the rampaging river. But the 35-mile-long Salton Sea remained, covering a once-dry sink. Now it grows saltier each year.

Newly seeded cotton field near the Colorado in Mohave County, Arizona, will bring a rich yield to farmer John Vanderslice.

Yet I easily fed my craving for places without people. Only minutes from Needles I sat behind tangled high grass in Topock Marsh and watched coots bob for their supper. Minutes from Yuma I followed my nose upwind into a world of giant dunes where lavender and verbena scented the air.

On a grassy riverbank below the Buckskin Mountains, I found Edith Fletcher alone with her watercolors and a panorama of river, roughhewn peaks, and November sky. "I paint it, and my husband, Guy, photographs it," she said. "That way, we take a lot of lovely places back home with us to Washington, Kansas."

I took a few back home with me, to Washington, D.C. One of them was Mohave Canyon, where emerald waters loop through masses of warped, uptilted rock. Here, beneath the stone fingers that give nearby Needles, California, its name, the lower Colorado squeezes through one of its few constricting defiles.

Explorers Learned to Fear Tidal Bore

Exploring the chasm in an outboard boat, I passed marshy inlets where snowy egrets flapped away at my approach. On the way out of the canyon my boat hung up on a mud bar. Under angry surges of the throttle, it merely pirouetted in place. It took me 20 minutes to free the boat by poling off with oars.

Getting stuck in the Colorado, I thought with satisfaction, was the appropriate thing to do. Conquistador Hernando de Alarcón did it when he discovered the river in 1540. Lt. R. W. H. Hardy of the British Royal Navy did it in 1826 and smashed a rudder. Lt. George H. Derby of the U. S. Army did it in 1850 and lost a couple of anchors.

In 1857 the U. S. Government sent Lt. Joseph C. Ives of the Army Engineers to see if the river could be navigated above Yuma. A schooner landed his expedition at the Colorado's mouth, where they assembled their craft, a prefabricated 54-foot stern-wheeler called the *Explorer*. Some 150 hard-won miles upstream, he was finding the navigability questionable: "One bar would scarcely be passed before another would be encountered, and we were three days in accomplishing a distance of nine miles. . . ."

Ives returned with excellent notes, maps, and drawings, but his best description was of an awesome phenomenon at the river's mouth —a wall of water, or tidal bore: ". . . a great

Lifeline river

WITHOUT THE COLORADO, much of the southwestern United States would be a Sahara, incapable of supporting the millions now dependent upon it. Demands begin in the upper basin, with tunnels through the Continental Divide to channel water to high-plains farmlands, to Colorado Springs, and to Denver. Lower-basin projects soak up the rest of the stream, leaving only brackish drainage to meander into its delta. Man's commitments exceed the river's supply. Only the upper basin's slowness in utilizing its full share and skillful water management have thus far averted critical shortages.

Las Vegas
LAKE MEAD
Colorado River
Boulder City
HOOVER DAM
Nelson
LAKE MOHAVE
NEVADA
DAVIS DAM
Kingman
CALIFORNIA
Bullhead City
FT. MOHAVE INDIAN RESERVATION
Needles
Mohave Canyon
Topock Marsh
Lake Havasu City
LAKE HAVASU
PARKER DAM
HEADGATE ROCK DAM
Bill Williams River
Parker
Buckskin Mountains
CENTRAL ARIZONA PROJECT (under construction)
COLORADO RIVER AQUEDUCT supplies water to the Los Angeles and San Diego areas
COLORADO RIVER INDIAN TRIBES RESERVATION
PALO VERDE DIVERSION DAM
Blythe
Colorado River
ARIZONA
IMPERIAL NATIONAL WILDLIFE REFUGE
SOUTHERN PACIFIC RAILROAD
SENATOR WASH RESERVOIR
FT. YUMA INDIAN RES.
IMPERIAL DAM
LAGUNA DAM
GILA GRAVITY MAIN CANAL
ALL AMERICAN CANAL
MORELOS DAM
WELLTON CANAL
Gila
Roll
Yuma
MOHAWK CANAL
UNITED STATES
San Luis
MEXICO

How the waters are divided by treaty

Upper basin	7,500,000 acre-ft/yr*
Lower basin	7,500,000 acre-ft/yr
Mexico†	1,500,000 acre-ft/yr
	16,500,000 acre-ft/yr
Average annual flow	14,000,000 acre-ft/yr
DEFICIT	2,500,000 acre-ft/yr

*An acre-foot equals one foot of depth over an acre, or 325,851 gallons.

†Mexico's share has priority over that of the basin states.

1 River tamer, the mighty Hoover Dam can hold back two years' flow, a storage capacity nearly half of the total of all the Colorado's dams. Las Vegas taps Lake Mead water.

2 Davis Dam and seven others on the lower river complement Hoover's varied tasks of flood control, storage, and power generation.

3 The Colorado River Aqueduct carries water through 242 miles of open canals, tunnels, and pumping stations to the southern California coastal area, where it provides 75 percent of the water needed for some 12 million people.

4 The Central Arizona Project, now under construction, will send water 307 miles to the Phoenix-Tucson area, where demands began to exceed local surface supplies years ago. Pumps alarmingly deplete underground water.

5 Imperial Dam's gates turn four-fifths of the remaining river down the All American Canal and send a sixth into the Gila Gravity Main Canal, leaving an average of only 4 percent to continue down the channel. Laguna Dam, a pioneer reclamation work completed in 1910, is now largely unneeded. Senator Wash Dam, closing off a huge arroyo beside the river, holds reserve water.

6 Morelos Dam diverts what's left of the river into Mexico's Mexicali Valley. Just above the dam, the Colorado receives a return flow from the All American Canal, whose paved banks transport water with less loss than the river channel.

7 Irrigation projects along the river add to its salt load by sending brackish outflows back to the main stream. Wellton-Mohawk, with one of the saltiest drainages, set off a dispute with Mexico over water quality. A bypass now carries Wellton-Mohawk drainage around Morelos Dam; fresher water replaces more than half of it.

The canal also serves the Yuma area, but to reach that east-bank city, the waters must cross the river from which they originally came, through a giant siphon under the stream bed.

8 The Salton Sea — after Death Valley the lowest point in the Western Hemisphere — formed in 1905-07 when the flooding Colorado cut a route across the Imperial Valley to the Salton Sink.

9 Tidal bores once surged up the river's wide shallow estuaries when incoming tides met the river's massive flow. But as the force of the Colorado's current has diminished, so have the bores.

wave, several feet in height, could be distinctly seen flashing and sparkling in the moonlight, extending from one bank to the other, and advancing swiftly upon us . . . the broad sheet around us boiled up and foamed like the surface of a caldron, and then, with scarcely a moment of slack water, the whole went whirling by . . . with the thunder of a cataract. . . ."

But the tidal bore is dying, a casualty of the dams. No longer are the delta channels purged of silt by periodic floods. No longer do the Gulf of California's incoming tides—as high as 28 feet—clash with the current of a mighty river, then buck and rear into awesome, speeding, liquid walls.

Those great walls of water have studded the delta mud with wrecks. The worst was the Mexican steamer *Topolobampo*, which flipped over in 1923 at a cost of 80 lives. As recently as eight years ago a bore almost capsized the boat of Morlin Childers of El Centro, whose hobby is studying the delta area. "Then we grounded and spent 24 hours waiting for the next tide," he told me.

Hoover Dam Began the River's Taming

The demise of the bores, the rise of a vast irrigation and recreation economy, the using up of a river—all derive from the dams. The king of these—in size and muscle—is Hoover.

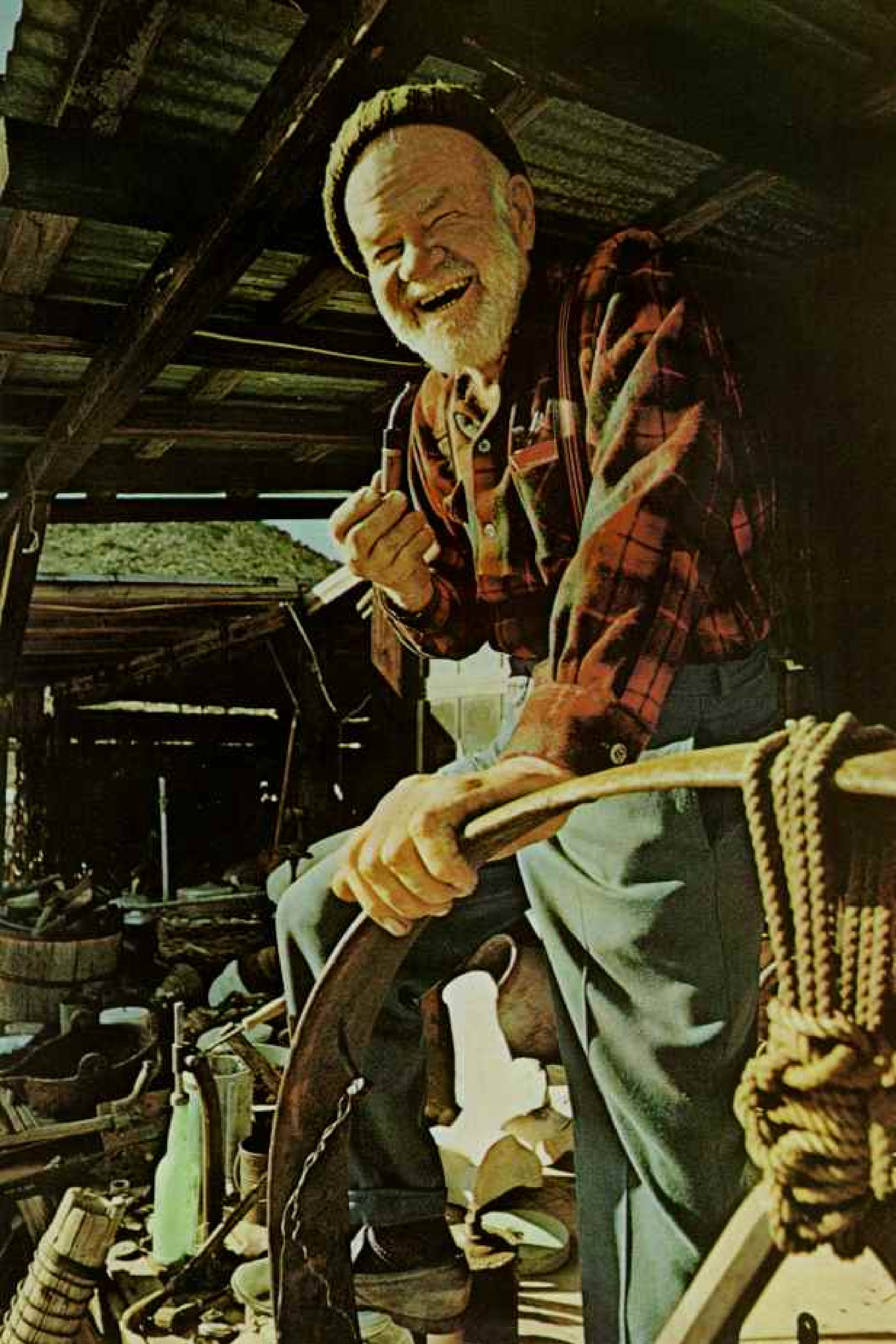
I was one of nearly a million people last year to peer cautiously from its 726-foot-high parapet and to make the minute-long descent by elevator to its cavernous turbine rooms, while a tirelessly cheerful tape recited: "Welcome to Hoover Dam . . ." and spewed statistical superlatives to boggle the mind. Enough concrete to fill a city block higher than the Empire State Building . . . enough reservoir capacity in Lake Mead to contain two years' flow of the Colorado . . . enough turbines to generate the power of 1,857,000 horses!

Southern California, Arizona, and southern Nevada—some 13 million people—depend on Hoover and smaller plants at Davis and Parker Dams as primary sources of electricity. In another 20 years Hoover will have paid for itself, with interest. Since 1937 it has churned out nearly 200 million dollars' worth of power. And although I talked to several people along the Colorado who didn't like Hoover Dam—or any dams, for that matter—none of them lived in the valley where those all-engulfing floods once raged.

(Continued on page 554)

Roadway of planking carried Tin Lizzies across dunes near Holtville during the region's younger, leaner days. Fencing protects this segment of the historic route from Yuma to the Imperial Valley. Wide lanes of Interstate 8 now serve motorists, who must still drive warily, for the walking dunes occasionally invade the road.

Child of the wild Colorado, Murl Emery of Nelson, Nevada, nostalgically recalls running a ferry in the days before dams. "After one spring flood I had to dig for my boat—buried by silt," he remembers. Now 70, he collects old mine machinery, works mining claims, and goes adventuring by pickup and motorcycle through Baja California.




54
198
24
31
12
199
22
17

Horsepower and wind power push racers across lower Colorado waters. On Parker Dam's Lake Havasu, drivers don helmets for the roaring start of the two-day, $65,000 Outboard World Championship. Here each November more than a hundred tunnel-hull craft practically take wing at speeds exceeding 100 miles an hour. Tricky winds, waves, and colliding wakes trigger geyser-spewing spills.

Desert-locked seamen on Hoover Dam's Lake Mead (**above**) sail on the gusty cross-wind leg of a yacht-club regatta. Fishermen, too, flock here in quest of trout, largemouth bass, and striped bass, a species introduced from the ocean.

Working harness of a busy river—its dams, gates, and canals. Earth-and-rock Davis Dam (**left**) backs up 67-mile Lake Mohave. Turbines of the Davis powerhouse help light the Southwest.

On the Colorado River Indian Tribes Reservation (**below**) near Parker, Arizona, a cascade foams over a gate adjusted by ditch rider Vincent Humeimptewa, a Hopi who moved here from the Second Mesa of northeast Arizona. Ditch riders patrol canal banks daily to regulate flows and turn water into the fields.

The water's salt load, a peril to growth and life, actually favors one lower-Colorado harvest, alfalfa seed. The salinity causes the plant to seed early and generously.

Just north of Yuma, a shrunken Colorado meanders between onetime flood banks (**right**), all that's left after diversions peel off four-fifths of the river into the All American Canal, visible at the top of the picture.

One who did remember the floods was a 92-year-old woman I met in Yuma, where the notorious former Territorial Prison walls a dusty hilltop above the river. Clarissa Winsor was a pioneer farmwife and first curator of the prison museum. She told me of wrapping her babies in wet sheets, in the days before air conditioning, to help them survive summer's oven heat. And she experienced floods enough for two lifetimes, floods that ruined wells, homes, and crops.

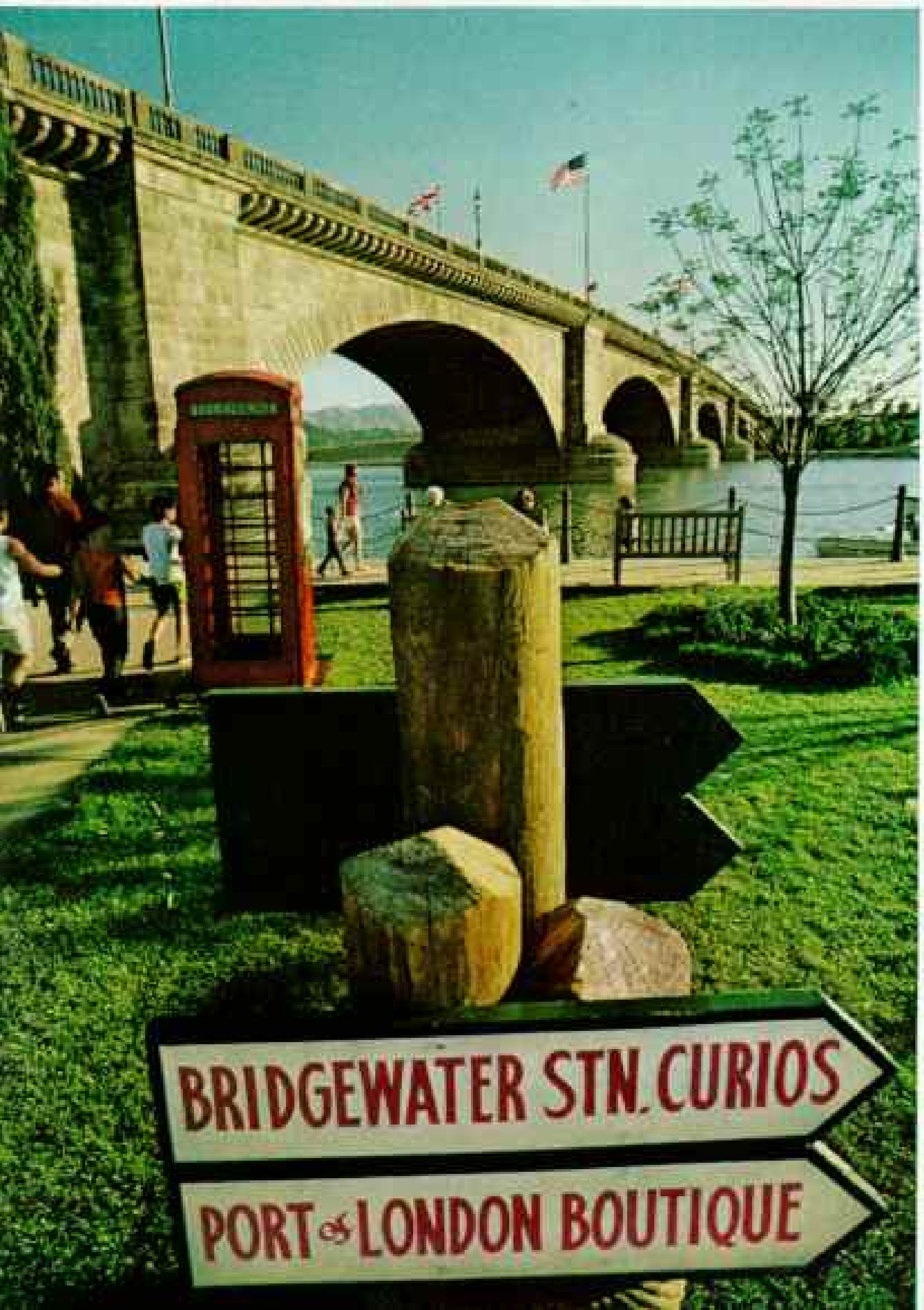
"In 1916 I watched a rooster on a crate float right down Main Street," she said. Today, protected by Colorado dams and Painted Rock Dam on the tributary Gila, that street has become an inviting pedestrian mall of mosaic tiles, fountains, palms, and stores.

