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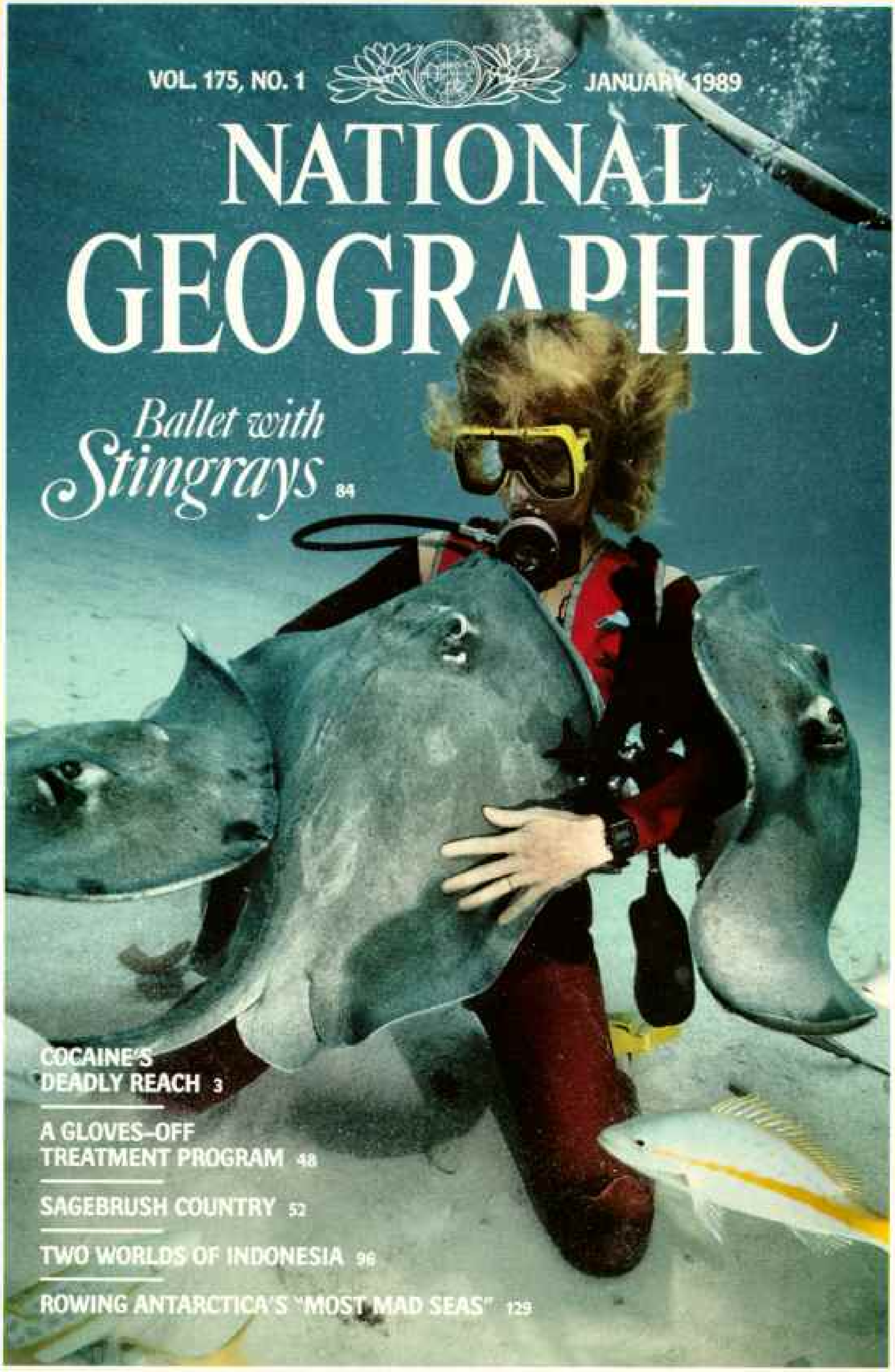

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COVER: *Searching for food, stingrays approach Penny Pritchett Hatch off Grand Cayman island. Fed regularly by divers, these fish with the dreaded name proved to be friendly. Photograph by David Doubilet.*

THE NATIONAL GEOGRAPHIC MAGAZINE
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FOUNDED 1888

An Ancient Indian Herb Turns Deadly

COCA

By PETER T. WHITE
ASSISTANT EDITOR

Photographs by JOSÉ AZEL
CONTACT PRESS IMAGES

From the leaves of a South American shrub comes a substance with immense power to stimulate pleasure, to generate wealth—and sometimes to kill. Hailed as a wonder drug in the late 19th century, cocaine was outlawed in the United States in 1914. As an illicit drug—here finely chopped to be inhaled through the nose—it fuels a multibillion-dollar industry with a staggering impact on both supplier nations and their chief customer, the U. S.

THE MERCHANDISE

Slogging through a vat of coca leaves and a mild solution of sulfuric acid—several times a day for about four days—a worker on an illegal coca farm in eastern Colombia starts the process of extracting cocaine. Liquid from the vat will be mixed with lime, gasoline, ammonia, and other chemicals to make cocaine base. Large labs refine the base and add acetone, ether, and hydrochloric acid to form a crystalline powder, cocaine hydrochloride.

"Smuggled" from Colombia on a small plane, 500 kilograms of cocaine are unloaded in south Florida by U. S. undercover agents and informants infiltrating a trafficking network. Bought for about $2,000 each kilo (2.2 pounds) can sell for $12,000 to $17,000. Rising production has dropped the wholesale price from the 1979 peak of $70,000. But profits still outweigh the dangers of running a commodity as costly as gold.

THE DEAL

THE FRUSTRATION

Fatigue overcomes an adviser from the U. S. Drug Enforcement Administration (DEA) in Tingo María, a coca boom-town in Peru's Huallaga Valley. More than half the world's illicit coca grows in the valley, where a U. S.-funded eradication effort struggles against farmers' protests, widespread corruption, and unpredictable violence.

A SHRUB GROWS in South America whose little leaves—one to three inches long and stripped off several times a year—contain a drug with unequaled power to stimulate the pleasure centers of the human brain: so much so that it fosters the most dynamic variety of free enterprise in our time. That's the coca plant. And the drug is cocaine.

Those little leaves have long been chewed by people of the Andean highlands as a tonic. The earliest solid evidence of this is in the Museum of the Bank of the Pacific in Guayaquil, Ecuador: a three-inch ceramic head of a man with the characteristic chewer's bulge in his left cheek, Valdivia culture, circa 1500 B.C.

By 1862 German chemists had taken coca leaves brought by an Austrian scientific expedition from Peru and isolated from them an alkaloid, or nitrogen-based compound: $C_{17}H_{21}NO_4$. They labeled it *Cocain*. Today at least six million Americans keep buying it—to sniff, smoke, or inject. This brings them indescribable pleasure, unbounded energy. Often misery. Sometimes death.

Under U. S. law—and a 1961 treaty ratified by 125 nations—it is forbidden to produce cocaine, or to possess it, except for prescribed medical use. Yet such is the demand that the illicit buying and selling of it generates stupendous quantities of money—with profound effect, as we shall see, on varied people far beyond the coca planters and cocaine consumers. On Colombian guerrillas, say, and top political leaders across the Caribbean, on international bankers and American inner-city teenagers. Cocaine money means economic growth for entire regions in Peru, economic survival for Bolivia. For some individuals, it is said, billions of dollars. For some, murder most gruesome. . . .

When I set out to look at the coca plant—and to learn who gets what out of it, and how—I wondered about the lawful use of cocaine today. Well, it's for local anesthesia. Cocaine blocks nerve conduction, causing numbness. It also constricts blood vessels; that's why each year surgeons in the United States prefer it for some 200,000 operations involving the nose, to shut down the mass of capillaries in there. And at a hospital in my neighborhood hardly a day passes without a child in the emergency room needing stitches but frightened by that curved needle and the blood; the nice nurse will swab on a colorless liquid containing cocaine and presto—less blood, no pain.

Incidentally, in case you've been wondering about Coca-Cola: Yes, there's something from the coca plant in it, and no, it isn't cocaine. Coca leaves from Peru and Bolivia are shipped to a chemical factory in New Jersey, their cocaine is extracted for medical use, and from what's left of them comes a flavoring agent—to go, in minuscule amounts, into the Coca-Cola enjoyed in 155 countries. Thus hundreds of millions of people around the globe are, so to speak, in touch with the coca plant.

The first coca plant I see close up is a big one: From a trunk six inches thick, three slender stems rise to eight feet. This is in Colombia, 6,000 feet up in the Sierra Nevada de Santa Marta, the northernmost heights of the Andes, almost touching the Caribbean. Some 2,000 Kogi Indians, whose ancestors fled the conquering Spaniards four centuries ago, now live here in isolation, holding on to their traditions—their ceremonies, their chewing of coca. It grows right outside their huts.

The Kogi don't talk much to visitors—they said, "Hello, when are you leaving?"—but I can see what they do. Women harvest the leaves. Men toast them in earthenware pots, put some into pouches and then into their mouths all day long. Why? "It's good."

With the leaves goes an alkali—a lime powder, produced by burning seashells gathered on the coast or bartered for cattle and coffee raised here. This cuts the somewhat bitter coca taste and increases the stimulating effect. It's carried in a small gourd with a stick poking out on top; every male gets one, at a ceremony after puberty, and holds on to it till death. He'll moisten the stick with saliva, put it into the gourd to pick up some lime and then into his mouth again. Periodically he'll rub it with fiddling motions against the rim of the gourd; a little lime and saliva will stick there, building up with time. Old men carry big-rimmed gourds (pages 12-13).

Chewing, by the way, is not really the right word. There isn't one in English, just as there isn't one for chewing tobacco. But there are special words in Spanish: in Colombia, *mambear*; elsewhere, *coquear*—to coca. You move the wad in your cheek and suck from it. Some cocaine will be absorbed into the bloodstream through the mouth's mucous membranes, providing a slight numbing of cheek and tongue; more will be absorbed in the stomach and intestinal tract. Recent research suggests

that this may not be harmful, as some earlier investigators believed. The dried leaves are in fact high in valuable nutrients—calcium, phosphorus, vitamins A and B_2; how much benefit the chewer gets from these is uncertain, since he'll spit out what's left of the wad after an hour or so.

How do the effects of chewing coca compare with those of sniffing cocaine? Like night and day, experts say—like riding a donkey and flying the Concorde!

Growing coca for the cocaine trade is a far different matter too, as I began to see in Calamar, in Colombia's Guaviare territory. Horses and cattle, easy women and loud music—it was the Wild West in an equatorial rain forest setting, and what drove it all was coca. Along the muddy shopping street I saw what you need to raise a good crop and process it. Fertilizer and weed-control spray; rolls of strong black plastic, nine feet wide, to make pits for soaking the leaves. That's illegal, of course. The police lieutenant said he's the enemy here. He pointed to two grenades on his belt. "This says it all."

After nine outboard hours downstream—on the Unilla River, then the Vaupés—I'm on a typical farm, slashed and burned out of the jungle: five acres for food, manioc and maize; ten acres for coca. The altitude is a thousand feet and it's hot and humid, with some 110 inches of annual rain. Under these conditions, and with careful fertilizing and weeding, leaves will be ready for stripping every 35 days or so, or ten times a year.

Five young men are doing the stripping now, amid waist-high plants. They bend them down, stand astride, and strip away with both hands, left—right—left. The leaves go into a plastic pit with a solution of water and a little sulfuric acid. Three or four times daily, a man will hop in up to his thighs, barefoot, and briskly step on the leaves and push them around with his hands, to mix them well with the solution (pages 4-5). You don't stay in long or you get blisters.

When I'm back three days later, the leaves are grayish; I am reminded of the sour-mash smell in a whiskey distillery. Now the fluid is drawn off, and there's a succession of mixing and stirring in plastic buckets—lime water, gasoline, more acid, potassium permanganate, ammonia. At last a reddish brown liquid filters through a piece of old blue jeans; it drips down clear. A few more ammonia drops and the liquid turns milky. "Look," says the man, "you see it?"

I see something curdling in the liquid. He pours it into a piece of white bed sheet, wrings it out, and there it is—ivory-colored granules, *la merca*, the merchandise. Properly called cocaine base. The yield is low—from the harvest of a little more than an acre, it's a bit less than a pound, 400 grams. But the cocaine content is high, the man says—75 percent. The rest is assorted impurities.

When you come here you'd better be properly introduced, lest people take you for a police agent. This area is controlled by the VII Front of FARC, the far-left Revolutionary Armed Forces of Colombia. Under a truce with the government, and in return for a contribution from the growers, allegedly voluntary, FARC has protected the thousands of them who arrived since the coca boom began in the late 1970s. Luckily, Colombian friends managed to persuade the local political leader to come along and explain that a NATIONAL GEOGRAPHIC visit will bring no harm to anyone.

Now let's see how others get something out of the merchandise in the early stages: The *hired hand* earns twice what he got on a coffee farm back home and saves most of it—"no

GOLD MUSEUM, BOGOTÁ, 10 IN

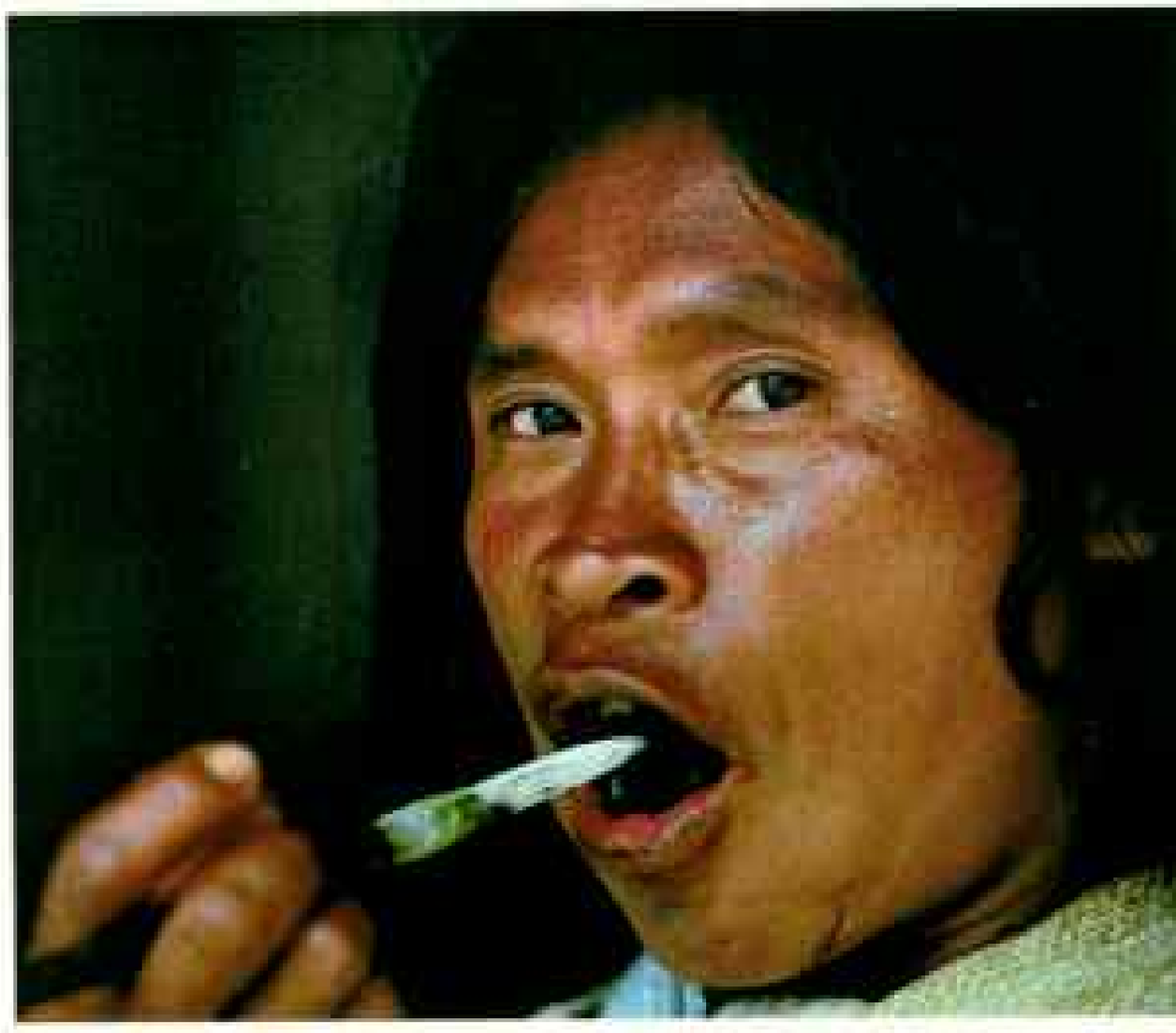
Coca paraphernalia from the first millennium A.D., a gold Colombian poporo held powdered lime, taken while chewing coca leaves to help release the cocaine alkaloid.

movies here, no girls." The *three brothers* who own and also work the farm sell to the *merchant* along the river. He often pays in goods, on which he makes 25 percent; and after assembling enough merca he'll sell it at another 25 percent markup. The *boatman* who takes it to the town upstream gets so much a kilo. . . .

The cocaine base may go through a couple more middlemen before reaching a laboratory to be turned—via more plastic buckets and more chemicals—into cocaine hydrochloride, the white or cream-colored crystalline powder that's the final product. It's been done near Miraflores, and in Villavicencio. And even around Medellín, the metropolis of the department of Antioquia.

AH, MEDELLÍN. Nestled among mountains, blessed with eternal spring, it's a textile and fashion center and home to many in the higher echelons of the cocaine trade. Some younger aspirants, already millionaires, can be found at Kevins, a discotheque overlooking the brightly lit city. One just checked his gun at the door.

Next day I see Fabio Ochoa Restrepo—father of the reputed billionaire Jorge Ochoa Vásquez—enjoying himself at a horse show in suburban Envigado. Those are Paso Fino horses, with a four-beat lateral gait so smooth that riding one is said to be like riding on a cloud. Don Fabio, white-haired and grotesquely fat but an excellent equestrian, watches one prize after another go to his horses. I'm told he has 500 of them at his nearby



As casual as a coffee break or as sacred as Communion, coca-leaf chewing is an ancient, multifaceted ritual in the Andes. Slow ingestion of small amounts of cocaine counters hunger, fatigue, and the effects of living at a high altitude. In northern Colombia, Kogi men "marry" coca at puberty and are rarely without bags of toasted leaves and lime-filled poporos (top). Elders this day show effects of home-brewed alcohol. To make the lime alkali, the Kogi trade cattle for Caribbean seashells, which they fire and crush (far right). A chewer lifts a lime-covered poporo stick to activate his coca leaves (right).

breeding farm alone, each with its own groom.

Everyone here knows who the big cocaine traffickers are. People call them *mágicos*, the magicians, and you don't mess with them. In fact they're becoming respectable—some indeed beloved, such as the reputed billionaire Pablo Escobar Gaviria. On a hillside I see what he built for the poor: scores of brick houses with flowers in front, a church, a soccer field. A little girl tells me there'll be many more houses, "if God helps him."

Scrawled on a wall is the slogan "*Afuera Extradición*—Down With Extradition." The United States government indicted Pablo Escobar as a leading cocaine trafficker, along with others of the so-called Medellín cartel, demanding he be given up for trial in the

MUSÉUM NATIONAL D'HISTOIRE NATURELLE, PARIS

Legally grown for chewing, seedlings of Erythroxylum coca *sprout between protective ridges in western Bolivia. This shrub was domesticated in Peru perhaps 7,000 years ago, theorizes Chicago Field Museum botanist Timothy Plowman (top), framed by a few of the some 230 species of* Erythroxylum. *Only* E. coca, *at top right, and three other cocas developed from it contain usable amounts of cocaine. Mislabeled in this 1895 print (above),* E. novogranatense *var.* novogranatense *is the coca grown by the Kogi.*

U. S. It hasn't happened; he's too powerful.

He's also a stereotypical *paisa*, a man from Antioquia labeled hardworking, smart, ambitious, aggressive. Paisas provided the entrepreneurial spirit that developed coffee and textile industries; some also have traditionally been involved in the smuggling of whatever's been profitable. Coffee. Emeralds. Marijuana. Most recently and most profitably: cocaine. You buy the raw stuff in the south. Refine it here, and smuggle it, by air and by sea, to the big market up north.

We'll hear more of the powers that be in Medellín—how they spend millions for bribes, and of their hired killers who come in pairs on motorcycles, one driving, the other with a submachine gun. . . .

NOW I'M IN PERU, the land where coca leaves are most extensively in evidence. As soon as tourists arrive in two-mile-high Cuzco, the old Inca capital, the hotel serves fresh-brewed coca tea; it's said to be good for adjusting to the altitude. Three French ladies sniff the pot and agree, it smells like spinach. They like it.

At Peru's main tourist destination, the glorious Inca ruins of Machu Picchu, the guide shows me the altar in the temple of Mother Earth where coca was ceremonially burned in a ceramic dish.

"We still live in the same way," he says. "Mother Earth gets hungry and must be fed—flowers, sweets, always coca. Today it's all put together into bundles called *pagos*. None

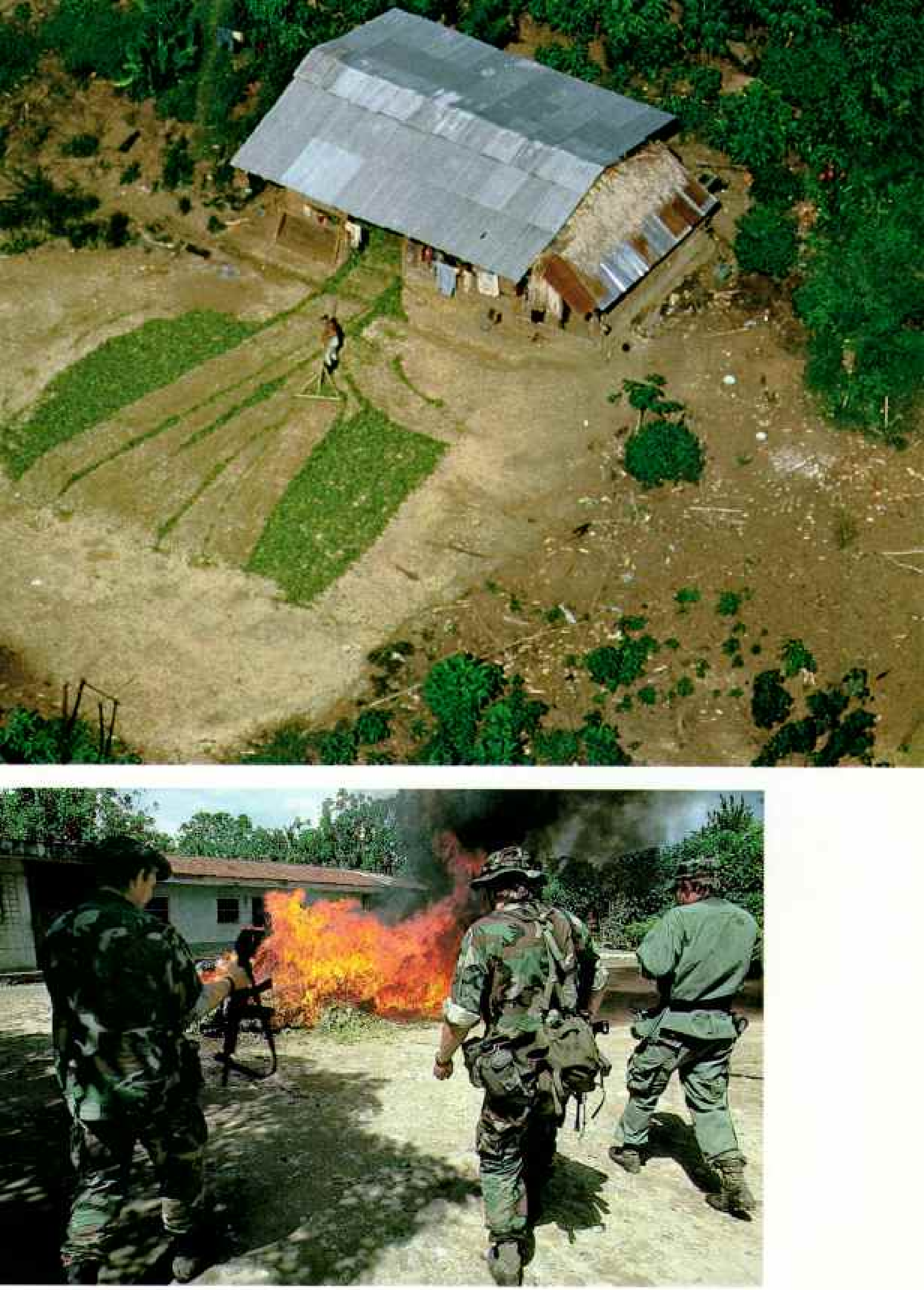
are burned here any more, but you can see the fires on the mountains at midnight."

From Machu Picchu, old agricultural terraces step down steeply toward the Urubamba River. The higher ones once grew corn, the lower ones coca. Down in the valley coca is still a big legal crop—to be sold to ENACO, the Peruvian government coca monopoly. In the markets and groceries of Cuzco a pound of leaves costs about a dollar; they're fresh, smelling like new-mown hay. A market stand sells different pagos for different purposes—to put into the foundation of a new house; for help in matters of health, business, or love. For magic white or black, good or bad.

Is there a renowned practitioner of the good kind nearby? Yes, Don Benito, called a high priest. I find him busy with a family that came from Puerto Maldonado, ten car hours away. Their little boy suffers terrible nightmares, the father tells me—he's taken him to doctors all the way to Lima, but they haven't helped. He believes Don Benito will, I can see it in his eyes. The mother has brought coca leaves. Don Benito will pick some and put them, in groups of three, into a special pago. . . .

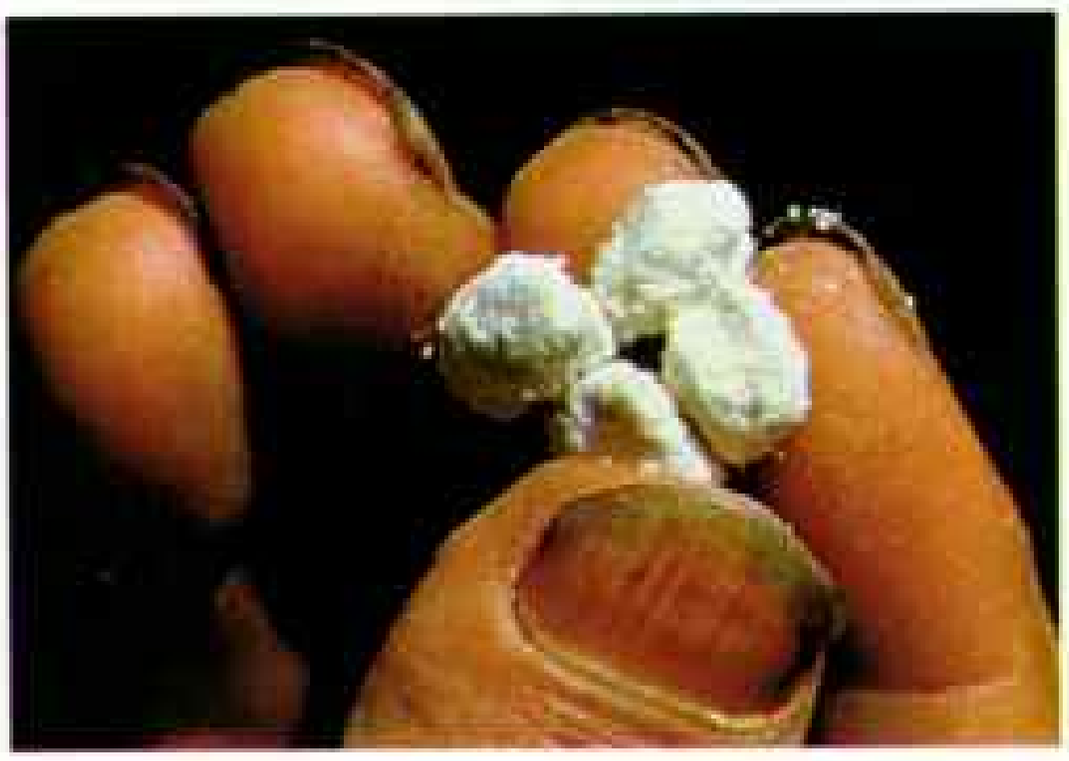
THE MAIN LEGAL USE for coca in Peru is chewing, most of it in the Sierra, a region of breathtaking mountains and terrible roads—and not many of those—that's home to half the country's population, some ten million. Most of these uplanders speak Quechua as well as Spanish, but they aren't Indians, as is often stated—they're *mestizos*, and those higher on the socioeconomic ladder look down on the chewers as peasants. One of those higher-ups tells me: "They believe it makes them strong. I think that's nonsense, but if you don't give them coca they keep yawning, turn melancholy, and want to go home. They'd rather have coca than food."

A surveillance helicopter in the Huallaga Valley passes over a farmer raking coca leaves, probably to be converted to paste before being sold to a lab. Peruvian officials and U. S. DEA advisers aboard the helicopter later burned a larger stash of coca (far right), using gallons of paste-making kerosene found in the house. The occupant (right), not arrested, cried, "What will I tell my husband?" Coca rules the valley's economy; no other crop can match its profits.



They certainly do chew a lot—those five men up there breaking rock with 25-pound sledgehammers, to build a road. The foreman gave them the first handful of leaves at nine, along with a shot of sugarcane liquor; he'll do it four more times today, as agreed, or they wouldn't have taken the job. And those 24 men over there, cutting barley? Twenty-four little liquor bottles, 33 ounces of coca. Everybody brings his own container with lime.

Nowadays coca also figures here in another way. For centuries people of the Sierra have



Working the "green mine," one of three brothers running a ten-acre coca farm in eastern Colombia fills a 25-pound sack. A hired hand (left) shoulders one of the bundles to the base-making pit. Fingers stained in the process hold chunks of cocaine base. About 500 kilos of leaves yielded half a kilo of base.

taken food eastward over the mountains to the jungle—potatoes, corn, guinea pig meat—and brought back coffee, cacao, or bananas grown on little farms they keep over there. But in the past dozen years those jungle farms have turned to coca, for the cocaine trade. And so this morning, as he does four or five times a year, a man from this town—no need to name it, there are dozens like it—makes ready for another trek to the Huallaga Valley.

He's taking a horse, a mule, and eight rented burros, two dogs, his wife, and his .38 revolver. He'll cross three ranges in four 18-hour days—walking, because the animals must carry food, chemicals, plastic sheets. Over there he'll strip his coca bushes, sun dry and pack some leaves to bring back and sell for chewing, and from the rest make coca paste—crude cocaine, about 25 percent pure. Back here he'll sell that to a big middleman—the hardware-store owner or the postmaster; or maybe he'll send it to a contact in Lima on the bus going twice a week, chock-full of people. Who'll find a few kilos of paste amid all those

TARGET 384

#2

Nov. 16, 1987

ZW-88-001

3

4

5

7

6

LATRINE

DORMITORY

DORMITORY

KITCHEN

80 FEET

30 FEET

POWER SUPPLY

DRYING STRUCTURE

22 FEET

LAB

FILTERING

TRAIL

ACID

ACID

WATER STORAGE BARREL

TRAIL (Possible escape route)

UNDER CONST

BOAT

BOAT

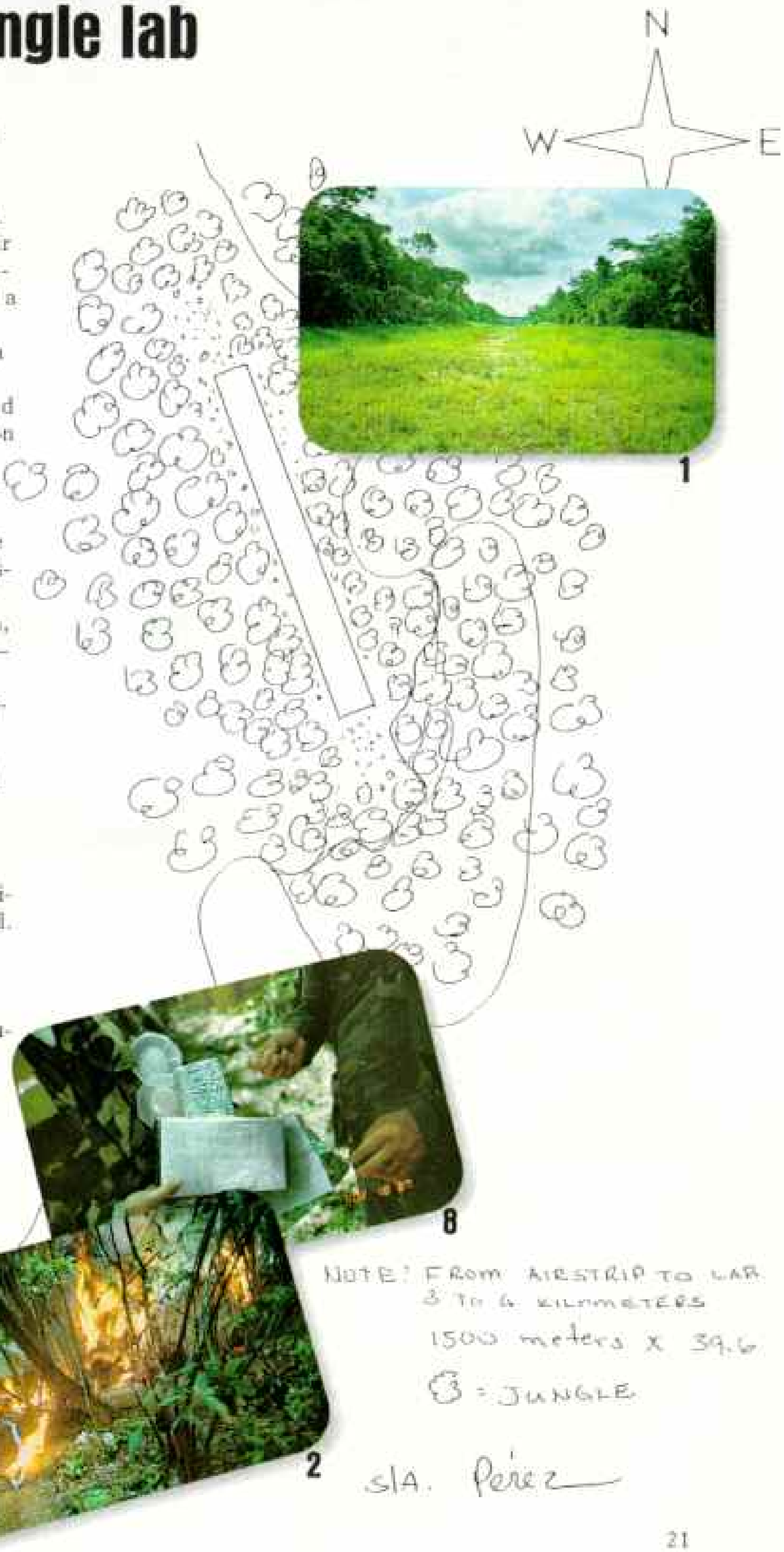
RIVER or ARROYO

S/A Peña

Operation Snowcap: Raid on a jungle lab

SLASHED INTO the forest of eastern Bolivia, an airstrip *(1)* was the tip-off that a lab was near. Spotting a flash of green canvas from their hovering helicopter, two Bolivian Air Force pilots discovered a camp capable of making as much as three tons of cocaine a week. The pilots returned the next day with federal police and DEA agents—part of Operation Snowcap, a U. S.-funded 50-million-dollar attack on Bolivian cocaine production—to investigate, map, and burn the camp *(2)*, described as "sophisticated and larger than most." Lab workers—perhaps 35 men, judging by the bunk tents *(3)*—had scattered mid-meal *(4)*. Stashed around the site, chemicals—stored in plastic mixing barrels *(5)* and worth perhaps 1.5 million dollars—converted cocaine base to cocaine. The base likely was flown in from the Chapare, Bolivia's chief coca-growing region; the chemicals probably came from Brazil. Filtered *(6)*, the cocaine was dried under hot lights *(7)* and packaged. The raid netted 300 kilos of powder and, more valuable, a notebook of formulas and phone numbers *(8)*.

