VOL. 121, NO. 1 JANUARY, 1962

NATIONAL GEOGRAPHIC

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◀ COVER: *Free diver and scrawled filefish meet above the bed of John Pennekamp Coral Reef State Park, Florida* *(page 72).*

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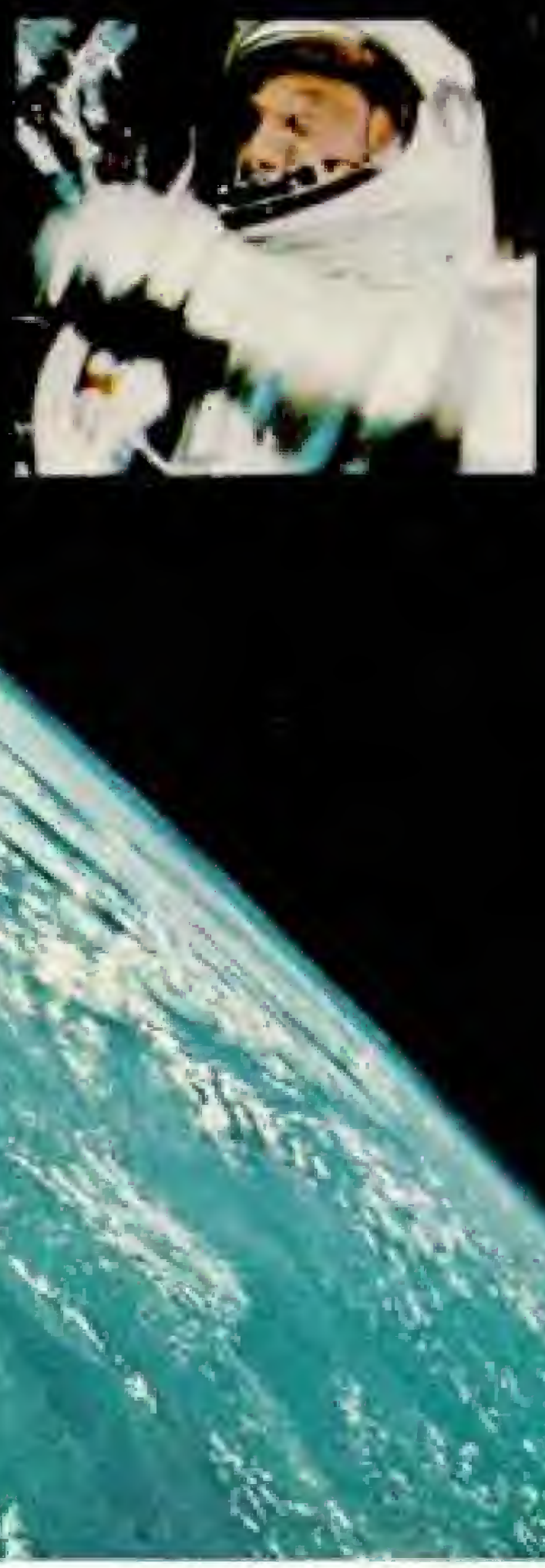

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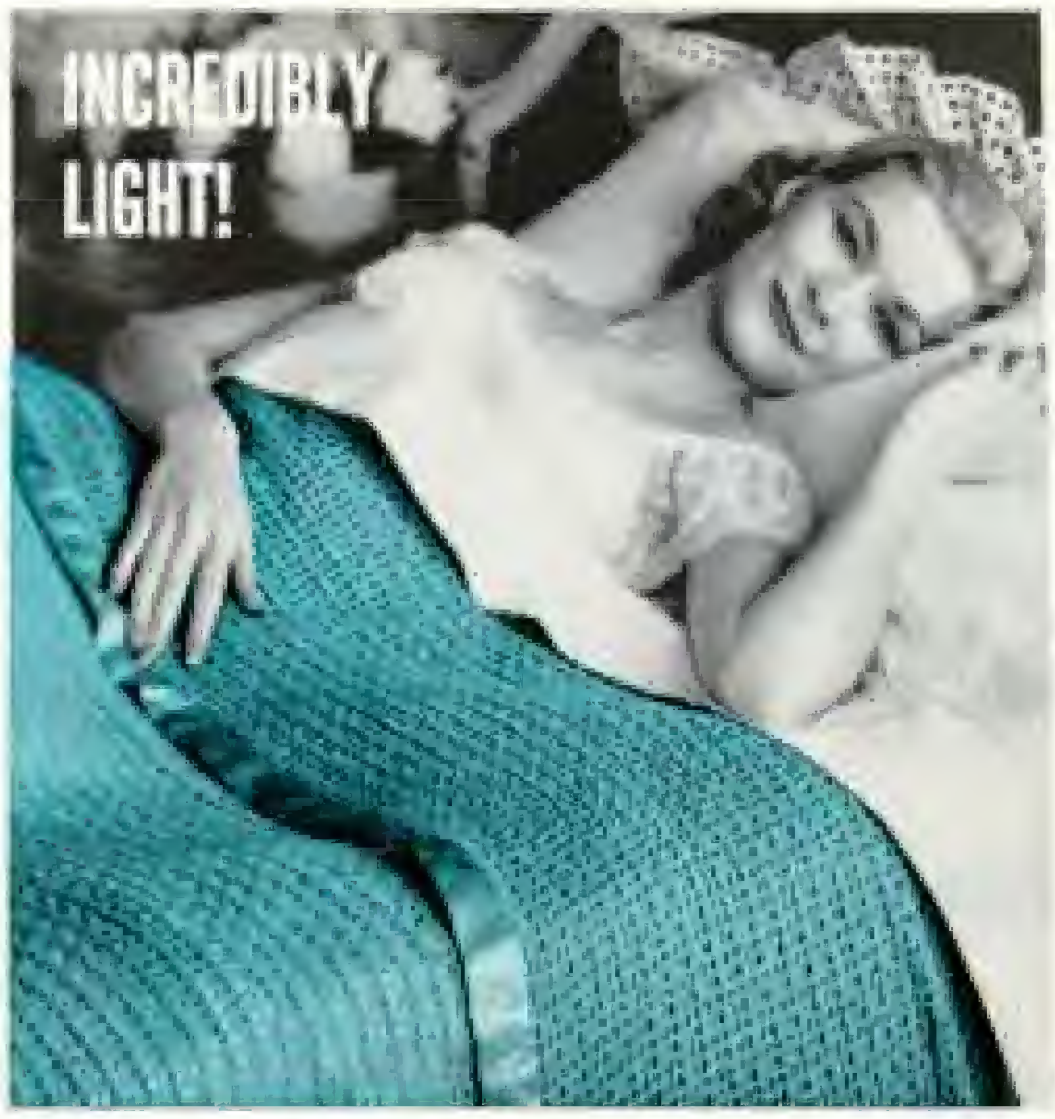

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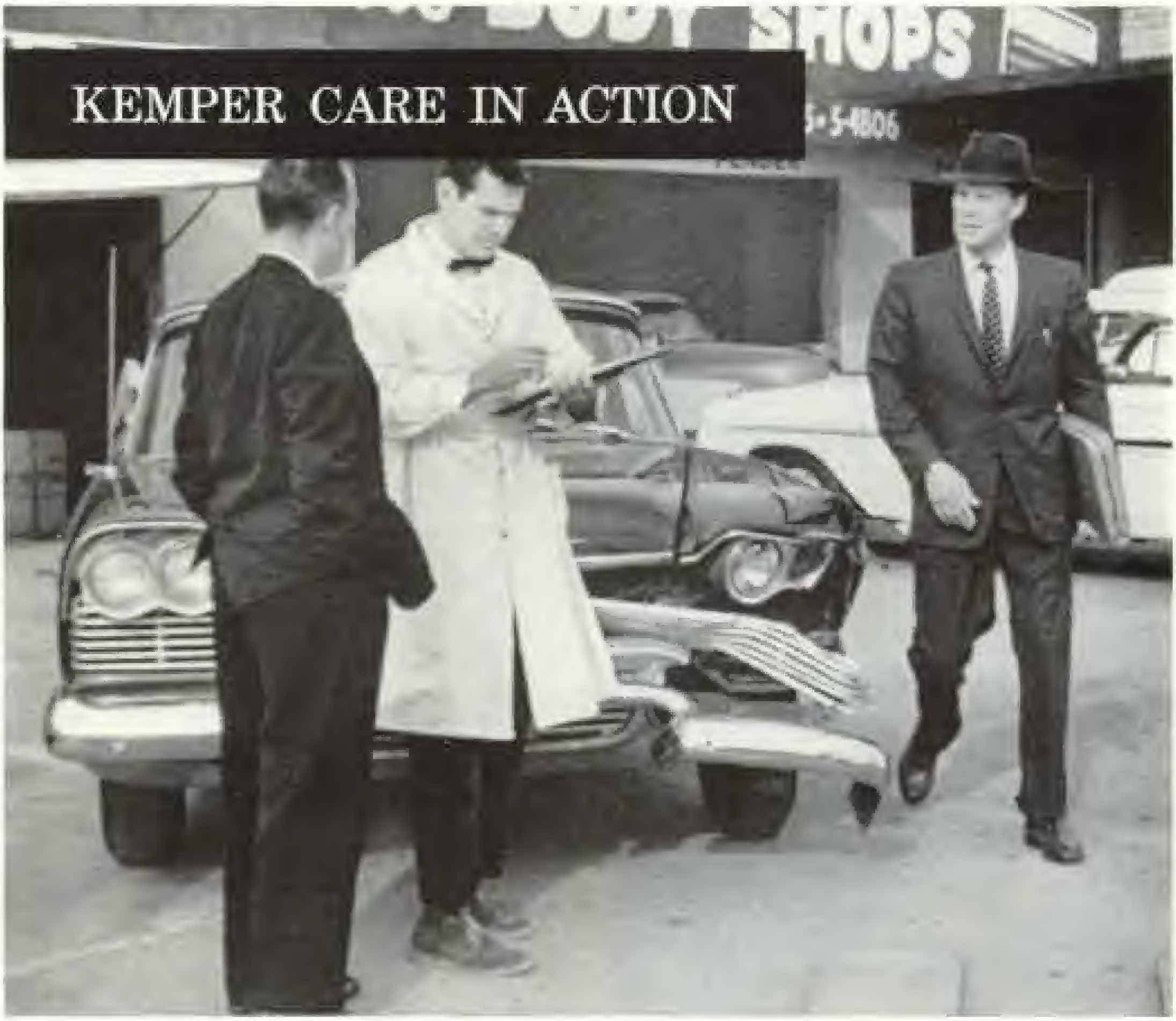

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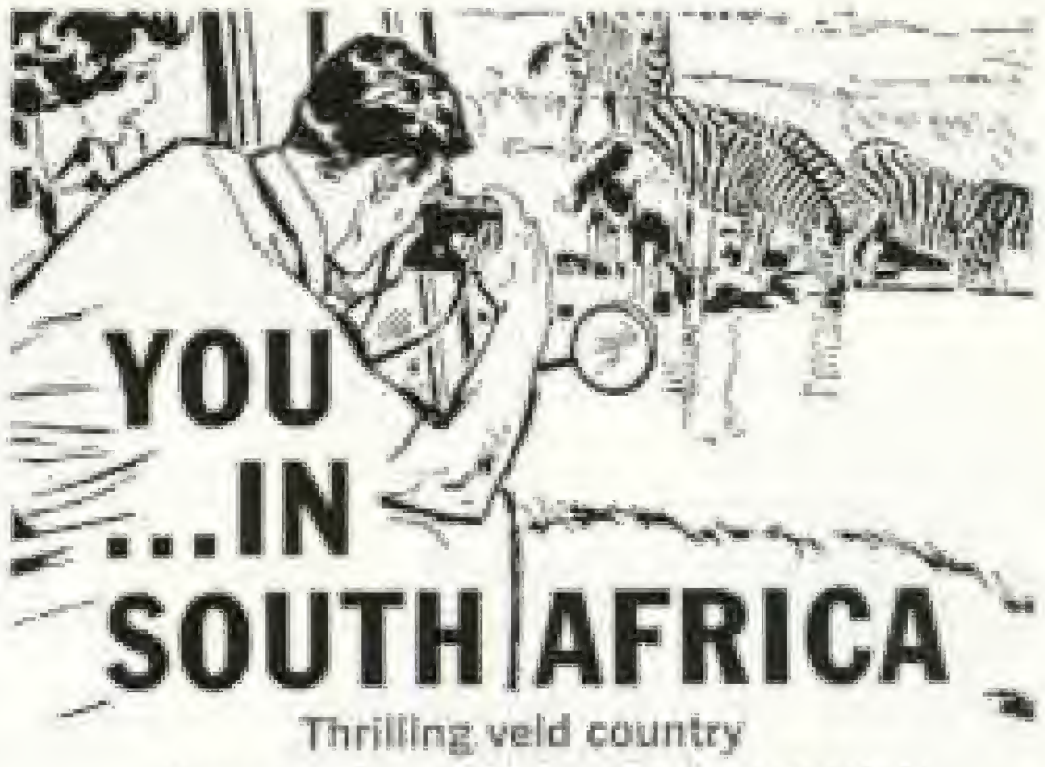

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CORINTH — Pageant — Apr. 6-7

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July 20-21, Texas Days

Aug. 17-18, Confederate States Days

1962 PILGRIMAGES

Natchez—Mar. 3-Apr. 1
Vicksburg—Mar. 2-Apr. 14
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Columbus—Mar. 31-Apr. 8
Gulf Coast—Mar. 17-29

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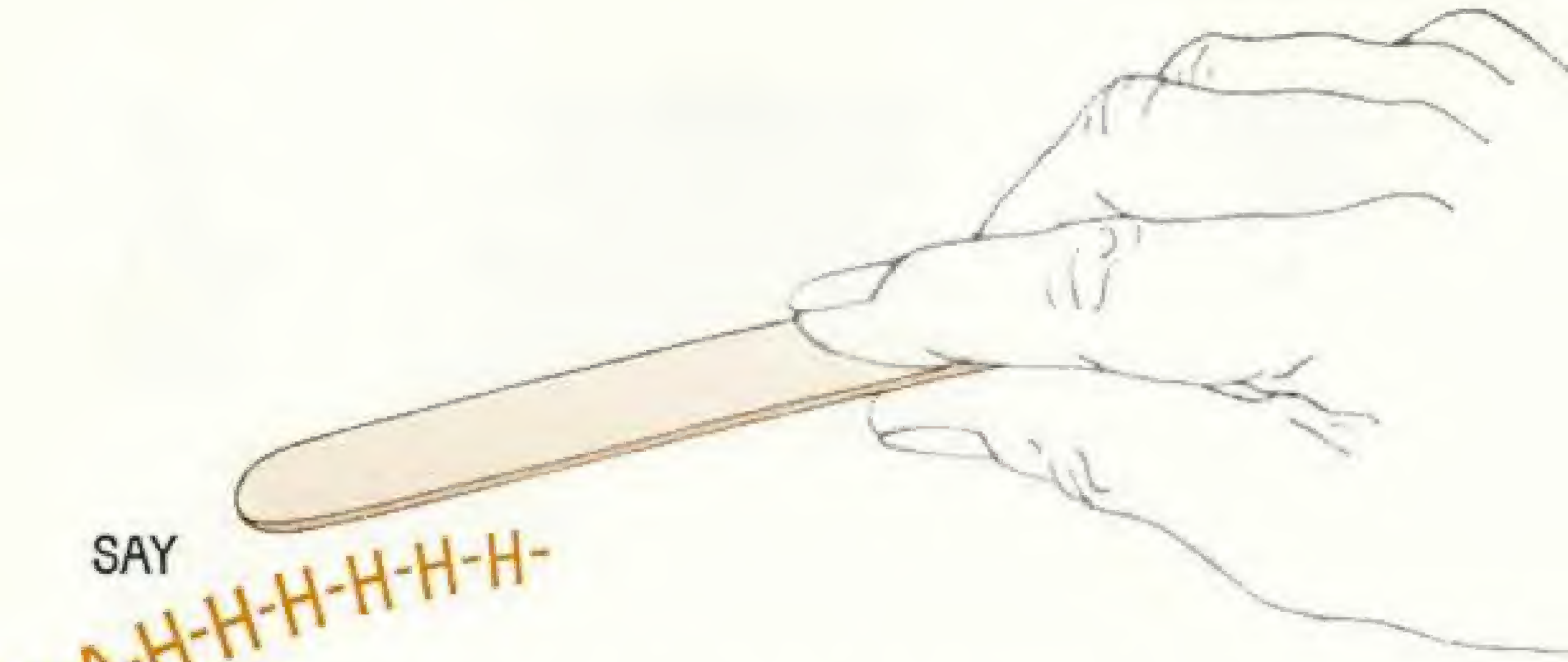

...AND EVERYTHING ELSE THAT'S IMPORTANT

Here's a suggestion that could make your next health examination the most *complete* one you've ever had.

Your doctor, of course, has many diagnostic instruments and laboratory tests for checking the state of your physical health. But he has no way at all of knowing what's on your mind—*unless you tell him.*

A frank talk about any worries, pressures, fears or frustrations that you may have can, in fact, be as important in an appraisal of your health as anything your doctor may detect with instruments or tests.

That's because emotions that are "bottled up" account for many physical complaints—including headache, backache, digestive troubles and certain disorders of the heart.

So, whenever you have a check-up, be sure you tell your doctor about any situations you may be up against—at home or at work—that keep you worried, tense or anxious. He will welcome your frankness in discussing such problems. The more you tell him about yourself as a person, the more he can do for you as a patient.

Putting together the results of the tests he makes, his findings as he examines you—*and what you tell him*—your doctor gains a unique understanding of you as an individual whose physical make-up, whose emotional reactions, whose personal problems are never quite like those of anyone else. And this knowledge of you as a person deepens with each check-up you have.

Then, too, these check-ups give your doctor a chance to uncover early signs of some illnesses—often before there are symptoms—and while possibilities for successful treatment are best.

Are you in the habit of having regular health examinations? There's no safeguard you can take, especially if you are age 35 or older, that's more important to your physical *and* emotional health—*now and in the future.*

Swim party off Nassau. Photographed by Ozzie Sweet

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THE NATIONAL GEOGRAPHIC MAGAZINE

VOL. 121, NO. 1 JANUARY, 1962

BY JOHN SCOFIELD

香港 HONG KONG HAS MANY FACES

PHOTOGRAPHS BY THE AUTHOR

"WHERE did they all come from?" I asked. I had been in Hong Kong only a few hours, but even in that time the essential fact of this throbbing, vital Asian metropolis had struck me. Here were more people in less space than I had ever seen before.

"Over there," my friend said, and motioned west toward Portuguese Macau, 40 miles away across the Sea of Nine Islands (map, page 8). "In the old days, men fleeing the Communist tide came direct to Hong Kong. Today many of them come by way of Macau. There the bamboo curtain is not so thick; sometimes one may even peep through it a little."

And so, before I started to write this story about the miracle of Hong Kong, I went to Macau. There, as close to Red China as I could go, I might learn where Hong Kong's bustling millions came from, and why.

Eight Flee in a Rickety Sampan

In Macau, as I had in Hong Kong, I started my quest with a question. "Lung Kan," I asked, "why did you run away?"

Across from me sat a man in a black two-piece denim suit of the kind worn by Red Chinese agricultural workers. His wife hunched shyly beside him, holding a protective arm around two barefoot daughters.

"We were starving," he said simply. "Every day two, three people in my commune die from not eating enough."

From where Lung Kan and I talked, at the very edge of Macau, we could look across a narrow channel of salt water into the People's Republic of China. Barely two hundred yards from us stood a concrete pillbox where a Communist soldier walked his post.

Lung Kan told me how he and seven members of his family had fled 13 days before from the starvation sweeping China's Kwangtung Province. Traveling only in darkness, and living

on banana skins and potatoes, they rowed for four nights to reach the haven of Macau.

"What will you do now, Lung Kan?"

"Go to Hong Kong," he said, and smiled confidently. "Plenty jobs in Hong Kong."

Discreet inquiries by Lung Kan revealed that he and his family would have to pay 80 to 100 patacas each—the equivalent of $15.50 to $17—for the privilege of being smuggled into British territory aboard a fishing junk. Where would they get the money? Probably from friends already in Hong Kong.

The Author: As these pages went to press, Assistant Editor John Scofield was on assignment in remote New Guinea, gathering material for an up-to-the-minute report on another of the world's swiftly changing far places.

Back in British territory, I asked soft-spoken Lorenzo Lo—I hesitate to call him a refugee, though like so many of Hong Kong's intellectuals he came from Communist Shanghai to the freedom of Hong Kong—how a city could absorb a million Lung Kans and still continue its meteoric rise as a new manufacturing center of Southeast Asia.

Lorenzo straightened me out on that in a hurry. His arm swept in a gesture that seemed to take in everything of this new Hong Kong: clattering textile mills and the three new hotels that opened while I was there; the vast housing developments and the thousands of factories that turn out alarm clocks, steel rods, vegetable soup, and delicate ivory carvings.

"What you see here," Lorenzo said emphatically, "hasn't happened in spite of the

refugees, but because of them. When Communism took over in China, they were the ones who had the spunk to get out. Now that same quality—call it energy, imagination, what you will—makes Hong Kong hum."

London With a Chinese Accent

As the days became weeks, Hong Kong revealed its many faces, and there was a name for each one. Manhattan of the Far East. China with a British accent. London with a Chinese accent. It all depended on where I stood at the moment.

The morning I watched the annual reopening of the colony's Supreme Court Assizes, the Chinese accent was faint indeed: a quiet, attentive throng in Western garb looking on as a bewigged British judge inspected an honor guard from the Royal Hong Kong Regiment (page 24). And yet a few minutes later and only a few blocks away, I climbed one of Victoria's teeming "ladder streets" and found only a wandering tourist to remind me that I was in a British Crown Colony and not in a back street of Canton.

To the jet-borne visitor from the West, Hong Kong beckons as the world's most alluring bargain counter. A walk down Kowloon's neon-bright Nathan Road (page 28) inevitably turns into a shopping spree. Swiss watches—at less than Swiss prices—compete with duty-free Japanese cameras and hi-fi equipment. Silks from Thailand glow beside bolts of Italian cloth and Harris tweed. Diamonds and jade glitter in open-fronted goldsmiths' shops. Chinese antiques crowd beside locally made shoes and transistor radios.

Of all the bargains, Hong Kong's "instant clothing" ranks as the most difficult to resist. The city's tailors feverishly turn out hundreds of thousands of suits and custom-made dresses a year. When they are good, they are very good indeed.

I asked tailor George Chen how quickly he could make me a suit. "Twenty-four hours," he said, "with one fitting. But we don't like to work that fast."

For fun, I tried to better Chen's time limit. One of his rivals, a young Indian, offered to make me a suit overnight—between 6 p.m. and 8 a.m.

"First fitting at 9 tonight," he suggested.

In the end I went back to George Chen.

(Continued on page 9)

NEXT PAGE FOLDS OUT ▶

Dancing Lights Spangle Hong Kong, Asian Jewel in the British Crown

Hong Kong means "Fragrant Harbor" (Chinese characters on page 1). Ceded to Britain in 1841, the arid rocky island seemed no prize at first. Londoners viewed the acquisition with derision, and fashionable ladies cried, "Go to Hong Kong!" when provoked to strong language.

Trade with China soon made Hong Kong boom. Needing room, the colony acquired the Kowloon peninsula in 1860 and leased the New Territories in 1898. A free port, Hong Kong sickened when the United Nations embargoed the bulk of trade with Red China during the Korean War. But refugee capital and labor, fleeing Communist oppression, provided a cure. Today the colony hums with new industries.

Here the city of Victoria climbs an island amphitheater above the harbor. Steamships *President Wilson* (left), *Changsha* (center), and *Benarty* load cargo at Kowloon docks.

THIS PAGE FOLDS OUT

Patrol on smuggler hunt hails a junk

Grandmother and child wait in line

Rickshaw man reads during a lull

Film actress radiates glamour

Like laundry on a line, noodles hang to dry in the sun

Every night seems

Young rider finds bliss on a carrousel gallop

Refugee carves latticed back for a chair

Hole-in-the-wall dentist uses modern tools

Plastic flowers bloom at an outdoor stand

like Saturday night on crowded Temple Street, Kowloon

Hong Kong means business

A SMALL WORLD unto itself, Hong Kong is an oasis of free enterprise on the coast of Red China. In the past decade more than a million Chinese have fled to freedom in the British Crown Colony.

Compressed into 398 square miles, the colony is a seething mass of humanity, bursting with energy. Its contrasts are awesome: Luxurious villas set in serene gardens and packing-box shanties jammed together on rooftops; sweatshops and air-conditioned banks; gleaming white skyscrapers and sampan villages; cubbyhole shops and block-long glass emporiums.

Despite pockets of poverty and the never-ending struggle to feed, house, and school the refugees, Hong Kong represents a productive partnership between East and West. Through the colony's sea door pour the world's raw materials for transformation into manufactured goods that in turn flow out to markets around the globe.

These scenes and those that follow illustrate the heady brew that bears the stamp, "Made in Hong Kong."

JOHN SCOFIELD, NATIONAL GEOGRAPHIC STAFF


PEOPLE'S REPUBLIC OF CHINA
KWANGTUNG
BRITISH CROWN COLONY OF
HONG KONG
AND THE NEW TERRITORIES
Map by Eugene M. Scheel and Snejinka Stefanoff
STATUTE MILES
Canton (Kuangchou)
Huangpu (Whampoa)
Tungkuan
Taochiao
Hsiaolan (Siulam)
Tang Wang Island
Hsiaolan Channel
Hengmon Island
Shunte (Shuntak)
Kueichou
Tahuangpu
Wanch'ing Island
Humenchai
Chiangkou
Changchiapien
Shihch'i (Chungshan)
South West Point
Macau
MACAU (PORTUGAL)
Sea of Nine Islands
Coloane
Taipa
Pai'eng Island
Hsiaohengch'in I.
Hsiaolin Island
Tahengch'in Island
Samkok Islands
Wallingting Island
Boundary follows the high water mark
Lantau Channel
Papan (Shenchüan)
Chiupanan
Kowloon - Canton Railway
Pengkanghsü
Haishan
Crooked I.
Sha Tau Kok
Mirs Bay
Mirs Point
Fung Head
High Island
Sheung Shui
Fanling
Deep Bay
Yuen Long
Kam Tin
Tai Po
Tsuen Wan
Castle Peak
Tsing Yi Island
Chek Lap Kok I.
Peng Chau
Lantau
Mui Wo
Tai O
Lantau Peak
Aberdeen
Cheung Chau
Soko Islands
West Lamma Channel
Lamma Island
Victoria
Kowloon
Hong Kong Island
Tung Lung Island
Tathong Channel
Stanley
Po Toi Group
Sha Tin
Ma On
Sai Kung
Port Shelter
Tolo Harbour
U.S.S.R.
MONGOLIA
CHINA
Peking
Tokyo
JAPAN
Shanghai
FORMOSA
HONG KONG
IRAN
PAKISTAN
INDIA
Calcutta
BURMA
SAUDI ARABIA
AFRICA
THAILAND
Bangkok
VIET NAM
Saigon
Manila
Pacific Ocean
PHILIPPINES
CEYLON
MALAYA
Singapore
INDONESIA
Djakarta
Indian Ocean
AUSTRALIA


Rambler Channel
Tsing Yi Island
Lai Chi Kok
Cheung Sha Wan
Sham Shui Po
Elevations in feet
STATUTE MILES
Stonecutters Island
Tai Kok Tsui
Mong Kok
Kowloon Tong
Yau Yat Tsuen
Kowloon City
San Po Kong
Ngau Chi Wan
Terminal Building
NEW TERRITORIES
Ma Tau Wai
Kai Tak Airport
Ngau Tau Kok
Ho Man Tin
Ma Tau Kok
To Kwa Wan
Kowloon Bay
Kwun Tong
Runway
Yau Ma Tei Typhoon Anchorage
King's Park
Hung Hom
Kowloon
Hung Hom Bay
Tsim Sha Tsui
North Point
Victoria Harbour
Victoria
Sai Ying Pun
Sheung Wan
Chung Wan
Typhoon Anchorage
Wan Chai
Victoria Park
Causeway Bay
Tai Hang
Tiger Balm Gardens
Shau Kei Wan
Braemar Reservoir
Braemar Hill
Quarry Bay
Quarry Point
Sai Wan Ho
Little Green Island
Green Island
Sulphur Channel
Kennedy Town
University of Hong Kong
Mt. Davis 883
Government House
Victoria Peak 1808
Sandy Bay
High West 1625
Race Course
Hong Kong Island
© N.G.S.