Near Parker I talked with Bill Alcaida, a leader of the Colorado River Indian Tribes Reservation and a successful farmer. Mutual admiration for the exquisite baskets once woven by the Chemehuevis—Bill's people—put us on a first-name basis as he showed me several beauties from the reservation museum.

Bill took me past fields spangled white with cotton bolls, past a cemetery where Christian crosses coexist with a Mohave tribal cry house for mourners, to an undulating stretch of brushy sand. There he quickly searched out a few shards of ancient pottery and a bit of crumbly cordage.

"For centuries the river tribes came in here after the spring floods and planted small crops," Bill said.

Floodplain farming, like the ancient Egyptians did along the Nile, I thought. But those same floods limited how much land they could use and how long they could stay. Sooner



London Bridge is up again. The historic structure, which spanned the Thames for some 140 years, now leaps an arm of Lake Havasu on the Colorado. Built in 1831, the bridge eventually proved unequal to increasingly heavy traffic. Offered for sale, it brought $2,460,000 from developers of Lake Havasu City. Stone by numbered stone, the granite span was disassembled for shipment across the Atlantic and took form again in 1969-71, at an added cost of $5,600,000. Other bits of England for sightseers: a London phone booth, a cluster of half-timbered shops beneath the bridge, and a pub serving beef and ale.

Even though such new communities are carefully and tastefully planned, the demand for water created by Lake Havasu City's ultimate 70,000 residents will add to the region's already-critical shortage.

or later, they had to run for high ground.

Bill then led me to an overgrown, silt-filled trench some twenty feet wide, stretching across the plain. "This was the Grant-Dent Canal. Indians dug it by hand a century ago, trying to irrigate their fields from the Colorado. Floods washed out the gates."

Now the reservoir behind Headgate Rock Dam irrigates some 63,000 acres of reservation lands. When the Indians need water, they telephone for it.

Commitments Outrun the River's Supply

So far, the water has been forthcoming. But Colorado water users are living on a bank account that is already technically overdrawn. Commitments now exceed the river's average flow. Ed Lundberg of the Bureau of Reclamation explained it to me.

"The problem goes back to 1922," he said. "The Colorado River Compact apportioned the river's water between the upper basin and the lower basin [see inset map, page 546].

"The trouble was that the river in those days averaged about 15 million acre-feet a year at the boundary point, Lee Ferry, Arizona. The two basins agreed that each would get 7½ million acre-feet annually. But since then the flow has averaged well below 14 million, and in addition the Federal Government in 1944 promised 1½ million acre-feet annually to Mexico.

"The only thing that's saved us so far is the slowness of the upper-basin states to use their full allotment."

The bureau, consequently, is under great pressure to conserve water. The man in the pressure seat is a low-key veteran of the agency named Bill Sears, supervisor of operations at Imperial Dam, about twenty miles north of Yuma.

I found Bill and his crew convened before impressive consoles of red and green lights, switches, dials, and Teletype computer readouts. This electronic nerve center is tied to gauges along a 150-mile stretch of river and reservoir, to remote-controlled gates in dams and canals. Here Bill, more than any other man, presides over the final parting of the waters of a great river.

"Below Imperial Dam," Bill said, "only about 4 percent of the Colorado continues on down the river channel. Most of it goes through our big desilting basins here and into the All American Canal [pages 540–41]."

This is the canal that carries water to California's Imperial and Coachella Valleys, but it also serves the Fort Yuma Indian Reservation, the city of Yuma and environs, and even carries some water for Mexico.

Every Wednesday Bill and his crew get water orders for the following week from customers as far away as 150 miles—three days' travel for the water itself. How precisely can they parcel out the flow?

"We've been hitting the mark with less than half of one percent waste," Bill said.

The ditch rider must be precise, too. He's the man who patrols the canals, setting each gate to let just the right amount of water into the fields. Once he rode a horse, but now he spurs a pickup or jeep along the dirt banks.

The Imperial Valley calls its ditch riders *zanjeros*, a reminder of the days when Spain's flag flew over the land; *zanja* means "ditch." I met zanjero Monroe Alexander one early morning beside a canal near Calipatria. Once he arose with the rooster's crow to feed several thousand chickens on his Arkansas poultry farm.

"My days still start before 6:30," he said. "I have five ditches, and each one is ten to twelve miles long with lots of gates. I ride them twice a day, so I have to keep moving. But I like it better than the chicken business."

Disaster Creates a New Body of Water

The salad-green Imperial Valley was ocean-blue ten million years ago, when a much longer Gulf of California washed over it, lapping beaches northward beyond Palm Springs. Then the Colorado River deposited a dike of silt westward from the Yuma area, cutting off the northern end of the gulf, causing it to dry into a dazzling pavement of salt called the Salton Sink, some 280 feet below sea level. During written history the sink has generally remained dry—until early in this century, when catastrophe created the Salton Sea.

Charge it to miscalculation by man. In 1901 engineers first diverted Colorado water westward into the below-sea-level Imperial Valley. In 1905 huge floods washed out the controlling head gates south of Yuma, and the whole river changed course, abandoning its seaward channel for the Imperial Valley and Salton Sink. The abrasive river swiftly cut chasms, in a few months removing twice as much earth as the Panama Canal builders excavated in ten years!

"I remember seeing the water pour in," Dr. Edmund Jaeger, dean of North American

Can a desert afford a swamp? Topock Marsh, a 16,000-acre federal wildlife refuge in northwestern Arizona, has long stirred controversy. Created 32 years ago when Parker Dam backed uppermost Lake Havasu into a low, shallow basin, the marsh spreads a broad surface that increases evaporation loss. It also spawns salt cedars, cattails, and various marsh grasses that take a toll in moisture. But the marsh creates a larder for migrating snow geese, ruddy ducks, the cinnamon teal, the common loon. It shelters the endangered Yuma clapper rail and offers a roost at sunset to an egret (**above**). For years reclamationists have sought to channelize the river, reduce the swamp, and conserve water, while environmentalists have fought to save the marshy expanse with its interlocking web of plant, animal, and aquatic life.

desert naturalists, told me in his study at Riverside, California. "The Southern Pacific Railroad tried many times to build a bypass around the expanding lake, but the water always covered the tracks again."

It was the Southern Pacific that finally closed the breach. Quarries from New Orleans to the Pacific yielded stone by the trainload. Gondola cars by the hundreds spewed 80,000 cubic yards of rock into the swirling maw in 15 days. "It was a case of putting rock into the break faster than the river could take it away," engineer in charge Harry Cory later explained. By 1907 man with his iron horses had turned the wild bull of a river back to its seaward course. He'd saved his Imperial Valley and witnessed the birth of a new body of water—the 35-mile-long Salton Sea.

Now the Salton Sea has become a problem child. With no outlet, heavy evaporation, and saline inflow from irrigation drainage, the lake in less than 70 years has become saltier than the ocean. California corbina and other sport fish introduced in the 1950's face death in a few years, and various plans to save them would cost millions of dollars.

Mild winter temperatures attract thousands to the Salton's shores, spawning marinas, trailer parks, and retirement cities. The land rush has fallen short of the boom that some promoters hoped for, and many streets blocked out for homes know only dust devils; for-sale signs bleach to blankness or topple in the wind. But buyers still come, and salesmen still bubble with word pictures of how your desert dream house will look.

Pioneers Lived in Tent Cities

Though the Salton Sea laps desert along its eastern and western shores, on north and south it borders the manicured greenery of the Coachella and Imperial Valleys (pages 544-5). Constellations of towns gleam where lantern-lit tent cities sprang up only two generations back.

"My mother and dad at first lived under canvas, with a stovepipe for a chimney," said C. W. (Chuck) Seybert of Brawley. "They lived with the dust and got stuck fording the canals. Now we have pavement and bridges, and farmers worry about how much grain they're losing to wild ducks and geese.

"Sometimes the birds land by the thousands," Chuck said. I'd met him at dawn near some blinds he manages for sportsmen. "The farmers try all kinds of scare devices. They even set off little explosive charges. Strips of metal foil seem to work best. The least breeze makes them shimmer, and the birds can see that movement, even by starlight."

Chuck paused as distant V's of pintails wheeled low. A few ducks fell abruptly, and the dull percussion of shotguns reached our ears. Some hunters straggled from brush-pile blinds, led by 6-foot-5 John Elmore, whose hunting jacket bulged with birds.

Rain Can Be a Nuisance

John is a second-generation Imperial Valley farmer with thousands of acres to cultivate. The talk turned to farming and, inevitably, to the water that makes it possible here—water brought by the 80-mile All American Canal in a volume greater than that normally carried by the Potomac River.

"We'd just as soon not see rain at all," John said. "It just interferes." Even though rare, rainfall can erode seedbeds, wash off pesticides, cause leaf rot, and mire machines. "We're a food factory here in the valley. Sometimes we have to operate 24 hours a day."

This sun-drenched land yields two harvests a year—in some cases, three. By early November lettuce by the trainload is speeding across the continent from "the nation's winter salad bowl." Good Imperial Valley soil grows crops ranging from alfalfa to zucchini.

Even the valley's poorer soil—the caliche, or chalky hardpan—is good for something if you've got water, I found. Last year several "farms" in the area shipped $300,000 worth of catfish to market.

"The caliche is ideal for our ponds," manager Bob Dailey of the Mesquite Lake Catfish Farm told me when I stopped by. "It's like concrete—no seepage." He was having a busy afternoon, packing a shipment in ice for a San Diego seafood restaurant, showing off an albino catfish to some visiting Boy Scouts, and answering my questions.

"They grow fast when you give them the right combination of water, temperature, sunshine, and food," he said, holding up a pair of plump, bewhiskered three-pounders just netted from the farm's shallow, diked ponds. "These fellows are only two years old. Last year we marketed 300,000 pounds."

But the valley's top money-maker is neither fish nor vegetable. "It's beef cattle," Ed Rutherford of Brawley told me. "Feeder-pen beef last year brought Imperial County $125,000,000."

We met in his office in the rambling Planter's Hotel, since pioneer days a place where cattlemen gather to trade and talk. Firm jaw, dark moustache, and weathered skin gave him the look of a Western movie sheriff, and in fact he does have a stake in the film business. With son S. P. Rutherford he runs Randall Ranch, which stocks a herd of real Texas longhorns, plus buckboards, fringe-topped surreys, and even glass-sided hearses—all for rent to moviemakers. But like his father before him, Ed is primarily a cattleman.

"We feed out and sell about 100,000 head a year," he said. The Orita Land and Cattle Company, which he runs with partner Dan Cameron, spreads pens over 160 acres. A towering feed mill grinds grain and silage rations by the ton. "We buy animals from as far away as Montana, although most are local stock. We grow most of our feed. Water costs are negligible." That's Colorado water, of course.

Rodeo Not All Fun for a Clown

The Imperial Valley's festivals celebrate its products. In Holtville it's carrots, in El Centro it's lettuce, but in beefy Brawley it's an annual rodeo named Cattle Call. I attended it with Ed Rutherford.

"Cattle Call is the first rodeo of the season, and we come to enjoy the good weather and have a good time," said J. C. Bonine, a top money winner last year.

But no rodeo—not even Cattle Call—is all fun, especially for the rodeo clown. "I just got over five broken ribs," red-mop-topped Chuck Henson said. "Happened when a bull got me up against a fence at Fort Madison, Iowa, and stuck a horn in my side." In sagging pants, top hat, and sneakers Chuck sashayed into the arena, where he cavorted nimbly to divert wild bulls from thrown riders, or stumbled over his own feet to divert the crowd, as occasion required.

For two days thousands of spectators cheered, and a hundred performers shared bruises and prize money. To keep grass on the rodeo grounds costs water—"about $100 worth a year," Ed Rutherford said.

It takes a lot more water to stage another annual sporting event over on Lake Havasu, behind Parker Dam, but it's free. I watched drivers from as far as the Netherlands and Tahiti race for $65,000 in prizes in the Outboard World Championship. About a hundred tunnel-hull boats reared up and planed at more than 100 miles an hour (page 550).

"Hardly more than your propeller is in the water," said St. Louis racer Bill Seebold. "It's the nearest thing to flying."

"But watch out for gusts—and for holes in the water," said Bob Hering of Oshkosh, Wisconsin. Wakes, winds, and waves can combine to make the "holes." Bob knows. He hit one in 1971 and flipped, cracking a vertebra: "When you're doing 100, that water can be hard."

The race takes place in sight of the most

New game of tag: Second-graders help band pintail ducks in a migration study at Salton Sea National Wildlife Refuge. The marsh and surrounding area shelter thousands of waterfowl and the West's biggest congregation of doves.

famous bridge on the river. Stately London Bridge, which until recently arched over the Thames, now crosses a part of Lake Havasu (page 554) and helps draw tourists to Lake Havasu City, a development of Robert P. McCulloch, Sr., and C. V. Wood, Jr.

When the London Council in 1968 put the aging span up for sale, the partners offered the winning bid of $2,400,000, "with an extra $60,000 thrown in for Bob's sixtieth birthday," as Mr. Wood remembers it. They spent another $5,600,000 to take apart, ship, and rebuild the historic span in Arizona. Under one end now clusters a tiny English village, complete with a pub where the ale and beef are rare, and where two different waitresses thought my first name was "Luv."

I drove from the river to the Coachella Valley in a couple of hours, but the Colorado water that moistens valley fields is three days getting there by canal. Distance and time mean higher water costs—$3.25 per acre-foot for the Coachella farmer, versus $2.30 in the Imperial Valley.

"Also, except for the main canal, our system is underground—in 500 miles of pipes," said Keith Ainsworth, veteran assistant manager of the Coachella distribution system.

Minimal seepage and evaporation plus profitable crops like dates and table grapes make the system economically feasible. "Our per-acre yield is $1,280, and that's tops for any irrigated district in the nation."

Date Palms Grow in Harems

"When my dad settled here in 1904, there were artesian wells," said George Leach, who bosses a date-packing plant south of Indio. "Put a pipe down 500 feet and you'd get a jet of water four feet high, enough for 40 acres from one well. But that didn't last."

From contract signing to first flow, valley farmers waited 20 years to tap the Colorado. The river arrived in 1949, relieving an alarming depletion of groundwater by pumping.

George grew dates for 22 years and waxes poetic about the groves. "There's hardly a prettier sight than the ripe fruit hanging

Making war on bugs, daring crop dusters spray at leaf-top level for best results. Farmers may spend more than $125 an acre to protect fields from insect hordes. During harvest, "stoop-labor"

heavy and red, and those tall trunks standing in water that reflects the trees and sky."

The valley's 170,000 date palms descend from a few hundred Near East immigrant types with exotic names—deglet noor, khadrawy, zahidi. My favorite is medjool, caramel-chewy and sweet.

Palms are planted in harems. "One male tree can pollinate 50 female trees," George Leach said. So that's the per-acre ratio: 1 to 50.

Arabian Nights flavor spices valley life. Indio High School cheers the Rajahs to sports victories, and Palm Desert's poshest golf club is the Marrakesh. And the valley's National Date Festival each February features—you guessed it—an Arabian Nights Pageant, with harem lots of bejeweled beauties.

But the Coachella's biggest dollar getter is not the date but the white table grape, and for a decade the vineyards have seethed with bitter struggle. Cesar Chavez's United Farm Workers won organizational rights three years ago, then saw their victory fall apart in a violent rivalry with the Teamsters. Now the feud spreads to other valleys and other crops—including lettuce.

Any lettuce that a grower gets to market is a triumph over odds that would shake a dedicated horseplayer. Tom Howell of Roll, Arizona, a former Stanford University football player, convinced me of that.

"Every year it's something. This year it's the rain. I'd just planted two fields in September when we got an inch, and it absolutely destroyed the beds. We replanted, and on October 6 we got a three-incher. The lettuce took off, started growing too fast, making the head faster than the nutrient could get into the leaves. So they turned brown, and that finally causes a slime in the head, and you can't harvest lettuce like that."

Nature's moods and the market's spasms tend to turn a farmer cynical, so that he takes things with a grain of salt. But that's an unhappy phrase in Tom's valley—the Wellton-Mohawk—where salt is a big problem.