ALL BY U. S. DRUG ENFORCEMENT ADMINISTRATION



Brutal message from drug traffickers, a strangled informer lies on the Huallaga Valley highway. Clouding the issue, they placed his body over a slogan of the Shining Path, an ultraleftist group opposed to drugs and capitalism but supportive of coca growers exploited by dealers and harassed by U. S. programs. Corruption is so profitable in the region that police pay to be assigned here.

bundles of wheat and beans on the roof? When the bus comes back with bags of sodium carbonate and five-gallon plastic cans of sulfuric acid, the driver will make a detour to avoid the police. If he can't, he'll pay them off.

PEOPLE TALK about these things pretty freely. They may not say they're in the business themselves, not in so many words. Some just pass an index finger under the nose, back and forth two or three times, and go sniff, sniff. I'm told two out of three here have something to do with the business, it's on their minds.

And no wonder. I've seen no comfortable chair in this town, no decent lighting, and it's cold after sundown if you don't have glass windows, only shutters and blankets. That storekeeper arrived 15 years ago, poor. Now he has a lot of land, a nice house in Lima, two sons in the university. He's making his way into the Peruvian middle class, as many others have done. You buy a lot in Lima and build a house slowly, then send part of the family and buy a store there, and then you move too. . . .

When I ask, extra politely, do you ever worry about what cocaine can do to people who use it, the answer is, oh, I don't use it, or supply it to addicts, it's just a business. Or I hear what I heard in Colombia—yes, it's wrong, but how else can we make a decent living?

I see boys and girls in smart gray trousers and skirts, white shirts and blouses, happily walking home from high school—and wish I hadn't heard what a school principal told me last night. Many of these kids, he said, when they finish in December, will go to the jungle, to bring back coca paste. Some may be caught and get a year in jail. The others will have money to buy books and uniforms for next year, and radios and tape recorders. The year after that, if they've made the right connections, they'll start bigger dealings. . . .

The work over there is dangerous, he said.

Airplanes from Colombia land and load in a few minutes, but the boys must carry those loads for hours in the woods; some get caught and killed by anti-narcotics police, or by traffickers. It happened to six of his students. Girls go as cooks or housekeepers—some wind up owning restaurants, some as prostitutes. "The parents worry all the time, it's like having their children go to war."

IN THE HUALLAGA VALLEY, it looks like war indeed. Three bridges blown in three weeks. Corpses with signs saying these are informers, don't touch them. A bus is stopped by men in police uniform; they identify three young men as police cadets and immediately shoot them. Were the killers traffickers—*narcos?* Or guerrillas? The Peruvian government has clamped a state of emergency on an area the size of West Virginia.

The anti-narcotics police pounce from

EDMUNDO MORALES

helicopters, burn processing pits, dynamite remote airstrips. With them come advisers from DEA, the U. S. Drug Enforcement Administration. This is Operation Lightning—a thousand arrests so far, a mass of weapons and 12 tons of coca paste seized.

Prices of chemicals are up, coca paste is down. How so? Production stays the same but marketing has been affected. For the moment there are fewer flights from Colombia, so less paste goes out. Some piles up. But the little planes still come and go—early, before the helicopters show up—each flying hundreds of kilos north to be made into cocaine hydrochloride. The purchasers pay in dollars; local policemen are said to collect their share after every flight. As people here say, *El Poderoso Señor Don Dinero puede hacer todo*—meaning money can do anything.

I see jeeps of CORAH, the U. S.-financed agency supposed to uproot coca plants. They haven't uprooted much lately—their people have been murdered. I'm told look up there, that used to be a coca field. Now it's weeds. What's that on the steep slope just behind it? Vigorous young coca. The climate is good for it—warm, not too dry—and the altitude ideal, around 2,000 feet. This valley, from Tingo María north, is the biggest illicit coca producer in the world. And to think that the U. S. Department of Agriculture sent experts here in the 1940s, to show people how to grow things better; that the U. S. Agency for International Development helped build the highway through the valley, to open it to settlers. . . .

I'M DRIVING NORTH from Tingo María—well, actually I'm riding in a dilapidated taxi that's well-known locally, with a Peruvian-American sociologist who is my friend and also the taxi man's friend. You can't have enough *(Continued on page 30)*

CANADA

UNITED STATES

MEXICO

Pacific Ocean

Atlantic Ocean

Caribbean Sea

SOUTH AMERICA

BRAZIL

COLOMBIA

VENEZUELA

GUYANA

SURINAME

FRENCH GUIANA

ECUADOR

PERU

BOLIVIA

CHILE

PARAGUAY

ARGENTINA

URUGUAY

PANAMA

HONDURAS

HAITI

BAHAMAS

Vancouver

Seattle

Los Angeles

San Diego

San Ysidro

El Paso

Ft. Hancock-Ch./Allende Oct. 1989 5,000 lbs.

Dallas

Houston

Laredo

Corpus Christi

Brownsville

Jackson

Mobile

Tampa

Miami and Ft. Lauderdale 50,000 + lbs.

Key West & Marathon

Straits of Florida

Port Everglades Apr. 1988 2,000 + lbs.

Homestead A.F.B.

Detroit

Chicago

Scranton

Philadelphia

New York

Washington

Greensboro

Montreal

Queens, N.Y. Aug. 1988 4,000 + lbs.

Hicksville, N.Y. June 1988 6,000 lbs.

George Town, Cayman Islands

Curaçao Nov. 1987 3,400 + lbs.

San Juan, Puerto Rico

Caracas

Sierra Nevada de Santa Marta

Barranquilla

Cartagena

Medellín

Bogotá

Cali

Villavicencio

Quito

Guayaquil

Manta

Trujillo

Chiclayo

Tocache

Tingo María

Lima

Machu Picchu

Cuzco

Puerto Maldonado

La Paz

Puerto Villarroel

Cochabamba

Villa Tunari

Chimoré

Santa Cruz

Sucre

Magdalena R.

Orinoco

Caroní

Negro R.

Solimões

Madeira

Tapajós

Xingu

Madeira R.

Mamoré R.

Guaporé R.

Ucayali R.

Huallaga R.

Marañón R.

Beni R.

Paraguay R.

Iguaçu

Rio de Janeiro

Buenos Aires

Montevideo

EQUATOR

30°

40°

50°

60°

70°

80°

One smuggler's ruse

A van was bought in Canada and shipped to Chile via Los Angeles. It was then driven to Bolivia, where the chassis was packed with 200 pounds of cocaine. Driven to Buenos Aires, the van was shipped to Belgium. It was intercepted in Antwerp as Canada-bound cargo.

Varieties of coca (*Erythroxylum*)

- *E. coca* var. *coca*
  The most widely grown coca prefers high, moist forest
- *E. coca* var. *ipadu*
  A lowland rain forest variety propagated by cutting
- *E. novogranatense* var. *novogranatense*
  Possibly high cocaine content, but other chemicals hinder extraction
- *E. novogranatense* var. *truxillense*
  The most flavorful; developed to grow in drier areas

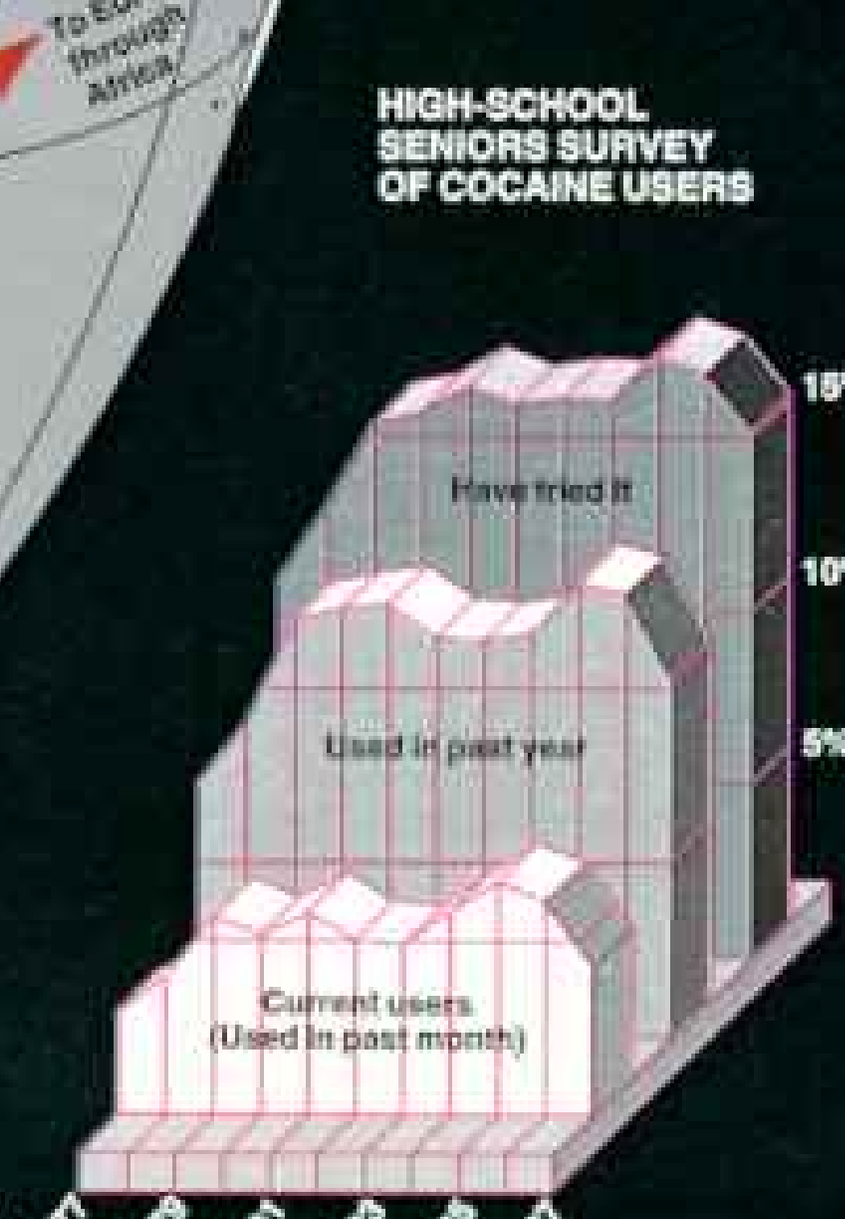
The cocaine empire

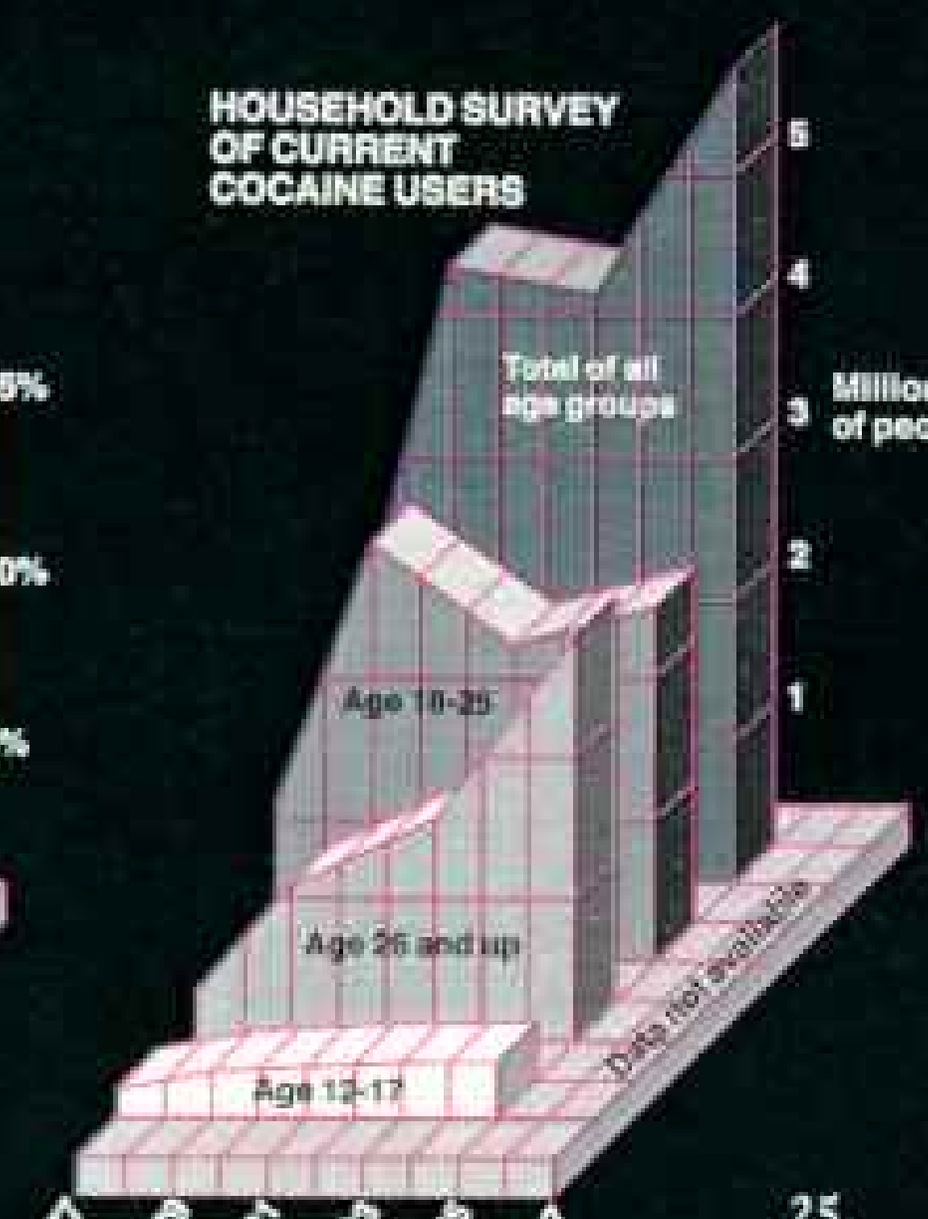
FAILING TO REPRESS coca chewing among the natives of South America in the 16th century, the conquering Spanish turned to selling the leaf—and made fortunes. Today's cocaine riches—apart from the huge profits that find their way to the U. S.—are concentrated in Colombia, where the drug is a principal source of foreign exchange. Peru and Bolivia grow most of the illicit coca, but Colombia dominates cocaine production and smuggling. Protecting their profits, the Medellín and Cali cartels have been implicated in the assassination of at least 30 judges, an attorney general, and hundreds of other Colombian public servants and citizens.

Easily grown at elevations from 1,000 to 6,000 feet, coca can be harvested three or more times a year. An estimated 400,000 acres are devoted to illegal cultivation, increasing 10 percent annually. Shifting smuggling routes may carry 400 tons of the drug each year, more than half of it to the U. S.

The cocaine rush began in the 1970s. Imparting a sense of energy and confidence, the drug "counters the anguish of the modern working world," says a former user. Its high price—about $100 a gram—makes an alluring statement, says another: "Today it's acceptable to be self-indulgent without guilt."

Once held to be relatively harmless if taken nasally, cocaine by 1978 was proved to be so "reinforcing" that lab animals prefer it to food. More than 1,600 persons died in the U. S. in 1987 after using cocaine. An estimated 5.8 million Americans were users in 1985 (below right). But a 1987 survey shows declining use among high-school seniors. Consumption is now rising in Europe, where a kilo can bring $45,000 wholesale, and South American countries report an increase in coca-paste smoking.





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MAP PROJECTION: PERSPECTIVE

Lights of Miami streak below a U. S. Customs Black Hawk helicopter summoned from Homestead Air Force Base to intercept an unidentified plane over the Straits of Florida. The pilot, equipped with night-vision goggles, is accompanied by three Customs agents and two Bahamian policemen. An estimated 50 percent of the cocaine entering the U. S. in 1987 passed over or through the Bahamas.

Contraband often is dropped from the air to a high-speed boat. A Customs jet videotaped the drop at top left from half a mile away with infrared equipment. Jets track suspicious craft by radar, then call in the Black Hawk. Few small planes can outrun the helicopter—capable of almost 200 miles an hour—and none can outmaneuver it. At Homestead (right) a helicopter pilot trains with a plane confiscated from a smuggler—part of the 530 million dollars in dealer assets seized by the DEA in 1987.

Despite such high technology and greater coordination among agencies, arrests of smuggler planes in south Florida number only one or two a week. Most of the 50 tons of cocaine seized here in 1988 came in commercial marine and air cargoes. Heightened interdiction efforts have also diverted traffickers: Seizures along the U. S.-Mexican border are up 40 percent. Tethered radar balloons at Fort Huachuca, Arizona (above left), and four other sites can each scan a 150-mile-radius from 15,000 feet.


N50424

Luck ran out for a smuggler on the eastern edge of the Everglades when a U. S. Customs Black Hawk intercepted his plane. Customs agents and members of the Broward County Sheriff's Department found 600 pounds of marijuana—worth about $420,000 and a five-year jail sentence. With an equal weight of cocaine bringing at least 2.7 million dollars, smugglers more often take greater legal risks for larger delivery fees. "I think the only type of pilot we haven't arrested is a nun," says a Customs agent. "We have arrested a priest."

(Continued from page 23) friends around here, and I just hope nobody'll stop us and ask for *my* identification.

We skirt a collapsed bridge—the river is shallow enough today—and here again are a lot of Communist slogans painted on the road. And various versions of "Down With Operation Lightning" and "Yankees Go Home." No matter who painted them, real guerrillas or narcos, it's clear that these sentiments are widely shared. By the merchants whose sales of Japanese motorcycles and VCRs are down, by the peddlers who sell fewer T-shirts. And especially by the "defense committees" made up of coca growers and local merchants. They're calling for a general strike. Maybe the only ones not caring are the disheveled teenagers darting around Tingo María's bus-and-taxi corner and the market. People call them *moscas*, flies. Their faces are pale and yellow because they're hooked coca-paste smokers. They're trying to pick out some hapless housewife to rob, so they can buy their next fix.

I charter a plane and fly along the valley. Lots of little huts down there are flanked by a flat surface for drying coca leaves; those growers don't process them but sell them to others who do. Occasionally smoke rises—someone clearing more forest, for more coca. Few would try to raise much else here nowadays.

We stop in Tocache, where a public prosecutor tells me how a big operation here was bungled. Police and DEA men dropped by parachute but perhaps a hundred traffickers

Confronted with the contents of her luggage—five pounds of cocaine hidden in the handles and lining—a Colombian traveler squirms in customs at Miami International Airport. Pleading guilty, she drew a five-year federal sentence. Miami leads the nation in airport cocaine seizures; most shipments arrive in cargo. Luggage, sniffed by U. S. Customs inspectors for chemicals or masking odors, held about 20 percent of the more than 10,000 pounds confiscated here last year.

—"Colombians"—got away. And in Uchiza I see the main square fortified with sandbagged emplacements, manned by a black-uniformed detachment of the Republican Guard. It's the aftermath of spectacular night attacks that destroyed the municipal building and the police station. News reports said guerrillas did it. Locals say no, it was mercenaries of the narcos, who killed five policemen but took the captain alive; then the "butchers" moved in, gouged out his eyes and slowly cut away pieces from his body. They say it was strictly a business-related operation, ordered by a big trafficker; this captain hadn't been satisfied with so many dollars per flight; his fate was intended to send a message.

Back in Lima a chemist tells me that making cocaine hydrochloride is easier than baking bread. "You put in so much of this, so much of that—just get the quantities right, that's all." The problem is finding the necessary chemicals, at a good price, and who'll buy from you. He never carries cocaine himself, of course; he sends it airfreight, say a couple of kilos in a shipment of wool ponchos or pottery.

What about the economics, per kilo? Maybe $500 for coca paste, $4,000 for chemicals. In New York he can get $25,000. But next week he'll fly to Europe; there it's $45,000. The *peces gordos*, the big fish, with big labs in Colombia, may send 500 kilos at a time in a small plane, or a thousand by freighter, to the big market up north in the U.S.A. . . .

THAT BIG MARKET is a relatively recent phenomenon. But awareness of coca in the U. S. dates back to around 1880, when it was tried as a cure for opium addiction and alcoholism. Young Dr. Sigmund Freud in Vienna read of this in a medical journal from Detroit; he also saw a report that

Concealing cocaine in their clothes or taping it to their skin, "body carriers" cover a Customs bulletin board (right) at Miami Airport. Their faces have been obscured to protect their identities. Less common, "body packers" swallow bundles of cocaine; rupture brings almost certain death. An X ray of a woman at London's Gatwick Airport reveals 95 cocaine-filled condoms. British Customs retrieves internal contraband with a special toilet (bottom), which funnels evidence into a sink to be cleaned.

Bavarian soldiers, dead tired after marching a lot, got cocaine and marched smartly on again. Freud took some himself and pronounced it a magical substance, wonderfully stimulating. He also found it good against asthma and stomach disorders, and thought it would help a colleague overcome addiction to morphine. Instead it made him hopelessly psychotic, imagining snakes crawling under his skin. Noted American physicians tried it also, were impressed, and then also had bad experiences. Thus a *Washington Post* headline of 1887: "The Cocaine Habit. There have been only a few victims, but these are incurable."

Nevertheless, cocaine-containing patent medicines were popular—for hay fever, sinusitis, and as a general tonic. So were cocaine-containing wine and soft drinks (page 34). In a widely read 1888 story by the British physician Arthur Conan Doyle—"The Sign of Four"—his fictional master detective, Sherlock Holmes, explains why he injects cocaine: "I suppose that its influence is physically a bad one. I find it, however, so transcendingly stimulating and clarifying to the mind that its secondary action is a matter of small moment." It has been suggested—by Dr. David F. Musto, a psychiatrist and medical historian at Yale—that Holmes's later obsession with Professor Moriarty, the master criminal he thinks is persecuting him, may have been a portrayal of cocaine-induced paranoia.

Anticocaine agitation rose in the early 1900s, fanned by hysterical scare stories that southern blacks, high on cocaine, might attack whites. By 1914 it had been outlawed, except for medical use. President Calvin Coolidge insisted that his personal physician prescribe cocaine drops for his ears, against seasickness. It didn't do much good, the doctor wrote, but no harm either. Some society leaders and jazz

musicians in the 1920s and '30s sniffed illicit cocaine, mostly diverted from medical stocks. Coca leaves then also came from Dutch plantations on Java, which early on had imported plants and seeds from South America.

After the rise of the drug culture of the 1960s, cocaine became the champagne of drugs to those who could afford it—business executives, big-time pimps, rock singers, ballet stars, Hollywood and sports celebrities and their hangers-on. It's harmless, it was said, and isn't it wonderful? It was expensive, associated with glamour and power. Little gold cocaine spoons became a fad, openly worn on gold chains. Manhattan's trendiest disco of the '70s—Studio 54, where a moon with a huge cocaine spoon dangled over the pulsating dance floor—reportedly dispensed free cocaine to its most favored clientele. To keep pace with burgeoning demand, South American coca cultivation multiplied, and so did cocaine laboratories. The total amount seized by U. S. authorities in 1966 was 12 kilos. In 1969 it was 53; in 1970, 267. Cocaine had begun to pour in.

BOTH FROM AL FREIN

Did Coca-Cola get a kick from cocaine before 1903? A company letterhead and actress Hilda Clark's endorsement hinted so. It is still flavored by a non-narcotic coca-leaf extract.

DOCTORS now say the effects of cocaine are unpredictable. It might take three or four years before more and more sniffing of cocaine—in binges that may last a night or a weekend—will lead to serious medical problems. But there have been cases of a single use bringing death.

In June 1986 cocaine poisoning took the life of football star Don Rogers. The same month, All-America basketballer Len Bias, just drafted by the Boston Celtics, had celebrated with so much cocaine that he died of cardiac arrest. As newspapers and TV increasingly reported the cocaine troubles of sports stars, cocaine took on a new face to the public at large. What had happened?

Free basing, for one thing. The user takes cocaine hydrochloride, dissolves it in water, and treats it with ammonia or baking soda, then with ether and heat. The result is pure cocaine, so-called free base, to be smoked in a water pipe. It'll hit the brain within 15 seconds. So—a rush, intense euphoria. Then restlessness, irritability. Insomnia. Compulsion to do it again. Often users find themselves hooked within six to eight weeks.

And then came crack. That's a sort of free base, but sometimes with adulterants such as speed or lidocaine. And it's more easily made. A cocaine hydrochloride solution is heated in a pan together with baking soda, yielding a solid chunk to be divided into hundreds of tiny "rocks"; these go into little vials—five or six to a vial that's sold for $15 or $20. Seems cheap? Yes, sometimes a kid can buy a vial with a couple of rocks for five dollars, or even three. But in fact it's quite profitable. An ounce of adulterated cocaine bought

on the street for, say, $1,000, plus 60 cents for baking soda, can turn into $7,000 in crack sales. The effects make devastating news.

Crack houses for buying and smoking multiply—50 in Seattle, 75 in Dallas, hundreds around Detroit, Miami, Los Angeles, New York. Dealers with submachine guns infest low-income housing projects and entire poor neighborhoods, terrifying residents. Some employ children as young as eight as runners and lookouts; they're less likely to be arrested. Teenage street sellers making hundreds of dollars a day become role models for schoolmates bedazzled by their status symbols: Fancy warm-up suits and athletic shoes. Beepers. Heavy gold chains. A BMW! Young mothers smoking crack all day sell their food stamps to buy more, next the furniture; then comes prostitution. Three Philadelphia boys—aged 15, 13, and 12—are given crack to sell, return with too little money, so the dealers start shooting; only the youngest survives.

HOW THE IMPACT of cocaine cuts across socioeconomic levels comes home to me in Atlanta at the annual conference of PRIDE, the Parents' Resource Institute for Drug Education. With a thousand well-dressed parents are a thousand cheerful well-scrubbed youngsters, like those you'd meet in the high school of any well-to-do suburb. Quite a few of them had cocaine problems but have overcome them—though the stories I hear some tell are startling. Of lying, stealing, loss of self-respect, wanting to die.

It hits me even harder at a Narcotics Anonymous meeting in Washington, D. C. These friendly people, supporting each other as they tell how they've struggled to hold their cocaine craving in check—they look just like neighbors I've known. Teachers, a government official, a salesman, a journalist.

At least they could get help. Health insurance typically covers a month of treatment. After all, the American Medical Association, in June 1987, declared that all "drug dependencies" are diseases. But what if you have no medical insurance? You'll call some hot line, probably be referred to some public agency, and then wait and wait for weeks and months. In Washington, there have been at least two cases of young men, driven to desperation by cocaine and turned away by a public psychiatric hospital, trying to hang themselves. . . .

And to think of how many Americans are involved with cocaine nowadays! A "household survey" done for NIDA, the National Institute on Drug Abuse, showed 5.8 million having used it within the previous month. But most experts think there must be more regular users. They put the maximum number a retailer would want to supply at 25, so there must be at least 230,000 dealers out there. That's more than all the dentists, or taxi drivers.

How reliable are such figures? When it comes to coca and cocaine, that's a problem right from the start. How much coca is there? Satellite photography suggests 400,000 acres, but some are planted loosely, some densely. How many harvests a year—three, or four, or more? How many kilos of leaf an acre? And what percentage cocaine content? *Erythroxylum coca* var. *coca* in Peru differs from *Erythroxylum coca* var. *ipadu* in Colombian Amazonia. But legislators, law-enforcement bureaucracies, the press—all demand figures, and so we have some: Annual cocaine production, U. S. officials tell me, is running at 200 tons; other experts say 400. All agree—it's rising. We *must* do something.

At the International Conference on Drug Abuse and Illicit Trafficking, convened by the United Nations in Vienna, it's agreed that more drugs than ever are flooding the world—and the focus is on the fastest spreading one, cocaine. Foreign ministers and health ministers, ministers of justice and the U. S. Attorney General make strong speeches in the plenary sessions. But in the main committee, where a 114-page draft paper is up for adoption—to stress the international community's political will—there's disagreement point by point. Most countries just don't want to be told by other countries what to do. And so the draft is drastically amended. To start, in every paragraph where it says a government *should* do something, the word "should" is changed to "could" or "may."

Outside the meeting halls, salesmen offer technological help. I watch a demonstration of a contraband detection van priced at four million dollars. It has a computerized mass spectrometer. You draw an air sample from a cargo container, and in two minutes the printout is supposed to tell if there's cocaine in there. There is, provided for the occasion by the Austrian police. But the printout says "negative."

The chief superintendent in charge of drug

fighting for the Royal Canadian Mounted Police tells me technology could never go to the heart of the problem—corruption. The big conference document hardly mentioned this. At least he's not totally pessimistic. By the time this article is published, he says, negotiations may have been concluded for a new treaty, to supplement the 1961 Single Convention on Narcotic Drugs. It should provide for tracing those billions in drug profits through the world's financial system and seizing them. "We've got to get at all that money." But how, even with new laws in effect? Investigators move with the speed of legal papers while traffickers shift their loot from country to country with the speed of telex machines. . . .

A "magical substance," Sigmund Freud pronounced in 1884. Like many doctors, he saw a host of uses for cocaine, earlier isolated by German chemists. The U. S. Hay Fever Association endorsed it as a decongestant. Sears, Roebuck sold an energizing cocaine wine. Today the drug remains invaluable as a local anesthetic and blood-vessel constrictor. Swabs soaked with a cocaine solution prepare a patient for nose surgery (below). The world buys pharmaceutical cocaine, or the coca leaves to produce it, from Peru's National Coca Enterprise. Three separately guarded keys (above) are needed to unlock the vault (right).

SOME 60 PERCENT of all coca leaf is said to grow in Peru, maybe 15 percent in Colombia, and about 22 percent in Bolivia, where I learn just how slippery things can get when you try to come to grips with the cocaine problem right at the source.

In 1986 U. S. Army troops and helicopters joined UMOPAR, the Bolivian anti-narcotics police, in Operation Blast Furnace to disrupt coca-leaf processing in the Chapare region—the country's main growing area. Harvesting virtually halted, an American Embassy man says, and the leaf price fell by 90 percent. Local lab operators weren't buying. But after four months the operation had to end, and the price rose. Now the idea is to try once more—no U. S. troops this time, just advisers.

At Paracti, the major checkpoint on the road into the Chapare lowlands, UMOPAR men advised by U. S. Border Patrol officers stick metal probes into bus passengers' belongings, searching for chemicals. The officer from Texas is pleased—the price of lime is up 100 percent. But there's consternation at the UMOPAR post in Villa Tunari. The U. S.-provided pay supplement, due each man once a month, somehow is four months late. Farmers stand in line nearby. In return for having voluntarily eradicated one hectare of coca—or 2.5 acres—each is supposed to receive $2,000 in Bolivian funds indirectly supplied by the

"You don't hear of the people who take cocaine in a disciplined manner," says a Washington, D. C., businessman who, with guests, consumes two grams a week. "More white-collar professionals use it than you think." Most buy a gram at a time. Selling to friends pays for his annual supply—four ounces, costing $7,000 wholesale.

U. S. and other foreign donors. These farmers have been lining up daily for a week. Today they're told again, come back tomorrow. . . .

The coca plant is tough, says the embassy man. Plantings up to two years old can easily be pulled up—but after five years, when they're waist-high here, you need a winch or have to dig them out. You can cut them, of course, but unless it's done at ground level, they might sprout again, producing more than ever. The ideal way would be to eradicate the coca with herbicide from airplanes. But even the Bolivian government is against that. And how can we press them on this when a U. S. federal court stopped the spraying of our own marijuana crop in Georgia and Kentucky?

These coca growers are tough too. The chief of DIRECO, the Bolivian agency for coca reduction and alternative development, must negotiate with 40 growers associations, and they're mad. They say the government isn't making good on promises for development projects, so they'll go on with coca. They've got powerful support in the capital, in La Paz. The DIRECO chief is proud of 2,200 hectares voluntarily eradicated. He hopes for 3,000 soon—not much, considering the estimate of more than 40,000 hectares, but it's something. The

problem, he says, is that coca growing has been legal in Bolivia. The government has pushed through a law to prohibit eventually all but 12,000 hectares for traditional chewing. But can this be enforced?