I let him have a week—forever by Hong Kong standards—and he fitted me with a beautifully hand-tailored suit of British fabric for a third of what it would have cost in the United States.

The luxury shops and busy tailors of Nathan Road depend largely on visitors. Hong Kong's rising middle class flocks to such emporiums as the glittering new Daimaru department store on the Victoria side (page 33).

Only a couple of blocks away, and obviously competing with Daimaru, stands China Products, Ltd. Here, in Red China's busiest Hong Kong showcase, I chatted with a tall, lovely girl from Formosa.

"These are good buys," she admitted frankly, nodding toward a whole department of traditional Chinese arts: jade, painted scrolls, carved stone, and ivory. "But I wouldn't purchase the clothing."

The average Hong Kong white-collar worker, however, welcomes China Products' cotton prints from Shanghai mills, which cost as little as 15 cents a yard. Also the rough but serviceable shoes for $3 a pair.

Hong Kong's bargain counters are an old story. One day in the Victoria offices of the Commerce and Industry Department, I tried to talk with one of the colony's trade officers about a newer marvel: the city's dramatic emergence in the past decade as an industrial leader of Southeast Asia. But the city itself insisted on doing the talking. Outside the window twin pile drivers slammed out shifting patterns of sound as another of the city's Victorian structures disappeared and a new office building took its place.

We fled to a hilltop beyond Kai Tak Airport to see the kind of thing that scarcely seems to raise a Hong Kong eyebrow any more.

Below us, where seven years before a range of hills had stood, now spread a vast amphitheater in which housing for 60,000 people had risen. The spoil from the hills, dumped into the sea, created more acres of land. Here nearly 100 factories were busily gushing textiles and paint and spectacle frames and felt hats and dozens of other commodities.

"Come back in five years," my friend invited, "and you will find a self-supporting community with a quarter of a million people."

Flood of Refugees Spurs the Economy

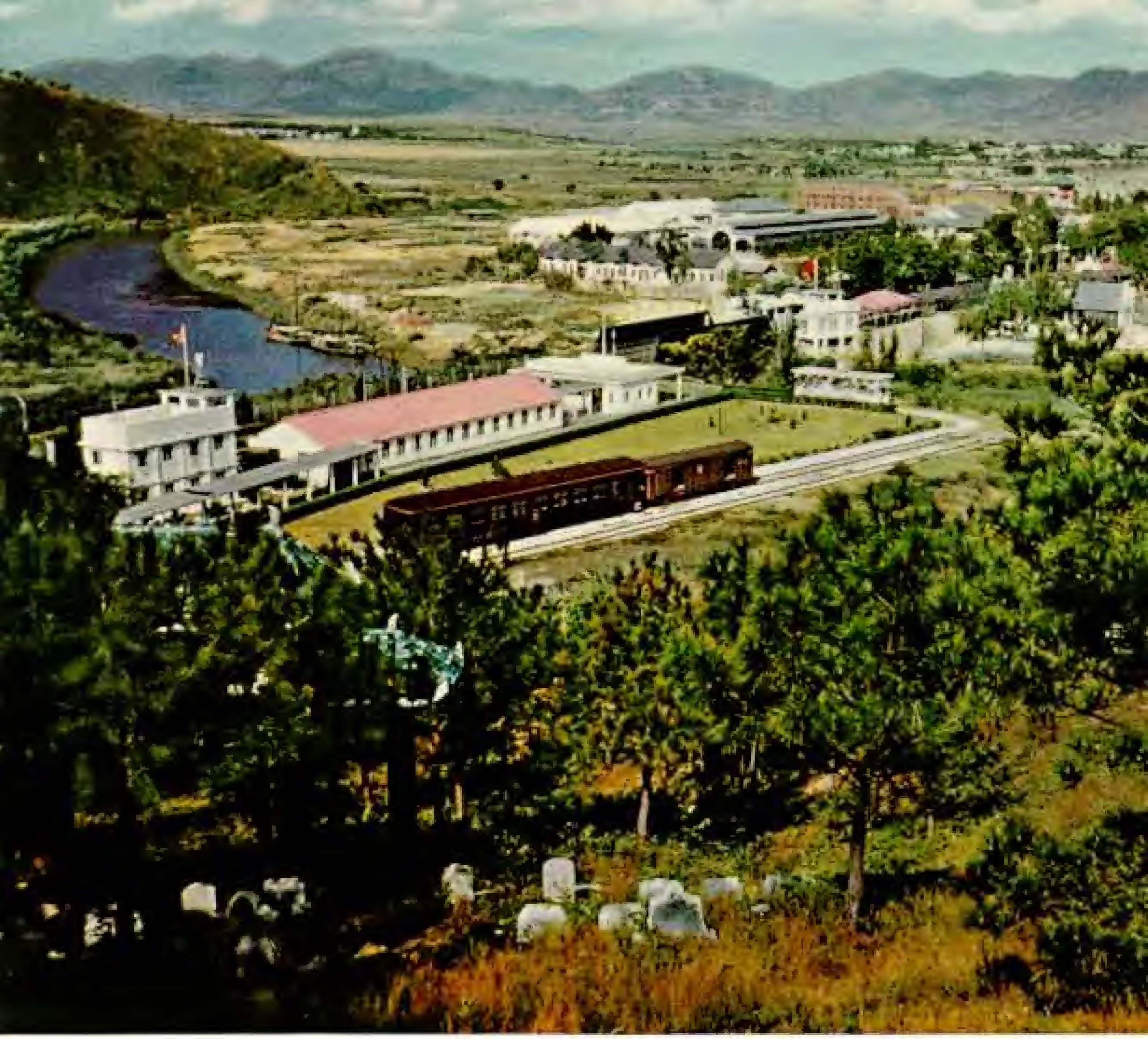
Kwun Tong township represents one small chapter in the almost unbelievable story of Hong Kong's rise as an industrial city. I asked how it had happened. "In two words," the officer told me, "'economic necessity.'"

For decades, he explained, Hong Kong was the front door for the great China market. Sitting astride the world's trade lanes, the city endlessly shuttled goods in and out of its busy warehouses, bound from China to the world, and from the world to China. Then came the Korean War. The United Nations voted an embargo on trade with China, and

Half a world away from Great Britain lies Hong Kong, a dot on the broad face of China. Once the trans-Eurasia train or the steamship through Suez took weeks, even months, from London. Today practically no Westerners arrive by way of the Kowloon-Canton railway, and only leisurely travelers come by boat. Most arrive by jet, landing at Kai Tak Airport on land reclaimed from water.

To men long at sea, Hong Kong's bright lights and busy shops beckon irresistibly. Every year thousands of U. S. sailors pour ashore in this most popular liberty port in the Far East. These seamen, from visiting warships of the Seventh Fleet, shop along bargain-rich Queen's Road in Victoria.

COLOR PHOTOGRAPHS BY B. E. GARRETT, NATIONAL GEOGRAPHIC STAFF



Hong Kong—the old Hong Kong—sickened.

The city might have died if another "disaster" had not come along at almost the same time. The years of the refugee were 1949 to 1951, when men poured out of Red China in the hundreds of thousands. Hong Kong began the rise from the 600,000 souls who hung on at the end of the Japanese occupation to today's three and a quarter million.*

A Hong Kong investment specialist told me the rest of the story.

"Fortunately," he said, "that problem arrived with a built-in solution, for the refugees were not all poor men. Some came to Hong Kong with enormous wealth. Others had long before seen the handwriting on the wall, and had shifted operations from Shanghai and north China to the freedom of Hong Kong.

"Here, in one place, were capital and labor, eager to work together."

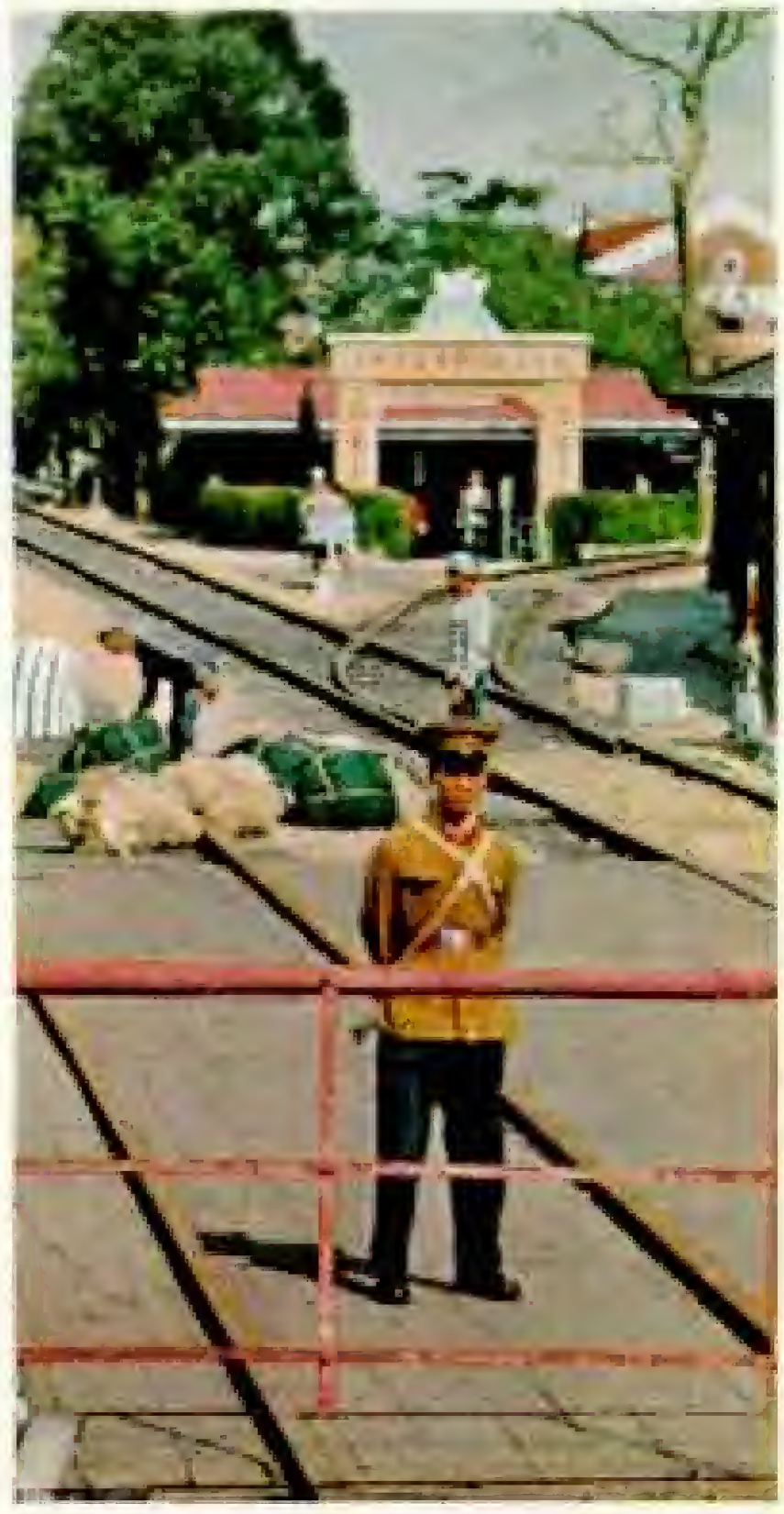
In the decade that followed, he said, others looked at Hong Kong and liked what they saw. Capital flowed in from Italy and England and the United States. The fortunes of overseas Chinese in Singapore and Malaya went to work. Japanese money arrived.

Movie Industry Booms in Hong Kong

What does Hong Kong make? You name it. Preserved ducks and canned fried rice. Shoes and steel bars. Yachts and imitation flowers. Marbles and frying pans. Ships and flashlight bulbs. Air conditioners and phonograph records. Helmets and footballs. Cotton cloth and bird cages.

And movies. I knew that American motion pictures had been filmed in Hong Kong—including Clark Gable's *Soldier of Fortune* and,

*See "Hong Kong Hangs On," by George W. Long, NATIONAL GEOGRAPHIC, February, 1954.



Red China's Door to the West Is Lo Wu, Where a Daily Few Walk Out to Freedom

Iron-railed bridge across the Sham Chun River links British Crown territory (foreground) with China. Almost any Chinese with proper papers can go in or out. Enforcing inoculation requirements, Hong Kong slowed border traffic last August, when cholera broke out in Kwangtung Province (background). Here a train awaits Hong Kong-bound passengers. Hilltop barracks at far right house Red Chinese soldiers.

Communist guard at upper right peers across the bamboo curtain at Lo Wu, another inspects bags. Passengers must walk across the border and change trains, but freight cars cross daily in both directions.

Hong Kong police check identity cards of Chinese crossing the frontier. Others, still in Communist territory, wait their turn beneath a sign proclaiming, "Long Live the Grand Union of the Peoples of the World."

more recently, *The World of Suzie Wong* – but I didn't know much about the city's own movie industry. What I learned surprised me.

"Hong Kong studios turn out 240 feature-length pictures a year," Robert Chung Chi-Wen told me. From an office cluttered with "Oscars" – I counted eleven Golden Harvest Awards for best picture at the Asian Film Festival – this dynamic young executive directs the Hong Kong office of an empire that includes motion-picture studios and some 60 new theaters in Southeast Asia, plus tin mines and Malayan rubber plantations, finance and insurance companies, and a movie magazine of its own.

Hong Kong films entertain some 15 million overseas Chinese scattered from San Francisco to the Philippines, North Borneo, Malaya, Singapore, and Indonesia.

As a result, the city ranks fourth among the world's producers of motion pictures – after Japan, India, and the United States.

Refugees Dominate Booming City

Though born in Peking, Robert Chung has been a part of Hong Kong too long to think of himself as a refugee. But he still represents a part of the great wave of men who left China when Communism came, and whose energies and skills have helped to create this exciting new city on the China coast.

The refugees and their doings are still the biggest single fact about Hong Kong. The executive, the restaurant manager, the tailor,

Junks Beneath Patched Sails Head for the China Coast

Sturdy, seaworthy junks serve as the trucks of Hong Kong. They haul everything: vegetables and meats from Red China; building materials (below); and, often, smuggled refugees or narcotics.

Many vessels make their living off-loading ships anchored in the roadsteads. Others go to sea for fish and serve as homes for owners and their families; dozens of people live aboard the larger junks.

When the Japanese occupied Hong Kong during World War II, they ordered junk owners to unload supplies. Unknown to the enemy, many watermen installed false bottoms in their boats and helped feed the city's hungry with pilfered food.

Bricks swing ashore on a stevedore's shoulder pole at a junk-lined waterfront. Balanced loads cross a narrow plank between pier and bobbing boat. Labor is cheap; the human back carries many cargoes overland.

the mason, the sampan woman, the New Territories vegetable farmer, the ricksha man—wherever you see him and whatever he's doing, chances are he's what Hong Kong thinks of as a refugee. And all save a fortunate few must look to the government, sooner or later, to house them.

The first thing I saw in Hong Kong, even before my plane touched ground, was a row of vast concrete apartment houses thrusting up from the bare hills beyond Kai Tak Airport. Within a few hours I found out what they really are. "Resettlement blocks" is the local term. Already, 180 of these ugly but practical structures stud the city, each sheltering an average of 2,250 people (pages 18 and 19). Others are completed at the rate of one every ten days. A third of a million Chinese live in these apartment buildings.

(Continued on page 18)

PHOTOGRAPHED BY MELVILLE BELL GROSVENOR (ABOVE), BRIAN BRAKE, MARRIUS (OPPOSITE), AND DEPARTMENT OF JOHN SCOFIELD © N.G.S.

Floating shop parades its wares past the sampan homes of customers. Crocks hold pickled cabbage, and the glass case displays cakes. A single sweep at the stern propels the boat. Storekeeper greets shoppers in a water taxi.

Water Folk Live in a Forest of Masts Amid a Jungle of Lines and Catwalks

Boat people, known as the Tanka, have long been considered a people apart. For centuries Chinese law forbade them to settle ashore, marry landowners, or take government examinations. Although this discrimination no longer exists, Hong Kong's 138,000 water people still congregate in anchorages such as Victoria's typhoon shelter (left). Sweeping in from the sea, typhoons can wreak havoc in the crowded harbor.

Chopsticks in hand, youngsters eat aboard a sampan, their only home. Laundry dries above a red-and-gold family altar, a feature of every sampan and junk.

Squatters' Shacks Invade a Wooded Slope Above Victoria's Towers and Apartments

Hung with villas, Victoria Peak looks down on Hong Kong's commercial hub with its banks, insurance companies, shipping firms, and exclusive

shops. Wan Chai, cluttered haunt of cheap hotels, bars, and cabarets, rims a bend in the bay. New apartment houses and massive resettlement blocks rise at right. The colony's poor mingle with refugees in hovels in foreground. A graceful pagoda rises from the city's garish Tiger Balm Gardens.

One of the government officers who administer the city's resettlement blocks, and might be called super-landlords, showed me through the crowded quarters of Shek Kip Mei in the New Territories. Here, in 26 huge H-shaped buildings and a couple of I-blocks, live 67,500 people, packed on an average of more than 5½ to a room.

"Where do you get that half a person in your average?" I joked.

"Children," the officer said seriously. "Under ten they count only half."

Seven Live in One-room Flat

We stopped at the door of a ten-by-twelve-foot room where a family was starting its noontime meal. The food looked appetizing: rice, fried fish, Chinese celery and pork, and a bowl of beef stewed with tomatoes.

Wong Yuen Wai was proud of his one-room home and eager to tell me about it. He was not really a refugee, he explained.

"I came from Funan Province thirteen years ago. Even then there was trouble with the Communists and things looked more stable in Hong Kong."

Now earning four or five Hong Kong dollars a day—equivalent to about a dollar, U. S.—running a tiny glass shop, Wong considers himself fortunate. A month's rent takes only a few days' earnings, so there is enough left for food and even an occasional luxury. I noticed a German radio that he had considerately turned off as we approached. I asked how many people lived with him.

"Six with me in this room," he said, obviously pleased to provide for so many. "And two more downstairs in the shop."

SCHOOLCHILDREN ON UNION GRADE, KOWLOON

Refugee Children Do Calisthenics on the Roof of a Resettlement Block

Lacking separate buildings, many neighborhood welfare associations have organized schools on rooftops. Students use open space for sports. Better facilities are coming: Hong Kong builds a new school every two weeks.

Laundry festoons balconies of concrete blocks where entire families crowd together in single rooms. A new resettlement block goes up every 10 days.

Twirling his Hula Hoop, a schoolboy works off energy during recess.

My guide and I peered into other rooms. Always there were smiles of pride, or at least of friendly welcome. In one, twin foot-powered sewing machines buzzed as two women assembled shirts to earn extra money. In another an old man fluttered uncertainly in the background ("The old fellow's a heroin addict, by the look of him," my companion whispered), while two younger women squatted on the floor stitching together gay quilted Chinese jackets. Clothing wholesalers brought the materials and took away the finished products. Each woman completed one jacket a day, earning the equivalent of 80 U. S. cents.

Everywhere there was this feverish activity, this endless capacity of the Chinese to keep busy. Everywhere, that is, except in one room, and we went there last. In it, on a simple bed, lay an old man with a sick, unhappy face. His wife, much younger, hovered over him.

This was 71-year-old Gen. Yip Man Yee, of the Chinese

One-man factory turns out quilted jackets on a foot-powered sewing machine in a one-room apartment. Piecework earns small wages, but rent and food are cheap, too.

Imitation pearls drop onto strings for costume jewelry. Working at home, the young woman adds to the family income. To make a living, some refugees toil as much as 14 hours a day.

Mah-jongg tiles clatter in a bunk-lined room of one of the resettlement buildings.

Nationalist Army. At the end of World War II he had been governor of Swatow. The old man's face contorted with grief that he could have fallen on such evil times.

He had fled China with nothing, he told me. Now he lived in a room with five others, existing on what his son could send him from his own exile in Formosa.

Thousands Live on City's Rooftops

As we walked through these teeming hives, I found my values subtly shifting. In Europe or North America, social workers would rush to the aid of people who had to get along five and six to a room. But here one of Shek Kip Mei's cubicles, with electricity and a sound roof overhead, represents a reasonable degree of well-being. For, elsewhere in this fabulously crowded colony, hundreds of thousands of people must continue to exist in dark alleyways and crowded tenements, or set up house on a sidewalk or a rooftop.

Slacks-clad Margaret Lung, who had the fresh face and pert manner of an American teen-ager, showed me how the city's 70,000 or so roof dwellers spend their lives. Bouncing ahead of me up dark flights of stairs, she led me through a three-story Wan Chai tenement, typical of an area where as many as 2,400 people per acre jam together. I thought of my own half-acre suburban lot and wondered how it would look if 1,200 people tried to squeeze onto it.

In this crowded world, the fortunate few get a bit of rooftop space where they can put together houses of packing-case wood and flattened gasoline tins. Margaret showed me the 7-by-14-foot home she has shared for six years with her parents and five younger children. The inside, neatly partitioned into two rooms, was fragrant with plum blossoms brought home in anticipation of Chinese New Year.

It was nice, Margaret agreed, to have the luxuries of sun and air. But her face clouded as she remembered how Typhoon Mary had shattered the house at two o'clock one morning in June, 1960.

I never tired of wandering this seething, overpopulated world of shops—for only on second glance did I realize how many people lived behind and above the façades of cluttered stores that line almost every "residential" street in Hong Kong.

Here were the wondrous drugstores where, without a prescription, one could buy tranquilizers and miracle drugs as freely as tiger bones and dried sea horses. Ranks of children sat enraptured at sidewalk libraries where, for a penny or two, they could read comic books by the hour. Streetside vendors hawked goldfish whose popeyes gazed

Surf, Sun, and Sand Lure Crowds to Repulse Bay

Fleeing China just before the Red take-over, many refugees arrived with their wealth intact. They live in exquisite villas or apartments.

Admitting the contrast between the abject poverty of some refugees and the opulent luxury of others, one Hong Kong official says, "There appears to be little discontent, however, because of the opportunity here for advancement. Yesterday's shanty dweller lives in a resettlement block today. And if he works hard, he may move to Repulse Bay tomorrow."

Chinese amah tends her young English charge at the beach.

eternally heavenward. Flattened dried ducks, translucent and golden in the morning sun, hung in readiness for New Year feasts.

Time after time I was held fascinated by a gay paper shop, to browse for minutes amid automobiles and yachts, suits and elaborate houses—all made of paper. The Chinese burn them to give their dead the luxuries they missed in life. Wads of imitation banknotes for the deceased are popular too. The practical Chinese printer issues them on the Bank of Hell—just in case.

But not all Hong Kong's teeming millions live crowded lives ashore. On a gray, rainy morning I hired a woman to row me out among some of the city's 138,000 water people (pages 14 and 15).

We threaded our way amid hundreds of sampans and high-sterned junks moored within the curving arms of the Yau Ma Tei typhoon shelter. Here 26-year-old Chou Un Lui invited me aboard her 13-foot craft, where she keeps house for a family of six.

Four children clustered around her as she

KODACHROME BY BRIAN BRAKE, MAGNUM © NATIONAL GEOGRAPHIC SOCIETY

tended a charcoal fire beneath a clay brazier. She showed me the meal: rice garnished with three tiny jewel-like fish that retained their bright pink and yellow stripes even when cooked. Behind her a joss stick burned fragrantly at a little red shrine dedicated to Tien Hau, the sea goddess.

Some of the old women among the water people, I had been told, boast that they have spent their entire lives afloat. I asked Chou Un Lai how often she went ashore.

"Perhaps twice a week," she told me; her expression indicated that this was at least once too often. "But I can buy rice and vegetables a little cheaper there than from the hawkers who bring food on their boats." Her husband, she said, worked aboard a "wallawalla"—a harbor launch—and brought home 36 cents a day.

"It is only half what we need to live on," she said without bitterness. "I earn the rest operating the sampan as a water taxi."

Her eldest child, a boy of about ten, grinned impishly at me. I asked if he went to school.

PHOTOGRAPH (ABOVE) AND ON OPPOSITE PAGE BY JOHN SCOFIELD © N.G.S.

British pomp marks the opening of the Supreme Court Assizes. In wig and judicial gown, Chief Justice Sir Michael Hogan inspects a guard of honor. Royal Hong Kong Regiment. Black-robed chief bailiff follows with the mace.

Barrister doffs his wig at the exclusive Hong Kong Cricket Club.

and a hint of sadness crossed her round face.

"How can we afford it? Even in the mission school"—she pointed toward a squat houseboat moored not far away—"school for each child would cost five days of my husband's pay every month."

Booming industries notwithstanding, no city can increase its population by half—in largely penniless, homeless refugees and their offspring—without having problems. People from dozens of relief organizations still work tirelessly distributing food and clothing, helping the sick, and creating new jobs for men without a livelihood.

Noodles Solve a Relief Problem

I went one afternoon with Dr. Luther H. Evans, former Librarian of Congress who was visiting in Hong Kong, to see one of the city's most engaging relief projects.

Italian-born Monsignor John Romaniello, who grew up in New Rochelle, New York, had struggled for a long time with the problem of how to distribute the Catholic Relief Service's share of $6,000,000 worth of surplus food that the United States donates each year to Hong Kong's refugees. The people were hungry enough, but they didn't understand about milk powder. Cornmeal was strange and distasteful to them. And what

could a Chinese, whose only home was a bed shared in shifts with two others, do with a bag of flour?

Pondering the problem one day, Father Romaniello saw a girl take a package of flour into a shop and have it made into noodles. That set him thinking.