All rivers carry dissolved salts, but the Colorado is saltier than most. Irrigation

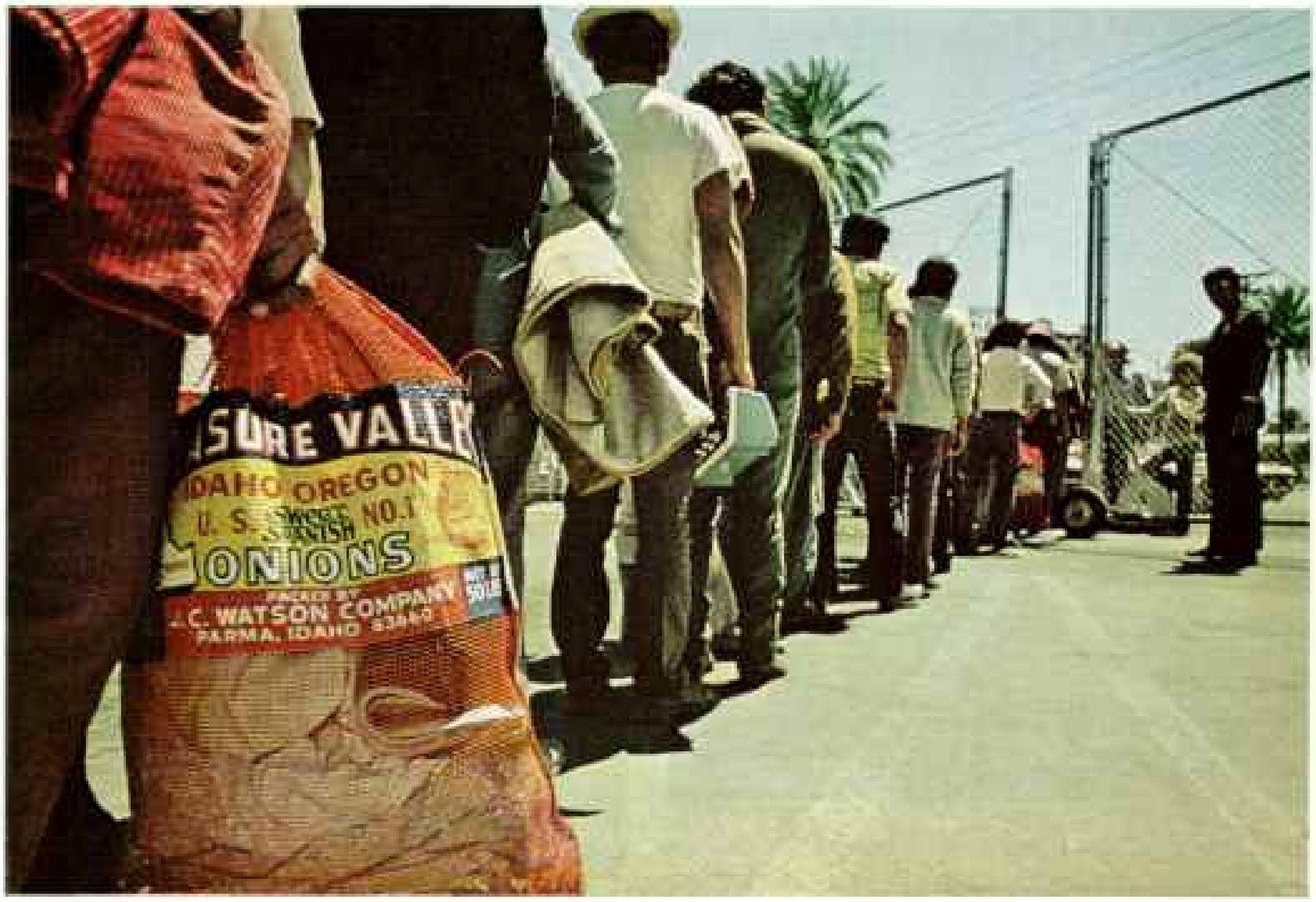
teams on Indian lands near Parker work fast to start crisp head lettuce on its way to market.

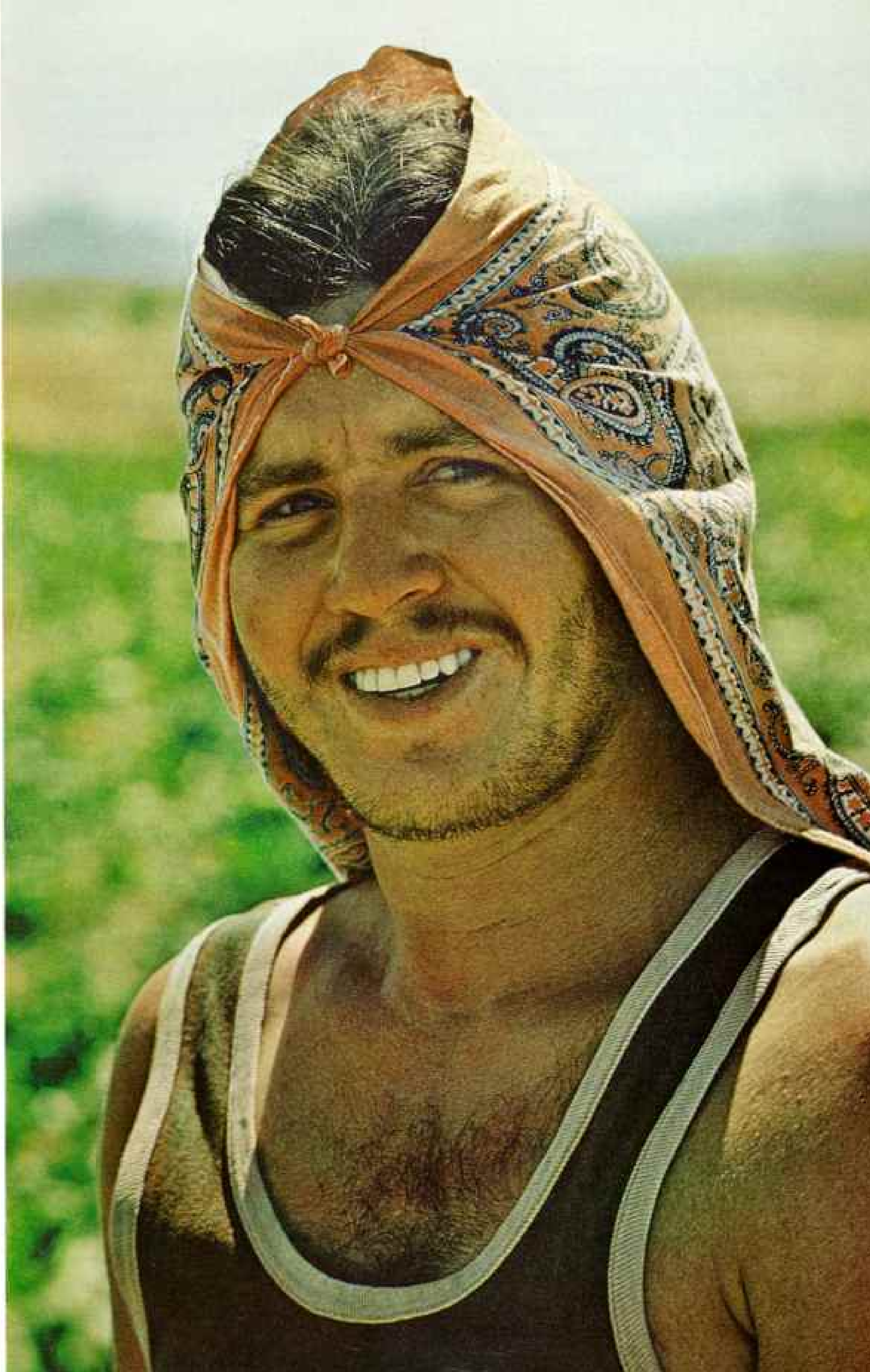
The Bittersweet Waters of the Lower Colorado

Reaching for a better life, Mexican workers daily cross the border to jobs in the U. S., where the pay is higher, and return nightly to homes below the border, where living is cheaper. Green cards, inspected by a U. S. immigration officer at Calexico, California (**left**), permit them to settle in the U. S. if they wish.

Lettuce pickers like Jugo Olivas (**right**) earn as much as $8,000 during about eleven months of varied field work. Their earnings have risen in recent years, in part because of union influence. But now they find themselves caught in a fierce rivalry between Cesar Chavez's United Farm Workers and the Teamsters. The fight has included strikes, angry confrontations, and violence.

Higher U. S. pay each year draws some 300,000 wetbacks —illegal entrants from Mexico —and authorities return most (**below**). But if a worker is lucky, he may avoid detection until he has earned a few weeks' pay and accumulated an onion sack full of possessions.





farmers flush its water on through their soil, sending even saltier drainage back to the river. As you descend the lower Colorado, the water volume shrinks and the salt content rises.

Finally the river meets Morelos Dam, a chief diversion point for Mexico's irrigation water (map, page 547). And the Mexicans don't like the quality of the water they are getting.

"You can see what has happened," said Ramon Lopez Zepeda, his palms outstretched over his field of stunted, dying sorghum. "About 80 percent of the seed came up at first and tried to grow." The 56-year-old Mexicali Valley farmer let his arms fall. "We don't have enough money to fight this salt, this cancer that is eating up our farms."

But Cliff Tabor, manager of Arizona's Wellton-Mohawk Irrigation and Drainage District, saw it differently. "I'd say that poor drainage and tillage practices are the principal cause of damage to their land. Farmers in many parts of the world, including the San Luis Valley just south of us in Mexico, use saltier water and grow profitable crops."

Mexico recognizes the need for improvements. "By 1975 all our major canals and ditches will be lined," said Leandro Rovirosa Wade, that nation's Director of Water Resources. "But how we use or waste the water is not the point. We are entitled to receive usable water, regardless of what we do with it."

Mexico's President Luis Echeverria Alvarez visited Washington last year and emphasized that the Colorado salinity question was "the most important single issue between our two countries." The U. S. began releasing extra water to Mexico for temporary relief, and last May proposed terms for a "permanent and just solution." The plan, undisclosed while Mexico considers it, reportedly would put many millions of dollars into reducing man-made and natural sources of salt.

Underground Water Could Swell River

Any man who has a scheme to add water to the Colorado finds eager listeners throughout the West. Such a man is Dr. Robert Rex, who offers a plan to mine large quantities of water from under the Imperial Valley.

The water in question is briny—but it's very hot, and there's a lot of it.

"Enough to add 2,300,000 acre-feet a year to the Colorado eventually," said geologist Rex, a vice president of a geothermal-power

Testament to Mexico's distress, a vendor of bottled water finds many buyers in the areas of the Mexicali Valley supplied by canals of the salt-laden Colorado. Parts of the valley irrigate from wells, which generally provide drinkable water.

development firm called Pacific Energy Corporation. "And enough heat energy to distill the water and pump it across more than a hundred miles of desert to the river."

As we approached a Bureau of Reclamation test well east of Holtville, I could see some of that energy—plumes of steam billowing white against the desert sky's deep blue.

"We're over one of the world's major rifts—the San Andreas Fault, it's called north of here," said Dr. Rex. Fault systems leak heat upward, producing hot pockets relatively near the surface.* "Power generation is my primary goal, and that water is leaving the wellhead at 374° F. But the Holtville field is associated with enormous amounts of water."

When engineers have drilled enough holes and jetted off enough hissing steam to establish pressure guides, piping requirements, and nozzling techniques, actual production can begin. "But that's a few years away," Dr. Rex said. Even so, he's enthusiastic about the outlook for geothermal power.

"In the western third of the nation, geothermal plants could produce enough energy to satisfy all additional needs anticipated by the year 2000—and without air pollution."

Another source of more water for the lower Colorado lies straight up, in the supercold rivers of air that jet across the continent.

"Every day about 200 billion tons of water flows over the United States on the prevailing winds," Dr. Archie Kahan of Denver told me. He heads the Bureau of Reclamation research team in a project called Skywater.

Skywater's goals include combing more moisture from winter snow clouds over the Rockies. For two years any pregnant-looking cloud mass above the San Juans has been liable to seeding with silver iodide crystals, from planes, rockets, or from the ground.

"I believe we could control our seeding area, so that we wouldn't generate unwanted blizzards across the Continental Divide," Dr. Kahan said. "And I think we could send an additional 1,800,000 acre-feet of snowmelt down the Colorado each spring."

The search for other water sources goes on, among them a way to distill seawater economically and a proposal to tap the Columbia River, 800 miles away. The latter idea has stirred fierce opposition across the Northwest.

Congressional fear of a Colorado water crisis was a factor in Arizona's now-famous suit against California, the one that went to the U. S. Supreme Court.

"Congress wanted to be sure we had enough water for the Central Arizona Project," state engineer Bob Farrer had explained to me when I visited him in Phoenix. "Only then did the authorizing legislation pass."

The Central Arizona Project, scheduled for completion in 1985, will pull 1,200,000 acre-feet a year from the river just above Parker Dam, tunnel it through the Buckskin Mountains, and channel it southeastward to three thirsty counties in the Phoenix-Tucson area.

"It's called a rescue project, because each year the area pumps over 2,000,000 acre-feet more water from the ground than nature is putting back," said Michael C. Thomas of the Bureau of Reclamation. I talked with him and Oliver H. Lillard in their Phoenix planning offices, where CAP already exists on blueprints, wall maps, and artists' conceptions. "The project won't make up the deficit," said Mr. Lillard, "but it will delay the day of water bankruptcy and allow more time to adjust needs to supply."

Villain's Role Comes as a Surprise

While Arizonans await CAP water, the groundwater table sinks eight to ten feet a year, on the average. As a result, the surface cracks open, sometimes threatening homes.

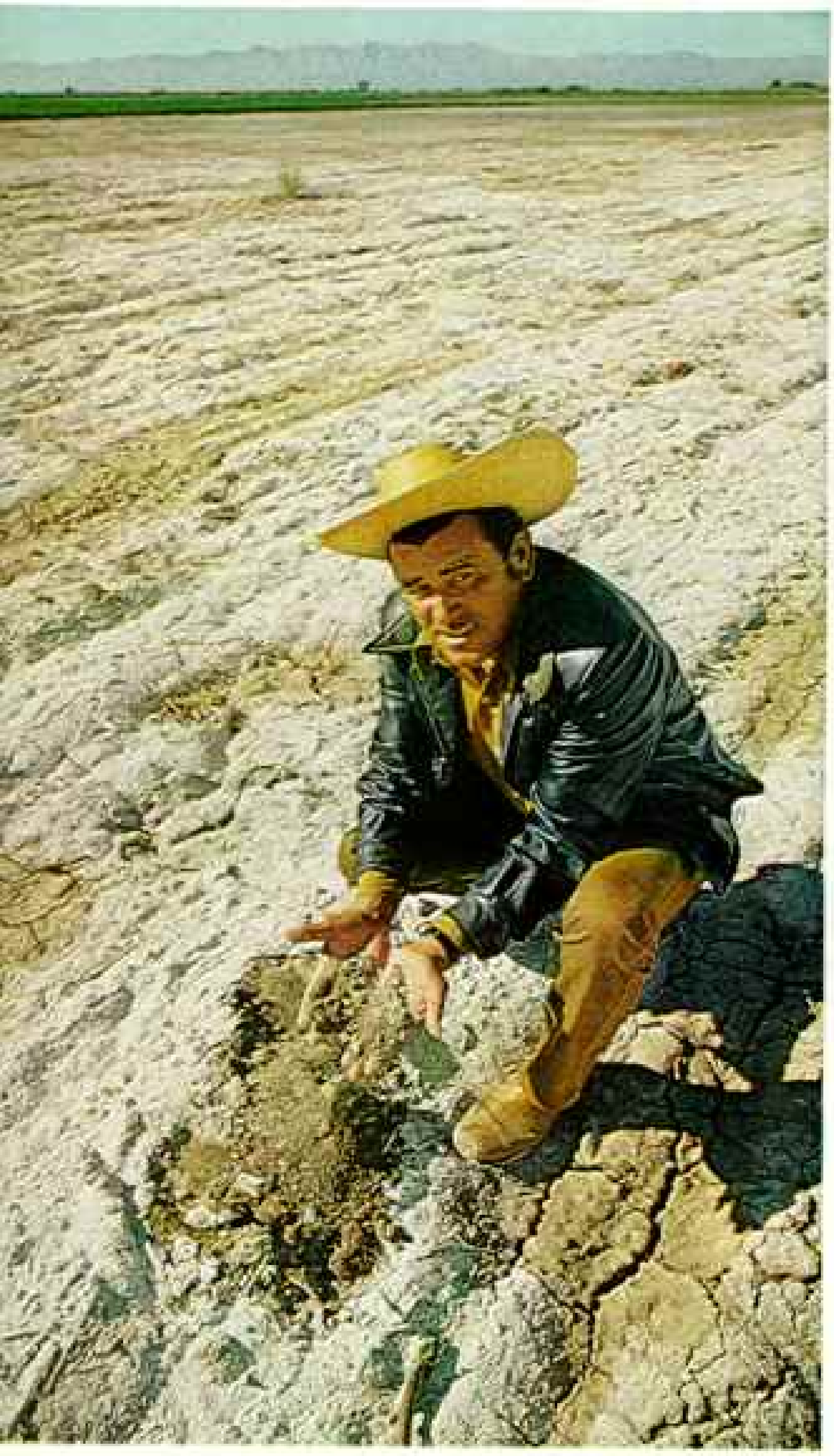
Despite the dire need, the project has its critics. The Sierra Club, for instance, questions sending the Colorado's saline water into an area already plagued by salty soil, and terms the proposal "a waste of national resources." Indians of the Fort McDowell Reservation oppose the building of a reservoir that would flood almost a fourth of their land, including their burying ground.

Critical blasts are a relatively new experience for the Bureau of Reclamation. When it was born, early in the century, many clamored to water the desert, few to preserve it. The bureau went dutifully to work, damming and diverting, adding new farmland, to the cheers of nearly everyone.

But a few years ago it started getting verbal fusillades, especially for trying to save water by taking the kinks out of the river, drying sloughs, and killing salt cedars and other phreatophytes (literally "well plants," because their thirsty roots drill deep for water).

"The trouble," said Forrest Reynolds of Blythe, "is that channelization destroys the habitat for fish and wildlife." His job, for the

*See "California's San Andreas Fault," by Thomas V. Canby, NATIONAL GEOGRAPHIC, January 1973.



Hands full of futility, Mexican farmer Gilberto Guitierrez Bañaga scoops up soil sterilized by accumulated salt. Some agricultural experts in Arizona and California blame the toll on poor salt-control practices, but Mexicans say they should get better water from the river, no matter how they use it. The United States and Mexico now seek a solution to the dispute.

During final miles in Mexico, the once-huge Colorado is hardly more than creek size, but it's still large enough to provide an evening bath (**upper right**). In Mexicali, capital of Mexico's State of Baja California, Governor Milton Castellanos confers with cotton farmers (**right**) on how to combat the salt problem and obtain better markets.

California Department of Fish and Game, is to preserve shrinking wildlife havens on the Colorado. "Much of the river has been turned into a series of rock-lined channels and sterile backwater lakes."

Ed Lundberg of the Bureau of Reclamation has formed a Lower Colorado Management Coordinating Committee, so interested parties like Forrest Reynolds can learn about, react to, and participate in major plans for the river.

Some regard this move as too little and too late. "When I was a boy, I could take a boat out all day on the river without seeing anybody," said Jerry Collings, who grew up near the Indian reservation around Parker. "I remember great marsh areas where the ducks and geese came in. Now you have to fight your way to the river, and when you get there, a lot of it looks like a big canal."