Near Chimoré, U. S. Army Special Forces instructors help UMOPAR set up a new camp. The mission is to search out and destroy processing pits and clandestine landing strips. "Those narcos use textbook insurgency tactics," says the warrant officer from Fort Bragg. "They're compartmentalized, good at intelligence. Whatever we do, they're prepared." If only he'd be allowed to use textbook *anti*-insurgency tactics!

TO PUSH the coca price down, in the hope of making the growing unprofitable, one must also go after the cocaine hydrochloride labs in the vast Beni region. And so we're now flying low out of Santa Cruz—five U. S.-lent Huey helicopters with Bolivian pilots, carrying camouflage-uniformed UMOPAR men and U. S. DEA advisers. A fixed-wing guide plane is high overhead. These Hueys with machine guns sticking out . . . the jungle canopy below like endless broccoli, with our shadows gliding over it . . . this seems like Vietnam long ago.

We dodge and turn and twist across rivers, past settlements, past coca clearings right and left. One of these camouflage-wearing fellows is our informant. Is it here? No. There! No. Ah, that may be it. We set down along a river bank and let the troops out. They comb through the forest. We pick them up two hours later. Nothing. A typical day.

How different it was two days ago, just before I showed up. They hit Target 384 (pages 20-21). Incredible: 150 barrels of ether, 150 of acetone, purchase price about $10,000 a pair. Separate screened huts for mixing, filtering, and drying; a power supply hut, a kitchen, two dormitories with 35 bunks, freezer, clothes dryer—all hidden under the trees and connected by planked paths with electric lights. Estimated capacity? Three tons a week, says the DEA supervisor. "They wouldn't make that much all the time, of course. But they must have been really busy, just before Christmas and New Year's." That's the season when demand goes way up in the U. S.

Press notes from Santa Cruz: A civic leader charges that the departmental governor's blond cousin—nicknamed Techo de Paja, or Straw Roof, and known as a big trafficker—is the real owner of the Santa Cruz racetrack, where the civic leader says $100,000 was bet on a single race last Saturday. The track director says it isn't so. A congressman charges that local TV Channel 5 provided live coverage of Techo de Paja's party for the Miss Latin America contestants and is connected with traffickers. Channel 5 executives deny it all.

Alas, Bolivia too has really big cocaine profiteers. Some are from the landowning elite, with big ranches in the Beni region, with airstrips. A few years ago they were tight with the then military dictator. Until recently with the minister of the interior. Supposedly the U. S. applied pressure; he's now a congressman.

An embassy man tells me Bolivia is bankrupt. The price of tin has crashed—of 60,000 miners, 35,000 are unemployed. Among a total population of 6.9 million, some 40,000 families—that's 200,000 souls—depend on coca growing in the Chapare region alone. U. S. aid to Bolivia runs at 75 million dollars a year, including 14 million for anticocaine measures. UNFDAC, the United Nations Fund for Drug Abuse Control, is making a big contribution for rural development, including coca substitution—37 million dollars. But coca brings in an estimated 400 million to 600 million dollars a year. That's what keeps the Bolivian economy afloat. I ask, can one really expect coca to be done away with here? "We have to continue doing what we are doing," says the embassy man. "Our options are very limited."

U. S. State Department experts in Washington expect coca acreage in Bolivia—and in Peru and Colombia—to continue to expand at about 10 percent a year, unless large-scale eradication can be carried out with herbicides sprayed from the air. A new Bolivian law expressly forbids this.

IF ERADICATION is no panacea, what about interdiction—preventing cocaine from entering the U. S.?

It comes by the thousands of kilos, in a hundred ways—mainly from Colombia, often to southern Florida, in air passengers' luggage, in air shipments of flowers, in furniture brought by freighter, in anything. Small twin-engine planes bring five or six duffel bags to some island in the Bahamas, say, to be loaded onto a fishing or pleasure boat. Or they'll drop them at night into the sea—and a sleek speedboat makes the pickup and races

toward the Florida Keys. In the Bahamas people commonly hope that some lost duffel bag will wash ashore and make them rich.

U. S. Coast Guard vessels stop ships, search, and seize—more each year, 3,000 kilos, 5,000, 7,000. Planes and helicopters of the U. S. Customs Service circle, chase, and once or twice a week come up with a hit. But most of the time, despite all the radar, all the computers spitting out intelligence, it's frustration.

I know the feeling, from flying in a Customs plane over the Bahamas and the Straits of Florida. After four hours of chasing around, there's a target on our radar: a plane without a flight plan, doing 200 knots at 8,400 feet, 14 miles away. But we can't go after him any more, we have just enough fuel left to get back to Homestead Air Force Base. Or there's a suspicious boat going in, but no boats are available to intercept it. . . .

One morning I'm with the Customs Blue Lightning strike force off Miami, in one of their awesome catamarans—39 feet, with two 575-horsepower engines. We stop a boat and ask for papers but can't look below because it's within the three-mile limit. Two T-shirted young men aboard are grinning. Their boat is just like ours but it's longer, with bigger engines. I ask how fast it can go.

"Oh, 105 knots."

That's a lot faster than ours. After we pull away, the Customs captain says a kid like that can make $100,000 a night. Maybe he's got a $160,000 Rolls-Royce like the one we saw on the dock. . . .

I begin to view everything afloat with suspicion. From my hotel balcony I look down on the Miami River entrance. A scruffy freighter—homeport George Town, Cayman Islands—enters the river, its deck full of big cargo containers. Gad, what's in there? Containers are the big thing now. Federal agents

Recipe for a quick fix, crack is made and smoked in a Bronx apartment (left). Heating cocaine powder with baking soda and water removes additives and yields a smokable solid. Inhaled through a pipe, it hits the brain in seconds. But the high lasts only minutes and leaves the user craving more. Snorted cocaine takes effect within ten minutes and peaks at 20. At less than $20 for a few pellets, crack has helped cocaine abuse spread into lower economic levels since it swept the drug scene in the mid-1980s. A $100 gram of powder sold in a handshake (below) could make more than $500 in crack sales.

seized 3,652 kilos—8,052 pounds—hidden inside the hollow boards of container pallets, all in one shipment. From Colombia, loaded in Honduras. What's it worth? About 36 million dollars wholesale. At retail, maybe 370.

HOW MUCH GETS THROUGH? Nobody knows. But this is pretty sure, determined by U. S. government-sponsored economists: The cost of cocaine on arrival in Miami is less than 10 percent of the retail price in New York; and thus even if twice as much were seized—and even if because of this the price at the dock doubled—retail prices in New York would rise less than 10 percent. Moreover, what's on the market would hardly be reduced, because the supply from abroad is virtually unlimited. And this is quite evident: Cocaine seizures are way up, yet wholesale prices are way down. The only overall conclusion to be drawn is that more than ever is flooding in. Frustration!

If only there weren't so much money to be made from this mesmeric product of the coca plant! The owner-pilot of one of those little two-engine smuggling planes—they carry extra fuel tanks and the most sophisticated navigation and communications electronics—got 1.5 million dollars per flight to Colombia and back to Scranton, Pennsylvania.

Whenever cocaine is smuggled in big quantities, bribes must be offered along the way; and when these are commensurately big, there will be takers among those who are most powerful—the politicians, the leaders of the armed forces. As publicly revealed of late, this has been so in Paraguay and Honduras. In Haiti. Panama. Mexico. Involving tens of millions of dollars.

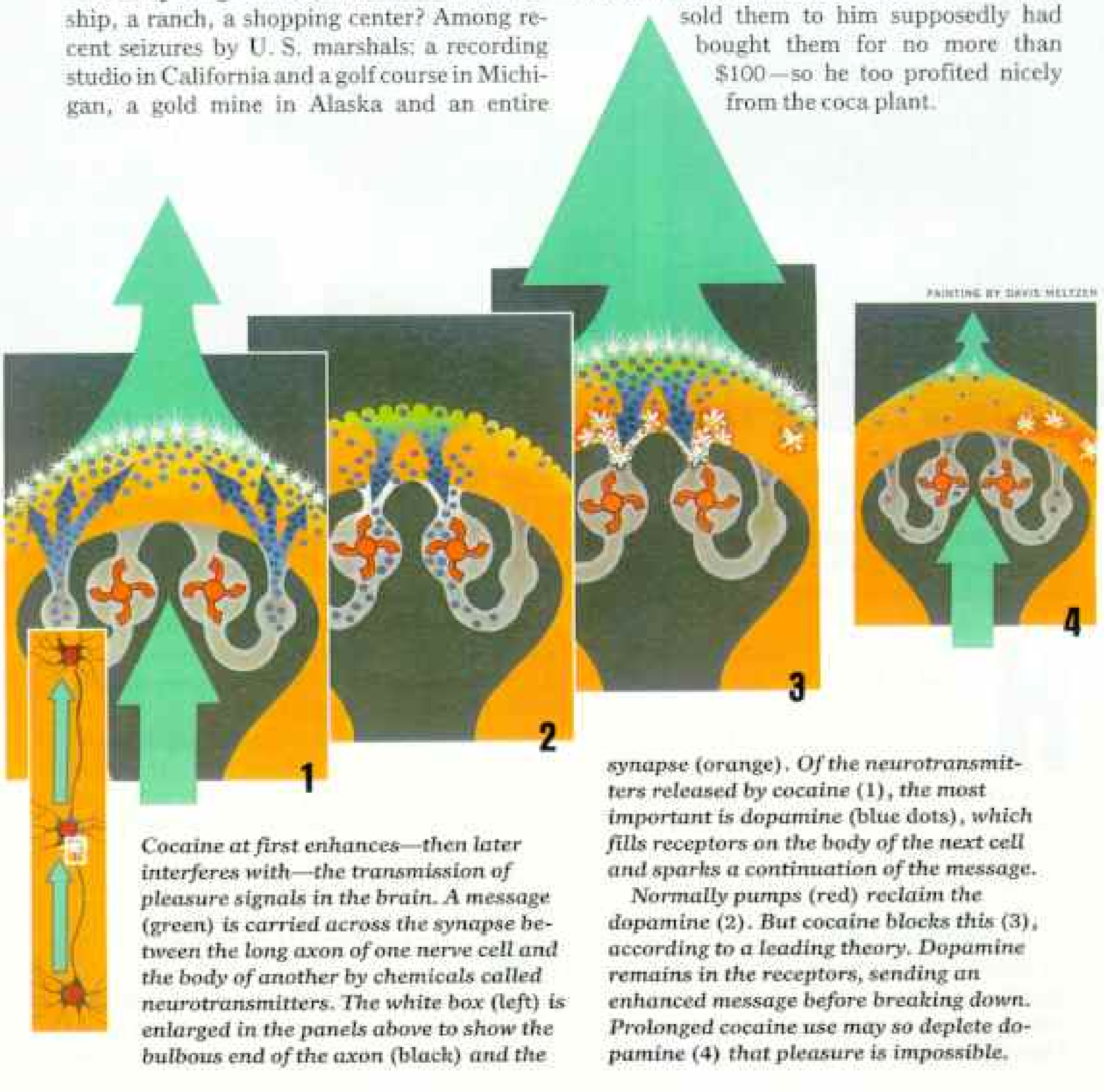
Now consider all the cocaine profits in the United States, the tides of cash churning up—from street dealers to ounce dealers to kilo

dealers—and what they do with all that money. One man in Rhode Island is said to have paid $345,000 for a 1963 Ferrari 250 GTO, all in $20 and $50 bills. (The car was seized by U. S. marshals and auctioned off for 1.6 million dollars to a dealer—a car dealer, that is.)

That Rhode Island man had been laundering money—that is, turning cash of unlawful origin into respectable assets. Often the first step will be to get the cash into a bank somewhere. In the U. S., banks must now report any deposit of $10,000 or more to the U. S. Treasury—but there are ways to get around that. Couriers carry dollar bills abroad by the millions, for deposit in foreign banks; then the money can be telexed back to an account in New York, say, and spent for just about anything. Stocks, bonds? A car dealership, a ranch, a shopping center? Among recent seizures by U. S. marshals: a recording studio in California and a golf course in Michigan, a gold mine in Alaska and an entire commercial block in Chicago's Chinatown.

Most cocaine-gotten gains are not seized, of course, and I think I see manifestations of them all over Miami. Those stunning condos, that glitzy hotel? Pizza parlors, video rental stores! Treasury people tell me these are handy for money laundering; they take in lots of cash, and so deposits from them are less likely to be questioned. . . .

Could this be cocaine paranoia too? Maybe I've been hearing too many tall but true stories, like the one about a money laundering operation from Miami—2.7 billion dollars going into the economy of, well, let's just say, a developed Commonwealth country. Or the one I haven't been able to run down, about the teenage crack seller in Washington spending $800 for lizard-skin shoes. The merchant who sold them to him supposedly had bought them for no more than $100—so he too profited nicely from the coca plant.



PAINTING BY DAVID MELTZER

Cocaine at first enhances—then later interferes with—the transmission of pleasure signals in the brain. A message (green) is carried across the synapse between the long axon of one nerve cell and the body of another by chemicals called neurotransmitters. The white box (left) is enlarged in the panels above to show the bulbous end of the axon (black) and the synapse (orange). Of the neurotransmitters released by cocaine (1), the most important is dopamine (blue dots), which fills receptors on the body of the next cell and sparks a continuation of the message.

Normally pumps (red) reclaim the dopamine (2). But cocaine blocks this (3), according to a leading theory. Dopamine remains in the receptors, sending an enhanced message before breaking down. Prolonged cocaine use may so deplete dopamine (4) that pleasure is impossible.

THE POLICE CHIEF of Washington, D. C., reports: 40,000 drug arrests in two years. But there's been no appreciable impact. It's pretty much like that with all the big cocaine-busting campaigns across the country. Most of those young men brought in, handcuffed, soon swagger out again, on bail. Their cases drag on and on, the charges are reduced, and when eventually they do wind up in jail they're replaced at once by others eager for the easy money. So, for police and prosecutors too—more frustration.

Congressmen and mayors, bureaucrats and editorial writers urge strong measures against cocaine. Let's have a real war on drugs! Send troops to suppress the coca growing—an international military force. Cut off all aid to countries that don't cooperate enough, quarantine them. Insist on eradication of all coca plants with herbicide spraying from the air.

But diplomats say such measures would undermine struggling democracies and drive millions to communism. How about really effective rules to stop the money laundering? Some of the world's most respectable bankers object. A veteran drug fighter in the State Department tells me, "It drives us up the wall."

Art therapy expresses the feelings of a 33-year-old man who entered treatment after losing his job and home. At Johns Hopkins University a research volunteer performs tasks under the influence. "People report that they can do anything better on cocaine," says project head Dr. Marian Fischman. "But can they? No."

PSYCHIATRIC INSTITUTE OF WASHINGTON, D. C. (TOP)

Dealing with the demand side, Miami undercover police pose as crack sellers in a "reverse sting," then arrest buyers and detain them in a local residence (right). Crack accounts for perhaps 75 percent of the drugs bought on the street in Miami. The vast majority of south Florida crimes are drug related, a statistic repeated in urban centers across the country.

Then why not legalize cocaine? More and more pundits say this should be considered—after all, we threw out Prohibition when it didn't work; wouldn't decriminalizing drugs take the profit out of selling them and stop the trafficking? The idea could be debated endlessly, but not this: No members of Congress could vote in favor, lest they be buried at the next election by rivals who'd call them immoral.

Can't we at least count on compliance when we've made a treaty for the extradition of the biggest foreign cocaine traffickers, the ones indicted in the U. S.? Well, look what's been happening in Colombia.

In 1983 the president then in office decided

to increase pressure on drug traffickers. He appointed a tough minister of justice, who ordered the seizing of their boats, jeeps, and planes. With DEA guidance his men found a gigantic jungle lab and threw more than *ten tons* of cocaine into the Yarí River. I've seen a landmark of the traffickers' reply: at a crossroads in Bogotá, a 20-foot memorial where the minister of justice died in a hurricane of machine-gun bullets.

Thereupon the president let it be known he would allow top Medellín traffickers to be sent to the U. S. for trial, under a Colombian-U. S. extradition treaty. And soon there was another landmark: in the capital's central square, the burned-out shell of the Palace of Justice. In there guerrillas of the leftist M-19 organization murdered 11 supreme court justices; had they been put up to it from Medellín? A new supreme court subsequently declared the extradition treaty cannot be implemented without ratification of a new law. In effect, extradition is dead.

Since then a couple of top traffickers have been arrested—but they quickly bought their way out of jail, and judges soon ruled there's no evidence against them. It's said those judges had the choice of *plata o plomo*—silver or lead; that is, accept half a million dollars or we'll kill you and your family.

Of late, after an incorruptible attorney general was assassinated, more and more respectable Colombians are saying repression hasn't worked, so why can't the *gringos* stop agitating for it? Their country is the biggest cocaine market—let them stop the demand in their own backyard.

Indeed, the U. S. is the biggest market by far, but every week brings reports of new record cocaine seizures at European ports and airports. In Sweden, three kilos. Switzerland, 25. Portugal, 60. Great Britain, 208. More and more in Frankfurt and Amsterdam. . . .

In Spain the total was 678 kilos in 1986; in 1987, 1,134. People here still think cocaine is pretty harmless, a senior antidrug official tells me in the health ministry in Madrid: *Esnifar cocaína*, to sniff cocaine, is newly fashionable in high social and bohemian circles. Students look forward to it as a treat for special occasions—birthdays, graduation parties.

When it comes to cocaine, Spain seems to be

where the U. S. was 15 years ago. A meeting of European police officials concludes they face a cocaine explosion.

BUT AT LONG LAST there are signs that cocaine use in the U. S. has leveled off. It may in fact be declining.

At the White House the President's special assistant for drug abuse policy tells me he's encouraged by the latest annual survey of high-school seniors sponsored by the National Institute on Drug Abuse. True, such surveys may not reliably reflect actual numbers of users; but when similar samplings are taken year after year, one can at least detect trends. Now, for the first time in 12 years, the percentage of current users in this group is decidedly down—from 6.2 to 4.3.

As for me, I can only report what I observe or hear. That in Hollywood, where the best parties used to be those with the biggest bowl of cocaine on the table, it isn't flaunted any more—people boast of exercising, not drinking much, and staying off drugs. Or that a dealer in Washington has a duffel bag full of plastic envelopes with cocaine he's been unable to unload in four months.

What a young actor tells me really makes me believe that cocaine is on the way out in another important age group. He's 28, and in his circle nobody buys cocaine any more, he says, although if it's offered free one doesn't refuse.

Fleeing arrest in a Miami reverse sting, a suspected buyer surrenders at gunpoint. Bookings show arrests from among all ethnic groups. "Crack is not just a ghetto problem," says one officer. "Suburbanites are coming to the inner city to buy it." In Miami's entrenched drug war, police see hope in these stings. "Drug dealers can buy anything they want, except customers. If we can scare the customers off, we can have an impact."

"Three years ago, everybody I knew was doing cocaine. Now nobody. And it isn't because of all the to-do about just saying no to drugs. It's because you know it's bad, you know it's wrong."

Wrong morally?

"No, not that, it lays waste your life. There's nothing worse than a friend doing coke all the time. No sex, no food, no booze, only cocaine, and they can't stop. They get fired, their wives leave them. But like it says on one of those Robin Williams tapes, it 'makes you paranoid and impotent—give me more of that!'

"I've seen it, they get up at four in the afternoon and stay up all night, they're the life of the party for half an hour, then more coke, and so on. Then at three in the morning, a nervous breakdown—crying, yelling, a straitjacket case. Everybody knows somebody like that."

I SHOULD HAVE LIKED to end this article on an optimistic note. But it would not be helpful to pretend that cocaine can be brought under control anytime soon. Alas, it's more persistently entrenched than most of us imagine.

Consider the words of a man who says he has sniffed cocaine for 27 years now, without medical problems or troubles with the police. "The public view of cocaine use—held by people who are not involved—knows only two types of prominent symbolic figures. Those who died of it, like Len Bias—and those who've gone through hell, have seen the light, and now preach against it. What you don't see is an awful lot of people like me for whom it isn't a big deal. A fairly important thing, yes, but we can take it or leave it."

He's speaking of people he knows in their 30s to late 40s, with graduate degrees and good incomes. "We do it discreetly, of course, because it's illegal. If you go abroad for six weeks, you don't take any cocaine along, it's too dangerous now, so you just do without."

Wishful thinking may prompt us to dismiss such rarely heard voices, but if we do that we're turning away from unpalatable reality. This reality may change if regular urine testing for traces of illegal drugs should become widespread on the American scene—as is advocated by many, and also widely opposed. Otherwise—unless unforeseen changes occur in the U. S. and in the world—the only realistic outlook is that quite a few years will have to pass before the most prevalent use made of the coca plant will again be the chewing of its little leaves by people in the highlands of the Andes. □

STRAIGHT

A Gloves-off Treatment Program

By CLIFF TARPY NATIONAL GEOGRAPHIC SENIOR STAFF

Photographs by JOSÉ AZEL

WITH AN URGENCY born of emotional turmoil, young people flail their arms in hopes of being called on during a group therapy session in Stoughton, Massachusetts, near Boston. Their stories vary, but the 125 mostly middle-class youths share a common element: a chemical dependency that brought them to Straight, Inc., a private, no-nonsense drug rehabilitation program. At group sessions they tell of their anger toward their parents, the urge to run from responsibility, the pain of trying to share their emotions with others, and the difficulty of even admitting to having a drug problem.

Most of the youths were introduced to drugs by schoolmates or other friends, who often remained their chief suppliers. Designed for those in their early teens through early 20s, the state-licensed program isolates clients from outside influences during the initial treatment phase. A newcomer is prohibited from receiving mail or phone calls and must live with the family of another youth involved in a later stage of treatment. Some graduates stay on as paid "peer staff," assisting the professional staff of psychologists and drug-abuse counselors.

Straight views dependence on alcohol, cocaine, and other drugs as a family, rather than an individual, problem. Separate sessions for parents are held on the theme of chemical dependency as a "family disease." Joint meetings between youths and parents often result in emotional reconciliations (left).

Since 1984 the percentage of Straight's clients admitting to cocaine use has risen from about 25 to more than 75 percent. Cocaine is also a major factor in the 111 percent increase in admissions to state-supported treatment facilities in the U. S. during the past two years.

SHARING THE PAIN of having a troubled child, couples comfort each other at a Stoughton counseling session (below left). Such mutual concern helped create Straight in 1976 when parents in St. Petersburg, Florida, saw a need for a program designed for adolescents. Today the program serves 850 clients in seven cities.

Parents see their children only at Straight headquarters during the first treatment phase, which usually lasts 65 to 75 days. During that period the newcomers must remain free of drugs, behave properly, and demonstrate a positive attitude. They may then resume living at home and, as "oldcomers," enter the next rehabilitation stage. Treatment usually takes about a year and costs more than $11,000.

To discourage attempts to flee, oldcomers accompany newcomers within the building, often holding on to their belts (above, far left). Staff members and clients restrain a girl who became unruly (above left). Straight's practices have been criticized as overly harsh and authoritarian. In 1983 a 20-year-old Virginia youth who insisted he had no drug problem claimed he had been tricked into entering and then prevented from leaving Straight facilities in St. Petersburg and in Springfield, Virginia. He successfully sued Straight for false imprisonment. Since then, Straight says, it has used more caution in custody matters. While clients 18 and older may leave at will, the release of a minor still requires the consent of a parent or legal guardian.

Drug-abuse experts stress that Straight's confrontational, group-oriented approach may be unsuitable for some youths. They urge care in choosing among the many treatment programs available. □

Lonely ranges and basins undulate across the western heartland,

Sagebrush Country:

By DOUGLAS H. CHADWICK

home to mustangs, jackrabbits, and saddle-tough cowhands.

America's Outback

Photographs by PHIL SCHOFIELD APERTURE

SEEMS LIKE EVERYTHING'S at least half a windy day away from everything else out here. Sometimes it ranges on so free and endless I get a coyote feeling: I don't know whether to sing for joy or cry for myself. With my windows down and the radio way up and all the blue sky in the world overhead, I'm a 70-mile-an-hour plume of dust and country music rolling through a silver-green sagebrush sea.

Hawks and bullet-riddled road signs fly by until I pull into Denio on the Oregon-Nevada line. Inside the Diamond Inn Bar a pony stands at the counter while its six-year-old rider slugs down soda pop. The back room, where owner Ted Hartman makes saddles and holsters, holds an older buckaroo, writing a check.

"I expect this is the last saddle I'll ever need," says Jack Larsen. About to turn 62 come autumn, he is the sole hand on a thousand-cow spread up Jordan Valley way, where they're known for firing big loops with their lariats. "About all my bones have been busted by now. Broke both knees a little while back when my horse kicked 'em out. Nice gentle horse too."

I'm thinking: Suppose there wasn't a half-ton creature that would nuzzle you one minute and the next minute step on a jackrabbit's shadow, plumb turn wrong side out, blow you onto a rock pile, then stomp your sorry hide half to death. Knowing cowboys, I bet they'd invent one.

"Aww, I know a guy who's been saying it's his last saddle for years," Ted offers. "He's got to be nine days older than God by now. And he's still buckarooin' and buying saddles. Thing is, he used to be a college professor but chucked it all for a little sagebrush starvation outfit. Wanted to be a cowboy."

Tough and adapted to extremes, sagebrush covers one-twelfth of the area of the lower 48 states. The Great Basin, Columbia Plateau, Colorado Plateau, and Wyoming Basin are practically made of the stuff. Northern Mexico has a share.

Author DOUGLAS H. CHADWICK lives in Whitefish, Montana. He has written nine articles for the GEOGRAPHIC and is at work on a tenth. For various publications, photographer PHIL SCHOFIELD has covered subjects as diverse as the eruption of Mount St. Helens and the invasion of Grenada. He lives in Bellingham, Washington.

STRAIGHT TALK and hard work fit folks in the American outback like a pair of old boots. Miners, ranchers, and sheepherders fight blizzards, droughts, and solitude—and wouldn't live anywhere else. In one of

six bars in Eureka, Nevada, Linda Jackson shares a thought with husband Steve, next to her, and a friend. Like other establishments in the town of 750, the bars sponsor softball teams and dances. In the 1870s a silver boom here supported 9,000 people—and 100 saloons. Now invisible specks of gold are leached from mountains of crushed ore at nearby mines, and mobile homes have replaced the old roistering tent camps.

Even streaks of Alberta and British Columbia give off its bittersweet scent. Most of these landscapes are high—4,000 feet or more above sea level—and thirsty, averaging 8 to 12 inches of rainfall a year. The summers fry. Winters freeze hard and last just as long. Some call sagebrush country our continent's cold desert. Others speak of the shrub steppe, a fancy name for scrublands. I like American outback.

What we're really talking about is the big lonesome heart of the West. Our culture has carried on such an epic romance here that the rest of the world tends to see all Americans as part cowboy. Maybe we are. But how well do we know the lean land underlying our richest frontier myth? Two years ago I set out to get better acquainted. After all, I own most of the place. So do you, partner. One-third of our nation, half of the West, and nine-tenths of sagebrush country is public land.

In 1946 the Department of the Interior merged its General Land Office, which had overseen the disposal of public lands, with its Grazing Service, which regulated range use. The result was the Bureau of Land Management, or BLM. It controls 45 percent of America's federal domain—far more than any other agency—including a hundred million acres of sagebrush country.

Some 25 million acres of cold desert, chiefly the upper elevations with pine and juniper, are administered by the U. S. Forest Service. In 1986, Lehman Caves National Monument and 77,000 national forest acres along Nevada's Snake Range became Great Basin National Park. A high-elevation mix of glaciers, alpine lakes, millennia-old bristlecone pines, and limestone caverns, it was the first U. S. park created outside Alaska in nearly ten years.

"Loneliest Road in America," proclaim signs along Nevada's Highway 50 (above). It has proved otherwise for Wally and Fay Carlson (facing page), residents of Eskdale, Utah, a commune planted in 1955 by former Mormons. After rearing nine children, the Carlsons now help care for others. "But there's no keeping up with the Joneses out here," says Wally.

Ranchers have always leased grazing rights for a minimal fee on Forest Service and BLM land. Environmentalists sometimes joke that BLM means Bureau of Livestock and Mining. During the 1970s that agency's own studies showed more than 80 percent of its rangeland had long been overgrazed. Tighter restrictions on livestock soon followed. Guess how that went over with folks whose favorite pastime after rodeoing is cussing the government.

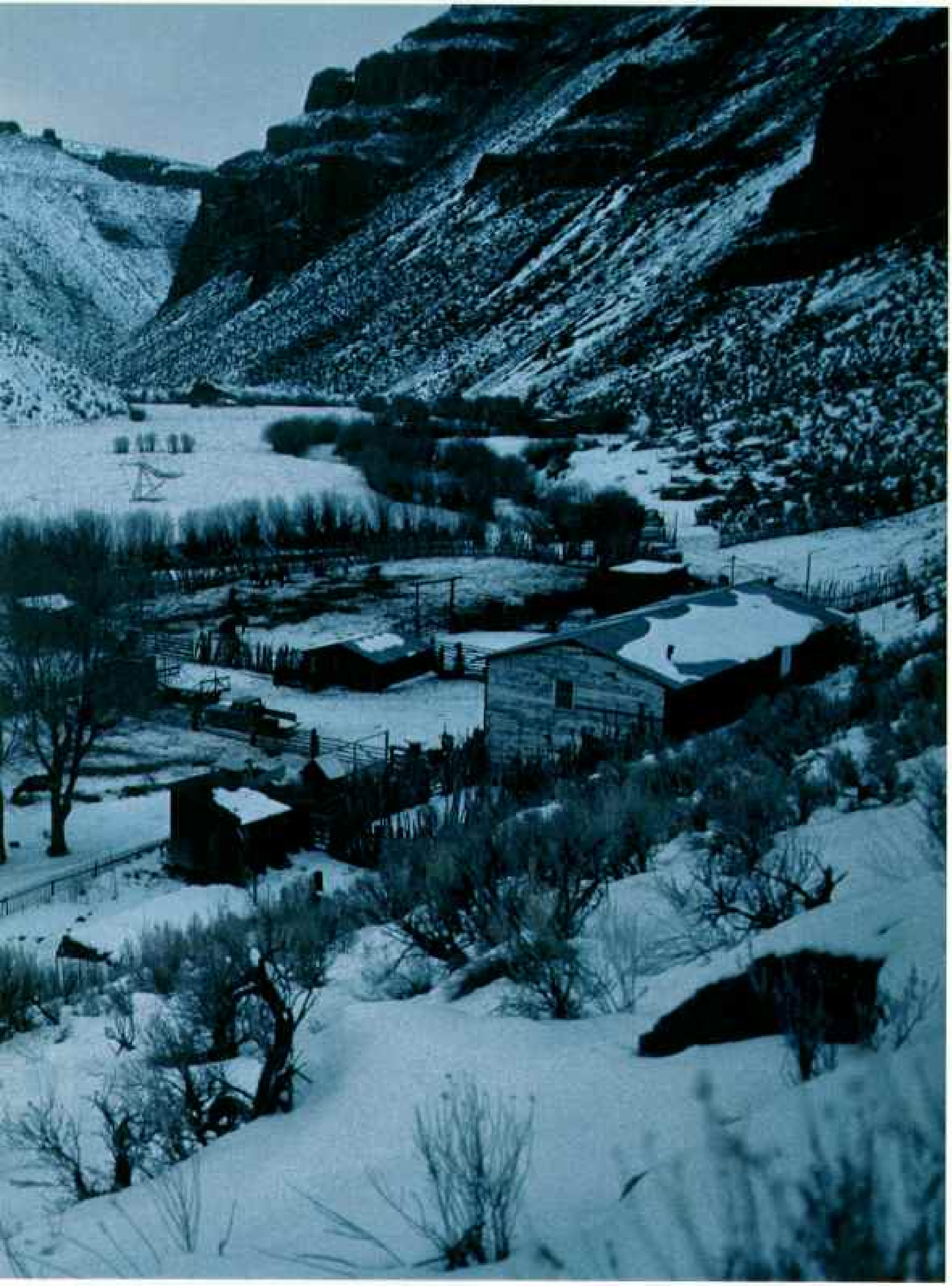
In 1976 Congress asked the BLM to review all its roadless areas and recommend by 1991 which should be part of our national wilderness system. Although stockmen would be allowed to continue grazing there, many fear "more damn regulations. We'll end up having to put diapers on our cows," as one told me.

Next, the bureaucrats wanted to hike grazing fees. Smoldering resentments ignited, and the West had a Sagebrush Rebellion on its hands. Spearheaded by Nevada—87 percent owned by the feds—this uprising of legislation aimed to transfer control of public lands to the states. The states would then be able to sell the property to the highest bidders. Would those be small, independent ranchers? Or megacorporations?

Such questions cooled off the rebels, but other sagebrush issues keep heating up. "Meetings. Letter writing. Environmental impact statements to plow through. I spend a third of my time working on public land policies. That's getting to be typical for ranchers," Oregon cowgirl Jean Schadler tells me. Still, conservationists warn that the fate of millions of acres of public lands is being decided with far too little public involvement.

To some of the public, sagebrush is whatever monotonous shrubbery grows in those

THREE HOURS FROM ANYWHERE, Gary and Marsha Stowell operate the cattle ranch that Gary grew up on beside the Bruneau River in northern Nevada. Together they grow their own food, repair their own trucks and tractors, put up their own hay, and break their own horses. They also deliver their own mail, along with that of their scattered neighbors (80 miles of tire-shredding terrain twice a week).



Evening chores done, Gary heads home by lantern light with the oldest of his five children, Sherry. "She's a lot of help to me," he says. "On a horse she's as good as any man." The river provides swimming and trout fishing in the summer, ice-skating in winter. There are even occasional movies on the videocassette recorder, once the diesel-powered generator kicks in.

out-of-the-way places. But only woody plants in the genus *Artemisia*, part of the sunflower family, actually qualify. That leaves out saltbush, rabbitbrush, bitterbrush, and a lot of other look-alikes from the Big Lonesome. It also leaves out purple sage, a member of the mint family common in Southwest deserts, and the seasoning herb known as sage, another mint. But it includes shrubs from Africa to Siberia. At least nine sagebrush species and 18 subspecies make their home on the range in America.