Now, four years later, noodle factories started by the Maryknoll priest hum in 18 Hong Kong neighborhoods, and the idea has spread as far as India and South America. More important, several million dollars' worth of U. S. surplus corn, wheat, and milk powder have found their way into Chinese stomachs in the form of noodles.

"Sometimes my own people say I'm crazy, always talking about noodles," the stocky 62-year-old priest said as we came back from a crowded refugee settlement where he had passed out more than a ton of noodles in three- and five-pound packages.

"You've got noodles on the noodle," Dr. Evans agreed.

As we left, "Romy" presented us with paperback copies of an autobiographical novel to which he has given the marathon title, *You Can't Prevent the Bird of Sorrow From Flying Over Your Head but You Can Keep Him From Nesting in Your Hair.*

Who published it? The Noodle Press, of course.

Progress Invades the New Territories

"Have you seen Hong Kong's backyard?" Monsignor Romaniello asked as I said goodbye. "People think of us as nothing but a city. Go out into the New Territories," he ordered jovially, "and find out how wrong they are."

Before I was through, I spent many days threading this 365-square-mile hinterland added to the colony by lease from the Chinese in 1898 (map, page 8). And always I delighted in the glimpses of "Old China" the guidebooks had told me I would see.

They were there, all right—medieval walled villages, men patiently following teams of water buffaloes, and long lines of women squatting in muddy fields to dig up water chestnuts. But, for every tableau of Old China, there were a dozen glimpses of the new Hong Kong: valleys carpeted with pin-neat fields (page 38); chicken farms that raise as many as 100,000 birds at a time; broad fish ponds; and bustling towns that look like adolescent versions of Hong Kong itself.

"How did all this happen?" I asked government agriculturist E. H. Nichols when I met him a few days later.

Before World War II, he said, Hong Kong imported nearly all its food. New Territories farmers, conservative and distrustful of city markets, produced only rice, and that for themselves. Then came the refugees.

Farmers Harvest Eight Crops Yearly

"Market gardeners from Canton and Shanghai," Nichols went on, "saw a golden chance to put their knowledge to work."

I had seen the result: Literally thousands of tiny farms—they average only half an acre—on which tireless men and women harvest as many as eight crops of vegetables a year.

"We believe we have the most intensive vegetable production in the world out there," Nichols added. "Most of these farmers came in penniless and became tenant farmers. Now they supply nearly half the vegetable requirements for a city of 3¼ million people."

I went back to one of the walled villages—Kam Tin, whose name means "Beautiful Fields"—and spent an hour roaming its narrow streets and peering in at doorways. The people fled ahead of me, because they hate cameras and believe that they will steal their souls away.

But outside the village, near a row of neat new piggens, I found some women who seemed more at ease, less distrustful of strangers and their cameras (page 39). There was a story behind this, I learned.

In rural Hong Kong, life can be difficult for a poor man's widow. Husbandless and landless—and, of course, moneyless—she must scratch a bare living by gathering grass for cattle feed or doing odd jobs of the meanest sort. Hong Kong financiers Lawrence and Horace Kadoorie, who have taken the New Territories farmers under their philanthropic wing, looked about for a way to help.

The answer, it seemed, was pigs. Hong Kong's Chinese gourmets delight in pork, but the colony produced little of it.

The Kadoories' solution was simple: Give a widow half a dozen piglets, build her a pigpen, and let her borrow enough money to care for them until she can market one or two.

With enthusiastic government support—including financing the bulk of the loan fund—the result has been a happy one. Several thousand widowed farmwives have been started on the road from village drudgery to self-support, and Hong Kong has begun to

ease its almost total dependence on pigs imported from Red China.

Unlike sea-girt Hong Kong island, the New Territories boasts another distinction—a 20-mile land frontier with Red China. Before Communism came, you could buy a ticket in the railroad station in Kowloon and ride clear to London. Nowadays the Kowloon station hums with more activity than ever before—a dozen trains a day and nearly six million passengers a year—but now you need Communist clearance to enter Red China at Lo Wu, 22½ miles away (pages 10 and 11).

I went there one bright January morning with an inspector from the near-by police post. Two-thirds of the way across the bridge that links Hong Kong and Communist China, an iron barricade blocked our way.

The inspector gestured toward a group of about 35 people who waited patiently on the Communist side. They were mostly women and children, plus a few old men.

"When the British leased the New Territories," he explained, "they put very few restrictions on travel between neighboring Kwangtung Province and the colony. This still holds, as far as population pressures allow."

Every day a line forms on the bridge to Lo Wu—wives going to join husbands, children, old men whose sons will support them

Horses pound toward the finish line at Hong Kong's Happy Valley Race Course. After a series of accidents in 1959, Buddhist monks paraded around the course burning incense to propitiate the "restless ghosts" deemed responsible.

Chinese beauties spend an afternoon at the races

in their waning years. But the able-bodied men are few. Only the ones who are of little value to the Red regime can escape so easily.

Three Hong Kong policemen stood at the barricade, patiently interviewing the people one by one. A Cantonese accent, as evidence of Kwangtung residence, and reasonable assurance that they would not become public charges, were usually enough to get them through. Technically they came as visitors. Once in, they rarely returned to Red China.

We made our way back to the station platform on the Hong Kong side, past clumps of people chattering happily and shouldering bundles slung from poles. Going the other way through the crowd, back toward the frontier, came three Hong Kong policemen; behind them, handcuffed in pairs, walked eight young Chinese. I asked if I were imagining the frightened look on their faces.

"I should think not," the inspector said. "They're chaps we caught in the hills, sneaking in. It seems hardhearted not to let them stay. But with a million newcomers already in Hong Kong, we can't just open the gates to anyone who wants to slip across the border. So, if we catch them before they can disappear into the city, back they go."

Far from thinking it hardhearted, I marveled anew at the humanity of Hong Kong's

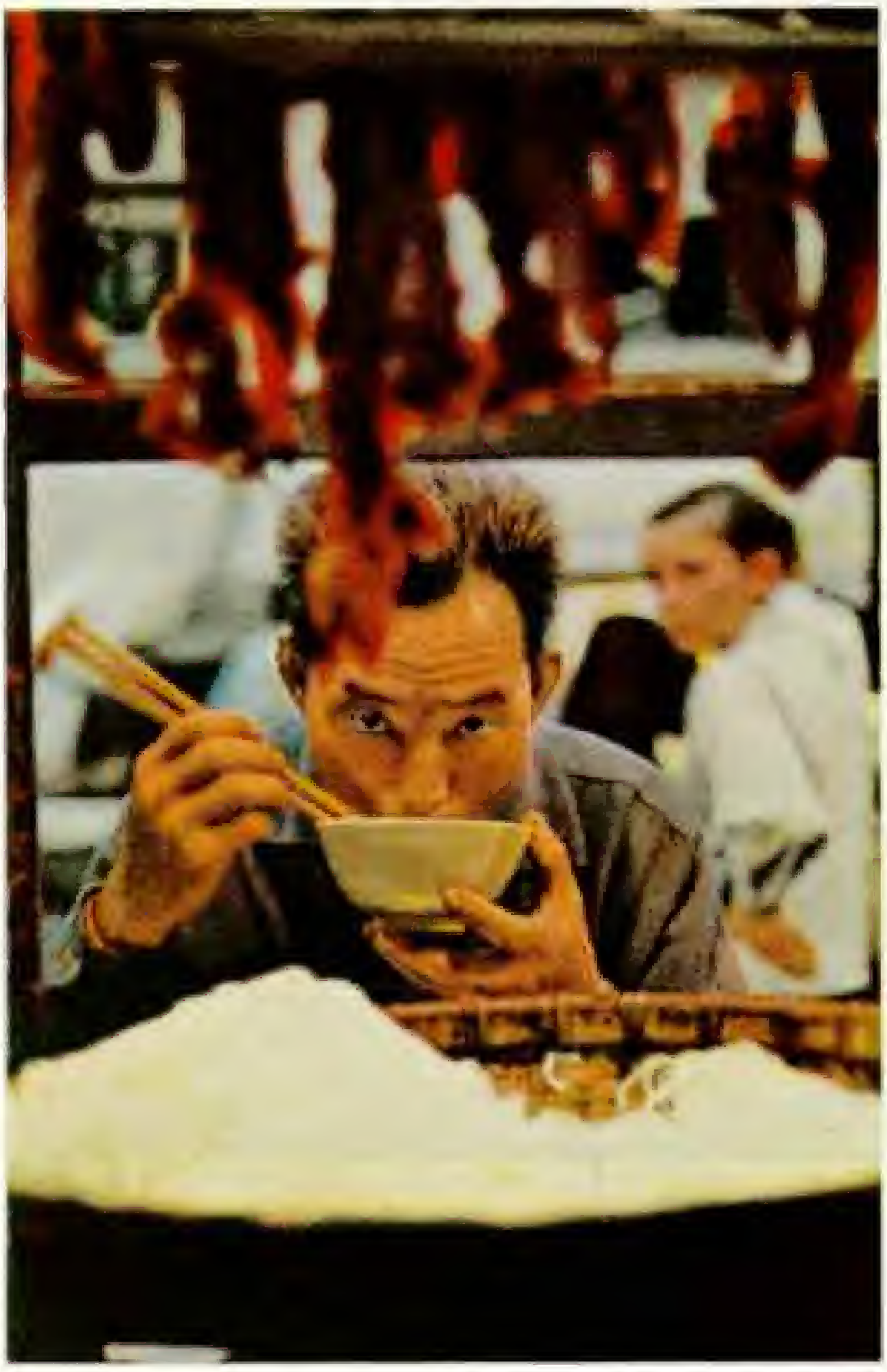
PHOTOGRAPHED BY JOHN SCOFIELD, NATIONAL GEOGRAPHIC STAFF © N.G.S.

Nathan Road at Night Presents a Carnival of Signs in English and Chinese

Street signs in Kowloon's shopping center advertise everything from tattoos to tailor-made suits, copies of antique furniture to fortunetellers. Indian

silks to Paris perfumes, Swiss watches to German cameras. Almost anything may be bought at free-port prices. Stores remain open long after dark to accommodate working people. Policeman in his kiosk directs a swirl of foot traffic. Bus copies London's double-deckers.

ALL PHOTOGRAPHS BY BRIAN BRAKE, MARBURY (ABOVE), AND JOHN SCOFIELD © M.S.U.



At 10:38 p.m., Customers Shop for Food in Kowloon

Chinese cuisine demonstrates the ingenuity of its creators. Rice provides the complement to an infinite variety of dishes that combine bits of meat, fowl, and sea food with lightly cooked fresh vegetables.

Specializing in the refinement of flavors, Chinese chefs regard almost every living thing as a challenge to their skill. Consider the specialties of Hong Kong's best restaurants: Peking duck with crisp skin and succulent flesh, shrimp and fish tails in soy sauce, smoked eels, shark's-fin soup, cobra chow mein, and chicken baked in mud-covered leaves.

Even the humblest Chinese does not neglect the sensitivity of his palate. A housewife will bargain endlessly over six chicken heads destined for stew, or repeatedly finger a counter of small fish before selecting five for a penny each.

Shoppers above take their time in selecting eggs that have been graded by age. Dried ducks and sausages hang from the ceiling. Root vegetables and dried seaweed occupy the rack at left.

Feasting on plain boiled rice, a diner looks hungrily to his second helping.

public servants. For every illegal immigrant sent back, I knew, 20 get through and are allowed to stay. But I couldn't help wondering about the fate of these unhappy men who had tried for freedom and a fuller rice bowl and failed.

Hong Kong has even more interesting transportation than its busy short-line railroad to the front door of Communist China. Its public conveyances, varied as perhaps in no other place on earth, afford an endlessly shifting view of the city's throb and bustle. From the green-and-white Star Ferries – they make upwards of 400 crossings a day – I delighted in watching the colorful kaleidoscope of Hong Kong's great peak-girt harbor. Double-decker buses and trams gave me a giraffe's-eye look at pulsing streets of Chinese shops.

When I tired of the constant ebb and flow of people, I could let the city's famed cableway lift me steeply upward toward Victoria Peak. There, far above the crowds and the scuttling ferries, I could laze away an hour of solitude as the lights of Hong Kong went on and the city turned tawny orange, then dusty lavender, and finally jeweled black velvet.

Rickshas Survive in Busy City

But of all the city's rich fare of transportation, I liked the rickshas best – in spite of remembering that a friend of mine spent six months in a hospital after a ricksha-automobile accident. Unfortunately, he was in the ricksha. Perhaps I like rickshas because they are disappearing from the world. Except as tourist attractions here and there in the Far East, they survive only in Hong Kong and Calcutta.

Close-cropped Wong Tsun, whose scarlet vehicle sits with eight or ten others at the foot of Wyndham Street in Victoria, eyed me with amusement. Of course he would talk to me, but I would have to pay for his time like any other customer.

Wong rents ricksha No. 153 from a friend: 75 Hong Kong cents – 13½ cents U. S. – for ten hours. Another man pays the same amount for its use during the night.

On a busy day Wong may earn as much as five or six Hong Kong dollars. Bad days drop his take to less than the rent he must pay for the ricksha.

Wong's family consists of a wife, a daughter, and a son-in-law who works in a factory. Wong isn't sure what kind of factory; it is enough that the son-in-law brings home a few dollars a month.

I asked Wong Tsun what he thought about the Communists having banned rickshas in Red China; it was not right, they said, for one man to pull another. But Wong was no

Sidewalk serves as counter for a clothing shop in the Temple Street night market. Rented gasoline lantern lights the squatting proprietor's jumbled stock.

Human Van Transports Stools, Children's Chairs, and Gocarts

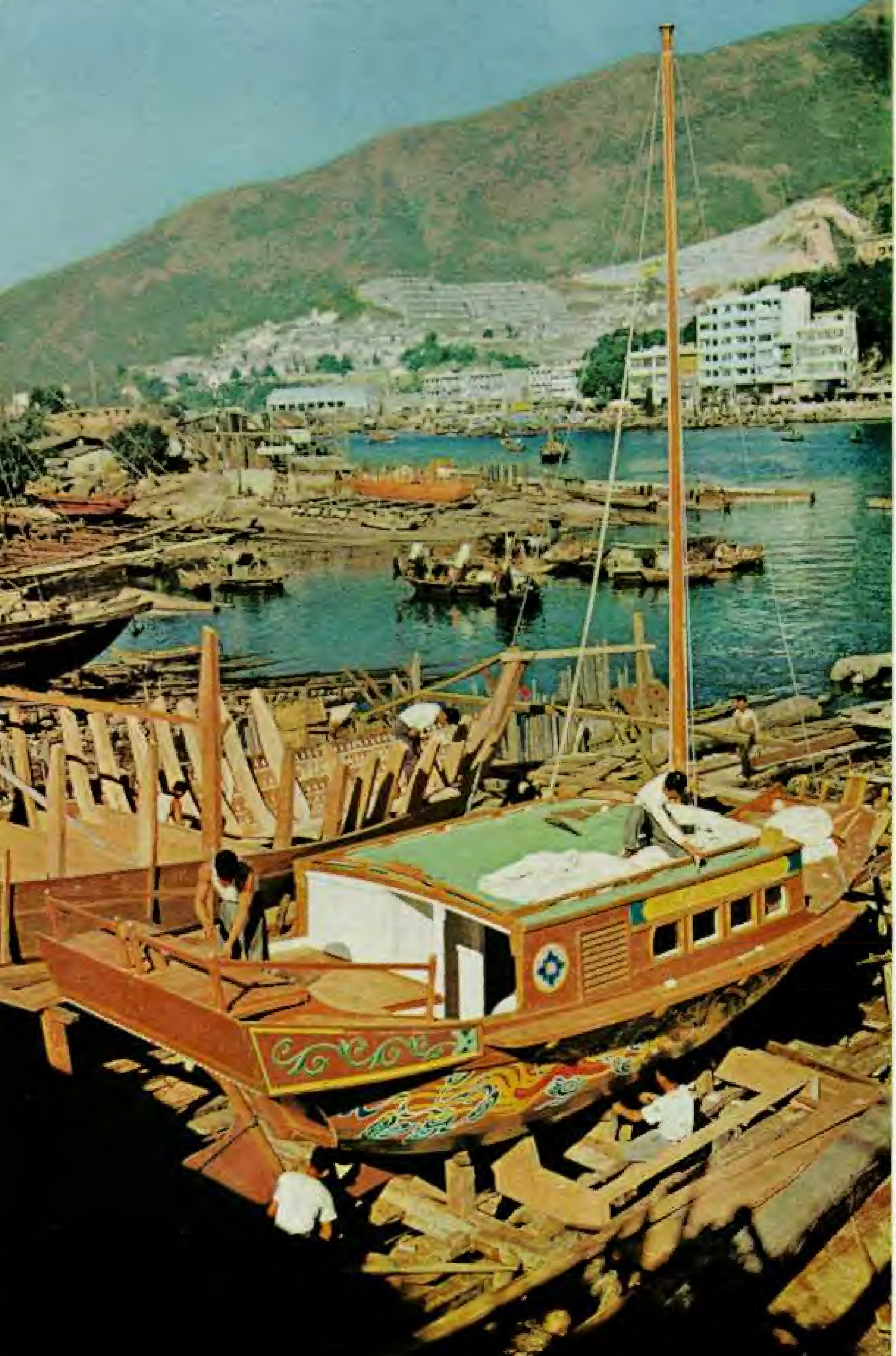
Hong Kong makes or can make almost any article used by anyone, anywhere. Eying the needs of various parts of the world, the Crown Colony ships drip-dry shirts to the United States, cotton cloth to Africa, knitwear to Southeast Asia, and woolens to Europe. When expensive plastic flowers found favor on Fifth Avenue, Hong Kong jumped into the market and produced inexpensive ones for American 5-cent stores and supermarkets.

Although many factories work under one roof, others form a sort of assembly line in which craftsmen in cubbyhole shops turn out parts for a single manufactured item. These chairs may have been cut in one place, glued together in another, and painted here in Tai Po, New Territories.

Chinese lanterns advertise a New Year's sale at Daimaru, the colony's newest department store. Branch of a Japanese firm, the glass-faced establishment sponsors an international fair that displays new products from all countries.

Dolls fail to keep baby awake, but the "Moon Explorer" fascinates parents shopping for toys at Daimaru.

香港
大
價



philosopher. He was more interested in making a living than in worrying about what the Communists say.

Administration of 853 registered rickshas and four sedan chairs, together with Hong Kong's sleek Mercedes-Benz diesel taxicabs and other public conveyances, ranks as a relatively minor detail in the bewildering array of problems faced daily by the Crown Colony's guardians of the peace. With most of its 3¾ million people packed into roughly ten square miles (imagine 4½ times the population of Washington, D. C., crowded into one-seventh the space!), Hong Kong has a spectacular potential for traffic problems.

Crowding Creates Traffic Hazards

In this connection, I asked G. A. R. Wright-Nooth, the colony's Assistant Commissioner of Police, Headquarters, about a story I had heard. Superstitious Chinese, it went, scoot across streets only inches ahead of passing automobiles so that the vehicles will run over any devils that may be following them.

"Well," he said, "perhaps a few old and uneducated Chinese might try to get rid of their devils that way. But our real problem is simpler—too many automobiles and too many immigrants in from the country with no traffic sense whatever."

Beyond the hazards of traffic (on some of Victoria's crowded market streets, automobiles run more risk of being crashed into by jaywalking pedestrians than the other way round), Hong Kong bears little resemblance to the sinister city of the same name I had seen in motion pictures and television serials.

"About the worst that might happen to you," Mr. Wright-Nooth assured me, "would be to have your pocket picked—if you were extremely careless."

Our talk shifted to narcotics.

"This is one situation in which Hong Kong really can't help itself," he told me. "The city sits at the hub of a huge spoked wheel. On one side lie the opium fields of China, Laos, Thailand, and Burma; on the other, the shipping lanes of the world."

But I gathered that the city's narcotics squad keeps things hopping for dope smugglers. Shortly before I arrived, they had seized 339 pounds of morphine and 784 pounds of opium. It was a record seizure, Mr. Wright-Nooth told me—enough to supply the world's legitimate needs for several years.

Would it be possible, I wondered, to see an

Chinese Junk for an American Buyer Gets Finishing Touches Near Aberdeen

Thousands of craft ply the waters around Hong Kong. Some are newly launched from local yards. Others drop anchor for destruction in one of the world's largest ship-breaking centers. These artist-shipwrights decorate a junk-type yacht that will go to the United States in the hold of a cargo ship. Although its style copies that of the working boat, the pleasure craft has air cushions, built-in cabinets, and seats that can be converted into bunks.

White-gowned mourners wail as they follow the dead. Logs form the coffin. Chinese characters say the deceased, Mother Ho, born Kuo, came from Kwangtung.

Woven bamboo hat shades a woman sampan taxi driver

opium den if one were discovered and raided while I was in the colony?

"Divan, not den," Mr. Wright-Nooth corrected.

"A bit difficult," he said, "and you won't find it particularly romantic.

"Generally we discover them in squatters' shacks. Perhaps we could ring you up if we raid one and let you see it before it's pulled down."

That very afternoon coincidence took a hand in my affairs. In a crowded tenement building in Wan Chai, I happened to pass a dimly lit stair-

way. Four men crouched intently together on a landing, moving lighted tapers back and forth under V-shaped troughs of tin foil. As a heated droplet of some kind rolled back and forth, they intently inhaled its fumes through matchbox covers held in their mouths.

These men were some of the colony's estimated 200,000 drug addicts. The droplets, I was told later, were molten heroin, an extremely potent derivative of opium. And, as Mr. Wright-Nooth had warned, there was nothing at all romantic about it.

I called him next day. "About that raid," I said. "Thanks, but don't bother about showing me any den . . . er, divan. I found my own dope smokers—four of them."

One afternoon, GEOGRAPHIC staff men Bill Garrett and Peter White arrived unexpectedly in Hong Kong on their way to assignments in Laos and Viet Nam—just in time to join me for dinner.

Snake Shop Caters to Strange Tastes

Earlier in the day I had dropped in at She Wong Lam's cluttered little snake shop on a Victoria side street. While I watched, a man named Lo Ken fearlessly reached into one square wicker basket after another to select a

Aberdeen Restaurants Float Serenely; Sampans Shuttle Diners To and Fro

Fishing boats often bring their catch home alive. Sold to double-decked restaurants such as Tai Pak (left) and Sea Palace, the fish go on display in tanks where patrons may select their entree.

Round-bottomed pans fit over fire pits in the Sea Palace. The method ensures the quick cooking required by Chinese recipes.

PHOTOGRAPHS BY JOHN SCOFIELD, NATIONAL GEOGRAPHIC STAFF © N.G.S.

Lawn-sized Farms in Tsuen Wan Valley Yield as Many as Eight Crops a Year

Importing food from China, the colony strives to become as self-supporting as possible. These irrigated plots average about half an acre each. Part of the New Territories, they are scheduled to revert to China in 1997, when the lease expires.

six-foot banded krait and a yard-long Chinese cobra. Skillfully he killed the two deadly reptiles, skinned them, and pulled away thin filets of still-wriggling meat from the long backbones. Later he added the meat of an Indochinese rat snake.

That night we gathered in a near-by restaurant. Another of "Snake King" Lam's specialists brought live cobras and kraits one after another to the table, neatly cut out their gall bladders, and drained them into a glass of rice wine that had itself been fortified with the meat of five kinds of snakes. We were to toast each course with a sip of the bitter, greenish potion.

Then came the dishes: stewed snake; fried snake; snake with shredded lemon leaves and fresh chrysanthemum petals; boiled snake; snake with mushrooms and ham; and a mixture, served on a bed of crisp fried noodles, that was unmistakably cobra chow mein. In all, we accounted for 14 serpents that night —a performance that might have pleased St. Patrick himself.

"There's nothing," punned Peter White, "like a good, thick snake."

Only southern Chinese enjoy such meals; my friend Eddie Hsu, born in Peking, refuses even to discuss the subject. But to the Cantonese, who make up the bulk of Hong Kong's population, a snake banquet represents a treat and a treatment rolled into one. The gall, they say, cures rheumatism, and Hong Kong gourmets relish the meat as a tonic.

Exotic Cookery Adds Spice to Eating

It was an exciting and memorable meal, but I still cannot class myself as an expert on the exotic side of Hong Kong's richly varied bill of fare. For one thing, I didn't try the fabulous "emperor's feast" offered by the Tai Tung Restaurant on Des Voeux Road. Actually consisting of two lunches and two dinners, it features such delicacies as bears' paws and ducks' tongues. The check, for a party of 14, comes to $540 U. S.—plus tip.

For more reasonable adventures in eating, Hong Kong offers an endlessly varied array of Chinese regional cookery. I sampled the Peking duck of the north, and cooked paper-thin slices of mutton as the Mongols do it, dipping them into water boiling in a firepot at the center of the table. There were the peppery foods of Szechwan and the rich soups of shark's fin and edible bird's nest. But of all the dining in Hong Kong my favorite—for sheer atmosphere—must be Aberdeen (pages 36 and 37).

I always tried to reach this busy fishing village at sunset, when the strings of lights on the floating restaurants cast magical patterns on the water, yet enough light remained to watch the sampan women scull their blue-canopied craft back and forth like so many agile waterbugs.

Diners Select Live Sea Food

Each of the restaurants has its wicker live pens arrayed alongside. When I asked them to, the waiters let me choose my own sea food: huge flapping lobsters, live prawns that must have weighed a quarter-pound apiece, conchs, and queer spotted garoupas.

As I pointed to what I wanted, a man dipped my selections out and tossed them, squirming and wriggling, to another; he in turn deftly killed and cleaned them and passed

Baby on back, a farmer's widow saws firewood. With government and philanthropic aid, she raises pigs to support her family.

them to cooks in the water-borne kitchen.

But even in "timeless" Aberdeen—here was the original Heung Kong, the "Fragrant Harbor" from which the colony took its name—change lies only a little way around the corner. Colonial planners, looking desperately for space, plan to fill the crowded upper harbor to make room for a new industrial center. On summer nights Aberdeen will be a lot gentler on the nostrils, but I wonder how much of its nighttime magic will remain.

Statistics Paint a Challenging Picture

Change, in fact, lies just around the corner for nearly every aspect of swiftly marching Hong Kong. In his spacious office in Government House, the Governor, Sir Robert Black, outlined some of the problems that the colony faces in the next decade.

"Our most serious problem?" he echoed my question. "The press of population."

He gave me some figures. For every death in the colony last year, six babies were born. The city can look forward to a natural increase of another million in the next ten years—without counting a single new immigrant.

Forty-seven percent of Hong Kong's residents are under 15 years old. To educate them, the colony completes a new school every two weeks.

Resettlement schemes have already provided homes for more than a third of a million. "Our eventual goal," said Sir Robert, "is to build adequate housing for every family earning less than $150 U. S. a month. That means three out of four Hong Kong families."

An adequate supply of water ranks high among the problems. When I was there, the taps functioned only from 6 to 11 a.m. and 4 to 9 p.m. But last year, the Governor told me, the water flowed for only four hours a day during the most stringent rationing period.