Contributing to Jerry's bleak view is the so-called Parker Strip (pages 542-3), a 12-mile stretch of people-impacted river—bankside cabins, boat ramps, trailer parks, bars, mobile homes, cafés, campgrounds, motels, food stores, and gas stations, umbilically tied to power lines above ground and septic tanks below.

On a Fourth of July weekend as many as 50,000 people pour in. "You can almost cross the river by stepping from boat to boat," Lloyd Walker, at the desk of the Bedrock Motel, told me.

Reprieve for an Overburdened Stream

Before leaving the lower Colorado, I got a bird's-eye view of the river—and its problems—with Russ Freeman of the Environmental Protection Agency. In a noisy but leisurely DeHavilland Otter we flew south from Las Vegas. We saw raw sewage discolor the river near Needles, alfalfa fields blotched white by salt near Parker, a dying orchard near Calexico. Along the Parker Strip we saw desert hills bladed bare for a grafting of split-level and ranch-style homes. We saw care and planning in Lake Havasu City's graceful advance up a broad riverside slope, but wondered about the wisdom of attracting an eventual 70,000 new residents to an already thirsty land.

"People expect the Colorado to be their fountain and cesspool," Russ said. "They put demands on it beyond its capabilities."

While man desperately seeks answers, nature granted him at least brief respite in the form of a very wet 1973 spring. From the snowy Rockies to the balmy gulf, enough moisture fell to swell runoff by a fourth, raising low reservoirs, awakening a horizon-filling bloom of desert flowers, greening hopes of good solutions to bitter problems.

In dry country, moisture and mercy can sometimes sound like the same word. □

Bloom of a dying river: The Colorado-watered fields of two nations wear an orange blush of productivity in this infrared view from space, but the river itself shrinks to nothing before reaching delta estuaries. This composite of two pictures, taken in different months, shows a segment of the U. S.-Mexican border distinctly, a result of variations in crop seasons: In November the alfalfa, sugar beets, and lettuce north of the border show vivid hues, in contrast to fallow cotton fields to the south. The portion at right, taken in September, shows Mexican crops at harvesttime.

Pondering the river's problems, experts try many solutions. Researchers in the Rockies seed snow clouds to increase spring runoff; engineers in the Imperial Valley test-drill into a vast underground reservoir. Such projects buoy hope in a region desperate for the blessing of adequate water.


Riverside
Indio
Palm Springs
COLORADO RIVER AQUEDUCT
COACHELLA VALLEY
COACHELLA CANAL
Colorado
STATUTE MILES
AREA OF PHOTOGRAPHS
Salton Sea
IMPERIAL VALLEY
ALL AMERICAN CANAL
Gila
San Diego
U.S.
MEXICO
Tijuana
Mexicali
San Luis
MEXICALI VALLEY
SAN LUIS VALLEY
Laguna Salada
(intermittant lake)
Agua Caliente de Leon
Pacific Ocean
San Felipe
Gulf of California

One Strange Night on

MY FEET LEFT DEEP TRACKS on the warm, soft sand of that remote Pacific beach, but incoming rollers quickly erased them. Offshore the surf heaved somberly. In the east the purplish tiara of dawn was growing.

Ahead, several dozen black vultures suddenly erupted from the beach where they had huddled as if awaiting daybreak. Like evil omens they circled in silence, then plummeted down and in winged fury sparred and fought for something on the sand.

When I sprinted to the spot, the vultures again took to the air. Now I could see their prey: leathery slate-gray bits scarcely bigger than silver dollars—newly hatched Pacific ridley turtles. I counted eight dead. Four were still alive, churning the sand with their untaught flippers in a desperate effort to gain the cover of the sea. I picked up one of the

Vanguard of an incredible annual invasion, Pacific ridley turtles come ashore on Costa Rica's Ostional Beach. In a few

ARTICLE AND PHOTOGRAPHS BY PAUL A. ZAHL, Ph.D. NATIONAL GEOGRAPHIC SENIOR SCIENTIST

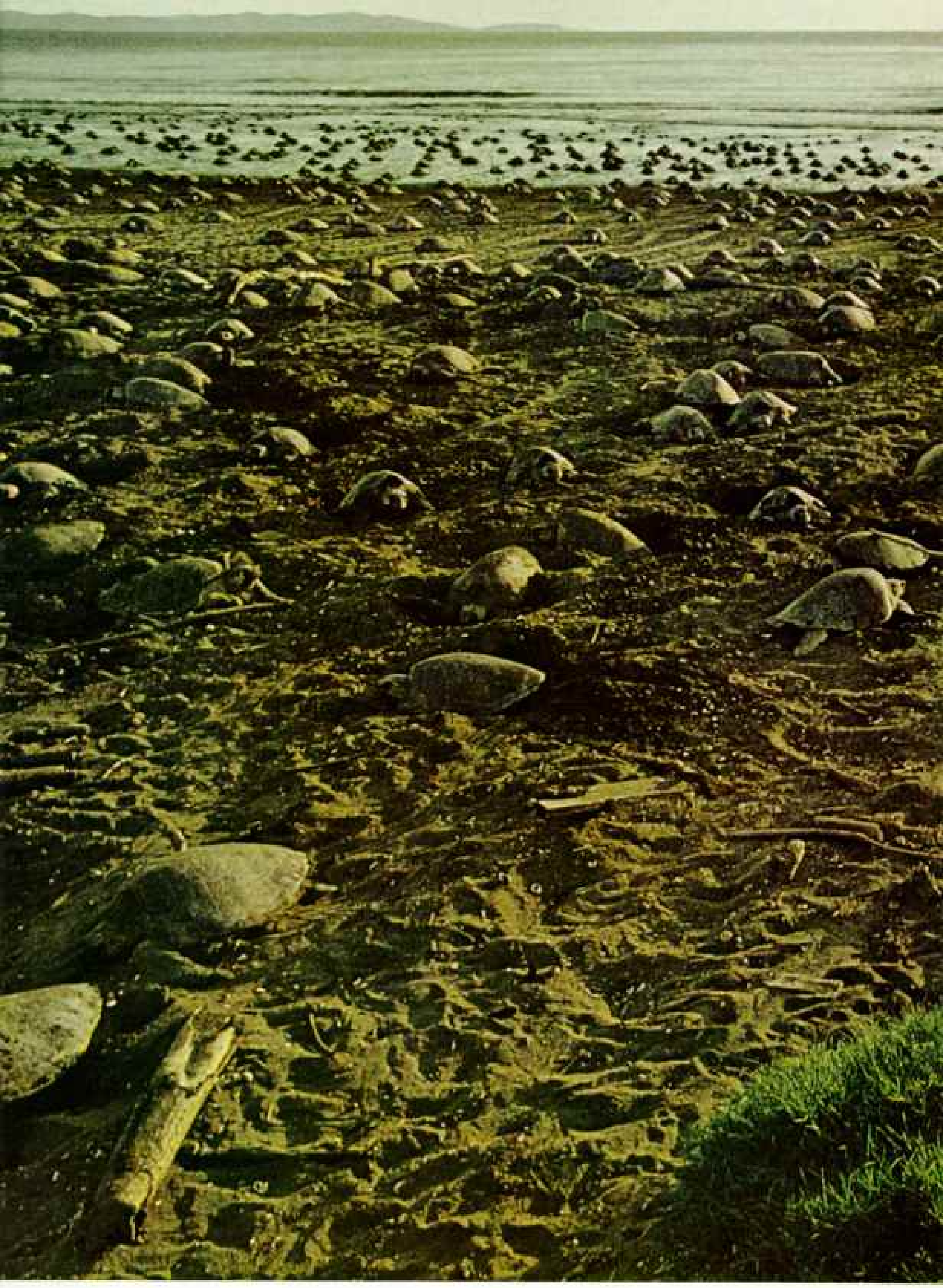
Turtle Beach

lifeless infants, decapitated cleanly as though by a 16th-century headsman. The seven others had been just as neatly beheaded by scissors-sharp beaks.

"Not more than one in a hundred makes it to the water," commented Dan McDuffie, who was also combing the beach. His hands held half a dozen live hatchlings. Tossing them into the surf, he added grimly: "At least the vultures won't get these."

Early every morning Dan and his wife, Joan, hiked this half-mile stretch of sand, recording the number of tracks left by female turtles that might have come ashore under cover of darkness to deposit their eggs. Dan and Joan are Peace Corps Volunteers assigned to aid in the University of Costa Rica's study of the Pacific ridley turtle (*Lepidochelys olivacea*), a species quite distinct from such other—and better-known—sea turtles as the

days tens of thousands will emerge from the sea, march beyond the surf's reach, and lay their eggs. The *arribada*—"arrival"—is one of nature's most spectacular phenomena.



Like water-worn boulders, female ridleys swarm over Nancite Beach, Costa Rica, in a rare daylight appearance. Intent on their egg-laying mission, they ignore human spectators. No one knows why such

DAVID A. HUGHES

awesome throngs blanket only a few of the world's most isolated beaches. Even the name ridley is a puzzle. "Ridley" or "ridler" was first applied to a related Atlantic species by Gulf Coast shrimp fishermen.

hawksbill, loggerhead, leatherback, and green.

Among these great turtles of the sea, the handsome olive-green Pacific ridley remains a mystery. It may be a migratory species, but no one is sure where it comes from—or goes. It is native to widely separated reaches of the Pacific, Indian, and Atlantic Oceans.

A mature specimen, with a shell measuring as much as 30 inches in length, may weigh 100 pounds. We can only guess at its life-span—perhaps as long as a man's. Little is known of its mating or other habits. And, curiously, no one has yet reported finding a young Pacific ridley after it has hatched and slipped into the sea.

But the most dramatic riddle of the ridley is its custom of visiting a few traditional beaches en masse during the latter half of the year to nest. Relatively few humans along the coast, from Chile to lower California, have ever witnessed this awesome spectacle: wave after wave of big, gravid female turtles emerging from the surf—ten, twenty, even thirty thousand in a night.

It was this phenomenon, called an *arribada,* or "arrival," that I had come to Costa Rica's Ostional Beach to see (map, opposite).

On the bulletin board at the turtle-watchers' camp I read the daily log. Between October 8 and 12, no turtles had come ashore. On the 12th, eight sets of tracks appeared where females had plodded up to the soft, deep sand above the high-water mark, dug their nesting holes, and released their loads of as many as 120 eggs each. Mating had occurred at sea; the males rarely if ever accompany the females ashore. Each morning the number of tracks grew: On the 13th of October, 26 were found; on the 15th, 116.

Waiting's Easy on Ostional

"I guess we can expect an arribada any day," said Dr. Douglas Robinson, associate professor of biology at the University of Costa Rica, in charge of the turtle study.

Doug told me that the last arribada on this beach had occurred in late September. The next? One could only guess. Moon, tide, weather, a built-in urge, a biological clock—any and all may be factors triggering the mass landing. "Who knows?" Doug teased me. "You may have to sit on this beach for another month or two!"

I didn't mind that prospect at all. The camp quarters overlooked the sandy beach—and spectacular Pacific sunsets. There were

Topsy-turvy ridleys lie helpless on Ostional Beach the morning after the melee of an arribada. Upended by tumbling over a timber and unable to right themselves, these adults await the coming of high tide or a friendly passerby—with luck, before the sun gets too hot.

cots and hammocks, and Joan McDuffie knew how to cook rice and beans in the best Costa Rican style. One night she served up savory iguana steak. Gaudy parrots and hoarse-voiced howler monkeys enlivened the shoreline jungle. All of us, including two student aides, spent each balmy day in shorts, and quickly forgot the meaning of shoes. The prospect of waiting was hardly depressing.

Darwin would have savored this place, I thought more than once as the days slipped by. Here occurs a struggle for survival that is seldom matched anywhere else. First there is the competition for egg space; then the embryos must survive an incubation period of some 65 days beneath the sand. The hatchlings must then escape waiting predators on the perilous trek from nest to surf. Once the sea is attained, they must elude sharks, groupers, snappers, and barracuda.

The survival odds from egg to adult are perhaps less than one in a thousand. But that seems to be enough, for adults reappear each year in undiminished numbers.

The grayish lava sand of Ostional Beach slopes gently into a sea wild one hour with crashing breakers, placid the next. Inland rises a swampy jungle—cover for hundreds of rapacious vultures, and also for egrets, spoonbills, and herons. At the high-water line lie untidy heaps of logs and other flotsam. Yet the distinctive debris of this beach is not paper plates or pop bottles, but thousands of small white leathery fragments—the broken husks of turtle eggs that have fallen prey to vultures, raccoons, crabs, and even domestic pigs and dogs.

Pigs and Poultry Relish Ridley Eggs

One morning on the beach I followed a farmer from a nearby village. With his son, his dogs, and a cart, he was clearly bent on egg collecting. Once in the egg-laying arena, he shoveled away a little surface sand, then his hands took over. "*Huevos de tortuga,*" the man said with a grin, displaying a handful of white eggs the size of Ping-Pong balls. He tossed them into the cart.

Even though there had been no recent arribada, he unearthed at least 500 eggs within an hour—some from the previous night, others weeks old. Finally the cart was full, and the boy strained to pull it off the beach, past a cemetery where simple wooden crosses leaned, then down a picturesque lane.

I followed the party to a little farm, where sounds in the wallow seemed to anticipate breakfast. Pigs, hens, ducks, and turkeys joined in a noisy welcome as the boy began tossing turtle eggs into the muddy yard. Within minutes pigs and poultry finished off the feast, leaving only shredded husks.

The sight was in a way appalling, but I knew that it was part of the local economy. Never once did I see a native harm an adult turtle, for he knows that the big ones provide nutritious eggs for his livestock. By contrast, it is said that in times past on some beaches of Mexico's Pacific and Gulf Coasts multitudes of ridleys were butchered for their meat, leather, and oil.

Next morning the man and his son were back on the beach, along with a dozen or so other teams. This time each led a sow. Powerful snouts emitted eager grunts as the pigs uncovered and did away with hundreds of eggs. Village dogs competed for those overlooked by the pigs; vultures and crabs snatched and snipped whenever possible.

Willy Navarro, a student from the University of Costa Rica, showed me another hazard ridley pre-hatchlings must withstand. "Long before the vultures, pigs, or dogs get their chance, fungi and bacteria make inroads,

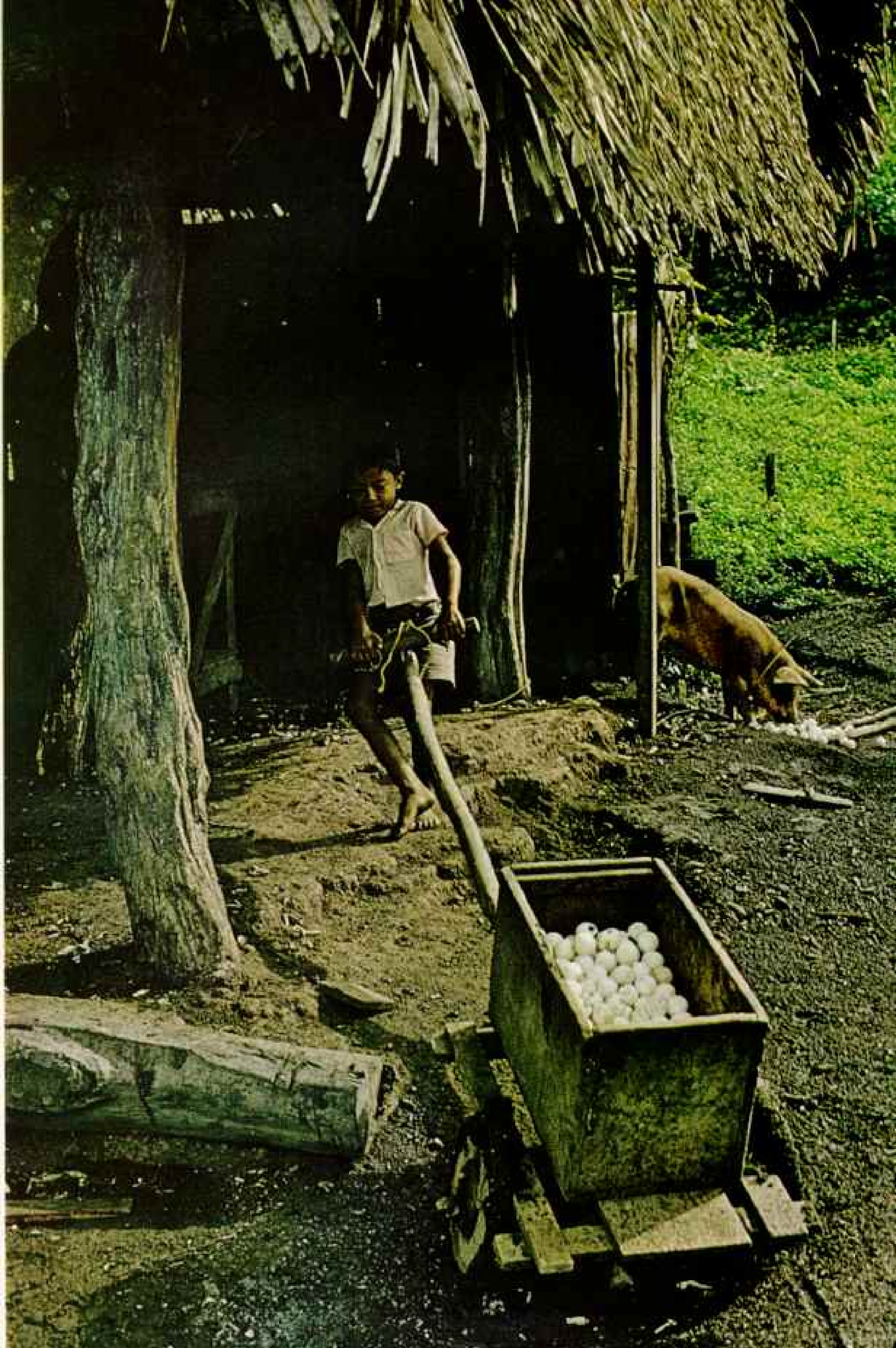
Pacific shores of Mexico and Costa Rica harbor the massive arribadas of the ridleys. The species also nests in tropical regions of the Pacific, Atlantic, and Indian Oceans.