On shallow and rocky soils look for either low sagebrush or black sagebrush. Where meltwater floods the ground each spring, you may find silver sagebrush instead. Other conditions favor Rothrock's, three-tip, or bud . . . even a rare pygmy sagebrush—not to mention a rare pygmy rabbit found only in sagebrush habitats. Whereas range managers used to lump many different types of sagebrush together, they have begun to appreciate how much each one has to tell us about a particular habitat and what wildlife and livestock it will support.

ARTEMISIA TRIDENTATA, big sagebrush, is perhaps North America's most abundant shrub. It may grow as high as 15 feet, can live a hundred years, and comes in three subspecies: mountain, basin, and Wyoming. At the Forest Service Shrub Sciences Laboratory in Provo, Utah, Durant McArthur can quickly tell which one he's dealing with. He simply crushes a few leaves and savors the aroma like a wine connoisseur. If that doesn't work for you, put the crushed leaves in a glass of water and hold it under ultraviolet light. The mountain subspecies will glow like a Reno casino.

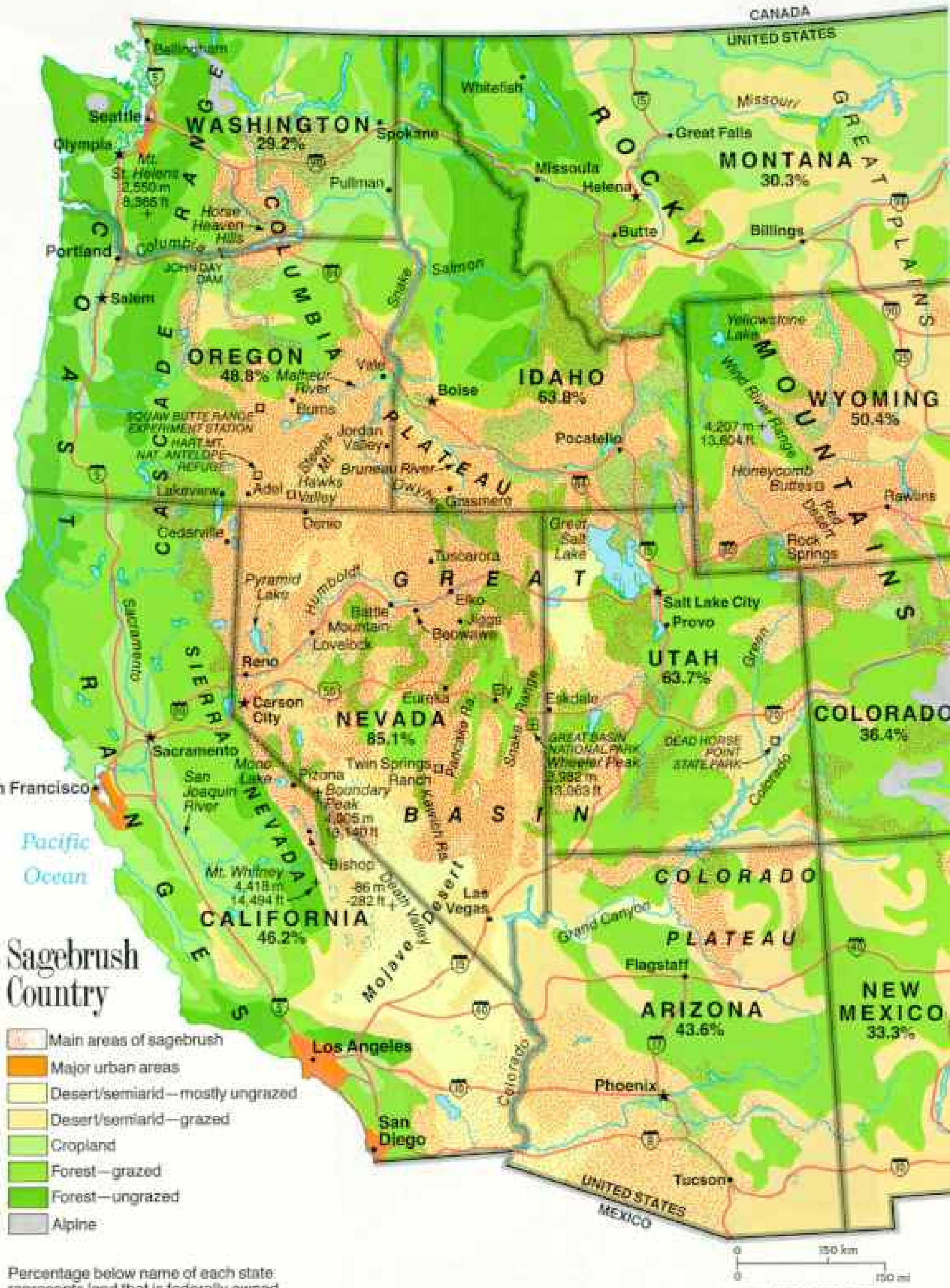
This now common identification technique was inspired by a co-worker's grandmother, who used to drink sagebrush tea for her health. No one has proved that such a brew does anything except taste awful. However, in addition to weaving sagebrush's stringy bark into containers and sandals, native Paiute and Shoshone also made a tonic from the leaves. And the common European *Artemisia* known as wormwood was an ingredient of absinthe, a liqueur so mind wobbling it was eventually banned.

The subspecies of cowboy found in sagebrush country is the buckaroo. He—and

IN THEIR EVENING LINEUP, kittens await fresh milk at the Stowell ranch. "It's way better than store-bought," says 11-year-old Sherry. Cats and colts will share this bucket, tinged with onion from the day's foraging. Confined to hay at night, the cows give sweet morning milk. After breakfast it's time for subtraction for mother Marsha (left) and seven-year-old Ryan. Home teaching has brought family closeness, and long days.

Hours of solitary work give Gary (far left) plenty of time to reflect on the future. "There's a lot of pressure from environmentalists and BLM regulations about what we do on the land," he says. "I hope my children can keep the ranch going."

Sagebrush Country



Sagebrush Country

- Main areas of sagebrush
- Major urban areas
- Desert/semiarid—mostly ungrazed
- Desert/semiarid—grazed
- Cropland
- Forest—grazed
- Forest—ungrazed
- Alpine

Percentage below name of each state represents land that is federally owned.

IMS CARTOGRAPHIC DIVISION
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Heart of the West

TOUGH, PUNGENT sagebrush carpets some 220,000 square miles from Mexico to Canada. Blocked by the Sierra Nevada, moisture from the Pacific rarely falls on the region. Indeed the Great Basin desert, center of sagebrush country, proved so forbidding that it was the last area of the U. S. to be explored south of Alaska. It was not until 1844 that John C. Frémont, finally accepting that none of the area's rivers reached the sea, labeled it the Great Basin. All told there are some 90 basins, corrugated by more than 160 ranges running north and south.

Settlers following the Humboldt River west often found arid 160-acre homesteads to be giant gambles. The government land office later became the Bureau of Land Management (BLM), which today controls about a hundred million acres of sagebrush country. Added to the 25 million acres managed by the U. S. Forest Service, that makes 90 percent of the region public land.

Conservationists urge higher grazing fees for ranchers and greater public say in the use of the land, as do some residents of fast-growing Las Vegas and Reno, where 85 percent of all Nevadans live and where gaming tables bring in most of the state's revenue. Ranchers and miners, attuned to rhythms of boom and bust, respond that the land is much too dry and remote to be useful for other purposes.

PLANT DOCTORS Rick Miller and Jianguo Wang (above) of the Squaw Butte research station near Burns, Oregon, take a sagebrush's vital signs. Poor fodder for cattle, the shrub is often dug up or burned off. Yet increasingly, range managers value sagebrush as food and shelter for wildlife and as an efficient way to reseed areas scarred by fires, road construction, or mining. The plant also reveals water and soil conditions: Areas where it grows less than three feet tall are not considered arable. Crushed leaves glowing under ultraviolet light (left) identify a sprig as mountain sagebrush, one of numerous subspecies.

occasionally she—can be identified by short chaps called chinks; wild rags, as the extra long bandanna used to ward off dust and cold is called; and a belief that if you can't do something on horseback, it's probably not worth doing. The silver shining on his spurs and bridle work reveals a Spanish legacy. "Buckaroo" is Western for *vaquero*, just as "mustang" comes from *mestengo*, meaning an unbranded feral horse.

Spaniards were the first to run cattle in America's deserts, trailing them into northern California. The tradition of horsemanship, which they adapted for handling stock and called *la Jineta*, can be traced back through old Spain and the Moors to Arabia, and from there to nomadic Tartars and Mongols of the Asian shrub steppe. Which, come to think of it, includes plenty of *Artemisia* and is likely where horses were first tamed.

OUTSIDE ADEL, OREGON, the MC Ranch has seven buckaroos, nearly 900,000 acres of range, and about 8,000 mother cows with 7,000 calves. Figure one buckaroo for every 130,000 acres and 2,500 head of cattle. Figure these boys *ride* for their money. Yet this big corporate-owned outfit is only a tiny fragment of the Miller and Lux holdings that went from here clean through Nevada to the San Joaquin Valley around the turn of the century. The largest private piece of real estate in the U. S., it was stocked with at least a million head of cattle.

I catch up with MC cow boss Bill Black and the others in the cool dawn air of Hawks Valley as they saddle up to gather calves for branding. The rimrock glows like stirred coals. Birds are all shouting about how they own the place. Seven men gallop off together, horses blowing vapor clouds. One mount bucks out kinks of morning excitement. They disappear over a rise, whooping and leaping on their way into a fresh-made world without fences that seems to come from a long time back and go on forever. Somewhere else, I suppose, people are traffic jamming to offices and factories.

Not Steve Madsen. He's over by the Idaho-Nevada line, working alone on a ranch that runs for 37 miles across the headwaters of the Bruneau River. Most of the day he'll rassle with a horse named Blutcher. This sorrel is big and ornery enough to carry you straight up any canyonside, but you don't want to hammer horseshoes on the son of a gun by yourself. By late afternoon the temperature jumps above 100 degrees. Steve still has one shoe to go.

Without warning, a powerful thirst grabs his throat. He readies the pickup for a three-hour round-trip to Grasmere. "I wouldn't call it the first civilization, but it's the first cold beer," he allows, counting up his spending money. Like most buckaroos, he makes about $125 for each six-day week. The new pair of boots he has on order will eat up the next three weeks' wages. "Course I'm already paying two and a half months' wages for a new saddle to replace the one my horse kicked up," he shrugs.

"Ever think of settling down?" I ask.

Rope-burned, bruised, streaked with Blutcher sweat, he looks at me amazed. "Are you kiddin'? This is too much fun."

Deeper in the Bruneau canyon Marsha and Gary Stowell are rearing five children in a ranch house edged by basalt cliffs, mule deer, falcons, garden plots, geese, and every tractor part or piece of baling wire ever brought into the remote area. This outfit too runs on long hours and improvisation.

While seven-year-old Ryan fishes for trout in a pool reflecting gooseberry and wild rose, 11-year-old Sherry is helping ready the team of horses to pull the hay rake.

For a while, Marsha taught school lessons to two neighbor kids as well as her own in between ranch chores. She has even been known to carry the U. S. mail. The usual mail carrier is Gary's father, Verland, age 80, who also lives and works on the ranch. Besides raising cattle, Gary and his brother Randy break horses and do a little horse trading. They've rounded up mustangs for the BLM. They cut hay, build fences, and truck cattle. And Randy braids rawhide to sell as handmade reins and lariats.

"We just do whatever we have to so we can keep this way of life," says Marsha.

THE PAIUTE of the Great Basin lived scattered in small family bands, reflecting the harsh environment. Jackrabbits were the staple of their diet, supplemented by ground squirrels, grasshoppers, and the seeds of Indian ricegrass and basin wild rye. They took fish and ducks from lakes but were

DOUGLAS M. CHADWICK

THE DANCE OF LIFE among sage grouse begins when a male fans his tail feathers, pops air from sacs on its throat, and wins the right to mate with hens. Once abundant, the birds are dwindling from loss of sagebrush habitat.

never able to rely on big game as other tribes did. Nor did they ever master the horse.

West of Burns, Oregon, and a small Paiute reservation lies Squaw Butte, now part of an agricultural experiment station. Clamping a plastic chamber over a sprig of sagebrush, researchers Jianguo Wang, from China, and Rick Miller watch digital readouts stampede across their microcomputer screen: leaf temperature, photosynthesis rate, transpiration rate, and other factors that were time-consuming or impossible to measure in the field a few years ago.

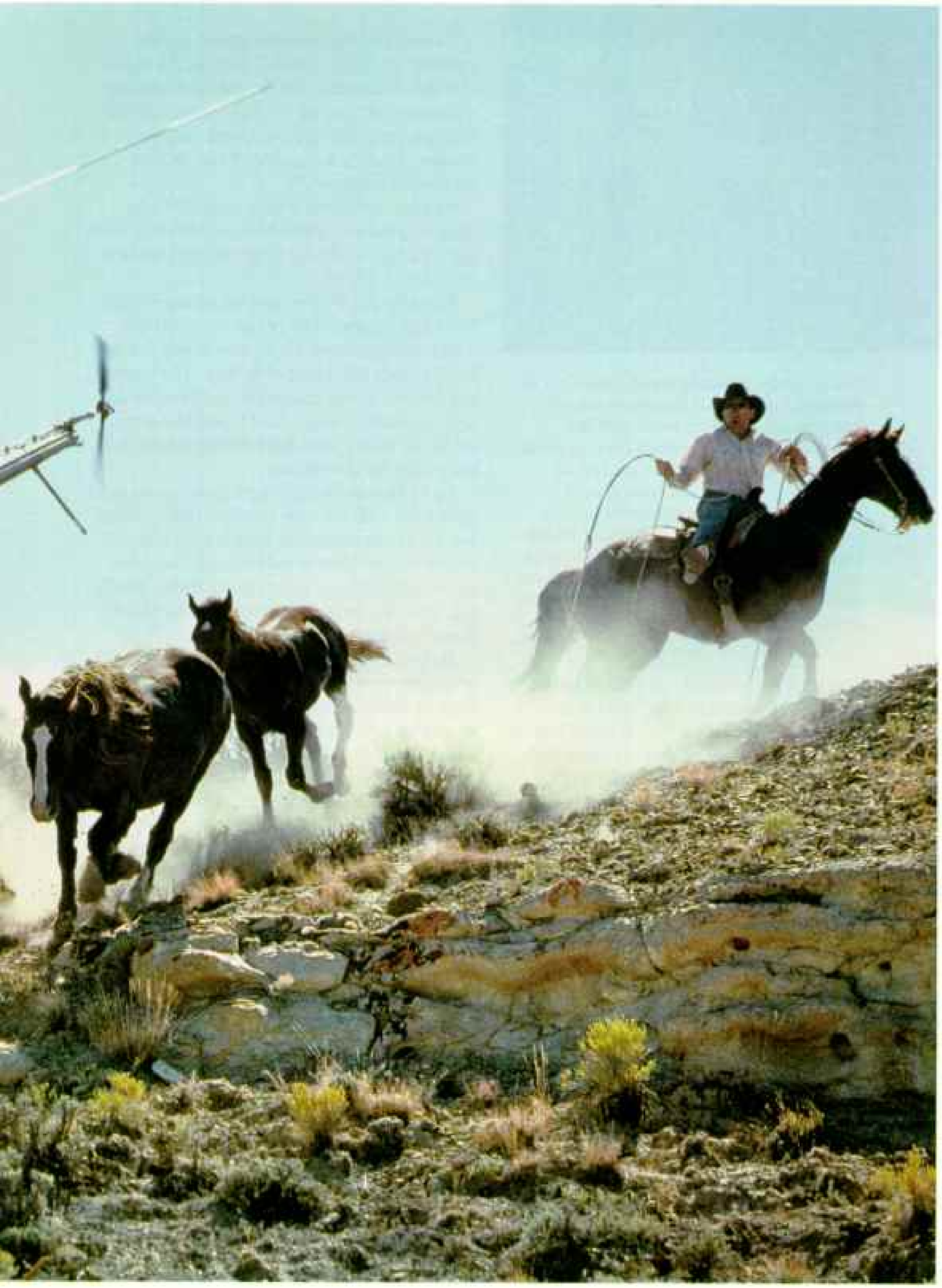
"Most sagebrush species get a jump start on the growing season because they keep a set of perennial, or overwinter, leaves," Rick explains. "While other plants are sprouting their first leaves, sagebrush is already putting out extra, elongated leaves known as ephemerals. As the soil dries out over summer, these start dropping off to conserve moisture." The silvery cast to sagebrush leaves comes from the tomentum—a coat of soft hairs. Besides trapping humidity to slow down water loss, they reflect sunlight to prevent overheating. An extensive system of fine lateral roots in the upper soil is part of the competitive strategy. So is the thick central root that penetrates much deeper levels. In August, when all the countryside seems brown and crackling dry underfoot, *Artemisia* is just coming into flower.

In pristine conditions sagebrush country is a mosaic of shrubs, grasses, and forbs. At a Washington State University laboratory in Pullman, I'm handed 6,000-year-old wood rat manure plucked from a crevice.

"A fine sample of seeds and other plant parts" is how paleo-ecologist Peter Mehringer sees it. "We also take core samples of lake beds to analyze pollen from the sediment layers. The picture that emerges is of a dynamic balance, with sagebrush increasing during dry climatic cycles and the grasslands getting the upper hand during wet periods."

Over the past century *Artemisia* expanded across meadows, monopolizing streamsides,

RUNNING INTO A TRAP, mustangs attempt to flee a BLM helicopter in Wyoming. Wild horses and burros, many once slaughtered for dog food, have been federally protected since 1971. They have since tripled their numbers to 50,000 across the West, competing



for food and water with livestock as well as with elk, deer, and antelope. Under a 15-million-dollar-a-year program, the BLM rounds up some 8,000 animals a year for adoption. More than 3,000 animals remain corralled, unclaimed or unadoptable.

"PREDATORS are putting ranch people out of business," claims Bill Taliaferro (above), who uses an ultralight to guard 6,000 sheep. One of 1,300 ranchers herding sheep in Wyoming, he has seen others give up.

Learning the nuts and bolts of auto mechanics comes naturally to Amy Blair (right) and other students at Crane Union High School near Burns, Oregon. Serving a county the size of New Jersey, Crane houses most of its 85 students, making it one of the last U. S. public boarding schools.

growing so thick in places you can hardly ride through it. Ranchers declared war. They tore it out with tractors. Grubbed it up by hand. Strung giant chains between bulldozers and skinned it off. Torched it off. Rained herbicides on it from aircraft.

OUR NATION'S largest rangeland conversion project took place around Vale, Oregon, on 4.5 million acres that drain into the Owyhee and Malheur Rivers. The BLM spent millions of dollars to knock back shrubs and plant crested wheatgrass on 720,000 of those acres. This import from the Siberian steppe has now been seeded on tens of millions of acres of the West and Great Plains. Ranchers love the way it stands up to heavy grazing.

Antelope, bobcats, jackrabbits, pygmy rabbits, sagebrush voles, Brewer's sparrows, sage sparrows, sage thrashers, and sage grouse, among others, view things differently. To them a solid span of crested wheatgrass is more desolate than desert. Sagebrush represents nesting habitat, shelter, or forage. In hard winters it is sometimes the only thing poking above the snow to eat.

"Another critical requirement in this country is simply shade," says BLM biologist Bob Kindschy, his forehead shaded by a cowboy hat during an August tour of the Vale project. "Without a shrub canopy, snakes, lizards, and some of the smaller mammals burn out."

Shade, combined with nutrients from decaying leaves, also allows wildflower and native grass seedlings to get started around the base of a bush.

For decades we've beat up on sagebrush, trying to improve the range for livestock. The irony remains: Cows and sheep are the best friends this plant ever had. They graze out better tasting competitors, trample the soil, increase erosion, and lower the water table. In short, they have vastly improved the range for *Artemisia*.

So have we, by fighting lightning-set wildfires for a century. We meant to save rangelands. Yet periodic burning is how nature keeps woody shrubs in check and recycles nutrients. Grasses thrive in its wake. Realizing that, we have begun using prescribed burns to restore range.

Before the snowbound winter of 1889-90, when herders tore the thatched roofs off their huts to feed starving animals, stockmen never put up much hay here. They grazed open range year-round on a get-there-first and grab-the-grass basis. The numbers were astounding. Up on Oregon's Hart Mountain National Antelope Refuge biologists explain to me how they fine-tune the movements of 2,000 cattle to prevent overuse. Around 1930 there were 20,000 cows and 100,000 sheep munching away in these hills.

Worst hit were riparian, or wet meadow and streamside, habitats. They make up only 2 percent of sagebrush country but receive 50 percent of the grazing pressure. As early as 1910 a congressional report described shocking abuse of rangelands.

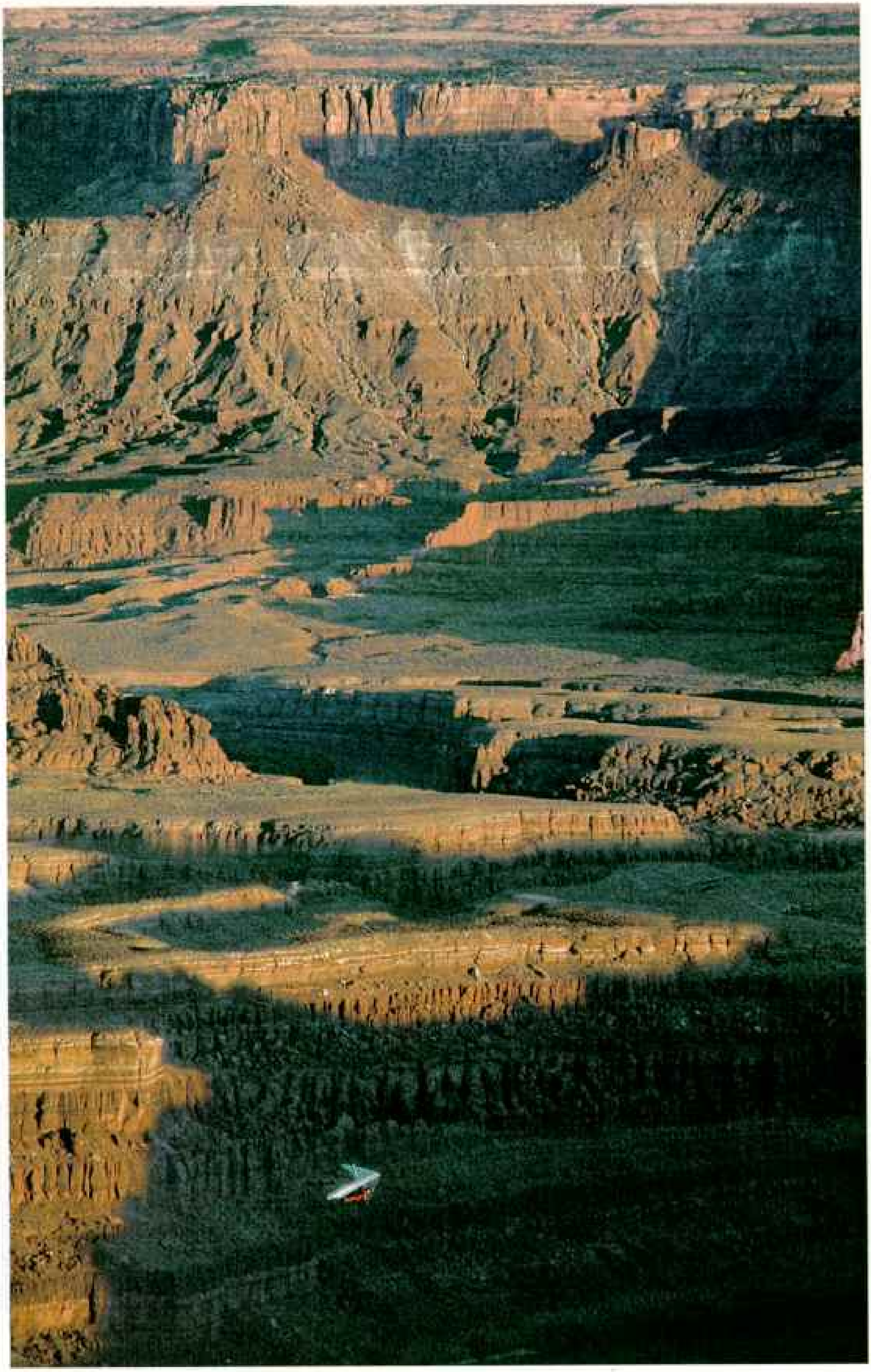
The 1934 Taylor Grazing Act, an attempt to prevent range degradation, gave exclusive leases to individual landowners within established grazing districts. It proved to be a victory for cattlemen in their range war with nomadic sheepherders. Beef prices kept rising into the 1970s, encouraging more people to raise ever more cows. Supply soon exceeded demand by a long shot—especially as a nation suddenly concerned with cholesterol cut down on red meat.

"It takes a lot to kill a cowboy, but them chicken factories are doin' a pretty fair job of it," sighs cow boss Doug Groves in Tuscarora, Nevada. Beef's share of the meat market skidded from 41 percent in 1975 to 31 percent in 1987. By 1981 cattle were already back down to the equivalent of 1950s prices. Everything else—from pickup trucks and salt blocks to bank loans—had become twice as expensive. Many a ranch that found itself being squeezed between low-priced cows and all-time-high interest rates headed for the auction block.

After the Taylor Grazing Act what was left of the U. S. sheep industry began losing more and more ground to foreign competitors like New Zealand. The last U. S. woolgrower might have vanished by now without price supports from our federal government. But imagine a time when not one thread of nylon or rayon had yet been woven into clothing or carpets. Wyoming alone had more than half as much fleece on the hoof as the entire U. S. does today.

JIM MAGAGNA'S grandfather came to Rock Springs, Wyoming, from northern Italy, worked as a butcher and bought sheep with his earnings, then a ranch. The lease that goes with it runs north to the Wind River Range and east to the labyrinths of Honeycomb Buttes in the Red Desert. Princes and god-kings never owned such an empire, with blue flag iris cascading down moist coulees, aspen trembling with sunlight on the foothills, snow peaks shining, antelope flashing 40 miles an hour, trout streams flowing below eagle aeries.

A former president of the Wyoming woolgrowers, Jim tells me, "I've seen a real improvement in the range since the old days. Most of it comes from just having fewer stock and spreading them out better. For example, instead of trailing big bands of sheep along the same routes each year, we truck them between summer and winter pastures. Easier on the country, all right, but one more expense to add up."



"Banditos, banditos!" At Magagna's even the dogs sent to round up a breakaway gang of lambs work in Spanish. Jim hires high-school kids for seasonal help, but his regular crew is Mexican and, mainly, Basque. Many sheepmen now use Peruvian and Chilean herders, brought in under special contract through the Labor Department. (More males for the state with the most lopsided ratio of men to women in the lower 48, Nevada being a close second.) After a day of branding, notching ears, docking tails, and castrating lambs by biting off their testicles—simpler and less time-consuming than cutting with tools, they say—the men pass around a wineskin of blood red paisano.

"I totted up my wine expenses one year, and they came to $4,000," Jim marvels.

UP IN WASHINGTON, Willis Mercer arrived from Bone Gap, Illinois, in 1886 and got a sheep herd going in Horse Heaven Hills, near the Columbia River. These basalt scablands are lucky to get 7 to 11 inches of precipitation yearly. Once the John Day Dam made irrigation feasible in 1968, the Mercers could sprinkle on 15 more inches. Up from the volcanic ashes came alfalfa, corn, wheat, mint, and sugar beets.

Not many areas have the right blend of sunshine and soils to grow wine grapes as well. Washington's sagebrush country does. Combined with the massive Columbia Basin Project of dams and canals, it has made this state the major U. S. producer of premium wines, after California.

"We call ours handcrafted wines. That means we don't have as much fancy equipment as we should, and everything is pretty labor-intensive. Where this land supported maybe 15 people as a farm, we now employ up to a hundred as a farm and vineyard," third-generation Washingtonian Don Mercer explains as we stop to savor ripening Cabernet grapes. He points to a spot where a coyote stopped to savor some as well.

"A coyote pelt brought four bucks 20 years ago. Now you've got a fifty-dollar bill lopin' by out there," Bill Austin tells me in Rawlins, Wyoming. He ought to know. He's probably killed 5,000 as a federal predator-control agent, using rifles, traps, poison baits, and smoke bombs that suffocate pups in dens. At the current price everyone from weekend recreationists to laid-off laborers is after their hide as well. Bill recently went into business for himself selling coyote calls, along with cassette and videotape instructions on how to hunt the varmints.

Where traditional calls mimic a rabbit in distress, Bill's are for carrying on conversations in coyote, a language he has spent 20 years studying. He pauses for a chew of tobacco, then says, "That's a Western frontier right there—communicating with these animals; trying to see into their minds."

Funny, but he's come to respect the creature's intelligence above all others, much as sagebrush country Indians did. "Tell you the truth, coyotes don't do anywhere near the damage a lot of ranchers and hunters claim they do. A sheep can die from disease, being lost, dogs—anything. God knows it's suicidally dumb. And if a coyote walks by the carcass, it gets the blame."

Aury Smith is one rancher who wouldn't mind seeing more coyotes around. In 1928 he came through the shrub steppe on a horse-drawn wagon to Cedarville, California. He took to raising cows across the line in Nevada. When times kept getting tougher, Aury sold most of his cows, taught his grandsons to drive tractors, and concentrated on raising alfalfa hay. Dairy farmers on the coast pay a premium price for sagebrush country alfalfa, which grows slow and leafy (and thus higher in protein) because of the cold nights.

But night was when the jackrabbits showed up for their share. "One year they came so thick, I'd try to line 'em up to nail three or four with one shot and save on ammo," Aury remembers. "They just kept coming. The bodies got to stinking, so I'd fill the pickup and haul them out. And they still kept coming. You could see them wearing trails down the mountain." At last the population crashed. Aury could not find one live jack. Nope. He noticed mounds spreading across his alfalfa fields instead: the beginning of an upsurge in ground squirrels.

Boom and bust. Oregon's Harney County used to put out *(Continued on page 76)*

RIDING THERMALS 2,000 feet above the Colorado River, a hang glider floats above Utah's Dead Horse Point State Park. Like other sagebrush states, Utah offers vast expanses for recreation, landscapes to lose —and find—oneself in.

Great Basin National Park

THE NATION'S NEWEST national park, and Nevada's first, encompasses 77,000 acres of sagebrush country with 13,063-foot Wheeler Peak (above and right) as its centerpiece. Near the border with Utah, the park—established in 1986—offers high-elevation camping amid a thunderous silence and a wondrous display of wild plants and animals.

"YOU FEEL REVERENCE when surrounded by such antiquity," says Park Superintendent Al Hendricks of the bristlecone pines (left). "They exude character . . . deserve respect." At 4,600 years old or more, the pines—often multitrimbed and under 30 feet tall—rank among the planet's oldest known living organisms. Resembling standing driftwood, they protect thin strips of living bark with dense, resinous deadwood that winter's storm-driven ice and sand can polish but not easily penetrate. Except in years of drought the live branches grow additional clusters of needles (below), which live as long as 30 years before being replaced. Three groves of bristlecones, along with spruce, fir, and mountain mahogany, form the tree line in the park.

RICHARD OLSENIUS (ABOVE AND LEFT)

RICHARD OLSENIUS

TAKING A RESPITE, hikers pause in a glacial basin (below) near Wheeler Peak, second highest mountain in Nevada after 13,140-foot Boundary Peak. Snow and ice remain year-round at the top, feeding alpine lakes and trout streams. Those who venture from the paved 12-mile scenic drive may be rewarded with views of bristlecone pines (left), sanded smooth as a fence post by millennia of rough winds. Or they might be shocked by the sight of roaming cattle or sheep. Great Basin is one of the few national parks to permit grazing, and the only one without a deadline for phasing out the practice—a compromise with livestock and mining interests to facilitate its founding. While the park has seen a 70 percent increase in the number of visitors since its opening, totals remain modest. Last year roughly 75,000 travelers used the park.

UNDERGROUND ARCHITECTURE dazzles visitors to the park's Lehman Caves (above), a mile-and-a-half-long string of limestone chambers opened to the public in 1885. Aptly called the Gothic Palace, this room drips with formations: columns, hanging stalactites, draperies, stalagmites, flowstone. While growth averages an inch every hundred years, similar formations may be thousands of years apart in age, depending on water flow and calcite concentration. Those preferring physical challenge crawl into Little Muddy Cave, a maze discovered in 1978.

(Continued from page 71) a nickel bounty on jackrabbits but got so swamped with pelts that they eventually called it off. I heard a bounty was tried in Nevada too. Silver prices being down, the deal was that three jack pelts got you a drink and ten pelts a lady of the evening.

"I wish hard livin' didn't come so easy to me," complains the guy on my radio. Man, these country singers; if it isn't drinkin' or fightin', it's cheatin' on wives again. "My mind can't take my body runnin' round like this," moans another.

"I'm thinking that's the boy who's gonna do most of the lovin'," Oregon fish and wildlife research biologist Mitch Willis says. But he is pointing to a dominant male sage grouse surrounded by scores of others in dawn-struck hills near Steens Mountain.

This is the continent's largest grouse species—even before it puffs up its chest, fans its tail feathers, and begins hooting and strutting on the spring breeding ground, known as a lek. It's like the ceremonial arena of some remarkable tribe.

Unfortunately, this tribe has been declining. Once so abundant that homesteaders scrambled their eggs for breakfast, sage grouse are candidates for Oregon's threatened species list. Natural predators and excessive hunting hurt some populations. Agriculture plowed under others. But why should a creature so closely tied to sagebrush—it eats little else during the critical winter months—be dwindling when these bushes are more common than ever?

"For every one percent increase in sagebrush cover, we get a 10 percent decrease of grasses and forbs—weeds and wildflowers," I learn from Jim Young, a U. S. Department of Agriculture researcher in Reno, Nevada. "Say our shrub cover goes from 15 percent to 20 under grazing pressure. Five percent difference; no big deal. Except it means we just lost 50 percent of our grasses and forbs." And forbs, in riparian habitats, are a key to survival in sage grouse chicks.

The white-tailed jackrabbits that sustained Paiute and homesteaders have been widely replaced by the less tasty black-tailed jackrabbit. Since the whitetails are tied to grassy meadows while blacktails prefer scrub, these animals too signal changes in habitat quality.