"We are accomplishing a good deal," he went on. "My yardstick is not that a businessman tells me what a good year he has had. I judge what we are accomplishing by how far down the ladder our prosperity trickles. Are the people at the bottom getting enough to eat? I think more and more of them are."

I wondered if this rising prosperity did not contain the germ of its own destruction. Wages must rise as the standard of living goes up, and manufacturing costs inevitably rise with them. What will happen when Hong Kong no longer has a plentiful supply of cheap, skillful labor?

"Our job is to see that the standard of living *does* continue to go up," Sir Robert said emphatically. "But our skills must go up with it. We shall have to produce even more-attractive, higher-quality goods, so that people will buy from us because our products are better instead of simply cheaper."

I left one question unasked. What about Red China? How long can a tiny British Crown Colony continue to exist on the very doorstep of the Chinese Peoples Republic?

I knew Sir Robert would not want to comment. But every other old China hand I asked, whether he had been in Hong Kong ten days or ten years, had an answer—and the answer was always the same: as long as Hong Kong can be useful to Red China.

The chief measure of that usefulness can be chalked up in dollars and cents. Last year Communist China earned the equivalent of $180,000,000 net in hard currency, principally from sales of food and textiles, through Hong Kong's busy markets.

"No one would kick a customer off his doorstep," a visiting American commented wryly to me, "when he pays his way that handsomely."

No Firecrackers for Red Chinese

I left Hong Kong as the Chinese were celebrating the arrival of the Year of the Ox in the same way their ancestors have welcomed the New Year for centuries. Debts had been paid, new clothes bought, and the old household gods of paper had been consigned to tiny bonfires. Doorways had been repainted and new gods pasted up. Everywhere I heard cries of "*Kung hei fat choy*"—"Very humbly wish you every happiness and prosperity."

Hong Kong's 670 million neighbors in Red China celebrated without firecrackers; their Communist bosses had forbidden this needless luxury. But the tolerant British, with a fine feeling for tradition, set aside two days when the colony could bang off fireworks to its heart's content. The city resounded with the noise of a pitched battle as millions of firecrackers exploded in an ear-cracking day-and-night barrage.

To me, on the way to the airport through the din, those machine-gun bursts, rocketing from the walls of packed resettlement estates and holiday-closed textile mills, said a great deal about the happy and successful blend of West and East, of old China's skills and new Asia's energy, that is Hong Kong today.

Wrapped in a cocoon of bamboo scaffolding, a new apartment building towers above a miniature park in Kowloon, where old men and children while away leisure hours.

Ghost From the Depths:

Pride of the Swedish fleet, mighty Vasa *set sail on her maiden voyage on August 10, 1628. She capsized and sank the same day and lay on the bottom of Stockholm Harbor for more than three centuries. Recently raised from the deep, the warship is undergoing restoration*

the Warship *Vasa*

By ANDERS FRANZÉN

TRULY A PROUD MOMENT, a fine day, this Sunday afternoon in August, 1628. Milling spectators shout gay good wishes on the quay before the royal palace in Stockholm. The shouts swell into a cheer as seamen cast off and warp their country's mightiest warship into the harbor. After months of fitting out, *Vasa*—named for the royal family—has begun her maiden voyage.

Sweden, locked now in what history will record as the Thirty Years' War, welcomes this splendid 1,400-ton armed galleon to her navy. *Vasa*'s gilded lion figurehead snarls defiance; her 64 gleaming bronze cannon will roar appropriate reply to a German emperor's threat to invade Scandinavia.

Sailors high in the rigging break out light sails, and *Vasa* eases away from her berth. At last the costly showpiece of the Royal Swedish Navy has become a living ship.

Onlookers exclaim at the sight of cannon scowling from two tiers of open gunports. Each port has a door that, when lifted, reveals a ferocious gold lion's head on a blood-red background to terrorize enemies.

Now the great man-of-war ghosts along easily as the light southwesterly breeze fills fore-topsail, main-topsail, foresail, and mizzen—only part of the vessel's huge inventory of canvas.

Off the island of Beckholmen, not yet a nautical mile from the quay, a squall ruffles the harbor. It is a fragile gust, yet it heels *Vasa* drunkenly to port. Surprised, men brace themselves on slanting decks and wait for the ship to right herself. Instead, she leans over farther—and stays there, robbed of all grace, like a stricken whale.

Chief Ordnance Officer Erik Jönsson instantly senses disaster. He runs below and orders his gunners to haul cannon to windward in an effort to correct the list. But it is too late. Water cascades through the lower gunports, left open for the harbor passage.

Over on her beam-ends with all flags flying, the pride of the fleet of Gustaf II Adolf sinks like a stone in 110 feet of water. On shore cheers die in thousands of throats.

Small boats pull madly to pick up *Vasa*'s floundering complement. Besides 133 sailors, she carries wives and children, to be disembarked later, and possibly 300 soldiers. Despite the rescuers' best efforts, about 50 lives are lost.

Thus for Sweden the proud moment ends in tragedy, on a fine day in August, 1628.

On an equally fine day in August, 1956, I sat alone in a motorboat amid the bustling traffic of Stockholm Harbor and felt a moment no less stirring.

In my hand I held an instrument of my own design—a marine core sampler. The six-pound steel cylinder resembled an aerial bomb tipped with a sharp hollow punch. Many times before, I had reeled it in to find samples of mud and unidentifiable debris from the harbor floor 110 feet below. This time the punch had brought up something different—a plug of black, close-grained oak.

Oak requires at least 100 years of immersion in these waters to turn black. Only the largest and most important vessels of the 16th and 17th centuries were built of that expensive wood. Surely my find was a tiny fragment of a very large and very old ship—*Vasa*, almost beyond doubt!

That waterlogged plug of oak led to the recovery of the world's oldest preserved and fully identified ship. Less than five years later *Vasa* was afloat after her long sleep.

In astonishingly good condition, *Vasa* is now undergoing restoration necessary to transform her from a dead warship of another age into an incomparable 20th-century museum. As I write this, archeologists have just begun to recover and study some of the objects sealed in the ship's mud-clogged hull: a pewter tankard here, a powder can there; coins, earthenware, wooden dishes, muskets, leather boots, gauntlets, a cockaded felt hat, fragments of clothing—even casks of butter! These only hint at the fascinating cross sec-

tion of 17th-century life awaiting modern eyes when the work is finished.

Twelve skeletons—well preserved after more than 300 years in these northern waters—have also been recovered.

There had been other memorable days in my long search for *Vasa*. The day I learned that wood-destroying shipworms are not active in cold, brackish Baltic waters . . . the day I came upon a yellowed document clearly locating the scene of the *Vasa* catastrophe . . . the day a diver reported that he was climbing a wall of wood, probably *Vasa*'s hull. . . .

My interest in the archeology of old sunken ships began in the 1920's when, as a youngster, I spent summer holidays at Dalarö in

Vasa Heels Over and Sinks While Still in Sight of Stockholm Waterfront

One of the mightiest warships of her day, *Vasa* set sail on her maiden voyage on a calm day in 1628. When a puff of wind filled her shortened canvas, she heeled to port, scarcely a mile from her quay. Water gushed through the lower tier of gunports—carelessly left open—and lapped over the gunwale. Knocked on her beam-ends, she sank like a stone in 110 feet of water.

This and two other National Geographic paintings (pages 42 and 49) have been researched to the minutest detail. Sailors, scrambling for their lives, wear their hair long, in the fashion of the 17th century. A few men took along wives and children for the first stage of the voyage.

Modern Stockholm preserves buildings that saw *Vasa* set sail. One of these, St. Gertrude's spired church at right, appears in the scene painted on pages 42-43.

the Stockholm archipelago. My father's hobby was history, and his tales of ships sunk in battle and storm spurred me later to grapple and dive for bits of wreckage.

On a cruise off Sweden's west coast in 1939, just as World War II was breaking into flame, I saw some timbers riddled by teredos, the most common shipworms. I wondered why I had never found wood so eaten in east and south coast waters. Then I learned that teredos require a salinity of 0.9 percent to thrive.* The Baltic's average salinity is 0.7 percent. In many areas it is much less.

If teredos are not destructive there, I reasoned, the sunken wooden vessels in that sea could not be damaged by them. Water itself preserves wood, barring the presence of destructive organisms. If ever I became rich, I decided, I would find and salvage some of those ships. A lot of money would be needed, for helmet-and-hose diving, the only kind then known to me, was staggeringly expensive.

Ancient Charts Pinpoint Wrecks

But the war, for all its tragedy, brought with it a tool that would revolutionize underwater exploration: self-contained underwater breathing apparatus. Now almost anyone who could swim could dive, and at moderate cost.

Encouraged, I plunged into an intensive study of northern Europe's naval history, using what time I could spare from my work as a petroleum engineer.

Everything was grist for my research mill—civil and military archives, ships' logs, old charts, even yarns I heard from sailors.

The most interesting material, I soon decided, centered on the large, richly decorated warships of the 16th and 17th centuries. Any notable discoveries from this period would fill a big gap in maritime treasures between the Viking ships of A.D. 900 to 1000 and Admiral Nelson's H.M.S. *Victory*, built in 1765 and still well preserved—after several restorations—in Portsmouth, England.

Soon I had a list of about 50 ships known to have been wrecked off Sweden's east coast. These I narrowed down to about a dozen—*Vasa* among them. At that time I did not recognize her as the greatest prize of all.

Working in cooperation with the National Maritime Museum in Stockholm, I chose the big warship *Riksäpplet* (Orb of the Realm),

PHOTOGRAPH BY NATIONAL GEOGRAPHIC PHOTOGRAPHER WINFIELD PARKS, JR. N.G.S.

The author, Swedish Admiralty engineer Anders Franzén, searched for years before finding *Vasa*'s grave in 1956. Here he climbs past the old warship's rudder post.

sunk in Dalarö Harbor in 1676. *Riksäpplet* lay only eight fathoms deep, and when we dived to her, we saw that she had been smashed by ice and wave action. Most of her timbers were gone, removed by local people.

But now I was convinced that a complete 17th-century hull could be raised—if it was still intact and lay in deeper, calmer water where a salvage fleet could operate. *Vasa* seemed to fit these specifications.

The late Professor Nils Ahnlund, a famous Swedish historian, had rediscovered the tragic *Vasa* story while doing research on another shipwreck of 1628.

"Find *Vasa*," he told me, "and you will have the greatest treasure of all."

Vasa took top priority on my list.

*See "Shipworms, Saboteurs of the Sea," by F. G. Walton Smith, NATIONAL GEOGRAPHIC, October, 1956.

Breaking the surface after 333 years under water, *Vasa* rises on cables looped between two salvage pontoons, which alternately lifted her and coaxed her shoreward. From squared stern to curved bow, *Vasa* measures half again as long as the Pilgrims' *Mayflower*.

PHOTOGRAPH BY W. J. SALMONT, U. S. N.

The short, unhappy life of this great ship and subsequent efforts to salvage her have few parallels in naval history.

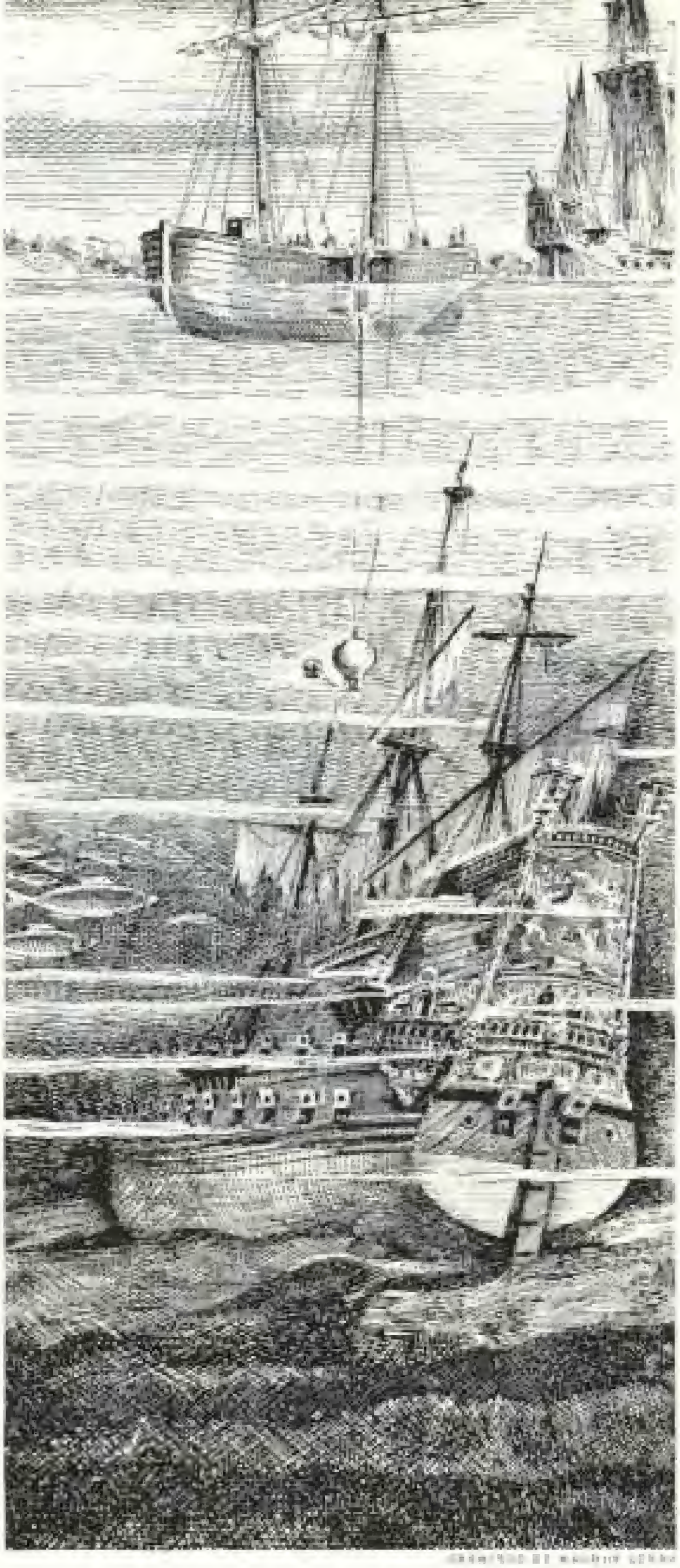
In January, 1625, King Gustaf II Adolf ordered his chief naval architect, Dutch-born Henrik Hybertsson, to build four new warships. Their construction was started at the Royal Dockyard—on the approximate site now occupied by the Grand Hotel.

The largest of these vessels, bearing the regal name *Vasa*, was to be flagship of the Home Squadron. In design she was similar to the *Mayflower*, which had sailed to America just a few years before.*

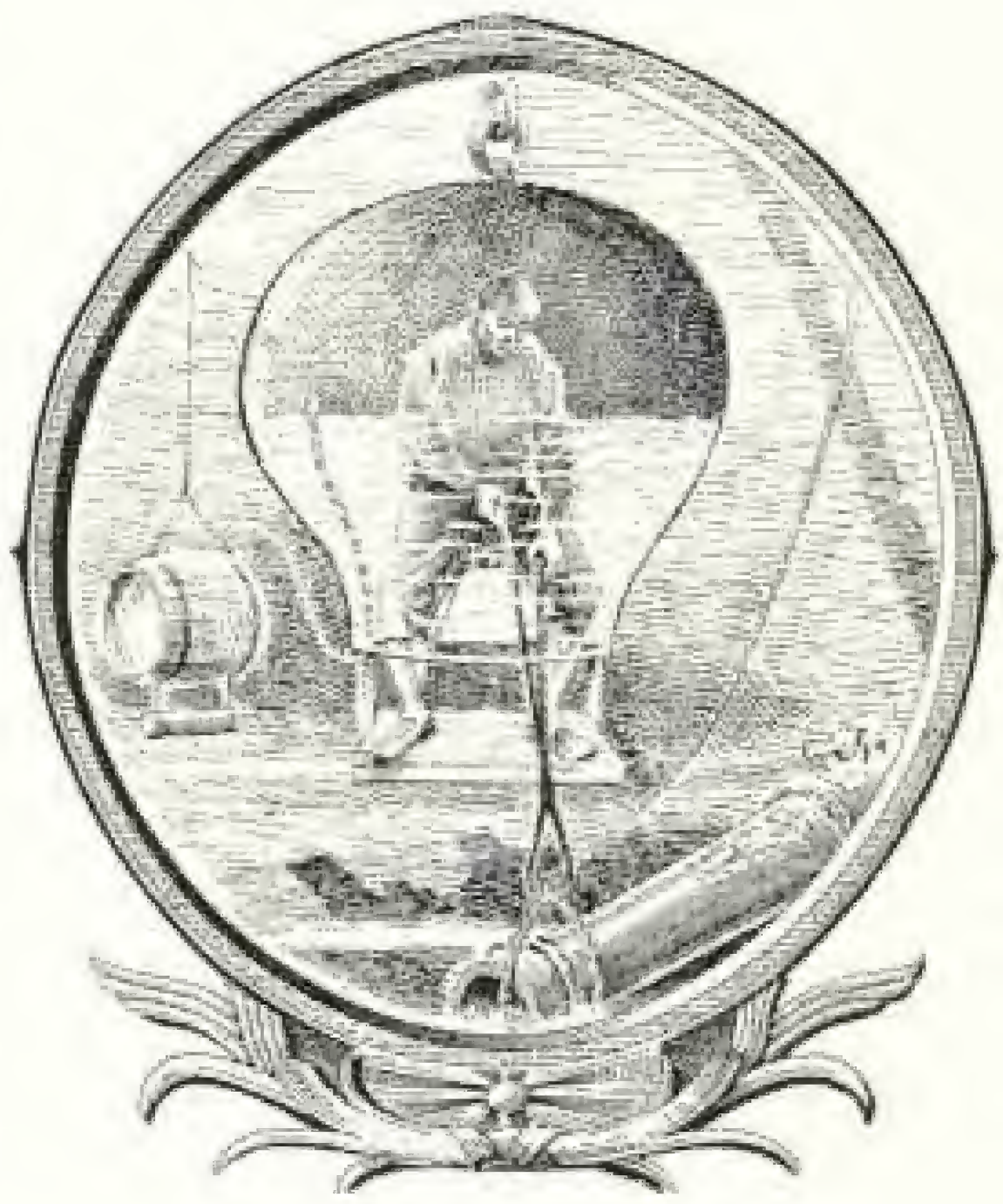
From the trailing edge of her rudder to the nose of her figurehead, the Swedish galleon measured nearly 180 feet; a sharply raked bowsprit added another 30 feet to her overall length. The loss of such a giant, for her day, amounted to a national disaster.

Stockholm's church bells had scarcely

*For an account of the building of *Mayflower II* and her voyage from England to the United States, see in the NATIONAL GEOGRAPHIC: "We're Coming Over on the *Mayflower*," May, 1957, and "How We Sailed the New *Mayflower* to America," November, 1957, both by Capt. Alan Villiers.



Primitive diving bell enabled salvagers in the 1660's to recover 53 of *Vasa*'s 64 guns. Standing on a platform suspended beneath the bell, the diver breathed air compressed at the top of the chamber while he fished for cannon. Casks carried extra air. When *Vasa* came to rest on the bottom in 1628, her topgallant masts actually jutted above the surface. Memory of the warship faded after early salvage efforts ended. A modern Swedish artist drew these impressions.



Risking their lives, helmeted divers drove six tunnels beneath *Vasa*. Through the tubes they threaded steel cables which were then suspended from pontoons on the surface. Emptied by pumps, the floats rose and lifted the hulk. Divers and frogmen worked by touch alone because each movement stirred blinding clouds of mud, which rose to the ship's top plank. Here the artist strips away the silt to show the men who recovered hundreds of artifacts, including a carved coat of arms, part of which he depicts.

Robert W Nicholson
NATIONAL GEOGRAPHIC SOCIETY

Held Upright by Wooden Stanchions, *Vasa* Awaits Restoration in Dry Dock

Early salvagers ripped up the galleon's main deck to gain access to the guns below. Anchors dropped by vessels overhead tore away the masts and high sterncastle. New wood patches the worst of the damage. Temporary covers seal the lower tier of gunports. *Vasa* rests on a submerged pontoon in dry dock at Beckholmen, just 300 feet from the point where she sank.

Waterlogged hull takes an around-the-clock bath to keep it damp. Blackened by three centuries under water, the oak planks would deteriorate if allowed to dry too rapidly. Plastic film at top helps conserve moisture. Bolts reinforce the hulk. A workman peers from a gunport.

ceased tolling for the *Vasa* dead before the first salvage attempt was under way. Three days after the sinking, the Council of the Realm authorized Ian Bulmer, an English engineer, to try to raise the ship.

Vasa had righted herself while settling to the bottom and lay with only a slight list, her topgallant masts thrust above the surface at an angle. For all his efforts, Bulmer succeeded only in getting the ship on an even keel. Presumably he used horses on shore to haul the ship upright, the animals pulling on lines attached to the masts.

After Bulmer had failed, the Royal Swedish Navy made a salvage attempt, but gave up because "the instruments were not strong enough." Then came a succession of French, English, Dutch, and German salvagers, leaving tons of anchors, grappling irons, cables, and chain around the sunken hull.

The most profitable attempt before modern times was launched in 1663 by Hans Albrecht von Treileben, a former Swedish Army officer, and his partner, Andreas Peckell, a German salvage expert. They brought an assortment of hooks, tongs, and grapnels, and an odd bell-shaped diving chamber. With their special implements, the pair set about ripping off upper deck timbers, thus gaining access to the cannon beneath.

PHOTOGRAPHED BY BRUCE DALE, NATIONAL GEOGRAPHIC STAFF

Divers brought the first guns to the surface in April, 1664. Some of the guns from the deck beneath were then recovered by fishing them out through the gunports.

Official Report Furnishes Vital Clue

Von Treileben and Peckell salvaged more than 50 cannon before departing. Then, for almost three centuries, *Vasa* rested in her grave, virtually forgotten by all but a few historians. Eventually even the exact location of the ship was forgotten.

By 1954, however, I had amassed a huge amount of research data and was ready for an all-out attack. Using borrowed and hired motorboats, I began a systematic sweep of the bottom with grapnels and wire drags. Crews aboard harbor craft became accustomed to the sight of a lonely figure engaged in a strange kind of fishing. They laughed when I brought up old bedsteads, tires, stoves, Christmas trees, and the like.

Poring over a contour map of the bottom, drawn for engineers who planned a bridge across the harbor, I noticed that echo-sounding gear had traced a large hump 300 feet south of the navy's Gustaf V Dry Dock on Beckholmen. The engineers told me that the mound no doubt was debris from the dry dock, blasted out of solid rock years before.

Water jet uncovers a skull on the lower gun deck. Historians believe about 50 persons went down with the ship. Archeologists, clearing tons of mud, found 12 complete skeletons.

Wheeled gun carriages line the lower gun deck. Water pouring in on this level sank the ship. Continuous spray today preserves the old timbers. Customarily the gun decks of such warships were painted red to soften the crews' shock at the sight of blood in battle.

Crowned by hard hat, King Gustaf VI Adolf deftly examines a bottle brought up with the warship. A trained archeologist, he is known as the scholar king. A predecessor built *Vasa*.

I went back to the archives and came upon an all-important letter. Dated August 12, 1628, it contained the Council of the Realm's report on the *Vasa* sinking to King Gustaf Adolf, then fighting in Poland. It read, in part:

"And when she came out into the bay by Tegelviken there came more wind into her sails . . . came to Beckholmsudden, where she entirely fell on her side and sank in 18 fathoms of water."

Beckholmen! I was on the right track at last. That submerged hump south of the dry dock entrance held something vastly more interesting than mere rock debris, I felt sure.

With my newly developed core sampler, I went straight to the spot and brought up the plug of black oak mentioned earlier. Just to make sure I had not sampled a sunken log, I dropped the instrument again and again over a wide area. Result: more oak plugs.

Diver Climbs "Wall of Wood"

I went immediately to the Royal Swedish Navy, told of my discoveries and my hopes, and proposed that the Divers Training School be moved to the Beckholmen site. Student divers might as well practice on the wreck of a historic warship as anywhere else, I pointed out, and the navy agreed.

Soon a diving vessel, manned by brawny helmet-and-hose veterans and eager young frogmen, anchored at the designated spot. First to make the descent into 110 feet of murk and mud was Chief Diver Per Edvin Fälting, who had logged more than ten thousand underwater hours. Fälting's first report from the bottom was not encouraging.

"I'm standing in porridge up to my chest," he told me over the telephone. "Can't see a thing. Shall I come up?"

"Yes," I said gloomily, "you might as well come up." Then I heard an excited whoop.

"Wait a minute!" cried Fälting. "I just reached out and touched something solid . . . it feels like a wall of wood! It's a big ship, all right! Now I'm climbing the wall . . . here are

Lion's head carved in linden wood snarled from *Vasa's* prow. Figurehead broke loose when water corroded the bolts that held it in place. Divers recovered the ornament before the ship was raised.

some square openings . . . must be gunports."

On the surface I watched the depth gauge drop as Fälting clambered up the hull.

"Here's a second row of gunports," he reported a few seconds later.

There could be no doubt about it now. In this vicinity my research had accounted for all other ships with two rows of gunports. We had reached *Vasa*.

After six months of preparation, the program for lifting and restoring the ship moved into high gear. A provisional *Vasa* Committee, headed by Commodore Edward Clason of the Royal Swedish Navy, recommended, in February, 1958, that the ship be lifted from its 110-foot depth, shifted to water only 50 feet deep, and left there still submerged until further plans could be worked out. Financed by the government, industry, and private subscribers, the project cost $2,000,000.

The Neptun Salvage Company of Stockholm agreed to do the lifting free of charge; the navy undertook the underwater work as a training exercise for its divers.

When stage No. 1 began, I had my time of doubt. Was the raising of even the precious *Vasa* worth the risk? Helmeted divers were calmly bubbling to the bottom to begin the task of driving six tunnels down beside *Vasa's* hull, under her oaken keel, and up the other side (page 49). They carved these tubes with powerful water jets; suction hoses, like huge vacuum cleaners, pumped debris to the surface. There it was sifted for artifacts.

Most of the time the steel-nerved divers and their hoses lay half-buried deep in clay. Over their heads tons of rock ballast hung poised in the ancient hull. Were the old ship's timbers strong enough to prevent a rock cascade—a deadly breakthrough that could crush a diver?

For more than 2,000 underwater man-hours of work those splendid planks held. Through the tunnels the divers passed 4,500 feet of steel cable six inches in circumference. At the surface the cables were secured to the big salvage pontoons *Oden* and *Frigg*.

The job ranks as one of the most complicated and perilous in diving history. Yet not a man suffered a serious injury.