Ensuring a new generation, a ridley drops leathery-shelled eggs (**left**), each roughly 1⅝ inches across, into a pit dug with her hind flippers. She deposits about 120 eggs, fills the nest with sand, then tamps and camouflages it. Leaving her brood in nature's care, she returns to the sea an hour after touching shore.

But the female's gifts to the future face many enemies. Lethal microbes and yolk-damaging salt water may invade the permeable shells. Other turtles, seeking havens for their own eggs, accidentally excavate those laid previously. Hungry pigs and dogs root up the eggs for food.

Men also hunt the caches, locating them by pushing a slim stick into the sand until it comes up yellow (**above**), then mine them as a source of much-needed protein for livestock (**right**). Beach residents never harm adult turtles and rarely eat the eggs; commercial exploitation is outlawed. But poaching occurs, for numerous Costa Rican cantinas serve turtle eggs, considered an aphrodisiac by many Latin Americans.

Eggs left uncovered by men, pigs, and dogs may feed some two thousand black vultures (**left**) that patrol Ostional.



especially if the sand is either too wet or too dry," he said. He scissored open an egg, revealing a dead embryo. Ugly blue-green streaks showed that its tissues had been attacked by insidious microorganisms. Willy collected a number of infected eggs for analysis in the university laboratory.

We still had not witnessed an arribada, but a few turtles came ashore each night, keeping the biologists busy. Undergraduate Bill Stewart had been assigned to aid the Peace Corps people. In the dark he and his associate Oliver Daniren stalked the beach with scales and oversize calipers. Object: to measure the precise length, breadth, and weight of the egg-laying turtles. They also recorded the sizes and numbers of eggs the turtles deposited.

"That's only one of our procedures," Doug said. "We want to learn more about ridley movements too, so we've started tagging."

Turtle tagging also takes place about 50 miles up the coast at Nancite, another site of the phenomenal ridley arribadas. In 1971 Dr. David A. Hughes, working there under a research grant from the National Geographic Society, wrote: "I estimate, I think conservatively, that no fewer than 120,000 nested over a four-day period. The experience of being among such a horde of clumsy, heaving, panting, digging creatures on a dark night is almost indescribable. Vast arrays of them nest shoulder-to-shoulder in the crush, and are continually crawling over each other."

Later one night on Ostional Beach I watched Dan McDuffie tag a big ridley on her nest. With one knee firmly planted on the broad, rock-hard carapace, he clamped a conspicuous metal tag onto a front flipper with heavy pliers (bottom).

She lay stonily indifferent, as if in a trance. I swept my flashlight beam over her head, from which mournful eyes gazed transfixed, then rearward. Her tail sloped into a foot-deep hole she had dug with her two back flippers, acting almost like hands.

As I watched, her neck tautened and she began to strain. Her mouth gaped as if to shriek, but there was no sound except that of dropping eggs and perhaps the suggestion

Turtle-man of Ostional, biologist Dr. Douglas Robinson (**below**) rights a female he found upside down. Assistant Bill Stewart (**right**) weighs eggs to correlate their size with that of the mother. Peace Corps Volunteer Dan McDuffie (**lower right**) fixes a metal tag to a front flipper. Tagging may help answer such questions as where ridleys go after egg laying and how often they nest.

of a sigh to punctuate the fulfillment of the creative process. There was more straining, more apparent agonizing, more eggs released, then again the easeful lull. All this while tears streamed from those great eyes, but they had nothing whatever to do with pain or sentiment. Lacrimal glands enable the sea turtle to rid itself of excess body salts.

Spasmodically the large female forced out eggs, one, three, or even five between pauses. The entire event lasted for a good half-hour, leaving more than a hundred eggs at the bottom of the hole.

Finally, after a brief rest, the matriarch stirred as if waking from a deep sleep. Rear flippers began to slash, raking sand over the nest and its cache. When the hole was filled, the turtle raised herself high on all four flippers and suddenly allowed the full mass of her hundred pounds to drop, the plastron, or lower shell, acting as a platterlike pile driver. Again and again she stretched upward and dropped heavily, until the nest site was firmly packed and essentially invisible.

With not so much as a farewell glance at her bassinet, the ponderous turtle turned and plodded implacably seaward, leaving tracks on the sand somewhat like those of a tank. Within a few minutes the creature was awash in the rollers and swallowed up by the sea. Neither eggs nor hatchlings would ever experience the concern or protection of maternal care.

Action Begins at Midnight

There were perhaps 50 egg-laying turtles on the beach that night. What a feeble demonstration compared to a week later!

About midnight I was awakened by excited voices and activities outside. Dan McDuffie, who had been patrolling the beach, was yelling, "Arribada . . . arribada!"

I leaped up, groped for my flashlight, and raced with my friends down the dark trail to the shore. In the pitch blackness my dim light failed to warn me of frontline turtles moving up on the sands. Crash! I slammed into them, heels flying wildly over my head, and my right shoulder crunched hard against one of the lumbering tanks. Unaware of my fall, my friends kept running.

I lay on the sand gasping, the wind knocked out of me. Survival suddenly seemed an issue as my feeble torch revealed a grim face and ominous armor inexorably plowing toward me, a couple of feet away.

Obviously the big turtle was not going to change her course. I rolled aside and regained my feet, dancing a jig to avoid a dozen others coming on immediately behind her.

Rubbing my bruised shoulder, I pushed on through the blackness where crawling colossuses were so numerous that I had to jump over, zigzag between, plunge through them. No flashlight could begin to reveal the vastness of the onslaught.

Beachhead Secured, Invaders Dig In

Finally I caught up with Doug. He was panting, too. "Thousands here already," he gasped. " . . . hundreds more coming out of the sea every minute!"

On and on they came, pushing aside driftwood near the high-water mark. There the thrust slowed, as one after another selected nesting spots in the sand.

We were wildly busy. The McDuffies raced from one turtle to the next, searching for tags affixed during an earlier arribada. Doug was counting turtles in a preselected area so that he might calculate the total magnitude of the foray; he estimated the horde at 7,400. Bill and Oliver were collecting eggs for measurement and weighing. And I was trying to make photographs.

Then a downpour began, pelting, splashing, drenching us, in best tropical style. I have a vivid memory of thousands of glistening carapaces each time my electronic flash went off. Finally my lighting gear, totally soaked, shorted out.

Six soggy turtle-watchers made for an abandoned thatched hut somewhat higher on the beach, where we huddled while the rain continued to pound. There was little talk. We felt tremors as one oncoming turtle after another careened against the little hut. I stepped outside for a second, sweeping the beam of my flashlight back and forth, and saw an army of ponderous shapes everywhere, one almost blocking the hut's entrance.

By dawn the rain had stopped, and I was again on the beach. Talk about Dunkirk or D-Day! The beach was a shambles. The invaders had vanished, but every square inch of sand was laced with their tracks. Unseen under the surface lay a new generation of ridley turtles, oblivious of the hostile world waiting above.

Actually, not quite all the turtles were gone. A scattered few lay flat on their backs, helpless, having been overturned during the

night's melee. They lay there vainly stretching necks and flippers, unable to right themselves until the next high tide (page 574). I recalled stories of sailing-ship mariners capturing giant turtles and placing them upside down in the hold, where they would stay alive for months, a ready source of fresh meat. We righted those we found, and they lumbered back into the sea.

By the time the sun was up, the picture had reverted, for there again were those bands of brooding vultures, and a little later the human egg gatherers with their pigs, dogs, groping hands, and carts (pages 576-7).

Racing for their lives, newly hatched Pacific ridleys churn toward the sea on a course fraught with danger. They risk ambush by ghost crabs and aerial attack by vultures. Emerging from the sand (**top**) after about ten weeks of incubation, the youngsters measure barely two inches in length. Instinctively they turn and begin their frantic drive for the water. If they make it, they flipper away into the ocean's vastness, only to face sharks, groupers, and other hunters of the sea. But at least one predator—man—will not see the turtles again for perhaps five to seven years. Then mature females, having overcome incalculable odds, will mate at sea and mysteriously find their way back to land.

My friends at camp were busy recording observations and figures: the date and magnitude of the invasion; conditions of tide, moon, and weather; the number of tags sighted and affixed. By the fourth and concluding day, some 50,000 turtles had come ashore, I learned later; only two were found that had been previously tagged.

The study at Ostional Beach had begun two months earlier and would continue for another ten, perhaps longer—and even then mysteries would persist.

Where do the turtles come from—and where do they go? What forces draw them in such vast numbers? How and when do they mate? How many times does a single female come ashore during the egg-laying period? What is the exact survival ratio between eggs and adults? Is the Pacific ridley turtle an endangered species? Only time and further study would provide the answers to such intriguing questions.

As for me, my wait was over. Within a few days I was back in San José, of whose quarter-million inhabitants perhaps only a score have ever seen, or even heard of, one of their country's great natural happenings—an arribada. □

Discover the vast unspoiled

PICTURE OUR LAND AS IT WAS when the first European settlers arrived. Marvel at the far horizons that lie ahead, the blue and white of distant mountains, the open reaches of deserts and plains. Explore priceless remnants of this vast virgin territory on foot or horseback, by packtrain or canoe.

Broiling sun . . . bitter Arctic cold . . . dense forests . . . roaring rapids . . . awesome snow-capped peaks prove formidable challenges to your progress. Yet you continue, refreshed by pure water, clean air, and the ever-changing panorama of nature—the tiny flowers and giant redwoods, gracefully soaring birds and surefooted mountain goats, majestic waterfalls and massive rock formations. . . .

In recent years millions of Americans have set out to experience the peace, beauty, and challenge of the American wilderness.

They are following in the footsteps of men such as Henry David Thoreau, whose inspiration to dedicated modern conservationists helped lead to the passage of the 1964 Wilderness Act. This act provided that millions of acres of wild lands in our national

NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT W. MADDEN

NATIONAL GEOGRAPHIC PHOTOGRAPHER JAMES P. BLAIR

beauty of our country...

parks, forests, and wildlife refuges be protected by law and managed so as to retain their primeval character without permanent improvements or human habitation.

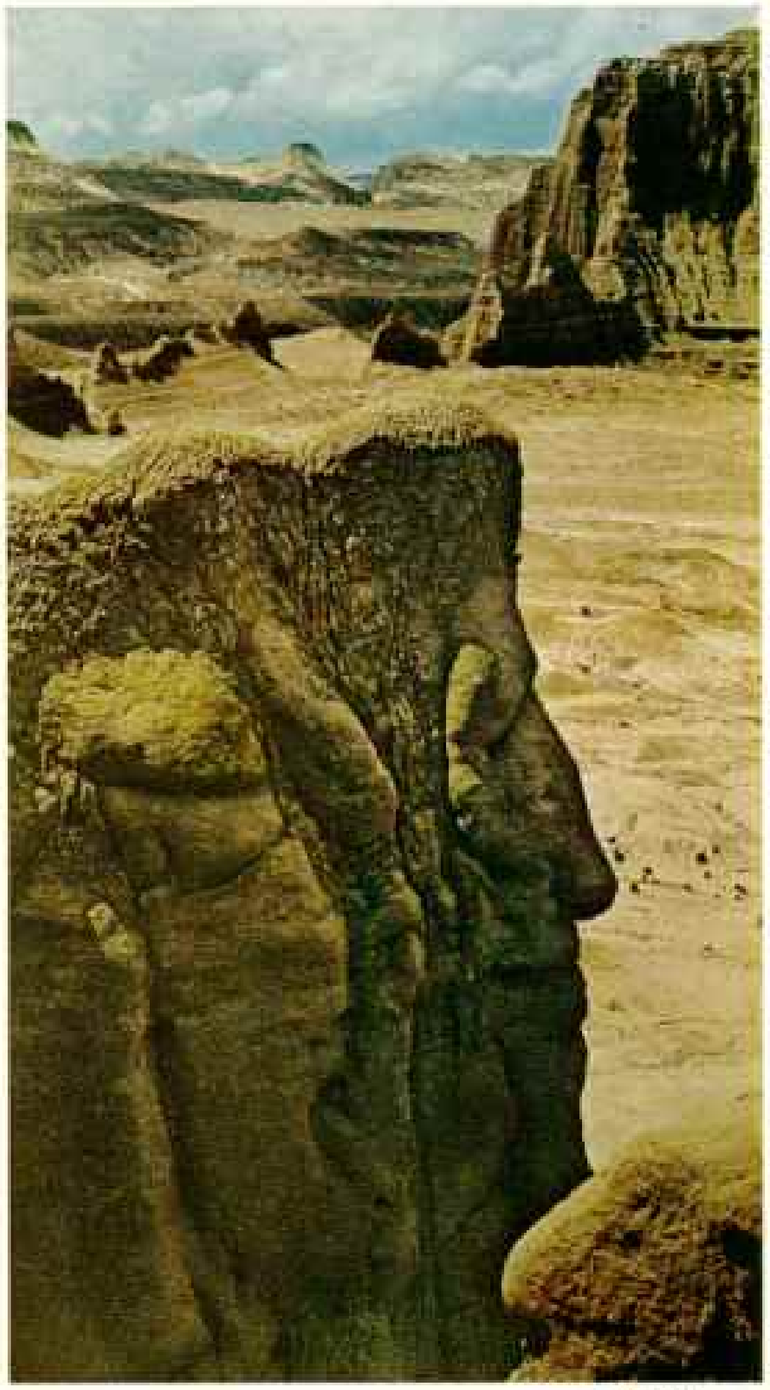
To take you to these regions throughout our country—and to help you enjoy them to the fullest—National Geographic called upon famed naturalist Sigurd Olson and a team of both veteran and novice outdoorsmen. The result: *Wilderness U.S.A.*

Walk your first glacier in the North Cascades of Washington or the Sierra Nevada of California. Know what it's like to "jump

In the largest picture format ever published by National Geographic, *Wilderness U.S.A.* breathtakingly captures the natural splendor of our country.

This magnificent 8⅝"-by-12¼" volume contains 344 pages of vivid, authoritative text. Its 302 full-color illustrations—90 percent never before published—include 25 double-spread panoramas and 22 superb Geographic maps; most show major roads to each area, main trails, and key points of interest. Plus additional reference sources and a comprehensive index.

No other single volume on this subject provides so much color and information for the modest price of $9.95. Turn the page for the table of contents.



ELLIOT PORTER

DETACH HERE

Self-mailing order form

NATIONAL GEOGRAPHIC BOOKS

Please send me a first-edition copy of WILDERNESS U.S.A. Bill me $9.95 plus postage and handling at time of shipment. If not satisfied, I may return this book without payment.

NAME (please print)

ADDRESS

CITY, STATE, ZIP 968

Complete order form; remove flap from magazine; then fold on line, staple or tape, and mail.

First Class
Permit No. 198-R
Washington, D. C.

BUSINESS REPLY MAIL
No postage stamp necessary if mailed in the United States

Postage will be paid by

National Geographic Society
Post Office Box 1640
Washington, D. C. 20013

MARTIN ROGERS

LOWELL GEORGIA

off and pray" and slide at breakneck speed down a precipitous snow slope. Hike the hills of golden stone in Arizona and Utah where, for all you know, no man or woman has ever gone before. In Montana, Idaho, Wyoming, and Colorado, see one of the nation's largest and most diverse concentrations of big-game animals—elk, moose, mountain

CHARLES AND DENIS CRISSMAN

sheep, black bear, grizzly, and mountain lion.

From the Dakota Badlands to the Big Thicket of Texas, find traces of the prairies as they used to be—open grassland that stretches away as far as you can see in every direction. From the Adirondacks to the Everglades, discover promising new natural sanctuaries not far from the crowded cities and highways of our East Coast. And finally, explore our last great wilderness—Alaska—most of it owned by the Federal Government and largely untouched by man.

Wilderness U.S.A.—for sheer reading pleasure or the outdoor experience of a lifetime! To examine a first-edition copy of this new National Geographic book, simply fill in the attached form. Your passport to those far and lovely horizons will be on its way to you by return mail. □

CONTENTS

COVER: Shirt matching the red in her nation's flag, a lovely Chilean joins a political rally. GEORGE F. MOBLEY

POSTMASTER: SEND CHANGE OF ADDRESS FORM 3579 AND UNDELIVERED COPIES TO NATIONAL GEOGRAPHIC MAGAZINE, 17TH AND M STS. N.W., WASHINGTON, D. C. 20036

If you're going to spend more than $5000 for a car, you should get the kind of comfort you can live with a long, long time.

Judy, how do you like Daddy's new 98 Regency . . . Judy? . . . Judy?

Don't settle on any new luxury car until you settle into this one . . .

until you let yourself sink into the comfort of the Olds 98 Regency . . . feel the "feel" of its velour fabrics . . . rest an elbow on one of the luxuriantly padded center armrests, front and rear . . .

until you've taken its magnificent ride . . . experienced the level of quiet of its interior . . . breathed in the cool, refreshing air circulated through an activated charcoal odor filter . . . part of the Tempmatic air conditioner available in this 98 Regency.

Spending over $5,000? Don't settle on any car until you've settled into this one.

THE 1974 OLDSMOBILE 98 REGENCY

A gift of diamonds need not be expensive. Your jeweler can show you many exciting pieces starting as low as $100.
De Beers Consolidated Mines, Ltd. A diamond is forever.

Just about the time
I was beginning to think there was
no woman in the world like you,
you came along.

Happy anniversary, darling,
to the wife who was
well worth waiting for.

Diamonds make a gift of love.

BOTH BY ROLAND MICHAUD

Afghanistan's horsemen from the past

HIS FOREFATHERS RODE WITH GENGHIS KHAN, and even now a Turkoman falconer rides off to hunt in the manner of those raider ancestors who terrorized the Central Asian steppes for seven centuries. Proud and insular, Turkomans of northern Afghanistan opened their homes and hearts to French photojournalists Sabrina and Roland Michaud and their 4-year-old son, Romain. Making friends instantly (**right**), the boy initiated adventures you will be reading about next month. Let your friends share in such memorable journeys by filling in the form below—a perfect addition to your Christmas gift list.