What little precipitation sagebrush country enjoys comes mainly as snow. Its bunchgrasses must shoot up and produce seed before the last spring meltwater is baked out of the soil. Nearly all the energy stored in their root systems is thrown into the effort. Graze them back down once or twice, and there might be enough reserves left for another try. Hit them any harder, though, and it could be the last you'll see of those plants—particularly if they were grazed down the previous year or two. This arid steppe never supported big herds of buffalo or of any other hoofed animals. It is simply not able to adapt to large numbers of cattle, sheep, and horses.

Species that can adapt—because they too come from Eurasia—follow in the wake of livestock: Tumbleweed, beloved of Western songwriters and moviemakers, but more

THE WARMTH of companionship eases range life for poet Waddie Mitchell (facing page, at left) and Gonzalo Carlos, who run 500 cattle near Jiggs, Nevada. Mitchell, who has been punching cows and reciting verse since he was a child, uses sagebrush for keeping warm, cooking, and heating branding irons in the spring. Sheepherders working for the Green River Livestock Company in Rock Springs, Wyoming (above), share a laugh in their winter camp.

accurately called Russian thistle. Tumble mustard, rolled in from the Mediterranean. Medusahead, from the Asian steppe and slightly poisonous. Halogeton, also poisonous; archaeologists note that it showed up in Iranian settlements about the time wild sheep and goats were first domesticated. Then cheatgrass, more common today than any grass native to the region. In springtime you'll see hillsides of this Mediterranean annual greened up plush as velvet. By June, if not earlier, it will have cheated on its promise, offering dry mouthfuls of sharp seeds with little nutrition.

DURING ITS SILVER BOOM in the 1870s, Eureka, Nevada, current population 750 or so, had more than 100 whiskey bars and 9,000 inhabitants. Three-quarters of them were from foreign shores too. In the cemeteries tilt headstones of miners from Cornwall and Wales, shopkeepers from China, stonemasons from Germany. A rattlesnake squirms under a board as I lean down to read a small plaque. It turns out to be another with the inscription "Unknown."

Hunkered in the glowing dust of late afternoon, I imagine a life swept out of Europe to the immense experiment called America and into this sudden explosion of wagoneers' cries, hammering, gunshots, church bells, dance hall music, and raggedy dreams. The stones around me remember that when all 16 lead-silver smelter furnaces were going, two things couldn't seem to survive: cats and babies. Rest in peace, all you whom the earth took in return for its metals.

Nevada's first gold discoveries came north of Eureka near Battle Mountain, as early as

1847. Marion Fisher arrived in 1928 and worked as a miner until an injury forced him into an aboveground job. He kept an interest in prospecting, and in 1955 bought up gold claims he called the Bootstrap Mine. Not much glittered in its veins. But as Marion's persistent digging helped reveal, the precious metal lay everywhere, disseminated as microscopic particles throughout the entire rock formation. Such formations underlie the region along parallel trends that run for a hundred miles and more. A shame the ore assays out as too low-grade to go after.

Or so went the thinking of mining companies a few decades ago, with gold stuck at $35 an ounce. Lately, though, this looks like the mother of mother lodes. Marion laughs. "Back then, the few geologists left around here were mostly out of work. Now there's one behind every sagebrush." It may be a biogeochemist prospecting the bush itself. With its highly developed root system, *Artemisia tridentata* draws water and minerals from an underground area the size of a house, selectively concentrating certain elements that provide clues about ore.

The rush for invisible gold is on—in pits the size of canyons, where one man operating a giant shovel can load a 100-ton truck every few minutes. At some sites the ore is crushed, piled high, and sprinkled with a cyanide solution in a gold-extracting process called heap leaching. At one property, with bulging gold veins as well as microscopic gold, video monitors and security guards with rifles patrol the pits. Drill samples sometimes travel in an armored truck.

Gambling remains the state's number one industry, mining 3.7 billion dollars in 1987. Still, primarily due to northern Nevada, U. S. gold production leaped from 30 metric tons in 1979 to more than 150 metric tons, surpassing Canada's output to place us third, behind South Africa and the U.S.S.R.

HERDED TIGHTLY by MC Ranch cowboys near Adel, Oregon, cattle graze a BLM allotment before being moved on. They will not be allowed back on the area until native grasses have recovered fully, a practice ranchers expect will increase range forage. BLM finds the effort an "encouraging" way to ride herd on overgrazing.

Tapping another subterranean resource—hot water and steam—several geothermal power plants have appeared in the region. More wait in the planning stages. Watching a geyser spew rainbows at the Beowawe plant, I'm reminded that some geologists believe the gold deposits formed as hot springs systems invaded faults, altering the rocks' mineral composition. The heat comes from magma close beneath the crust, which is stretched thin across the Great Basin. Northward, more hot rock welled up into Washington, southwestern Idaho, and eastern Oregon to build the Columbia Plateau.

HORSES roamed the New World through the Ice Age but vanished with the last glaciers. About 7,500 years later they returned, courtesy of Spanish expeditions. Other horse breeds soon escaped from settlers to join the Spanish stock in the wild. This free-roaming blend proved less subject to disease and far more fertile than the most carefully bred tame horses. As the 20th century got under way, mustangs in the American outback were more numerous than in the Australian outback, where feral horses go by the name of brumbies and total around 200,000. They weren't helping the range in either desert.

Ranchers used wild bands as handy reserves of saddle stock and draft animals. More serious mustangers captured large numbers for the U. S. Army or for European

AT YOUR SERVICE, 75-year-old Gene DiGrazia (above) still mans his gas station/food store/bus stop/post office/casino along Interstate 80 in Nevada. Nearby mobile homes house 200 gold miners and power-plant workers.

Trophy-size cutthroat trout attract fishermen to Pyramid Lake, where members of the Paiute tribe wrestle fish from a spawning raceway (facing page). The Indian-run fishery also raises cui-ui, a fish protected as an endangered species.

governments during outbreaks of war abroad. As engines replaced horses, those of the open range became more valuable as dog food. By 1970 all but perhaps 20,000 had been canned. Led by Velma Johnston of Reno, alias Wild Horse Annie, humane groups tried to rein in the slaughter. Given protection by act of Congress in 1971, wild horses have since tripled.

The BLM sets limits on how many mustangs each district's range can support, and the surplus is periodically rounded up and trucked to holding pens. The agency then tries to pass along as many as possible to the public through its Adopt-a-Horse program.

At the Lovelock, Nevada, holding facility, supervisor Elmer Walls points out a horse with zebralike stripes on its hind legs—supposedly a throwback to markings of the original wild horses, called tarpans. "People want palominos, creamellos, Appaloosa, roan, sevina . . . ones with a little chrome on 'em," he drawls. "But most are plain browns and bays. Others are too old for adoption. Or too broke down—we call 'em hard-doin' horses. Or too ornery. We've got inmates at Colorado and New Mexico prisons working on some of those, taming 'em enough to make 'em adoptable. The prisoners seem to relate to the mustangs real well. I reckon they can see them as critters that don't quite fit in."

Like a lot of cowboys, Bill Hyzer used to rope mustangs now and then, as much for the challenge as for the pocket money. "Used a horse called Old Red," Bill remembers as we spur our mounts through the Pizona Range east of Bishop, California. "Red never chased a mustang he didn't catch. Weeell, except that one time when he fell over dead." Nowadays Bill works as a guide

for outfitters Dave Dohnel and Herb London and Herb's son Craig, who is also a veterinarian. They offer horseback seminars on the ecology of the Pizona mustang herd.

The Londons also take dudes on branding roundups and cattle drives through the Pizonas to Nevada. Here it is: proof that folks will pay perfectly good money to work hard and get coated with blood, dust, and manure. It's the ultimate tribute to the lure of the cowpuncher's life.

WHAT'S STILL TRUE about the True West? Well, at the moment, the BLM and Forest Service charge ranchers $1.54 per A.U.M.—the amount of forage needed to feed one cow and calf, or animal unit, for a month. On good sagebrush country range that would be around six acres; on marginal range, make it more like 40 acres. For comparison, a cow needs just two acres a month in Missouri—a prime beef-cattle state. It holds nearly as many cows as all the public lands of the West, which now support only 7 percent of the nation's cattle.

"Stockmen's political clout in the West is out of all proportion to their economic importance," insists the Sierra Club's representative in Reno, Rose Strickland. "All but 150,000 of Nevada's million residents live in Las Vegas and the Reno area. This is one of our most urban states. Ranchers get the lion's share of resources, plus dirt-cheap grazing fees, predator control, a subsidy to keep wool prices high. . . . It's cowboy welfare. Oh, they get angry when they hear that. At some meetings, I feel lucky that cowboys are raised to be polite to women."

"Rose Strickland better watch out for me," jokes cowgirl Sue Fallini of Twin Springs, Nevada. She is standing in the doorway with her husband, Joe, below a sign that reads: ABSOLUTELY NO BUREAUCRATS. Of course, if any showed up, Sue would invite them in for coffee. And Joe has been cooperating with the BLM to develop his own range stewardship program. The Fallini spread crosses valleys of bud sagebrush, saltbush, and white alkali playas. It wraps around mesas and mountain ranges cloaked in black sagebrush. It contains caves, Indian petroglyphs, meteorites, and abandoned gold mines. It adjoins a rocket testing range and an Air Force gunnery range and is 50 miles from the nuclear testing site. It is nearly 700,000 acres altogether, and 98 percent of it is public land.

"I call it split-estate land," says Joe, cranking up a pump to fill a water tank. "The public owns certain rights, and we have a certain possessory interest through use." In the distance a helicopter hazes the last stallion down from a mountain range. The Fallinis just won a court decision forcing the government to remove all but 150 wild horses from this split-estate. Come evening, there's a celebration with neighbors, sagebrush rebels, and modern-day

COYOTES OUTFOX Lynn Lloyd and her hunt club in a chase near Reno. Dependent on ranchers for access to land, members in turn help round up cattle. Cooperation must become a byword for ranchers, environmentalists, and the government if the sagebrush country is to survive.

mustangers from the roundup team. Cordell Mike, a Shoshone Indian ranch hand, is dancing with Sister Helene Sharp, schoolmarm to the Fallini children.

ARGUMENT WILL CONTINUE over how much the cowboy way of life has changed the land that supports it. But I haven't seen anything like sagebrush country for growing independent and capable young people. Not all are staying, however.

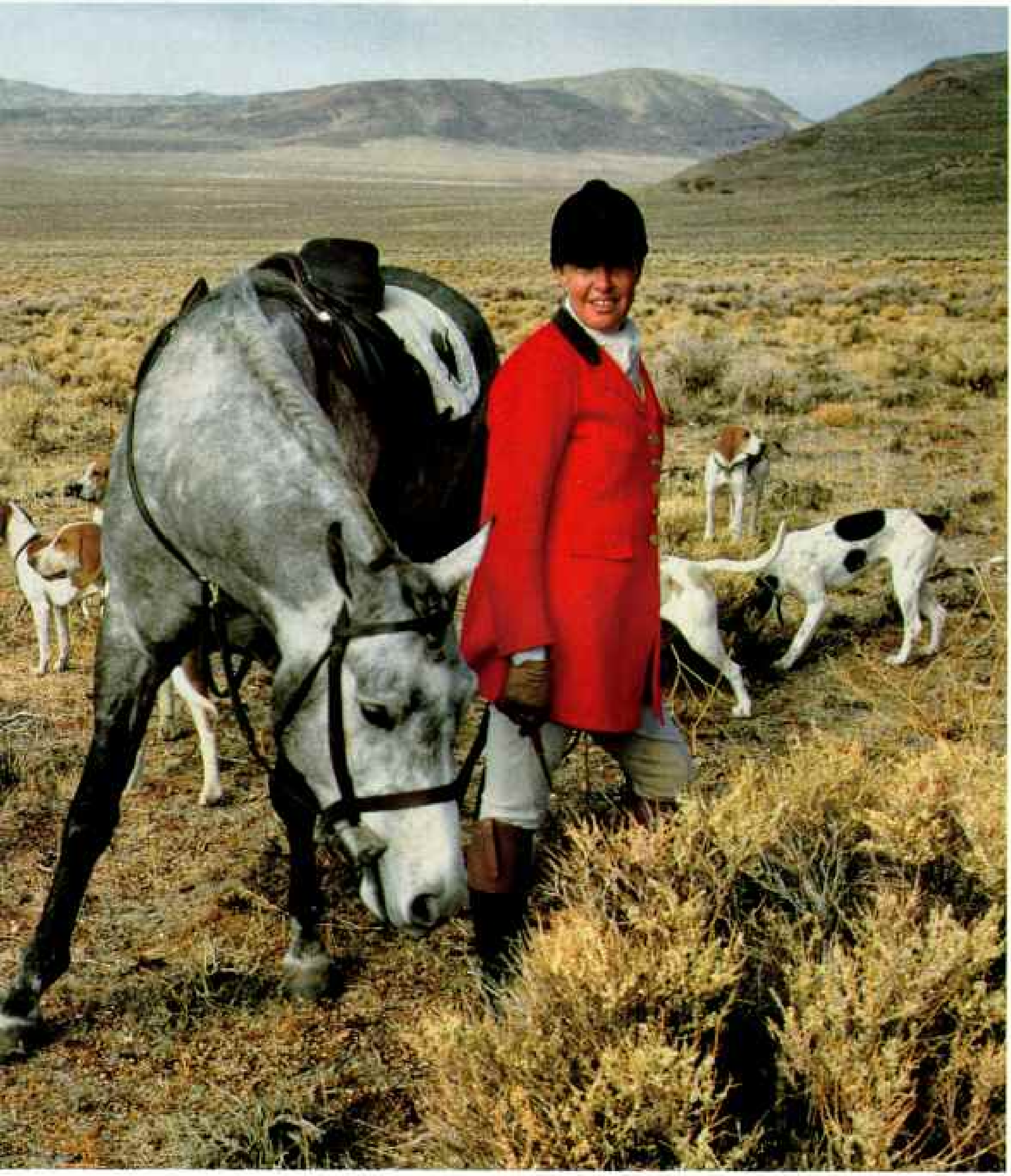
"Will you take over the family ranch?" I remember asking the young man who had come to help at a neighborhood branding in Oregon. "Naw," he sighed. "Seems like you're always fighting something: droughts, bad winters, lousy beef prices, the BLM. And then you're out there all winter with no one but maybe your dad to talk to. It just gets lonesome. . . ." He's making money nearby in Lakeview, cleaning up tailings from a uranium mill.

From the Fallinis' front door I hike east through gusts of horned larks into the Pancake Range. Coyote tracks funnel me into a rocky draw where ravens and a couple of golden eagles hunch over the last of a dead cow. I hoist myself on up the side of a butte above 7,000 feet and spend the night watching the heavens wheel west, my eyes seared by shooting stars and my heart wanting to gallop home to my family in Montana.

When our own star brings daylight, I belly out to where I can spy on a band of bighorn sheep recently reintroduced to these slopes. Some biologists have come to think that wild sheep were the most abundant big mammal in the region between the Sierra and the Rockies. It's a startling idea until you remember that the Great Basin is more like 90 basins separated by blocks of the earth's crust thrust as high as 13,000 feet. Nevada alone is corrugated by 128 mountain ranges.

The range southwest of the Pancakes is the Kawich, where a group of cows and mustangs feed peacefully as I hike by. Some of the mares may be carrying implanted contraceptive drugs—one of several federally funded studies seeking a way out of the wild-horse dilemma.

Eventually, I take my tired legs to a hot springs pool in an abandoned shack at the side of the road. Except for the Indians, every major player in our mythic drama of the West—horse, cow, sheep, burro, prospector,



and the cowboy himself—is an exotic, an invader, a stranger from another kind of country. Sagebrush growing in a place tells you the living won't be easy. But you can sure stretch out some. It's a reminder of how young and how big this nation is. What do we want from the sagebrush part of it? Who owns what rights? We're still making up the rules as we go along. That kind of freedom is really what the land offers. To keep it over the long run, we must turn around and learn what the land needs from us.

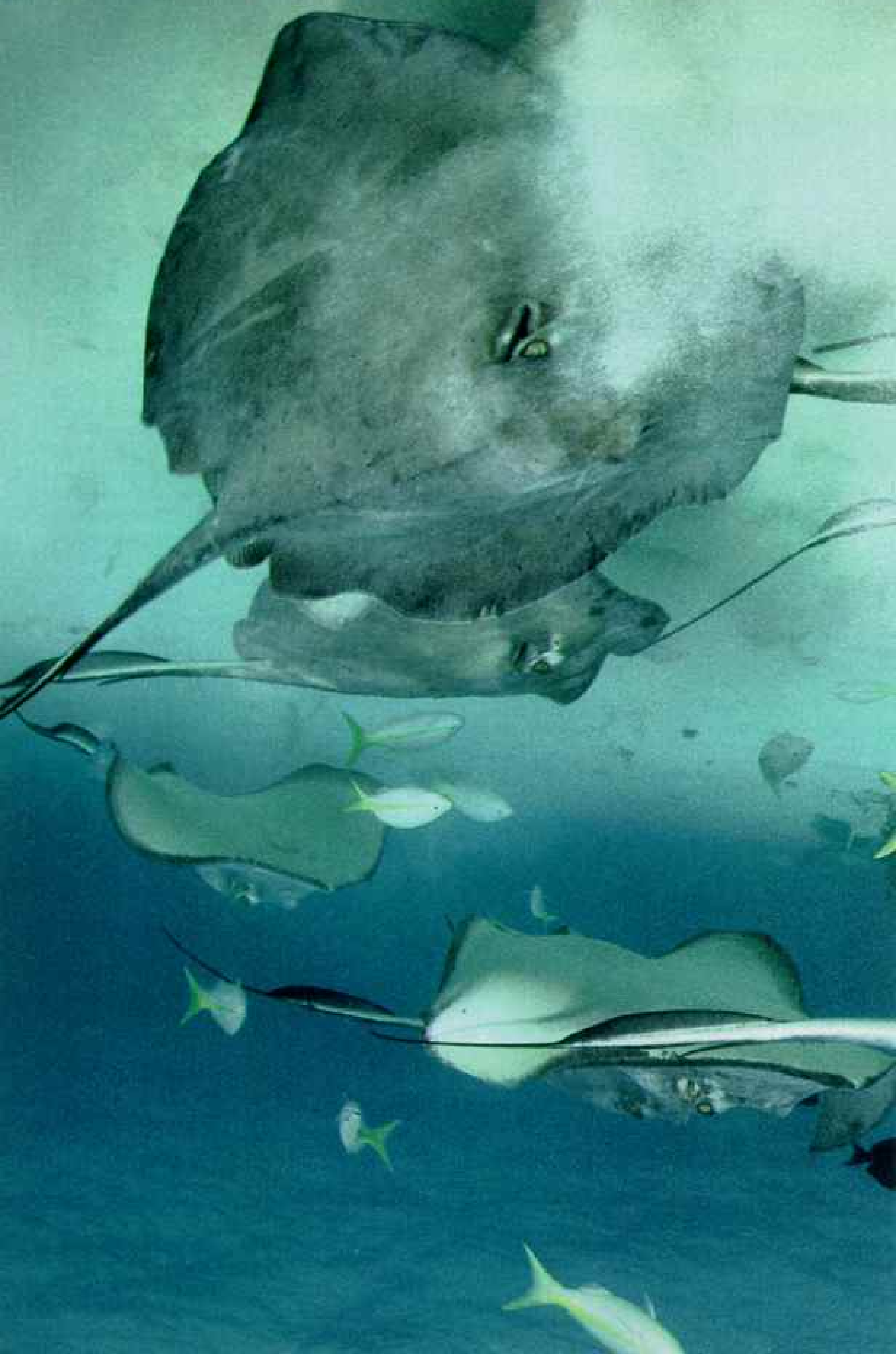
Me, I'm in a mood to give it all a little rest. As storm winds draw a light curtain of snow across the valley, I sink lower into the steaming water, warm and drowsy down to the tips of my toes. Wild horses couldn't tear me away. □

Ballet with Stingrays

TEXT AND PHOTOGRAPHS BY DAVID DOUBILET

I HAD ALWAYS THOUGHT of stingrays, with their broad wings and graceful movements, as almost mythological beasts: part bird, part fish. These creatures have long been feared for their whiplike tails bearing a spine that can deliver an excruciatingly painful wound. Now, as a crystalline wave washes over my camera—half in, half out of the water—I watch in fascination as two stingrays cruise the shallows of North Sound off Grand Cayman. I have come to join divers who, amazingly, have been feeding large groups of southern stingrays *(Dasyatis americana)* in waters protected by a barrier reef. As they gather around me, the rays lose their fearsome reputation. I find them to be gentle, wondrous birds of the sea.

UNDERSEA CATERER bearing fish scraps, Penny Pritchett Hatch (overleaf) attracts an octet of stingrays, as well as goatfish and yellowtail snappers, in what local divers now call Stingray City.

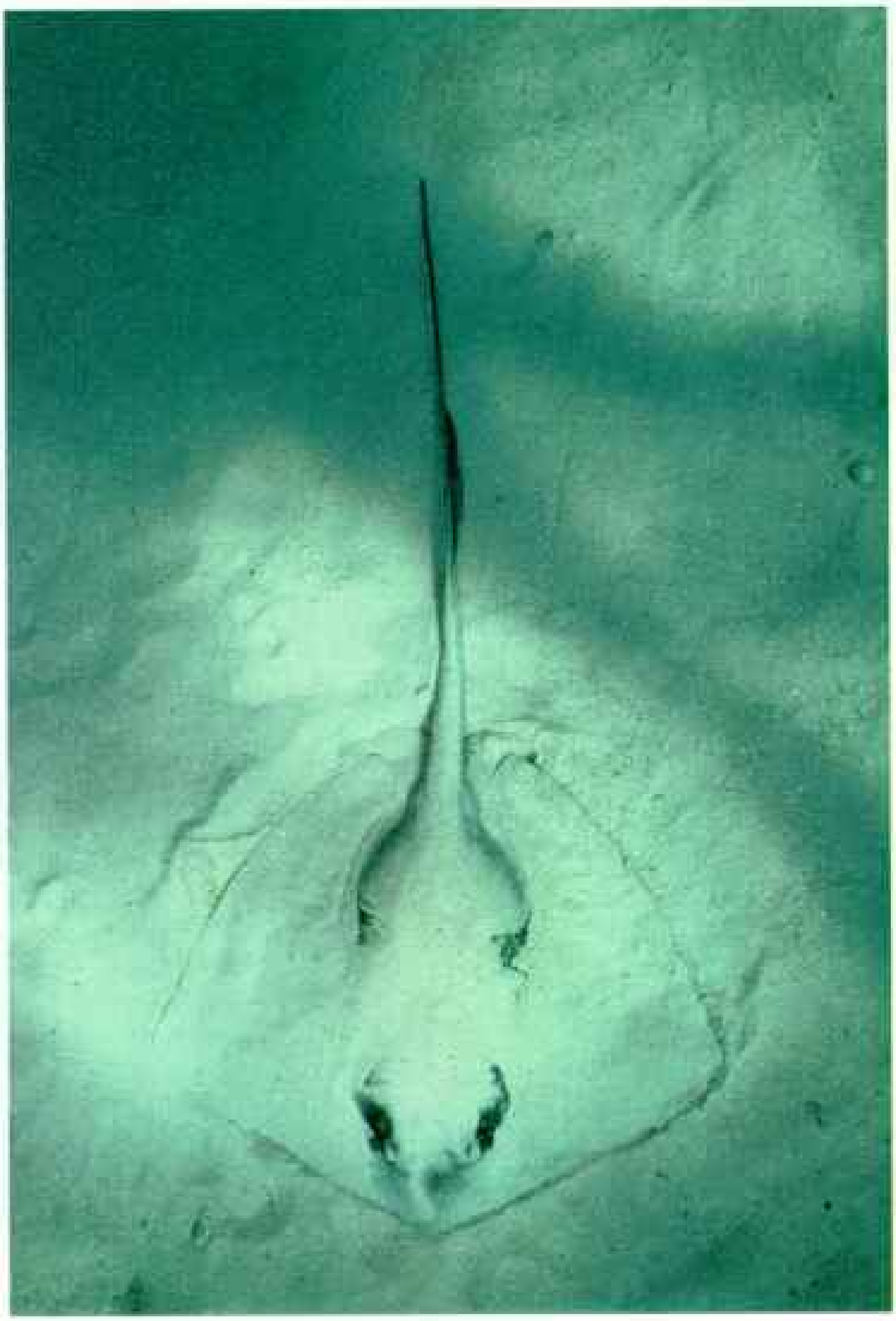


Open mouth, insert fish: Jay Ireland offers this hungry ray a ballyhoo. In 1986 Ireland, a photographer and diving guide in the Cayman Islands (map, below), began to investigate two sites inside the North Sound barrier reef where fishermen and tourists traditionally clean the fish they catch on day trips. Scraps of fish had fallen to the bottom, and stingrays, which are natural bottom feeders, were feasting on them. "I was fascinated," Ireland told me. "Usually you can't get close to stingrays, but they were swimming into my camera."

Ireland related his experience to fellow diver Pat Kenney, who began to feed the stingrays regularly. The rays have learned to expect such visits; today they become aggressive and pushy if the divers skip a day because of bad weather. Guides now bring as many as 150 divers and snorkelers a day to the feeding sessions.

Divers have found that these stingrays have discriminating tastes; they'll eat several types of seafood but prefer squid or, especially, ballyhoo, sometimes called halfbeaks.

DAVID DOUBILET, a contract photographer for the GEOGRAPHIC, has been recording undersea life since the age of 12.



Battling for ballyhoo, a quartet of stingrays tussles on the seafloor (above). A ray never actually sees the food as it eats, since its eyes are on top of its head and its mouth and nostrils are on the bottom—presenting a seemingly pugnacious expression (top, left). The ray locates its food with highly developed electro-receptors and finely tuned senses of smell and touch.

Stingrays eat mollusks, worms, crustaceans, and, occasionally, even flatfish. Sensing food, it will drape itself over the prey to claim it. The ray then sucks the food into its mouth, where it is crushed by powerful grinding plates.

Cloaked in sand (left), a ray is

prepared to defend itself against any human that unwittingly steps on or kicks it. When this happens, the tail will whip around, planting the serrated, razor-sharp spine (bottom right, and diagram) in the foot or ankle of the victim. The venomous spine, as long as six inches, causes tissue damage, swelling, and extreme pain, but it can also induce vomiting, diarrhea, sweating, a drop in blood pressure, and, rarely, death.

I never forgot—and diving guides like Jay and Pat never let tourists forget—that stingrays can be dangerous. But these were so gentle that I became accustomed to having their tails caress the back of my neck or scrape across my faceplate.

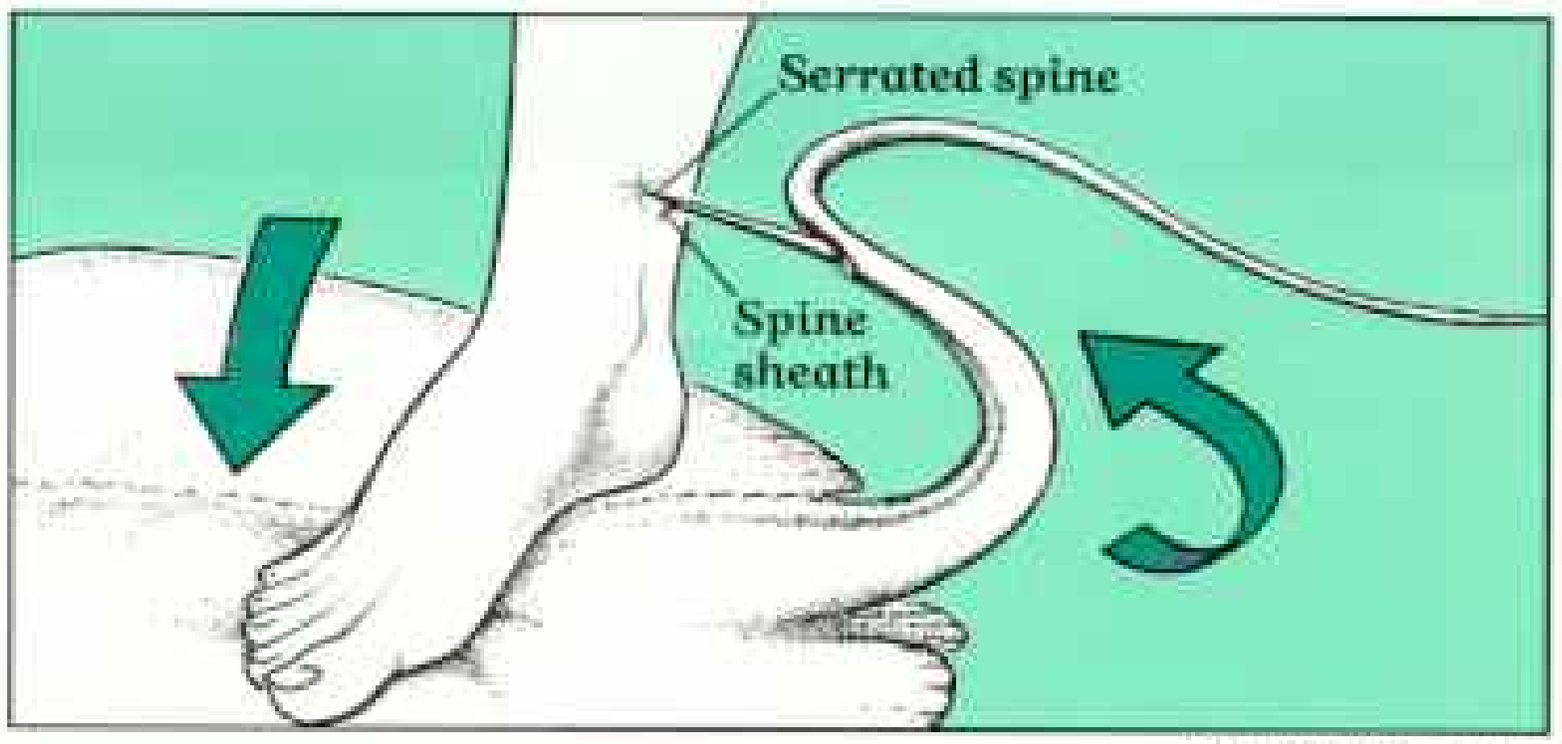


DIAGRAM BY MARK SCHLER

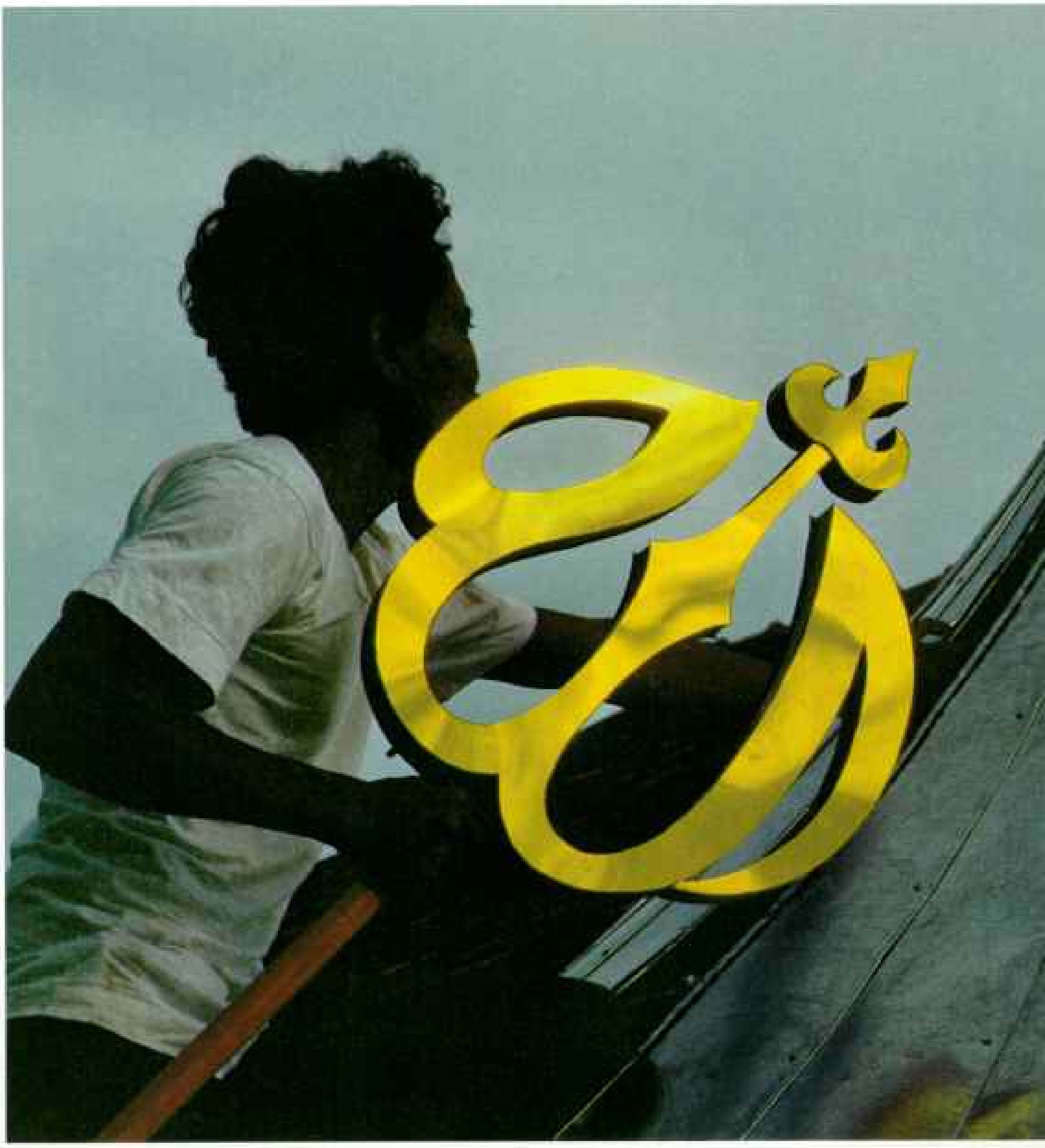
Draped over a coral head (above), a ray eats a piece of fallen fish. Southern stingrays normally reach four to five feet across. But Cayman marine biologist Tom Byrnes says, "Because these rays are being fed so much, we may soon have world records."