The "Old One" Guards Sunken *Vasa*

As the divers burrowed, hundreds of valuable objects streamed to the surface—most of them beautiful carved figures that had fallen from the hull over the centuries. During this phase the divers, as superstitious as any seafaring folk, began grumbling about the antics of *Den Gamle*, the "Old One"—the spirit of a boatswain, as legend had it, who still inhabited *Vasa*. The Old One, they said, was angry at having *Vasa* torn from his grasp and was making a nuisance of himself. Sometimes, when they reached out for a bit of wreckage, the Old One snatched it away.

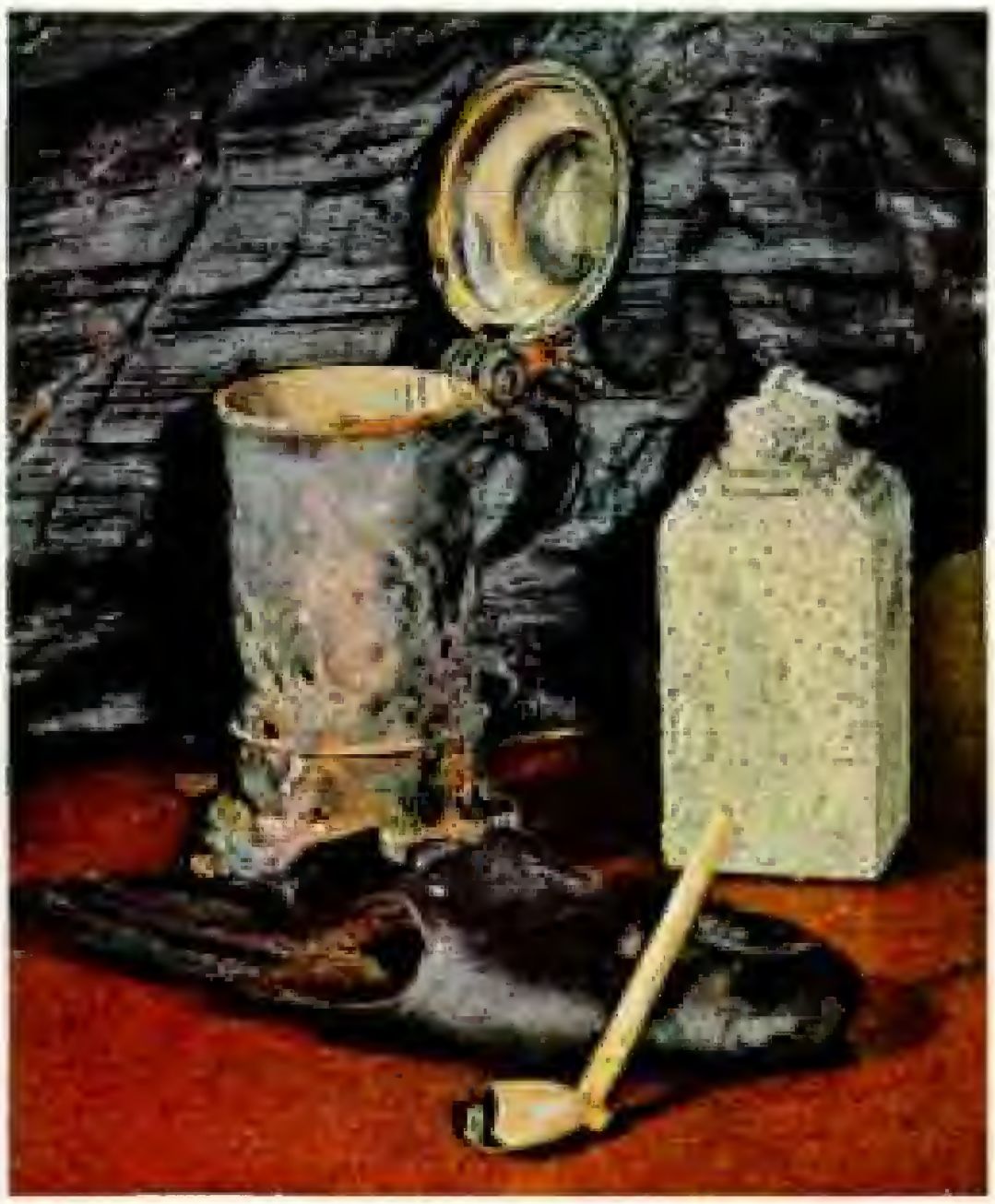
Actually these tricks were played by vagrant currents from fresh-water Lake Mälaren, which empties into Stockholm Harbor not far from here. But the divers adopted the habit of flinging 25-öre coins—each the equivalent of about five cents—into the water to placate the Old One before starting each day's work.

By August, 1959, the salvagers were ready for the initial lifting of *Vasa*. Would the ship, with her cargo of mud, stand the stress of the

Wooden plane and drills (above) and carving (right) undergo cleaning at the National Maritime Museum, Stockholm. Before displaying artifacts, curators soak them in polyethylene glycol, a wood preserver.

Wooden keg intrigues a workman at Beckholmen dry dock. Divers found similar casks filled with butter. Immersion keeps artifacts from drying until they can be treated. Distant scaffolding frames *Vasa*.

Pewter tankard and bottle, clay pipe, and leather slipper typify *Vasa* artifacts in the museum. A piece of wood sculpture from the vessel fills the background.



lifting cables—or collapse like an egg-shell?

The pumps began discharging water from the pontoons. As their buoyancy increased, they inched upward, taking up the strain on the lines. So far, it seemed, so good.

Then diver Sven-Olof Nyberg went down to the ship's stern to inspect our progress.

"*Vasa* has lifted 18 inches, all in one piece," he reported. "All well."

Clear of the bottom but still deeply submerged, *Vasa* "sailed" that first day about 80 yards toward Kastellholmen (Castle Island). Chief Diver Fälting reported that *Vasa*, her keel four feet above the bottom, was climbing a gentle slope.

"The sea bed is firm now," Fälting said. "Like walking in day-old snow. The mud comes only up to the top of your boots."

But farther on, the bottom became much softer, and *Vasa* sank deeply into the mud after each lift. After 18 lifts in 27 days, *Vasa* was eased to the bottom at a 50-foot depth, and here she went into hibernation.

Now the government formed the *Vasa* Board, with Prince Bertil as chairman, to direct the salvage and preservation. During 1959-61, divers boarded up the gunports, repaired the damaged stern, and made *Vasa* reasonably watertight.

Last April, frogmen attached four inflatable rubber pontoons to *Vasa*'s keel to give her some buoyancy of her own. Larger steel cables, nine inches in circumference, were passed under her hull and secured to huge hydraulic jacks on the salvage pontoons. Then the big jacks went to work.

Huge bronze cannon recovered from the hulk hurled a 24-pound ball. Its breech bears the crest of the Vasa dynasty and the monogram of King Gustaf II Adolf (1611-32). Scaffolding will support the temporary shelter planned for the warship while she slowly dries out. New wood shows where restoration is already under way.

In dry dock (opposite), *Vasa* perches on a concrete pontoon, her present resting place. During salvage, pontoons brought the hulk to the 50-foot depth after 18 lifts in 27 days. Hydraulic jacks lifted the ship the rest of the way to the surface.

Queen of Lake Mälaren and her court flash smiles from a naval launch. Sweden declared June 17, 1961, *Vasa* Day in honor of the ship's recovery.

It was a delicate task, inching the ship upward while keeping the pontoons in proper trim by flooding their compartments. But finally there she was—a ghost of a ship, lost for centuries, back among the living (page 46).

Powerful pumps went to work aboard *Vasa*, and by May 4 the ship, afloat with a slight list to port, was tugged into the dry dock at Beckholmen. There she was propped up on a concrete raft. A sprinkler system was introduced to keep the ship wet; should she dry out, her timbers would quickly deteriorate (pages 50 and 53). She will be preserved with polyethylene glycol, a waxy, water-soluble material that sinks in and forces out moisture, at the same time strengthening the wood. Eventually *Vasa* will be enclosed in a concrete-and-glass structure a quarter of a mile from Beckholmen.

Cause of Disaster Still Argued

Why did *Vasa* sink?

Many authorities believe *Vasa* was "crank"—that is, likely to capsize. She evidently was unstable, but I do not believe that she was any more crank than many other large 16th- and 17th-century vessels.

Who was to blame for the disaster?

The master of *Vasa* testified before a naval court of inquiry that he had noticed—and reported to the admiral—the ship's instability even before she left the quay. The shipwright maintained that he had followed the plans of naval architect Henrik Hybertsson almost precisely. Hybertsson? The man who knew most about *Vasa*'s design had died some months earlier. Besides, his plans had been approved by the king himself. Unwilling, perhaps, to delve further, the court adjourned without fixing blame or punishing anyone.

No evidence had been presented to prove that *Vasa* was badly designed for her time, or improperly sailed. Faulty distribution of weight on board—especially heavy cannon on the upper decks—was almost certainly one of the reasons for the disaster. Those open gunports surely were another.

Questions of blame and failure do not trouble me when occasionally of an evening I go to Beckholmen and stroll beside the *Vasa*. Often I go aboard the submarine-rescue ship *Belos* to relive salvage adventures with Commander Bo Cassel and his divers.

The divers still mutter uncomfortably about having robbed the Old One of his *Vasa*. But for myself, if I were to encounter the Old One, I think I would greet him with a short Swedish word. "*Tack*." It means "Thanks."

High and dry in dry dock at Beckholmen, *Vasa* awaits restoration. She is the world's oldest preserved, fully identified ship.

KEY LARGO CORAL REEF

America's First Undersea Park

By CHARLES M. BROOKFIELD

Photographs by JERRY GREENBERG

ALMOST within sight of the oceanside palaces of Miami Beach, a pencil-thin chain of islands begins its 221-mile sweep southwest to the Dry Tortugas.

Just offshore, paralleling the scimitar curve of these Florida Keys, lies an undersea rampart of exquisite beauty—a living coral reef, the only one of its kind in United States continental waters. Brilliant tropical fish dart about its multicolored coral gardens. Part of the magnificent reef, a segment roughly 21 nautical miles long by 4 wide, off Key Largo, has been dedicated as America's first undersea park.

I know this reef intimately. For more than 30 years I have sailed its warm, clear waters and probed its shifting sands and bizarre formations in quest of sunken ships and their treasure of artifacts.

Snorkel diver (opposite, right) glides above brain coral into a fantastic underseascape of elkhorn and staghorn in the new preserve off Key Largo, Florida.

Three-mile limit divides the rectangular park into State and Federal waters. Florida administers the entire area and calls it John Pennekamp Coral Reef State Park. An earlier Federal name, Key Largo Coral Reef Preserve, is also used.

Key Largo to Miami, 60 miles

U.S. 1

FLORIDA

Pumpkin Key

Pale Alto Key

Angelfish Key

Barnes Point

Middle Key

Flat Pt.

Short Key

Division Pt.

Shell Key

Thursday Pt.

Largo Point

Point Elizabeth

Point Mary

Jewfish Garden Cove

Stillwright Pt.

Key Largo Village

Rodgers Park

Upper Sound Point

Point Willie

Proposed Park headquarters area

Lower Sound Point

Elbow Reef Light

H.M.S. Winchester wreck

Carysfort Reef Light

North

JOHN PENNEKAMP CORAL REEF STATE PARK

also designated as

KEY LARGO CORAL REEF PRESERVE

Soundings in feet

STATUTE MILES

NAUTICAL MILES

Map prepared by W. W. Palmstrom

Drawn by V. J. Kelley and reproduced by H. F. Pollock, (C) N.G.S.

Here is a graveyard of countless brave sailing ships. Spanish galleons, English men-o'-war, pirate vessels, and privateers foundered on the reef's hidden fangs. In the 19th century alone, several hundred vessels met death here, and the wrecking masters of Key West gleaned close to ten million dollars from salvage operations.

In today's salt-water preserve the boundaries are marked by buoys, and visitors eventually will ride glass-bottomed boats above the lovely coral gardens. Even now the more active visitors fasten on mask and snorkel and bob face-down in gentle swells for a closer look at gaudy reef fish. The most adventurous strap on breathing units and descend to the beautiful coral world that underwater photographer Jerry Greenberg describes vividly on pages 70 to 89.

Author Found Wreck of the *Winchester*

Heavy seas break directly on the outer coral barrier, where the seaward edge of the reef comes up abruptly from the deeper waters of the Gulf Stream. Here, 23 years ago, I found the scattered remains of H.M.S. *Winchester*, which went down off Carysfort Reef, five miles east of Key Largo, in 1695.*

A British ship of the line with 60 guns and a crew of 350, the square-rigged *Winchester* fought with the West India Squadron in the war with France, harrying ports of the French islands. Mission accomplished, she refreshed at Jamaica, then set sail for England and home. But scurvy—that age-old plague of the sea—began to lay her crew low. I did not uncover this interesting fact until two years ago, when I learned that the *Winchester's* log had been saved. Writing to the Public Record Office in London, I obtained photostatic copies of the last few pages.

On September 14, 1695, the unhappy captain recorded that: "... we had not above 7 men Well our Shipp increasing upon us by the water She made in the holds & we Left Distitute of all ability to pump it out our people being all dead and Sick. ..."

Ten days later a vicious gale struck the ship off the Florida Keys. With the crew helpless, only a few men able to stand, the *Winchester* broke her back on the reef.

Key Largo, the nearest land, was inhabited only by fierce Calusa Indians, notorious for practicing human sacrifice and keeping slaves. There was no thought of seeking refuge there. An accompanying vessel rescued eight men—the only survivors.

For 244 years *Winchester's* guns, some weighing more than two tons, lay five fathoms deep, while shipworms made a sieve of her rotten hull. By 1939, when we located the wreck and raised the cannon, the ship had disintegrated.

Eighteen months ago I paid a return visit to *Winchester's* grave. With an air lift and free-diving gear, I hoped to recover objects overlooked by previous expeditions. Fortune favored us. We raised coral-encrusted cannon-

*For a description of *Winchester's* last voyage and the discovery of its wreck, see "Florida Cannon Solve Mystery of Sunken Ship," by Charles M. Brookfield, in the December, 1941, NATIONAL GEOGRAPHIC.

Giant sea whips, or gorgonians, reach for the sun like saguaros in a cactus forest. Blue-striped grunt (*Haemulon sciurus*) peers past the smaller branches below.

Gold watch raised from H.M.S. *Winchester*, which went down off Carysfort Reef in 1695, shows the hours in Roman numerals and the minutes in Arabic. Here a lump of rock bears the imprint of the dial's face in black iron oxide. For 264 years the watch lay on the bottom, sandwiched between an iron fitting and rock ballast.

When he discovered the *Winchester's* grave in 1959, the author salvaged cannon, cannonballs, wrought-iron fittings, and a brass sundial, as recounted in the December, 1941, NATIONAL GEOGRAPHIC. On a return visit 20 years later, this remarkable watch and a universal ring sundial were recovered.

A subaquatic army on the march

spadefish swerve majestically past a diver

balls, hinges, spikes, and fittings wrought by 17th-century craftsmen.

One day young Charles H. Baker III popped to the surface with an object wreathed in lumps of the ship's ballast. A hammer blow revealed a gold watch within the black mass. The watch's crystal was broken and its works were filled with grit and sand; but, miraculously, one of the brass wheels still turned on the pivots.

It seemed fitting that young Baker made the discovery. His father was with me when we raised *Winchester's* cannon, and the Baker sloop, *Mata Hari*, served as the mother ship of the latest expedition.

A second treasure raised from *Winchester's* remains was a universal ring sundial, used by mariners in the 17th century.

Museum Will Exhibit Relics

Both watch and sundial will be exhibited in a museum which will be constructed in park headquarters on Largo Sound.

Generous citizens have donated 74 acres for exhibit buildings, docks, and launching ramp, and the Florida Legislature has appropriated $150,000 for the center's development. From the marina, glass-bottomed boats will cruise out to the reef.

Here soft-bodied coral polyps—tiny anemonelike creatures that build protective cups of lime—flourish in the warm waters of the

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The Author: Florida representative of the National Audubon Society, Charles M. Brookfield also heads the State Park Board's Advisory Council on Florida Key Sites. A veteran explorer of Key Largo's reef, he found the remains of H.M.S. *Winchester* there in 1939 (page 61). During World War II he saw action in several theaters as an LST skipper.

Gulf Stream. Billions of their limestone skeletons form the foundations of the reef; vast colonies of the living coral animals grow on the dead, fashioning a fantasyland of strange forms.

Tourists who buy coral at roadside curio shops see only the bleached white skeletons of the once-living colony. But a visitor to the reef may feast his eye on living colors—the green, brown, and gold of stony corals; the blue, purple, and yellow of coral fans and plumes that sway with the current; the pastel tints of towering sea feathers and graceful coral whips (page 60). Altogether, they form one of nature's grandest shows, a submerged landscape of awesome beauty.

A preserve to safeguard this unique underwater world was discussed at a meeting of Florida conservationists in 1957. Dr. Gilbert L. Voss, of the University of Miami's Institute of Marine Science, warned that the gorgeous Florida reef might soon become a watery desert if steps were not taken to protect it.

His statement raised many an eyebrow. What could destroy a reef? he was asked.

"Man," Dr. Voss replied.

Coral From Reef Sold to Motorists

Curio vendors were tearing the reef apart, using dynamite and crowbars. Bargeloads of corals, sponges, and the imposing queen conch shell were piled along the roadsides for sale to motorists. Fish collectors raided the waters, and spearfishermen stabbed everything that swam or crawled.

Despoliation of the reef would have other consequences, Dr. Voss predicted. The coral gardens served as a haven for small tropical fish and a nursery ground for game fish. Without small fish to feed upon, the game fish

Water-loving Morays, members of a Miami diving club, leap into the Atlantic's gentle swells above Molasses Reef to explore the sea floor with snorkels, masks, and fins.

Head in Air, Body in the Water, a Diver Prepares for an Inspection Tour of Coral Gardens

Charles H. Baker III clears face mask and breathing tube near Carysfort Light. Refraction of light by water magnifies his body about 33 percent. In this unusual photograph, the camera sees simultaneously in air and water, like the four-eyed fish of Central America which has bifocal vision.

Bold white grunt (*Haemulon plumieri*) inspects a slice of sea urchin held by Judy Meade above a huge brain coral. Tiny bluehead wrasses (*Thalassoma bifasciatum*) hover near for leftovers. Many reef fish show little fear of humans.

Mountains and Valleys Corrugate Brain Coral

Neon goby (*Elacatinus oceanops*) darts over the maze, approximately three-quarters life-size, at center right. Using fused ventral fins shaped like a suction cup, this tiny fish perches on coral heads. Neon gobies pluck parasites from the mouths and bodies of groupers and other predatory fish.

would go elsewhere. In Florida, where one out of four visitors comes for salt-water angling, such a shift could be of grave concern.

Dr. Voss's plea spurred conservationists into action. The Florida Board of Parks and Historic Memorials approved a 75-square-mile section—10 percent of the entire reef—as a permanent preserve. The National Audubon Society's staff in Miami encouraged Floridians to write to the governor and the United States Secretary of the Interior.

Because the park's suggested boundaries straddled the three-mile line that divides State and Federal waters, approval by both governments was needed.

Complications delayed the park's birth for three years, but in March, 1960, President Eisenhower proclaimed the Key Largo Coral Reef Preserve. At dedication ceremonies the following December, Gov. Leroy Collins gave the preserve the name of John D. Pennekamp, associate editor of the *Miami Herald* and an ardent conservationist. Thus the protected area is known by two names, one chosen by the Federal Government, the other by Florida.

"His pen has struck down the despoiler and exalted those who would conserve," Governor Collins said of the editor who, in the press and in person, has fought more than 30 years to preserve Florida's natural beauty.

Today the 21-mile stretch of sea in the preserve is dotted with chartered fishing boats trolling the surface and smaller craft of free divers floating at anchor. Fleets of flat-bottomed clouds sail the horizon. Now and again one breaks away from the armada and scurries across the sky, darkening the sea with its shadow.

Fish-hunting cormorants ride the waves, and porpoises play leapfrog with whitecaps. A flying fish skims the sea, and a loggerhead turtle pops up for air. Floats bobbing on the surface mark the lobster traps of commercial fishermen seeking the spiny lobster.

Park rules prohibit spearfishing, but sanction rod-and-reel fishing and lobstering, provided the ocean floor suffers no damage.

Reef a Center for Marine Research

Marine biologists from all parts of the world work above and below the reef's waters. Dr. Voss and his associates at the University of Miami's Institute of Marine Science are carrying on a three-year research project to determine how fast corals grow and the maximum life a reef can sustain. Aided for the past 11 years by the National Geographic Society, through its Committee for Research and Exploration, they are also studying the food-chain relationship between living plants and animals, and the movements of fish populations.

Other scientists are shedding new light on one of nature's most remarkable associations—the relationship between the coral polyps and hordes of tiny plantlike cells that live within them.

Some of these microscopic cells contain chlorophyll, which tints the soft tissues of the

coral green.* Others lend a golden-brown color to their hosts. These cells benefit from the carbon dioxide and other wastes given off by coral tissues; in turn, they supply the polyps with oxygen. Symbiosis, as their mutually beneficial relationship is known, stems from a Greek word meaning "living together."

Close relatives of the true corals, millepores, or stinging corals, also flourish on the reef. Their stinging cells, touching human flesh, cause a burning sensation. Many of their colonies have distinctive shapes: branchlike, flat, or bladelike (page 861).

Altogether, more than 30 different species of coral have been found in this unique underwater preserve.

Other reservations in the West Indies and Florida include undersea areas, but the new preserve off Key Largo lies totally under water. Lighthouses and tide-exposed rocks alone break the surface. The three lighthouses studding the seaward side of the reef—Carysfort (page 841), Elbow, and Molasses—all perch on iron piles.

Carysfort, only habitable structure within the preserve, is manned by United States Coast Guard men. When I first visited it 35 years ago, the Lighthouse Service was in charge. Keepers then spent two months on the light for every 29 days on "honeymoon," their term for shore leave.

I shall never forget my first night on Carysfort. I had gone out with two friends in my cabin cruiser, *Manatee*, with meat and vegetables for the keeper and his two assistants.

Captain Johnson's Ghost Groans

At bedtime my companions and I settled on the lower deck of the light's dwelling, but I could not sleep. As I lay restless, a groan echoed through the lower deck.

"Did you hear that?" I asked.

My friends snored blissfully. I had just about convinced myself that my imagination was playing tricks when the moan was repeated, as if from a soul in torment.

Jumping up, I climbed the steps to the upper deck and circled the dark stairs to the tower, where Harry Baldwin, one of the assistants, was standing watch at the lantern.

"Harry," I panted, "have you ever heard any funny noises down below?"

"Oh, sure," he said, "but we don't pay attention to 'em any more. It's only Captain Johnson, and he just comes around to see if all's well. He died out here on the light, you know. Must have been a great sinner, he groans so. Sometimes he rattles his chains."

Thus reassured—I use the word loosely—I went below and slept, groans or no groans.

Next morning I solved the mystery of the moans, I believe. Under the hot sun, the tower's iron walls expand; in the cool of darkness, they contract. Shrinking, they make sounds startlingly human. My theory may not be true, but I have clung to it ever since.

Seminoles Ambush Lightship Crew

Oldest of the reef lighthouses, Carysfort was first lighted in 1852. But for more than a quarter of a century before that, a lightship had been stationed within the reef. Since the main source of supply for the crew was Key West, about 100 miles away, they cultivated vegetables in a little harbor they called Garden Cove, on near-by Key Largo.

One fine day in 1837, Capt. John Whalton and three of his crew lowered boats and headed for Key Largo to gather firewood. The Seminole Indians had been on the warpath in southern Florida for some time, but there had been no recent attacks on the Keys. It seemed safe enough to go ashore for a few hours.

But dark, hostile eyes watched from ambush as the boats beached. Without warning the Indians attacked, and the captain and one of his crew were killed. The two other men escaped with the boats.

In that earlier tragedy, when the warship *Winchester*'s keel struck Key Largo's coral barrier, the crew thought only of cruel rocks and surging seas. Crushing timbers were falling all about them, and the sea was rushing in through gaping holes in the ship's bottom. Soon the swirling waters brought merciful death.

No man aboard the ill-fated vessel could have dreamed that the treacherous reef possessed a rare beauty which man would one day deem worthy of preservation.

*See "How the Sun Gives Life to the Sea," by Paul A. Zahl, NATIONAL GEOGRAPHIC, February, 1961.

Mixed Battalions of Porkfish and Grunts Maneuver in Close-order Drill

Distinguished by its yellow stripes and black bars, the porkfish (*Anisotremus virginicus*) often travels with its relative, the white grunt. Like many reef fish, both species feed by night. This school will disband when the members go foraging for food.

Florida's Coral City

Article and photographs
by JERRY GREENBERG

Exploring the wonders of the reef, a diver finds another world and photographs its denizens in color

"BUT THE SHARKS... aren't you afraid of the sharks?" This is a familiar question. My answer is "No," with some reservations.

When working under water, I regard sharks as the man in the jungle does the tiger, or the midtown pedestrian does the reckless driver. I know they are there; sometimes I see them. But I go out of my way to avoid them.

For more than 10 years I have been diving

Lemon shark, 10 feet of malevolence, seizes

Beneath the Sea

for pictures of fish and coral reefs off the Florida Keys. I have spent thousands of hours in the depths, and I have seen countless sharks—hammerhead, blacktip, lemon, nurse, bull, tiger—but not one of them has ever attacked or even threatened me. I photographed the lemon shark below from a distance of only seven feet.

A shark is cautious: usually it steers clear of a diver if he doesn't bother it. But a shark is unpredictable, no one can say what it will do on any given encounter. "Don't provoke the animals." The admonition to zoo visitors also applies to an underwater reef.

Recently I spent two months rooming beneath the waters of the new John Pennekamp Coral Reef State Park (see preceding article). Here some fifty thousand acres—about 75 square miles—make up America's first park totally under water. This unique preserve

a snapper in razor teeth. Hitchhiking remoras loosen suction disks and rush for scraps

Silhouetted against blazing sun, a diver glides in the floor of the coral reef preserve.

Scrawled Filefish With Puckered Mouth Seems Asking for a Kiss

Actually, *Aluterus scripta* is making a grunting sound as he swims. Other brilliant reef fish share John Pennekamp Coral Reef State Park with artist-diver Judy Meade. Wide-eyed French grunt (*Haemulon flavolineatum*) inspects her fingers; gaudy sergeant major (*Abudefduf saxatilis*) darts between her flippered feet. Bluehead wrasses and yellowtail snappers (*Ocyurus chrysurus*) swim past leisurely. Stinging coral at upper right resembles a basket of flowers. Lobed star coral decorates the reef at lower right.

welcomes the free diver, the rod-and-reel fisherman, and the fish watcher. But to the spearfisherman, it is forbidden territory.

While exploring this magnificent marine realm, I encountered only three or four sharks. They did not molest me or any member of my diving party, and we interrupted their privacy only long enough to capture their portraits (pages 71 and 80).

My crew members, who doubled as models, included Judy Meade, a commercial artist, Carl Gage, Paul Dammann, and young Van Cadenhead. Van learned to use an Aqua-Lung three years ago, when he was 10 years old. Now he swims and dives with the best.