Follow these guidelines when you look at the 1974 Ford LTD and we think you'll find this isn't just another car slogan:

THE CLOSER YOU LOOK,

It's easy enough to decide whether a car is good-looking. But then you have to make some decisions that aren't as simple. Like how well-made it is. And how good the workmanship really is. Of course everybody has an opinion about which cars are well-made. But the fact remains that lots of people could use some advice about how to judge an automobile. And that's what we're doing. Telling you what to look at, and what to look for, when you go to buy a car. In short: **What to do after you kick the tires.**

1.

1. Slam the doors a couple of times. And listen for a good solid sound. And while you're at it pay careful attention to how the doors hang. The lines should be straight and the space around them even and tight. It might interest you to know that in some of our own quality tests we slam prototype doors about 80-thousand times just to be sure that they can stand the punishment.

2. Take a good look at how the hood joins the rest of the body. It should seat itself flush with the adjoining surfaces with neat even spacing all around.

3. Examine how the fenders join to form the body against the same standards that you've used in looking at the hood. See how the lights, bumpers, grille and other components are joined to form the body. The basic rule is tight, smooth fits.

2.

3.

4. Examine all the moldings and trim. And don't just look at it, run your hand along it, too. Besides being straight and true, the joints should be smooth, with no protruding edges. If you're looking at a car with a vinyl top, it should fit tight and smooth. Frayed edges and bits of cloth protruding are obviously a mark against it.

5. Get inside the car and sit down. Bounce up and down on the seats feeling for comfort and support. Check the seat adjustment. It should move easily and lock snugly. Looking at the upholstery it should have a neat, well-tailored appearance.

1974 Ford LTD Brougham shown with optional WSW tires, deluxe wheel covers, deluxe bumper group, vinyl roof, convenience group, accent stripes and cornering lamps.

THE BETTER WE LOOK.

Seams should be straight and the upholstery in general should reflect the fact that someone took the time and pains to do a nice job. Still sitting in the front seat, feel and look around overhead. This upholstery should be smooth and well-tailored. You'll note LTD luxury is carried through with a padded ceiling overhead.

4.

6. Check the instrument panel. It should be thoughtfully organized so that controls and accessories, like air conditioning, radio and cigarette lighter are located in such a way that either driver or passenger can use them. Fasten the seat belt to make sure all the controls are still easy to reach.

7. Notice the luster and high gloss of the paint.

5.

And remember, over the life of a car, enamel will continue to hold its luster and gleam.

Obviously we're confident that the new Ford LTD can stand close examination from informed consumers. Still, as in most automobile advertising, the car pictured here has been handpicked and carefully photographed to represent the new Ford LTD in the best possible way. Which can only make you wonder, or perhaps doubt, whether the ones you'll find at your Ford Dealer will look as good.

6.

But that's very easy for you to find out. And that should make this the most closely looked at car in America.

Think about this too: **Everyone says compare ... Ford tells you how.**

FORD LTD

FORD DIVISION

OUT HERE, THERE'S OIL AND GAS TO EASE AMERICA'S ENERGY SHORTAGE IN YEARS TO COME.

EXPERTS SAY THAT BENEATH OUR COASTAL WATERS THERE'S ENOUGH OIL AND NATURAL GAS TO MEET A SUBSTANTIALLY LARGER PORTION OF AMERICA'S ENERGY NEEDS.

PRESIDENT NIXON HAS DIRECTED THE SECRETARY OF THE INTERIOR TO INCREASE THE RATE OF LEASING OF OUTER CONTINENTAL SHELF AREAS FOR EXPLORATORY DRILLING.

THIS IS AN IMPORTANT FIRST STEP. THERE MAY STILL BE DELAYS BECAUSE OF ENVIRONMENTAL CONCERNS.

THE HISTORY OF U.S. MARINE DRILLING SUGGESTS THAT THERE WOULD BE SMALL RISK IN PROVIDING THE NATION WITH MUCH-NEEDED NEW SUPPLIES, WHICH COULD BE AVAILABLE WITHIN A FEW YEARS.

During the winter of 1972-73, some Americans experienced shortages of natural gas, certain heating oils, jet fuels, diesel fuel.

In the spring and summer of 1973, gasoline shortages.

Why?

Because the United States is using more energy than it is producing. Domestic reserves of oil and natural gas are being consumed much faster than replacement reserves are being discovered and developed. The growth of refining capacity also lags far behind the rise in demand.

Oil and natural gas supply 77 percent of all the energy this country uses, including nearly 40 percent of our electricity.

How Marine Drilling Could Help.

There are no quick and easy solutions for America's energy problems. But one that offers great promise toward meeting our future demand for energy is to expand exploration and drilling in our coastal waters.

Marine production already supplies almost 18 percent of our domestic crude oil, nearly 17 percent of domestic natural gas. Without these contributions our energy situation would be far worse than it is.

The United States now uses 17 million barrels of oil a day, more than 6 billion barrels a year. A larger share of this could be supplied by marine wells, perhaps within five years, if leasing for exploratory drilling is expanded rapidly.

According to U.S. Geological Survey estimates, the nation's Outer Continental Shelf may contain from 160 to 190 billion barrels of crude oil, 25 or 30 billion barrels of natural gas liquids, and from 820 to 1,110 trillion cubic feet of natural gas that are probably recoverable.

"Recoverable," that is, after the investment of billions of dollars and years of time in their development.

Oil: A Source of Public Revenue.

Marine drilling areas are owned either by the federal government or by state governments.

As a taxpayer, you'll be interested to know that under present laws the federal government and coastal states would receive bonuses, rents and royalties from leasing.

These could be important sources of public revenue. During 1972, the federal government received over $2.6 billion in royalties, bonuses, and other payments from Outer Continental Shelf oil and gas production.

Drillable portions of the Outer Continental Shelf add up to more than one million square miles, one-third as large as the total land surface of the "lower 48" states. To date, less than two percent of this vast area has been leased for drilling. In his Energy Message to Congress on April 18, 1973, President Nixon stated that he has directed the Secretary of the Interior to increase the annual acreage leased, beginning in 1974.

The Record of 17,000 Wells.

Drilling in American coastal waters began more than a quarter of a century ago. Some 17,000 oil and gas wells have been drilled in the marine environment. Yet only four marine oil well accidents have posed a serious pollution problem, and none of these resulted in permanent damage to the environment. And technology continues to be improved.

Yet in recent years, environmental opposition has delayed the orderly development of marine resources that are more urgently needed every day.

The Real Shortage Is Time.

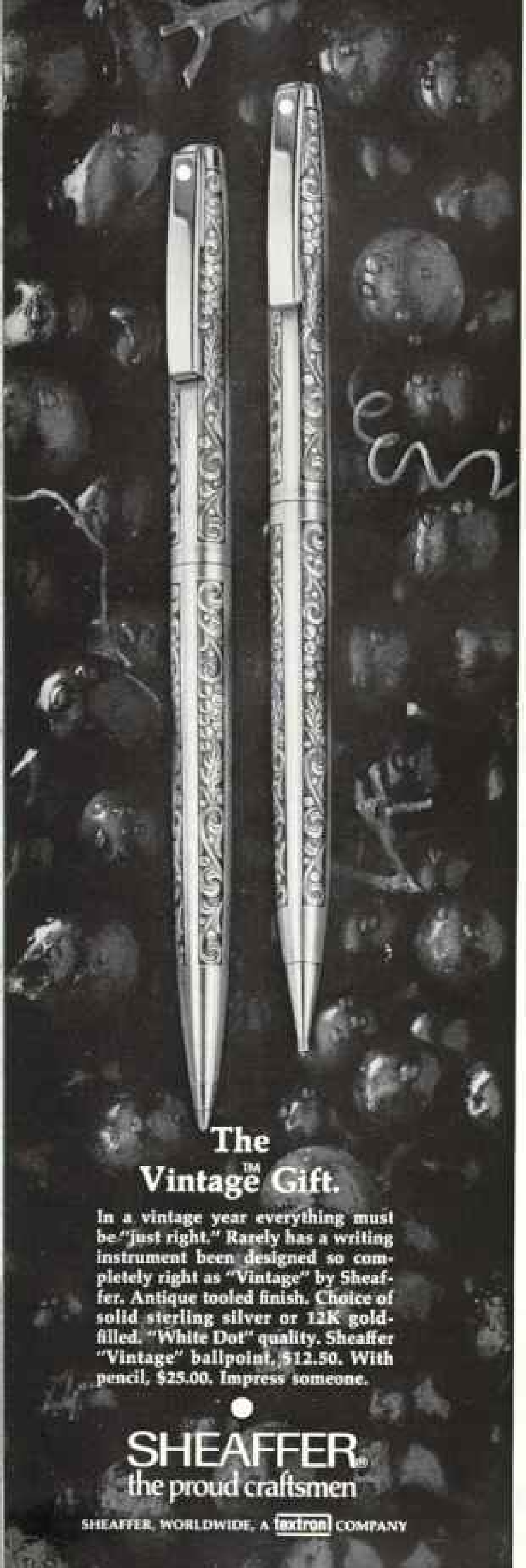
There is a pressing need to increase domestic supplies of oil and natural gas, and to build new refineries, terminals, and other facilities to get products to consumers.

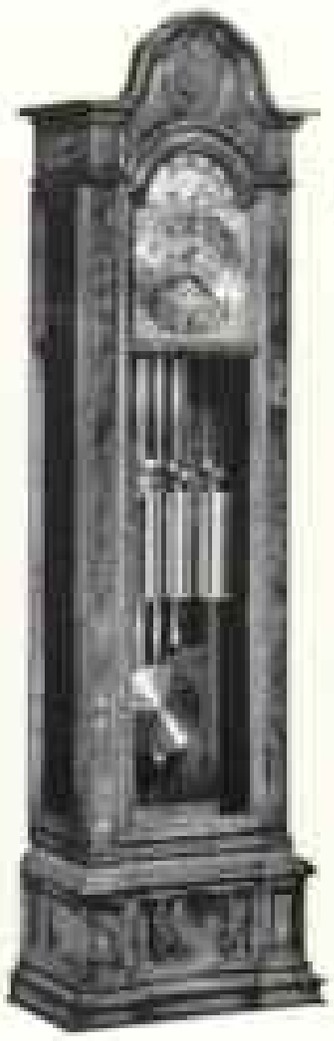
The United States will not "run out" of energy in the near future. But, because of the long lead time required to develop new energy sources, we cannot safely delay action that could increase those supplies. The need is real, and so is the urgency.

To tell you more about a vital subject, we've prepared a booklet, "The How and Why of Undersea Drilling." Write to Dept. G2, American Petroleum Institute, 1801 K Street, N.W., Washington, D.C. 20006 for your free copy.

A COUNTRY THAT RUNS ON OIL CAN'T AFFORD TO RUN SHORT.

THE OIL COMPANIES OF AMERICA





WE MAKE THE MOST OF TIME.

In America only Herschede makes grandfather clock movements. Others import cheaper movements. For a color booklet of the world's finest clocks send 25¢ to Herschede Hall Clock Co., Starkville, Mississippi 39759.

Herschede

Gold medal winning clocks since 1885

A Division of Arnold Industries

The American Quarter Horse. "The World's Most Versatile Horse." He's at home under Western or English tack. See why more people ride Quarter Horses than any other kind. Write for free pictures and information. Dept. N.G.

AMERICAN QUARTER HORSE ASSOCIATION
AMARILLO, TEXAS 79168

TIME LIFE BOOKS presents

The American Wilderness

WILD ALASKA
America's last frontier—a land of three million lakes, 119 million acres of forest, and still 99 per cent uninhabited.

THE NORTHEAST COAST
from storm-racked Maine to Newfoundland... home of the harp seal, the clown-like puffin, other fascinating shoreline creatures.

THE NORTH WOODS
from northern Minnesota to Lake Athabasca in Canada ...where beaver, moose, wolves and other animals roam the stands of lofty pines and glades of birch and aspen.

• The largest living plants on earth • sheep with horns a yard long • glacially polished rock that glistens like silver in the sun—just a few of the wonders you can enjoy while browsing free for 10 days through

The High Sierra

- 40,000 words of text
- written by avid outdoorsman Ezra Bowen with noted conservationist Martin Litton as consultant
- 9 by 10¼ inches, hardbound, 184 pages
- More than 100 illustrations—photographs, paintings, maps, including 87 pages in full color.

Detach this entire flap, fill out portion below, fold down on center line and seal at bottom by taping or stapling. Then mail—no stamp or envelope needed.

THE GRAND CANYON
The majestic "wilderness in stone" that has been called the world's largest and oldest history book.

BAJA CALIFORNIA
An unearthly region of spiny mountains, desert plains and odd life forms like a rattlesnake with no rattles.

THE EVERGLADES
A watery wilderness where alligators, panthers, and spectacular rare birds find refuge in the marshy grasslands and swampy jungle.

CACTUS COUNTRY
The weirdly beautiful desert country in southern Arizona and northern Mexico... home of buzzards, Gila monsters and 140 kinds of cactus.

THE HIGH SIERRA
A natural wonderland with a waterfall 15 times higher than Niagara, a bird that flies underwater, mushrooms that can wreck a train.

As your introduction, explore The High Sierra Free for 10 days

Just detach entire flap, then fold, seal and mail. No stamp or envelope is needed.

The wilderness areas that lie in and around the United States of America are one of our greatest treasures. The mountains, the forests, the shorelines and other sanctuaries are priceless not only as preserves where wild plants and animals can flourish, but also as a source of spiritual refreshment for you.

Now you and others in your family can enjoy the wilderness all year long and explore it extensively in THE AMERICAN WILDERNESS, a spectacular series by TIME-LIFE BOOKS. As a subscriber, you'll experience through words and pictures the scenic delights, the natural history, the flora and fauna of some of the world's most inspiring natural wonderlands.

You'll visit *Wild Alaska*, home of the world's largest bears, and of wolves that eat 25 pounds at one feeding...*The Northeast Coast*, teeming with fascinating life forms at the border where ocean meets forest...*The Grand Canyon*, which slices a mile into the earth's crust, revealing rocks that are two billion years old...*The North Woods*, where the tall, dark trees march up into Canada from the northern edge of Minnesota...*The Atlantic Beaches*, from Boston to North Carolina, where the tides and wind are constantly reshaping the shoreline...*Baja California*, where ruined missions, bleached bones and abandoned mines give evidence of man's unsuccessful efforts to triumph over inhospitable nature. And other books in the series will take you to many other wondrous wilderness areas.

Explore *The High Sierra* for 10 days FREE

To start your journey through THE AMERICAN WILDERNESS accept, for a 10-day free examination, the introductory volume in the series, *The High Sierra*. Explore the Sierra's 400 miles of cliffs and forests and meadows...home of the giant redwoods, the site of spectacular Yosemite, and a last stronghold of the West's big cats.

Then decide if you want to keep *The High Sierra*. You may do so for only $5.95 plus shipping and handling, or you may return it within 10 days with no further obligation. If you keep *The High Sierra*, we will send you other volumes in the series as described on the reply form. There is no obligation for you to buy any of these books, and you may cancel your subscription at any time.

To get *The High Sierra* for free 10-day examination, use the special order form at right. If form is missing, write TIME-LIFE BOOKS, Dept. 2306, Time & Life Building, Chicago, Ill. 60611.

Fold on this line

TIME LIFE BOOKS **TIME-LIFE BOOKS**
Time & Life Building, Chicago, Ill. 60611

Yes, I would like to examine *The High Sierra*. Please send it to me for free 10-day examination and enter my subscription to THE AMERICAN WILDERNESS. If I decide to keep *The High Sierra*, I will pay $5.95 ($6.95 in Canada) plus shipping and handling. I then will receive future volumes in THE AMERICAN WILDERNESS series, shipped a volume at a time every other month. Each is $5.95 ($6.95 in Canada) plus shipping and handling and comes on a 10-day free-examination basis. There is no minimum number of books that I must buy. I may cancel my subscription at any time simply by notifying you.

If I do not choose to keep *The High Sierra*, I will return the book within 10 days, my subscription for future volumes will be canceled and I will not be under any further obligation. 2307

Print Name _____

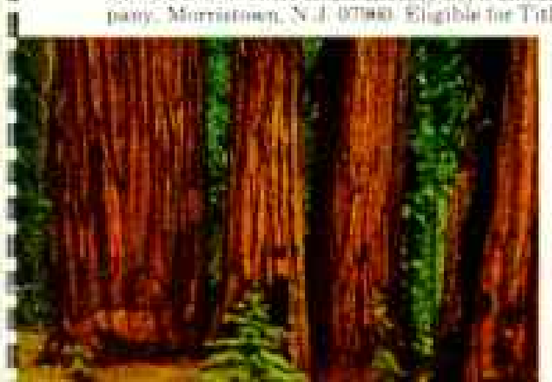
Address _____

City _____

State _____ *Zip* _____

Canadian residents: Please mail this form in an envelope.

Schools and libraries: Order Library Style Bindings from Silver Burdett Company, Morristown, N.J. 07960. Eligible for Titles I, II funds.