Trying a little tenderness, Penny hugs a ray (right) bent on finding the food she has brought. Divers do not wear gloves, to avoid irritating the stingray's sensitive skin. "It feels like a mixture of velvet and silk," Penny told me.

The sea offers few intimate moments to a diver. You always look into it through a faceplate, a window. I often feel as if I am trespassing. But here diver and sea creature can look at each other a little more closely. If Cayman Islands officials protect the rays, divers continue to feed them, and human visitors treat them with gentleness and respect, they will provide one of the most rewarding experiences in the undersea world. □

Two Worlds, Time Apart

INDON



ESIA

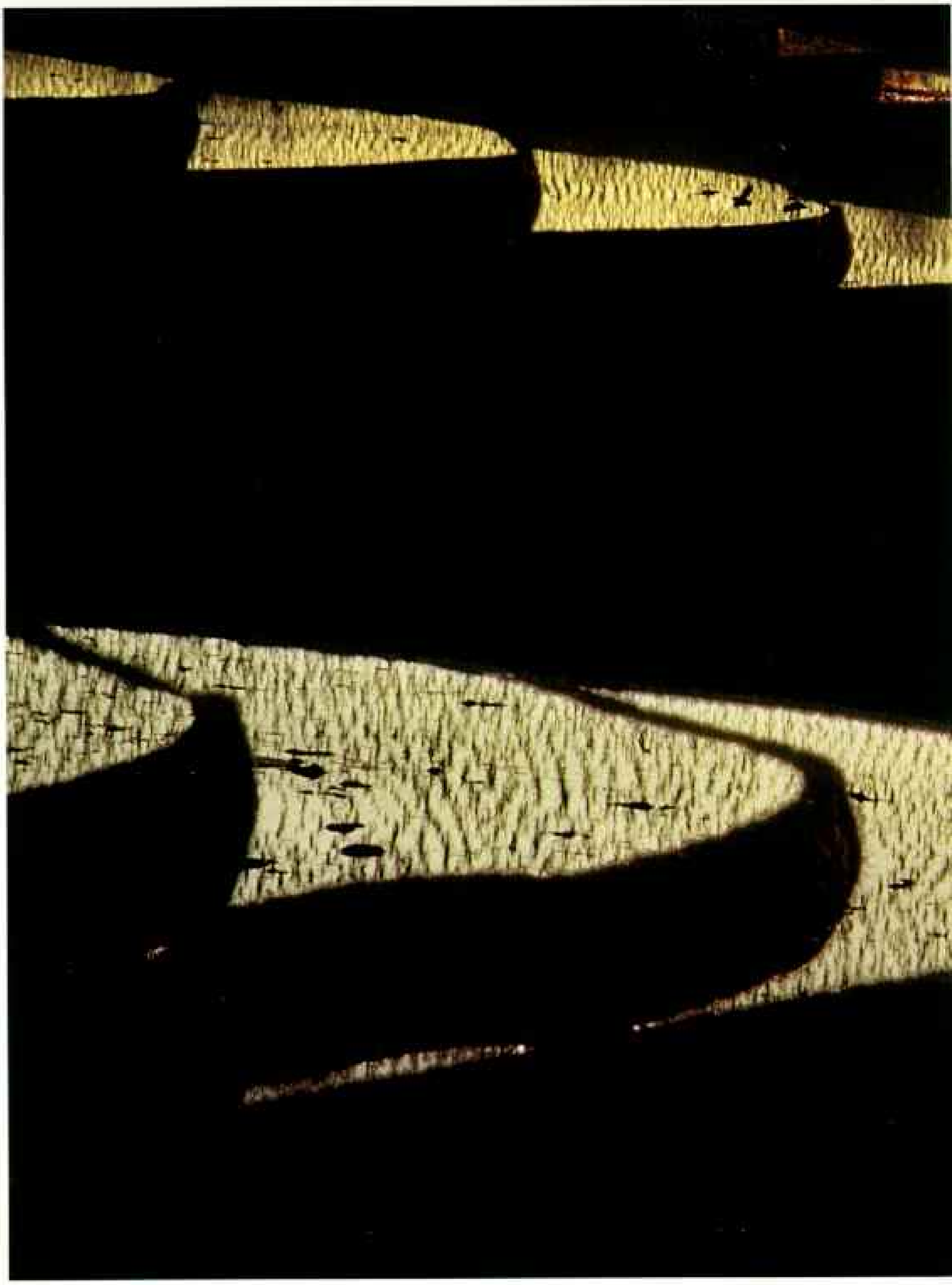
Raising Allah's name on high, a factory worker in the world's most populous Muslim nation hoists a stylized ornament in Arabic script onto a spire built for a mosque. Struggling to lift up their nation as well, the people of Indonesia wrestle with overpopulation, underemployment, poverty, corruption, a far-flung geography, and a staggering ethnic diversity. Their lofty ambitions might be hopeless were it not for the abundance of their natural resources—oil, natural gas, timber, incredibly fertile soil—and the strength of their spirit.

By ARTHUR ZICH

Photographs by
CHARLES O'REAR
WEST LIGHT

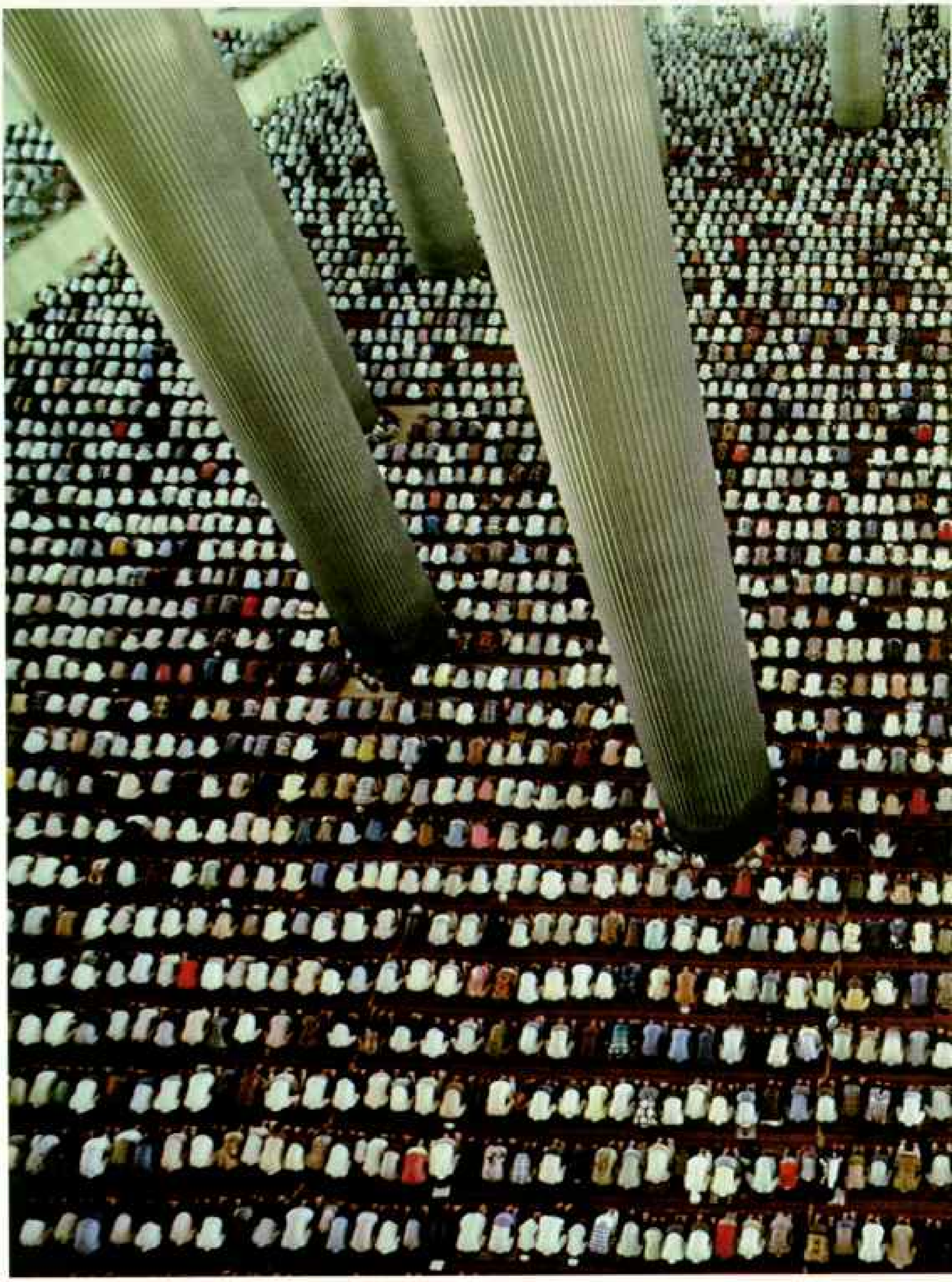
Shoulder to shoulder—and wheel to wheel—residents of Malang (population 547,000) jam a morning market on Java, the country's most densely populated

island. With 180 million people, Indonesia has the world's fifth largest population, after China, India, the Soviet Union, and the United States.



Gracefully stepping down a mountainside, terraced rice fields on the island of Bali produce as many as three crops a year with centuries-old irrigation systems.

Once a land of perpetual hunger, Indonesia is now nearly self-sufficient in rice and grows corn, cassava, sweet potatoes, peanuts, and soybeans.



Bowing as one in prayer, 7,000 worshipers fill Istiqlal mosque in Jakarta, one of the world's largest. Although almost 90 percent of all Indonesians say they are

Muslims, the majority are not strict followers, and many practice an Islam that has been blended with Hindu, Buddhist, or other beliefs.

THE SUBTERRANEAN ABODE of the demon dwarf Semar lies in the geographic heart of Java, on the fulminous, mountain-ringed Diyeng Plateau. Devout Javanese believe this cave is the center of the world, the most sacred place in creation.

More than once Darmudji, its caretaker, had accompanied Indonesian President Suharto into the cave to meditate and pray—or so Darmudji said, as he unlocked the small iron gate. By candlelight I crawled after him down into the chill, cramped darkness. Darmudji lit a packet of incense and joined his bony hands above his head. I supposed he intended to offer a prayer to the mischievous Semar, most beloved and purely Javanese of deities. Instead, reflecting the diverse faiths that have washed up on Java's shores over centuries, the old man invoked the Hindu deities Brahma, Siva, and Vishnu, then Buddha, Muhammad, Adam, and Jesus Christ.

Not long after, on northern Sumatra's swampy coast, I observed another subterranean phenomenon. P. T. Arun gas liquefaction plant, a multibillion-dollar installation owned in part by Pertamina, the government's energy monopoly, was tapping a deposit of natural gas 10,000 feet below. A high-pressure mix of methane, ethane, propane, butane, pentane, carbon dioxide, and nitrogen gushed into a ten-story cooling tower. I stood on the steel scaffolding of the tower, one hand pressed against it, eardrums bursting from the roar. Inside, refrigerants reduced the temperature of the swirling gases to minus 260°F. Liquid gas flowed from storage into thermos-bottle holds of waiting tankers.

"Basically," explained Efren Rocha, P. T. Arun's technical training coordinator, "it's the same process as your home refrigerator's, only colder." And potentially almost unimaginably more volatile. The plant sits atop an estimated 14 trillion cubic feet of natural gas, one of the world's largest fields. As training adviser Richard Burton put it only half jokingly, "One misplaced spark could rearrange the topography of northern Sumatra."

Two worlds, time apart, coexist in present-day Indonesia. "Indonesian man is not modern man," Dr. Mochtar Kusumaatmadja, former foreign minister, told me. "He is marginal man: one foot in the present, one in ancient traditions. But he is changing fast."

Her hands speak of modesty, but her dress and jewelry declare the confidence of an ethnic Samama girl welcoming visitors to a sultan's palace on the island of Sumbawa. Traditional Indonesian textile and jewelry designs help identify one's heritage and social status in a nation of some 300 ethnic groups.

JAVA AND SUMATRA are but two of the more than 13,660 wildly beautiful islands of the Republic of Indonesia, a nation populated by 180 million people of some 300 ethnic groups speaking 250 different languages—the fifth most populous nation in the world, after China, India, the Soviet Union, and the United States. Indonesia stretches across 3,200 miles of water, separating the Indian Ocean from the Pacific. On a map of the Western Hemisphere, it would reach from Oregon to Bermuda.

The colonial Dutch exploited Indonesia for nearly 350 years but never united the islands under a central administration. Thus, when Indonesians won independence in December 1949, they inherited no national polity, little sense of national identity, and few

experienced leaders. Four decades later they are bound together by their common struggle, a common language, Bahasa Indonesia, and an official ideology called Pancasila, Five Principles, affirming belief in one God, humanitarianism, national unity, democracy, and social justice.

"Unity in Diversity," the national motto, a phrase coined in the 15th century, aptly describes the country today. The Indonesian melting pot includes exquisitely refined Javanese, carefree Sundanese, artistic Balinese, seafaring Buginese, industrious Manadonese, and a dozen other "-ese," including traces of the Portuguese, who claimed the islands for the West in 1510.

But finding a balance between unity and diversity has proved difficult. The nation is beset with staggering problems. Conflicts and divisions cut through Indonesian society. Chief among these is Java's overwhelming political and economic dominance over the rest of the islands. "We call the Javanese the 'new colonials,' " a Manado journalist told me. President Suharto (like many Javanese, he goes by just one name) is the central figure in this drama—a personal and political force that binds the far-flung islands together. Son of a Javanese farmer, Suharto, 67, was a guerrilla fighter against the Dutch and rose to major general's rank by the early 1960s. By 1965 his young nation was foundering on the spendthrift nationalism and political excess of its first president, Sukarno, and drifting toward takeover by the Indonesian Communist Party, then the largest Communist Party in the world outside China and the Soviet Union. Suharto moved swiftly, unseating Sukarno and taking command of the country. His very first action led to the liquidation of the Communist Party—a bloodbath resulting in 250,000 to 500,000 deaths. A considerable number who died were ethnic Chinese.

Twenty-four years later Indonesian Chinese schools, political parties, even Chinese ideograms are banned. The Chinese have been prime targets of the violence that periodically engulfs Jakarta. Yet they are the richest of all Indonesian groups, owning as much as 75 percent of the nation's private capital.

Suharto's rule has been both ironhanded and subtle. After the massacre Suharto neutralized refractory political parties, opened Indonesia's long-closed doors to foreign aid and investment, and proclaimed political stability and economic development as the twin goals of his New Order regime.

The 1970s oil boom (Indonesia has proven reserves of nine billion barrels) provided the means for economic development. A team of University of California-trained economists known as the "Berkeley Mafia" provided the direction. Today blacktop highways twine through the mountains and jungles of Sumatra, Sulawesi, and far-off Irian Jaya. Some 136,000 new primary schools dot distant villages. Communications satellites orbit overhead, linking the 27 provinces with Jakarta, the nation's capital. Rice production has doubled. Massive industrial projects like the P. T. Arun natural-gas facility testify to the title often given to Suharto: Bapak Pembangunan, the Father of Development.

A golden smile, intricate bead cap, and elegant tattoos distinguish the chief's wife in a Dayak village on Kalimantan, part of Borneo. The original inhabitants of the island, Dayak men and women alike once stretched their earlobes with rings in a custom now rarely practiced outside remote inland areas.

INDONESIA

"Unity in Diversity," proclaims the national motto, stating a challenge as much as a fact. Draped across 3,200 miles, Indonesia is a cloth of many colors, comprising five main islands and 30 smaller archipelagoes, with a collection of cultures as diverse as its geography. Historically the center of wealth and power, Java still dominates. Even so, 250 different languages survive.

AREA: 2,000,000 sq km (772,000 sq mi). **LANGUAGE:** Bahasa Indonesia (official). **POPULATION:** 180,000,000. **MAJOR CITIES:** Jakarta (capital), Surabaya, Bandung, Medan, Semarang. **RELIGION:** Muslim (90 percent), Christian, Hindu, and Buddhist. **ECONOMY:** Agriculture: rubber, rice, coffee, timber, palm oil, sugar. Industry: oil and natural gas, plywood, minerals.

But 24 years is a long time in the political heat of equatorial Asia. Increasingly many Indonesians wonder aloud what will come after Suharto. Although a new generation of leaders, including young army officers more attuned than their elders to Western democratic values, waits impatiently in the wings, Suharto has not yet groomed a successor.

"As a modern president, Suharto must prepare for the eventual transition of power," one of his closest advisers explained. "But he rules in the tradition of Javanese kings. The moment the king chooses a successor, the *wahyu*, the divine ruling power,

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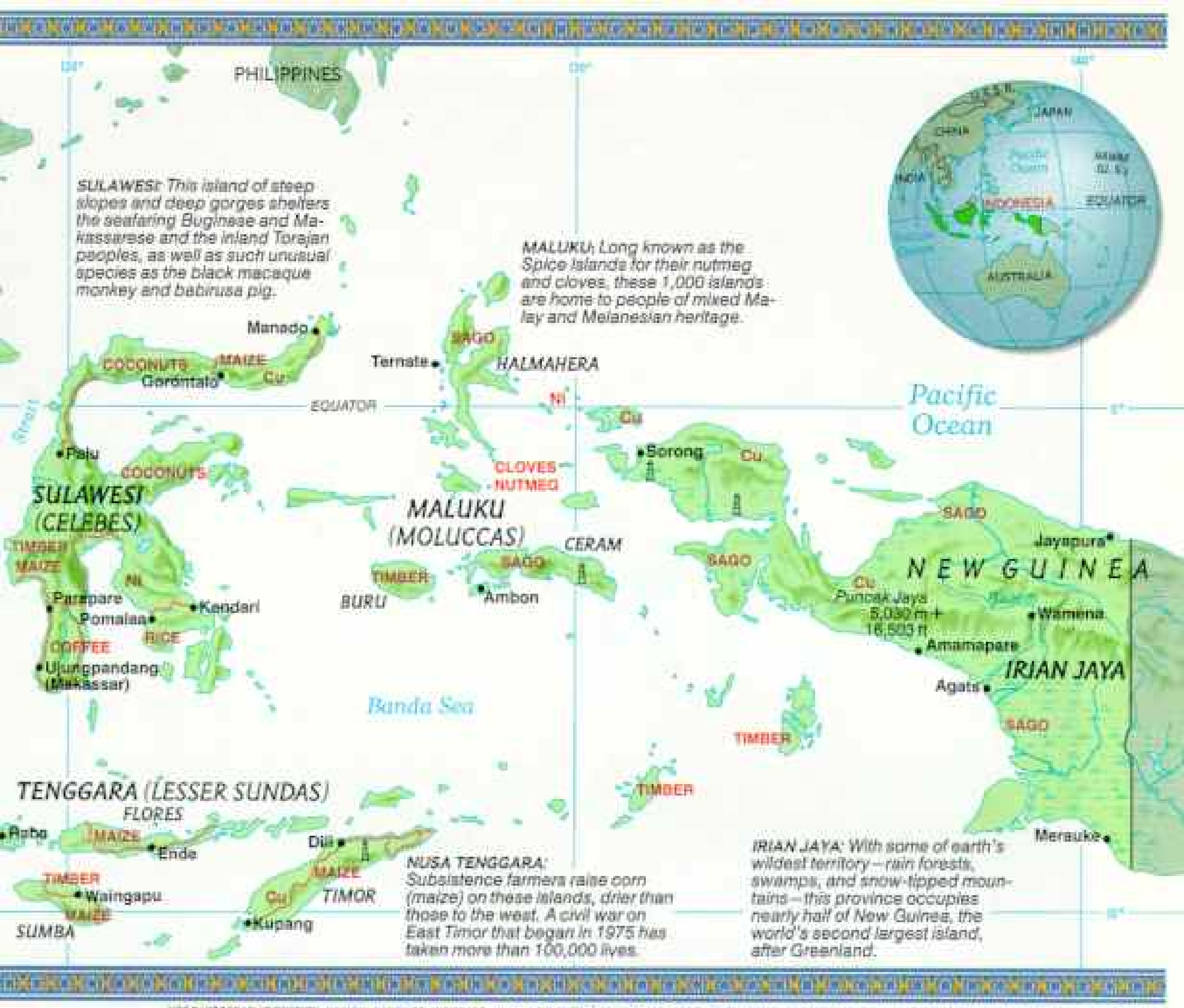
ARTHUR ZICH, a journalist who specializes in Asian subjects, wrote about the Philippines in the July 1986 issue of NATIONAL GEOGRAPHIC. Photographer CHARLES O'REAR's work has illustrated 15 articles in the magazine.



NGS CARTOGRAPHIC DIVISION DESIGN: NANCY SCHWEICKART; RESEARCH: MICHAEL A. MCGILL; PRODUCTION: NANCY L. CLAPPADOCIA, LAURA S. KRAUSMANN; MAP EDITOR: JOHN T. BLOZIS

begins to slip away. So he cannot do that."

In the 1987 elections Golongan Karya (known simply as Golkar), Suharto's pervasive, army-backed political organization, won 73 percent of the seats in the House of Representatives. Suharto then appointed a hundred army officers to that body and all 500 members of the People's Consultative Assembly. The two houses then reelected him to his fifth five-year term.

By Javanese standards Suharto is a very old man. Yet in these, his waning years, his powers are being tested as perhaps never before. For the past four years economic growth has barely kept ahead of population growth. Per capita income has stayed at about $530 a year—even lower than in the Philippines. The number of people underemployed is 40 percent. Some two million new workers enter the labor force each year, far more than the new jobs available. About 50 percent of the population is under the age of 20.

EVEN MORE than in other developing countries, Indonesia's politics are forged by the hammers of international economics. The 1983 oil-price collapse brought the loss of 28 percent of government revenues. Suharto slashed the budget, instituted sweeping tax and banking reforms, and devalued the rupiah three times in four years.

Then the U. S. dollar nose-dived. Since Indonesia borrows mainly in Japanese yen, its foreign debt rose as the dollar fell against the yen. With additional borrowing the debt is now 50 billion dollars. Repayment consumes 38 percent of annual earnings, an index the World Bank considers dangerously high.

Corruption compounds the problem. Long

Taking a blade to the land, a slash-and-burn farmer (left) finishes what a logging company began in a Kalimantan rain forest. Attempts to restrict the plundering of valuable hardwood forests have proved difficult to enforce.

A big success, however, has been a state fertilizer complex on Sumatra (below left), which produces subsidized fertilizer for farmers. Sulfur miners in Java's Ijen Mountains (below right) endure acrid fumes from a volcanic area.

endemic, it embraces everything from simple *pungli* (payoffs) to complex international deals. "The country is bleeding," said a prominent Indonesian economist, who requested anonymity. "The outlook is grim."

Through a tangle of monopolies, Chinese-Indonesian *cukong* (front men) control the import of many essential products, reaping huge profits for themselves and their Indonesian patrons. Suharto's immediate family and various relatives and associates are among the beneficiaries. Indeed, to Jakarta wags Suharto's wife, Tien, has long been irreverently known as "Madam Tien-percent."

The king of the cukongs is 72-year-old Liem Sioe Liong, a Fujian émigré who started out in the rebellion against the Dutch after World War II running supplies to a rebel colonel named Suharto. As custodian of the first family's fortunes, Liem now bestrides a colossus of 190 companies with interests ranging from cooking oil to Krakatau Steel.

I discussed corruption and other concerns with President Suharto in a private two-hour interview at his corn-and-cattle ranch in the hills of Tapos, south of Jakarta. A man of prodigious girth with the serene smile of a jovial deity, Suharto was voluble and immensely self-assured. He flatly rejected my suggestion that his family and friends may have benefited from his high office.

"There is no such thing as favoritism, sir," the president said coldly. "That is looking at things with one eye closed."

I sought to lighten the moment. "Surely, Mr. President," I said, "as a former soldier, you know that you must close one eye to take aim at the target."

Suharto roared. But his eyes were hard as ice. "Even with both eyes closed, I still can shoot!" he replied.

Suharto blamed "red tape, bureaucracy,

hanky-panky, and irresponsible elements" for Indonesia's "high-cost economy."

"We are trying to reorder and reform," he said, adding significantly: "We will continue to do that, sir, so that we can become really competitive!"

And when the time comes for a peaceful transfer of power, what then? "The constitution clearly stipulates the rules of succession," Suharto said over *telur asin* (salted eggs) and *lontong* (rice cakes in banana leaves). "Appointing a kind of crown prince, who would eventually replace the president, is contrary to the constitution. Only the assembly has the power and authority to appoint the president."

As a reward for family planning, a Javanese woman was given a job weaving sarongs in a factory where she can tend her child (above). Indonesia's birthrate, still high, has fallen 40 percent in 20 years.

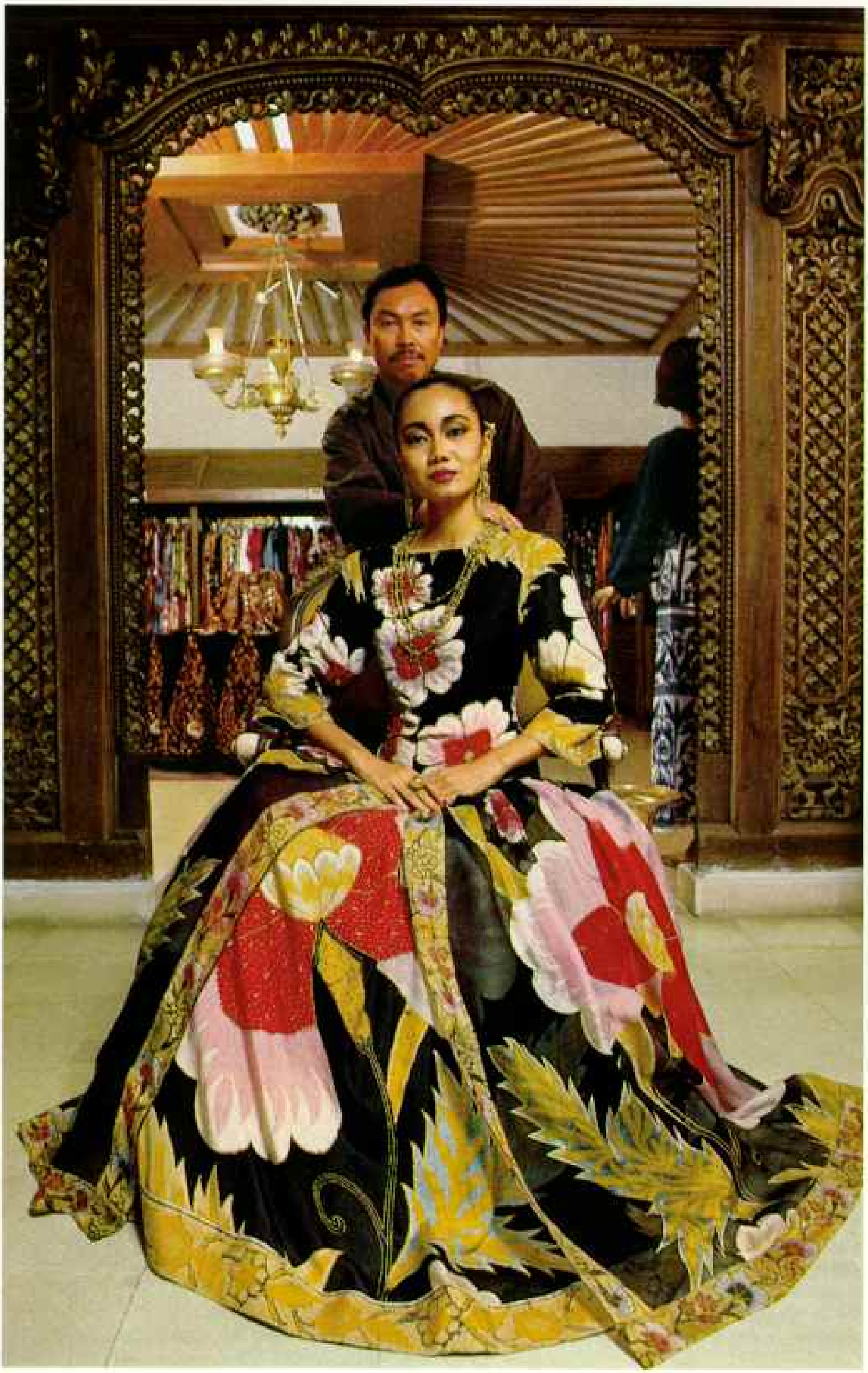
Devoted to Javanese culture, designer Iwan Tirta (facing page) helped save the batik industry by adapting folk art to such high fashion as worn by this model.

JAKARTA is capital and heartland of Indonesia, a rags-to-riches *rijsttafel*—rice table of many dishes—of eight million people. From on high this city on the north Java shore is a vast patchwork of mossy, orange tile roofs, green trees, and countless *kampung* (villages). To the west lies a warren of huts and bubbling black-water canals where people bathe and brush their teeth while others defecate into the same water from bamboo scaffolds. To the east stretches leafy Menteng, a graceful, white-washed quarter of Old World mansions and New World wealth. Down the middle runs ten-lane Jalan Thamrin, the nation's principal boulevard and nerve center, lined with foreign embassies, luxury hotels, and futuristic glass-and-steel towers. Over all stands the 430-foot-high National Monument, a marble pillar with 77 pounds of pure gold on its crowning flame—a symbol of the profligacy of the Sukarno era.

In Jakarta's streets runs Dr. Kusumaatmadja's marginal man. Hybrid *dangdut* music—Arabic melodies set to rock rhythms—blasts from loudspeakers in gaily lighted Taman Ria Park. Sinewy-legged *becak* (pedicab) drivers loll at curbside. Perfumed *banci* (transvestites) and WTS's (women of injured morals) flirt with passersby. Sidewalk hawkers and fast-food peddlers pushing carts called *kaki-lima* (five feet)—meaning two wheels, a stand stick, and the proprietor's own two feet—proffer everything from Gucci-like bags and Levi's-like jeans to *saté* (kabobs) and *sop kaki* (goat's feet soup).

These people are part of an underground economy. Dr. Mary Judd, an American anthropologist, estimates that they represent more than a quarter of the city's labor force. They toil up to 16 hours a day and consider themselves lucky. Their earnings average well above the $62.50 monthly base salary of university-educated government workers.

By some estimates as much as a fourth of Jakarta is without housing. Many residents eke out a sub-rosa subsistence in slums like *bongkaran*—a Jakarta dialect word meaning "rubble"—a stretch of packing-crate



Gentle reminders of a lurking danger, plumes of steam rise from Mount Semeru, top, and Mount Bromo, two of Indonesia's hundred active volcanoes. The greatest concentration occurs here on Java, which lies just north of a deep marine trench where the Indo-Australian plate plunges beneath the Eurasian plate. Here, too, fertile rice fields are enriched by volcanic ash, and population densities soar.

shanties along a railway line into the city. "Leave money and watch in hotel," Suparman, my driver, warned the day we went there. "Say *salamat sore* (good afternoon) and give plenty smile."

If Jakarta is Java's harsh, hard-scrabbling present, Yogyakarta, 270 miles to the southeast, is its past—the seat of culture, repository of its mystical tradition. Not far away stand Borobudur, the world's largest, most magnificent Buddhist monument, and

TIM HAMILTON O'NEAR

Prambanan, a soaring cluster of tenth-century Hindu temples. In Yogya itself (as it is fondly called) is the *kraton*, the sprawling palace of Java's last sultan, who recently passed away at the age of 76. He was a man so revered that snippets of his hair, fingernails, and clothes were offered up each year to Merapi and Lawu volcanoes and cast in the waters of the goddess of the southern seas.

I called at the unpretentious home of His Majesty Prince Poerboyo, the sultan's elder brother and the kraton's chief caretaker. A portly, wispily white-haired old man emerged and extended a small, soft hand. "Poerboyo," he said simply. "How can I serve you?"

"I would like to go through the kraton with you as my guide," I told him. "I want to know what the sultanate means to you."

He made a small, gracious bow.

Next morning we walked together through the kraton's massive gates into a sun-dappled courtyard flanked by large, low, open-sided buildings called *pendopo*, some of them more than 200 years old. There was no sense of height, as in Western palaces: Star apple trees rose above the rooftops. The feeling was of spaciousness, antiquity, and peace.

Prince Poerboyo pointed out a gong dating back to the 14th-century Majapahit Empire, Java's golden age. "They cannot make those any more," he said. "They don't know how to produce the sound: 'G-o-o-o-n-g!' " He shrugged. "Today: 'Gong.' Finished."

Through building after building, courtyard after courtyard, we examined the artifacts of Java's past. In the throne room officials used to come and kiss the sultan's knees. "The sultan abolished the big ceremonies," His Majesty said approvingly. "He never used the throne after the Japanese invasion."

In one pendopo, palace servants sat on the marble floor, giving lovely carved-leather *wayang kulit* puppets their weekly airing and animatedly chatting with them as if they were alive. I recalled reading that years ago the announcement of a rare wayang kulit performance of *Bharatayudha*, the final cosmic battle of the gods, had provoked widespread fears that the drama might precipitate the end of the world—and sure enough, during the performance, Merapi exploded.

"Did that really happen?" I asked.

"Yes," His Majesty replied.

I pressed: "What do you make of it?" He looked me in the eye, thought a moment, and chuckled. "Coincidence."

BETWEEN JAKARTA AND YOGYA stretches Java's lush, rural countryside—mile after mile of shimmering rice fields and trim green coffee and tea plantations that roll up the flanks of scores of volcanoes steaming and soaring into billowing thunderheads. Indeed, to a foreigner, Java is a primeval world of such

astonishing beauty that it is hard to believe it is so beset with woes. But if the cities have their problems, they pale beside those of the island as a whole.

More than a hundred million Javanese, nearly two-thirds of the nation's population, inhabit the island's 51,000 square miles—more people than the combined populations of California, Texas, Pennsylvania, Illinois, Florida, and Ohio, jammed into an area just a bit larger than Louisiana.

Java is one of the world's most densely populated rural societies, and is likely to remain so. A family-planning program instituted in 1970 has been hailed as one of the most successful anywhere. Roadside posters proclaim its motto, "*Dua anak cukup!*—Two children are enough!" But the population is still growing at the rate of two million a year.