Working off my 20-foot runabout, I dived four or five days a week. Many days I stayed submerged six hours, ascending only to switch air tanks and reload the cameras.

Often we made underwater photos at dusk. Sometimes we dived under a full moon, and the visibility was good enough to see 30 feet in any direction.

To photograph the reef's eerie beauty, I used four Rolleiflex cameras in Rolleimarin housings, four Leicas in special Seahawk housings, three electronic flashes in underwater casings, and assorted flash guns. To facilitate the changing of cameras, I suspended all gear on lines dropped over the boat's side. We worked mostly in depths of 15 to 50 feet,

where a tank of air can last an experienced diver about an hour and a half.

And what wonders we saw!

Let me show you this world beneath the waves that I find so intriguing and that claims so much of my life. Slip a mask over your face, clench the Aqua-Lung's rubber mouthpiece between your teeth, and drop down with me into the sea.

Awed Diver Feels Like Trespasser

As you sink slowly, you experience an exhilarating sense of buoyancy. The air tank felt heavy above the surface, now you are scarcely aware of it on your back. Freed from the demands of gravity, you move like a bird, free to dive or soar with no other power but your arms and flippered feet.

Just below the surface, jellyfish pump past as you submerge. Lying parachutes, they range in size from a dime to a dinner plate. At 20 feet you touch down on the reef. What had seemed a blurred tapestry of color at the surface now assumes dimensions and patterns.

Deep, winding gullies carpeted with sand slice plateaus of coral seemingly so soft, so untouchable you fear they may fade away before your eyes. Such primitive beauty and solitude make a man feel he is trespassing on forbidden ground.

The silence is awesome. Only the sound of breathing through the mouthpiece and

As a Diver Plants a Warning Flag, His Boat Appears to Float on Air

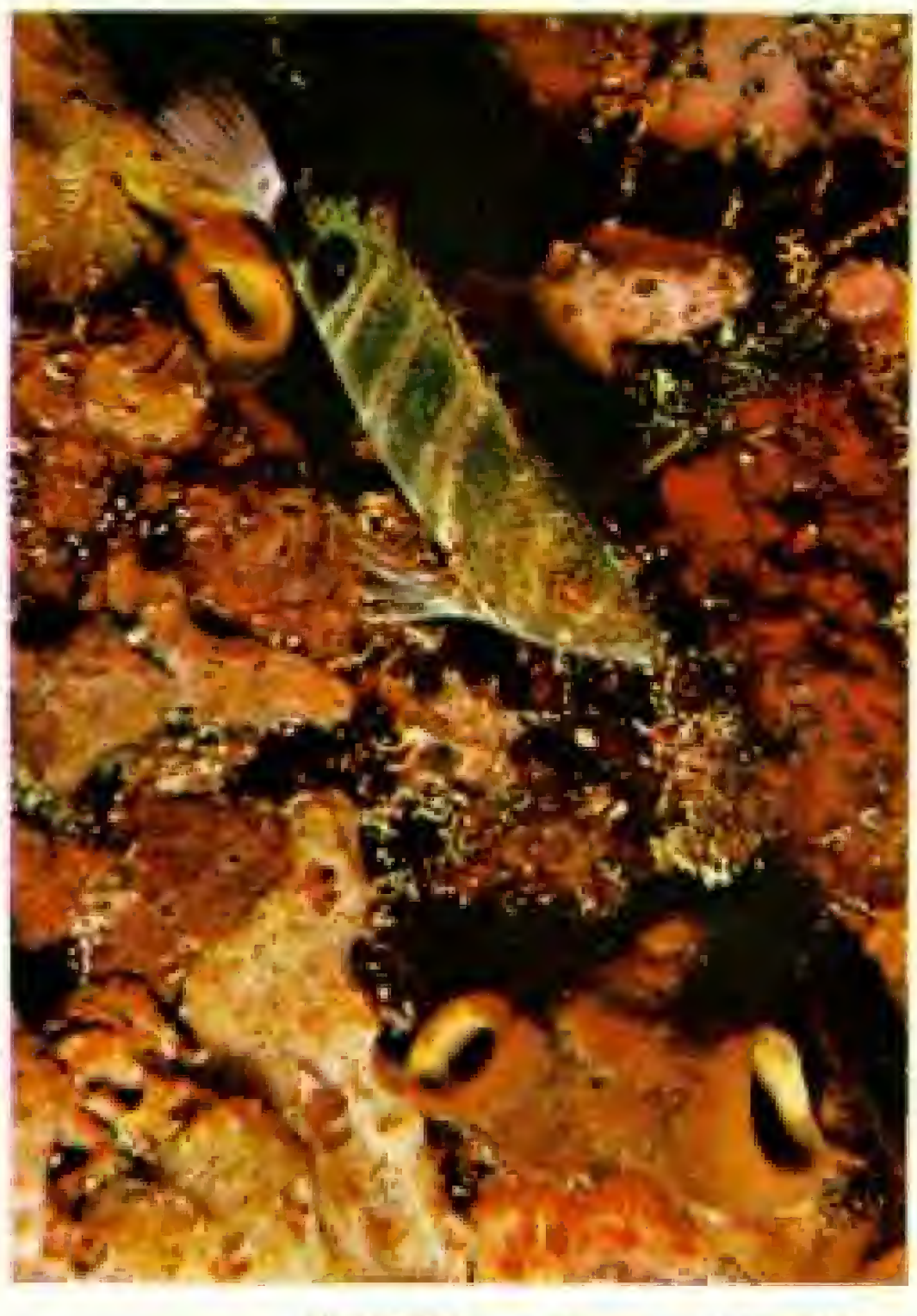
"Watch out for free divers," the red-and-white banner tells boatmen sailing the waters around Molasses Reef, America's first underwater park, the preserve welcomes divers and rod-and-reel anglers to its fifty thousand acres, but prohibits spearfishing. From a marina to be constructed on Largo Sound (map, page 58), visitors will ride glass-bottomed boats above the coral gardens. Sunlight filtering through the iridescent water glitters against coral of thirty or more varieties and tropical fish of two or three hundred different species. In this kaleidoscopic world, swimmers stare at the fish, and the fish goggle back.

Species pictured opposite are queen angelfish (*Holacanthus ciliaris*), barracuda (*Sphyraena barracuda*); hawkfish (*Amblycirrhitus pinos*); and moray (*Gymnothorax*).

Spotted moray lurks in coral ambush

Queen angelfish glides past elkhorn coral

Razor-toothed barracuda awaits prey



Hawkfish rests on pectoral fins

Diver and dog snapper play follow-the-leader among stands of elkhorn coral. Dog snapper (*Lutjanus jocu*), a popular sport fish, attains 50 pounds.

Sea Fan and Butter Hamlet Blend Their Beauty as in a Japanese Print

Members of the grouper family, butter hamlets (*Hypoplectrus*) wear coats of various colors: blue, pink, yellow, and orange. This six-inch specimen floats above a boulder-like colony of star coral and branching fingers of pink coral (bottom left). Filigree sea fan at upper right contrasts with skeletal branches of gorgonians at left.

exhaled air bubbling up from the regulator break the quiet. Later, when you have become more acclimated, you may hear the snapping of shrimp, the crunching of the parrotfish as he feeds, and the grunting noises that many fish make.

Reef Fish Escort Divers on Tour

You sense an air of subdued expectancy. The reef waits in hushed judgment until you make clear your intentions, and it is certain that friends have come to call.

Graceful gorgonians raise arched branches like uplifted arms. These dense stands of horny coral sometimes grow as tall as a man. Pastel-hued sea fans spread their lace to the eddying currents (opposite).

Forests of staghorn coral, amazingly like antlers, crown the crest of the reef. Boulder-shaped brain coral exhibits patterns of twisted grooves that bear remarkable resemblance to the surface of the human brain. Star coral, cactus coral, and leaf coral suggest decorations in a potentate's palace. At least 30 species of coral and 25 kinds of gorgonians adorn the reef (pages 58, 60, and 82).

Three queen angelfish in blue and gold lose their sense of caution, emerge from hiding, and swim toward you. A silvery school of spadefish shimmers into view and floats lazily above, below, and beside you, as though providing a path for your swimming pleasure (page 62).

You accept the welcome and begin the tour of a coral metropolis where every square inch teems with life. A red squirrelfish (page 78),

Feather-duster worms, their frilly gill plumes expanded, feed on microscopic plankton. Their coloring closely matches that of the red boring sponges to which they cling. These sponges secrete an acid that etches rock and shells.

Fins bristling, a squirrelfish darts toward a crevice in the rocks. When disturbed, the creature makes a chattering noise. Light-colored star coral appears at upper and lower left. Purple sponges grow above lettuce coral behind the fish.

its dorsal fin spread like a fan, peers at you from its rock crevice. Black groupers rest in shadows at the base of an elkhorn coral.

In the dark recesses of a coral cavern, a massive jewfish lurks to grab the next passing neighbor. Dwellers in this underwater housing development convert every hole, crack, and crevice into a home.

Now before your eyes parade all the beautiful and graceful tropical fish that you have seen hitherto only in aquarium or pet shop tank: sergeant majors in yellow with black bands; queen triggers, gray with two prominent blue stripes on the face; parrotfish arrayed in green, blue, purple, and even polka dots, blue tangs and other surgeon fish ranging from yellow to purple; spadefish in silver with black stripes, unicorn filefish—studies in olive brown with black-and-white markings; horned cowfish; and others whose vivid colors combine all the hues of rainbow and sunset.

All look larger than anticipated, an illusion caused by magnification. Refraction of light by the water magnifies all objects and makes them appear about 25 to 30 percent larger.

Flickering shadows darken the reef as a huge school of porkfish glides by, yellow tails glinting like ornaments of gold (page 68). Slowly the cloud passes as the fish swim elegantly on, follow the turns

Hammerhead shark (top), a remora riding its flank, travels with a convoy of yellowtails. Eyes and nostrils of this shark (*Sphyrna*) lie at the tips of the hammer.

Popeyed squid, common on the reef, moves by jet propulsion. As *Sepioteuthis sepioidea* swims, its 10 sucker-bearing arms press together in the shape of a beak.

White grunts hold a meeting beneath a ledge; one club member seems to voice his opinion. "Grits and grunts" fed the Conchs, pioneer settlers on the Keys.

of a coral canyon, and disappear in the distant gloaming.

A pancake-thin sting ray flaps batlike wings, waves a buggy-whip tail, and skims the sand. An evil-looking barracuda bares razor teeth and swims past arrow-straight (page 75). You have heard that barracudas seldom attack man, but you heave a sigh of relief when he is gone. A vicious moray eel keeps vigil in a rock cave. Any unwary fish that swims too close will find quick death in the moray's curved teeth (page 78). He is no menace to you, however, unless you try to dislodge him from his lair.

Now a bright green-and-yellow fish attracts your attention. Swimming closer, you watch a parrotfish hovering like a blimp above a brain coral. With parrotlike beak and small sharp teeth, it nibbles on the living coral.

You approach a sea whip, or gorgonian, and one of the

many thin "branches" appears to fall off, slither away, and wriggle into a narrow opening. The branch is a trumpetfish—an elongated species that finds perfect camouflage for itself among the gorgonians, whose branches it so deceptively resembles.

You wave your fins gently and glide along the bottom. Beneath you a small pale-blue fish disappears into the sand. At the spot where it vanished, you spy a patch of coral with a hole at the top. Close examination reveals a mound of fragments built up around the entrance of the burrow in which the fish is hiding. The yellowhead jawfish has excavated this retreat, then built up the entrance by picking up coral fragments in its mouth and piling one on another. The crater on top of the mound serves as a door into which the fish backs, tail first, to escape pursuit.

Survival of the fittest is the rule of the underwater jungle; size and might determine the hierarchy. The shark devours the grouper, which feeds on the snapper, which preys on the sardine, which eats the plankton.

Suddenly a flicker of gray cuts through

(Continued on page 88)

Flash and Camera Capture Subtle Colors of Reef Life

For undersea close-ups, the photographer uses a ring-shaped flash reflector around the lens to eliminate harsh shadows. Here wrasses devour bits of sea urchin above a huge brain coral.

Lavender branches of a sea fan (above) divide in a golden network. Gorgonian polyps at left extend petal-like tentacles to feed. These arms retract at a touch. Gray lettuce coral (below) circles the dark hiding place of a worm. Gaping tube sponges and a red sponge (bottom) feed on microscopic plankton.

Star coral owes its delicate green beauty to the algae that live within the polyps and help them extract lime from the ocean. The coral that forms living reefs needs some sunlight for survival. Flourishing within 90 feet of the surface, it usually does not grow below 150 feet, where light is too weak.

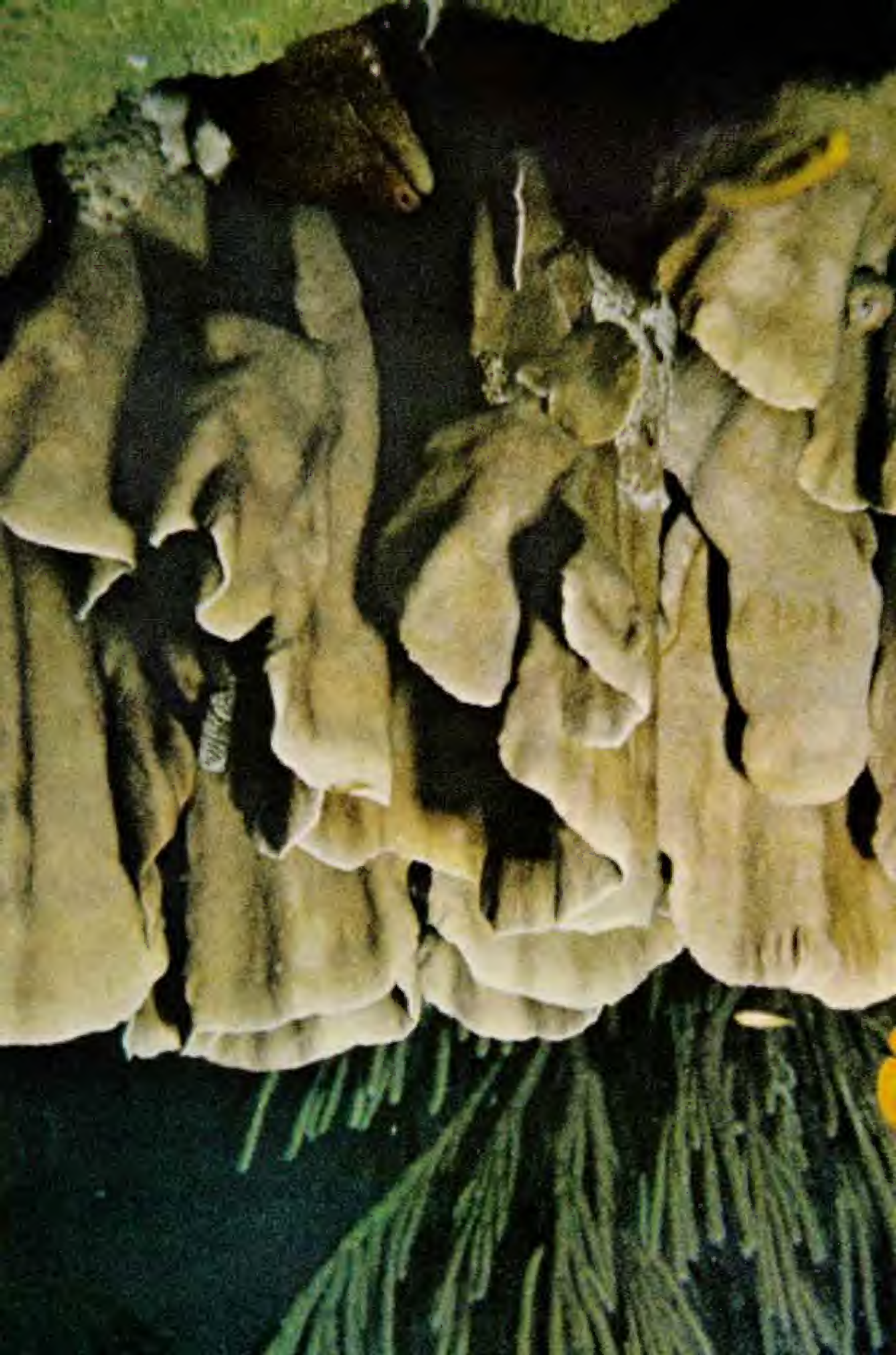
Spiral-shaped feather duster worm, living in a star coral, filters plankton swept past by the current.

Riding a snippet of stinging coral, a bristleworm reaches the end of the line.

Among the amazing variety of living creatures that inhabit the reef are many equipped with stinging cells or irritating spines. Divers should not touch bristleworms, which are also called fireworms. Stiff, fine bristles on the worm's sides penetrate the skin on contact, producing inflammation and pain. Living under rocks or dead coral heads, the bristleworm comes out at night to feed.

Stinging corals frequently grow on the horny skeletons of dead sea fans and sea whips. Divers avoid them too, for their minute hypodermics irritate flesh and cause a long-lasting rash.

Fierce moray eel at lower right lurks almost invisible in a crevice in plaster-like millepore, a stinging coral. Tiny wrasse close by barely escapes in a blur of speed. Yellow-and-black rock beauty flits past the wavy wall of millepore and the shrublike gorgonian beyond.



the distant blue haze: A 12-foot tiger shark is rocketing in. You stand motionless, frightened and fascinated as the streamlined giant sweeps through the water, caudal fin swishing. On and on comes the monster. When only 10 feet separate you, he turns away. But relief is short-lived as he shoots upward and traces two fast circles above your head. He leaves as abruptly as he arrived.

Breathing becomes more difficult; your compressed air is running low. You pull the air reserve rod on the breathing unit and earn a brief reprieve before you start a reluctant return to the surface.

As you rise toward the roof of the liquid world, you try to recall the bewildering variety of life on the reef. How jumbled the impressions are in your memory! Many more tours will be required before the mind's eye sorts out all the reef's fleeting beauties.

Tips on Safety for Beginners

For visitors planning to explore the Key Largo preserve, I offer a few simple but vital tips. First, and most important, the beginner who wants to use self-contained diving apparatus should take lessons from a qualified instructor. Before each dive he should make a thorough check of his equipment.

Never dive alone or stray far from the boat on a low tank of air. Always stay upcurrent of your boat; in case of emergency, the current will carry you toward it. If you spend more than two hours in water cooler than 78°, wear a rubber suit. After you've been down for awhile, the water begins to feel chilly at 50 feet.

Coral is sharp; watch your step. Be careful, too, where you place your hand. Beware of treading on long-spined sea urchins or brushing against stinging coral.

First Dive an Incomparable Thrill

I remind the amateur photographer that he needs no special magic. If he can take reasonably decent surface photographs, he should be able to get good underwater shots. Obey the basic rules of surface photography, and you will see the quality improve as you practice and experiment under the sea.

Underwater lighting conditions, of course, will vary with the water, the depth, and the time of day. But if you can see your subject you can photograph it—provided your film gets the proper exposure.

Despite my thousands of dives on the reef, I envy the man who is going below for the first time. It is an incomparable thrill.

James Aldridge, an Australian writer and veteran diver, has expressed it well:

"You are in another world—absolutely—the moment you put your head under the water. This thought will occur again and again, and you will never become tired of saying this trite thing to yourself. *It's another world, it's another world.*"

Author-photographer Jerry Greenberg has spent more than three thousand hours roaming the ocean floor off Florida's east coast. He himself designed the Seahawk housings for his cameras and flashes. His formula for underwater pictures: patience, practice, and proper equipment.

Adjusting his electronic flash unit, Mr. Greenberg stands on the ladder of his 20-foot, twin-engine runabout.

False Eyes and Look-alike Ends Save Butterfly Fish From Hunters

Deluded by a stripe that partly obscures the true eye, attackers often lunge for the big dot near the tail. With a burst of speed, the little butterfly (*Chaetodon capistratus*) escapes

By HOWARD LA FAY

Photographs by
THOMAS J. ABERCROMBIE
National Geographic Staff

THE SOUTHERN CROSS swung low over the village of Hanga Roa, and the men and women on the porch beside me began to sing in the melting accents of Polynesia.

Here in strange harmony was the Odyssey of the Easter Islanders: The tale of the high chief, Hotu Matu'a, and the great double canoes in which he and a few daring companions had left the green shores of their homeland, knifing into the blue swell of the Pacific, their prows seeking the bursting gold of the sunrise.

Silent survivors of a lost culture stare across a volcanic landscape under

Easter Island and Its Mysterious Monuments

an approaching squall. Archeologists reset the 14-foot, 16-ton monoliths on a ruined shrine

Eastward, ever eastward sailed Hotu Matu'a, the song continued. Day followed day until there, shimmering on the horizon, he sighted the island of his destiny. Hotu Matu'a made for a protected cove on the north coast, a cove where pale emerald water lisped against a beach worthy of a king. When the canoes ground to a halt on the pink sand, his men disembarked with their stores and animals. They had found their new home.

The chanting died around me, the pulsing rhythm ebbed, and Hotu Matu'a faded back into the mists of the distant past. The singers lit cigarettes and drifted away into the sultry darkness. The little party was over.

Mystery Shrouds Vanished Glories

Beyond the porch where I stood, lay Easter Island, the remote 64-square-mile dot of land whose secrets have puzzled generations of scientists.

Who carved the statues—the great *moai*—whose stone faces stare at the visitor with sightless contempt? What is the message of the strange wooden tablets called *kohau rongo-rongo*, with their baffling picture writing? What calamity befell those imposing coastal shrines, or *ahu*, with groups of statues smashed on their stone platforms?

The traditional song I had just heard, and others like it, are providing vital clues to the history of Easter Island, or Rapa Nui as its inhabitants call it. Archeological excavations, too, are helping to unravel the enigma that has enfolded the island ever since it was first sighted from the deck of a Dutch ship, *De Afrikaansche Galei*, on Easter Sunday, 1722.

Commodore Jacob Roggeveen christened his discovery in honor of the day and wrote in his log of the "remarkably tall stone figures . . . [that] caused us to be filled with wonder."

To many a smiling island of Polynesia, discovery brought not civilization but tragedy. On Easter it reached epic proportions. Roggeveen's own landing party inexplicably opened fire on the bewildered islanders, leaving 12 of them dead and more wounded.

Purse-lipped Goliath Shades an Easter Islander and His Mount

Ancient Polynesian artisans worked porous volcanic tufa with basalt pickaxes and polishing stones that still lie scattered in the quarry. How they hauled the massive monuments remains a mystery. Most of this figure lies submerged, like an iceberg, beneath the shifting soil of three centuries.

Easter is governed by Chile, shown in red

For the next 140 years ruthless adventurers brought violence, disease, and death to Rapa Nui. Then, in 1862, Easter's strange culture suffered its death blow.

Slavers swooped down and carried away about a thousand men to work the fetid guano deposits off the Peruvian coast. A few months later the Peruvian Government returned the 15 who survived. Smallpox came with them, and the disease ravaged the remaining islanders.

When Roggeveen stepped ashore on the Navel of the World, as the people of Easter sometimes call their island, the population stood at approximately 4,000. By 1877, it had dwindled to a scant 111. The last of the kings had died, and all memory of past greatness lay crushed beneath the island's toppled shrines.

Peace finally settled over Rapa Nui when Chile annexed it in 1888. Today the Chilean Navy administers Easter and operates an island-wide sheep farm, the sole organized industry. Its 40,000 sheep provide meat for the inhabitants and wool for export.

The children of Hotu Matu'a have once again multiplied until they number 1,011. Small Chilean Naval and Air Force detachments add to the population. They oversee equipment which automatically records data on tides, earthquakes, and weather.

But Easter remains one of the most isolated habitations on earth. Fishing vessels stop there occasionally, and so do training ships of the Chilean Navy. But no commercial ship makes the island a port of call.

Transport Carries Civilians and Cows

Easter's principal link with the outside world is a naval transport dispatched annually by the Chilean Government to Hanga Roa, the island's only village. This transport carries supplies to see the people through the following year. It remains about two weeks, discharging cargo and loading the annual wool crop.

To reach the island, NATIONAL GEOGRAPHIC photographer Tom Abercrombie and I boarded the supply ship on its 1961 voyage. Though Easter has an airfield, it is used today only by an occasional Chilean Air Force plane. However, Chile plans to convert it into a big international airport, a crossroads of the Pacific.

Passengers aboard the transport *Presidente Pinto* numbered more than a hundred civilians – including a score of islanders returning from training courses in Chile – and some two dozen cows to bolster Easter's beef herds. Almost daily the islanders gathered on deck to entertain all hands with traditional Easter Island songs and dances; the cows provided a doleful Greek chorus of moos.

Nine days and 2,300 miles out of Valparaiso, *Pinto* made its lonely landfall. Mysterious and totally dark, Easter materialized on the predawn horizon like a purple cloud. All of us on deck stared quietly, thoughtfully, at this tiny seat of a venerable culture standing alone and defiant amid a million square miles of empty ocean.

The first sunlight showed us a tranquil, rolling island dotted with ancient volcanoes, their fires long since spent. Clumps of trees nestled like cool oases in the parched turf.

All tranquillity ceased at the water's edge, however; the sea, as though resentful of this intruding island, clawed savagely at its coasts (page 114). For ages smashing surf had eroded the shoreline into a lunar wilderness of naked, jagged lava that kept ships at a wary distance.

We went ashore in landing craft, shooting a narrow, wave-whipped passage between rocks, to tie up at Hanga Roa's concrete wharf. For a weird moment I thought we had arrived in the Old West. From all sides islanders on wiry mustanglike horses galloped toward us, and just beyond the wharf several ponies nibbled grass in a corral.

Edmundo Edwards, a young Chilean, greeted us at the wharf. I asked about the horses. "Well," he answered, "here you either ride one or you walk – and the lava ruins shoes." Easter, I soon learned, actually has more horses than people, and babies start to ride as soon as they can toddle.

Buried Neck-deep, Tottering Stone Images Gaze Into Eternity

Folk history of Easter Island, or Rapa Nui, says the statues represent figures of venerated ancestors. Lacking wood to carve, artists turned to abundant and workable volcanic rock. Many figures wore cylindrical 3- to 15-ton hats of red stone that toppled long ago. Feuds or an epidemic may have halted the work about three hundred years ago.

Mounted Sheepmen Round Up Strays Before an Audience of Mute Titans

Rarnku volcano provided stone for Easter's carvers. High on the escarpment, patient artisans

ACCORDING TO THOR A. HEYERDAHL, NATIONAL GEOGRAPHIC STAFF © N.G.S.

chipped 90-ton monuments from solid rock and hauled them as far as 10 miles to shrines across the island. Later statues, abandoned near the mountain, were gradually buried to the neck.

Edmundo had arranged for us to lodge with his friend Santiago Pakarati, an island sage steeped in the old traditions. Santiago, an agile man of 63 (page 109), ushered us into an immaculately clean dining room. His daughter Maria brought us a pitcher of pineapple-flavored water.

Thus, painlessly, we encountered one of the harsh realities of life on Easter. The island has little potable fresh water—not a single spring or stream and only a few wells. Rain water supplies most wants, from washing to drinking. Each householder rigs an elaborate system of traps and pipes to channel every raindrop into storage tanks.