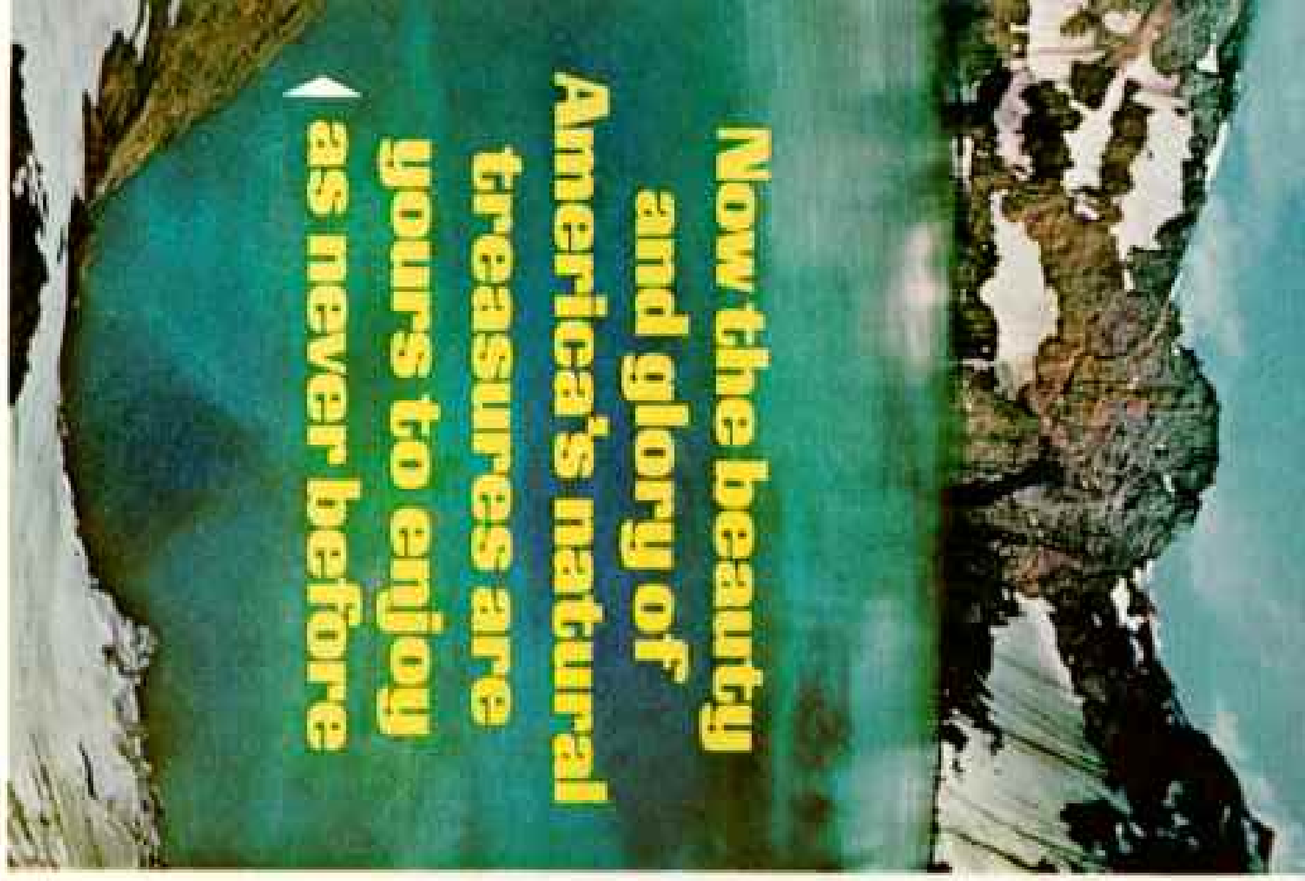


FIRST CLASS
Permit No. 22
Chicago, Ill.

BUSINESS REPLY MAIL
No Postage Stamp Necessary If Mailed in United States

Postage will be paid by

TIME-LIFE BOOKS
Time & Life Building
Chicago, Illinois 60611



- How it works.
- Why it is better than flashbulbs.
- Why it is more economical.
- How you can photograph a speeding bullet.
- How electronic flash can improve pictures taken in bright sunlight.

You get answers to hundreds of questions, all in one easy-to-read 20-page brochure. FREE. Just write Honeywell Photographic, Dept. 101-253, P.O. Box 22083, Denver, Colorado 80222. Do it today—and forget flashbulbs forever.

Honeywell Strobonar
...the heavy-duty electronic flash

We get people talking.

(To 23,000,000 people we're the telephone company)

GTE

We entertain them.

(Sylvania color TV and stereo)

GTE

We brighten their lives a bit.

(Sylvania lighting for home, industry and photography)

General Telephone & Electronics, One Stamford Forum, Stamford, Conn. 06904

We're GTE...

(a growing concern for your growing needs)

"What is our praise or pride
but to imagine excellence
and try to make it."

Photograph by Richard Kaufman

That has been our standard for 25 years as the pioneer in low-cost luxury charter air travel. The result is that we have flown more than 3-million passengers some 15-billion passenger miles.

And we have earned the confidence of our competitors, as well. That's why our maintenance facility, World Air Center, services not only our own jet fleet, the largest in the charter industry, but those of 14 other airlines, too.

Throughout a quarter of a century, at no time have our standards of excellence varied. And they never will.

World Airways

World's largest charter airline • A U.S. Certificated Supplemental Carrier • Member National Air Carrier Association • Oakland International Airport, Oakland CA 94614, Offices worldwide

THE 100 GREATEST MASTERPIECES

The world's 100 most valued art treasures preserved for all time in solid sterling silver.

Available by advance subscription only.
Subscription rolls close October 31, 1973.
Limit: One series per subscriber.

Since the beginning of time, man has created works of art which capture the beauty of the world around him and reflect his innermost visions.

Out of the thousands of such works, only the most inspired have stood the test of time. These are the masterpieces. Honored. Valued. Acclaimed.

Now, with the help of scholars and art historians, the very finest of these great works of art have been selected. The 100 greatest of *all* the masterpieces. Works of power and perfection, as alive today as when they were first created.

To honor these incomparable works of art in a form to be cherished now and by future generations, The Franklin Mint will issue an extraordinary collec-

tion of sterling silver fine art medals—*The 100 Greatest Masterpieces*.

The 100 works chosen for this collection are priceless treasures—man's crowning artistic achievements. Masterpieces from the hands of Michelangelo. Leonardo da Vinci. Rembrandt. Titian. Goya. El Greco. Rubens. Botticelli. Raphael. Broeghel. Velasquez. Rodin. Degas. Van Gogh. And all the others whose names ring like great bells down the avenues of time.

The 100 Greatest Masterpieces have been selected with the aid of curators and directors of major international museums, including the Louvre, the Vatican Museums, the Uffizi, the British Museum, the Prado, the National Museums of Greece, and the Rijksmuseum of The Netherlands. The guidance of these authorities has been indispensable in creating this medallic tribute to the world's greatest art.

An incomparable collection

To capture the full power and scope of these masterpieces, each medal in the collection will be exceptionally large: two inches in diameter. The face of each medal will present the masterpiece in finely sculptured detail. The reverse will identify the artist, the work and the date of its creation.

These exquisite art medals will be struck by The Franklin Mint—whose highly skilled craftsmen are renowned for their achievements in creating the finest art medals in the world.

The 100 Greatest Masterpieces will be issued at the rate of one each month for 100 months, beginning in November, 1973. Each medal will contain at least 1000 grains of solid sterling silver—a total of 100,000 grains in the complete collection. The original issue price is $25 per medal. *And this price will be guaranteed for the entire duration of the subscription period.* In view of recent increases in the price of silver and the costs of minting—and the likelihood of further increases in the years to come—this is an extremely significant guarantee.

A magnificent collector's cabinet

To house this unique 100-medal collection, a hand-finished mahogany cabinet will be provided to each subscriber at no additional cost. This magnificent cabinet will contain specially fitted drawers for the protection of the medals and for storage of the descriptive literature which accompanies each medal. The cabinet will be personalized with a nameplate bearing the name of the original owner.

Art of enduring value

There are few joys to rival the possession of enduring art. The owner lives with beauty and has the satisfaction of knowing that the value of fine art is timeless, no matter how other values may change.

Thus, for many a collector, there could be no worthier goal than to possess this heirloom collection of fine art medals honoring the 100 greatest masterpieces of all time—a collection that combines great art, great rarity and the intrinsic value of solid sterling silver.

To take advantage of this unique opportunity, mail the Advance Subscription Application below by October 31, 1973. Applications postmarked after that date must, regretfully, be returned.

QUEEN NEFERTITI—circa 1365 B.C.

THE 100 GREATEST MASTERPIECES

ADVANCE SUBSCRIPTION APPLICATION

Valid only if postmarked by October 31, 1973.
Limit: One series per subscriber.

The Franklin Mint
Franklin Center, Pennsylvania 19063

Please enter my subscription for *The 100 Greatest Masterpieces*, in solid sterling silver. The complete series will consist of 100 two-inch medals, to be issued at the rate of one medal per month.

I enclose $25.00* as payment for the first medal. I will pay for each subsequent medal individually, in advance, on a monthly basis.

*Plus my state sales tax

Mr.
Mrs.
Miss _____
PLEASE PRINT CLEARLY

Address _____

City, State, Zip _____

Signature _____

Orders are subject to acceptance by The Franklin Mint

THE FRANKLIN MINT IS THE WORLD'S LARGEST PRIVATE MINT. IT IS NOT AFFILIATED WITH THE U.S. MINT OR ANY OTHER GOVERNMENT AGENCY

31-50

MEDALS SHOWN ACTUAL SIZE

Top: THE LAST JUDGMENT – Michelangelo
Middle: THE LAUGHING CAVALIER – Frans Hals
Bottom: SUNFLOWERS – Van Gogh

CHOOSE AN ORGAN LIKE YOU'D CHOOSE AN ORCHESTRA.

Audition an organ with some of the same criteria a conductor would use to audition an orchestra.

First consideration: Size.

Like an undersized orchestra, a too-small organ could lack the right combination of power, range, and color to satisfy your musical appetite.

Since modern organs last for decades, underbuying is an enduring mistake.

If you do need a small instrument, make sure it incorporates the advantages of big instrument technology.

Yamaha makes a full range of organs, and even the small models have considerable variety and power.

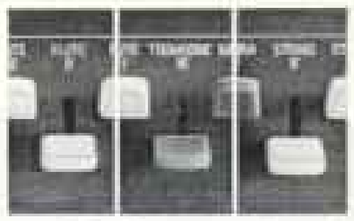
Conductors need a *large range of sound* to work with, and so do organists.

The smallest organ you should consider should have a minimum of three divisions worth of range for versatility: two keyboards and a pedalboard.

Larger organs, like the Yamaha E10R, have extended keyboards for wider tonal range.

One organ, the Yamaha DK40, has five divisions of sound instead of just three.

Choose an organ with a selection of tone colors from *each basic family of the orchestra:* brass, woodwinds, and strings.



Don't expect literal imitations of their sound. Rather, look for similarity in terms of sound character.

Avoid organs with whole families of color missing. Even the smallest Yamaha provides colors from the three basic families, and most also have a fourth family, percussion.

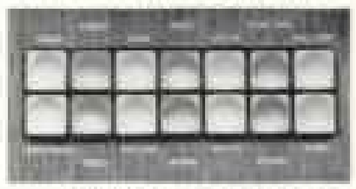
Yamaha Auto *Rhythms* borrow the rhythm section of the orchestra electronically.

They automatically play a variety of beats—from rock to bossanova—at the speed and volume level you predetermine.

Another Yamaha feature, ABC (Automatic Bass Chord) adds full harmonic accompaniment (and makes full-sounding organ music easier to play).

When an orchestra requires a *unique sound or effect*, it usually brings in extra musicians.

Many Yamaha Electones have those extras built right in.



Banjo, accordion, piano, harpsichord, chimes, Hawaiian guitar, and vibraphone are available.

So are Wah Wah (New Orleans jazz), Repeat (mandolin style), Glide (steel-guitarish), and Touch Vibrato ("crying" strings).

There are other extras, and it's helpful to try them all.

Like a fine orchestra, a fine organ can be called upon to do almost anything in the world of music.

If it's appropriately matched to its job.

For more information on organ buying, see your Yamaha dealer.

He'll make you feel like Toscanini.

YAMAHA

International Corp. Box 6600
Buena Park, Calif. 90620

COLOR

TRANSPARENCY

If you've got a favorite slide

you can get a beautiful color print made from it.

Color slides can be really great, sharp and clear, and shown big as life. But maybe you'd like to share that scene with a far-off friend, or have a print for your own album. No trouble—and the cost is less than you might think. Just take the slides you like to a photo dealer. He'll take it from there. Prints-from-slides service is available from Kodak and other photofinishers.

A message from Eastman Kodak Company on behalf of photo dealers and finishers.

The 21st cen

More than three out of five Americans living today will live to see the 21st century. In fact, the newborn child on the opposite page will be just 27 years old by the year 2000. She will live most of her entire life in the next century.

At Metropolitan Life, we recognize that the future is not as far off as we sometimes think. We also recognize that to serve your interests best, we must anticipate the future. Project ourselves into it. Try to identify problems that may not even exist today. And start looking for solutions today—not tomorrow.

So we're preparing for the future now. We're doing many things that can make your future and your children's future easier, safer and more satisfying.

For example, Metropolitan Life is working right now with the medical profession on ways to improve your medical care—and to make the best possible care available to everyone, at reasonable cost now and in the future. Future generations will be the direct beneficiaries of our many medical and health education programs.

We're also anticipating the future in many other areas important to you, such as education, retirement and housing. For instance, the housing we invest in must not only be livable today—but also 50, 60, and 70 years from now.

We've been thinking harder than we've ever thought before about the future and how it will affect you and your family. We believe we've gained new insights, new ideas and we've developed new approaches.

But most of all, our studies have made us realize the urgency of preparing for the future now because the future is now. Today. One second from now.

And that's why we're ready to help you now. At Metropolitan Life, we're ready with imaginative and farsighted policies and programs for the future.

Once you talk to your local Met Life representative, we think you'll agree he has the understanding, plans and policies to help you prepare for a better future.

Because he knows that the better prepared you are, the better your future will be.

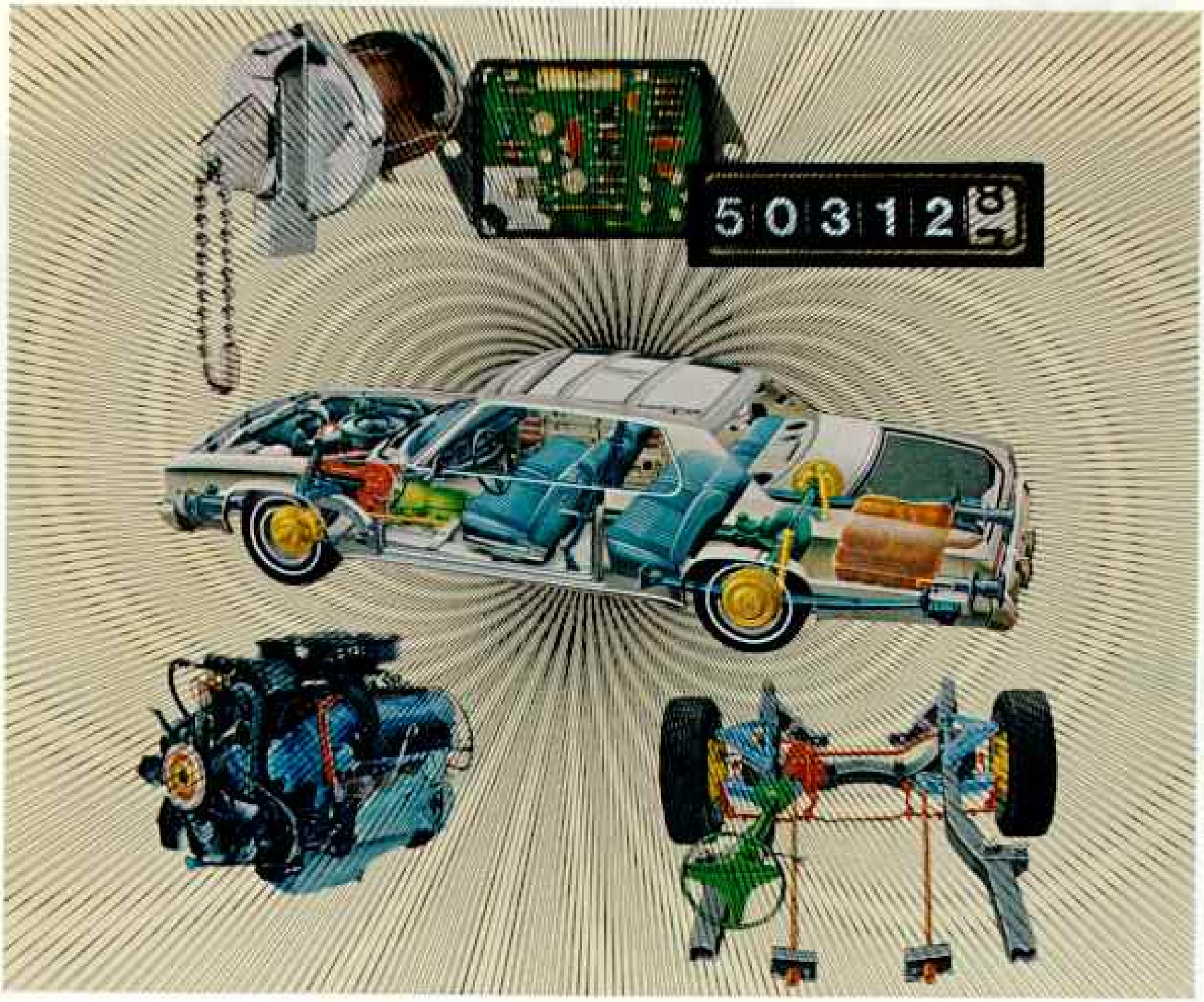
Metropolitan Life

Where the future is now

tury is now.

EXTRA CARE IN ENGINEERING...IT MAKES A DIFFERENCE.

Chrysler Corporation offers 7 important engineering differences that could help you choose your next car.



There are important engineering differences in every Chrysler Corporation car made in this country. Differences that are basic to the way we build our cars. You should know about them before you buy your next car.

Difference #1: Electronic Engine Testing. Every one of our engine plants in this country uses Chrysler-engineered Electronic Engine Function Testers to help keep substandard engines out of your car.

Difference #2: Use of Electronics. Electronic Ignition and Voltage Regulator are standard on all our American-made cars. The Electronic Digital Clock and Security Alarm System are available on many.

Difference #3: Reduced Maintenance. Like other carmakers, we've worked to improve service. We've also reduced, even eliminated, service in certain areas. For example, Electronic Ignition has no points or condenser to replace.