"We are in a race against time. We simply have to win it," Dr. Masri Singarimbun, founder of the Population Institute at Gajah Mada University in Yogyakarta, said.

"But how can you win?" I asked.

"Yes," he replied, "that is the question."

PROGRESS sometimes creates more problems. "Our schools are turning out millions of children with six years' primary education," a Jakarta educator told me worriedly. "They're spoiled for farming, but they can't afford higher education, and there are no jobs. So they hang out in gangs. Crime goes up. Respect for elders goes down. Society begins to unravel."

Taking a last look at her native Java, a woman (above) gazes out from an airplane carrying her family to less crowded Sumatra, where the government has promised five acres of land, a two-room house, tools, seed, fertilizer, herbicides, pesticides, and food for a year. "There is no future on this island," says one of the Javanese men waiting at Surabaya (upper right) for a flight to Kalimantan. Since 1950 the government has relocated three million people from Java, Madura, Bali, and Lombok to such frontier settlements as one (right) in eastern Kalimantan.

About half of Java's people are farmers. Eight out of ten own land, in most cases not enough, or barely enough, to live on. Indebtedness is inevitable—and this results in the sale of the land to industry, bringing still greater pressures on the land that is left.

"Too many people bring suffering to the land, and the land returns its suffering to the people," says Dr. Otto Soemarwoto, director of the Institute of Ecology at Padjadjaran University in Bandung. "As population grows, upland forests are leveled for settlements. The rains tear away the denuded soil and wash it down to choke the flatlands. More roads and houses are built. The soil becomes less permeable. Lowland water tables aren't replenished. Dry seasons become droughts; rainy seasons turn into floods.

"Human waste is dumped into the water supply and recycled back into the people. At least 60 percent of the population is infested with parasitic worms."

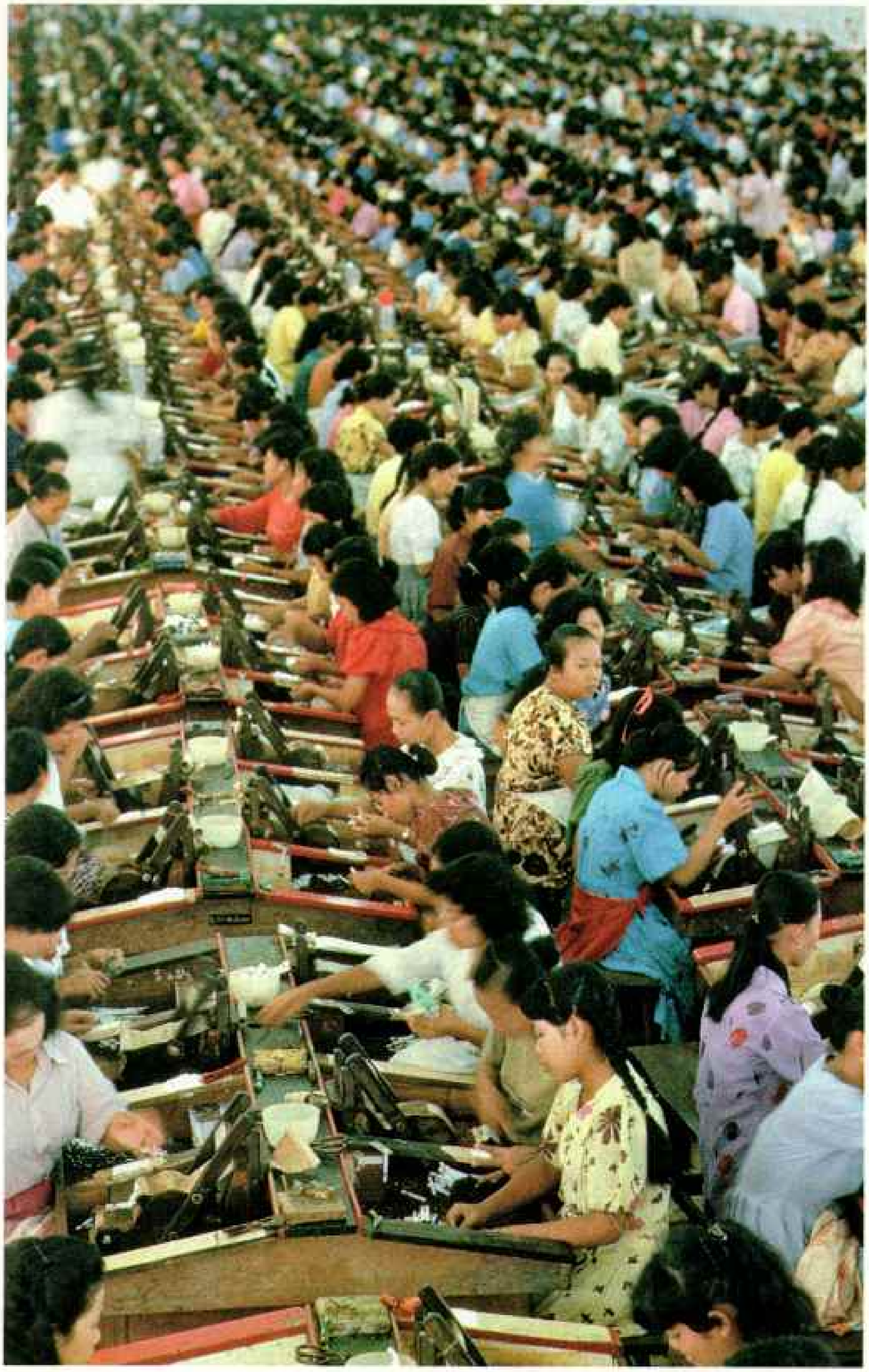
Savoring success, Mrs. Kemala Motik Abdul Gafur (above) runs a Jakarta factory that makes blue jeans for export. At the Gudang Garam plant in Kediri (facing page) each worker in this vast army of women hand rolls 3,000 clove cigarettes a day for about $2 (U. S.). Between Indonesia's wealthy few and poor millions, a great gap still exists.

AFTER A LIFETIME of such conditions, Pak Manto had had it. The half acre he and his wife, Suminten, tilled outside the central Java city of Surakarta was barely enough to keep them and their three children alive. So seven years ago they boarded a government C-130 Hercules airplane for Balikpapan, on the eastern coast of Kalimantan, Indonesian Borneo. They then traveled by bus, truck, and riverboat 115 miles up the muddy Mahakam River to the scrub-jungle outpost of Rimba Ayu and the five-acre homestead the government had promised.

"There was no water," Manto, now 43, told me in the dirt-floored house his family occupies in Rimba Ayu today. "The land was so overgrown we couldn't see the house. I said to my wife, 'We better get to work.' We've been working ever since."

Manto and Suminten have survived a seven-month drought, a five-month-long jungle fire, an epidemic of Newcastle disease that killed all but two of their chickens, and a plague of rats that devoured their seed. But today they own a carabao, grow enough rice, soybeans, corn, and chickens for consumption and sale, and they'll soon be marketing cloves, coffee, and hybrid coconuts as well. And Suminten, when I visited, was pregnant again. Manto's fingers curled around his teacup like gnarled roots. "I'm pretty content," he grinned, silver front tooth gleaming. "I'm just waiting for the big yields."

Manto and his brood are just one of more than 700,000 Indonesian families who have been relocated through the government's transmigration program from the overcrowded regions of Java, Madura, Bali, and Lombok to some 600 outer-island settlements. Each family is supposed to receive a two-room house and five acres of land, as well as food, tools, seed, fertilizer, and pesticides.



Transmigration minister Martono called it the "largest voluntary resettlement program in the world."

It is also one of the most controversial. Despite 400 million dollars in World Bank aid over the past decade, the program has made no appreciable impact on Java's miseries, and the country is running out of arable land.

"Today," one Indonesian expert told me, "much of the land allocated cannot even be described as marginal."

ALTHOUGH NEARLY 90 PERCENT of Indonesians call themselves Muslim, the majority are nominal adherents who intermix Islam with other practices and creeds. Not so the Acehnese. The 3.3 million people who inhabit the coastal plain between northern Sumatra's mountains and the Indian Ocean embrace the Prophet with militant zeal. Their land is Indonesia's western terminus, its closest point to Mecca. The Acehnese were probably the first to encounter Islam's proselytizing traders as early as the seventh century. Much of their bloody history since has been written in defense of the faith. In 1953 they even went to war against Jakarta, a six-year jihad that was brought under control when the government proclaimed Aceh a "special territory"—a state within a state where Islamic law prevails.

Aceh's defiance has left the region dirt-poor. Its natural gas, petroleum, rubber, and palm oil represent 15 percent of the nation's export revenues. Embittered Acehnese claim they get back less than 3 percent. Parts of Aceh remain rebellious—and Indonesian Army units remain on alert nearby.

"Islam is not closed to modernization," Professor H. A. Hasjmy, head of Aceh's *majelis ulama* (council of scholars) and former governor, told me. And that may be true. But Acehnese tend to be resistant. "They say, 'No family planning! You can die doing that!' " Judith Wagstaff, a New Zealand teacher at Aceh's Abulyatama Foundation, said. "And women *have* died from unsterilized IUDs. But they attribute that to Allah's wrath, not lack of sanitation."

In Banda Aceh, the capital, the magnificent black-domed Mesjid Raya Baiturrahman—Great Mosque—looms over a blue reflecting pool. Beside it garbage is heaped in broken streets; rivers are clogged with trash.

A symbol of national progress, the IPTN aircraft factory in Bandung—where workers assemble helicopter bodies (facing page)—represents the dreams of Indonesia's leaders to join the world's leading economies. Dragging such dreams back to earth are the relentless demands of the nation's populace, who cling to survival like the precarious passengers of this freight train rumbling through the slums of Jakarta. Here, in the heart of the nation's most modern city, millions jam into shantytowns infested with insects and rodents, lacking adequate water, sewers, drainage, electricity, schools, and health facilities.

Six hours to the east by car stands the modern installation of P. T. Arun. Its elegant hilltop employees enclave contrasts sharply with the filthy, overcrowded city of Lhokseumawe. The city's population has doubled to 60,000 since P. T. Arun opened in 1978, but its people hold fewer than a thousand jobs at the plant. "Our aim has been to employ as many Acehnese as we can," insisted manufacturing manager James Winget, an American who has since been replaced by a Javanese. "But they simply lack the skills."

"We've given them a school, a clinic, and a produce market," said one of P. T. Arun's Indonesian supervisors, as we drove through the city. "All they ever ask for is, 'A mosque! A mosque! A mosque!' "

WHEN THE SUN is high and hot, a chill wind hoots across the black rock summit of 10,308-foot Gunung Agung, the volcano the Balinese call the "navel of the world." The mountain falls away in black lava ridges that look like dragon backs—relics of the 1963 eruption that claimed more than 1,500 lives—to green plains and blue seas and a view of far-off Lombok island's own black smoking peaks. Gasping for breath after the steep climb, I stood on the summit and marveled at the impossible beauty of the scene.

But it was the crater, not the view, that transfixed Made and Komang, my two young guides. Its steaming bowl was a swirl of sulfurous yellow and iron oxide red. The lads laid an offering on the crater's lip—a plaited leaf, a hard-boiled egg, some rice, fruit, and frangipani blossoms.

"My grandmother told me that Gunung Agung is the beginning and end of life," Made had told me. "And when we die, our spirits go to live inside this mountain."

Gunung Agung is the core of the Bali-Hindu faith, which is the core of Balinese identity—which may well be the strongest of all the islands' cultures. Made's ancestors had their roots in Hindu Java until the spread of Islam in the 15th century drove them with their nobles and priests to seek sanctuary across the narrow strait between the islands. There the faith was wedded to animistic magic and draped in splendid robes of ritual and art. Alone among islanders, Balinese turn their backs to the sea, which they deem profane, and look to the mountains.

MICHAEL S. YAMASHITA

Like money in the hand for islanders, tens of thousands of visitors a year—many from Australia—travel to Bali's beaches to sunbathe, swim, and relax with a massage. Vendors have taken to wearing numbers to help customers recognize them. Despite the influx, the island's traditional Hindu-oriented culture is alive and well, at least for now.

But Bali is also Indonesia's tourist mecca, attracting a third of the nation's foreign visitors. In 1988, 400,000 spent the equivalent of 250 million dollars on this one island. While that represents a welcome windfall to the hard-pressed Balinese, it also symbolizes a Western invasion that poses a challenge all across the island's ancient ways—a challenge so disturbing to island authorities that future development plans call for containing tourism in a high-priced ghetto at the southern tip of the island.

Bali's 210-day calendar, charting almost daily religious rituals, was created eons ago around the growing cycle of rice according to

Fresh from the fields, carrots await transport to market by truck in eastern Java. Spicy, hot, and sweet, Indonesian cuisine is built around rice, with many side dishes. Tropical fruits also delight, from the lemony belimbing, or starfruit, to the tart zurzat, or custard apple.

one theory. New strains of rice that mature in a third that time upset the ancient cycle.

"When I was a child, I learned that the moon was the goddess Dewi Ratih," Suradnya, one of Bali's best known painters, told me in his Ubud studio. "Then Neil Armstrong landed on it. I still look up at night and pray to Dewi Ratih."

Would Suradnya's seven-year-old son also believe in Dewi Ratih? "My son has his own path," Suradnya replied. "He already knows Lego! But he doesn't make helicopters or cars. He makes temple gates and funeral towers. Every generation re-creates its culture."

FATE has dealt more harshly with the people of East Timor, a province half the size of Maryland with 650,000 mostly Roman Catholic inhabitants. It was a forgotten remnant of Portugal's ramshackle empire until the Portuguese armed forces seized power in Lisbon in 1974 and summarily freed their nation's overseas possessions. In East Timor an organization called the Revolutionary Front for an Independent East Timor (FRETILIN) prevailed over other hastily formed political groups, and in 1975 it declared independence.

Suharto branded FRETILIN Communist-controlled. Warning of an Asian Cuba, he moved 35,000 troops into East Timor and proclaimed it Indonesia's 27th province. Thousands of Timorese fled to the mountains and commenced a bitter guerrilla struggle that sputters on to this day.

The consequences have been devastating. By Jakarta's own figures, at least 100,000 Timorese have been killed in the fighting or have died of starvation and disease. Some 40,000 children have been left orphaned, abandoned, crippled, or maimed. And at least 600 civilians have simply disappeared.

"Practically speaking," Governor Mario Carrascalao told me in his office in Dili, the Timorese capital, "every family in East Timor has lost someone in this civil war."

Normally journalists are not allowed into the province, but I was granted a three-day visit in the company of a foreign-office

Memories of headhunting, cannibalism, and tribal warfare still linger among the native peoples of Irian Jaya, Indonesia's wild easternmost frontier. Skulls on display at the Asmat Museum of Progress and Culture in Agats recall the bloody days—only decades ago—when such trophies were prized as charms to repel evil spirits from a village.

A few steps out of the Stone Age, a Dani tribesman in the Baliem Valley of the central highlands (above) demonstrates how to make fire by using friction to ignite grasses. Skillful farmers who live in domed, thatch-roofed houses, the Dani are one among scores of tribal groups—each speaking a different dialect—who have inhabited the region for thousands of years.

During the past two decades, government agents and Christian missionaries have built schools and medical clinics and begun a Trans-Irian Highway, to bring the province's 1,000,000 tribal peoples into the 20th century and make them feel a part of the Indonesian nation. At the same time several forested areas traditionally used by tribal groups have been cleared for transmigrant settlements.

official. The army refused access to the eastern part of the province, where FRETILIN is said to be most active. But from what I was able to observe, it seemed clear that Jakarta was at least making an effort to set aside the past and bring East Timor into the Indonesian nation. For one thing, funding, despite cutbacks elsewhere, has been ample.

"Jakarta gives us more money per capita than any other province," Carrascalao said.

East Timor's 13 district capitals are being linked by asphalt roads. Schools and clinics are being built. Dili has a tidy, if not prosperous, air about it. Its streets are newly paved. Its hospital boasts 200 beds, a general practitioner, a pharmacist, two dentists, and a radiologist. The University of East Timor opened in 1986. "The library has just 10,000 books," the energetic Dr. Armindo Maia, a university rector, told me as we walked the corridors. "That's not much for a university—but it's a start!"

The FRETILIN threat and the presence of the army remain large question marks. Col. Yunus Yosfiah, the local military commander at the time of my visit, termed the problem "a little bit of bandits in the bush." His command's total strength, he said, consisted of only four battalions—approximately 4,000 men—two of which were engineering units on road-building duty. But Yosfiah neglected to mention that another command of 14 battalions—12,000 men—was reportedly bivouacked in the east, where we were not permitted to go.

More difficult to measure was a climate of fear that I felt where we did go. Former FRETILIN rebels talked as if reciting a script. Ordinary Timorese wouldn't talk at all. Outside Dili they cowered at the approach of our official jeep. Carrascalao offered an explanation: "We are in transition from horror to normalcy."

IRIAN JAYA, nicknamed Great Steamy, is the eastern terminus of the nation. Looking out on the vast Pacific, it makes up half the great bird-shaped island of New Guinea—the most remote and sparsely populated of Indonesia's provinces and one of the wildest places on earth. Its 1.5 million inhabitants, mostly Melanesian, are cut off from one another by dense rain forests, crocodile-infested swamps, limestone karst, and glacier-capped mountains—and from the rest of the world by several thousand years.

The Irianese speak 240 tribal dialects. Infant mortality runs so high that children are not even named until they are 12 months old. For some, headhunting and cannibalism are living memories.

The Dutch held on to Irian Jaya when they departed the rest of the Indies. Twenty years later 1,025 Irianese, handpicked by Jakarta, voted unanimously for union with Indonesia. Dissenters rebelled, rallying around the Organisasi Papua Merdeka (Free Papua Movement), better known as OPM, and yet another guerrilla struggle commenced—a fitful bloodletting that no longer poses any real threat to the government. But Irian Jaya still constitutes Indonesia's last frontier—and its most daunting challenge to national integration.

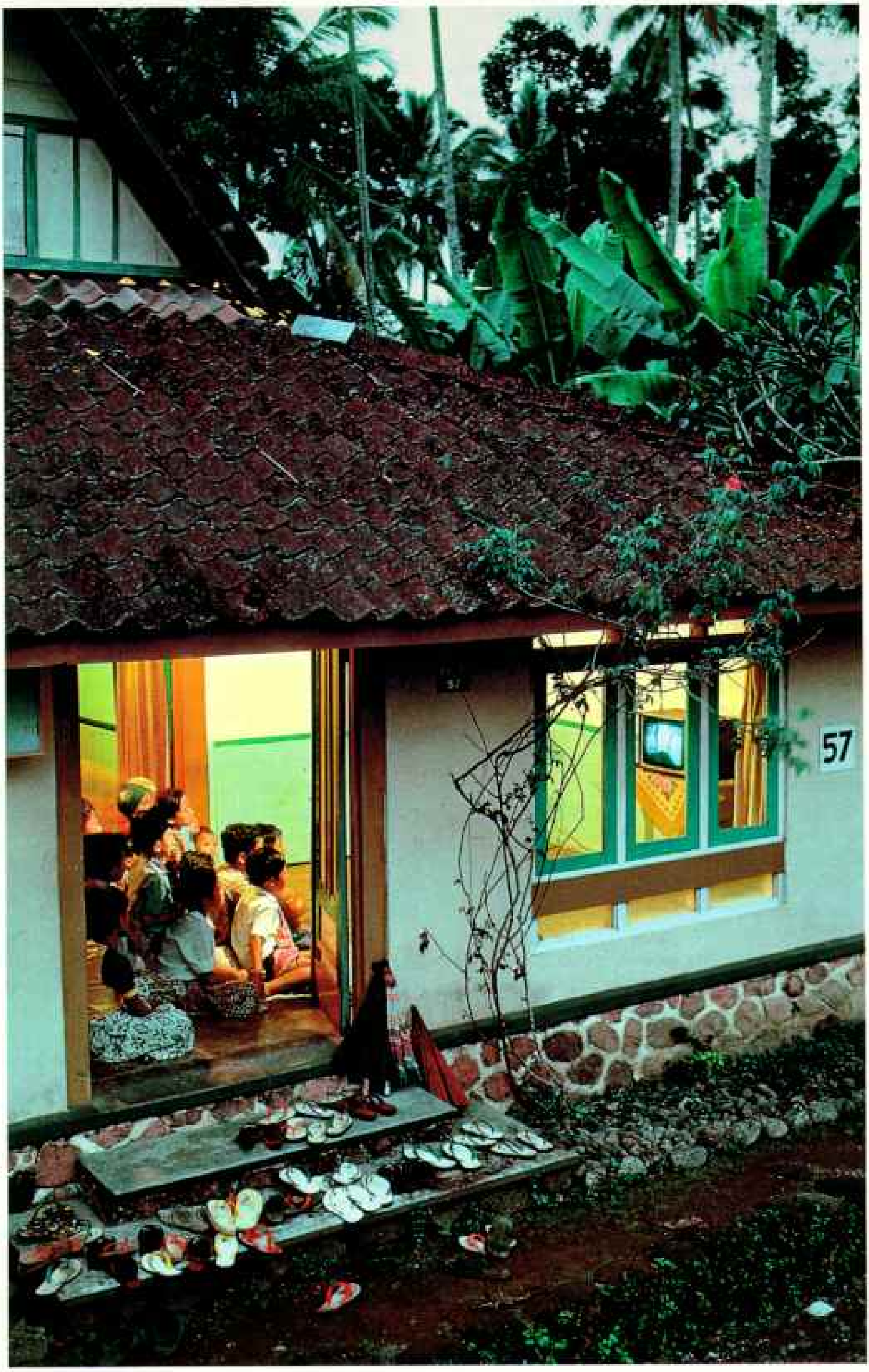
Jayapura, in the northeast corner, is farthest along in the process. An overcrowded harbor city looking out on the Pacific, it teems with migrants from other islands. Its cash flow is outward—back to the western islands. Javanese run the provincial administration. Chinese run the shops. Buginese and Makassarese, from Sulawesi, run the produce markets, the fishing industry, and most of the battered, garishly painted minibuses that swarm through the central city.

The Irianese grow vegetables and look for day labor on docks and boats—those who come to town. "Some are too embarrassed to come," a resident told me. "They haven't the clothes." An Irianese university professor put it more bluntly: "We are not the lords of Irian Jaya. We are losing our own province."

The first loss is the land. For 30 miles along the corkscrew road from tiny Sentani Airport to the city, jungle stands have been bulldozed down and buildings thrown up—visible evidence of a construction industry growing by 30 percent a year and of land values that have doubled and tripled in the process. Most of this land once belonged to the Sentani tribe. No longer.

In his jalousied living room surrounded by tribal carvings, Theys Eluay, the bewhiskered, iron-muscled Sentani chief, told me that his tribal council had sold it off to migrants. "My people need money now," he explained. "I am leading my people to a new way of life!"

What about the old ways? There would be no going back to them.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Eluay grinned. "My children and grandchildren will become university graduates and government officials," he replied.

"Education is the solution, but it's also where the problem starts," the Irianese professor explained. "Reading primers are written in Bahasa Indonesia, which 70 percent of the province does not speak. They tell about rice paddies and trains. Who knows anything about paddies and trains here? It's too big a jump. My people drop out, remain illiterate, and Jakarta says, 'See? Irianese don't want to learn.' We must Indonesianize Irian Jaya. But let's start with the language of the people—and stories about people who live here!"

The largest government project in the province—a symbol of Jakarta's determination to lift Irian Jaya into the 20th century—is the Trans-Irian Highway, designed to link Jayapura and the south-coast city of Merauke through Wamena, 5,500 feet up in the Baliem Valley. It is a 500-mile route as the crow flies. The road is being built in sections winding out of the three cities.

I WENT TO WAMENA—the Stone Age end of it. Here Dani tribesmen rub pig fat on their bodies against the cold and trudge the misty-morning roads wearing nothing but pumpkin-colored penis-sheath gourds, called *koteka*. The women wear grass or seed-bead skirts. Not so long ago the chief of one Baliem Valley tribe avenged the murder of his wife by catching and eating the murderers.

Simanjuntak, a strapping Sumatra Batak who has headed up the road-building project since its start in 1986, welcomed me to his cozy wood-paneled cottage. "We had to bring in everything by C-130 Hercules," he said. "Four, five flights a day: 15 tons of cement a flight."

We got into his red pickup truck and bounced down the packed-rock road and over a splendid new steel-girder bridge across the Baliem River. Seven miles farther on the road stopped abruptly at the foot of a wall rising to black rock pillars that frame the valley. Simanjuntak pointed to a distant 45-degree slope. "That's the only earth around. The rest is solid rock." He flashed a big can-do grin. "So we're going to switchback up that ridge."

How long before the road is completed? "If we had the money, ten more years," Simanjuntak replied. How long with budget cutbacks? He shook his head. "Maybe 25."

The most primitive people in the province are the Maskona tribe, who inhabit a region known as the Bird's Head at the island's western tip. Their land is impenetrable jungle karst pocked with sinkholes and ravines, separated from the coast by 7,000- to 10,000-foot peaks. Until a decade ago the Maskona fought brutal tribal wars, killed outsiders who trespassed on their lands, and lived in tree houses 40 feet above the jungle floor. Then Christian missionaries began to change traditional ways. The process is continuing.

The only way to reach the tribe is by air—and that's how the missionaries came. I went in on a missionary resupply helicopter and landed among a cluster of thatch-roofed huts on the flank of a mountain the Maskona call Very High Stone. Some 500 tribesmen clustered around the chopper. John and Linda Price, Americans from the Christian Bible Church who are studying the tribal language, bade me welcome and led me to the bark-walled hut that would be my quarters for the night.

What I hoped to learn was just how Indonesian these people had become. Maskona tribesmen crowded around to tell me. They had obviously been reached by politics. Musa Rocomna, the wiry, tattooed tribal *kepala* (chief), wore a yellow Golkar cap. I asked Rocomna if he had heard about the Second World War. "I never even heard about the first one," he replied.

A bright-eyed 16-year-old named Efradus served as spokesman for the group. "Eight years ago we didn't know what country we were in," he said. "We didn't know Irian Jaya, electricity, movies, TV, or money."

How had the government made its presence known? "They came three years ago and told us not to kill the missionaries," Efradus recounted. I asked him who the president of Indonesia was. "Pak Suharto," he answered promptly, using the short

Drawn to the flickering tube by the sound of cartoons, children in the Javanese village of Pabelan tune into Indonesia's one television network, which is run by the state and broadcast via satellite. The government, which controls all programming, gives a set to every village.

Cloaked in sorrow, young women in white shawls attend a funeral for a classmate at a Muslim boarding school on Java. Known for its progressive program of study, the Pondok Pesantren Pabelan school attracts students from all over Indonesia. Preserving its roots in Islam as it prepares pupils for modern life, the school embodies the ideals of a developing nation searching for its own path to world respect.

familiar form of *bapak*, the formal word for father. His smile lit up the hut. "He's the *big* kepala!"

WHAT IS IT that holds this extraordinarily diverse nation of Indonesia together? Over lunch in his office Emil Salim, the minister for population and environment, proposed the Five Principles, the Pancasila. I professed

skepticism. "Consider Korea, China, Germany," he explained. "Each is one people divided by nothing but ideology. Now think of us, who are so many different peoples, with so many disintegrating forces at work.

"Pancasila is like a star," Salim continued. "It provides guidance. There are millions of stars in the sky, and 180 million Indonesians. What if they all wanted to follow a different star? Our nation is still very young. It's constantly changing. But I know that all of our people agree upon the same star!"

Only once before have these islands come under the sway of central rule—the Majapahit Empire in the 14th century. An immensely gifted leader named Gajah Mada had been responsible. And I realized then that young Efradus had it right. It takes a *big* kepala to hold this land together—a *really big* kepala. And I wondered: After Pak Suharto, who in the world might that kepala be? □

Rowing Antarctica's "Most Mad Seas"

ARTICLE AND PHOTOGRAPHS BY NED GILLETTE

Battling monstrous seas off Cape Horn, our 28-foot craft, Sea Tomato, plunges down the slope of an enormous wave on a dizzying nautical roller coaster. Crew members Jay Morrison (left) and Fred Trombly hang on grimly as the boat broaches under the lash of a 50-knot storm. In this craft of my own design we are attempting to be the first to row from Chile to Antarctica across the 600-mile-wide Drake Passage, named for Sir Francis Drake, who in 1578 termed these treacherous waters the "most mad seas."

BOUND for the unknown, *Sea Tomato* heads south (below) through Chile's Paso Pratt on day one of the voyage—February 22, 1988. Our plan is to row the entire distance to Antarctica, but contrary onshore winds delay our departure for 30 days, as they did for three full months the previous year. We finally decide to sail the first leg of the voyage, then pick up west winds offshore that will push us along as we row southeastward across the Drake Passage (map, pages 132-3). Built for strength and safety rather than speed, *Sea Tomato* takes her name from her bright red color and bulbous shape.

Making ready for sea (right), our navigator, Mark Eichenberger, bends *Sea Tomato*'s jib onto the forestay. His hands are protected by rowing gloves that leave the tips of the fingers free for work. Our chartered Chilean support vessel, the fishing boat *Don Alberto*, escorts us the first few miles, then turns back.

We are four now against the sea: Mark, 35; Fred, 32; Jay, 33; and I, at 42, the leader of the expedition. Each of us has had extensive Antarctic experience or many years at sea. Our "fifth crew member," meteorologist Bob Rice, weather monitor in Bedford, Massachusetts, is not optimistic about our chances. "This project," he says solemnly, "has as low a probability of success as any of the 40-odd that I've assisted. Chances are 50-50 that the Chilean Navy will have to go after you."

Within hours the Drake Passage puts Bob's words to the test (right). As Fred steers under reefed sail, a powerful northwester that Bob had predicted slams into us, sending translucent, bottle green seas thundering over the rail into our self-bailing cockpits.

Shortly before dawn the next day I am standing watch in the aft cockpit. As *Sea Tomato* drives headlong down smoking, gunmetal seas, a rogue wave lifts her and kicks her upside down, sending me somersaulting out of the cockpit into the wild, frigid froth surrounding us. Still secured to the boat by my lifeline, I thrash desperately toward her. Suddenly a hand grips my shoulder, and Fred hauls me back aboard. "What are you doing," he roars, "taking a bath? And it's not even Saturday!" The first of many crises has been met and conquered.

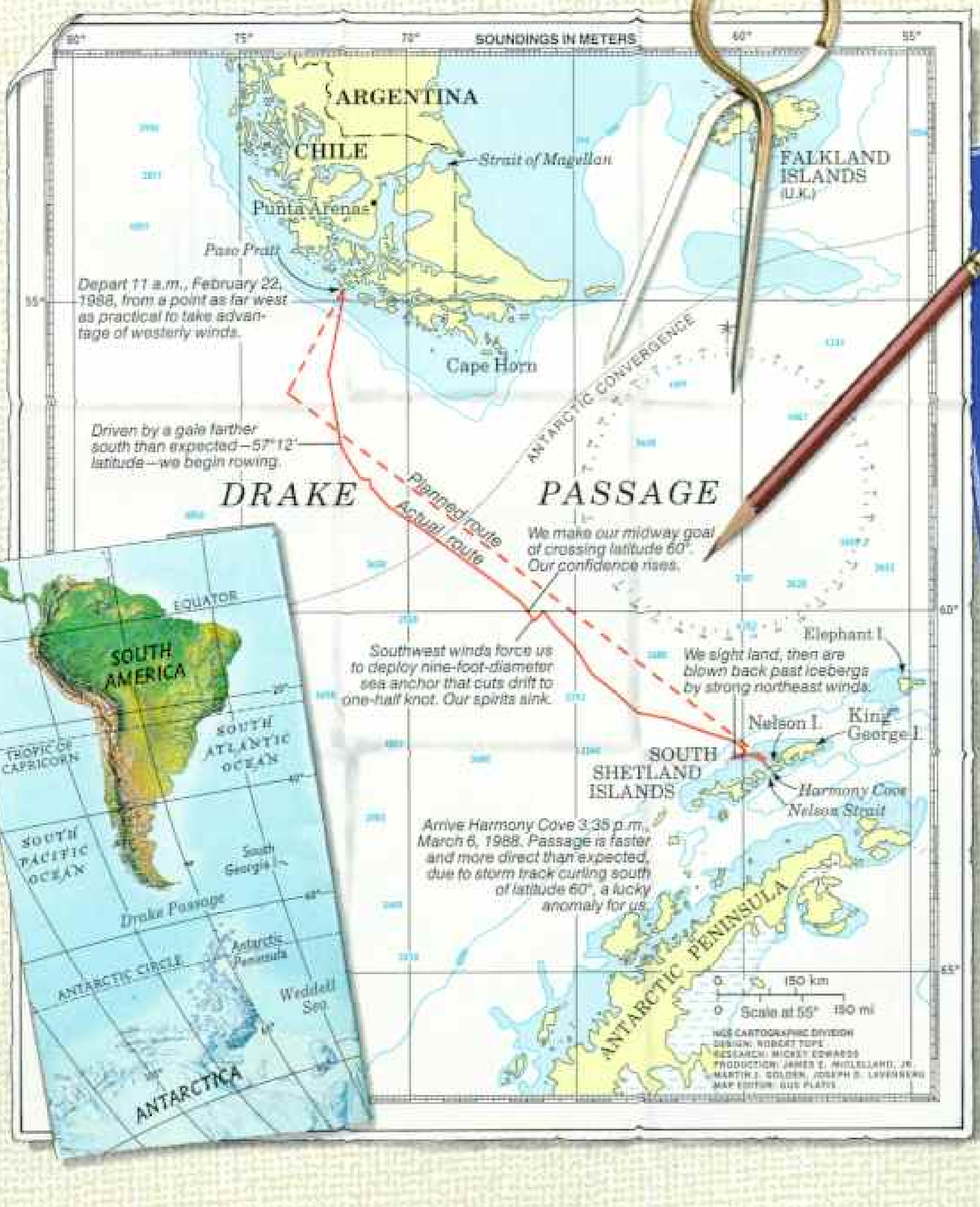
TERRY FOUR (BELOW)

Voyage of the *Sea Tomato:* Odyssey by Oar

AFTER the first 36 hours we strike sail and begin the long row. The northwester has driven us clear of Cape Horn's treacherous rocks into the relative safety of the open sea. Now the trick is to aim for the Antarctic Peninsula and avoid being swept past into the inhospitable South Atlantic by the prevailing westerlies. Normally each man will row alone for six hours.