Pineapple Juice Flavors Murky Water

I well remember the first time I drank this water straight. Santiago scooped up a bucketful from his tank and poured me a glass—cloudy, slightly rust colored, alive with flotsam—that brought a shudder to my stomach as I downed it. However, the islanders convert a deficiency into a grace by mixing it with the juice of the small, sweet pineapples that grow in Hanga Roa, creating a delicious, refreshing beverage.

Maria questioned us about life on the "island of United States," and was pleased to learn that we had both visited "the island of France," a country that fascinated her.

With a worn pocketknife, Santiago carved up a watermelon, a summertime staple on Easter Island. As we bit into its cool pinkness, he said, "We have your people to thank for these. Years ago an American yacht anchored here, and those aboard gave a watermelon to one of the islanders. He ate it and planted the seeds. Now, every watermelon on Rapa Nui is a descendant of that gift."

Santiago typified Easter Island's hospitality. He assigned Tom and me a bedroom to ourselves—sparsely furnished but with linen as white as soap and water could scrub it—and dipped deep into his meager larder for our meals. Not until we left did I discover that, to provide this space for us, Santiago himself was sleeping in an attic so cramped that he had to crawl in and out. For his generosity, Santiago would accept only one thing from us—our thanks.

Sheep Sell for Only 25 Cents

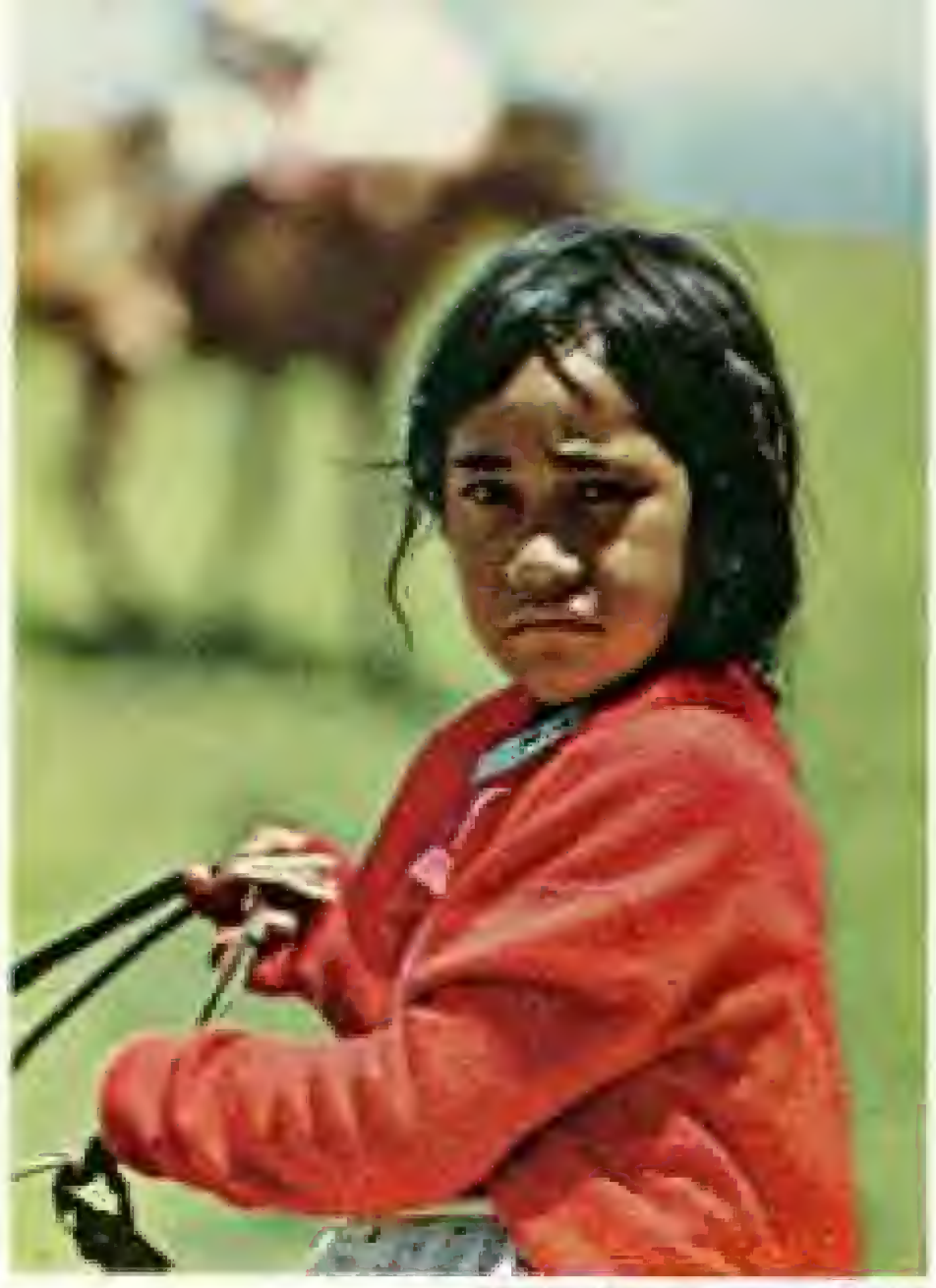
While Maria prepared our dinner of chicken and bananas, Tom and I toured the village. We passed a frame hospital, where a navy doctor provides free medical care for the islanders, and a neat wooden schoolhouse, where nuns offer education through the sixth grade for some 250 island children.

Nondescript chickens pecked everywhere, ready meat for those nimble enough to catch them. Easter families, I later learned, may also buy surplus sheep from the government farm for 25 cents each. Fish, which abound offshore, supplement the islanders' supply

Today's pet, tomorrow's dinner. Chickens give the islanders a major source of protein. The little boy is half Polynesian, half Chilean.

Twelve-year-old descendant of the old stonecutters stands at the village church. Behind the cross lies Brother Eugène Eyraud, the island's first missionary. He converted the people before he died in 1868.

Polynesian beauty, Maria Pakarati offers a bouquet of geraniums. Her father, Santiago, was host to the author and photographer during their two-week stay on the island.



Five-year-old rider handles her reins smartly on her way to church in Hanga Roa.

Faces of Rapa Nui

BILL RAGSDALE © NATIONAL GEOGRAPHIC SOCIETY

Key to mystic symbols died with Easter Islanders of the last century, but scholars are slowly cracking the script. *Rongo-rongo* boards served pagan priests reciting religious chants. Scribes carved figures on wood with obsidian knives or shark teeth. They used a unique hieroglyphic system, the only known native writing in Polynesia.

For reading, this board should be turned on its side and the characters followed from left to right. Every other line stands upside down, requiring the reader to twist the board around.

The message of this example, now in the Smithsonian Institution, Washington, D. C., remains in dispute. True size of the script appears at left.

of protein. Pineapples, melons, corn, and bananas help round out their diet.

However, life on Rapa Nui has its problems: for example, unemployment. Only 40 men work steadily on the farm. The remainder till their plots of land and carve traditional images of wood. These they barter to visitors for clothes and cigarettes.

I ended my first day on the island with a visit to Father Sebastian Englert. One of a distinguished line of missionaries that began with Brother Eugène Eyraud, who brought Christianity to the island in 1864, Father Sebastian has ministered to the islanders for 26 years. A scientist and linguist, he has written books on Easter's ethnology and archeology, as well as a dictionary of the language.

Geographics Arrive, 12 at a Time

I found Father Sebastian in his study, engulfed in the full year's mail that had arrived on the *Pinto*. Scattered across his desk, I saw the familiar yellow covers of 12 National Geographics, the issues for all 1960. Father Sebastian proved to be a fellow member—and an ardent one. Bearded, tonsured, clad in the white robes of a Capuchin, he reminded me of an Old Testament prophet—but a gentle, joyous prophet (page 104).

Collecting National Geographics has taxed many a member's storage space, and Father Sebastian was no exception. His copies extended back 35 years. When the *Pinto* dropped anchor, he was engrossed in rereading "Through the Great River Trenches of Asia," by Joseph F. Rock, in the August, 1926, issue. Now, however, he had focused all his attention upon his mountain of mail.

Father Sebastian's knowledge of Rapa Nui's fast disappearing traditions is unrivaled.

"A kernel of truth hides in every legend," he told me. "I have no doubt that Hotu Matu'a is a historical figure and very likely came from the Marquesas Islands. Tradition says his home was an island called Hiva. In the Marquesas this name occurs several times—Hiva Oa and Nuku Hiva, for example.

"Some cataclysm apparently drove Hotu Matu'a to sail to Easter. However, there is a strong probability that his group was not the first to settle here."

Father Sebastian's church is the social as well as the religious center of Hanga Roa, and Sunday Mass climaxes the week. I joined the starched and brushed islanders as they gathered for a gregarious stroll before Mass.

When the bell tolled, we filed inside the sparsely decorated building where men sit on

the left, women on the right (page 107).

Hanga Roa, I was to find throughout my stay, is far from Paris, and the women's dresses are plain, almost dowdy. But Polynesian magic—a snippet of golden ribbon, the flash of smoldering eyes, a red flower in the hair—lends an exotic charm.

Old traditions still color the islanders' Christianity, and many spend considerable effort propitiating the restless spirits, or *aku-aku*, that haunt the lava landscape.

A single cock crowing off schedule—a certain sign that such a spirit roams abroad—can terrorize everyone within earshot. Dreams foreshadow the future. For example, a woman who dreams of a rat, an ox, or the color white knows she will bear a son; a crab or the color red foretells a daughter. An islander hesitates to awaken another—he might be having an important dream.

As the first step in our exploration of the Navel of the World, Tom and I rented horses. The price,

Cat's cradle, here an adult pastime, forms symbolic designs that tell island myths. Stringed figures help Amelia de Pakarati to narrate the story of Hotu Matu'a, Easter's legendary first king, and his long canoe voyage in search of a new land for his people. Often Amelia chants as she weaves. Her husband (above), the author's host, stares through one of her designs.

we learned, would be one pack of cigarettes per horse per day.

Actually, the economy of Easter Island turns on cigarettes, not cash. By Chilean law, the $80,000-a-year proceeds of the sheep farm revert to the needs of the island, providing precious lumber, nails, cement, and machinery. Little remains for luxuries such as tobacco. As a result, cigarettes, generally obtained in barter from visiting ships, have become Rapa Nui's unofficial currency.

One Sunday morning I noticed a Chilean bank note lying on the grassy plaza before the church. Waiting for Mass to begin, the islanders strolled about the plaza, indifferently eying the money.

"Why doesn't anyone pick up that bill?" I asked Santiago.

"What for?" he shrugged. "It will buy nothing here."

The perennial cigarette shortage has also fathered a vigorous cottage industry. Tobacco plants—their pale-pink blooms nodding on awkward six-foot stems—grace virtually every kitchen garden. Santiago's tobacco patch stood behind his house, jealously protected by a high wall of lava blocks.

"Let me tell you, *hombre*, you can get used to anything," Santiago once told me mournfully as he reached for a leaf. "Here you cure the tobacco by charring it with a match. Then you roll it in a scrap of paper and smoke it."

Kerosene Torches Lure Fish Within Range of Spears

Easter's waters abound in tuna, bonito, and a sea crayfish as tasty as the Maine lobster. These men bounded barefoot across jagged rocks that lacerated the author's tennis shoes. Sparks fly as the boy at right charges his torch from a bottle.

Squirrelfish and jacks weight the spear of Regino Calderon, who wades ashore on the beach at Anakena Cove.

PHOTOGRAPHS BY PETER T. FURST, NATIONAL GEOGRAPHIC STAFF © N.G.S.

His face contorted. "Aiyee! What a taste!"

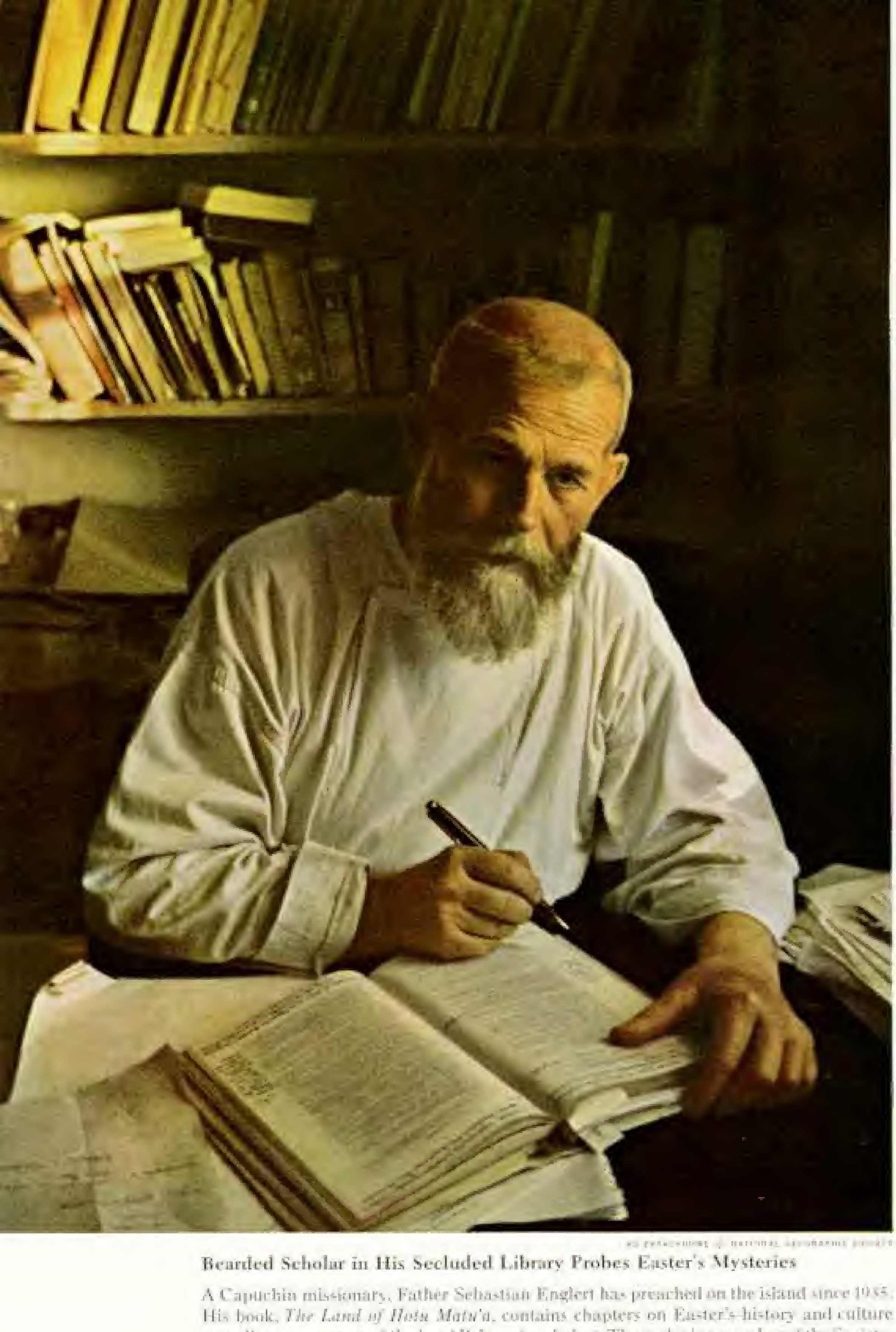
The craze for cigarettes has even had a small international repercussion. A Russian oceanographic ship recently stopped at Easter, and the islanders duly climbed aboard laden with wood carvings.

The Russians proved amiable traders, and the elated islanders returned with an apparent fortune in smokes. However, the cartons contained only *papiroy*, singular Russian cigarettes with three-inch mouthpieces tipped by a mere inch of tobacco. The outraged islanders promptly took sides in the cold war—against the Soviet Union.

With our cigarette-rented mounts, we set out from Hanga Roa in the dewy cool of the morning on a long tour through antiquity and vanished grandeur. Our guide was Mateo Veriveri, a sinewy sexagenarian who traced his lineage to Hotu Matu'a. Easter Island venerates age, and Mateo was Santiago's chief rival for the honored title of the island's oldest sage.

Giants in Stone Stand Eternal Guard

A brassy sun mounted the sky as we jogged out of Hanga Roa and wound across the rolling, treeless countryside. A day's trip brought us to the goal of all who visit Easter Island—the slopes of Rano Raraku. This great volcano, green and rounded now with age, moldered quietly near the island's eastern tip.



Bearded Scholar in His Secluded Library Probes Easter's Mysteries

A Capuchin missionary, Father Sebastian Englert has preached on the island since 1935. His book, *The Land of Hotu Matu'a*, contains chapters on Easter's history and culture as well as a grammar of the local Polynesian dialect. The padre is a member of the Society. "I receive my NATIONAL GEOGRAPHICS 12 at a time on the yearly supply ship," he told the author, "and I read every article."

Almost every moai on Easter was quarried from the volcanic tufa on this mountain, the largest examples still dot its slopes.

No matter how many pictures you have seen of the sneering statues, no matter how many accounts you have read of their origin, the first sight of them bursts upon you in strange and somber glory (page 96).

As our horses angled up Rano Raraku's southwest slope, the huge figures, many of them buried to the shoulders, hunched like an army of vanquished colossi. Yet their grim lips and beetling brows admitted no defeat —not by time, not by the elements, not by the death of the culture that produced them. They glowered across the island, past the seething surf, across the endless azure of the Pacific, seemingly across time itself.

Shrines Honor Islanders' Forebears

Dismounting, Mateo and I climbed to the volcano's rim. There, just below the crest, unfinished statues repose like bulky sarcophagi in hollowed crypts.

Using stone picks, the early islanders had laboriously chipped each figure out of the side of the mountain. We clambered past statues in all stages of completion—from the first tentative profiles scratched on a rock wall to those in the final phase when only a thin strip of stone bound them to their matrices. Centuries ago, a few strokes of a hand ax would have freed them; now they sleep prisoners of the rock forever.

Why did the people of Hotu Matu'a carve these mighty sentinels? Legends agree that each represented the figure of an ancestor.

After quarrying a statue from the stone of Rano Raraku, the islanders hauled it to one of more than 240 shrines, or ahu, that line the island's coasts. Each ahu honored the forebears of a given group of relatives. But intergroup rivalry apparently led to ever larger statues. In the end, the sculptors simply raised them on the slopes, some were abandoned en route to the shrines.

An eeriness pervaded the entire scene. Everything about Rano Raraku—the partially completed statues, the stone tools abandoned beside them, the finished giants deployed upon the slope—spoke of catastrophe. I had the impression that once, long ago, legions of craftsmen laid down their tools at the end of a day and simply never returned.

The key to the twin riddles of Rano Raraku—why did the islanders carve the outsized images? why did they abruptly stop? —lies buried somewhere among those frowning giants. Archeologists are convinced that systematic excavation will eventually bring it to light.

From Rano Raraku we rode along the southern coast, where titanic waves that had rampaged up 3,000 miles of open ocean from Antarctica exploded like artillery salvos against Easter's crumbling shoreline. Towering and gray, they seemed to drown the very sky.

Mateo led me to a rock before an immense cave called Hanga tuu Hata that overlooked the sea. On it a bedazzled observer had carved his impression of a strange ship that visited his island.

With my finger I could still trace the weathered outline. Was it, as Mateo said, Roggeveen's *De Afrikaansche Galei*, sails taut and pennants whipping before a wind that had died 239 years before?

At Vinapu we paused before the imposing ruins of one of Easter's oldest coastal shrines. Long-forgotten masons had fitted together the great stones of the shrine's base so perfectly that Tom Abercrombie could not insert the blade of his penknife at any joint. On the site's landward side, broken statues littered the earth, the remains of some long-past Götterdämmerung.

With the fall of evening, we sat before our tent watching the savage beauty of sunsets that slashed the heavens with writhing flame. There in the dusk, Mateo rejoiced in his role of island patriarch.

This lineal descendant of Hotu Matu'a enchanted us with legends of the feuds that had raged across the island in the waning days of his ancestors' glory. And when Mateo finally turned in for the night, he slept on his elbows and knees in a crouching position—a throwback, he explained the next morning, to the days of those same civil wars when men slept thus in order to fly or fight at the first alarm.

Rivals Vie to Collect Eggs

Circling around and up the gradual slope of Rano Kao, Easter's mightiest extinct volcano, we came to the deserted village of Orongo crouched on its seaward crest. Here, until the late 19th century, the islanders had practiced a bizarre religious rite centered upon the eggs of the sooty tern.

In July of each year chiefs of the dominant tribes led a procession up to Orongo. There

ENGRAVING BY SERGE LOZNAK

Only stone foundations remain of an old-time dwelling near Hotuiti Anchorage. When in use, the house resembled an inverted longboat. Builders fitted wooden poles into the holes, lashed them together in the form of an arch, and covered them with thatch.

they lived in houses made of stone, while their agents took up posts upon the islet of Motu Nui just off the coast.

The man who found the first egg of the sooty terns that nested each year on Motu Nui would swim back through the shark-infested waters to the foot of the volcano, climb its sheer face, and present the treasured egg to his leader. A priest would thereupon declare the lucky chief *tangata manu*, or bird-man, for the coming year.

We saw nothing of the curious cult but the silent stone huts and a jumbled mass of rocks covered with petroglyphs (page 112). Outlined in basalt, stylized tangata manu, bird-masked humans holding eggs in attitudes of reverence, made their offerings beneath an empty sky. Fittingly enough, the only sound to break the stillness was the fretful squawking of birds as they wheeled above the vast abyss of Rano Kao's crater.

My wearying horse traced a long loop past Punapau, another extinct volcano

Trees Imported From Tahiti Shade a Modern Home on an Island Once Almost Barren of Trees

Here, in the quiet village of Hanga Roa, lives Easter's entire population, some 1,100 people. Corrugated-iron roofs catch rain, for water is scarce. Grass-carpeted street in foreground provides a playground for the boy and his dog. Easter's five Jeeps present no traffic problem.

BY JAMES L. STANFIELD, NATIONAL GEOGRAPHIC STAFF © N.G.S.

Church Services Bring Islanders Out in Their Sunday Best

Father Sebastian's congregation hears him conduct Mass in Latin and preach in Spanish and the native tongue. Members sing Christian hymns set to Tahitian chants. Women sit on one side of the aisle, men on the other. Nuns staff the island's only school.

that had furnished topknots of red tufa for some of the statues lining the coast. North of Hanga Roa, amid trees and vines and vivid flowers, I stopped at Easter's saddest monument—a leprosarium.

Leprosy, the scourge of Polynesia, came to Rapa Nui from Tahiti in the last century and decimated the population. New drugs can now arrest the disease, and many of Easter's lepers live at home; 13 contagious cases, however, remain in isolation at the leprosarium, with two nuns to care for them. I accompanied one of the sisters to the new, airy medical pavilion for afternoon treatments. Mercifully, leprosy is its own anesthetic, and the patients felt no pain as she dressed their lesions with infinite gentleness.

Back in Hanga Roa, we found Santiago Pakarati arranging to roast a pig for a last feast before the *Pinto*'s departure. For one entire day Santiago prepared an *umu*, or traditional Polynesian earth oven. Carefully he selected the stones he would heat and the broad, green banana leaves he would use to enfold the pig. Occasionally his eye drifted hungrily to the luckless entree, securely tied to a near-by tree; for its part, the pig just oinked disconsolately.

Early next morning, with the guests alerted and all the Pakarati women cooking tidbits, Santiago went to get the pig. But during the night someone had taken it. With a sigh of resignation, he canceled the dinner and went fishing. No one seemed upset.

During our stay someone casually made off with our horses and someone else just as casually found us two more. Again, no one seemed surprised or upset.

Scientists Reconstruct Old Shrine

Dr. William Mulloy, a University of Wyoming anthropologist who has spent almost two years on Easter, and Chilean archeologist Gonzalo Figueroa worked for eight months in 1960 reconstructing the shrine Ahu Akivi, three miles north of the village (page 90).

"Our biggest problem," he explained, "was learning the precise details of how the ancients raised the stone images. In the end, we levered up a statue, then placed stones beneath it, levered it further, added more stones, and repeated the process until it stood upright.

"This is almost certainly the method used in ancient times. Before just about every ahu

Evil spirit, a *moai kavakava* glares balefully. Small images appear to have been as important to the island's religious art as the large statues. Today's carvers make them only for the curio trade. Photographer Abercrombie bought this wooden reproduction for two shirts.

Wood Carver Shapes a Demon's Eyebrows on a Walking Stick Bearing Two Heads

All year long, artisans devote their spare time to fashioning souvenirs for sale to visitors. They reach a crescendo of activity just before the once-a-year ship arrives from Chile. In exchange for their wares, they accept shoes, shirts, and cigarettes. Often offered as antiques, many statuettes are copied from pictures; others are products of lusty imaginations. Santiago Pakarati, the author's host, works with a ground-down table knife. He sets obsidian pupils in the fishbone eyes of imp and bird.

on the island we've found stones scattered in great numbers. Since they're not natural to the sites, we assume that they served to raise the statues."

Dr. Mulloy's work, combined with the findings of the Thor Heyerdahl expedition of 1955-56, now presents a clear, though incomplete, picture of Easter Island's history. Near a ditch on the Poike headland, the Norwegian group unearthed signs of human presence that date, according to carbon-14 tests, from the fourth century A.D.

These early inhabitants built large open-air altars of excellent masonry. But sometime around A.D. 1000 many of the shrines fell into ruin and give evidence of total abandonment. Reconstruction followed, and during this period the first giant statues appeared. Nearby houses of the priesthood date from this era: long and boat-shaped, they bear some resemblance to early Marquesan dwellings.

Who were the rebuilders? No one knows.

On Rano Raraku craftsmen continued to carve obsessively, their statues growing ever larger, ever more stylized until some unknown catastrophe—perhaps a massacre—struck some 300 years ago.

The 17th century ushered in vicious inter-clan warfare, with the victors destroying the shrines of the defeated. Tradition tells us that, throughout this turbulent era, most islanders lived in caves, venturing out only at night in search of food. Cannibalism was rampant, and in any conflict the victors invariably ate the vanquished.

In addition to the stone images, Easter Island has produced the only form of writing yet discovered in Oceania. Meticulously en-

graved pictographs on wooden tablets, called kohau rongo-rongo (page 100), once served the priestly class as "talking boards."