Difference #4: TorqueFlite Transmission. It's rugged and dependable. With no recommended maintenance under normal driving conditions. TorqueFlite is standard on all our full-size cars, and it's available on all of our cars.

Difference #5: Electronic Ignition. Standard. It delivers up to 35% more starting voltage than conventional systems; works as good as new even after 50,000 miles.

Difference #6: Torsion-Bar Suspension. Our Torsion-Bar Suspension is a different way of obtaining a comfortable ride and is easily adjustable for height.

Difference #7: Unibody Construction. The body panels and structural members are joined by over 4,000 welds for strength, durability.

Compare Chrysler Corporation's engineering differences. See your Dodge or Chrysler-Plymouth dealer before you choose your next car.

CHRYSLER Dodge Plymouth Dodge Trucks

CHRYSLER CORPORATION

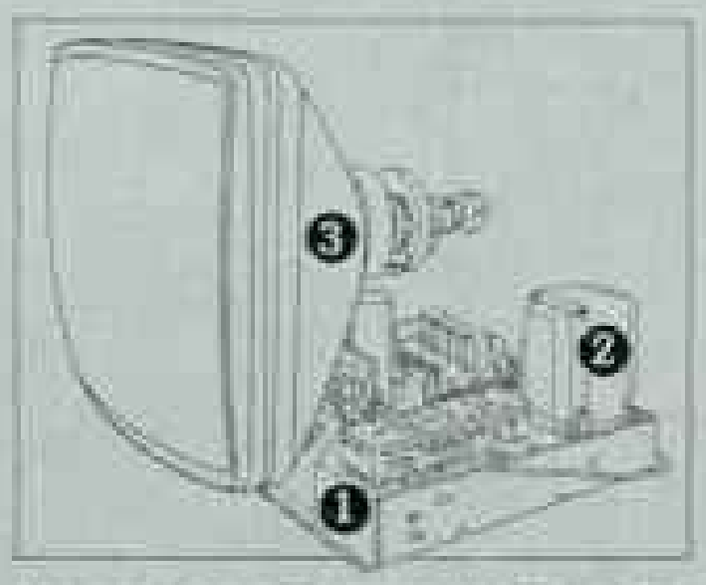
CHRYSLER • PLYMOUTH • DODGE • DODGE TRUCKS

Zenith introduces a whole new TV system- Solid-state Chromacolor II.

It's all new from chassis to picture tube. You get Zenith dependability and the best color picture we've ever brought you.

1. Zenith's 100% solid-state chassis. The most powerful chassis Zenith has ever built, for cleaner, more naturally brilliant colors. And Zenith solid-state design means years of dependable operation.

2. Unique voltage regulator to protect components. Another Zenith first. We call it Power Sentry. It guards your chassis and picture tube,



keeps your picture sharp under varying voltage conditions.

3. Advanced Chromacolor picture tube. The brightest picture tube in Zenith history. You get more contrast and detail than we've ever brought you before.

Zenith quality and dependability.* We're proud of our record of building dependable, quality products. But if it should ever happen that a Zenith doesn't live up to your expectations, we want to hear from you. Write to the Vice President, Consumer Affairs, Zenith Radio Corp., 1900 N. Austin Ave., Chicago, Ill. 60639.

At Zenith, *the quality goes in before the name goes on.*

*In two recent nationwide surveys, independent TV service technicians named Zenith, by more than 2 to 1 over the next best brand, as the color TV needing fewest repairs. Survey results on request.

Solid-state TV shown

Now available: Beautiful job with a great view.

There's no end to the horizon—your horizon—when you see it our way. Because there's no end to the opportunities the Air Force offers.

Take jobs. If you qualify, we'll send you to one of our many training centers around the country, and teach you one of over 250 different jobs—from aviation to health care to electronics to data processing, and then some. Expanding fields that call for a constant supply of skilled technicians—in or out of the Air Force.

Once technical training is completed, Air Force men and women are encouraged to further their education. And we subsidize that. You can take courses at vocational schools. Or, if you're after a college degree, take correspondence courses or off-duty classes at colleges. It's a complete career education package. And it's backed by the Community College of the Air Force, which offers a transcript of your Air Force technical education, and a 64-semester hour program mixing military and civilian instruction.

All this and 30-day paid vacations, too.

Reasons enough to see your local Air Force recruiter and get all the details. For his location call 800-447-4700, toll free (in Illinois call 800-322-4400). Or just send in the coupon for information on any of the Air Force programs listed below.

And expand your horizon.

Air Force Opportunities A-NG-103
Box A
Randolph AFB, Texas 78148

Please send me more information. I understand there is no obligation.

I am especially interested in:

☐ Air Force Training ☐ Air Force Academy
☐ Air Force Reserve ☐ Air Force ROTC
☐ Pilot/Navigator Program

Name _____ Sex ☐ M ☐ F
Please print

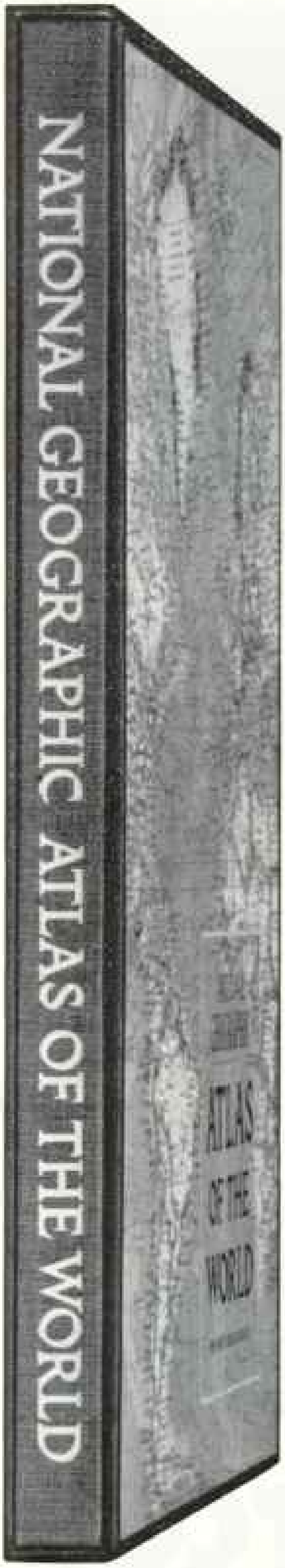
Address _____

City _____

State _____ Zip _____ Phone _____

Soc. Sec. # _____ Date of Birth _____

Find yourself in the Air Force.



Keep up with our changing world.

This new third edition of the renowned National Geographic ATLAS OF THE WORLD is more up to date, comprehensive, and authoritative than ever: 42 pages of text, 140 pages of full-color maps, and 149 pages of index containing 139,000 place names.

Use the ATLAS to pinpoint places in the news, to help your children in school, to plan vacations. It describes countries and climates, the earth in space, the floors of the oceans. Measures 12½"x19".

Standard edition, flexible simulated-leather cover: $18.75, plus postage and handling.

Deluxe hardbound edition, gold-stamped with owner's name, in matching slipcase: $24.50, plus postage and handling. (Print name to be gold-stamped – Deluxe edition only.)

Send no money. You will be billed at time of shipment.

Order from NATIONAL GEOGRAPHIC SOCIETY, Dept. 60, Washington, D. C. 20036

*Dial-it-yourself rates apply on all interstate calls within the continental U.S. (excluding Alaska) completed from a residence or business phone without operator assistance. They also apply on calls placed with an operator from a residence

The one-minute long distance rate. An inexpensive way to say you got home okay.

When you've something short to say, like "I'm home," we've got a way for you to say it for very little money.

It's our late-night and early-morning one-minute rate for long distance calls you dial direct without operator assistance.

You can use it any time after 11 at night all the way till 8 the next morning.

Any night of the week.

And it won't cost very much. Even coast-to-coast. New York to Los Angeles, for instance, is only 35¢, plus tax (additional minutes are 20¢ each).*

Obviously, most of your calls will take longer, so they'll cost more. But you'll still save money when you dial direct.

At AT&T and your local Bell Company, we want you to know all the ways to use your phone so you can save money. That includes using our late-night one-minute rate and dialing all long distance calls direct.

We hear you.

or business phone where direct dialing facilities are not available. For dial-it-yourself rates to Hawaii, check your operator. Dial-direct rates do not apply to person-to-person, coin, hotel guest, credit card, or collect calls, or to calls charged to another number, because an operator must assist on such calls.

Safeco saved Gene Walters $50 on his car insurance.

Safeco has long been known for fast, fair claim settling. But not enough drivers are aware of just how competitive Safeco's prices are.

The answer is *very*.

The best way to find out is to do what Gene Walters (Policy #P587491) did: call your local independent Safeco agent. Ask him to prove how competitive Safeco's prices are. The odds are pretty good you'll find our cost is lower than what you're currently paying. Your Safeco agent is in the Yellow Pages. Safeco. Insurance on your car, home, health, boat, business, life, and everything else you value.

Smile, you're with Safeco

CHANGE OF ADDRESS?

ATTACH YOUR NATIONAL GEOGRAPHIC LABEL HERE, print new address below, clip and mail to National Geographic Society, Washington, D.C. 20036. (Have a question about your magazine? Attach label to this form, and clip to your letter.)

NAME

NEW ADDRESS

CITY STATE ZIP CODE

"The perfect energy. Clean, cheap and can't foul up the environment."

Too bad about windmills. They just aren't a practical solution to our energy dilemma. Neither are a lot of other power sources. Take atomic power. It's promising, but not being developed nearly fast enough to meet the tremendous needs right now. Geothermal and solar energy are possible, but years away from broad, practical use.

We still have oil and natural gas. At least for now. That's the rub. Between 1955 and 1970 oil and gas consumption doubled. It may double again by 1985. At that rate, the world's known petroleum reserves will be exhausted in 20 years.

What's wrong with coal? "Plenty," say the environmentalists. "Burning coal is dirty, and strip mining leaves land ugly and lifeless."

But we have two trillion tons in the U. S. alone. We're well on our way to curing its air polluting properties. And we know how to reforest land, prevent erosion and make ground fertile again. For the near future, coal's advantages seem to outweigh its drawbacks.

Using coal won't increase our reserves of oil and natural gas. But there's so much more of it. Why not use it now for our electrical needs and conserve oil and gas for their best applications: transportation and home heating.

Coal gasification and liquefaction are promising too. We need more research on those alternatives. It's worth the cost.

Intelligent use of coal shows the greatest promise toward solving the so-called "energy crisis."

To learn more about energy, write "Power," Dept. 3079, Caterpillar Tractor Co., Peoria, Illinois 61662.

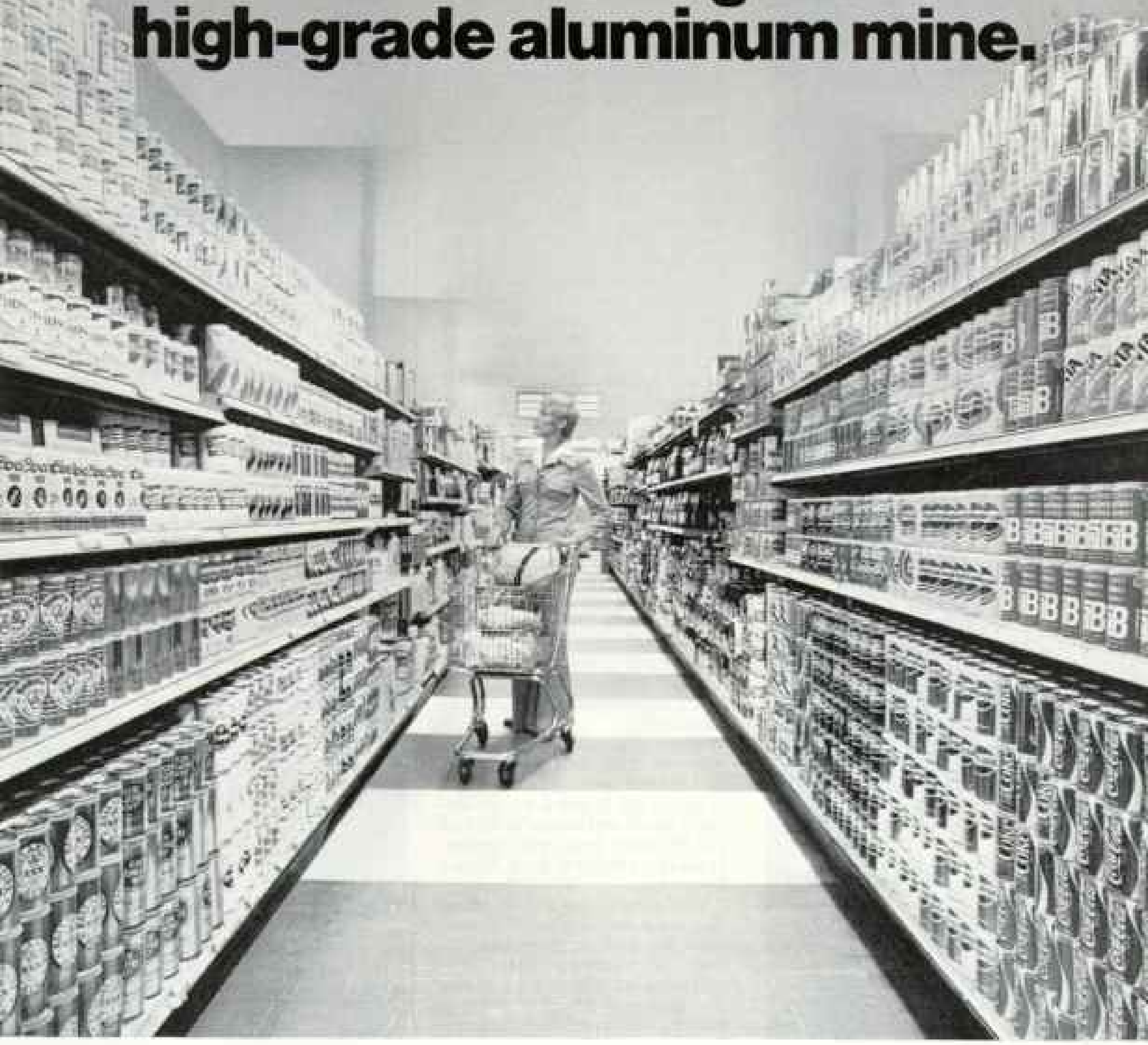
There are no simple solutions. Only intelligent choices.

CATERPILLAR

Caterpillar, Cat and 2 are Trademarks of Caterpillar Tractor Co.

"But it can't meet today's needs."

You're looking at a high-grade aluminum mine.



Every all-aluminum can in the beverage aisle of your local supermarket can be recycled and remade into another aluminum can. It's being done right now at Alcoa.

And when you recycle aluminum, you save energy. It takes only 5 percent of the energy it takes to make it the first time.

Once it's made, it can be recycled repeatedly, at a tremendous saving in energy.

There's not another beverage packaging material quite like aluminum. Only aluminum has all these things going for it: it's lightweight, chills quickly, keeps things fresh, opens with a snap, has high scrap value and can be recycled repeatedly. It's plentiful, too.

And because it's also good economics to recycle aluminum, Alcoa will pay as much as 10 cents a pound for all-aluminum cans, from any established reclamation center.

Alcoa is doing something to help conserve our natural resources. We would like to tell you more about it. Write for our free brochure on energy and aluminum.

We'll also send you a list of America's aluminum can reclamation centers.

Aluminum Company of America, 815-K Alcoa Building, Pittsburgh, Pa. 15219.

Aluminum: Pass it on

ALCOA

How to turn blue sky thinking into a blue chip investment.

Find out for yourself how a major business expense can become a profitable investment.

Blue sky thinking is a major ingredient of leadership. If the executive mind never soars above the known and accepted, the historical and routine ways of doing things, the company will falter, fall behind and fade away.

But all blue sky ideas must eventually pass the rugged test of business economics. That's why Beech Aircraft Corporation has always talked to businessmen in terms of *investment* in business airplanes.

Take a good, hard look

Sit down with your accountant and the Beechcraft Capital Recovery Guide to see what your net capital investment in a Beechcraft would actually be. You will probably be surprised. Going all the way to the top of the line to illustrate, many companies can own the famous King Air A100, turboprop, pressurized corporate transport for a net capital investment of about $2000 a month. The new King Air A100 can serve as an airborne executive suite for 8, or a transport to carry up to 11 and a crew of 2 in quiet, comfortable, 285 mile-per-hour flight. The Beechcraft King Air is the most widely used turboprop business aircraft in the world. Over one million flight hours logged!

Some down-to-earth qualities

The King Air A100 is much more than a corporate transport. It is a sound investment. It is a vital piece of business equipment, so well built that downtime for maintenance simply isn't a problem. So expertly crafted and ahead of its times that depreciation is low. Resale high. A Beechcraft fact of life you can easily prove to yourself. Performance and flight characteristics put thousands of small town airports and remote strips on your company air routes. The business opportunities this opens are subject matter for your own blue sky thinking.

The first step is an easy one.

Read the un-coupon below and write on your letterhead. You'll receive the Beech business flying kit entitled, "How to Turn Blue Sky Thinking Into a Blue Chip Investment." The kit includes a Capital Recovery Guide and everything you need to make your initial judgment about the profitability of a Beechcraft in your business.

THIS IS NOT A COUPON!

It's sort of an un-coupon. If it isn't a crime to cut up a page in National Geographic, it ought to be!

The un-coupon is to urge you to write now for your kit entitled, "How to turn blue sky thinking into a blue chip investment." Please tell us which airplane you would be most interested in:

- 4- to 6-place single engine (up to 170 mph)
- 4- to 6-place single engine (up to 210 mph)
- 4- to 6-place twin engine (up to 230 mph)
- 6-place twin engine (pressurized, 280 mph)
- Twin engine turboprop corporate transport (pressurized, 250 mph)
- Corporate jet

Write to Beech Aircraft Corporation, Department A, Wichita, Kansas 67201. Please write on your company letterhead, giving us your name and title. Are you a pilot? Aircraft owner? Thank you.

Beechcraft