Aided by quartering winds and seas, we average 2.3 knots—the rate of a casual stroll—during the 13-day voyage.

As Jay put it, "Survival is the name of the game." Making it through bone-chilling winds and giant waves means depending on one another for our lives, just as Sir Ernest Shackleton and his

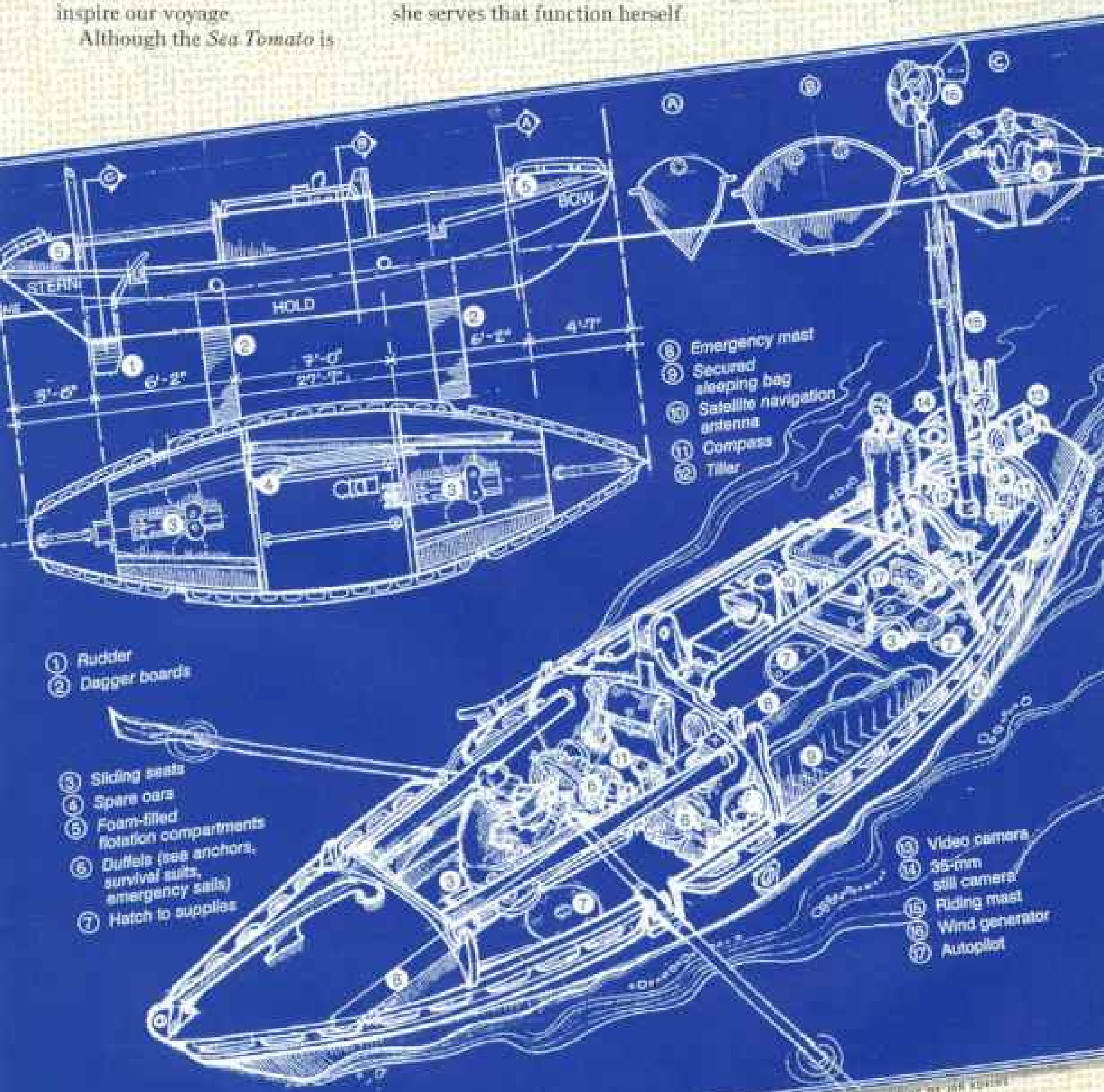


men had done more than 70 years before. In 1915 Shackleton's ship, *Endurance*, was crushed by ice in the Weddell Sea during exploration of the Antarctic coast. In search of help Shackleton and five companions sailed a 22.5-foot open boat 800 miles from Elephant Island to South Georgia Island and organized the rescue. Shackleton's story, which I had known since boyhood, helped inspire our voyage.

Although the *Sea Tomato* is propelled by the most primitive of means, muscle power, she is otherwise completely high-tech. Built dory style out of sturdy marine aluminum, she is divided into nine watertight compartments and can right herself after capsizing. She has a capacity for 30 days' supplies, the strength to withstand storm and ice, a configuration designed for rowing but with the ability to sail. *Sea Tomato* carries no life raft; she serves that function herself.

Expeditions conducted over the years on seven continents have taught me that exploration is not all derring-do. In fact, it is—or should be—a highly conservative business in which danger is measured against preparation.

As a result, we even know what we will do if we miss the Antarctic Peninsula—row downwind toward Shackleton's goal, South Georgia.



GEYSER of icy spray from a direct hit by a wave engulfs me. The impact slams me against the bulkhead and forces me to drop the oars, which are secured in the oarlocks against just such an emergency. The same mishap occurred to all of us and came to be known as the "Great Drake Tomato Paste."

In all we rowed 570 miles through seas whose winds, in the words of Sir Francis Drake, "were such as if the bowels of the earth had set all at liberty." In such unpredictable seas it's impossible to follow a regular

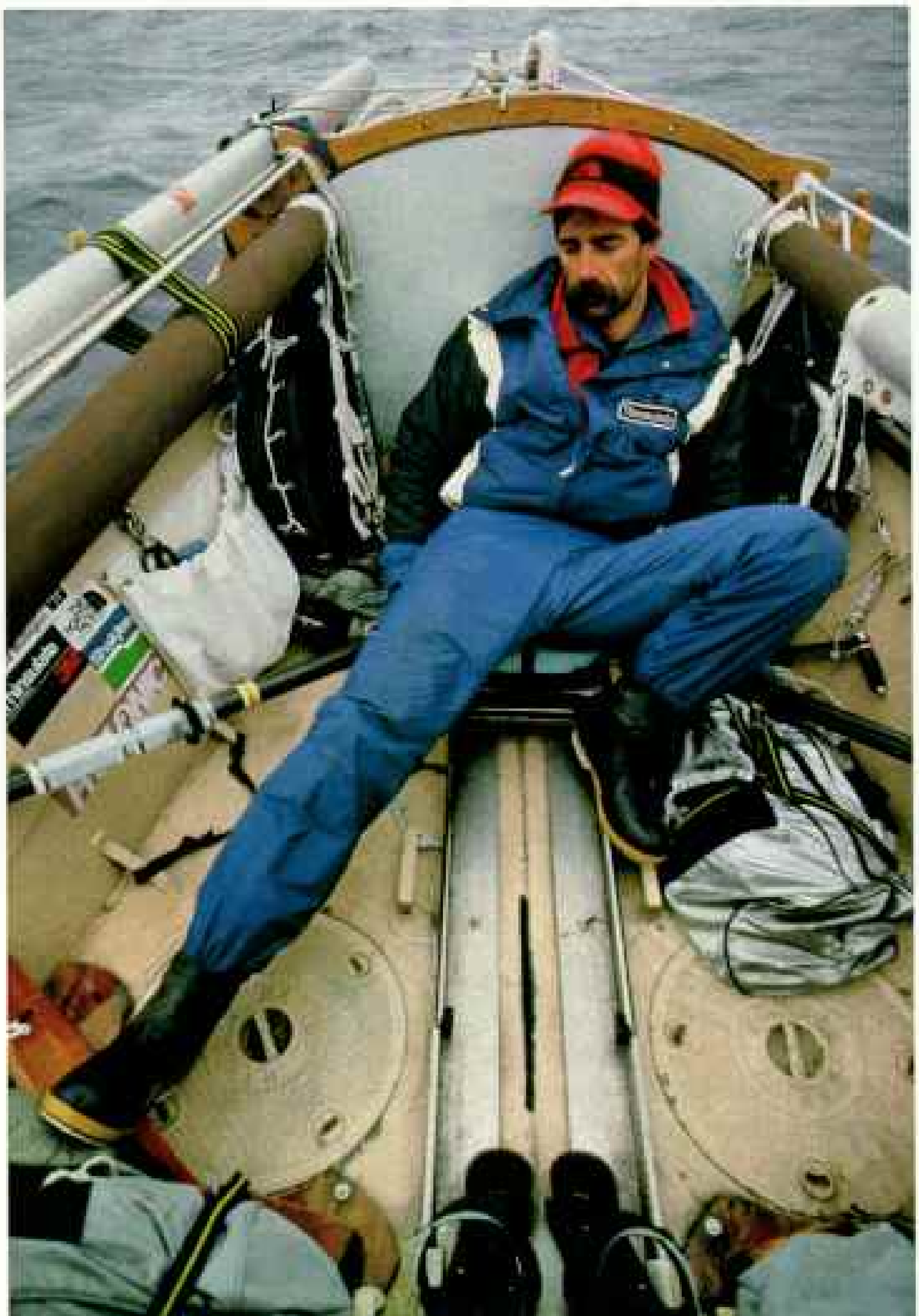
MARK EICHENBERGER

rhythm of oar stroke and recovery. The violent roll and pitch of the boat try our patience and endurance. When a strong wind heels us constantly to leeward, we use an oar on that side one foot shorter than the windward oar. We even learn to row in total darkness, timing the touch of blade to water by instinct. Before the voyage I would never have thought such a thing possible. But it works. The mood of the Drake Passage is usually hostile, but at times it's benign, with minke whales circling placidly and albatross soaring overhead on ten-foot wingspans.

SEAGOING SARDINES (above), the four of us lie jammed in *Sea Tomato's* six-by-seven-foot cabin, its three-foot-high ceiling padded to protect us during severe rolls and capsizings. Usually two men stand watch outside, but when our sea anchor is out and we are simply drifting, all four of us somehow wedge ourselves into a space about as large as a king-size bed. After a few days at sea the cabin took on an indescribable locker-room stench. Our definition of dry clothes became simply "wrung out."

Fatigue etches the face of Fred (right), resting momentarily at the oars on day nine. Although synthetic "wonder fabrics" protect us from the elements, we resort to an old-fashioned remedy—zinc oxide ointment slathered on our buttocks —to avoid saltwater boils from long hours in the rowing seat.

A rare period of calm (facing page) robs us of following winds and calls for two men at the oars to maintain speed.



ICY GRUEL (above) surrounds *Sea Tomato* on day twelve when we are in sight of land—the South Shetland Islands, just off the Antarctic Peninsula. Fred cautiously works his way through the brash ice. But the Drake Passage isn't going to let us off so easily. Soon 30-knot offshore winds hit us dead on, and despite desperate efforts at the oars we start losing ground. That night brings a driving snowstorm that cuts our visibility to zero. We are terrified of being blown headlong into an iceberg, something that even *Sea Tomato* could not survive. But luck—that ingredient you can never count on and only hope for—is with us. By next morning the wind drops, the snowstorm ends, and we double up on the oars, each man rowing 12 out of the next 24 hours. The last mile, against the current in Nelson Strait off Nelson Island, is a grueling, four-hour ordeal. We finally reach land at Harmony Cove (above right), where Fred makes his wobbly way over the rocks to shore just 13 days and five hours after we had left Chile's Paso Pratt. After an overnight we hoist *Sea Tomato*'s sails and arrive the next day at the Chilean base on King George Island, 25 miles away.

JAY MORRISON (ABOVE)

What did we accomplish? Nothing of great benefit to mankind perhaps, other than a daring challenge met and conquered. To my knowledge we are the first to row such a great distance in polar regions. But to the four of us the greater achievement was the inner voyage, reaching beyond our normal limits to attain the goal. None of us, I think, will ever forget that experience. □

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$20 MILLION

LAST JANUARY I was pleased to announce the creation of the National Geographic Society Education Foundation—a unique institution to raise and distribute money for geography programs in grades K-12. We are excited about our first year's progress.

More than 4,000 people have written to Lloyd H. Elliott, the foundation's president. Most are teachers or administrators delighted to receive support in the classroom.

As a start, the foundation organized a fund-raising campaign to pay for innovative geography instruction programs for teachers. Even before the formal campaign got under way, however, we received gifts totaling more than $700,000.

A Society member from Florida gave $21,000 worth of stock in memory of her husband, who had been a geography teacher. Another member, from Massachusetts, made a bequest of $295,000. Third-grade students at the John Glenn Elementary School in St. Joseph, Missouri, contributed $86.41 from the sale of handmade geography pins.

Every dollar has gone to support geography programs. Not one penny was used to run the foundation, whose expenses are entirely paid by the Society. What's more, every contribution was matched by the Geographic, adding $700,000 to the 20 million dollars that was the Society's initial centennial gift.

21
SUMMER GEOGRAPHY
INSTITUTES
IN 1988 TRAINING
643 TEACHERS IN
14 STATES

TEACHERS GIVING
1,451
WORKSHOPS AT
HOME SCHOOLS TO
43,530
OTHER TEACHERS

3,000,000
STUDENTS
BEING TAUGHT
GEOGRAPHY
THIS YEAR

Encouraged by this beginning, the foundation distributed more than a million dollars in grants in 1988. The majority went to support 21 teacher-training institutes in 14 states.

While it is too early to measure results, the immense value of rekindling a teacher's enthusiasm is clear. Joanne Flint of Dayton, Oregon, said she felt like a "missionary" after attending a summer institute at Society headquarters, which became the model for other institutes.

"A highlight in my life," wrote Judy Ludovise of Santa Rosa, California, of her experience at a summer institute. "I feel excited about my own classes this fall, plus I feel an enthusiasm for my geographic mission beyond the classroom," said Patricia Bruder of Belle Plaine, Minnesota. "Teachers inspiring teachers works," wrote Gail Wallace of Midlothian, Virginia, "and the students will win."

Teachers such as these deserve support from all Americans—corporations, foundations, and individuals. If you would like to participate in this effort by making a gift to the foundation or if you would like to receive a detailed update on the activities it funds, write to National Geographic Society Education Foundation, Dept. P, Washington, D. C. 20036-3652.

Members Forum

Robert E. Peary

A short note of correction on Wally Herbert's otherwise superb and moving article on Adm. Robert E. Peary's quest for the North Pole.

A note from Peary's wife is described by Herbert on page 412 of the September 1988 issue as "unpublished." To the contrary, Mrs. Peary's note appears in John Edward Weems' definitive biography *Peary: The Explorer and the Man.* This out-of-print classic was reissued by Jeremy P. Tarcher, Inc., last April to commemorate Peary's polar attainment and the reuniting of Peary and Matthew Henson at Arlington Cemetery.

NATHANIEL H. SHERRILL
Los Angeles, California

Weems, who had access to the Peary papers, published Mrs. Peary's comment on her husband's mental torment, although she herself never did.

It required great courage and dedication to journalistic accuracy for the Society and the Peary family to agree to publication of this article.

JAMES L. MACDONALD
Mill Creek, Washington

Considering the shifting ice mass and the location over the ocean, Peary crisscrossed the Pole and area nearby sufficiently to stake his claim; 87° 57′ seems to me to be the center ring.

R. BRUCE BRYANT
Atlanta, Georgia

The author suggests that Peary was "west of the Pole." Apparently the author meant west of the Columbia meridian.

ROBERT M. HOWELL
Joshua Tree, California

Let's assume Henson was indeed sitting "on top of the world" when Peary caught up with him and that subsequent sightings by the explorer bore this out. Obsessed as he was with wanting to be first to the Pole, might not have Peary, disillusioned and disappointed that his trusted friend had robbed him of his moment, been unable to bring himself to record the event in his diary?

GILBERT L. HASELBERGER
St. Paul, Minnesota

I have not found a single sentence that presented a mathematical analysis of the data presented by Peary to support his claim; not a single sentence to show why Peary would not have been aware of any significant errors and what he might have done to correct them. This man was *not* incompetent. He had dealt with surveying methods for 30 years and had traveled the far north for 20 years—and he always got back. His procedure appears to have been essentially what anyone would have done to verify his position and bracket the Pole to cover any minor errors. If he had been even as far from the Pole as Herbert theorizes, why would he not have taken an additional 24 hours or so to move to the Pole?

MARSHALL MCDONALD
Houston, Texas

The Peary story seems destined never to end. Since publication of Herbert's conclusion that Peary and Henson may have ended their historic trek 30 to 60 miles to the left of the Pole, astronomer Dennis Rawlins has interpreted a page of observations, found in the Peary papers at the National Archives, to mean that the party was actually some 120 miles to the right of the Pole. This conclusion also calls into question the observations of Capt. Robert Bartlett, who turned back above 87°, 133 nautical miles from the Pole. In the hope of resolving these questions, the National Geographic Society has commissioned the Navigation Foundation to make an independent study of all navigational data from the expedition. Herbert's study of Peary, The Noose of Laurels *(Atheneum), will appear this spring.*

Descendants of the Expeditions

I read with pride and admiration the story of Matthew Henson. I remember vividly his visit to Francis Junior High School in Washington, D. C. Mr. Henson, in full Eskimo regalia, spoke to the student body about the exciting and dangerous experiences that he and Robert E. Peary encountered in their search for the Pole.

LAURA E. CLAYTON
Brooklyn, New York

I was disappointed that you chose to tell only the stories of Peary's and Henson's Eskimo descendants. I would like to have known more about Peary's wife, Josephine, and their children, and about Henson's legitimate offspring.

I think there is another possible explanation for Peary's subdued reaction at the Pole. How often does one find that the dream attained falls short of the expectation. The statement from his diary, "I wish Jo could be here with me to share my feelings. I have drunk her health and that of the kids," may be more telling than all the blank pages. It may have been a very bitter drink indeed if he suddenly realized that he had sacrificed the best years of his life, the years when his wife and children most needed him, for the sake of finding a bunch of ice at the top of the world.

PEGGY S. BOLLES
Downey, California

Henson and his wife, Lucy, had no children.

Centennial

The September 1988 issue was right on target. It portrays in a significant way much of humankind's progress, adventures, and achievements during the first hundred years of the life of the magazine.

NUELL C. CRAIN
Dallas, Texas

Looking through the past covers (September 1988), it was my childhood that "passed before my eyes." I was immersed in very special memories of sitting on my father's knee while we examined the latest "yellow book." Here, surely, was born my interest in geography, history, social science, and human endeavor—a love of the world and her people.

MARION JOY BRADY
Ballarat North, Victoria, Australia

The picture of Joseph F. Rock and the words about his starched attire and accoutrements of Western civilization in Charles McCarry's article brought back memories. In 1947 our two-man search and recovery team of the American Graves Registration Service and three Chinese horsemen (mafoos) were eating lunch on the banks of the Mekong River north of the Burma Road. The older mafoo was grinning as he watched me shovel food from a rice bowl into my mouth with chopsticks. Upon inquiry, he claimed to have traveled with Dr. Rock, who, unlike round-eyed me, insisted that at every meal his table, crisp white tablecloth, silverware, and chair be arranged for his dining comfort.

MILTON E. BALLARD
Tucson, Arizona

Of special interest was the reference to the "critical mass of graduates of the University of Missouri School of Journalism." What a different tack these artful pages might have taken were it not for the influence of one of the nation's pioneers in photojournalism, Clifton Edom, MU professor emeritus.

JOANNIE V. KIDDER
Neosho, Missouri

Odyssey

In the September 1988 issue Jane Livingston compares photography in NATIONAL GEOGRAPHIC with that in *Arizona Highways* and *Sierra Club Bulletin* and rightly points out that the purpose of the former is primarily to give information, while the latter two are interested in aesthetic values. However, I feel she denigrates the efforts of the many fine photographers when she concludes that "the far less patently gorgeous, less picturesque images of nature made by the Geographic now seem more artful than those glamorous pictures. . . . the Geographic pictures triumph." Excellence in photography is not achieved by putting down another school of thought.

ED COOPER
El Verano, California

What of the talented artists who are employed by the Geographic! They deserve at least a curtain call for their contributions to a great magazine.

WILLIAM H. LAMAR
San Antonio, Texas

The story of Kodachrome was of particular interest to me. In 1961 Leopold Mannes told me how he and Godowsky made the first transparency in the family bathroom. To get the proper timing for each layer of color, they hummed Sousa marches, which gave them half-second beats. This was done in New York City when the two young men entered a photo contest. The process had already been patented when Kodak came into the picture. A joint venture was established, and the final perfection was to take place in Rochester, New York.

O. A. "JOLLY" BATCHELLER
Claremont, California

Alexander Graham Bell

Hats off to the Society for its superb article on Alexander Graham Bell (September 1988). There was definitely more to this man than being the inventor of the telephone; his compassion and concern for the hearing impaired is such an example. I highly recommend anyone traveling to Nova Scotia to visit the Bell museum in Baddeck.

JAMES R. MASSA
Manchester, New Hampshire

Spoofing the Geographic

I am glad the GEOGRAPHIC has such a sense of humor (September 1988). Great cartoons.

DONALD N. HAMMARSTROM
Denver, Colorado

May I make one small addition? The story was in the *New Yorker*, I think, in 1933 or 1934. Two elderly ladies have joined the National Geographic Society and received your acknowledgement that they are now National Geographic Associates. Hurriedly they write back: "Dear Mr. Grosvenor, please do not misunderstand us! We did not plan to go on all these exploration voyages. All we want is to get the magazine."

HANS JONGBLOED
Ontario, California

Letters should be addressed to ***Members Forum****, National Geographic Magazine, Box 37448, Washington, D. C. 20013, and should include sender's address and telephone number. Not all letters can be used. Those that are will often be edited and excerpted.*

JANUARY 1989

GEOGRAPHICA

NATIONAL GEOGRAPHIC MAGAZINE

PETER KEIT

Future Still Uncertain For Mountain Gorillas

Three years after the brutal murder of Dian Fossey (above), the African mountain gorillas she studied and loved survive, even if in an imperiled state.

A 1986 census in the Virunga Mountains of Rwanda, Zaire, and Uganda recorded 280 gorillas, up from 239 in 1981. "The trend is positive," reports Craig R. Sholley, director of the Mountain Gorilla Project. The project manages gorilla affairs in Rwanda's Parc National des Volcans, home of Dr. Fossey's Karisoke Research Centre.

But the gorillas—to Sholley "one of the most endangered large mammals in the wild"—suffered an outbreak of serious respiratory illness during the 1988 rainy season. Six died, and autopsies revealed that one had been infected with measles. The virus was probably transmitted by humans—guides, tourists, poachers, park rangers, soldiers, or area residents. Antibiotics were used to successfully treat 13 animals for the respiratory ailment. Then, last summer, almost all the gorillas in high-risk areas, except for infants and females that might be pregnant, were vaccinated against measles.

"There have been no new disease symptoms, and we now have a healthy population," Sholley says with relief. Still, he and his staff will watch for illness during the 1989 rainy season.

Virus May Threaten Wolves of Isle Royale

Also in jeopardy are the gray wolves of Isle Royale National Park (NATIONAL GEOGRAPHIC, April 1985).

Only 12 were found during last winter's annual census of the 210-square-mile archipelago in Lake Superior. That is the fewest since the study of Isle Royale's wolves began in 1958. In 1980 the wolf population peaked at 50. Now only three or four females capable of reproducing remain, and biologists and park managers fear that the wolves, so carefully protected, may vanish. A disease called canine parvovirus, transmitted by domestic dogs, may be the chief cause of the decline. It appeared among dogs in 1977, killing several thousand in the U.S. and spreading worldwide. Despite a ban against bringing pets onto Isle Royale, "boaters, out of ignorance, occasionally bring their dogs ashore," says wildlife biologist Rolf Peterson, who has led the wolf study since 1975.

Additional factors may include other diseases, inbreeding, and the current population of moose—the wolves' major prey—that are young, vigorous, and hard to kill. But if parvovirus is the culprit, the outlook is grim. Though a vaccine exists, it is almost impossible to repeatedly capture every wolf on the island for periodic inoculations.

Stone Age Textiles, Skulls in Israeli Cave

Archaeologists working in Israel's Nahal Hemar cave, a Neolithic site south of Jerusalem, have found pieces of fabric that may be the earliest known example of linen. The cave also has yielded what may be the oldest known samples of woven baskets in the Middle East.

The Israeli team, under Ofer Bar-Yosef and Tamar Schick and partially funded by the National Geographic Society, found a vast array of stone and bone tools, and human skulls decorated with asphalt. The team also discovered wooden arrowheads that, like the textiles and baskets, were preserved by the cave's dryness. The remains date back 8,500 years.

"By that time," says Bar-Yosef, "along the Jordan Valley there were

ROLF PETERSON

village communities with farmers who cultivated cereals, legumes, and flax, raised goats and sheep, and continued to gather wild plants and hunt. We think this cave was a sacred place they'd go to once a year, when the entire tribe or part of it would perform some kind of ceremony." The artifacts found there, including an almost complete stone mask that still bears traces of colored paint, were produced elsewhere and brought to the cave, where they were cached.

A "Living Fossil" in a High-Tech Age

The coelacanth, a fish whose origin dates back 400 million years, is being studied via modern high technology.

A coelacanth captured off the Comoro Islands and brought frozen to the United States underwent seven hours of three-dimensional computerized X-ray scanning and 13 hours of magnetic resonance imaging. The lengthy tests were designed to provide detailed data on the fish's tissues. Scientists will also study the genetic and biochemical makeup of the now dissected fish, a young female. Dr. Jack Musick of the Virginia Institute of Marine Science, who led the team, says such tests were not feasible when coelacanth tissues were last available for study in the U. S. a decade ago.

Coelacanths were thought to have been extinct for 60 million years until one was caught off South Africa in 1938. All specimens found since then were taken by fishermen off the Comoro Islands. None have ever been kept alive for longer than a few days, but in 1987, a German scientist, Hans Fricke, first observed the fish in its natural habitat (GEOGRAPHIC, June 1988).

HANS FRICKE

Killer Bees Nearing U. S. Border

Killer bees advancing through Mexico have slowed their pace. But scientists expect them to reach the U. S. in late 1989 or early 1990.

Since 26 African honeybee queens escaped from a research station in Brazil (GEOGRAPHIC, April 1976), their offspring have spread throughout Central and South America. By December 1988 the ferocious insects were about 350 miles south of Brownsville, Texas. Their stings are no worse than those of other honeybees, but, unlike most bees, they have been known to attack by the thousands—sometimes with fatal results.

Mexican and U. S. officials set up two control zones in central Mexico last summer to intercept the bees. Efforts to trap and kill migrating swarms were relatively successful, says Elba Quintero of the U. S. Department of Agriculture in Mexico City. But a plan to dilute the bees genetically, by flooding the zones with gentler European bees and having them interbreed, is failing because officials cannot obtain enough bees for the job.

"The plan probably won't help anyway," says Dr. Orley Taylor of the University of Kansas. A recent study of genetic material collected from Africanized bees shows they have not been changed by three decades of contact with European bees.

On the Water, Something New Under the Sun

We don't often hear about a government program that saves money and also benefits the environment. Here's one:

The U. S. Coast Guard has installed solar-powered batteries in 10,500 of its 16,600 lighted aids to navigation, replacing conventional batteries. Solar-powered batteries are longer lasting and cheaper—about $75 a year per buoy compared with $285 for conventional batteries, for a total saving of about 2.2 million dollars a year. In addition, solar batteries don't leak polluting mercury. Depleted zinc-carbon batteries often do, making them difficult to dispose of safely.

Coast Guardsmen who service the aids have been happy with the change. Said a report to the Department of Energy: "They liked the idea of carrying one or two 65-pound solar batteries up a cliff to a remote light every five years . . . when they were accustomed to struggling with at least one 400-pound primary battery annually."

1994 Olympics to Norway; Anchorage Effort Fails

Anchorage, Alaska, has failed in its bid to host the 1994 Winter Olympic Games (GEOGRAPHIC, March 1988). The International Olympic Committee chose instead the small Norwegian city of Lillehammer as the site of the first Winter Olympics to be held in a different year from the Summer Games.

Peary Caribou **Genus:** *Rangifer* **Species:** *tarandus* **Subspecies:** *pearyi*
Adult size: Length, male, 160cm; female, 130cm **Adult weight:** Male, 66-92kg; female, 51-86kg
Habitat: Islands in the Canadian High Arctic and Greenland **Surviving number:** Unknown
Photographed by Jim Brandenburg

Wildlife as Canon sees it

One of the greatest roles of photography is to record and preserve images of the world around us worthy to be handed down as a heritage for all generations. A photograph of a pair of Peary caribou offers us a glimpse of this rare subspecies amidst the starkness of its frozen habitat.

Peary caribou live in herds numbering less than 20 that are thinly scattered over a vast area. During the long arctic winter, the caribou have to fight for survival in one of the earth's most severe climates, existing in average temperatures of minus 40°F and on sparse vegetation hidden under snow and ice. Named after the North Pole explorer, Robert E. Peary, this ghostly creature of the north was never abundant, and a slow recovery rate leaves it in a continuous struggle for survival.

As with most endangered species, the future of the Peary caribou greatly depends on mankind's ability to live in harmony with the natural world. An invaluable research tool, photography can help promote a greater awareness and understanding of the Peary caribou and how it lives within its natural environment.

And understanding is perhaps the single most important factor in saving the Peary caribou and all of wildlife.

NATIONAL GEOGRAPHIC MAGAZINE

ABUSE OF THE DRUG COCAINE is moving through our society like a modern-day plague. In 1987 alone there were a thousand drug-related homicides in the U. S., and millions of Americans are sniffing and shooting their way to financial and physical ruin.

This craze is particularly tragic for the innocent victims—friends and families of users, crime victims, and those who unknowingly become enmeshed in the multibillion-dollar business.

Two years ago a former National Geographic photographic intern, Conan Owen (below), became one of the latter. Since then he has languished in a Spanish prison in Barcelona, convicted of trafficking in cocaine.

On March 13, 1987, Conan landed in Barcelona on a photo assignment. Among his bags was a case of brochures he was delivering for his

ALFONSO GUTIERREZ E., A.G.E. FOTOSTOCK

employer, a travel agency. A customs inspector found a false lining in the case, which hid two kilos of cocaine. Shocked, the Syracuse University honors graduate saw his world fall apart.

After a year in prison Conan was tried in a Spanish court, fined $18,000, and given six years and a day in prison. The extra day was important: Sentences over six years preclude deportation.

Conan's father, Ernest Owen, told me of the family's frustrations. "The arresting agent said he believed Conan was innocent: When the agent asked for a case to check, Conan handed him the one with the cocaine." This detail did not come out at the trial. A polygraph test that indicated innocence was not admitted as evidence. Nor was the dealer's confession that Conan did not know he was carrying cocaine.

Recently, the prosecutor dropped her appeal for an additional charge of smuggling. Conan became eligible for transfer to a U. S. prison under an international treaty. As I write this, Conan has just arrived home, where a parole can make him a free man again.

Conan is one of the luckier cocaine victims. In the pages that follow, Peter T. White and José Azel describe the shadowy cocaine business and the struggle of many to shake its chemical snare.

Wilbur E. Garrett

EDITOR

STOP!

Yes, you can. Chevy Astro.

A rear-wheel anti-lock brake system might be unexpected in a compact van. But is now standard in the advanced Chevy Astro.

On wet or icy roads especially, you'll feel good having a rear-wheel anti-lock brake system designed to help you make fast, stable stops. For all the driving, stopping and living your family does, Chevy Astro is the van that can.

New 3-year/50,000-mile Bumper to Bumper Plus Warranty protection. See your Chevrolet dealer for terms of this new limited warranty.

 Let's get it together...buckle up.

283 BSV

THE *Heartbeat*
OF AMERICA TODAY'S CHEVY TRUCK™

On Assignment

PHOTOGRAPHS BY JOSÉ AZEL (ABOVE LEFT); PETER T. WHITE (ABOVE); PHIL SCHOFIELD

GETTING HIS TEETH into the subject on his 35th assignment for the magazine, Assistant Editor PETER T. WHITE (above) sampled coca-leaf extract laced with sulfuric acid during illegal processing of cocaine in Colombia. "It tasted like gasoline," Peter said; the processor decreed, "It's just right." In Bolivia an elderly woman showed Peter how to bundle dried leaves of the herb into a cheek-filling wad, as highlanders have for centuries. The leaves warded off his hunger and thirst for 12 hours. "As Rosa predicted, 'it sleeps your stomach,' " he says.

On his first assignment for the magazine, photographer JOSÉ AZEL (above right) found that even people legally involved with cocaine didn't want to be photographed. These Colombian police at the Miraflores airfield loosened up after Spanish-speaking José befriended them.

Born in Cuba, a refugee at age seven, José earned his master's degree in journalism at the University of Missouri. After five years as a *Miami Herald* photographer he went free lance to do more in-depth stories. Coca proved one of these. "It took immense concentration and persistence to overcome resistance. In fact, it was a lot like rock climbing, my favorite hobby," says José.

Resting atop Steens Mountain in Oregon, DOUGLAS H. CHADWICK (below) was at it again—roaming the West. For this issue he sought the essence of sagebrush country, mythic heart of America, by walking 500 miles, riding horseback for 200, and driving some 30,000 more.

Chad found his calling at age six, when he served as chief bottle washer in his father's geology field camps. "I spent all my time collecting beetles and watching birds," he recalls. When he learned he could earn a master's degree by studying wild mountain goats in the Rockies, he leaped at the chance. Seven years later he had his degree, an article in the July 1977 GEOGRAPHIC, and a new home—a cabin beside Montana's Glacier National Park. You'll still find him in Montana with his wife and two children, except when he's trekking across Namibia, Nepal, or the Soviet Union, reporting on the people and animals who share the land. "Politics, economics, and finally human freedom and dignity, all these things rest on the natural environment," he believes.