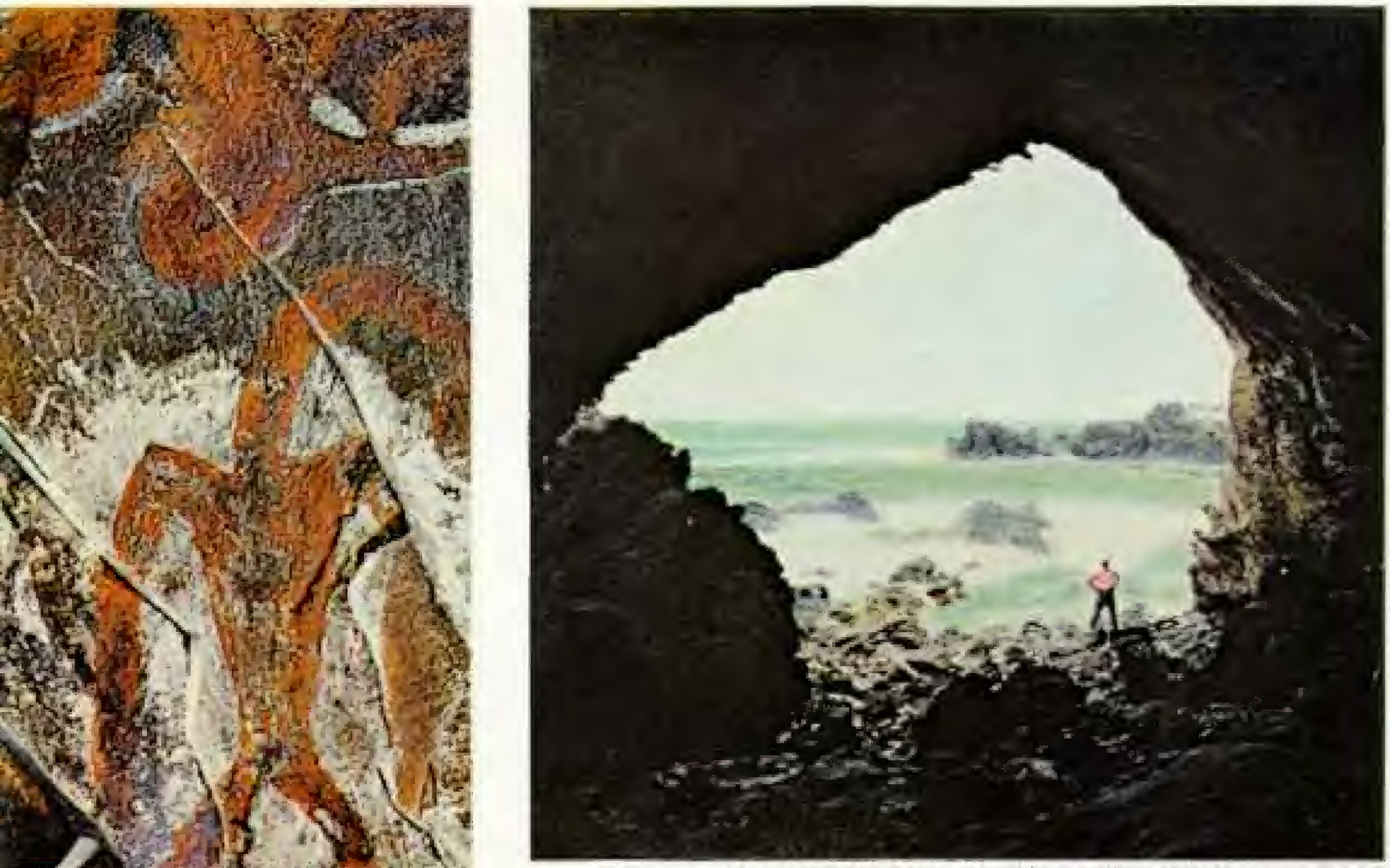
A German cryptanalyst, Dr. Thomas S. Barthel, attacked the script in 1953 and has gone far toward cracking its secrets. Virtually every delicately carved symbol, he says, represents a word. Thus a stylized human figure means "man"; a blossom means "flower" or "woman," both pronounced *pua* in the Rapa Nui language.

Tablets Refer to Polynesian Islands

The tablets have proved to be religious rather than historical texts, but in Barthel's opinion they link Easter inextricably with the rest of Polynesia. He has found references to the islands we know as Tahiti, Bora Bora, and Pitcairn, as well as to common Polynesian plants that never grew on Rapa Nui. He concludes that the rongo-rongo script originated elsewhere in Polynesia and came to Easter in the canoes of Hotu Matu'a.

Some archeologists see the prehistoric Easter Island culture as a mixture of Polynesian and Peruvian ideas. They cite: (1) the resemblance between the masonry at some shrines and a type of fine dressed-stone work found in Peru; (2) the presence in Easter Island's volcanic lakes of *totora* reeds, unknown elsewhere in Polynesia but common along the west coast of South America; (3) the Peruvian custom of wearing earplugs, also found on Easter Island; (4) interest in solar phenomena, common to both Rapa Nui and Peru; (5) the gigantic statues of both areas, which have many similarities.

Others, however, detect little South Ameri-



Pounding seas guard the entrance to Ana Kai Tangata, Cave of the Cannibals, not far from Hanga Roa. Feuding warriors devoured unlucky captives in the grotto. Until acceptance of Christianity a century ago, men feasted ceremonially on human flesh. Usually they excluded women and children from the rites.

Figures of birds fly across Eat-man Cave's peeling walls. Old-time artists painted with volcanic dust mixed with shark oil.

"Evidently ashamed of their ancestors' eating habits, islanders were reluctant to show us the paintings," photographer Abercrombie recalls, "and my guide refused to enter the cave."

Dancing Petroglyphs Preserve the Rituals of a Vanished Bird-man Cult

Until the mid-1800's the bird-man feast highlighted the religious year. Cultists moved into stone huts on Rano Kao crater, where they overlooked the isle of Motu Nui, nesting place of migratory sooty terns. For weeks celebrants chanted and danced. When the sacred birds settled on their nests, strong men swam the channel in competition for the season's first egg. The winner's patron became a ceremonial chief for a year, with a license to exact tribute. Hole behind the carvings leads through the roof of a stone hut.

can influence, or none at all. While some masonry may resemble that of Peru, the form of the shrine itself does not find an exact counterpart there.

Similarities might be due to Polynesian voyages to the continent, though the evidence for this is scanty. In any case, such contacts could not have been extensive, since no ceramics or textiles—the two most characteristic and plentiful products of Peruvian culture—have yet appeared on Easter.

"Long Ears" Fought the "Short Ears"

"Rapa Nui legends," Father Sebastian told me, "recount the presence of two factions on the island—Long Ears and Short Ears. In a climactic battle between the two, the Short Ears trapped their enemies in a ditch that cuts across Poike headland, and burned nearly all of them to death. According to my reckoning from genealogies, this took place in 1680.

"When Dr. Carlyle S. Smith, an American member of the Heyerdahl expedition, excavated the Long Ears Ditch, he found thick layers of charcoal. He told me that an intense fire had raged there and carbon-14 tests placed the date at about 1680—a striking confirmation of the legendary end of the Long Ears."

Some authorities believe the Long Ears—so named for the plugs worn in their ear lobes—came originally from Peru, whereas the Short Ears were later settlers from Polynesia.

However, visitors in the following century recorded the presence of long-eared islanders who apparently differed in no way from their fellow Polynesians. Also, an Easter Island vogue of elongating the ears persisted well into the 19th century.

Cook Saw Link to Western Isles

Some of the earliest voyagers give conflicting accounts of the islanders' racial characteristics. But the observant Captain Cook, who in 1774 touched at Rapa Nui briefly during a famous voyage, wrote: "In colour, features and language, they bear such affinity to the people of the more western islands, that no one will doubt that they have had the same origin."

The island's earliest living sites need more study, and carbon-14 tests must link their dates to those of other areas, before scientists can pass final judgment on the origins of Easter's culture. Most are prepared to admit the possibility of some South American influence, but only systematic investigation will show to what extent, if any, it existed.

Today's islanders, their blood diluted by successive waves of voyagers, feel a strange nostalgia for the Polynesian heartland. Periodically, in the dead of night, a small boat will break through the surf with a young, furtive crew. Their destination: Tahiti.

Since 1948, eight homemade boats, averaging less than 20 feet in length, have attempted the perilous 2,500-mile voyage. Three arrived safely. The other five, with 31 aboard, disappeared somewhere in the far, fierce wastes of the Pacific.

The first such voyage occurred by accident. On Christmas Day, 1948, Leonardo Pakarati was fishing off Rapa Nui in a small boat with three other men and his two sons aged 9 and 10. When the wind died, they drifted out of sight of the island. After almost two weeks of trying to make their way back, they admitted they were lost.

Leonardo, a classically handsome Polynesian whose hair is now shot with gray, told me: "We had only two pounds of meat, 28 pancakes rolled with sugar, and a small can of water. So we tried to ration ourselves. But by December 31 we had nothing left.

Set Course by Venus at Night

"We realized finally that we could never find the island. Our best chance was to steer for Tahiti, to the northwest." Their navigating, in the end, echoed the methods used by their ancestors a thousand years before, when they coursed the Pacific in frail canoes.

"At evening," Leonardo went on, "we steered just to the north of where the sun set. Then we would aim our prow at the star *te Ura Ahi-ahi*, which you call Venus. In the morning one of us would drop a piece of paper at the bow and we would count off the seconds—we didn't have a watch—until it drifted past the stern, in order to estimate our speed. By day, we steered by the angle of the waves as they hit the boat. Since the current there is always to the west, we tried to keep the breaking waves at an angle to our starboard side.

"We fished constantly, but caught nothing. Day after day, all day, the children cried for water. We could only douse them and ourselves with sea water. One rainfall helped, but not much.

"After a month we were all too weak to do anything but lie in the bottom of the boat between turns at the tiller.

"Then, on the 34th day, we saw sea birds, and I knew we were nearing land. Three days

Mountainous Swells Explode Into Foam
Against Jagged Volcanic Cliffs

Centuries ago Easter's first settlers braved heavy seas on a weeks-long canoe voyage. Today's population still leads an isolated life 2,300 miles from

Chile, the governing power. Only scheduled visitor is the one supply ship a year. The island exchanges wool, its sole cash crop, for food and other necessities. Horses, imported from the mainland in the last century, now outnumber the people. This pony carries a double load.

after that, we beached on a tiny island near Tahiti."

The voyagers like Leonardo, who do manage to reach Tahiti, find their Polynesian paradise short-lived. The realities of national sovereignty have swallowed up the old freebooting days of inter-island migrations. The Polynesians of Easter are now Chilean; their cousins of Tahiti are French. Passports and visas, not open canoes, are the modern currency of travel. In time, the venturesome voyagers are deported to their home island.

One villager told me of the tragicomic case of Felipe Teao, who reached Tahiti in 1954 after a 29-day voyage. There he worked for a Chinese firm, learning Cantonese as well as French. But, after five years on Tahiti, Felipe too was duly deported. Now, he is Easter's only speaker of Chinese.

On my last day, all Rapa Nui gathered at the wharf to bid *Pinto* farewell

Stone chaperon ignores a couple visiting Raraku volcano. Their ancestors carved the giant centuries ago. Villagers seldom visit the quarry, eight miles away.

Extinct volcano Rano Raraku cradles a fresh-water lake. Horsemen climb the crater's slope

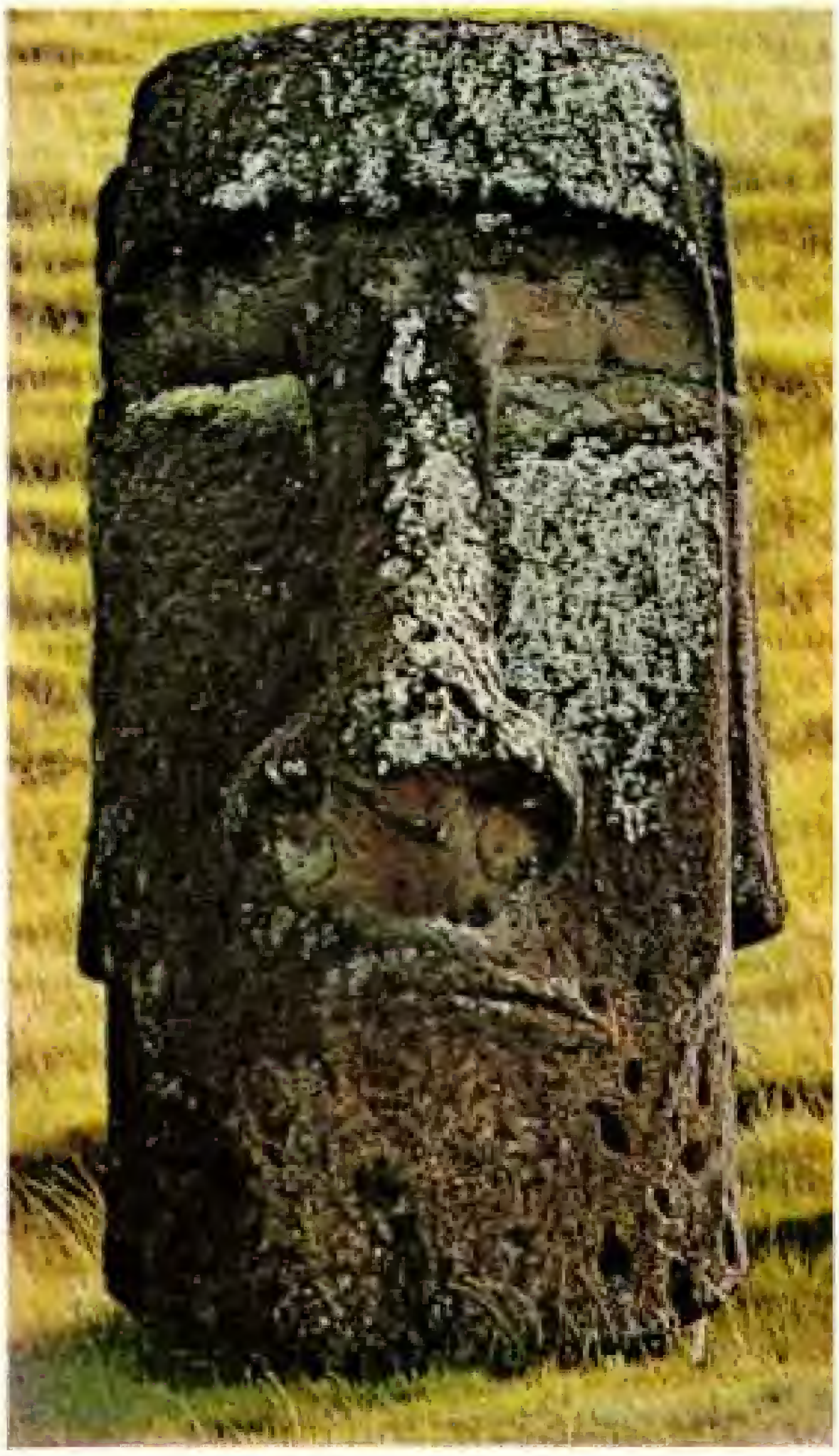
for yet another year. Before the islanders lay 12 months without mail, and probably without visitors—12 months of almost total isolation.

Father Sebastian rode out to the ship with us.

"Leaving Easter Island," he told me, "is unlike leaving any other place in the world. Why? Because all visitors know in their hearts that they will never come this way again. It is, I think, the saddest parting of all."

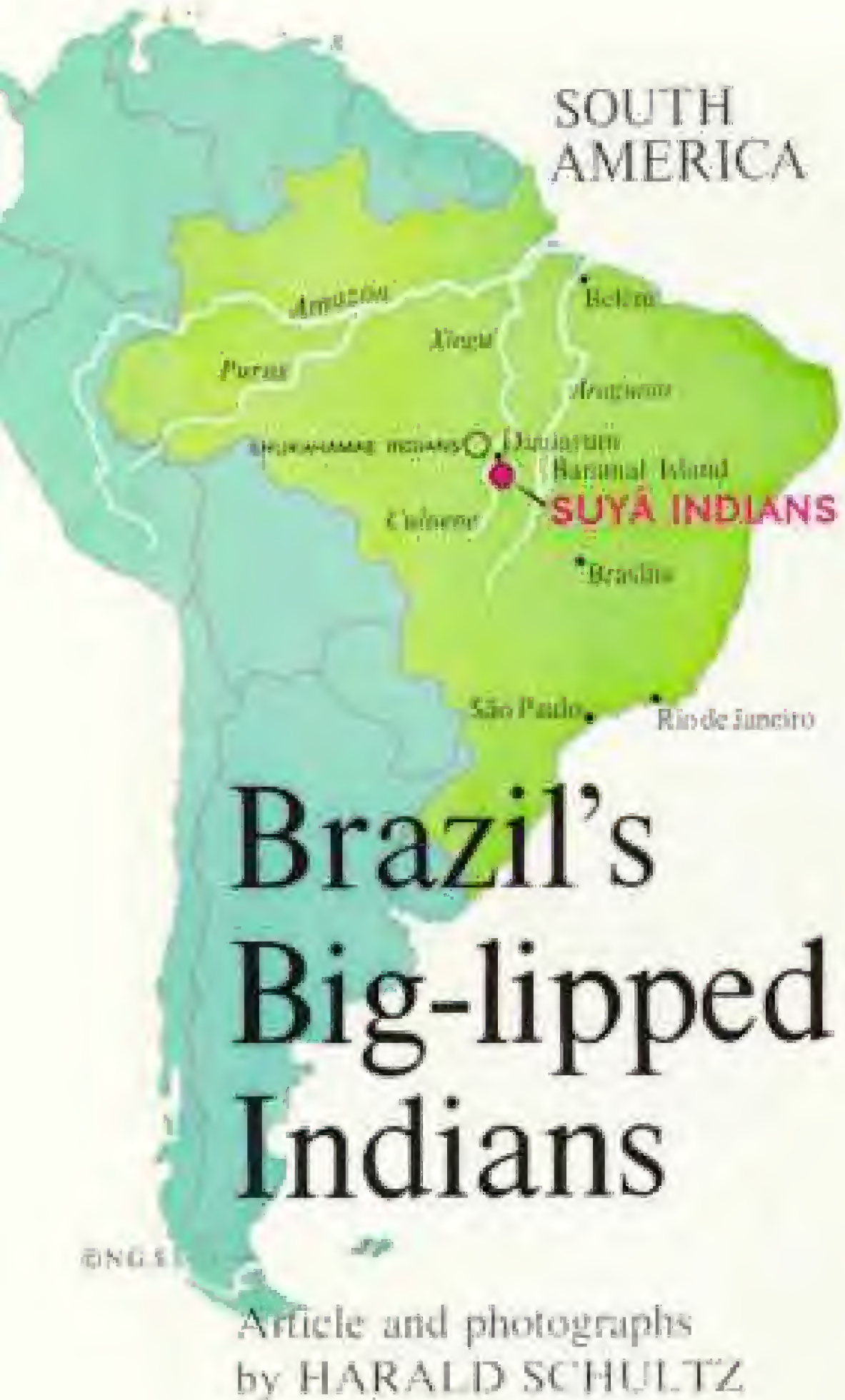
Shortly thereafter *Pinto* weighed anchor. Engines throbbing, the gray transport headed seaward.

I stood on the fantail in a lingering farewell, gazing back at the receding island. Familiar faces—Mateo, Santiago, Father Sebastian—blurred and disappeared. Slowly, almost reluctantly, the Navel of the World slipped into the immense void of the Pacific. The sun set upon an empty ocean, and I knew that Father Sebastian was right.



Lichen-covered face squints at the camera. Wind and weather pit the once-smooth carving. Long ears reflect the style of men who stretched their lobes with shell plugs.

toward the statues at the far right



Brazil's Big-lipped Indians

Article and photographs
by HARALD SCHULTZ

IT IS SUMMER in the Southern Hemisphere. From the hot, steaming heart of Brazil, word comes that a primitive tribe, the Suyá, has discovered the 20th-century world and made peace with civilization.

To me at the São Paulo State Museum this news is most exciting. The Suyá have long been feared as one of Brazil's fiercest tribes. Little is known about them except that their men distort the lower lip grotesquely by making a hole and inserting progressively larger disks of light wood.

What a challenge, what an opportunity for the student of primitive man! I study a map and make inquiries. . . .

By Air to an Outpost of Civilization

Now the little Piper plane climbs steeply from the new landing strip on Bananal Island and heads westward (map, left). Bushy plain and virgin forest stretch to the farthest limit of vision, broken only by the gleam of lakes and rivers. Smoke rises from the fires of the dry season, veiling the blue of the sky. The little plane rocks and dips in the wind and the rising thermal currents.

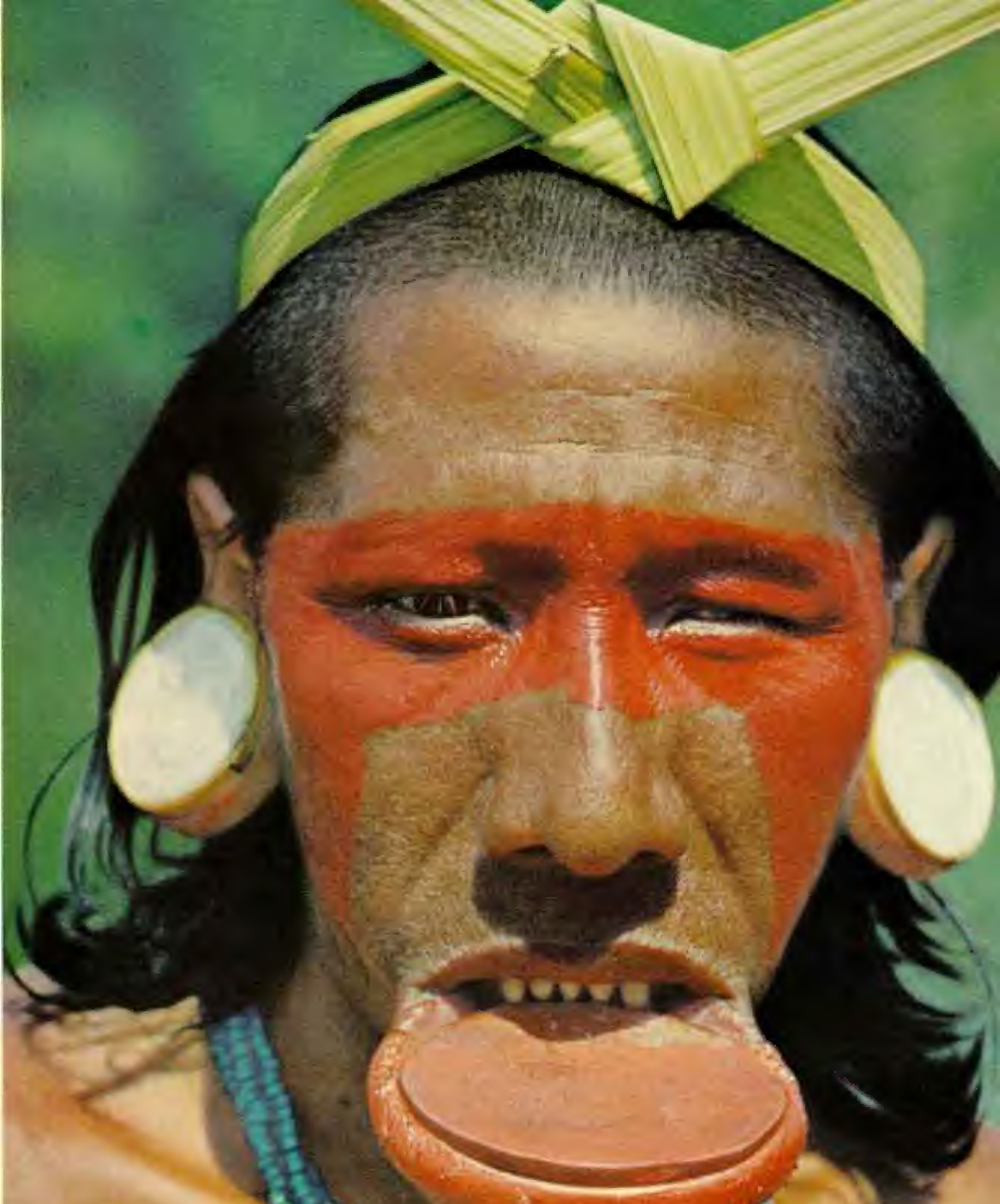
At last I see in the distance a silver-gray sinuous band—our goal, the Xingu River. In its forests and endless savannas, a few Indian tribes still pursue their original way of life in heavenly freedom. How long will this last? Today their domain is more and more threatened by small farmers and cattlemen.

The Piper circles over the river, then glides to a fresh clearing in the forest and halts between rows of straw-thatched houses. This is one of civilization's last outposts, the tiny settlement called Diauarum.

Two gentlemen with black beards meet the plane. They are the famous Villas Boas brothers, Claudio and Orlando. For nearly two decades they have looked after the In-

Turned-up disk shows the well-developed lip muscle of a Shukahamae Indian. Unlike the Suyá (opposite page), he started wearing his disk in childhood. Lip disks of Brazilian Indians are smaller than the platters once worn by the African Sara, miscalled Ubangis, who deformed the upper lip as well.

Stretched lip and disk of the well-dressed Suyá are dyed red. One-eyed Robndô wears earplugs of twisted palm leaves whitened with chalk, a broad band of red dye across eyes and cheeks, and a palm-frond headband. The beads were given him by the author. Robndô is one of 65 living Suyá. Map locates their home.



Innocent of clothing except for beads bestowed by their friend and guest, Harald Schultz, Suyá Indians in a bark canoe set out on a fishing trip. Robadó plies the stern paddle. Chief Pentoti directs in the center. Youth in bow, being unmarried, wears no lip disk.

dians of the region and won their devotion.

Yes, they say, it is true that the Suyá came down the river, making signs of peace, and that they may come again. They recognize my serious purpose and will not object to my joining the Suyá for a time to study their way of life.

Days pass, and my coworker Udo Loew arrives with an outboard motor. Now we both wait impatiently for the Suyá. Soon the rainy season will set in, threatening to ground the little Piper, and we shall have to depart.

And then one day a voice rings out: "There come the Suyá!" Far up the river five boats have appeared. Three are of bark; the others are hollowed-out tree trunks.

In them ride some of the strangest looking human beings it has been my fortune to see. The grown men wear in the lower lip a large wooden disk, dyed red, which gives them an odd, ducklike appearance. Round white plugs — made of twisted strands of palm leaf wound into tight spirals — distend their ear lobes in similar fashion.

PHOTOGRAPHED BY HARALD SCHULTZ © NATIONAL GEOGRAPHIC SOCIETY

Until the Suyá in 1959 made peaceful contact with the outside world, they were greatly feared. The creation myth of their neighbors, the Trumai, says the sun made all tribes but the Suyá; they are descended from snakes! The author found them most friendly.

For this occasion the Suyá men wear trousers or at least a short shirt, the women a red loincloth. Their natural tact has told them to cover their nakedness when visiting the *karai*, the civilized. The children are completely naked.

"Fierce" Suyá Shares His Food

One of the men wearing a big lip disk drags a heavy basket from his canoe. It is filled with roasted water pig—capybara.

As an opening gambit I ask for some.

"*Kaiam takakrẽ*," I say, taking a chance with the related language of the Krahos.*

The man looks at me with beaming face.

"Come," he says in the Kraho tongue, "you shall eat roasted water pig." And he hands me the whole leg!

This time the Suyá have come to get medical attention for some of their number who are suffering from dysentery. They speak not a word of Portuguese, the language of the

*See "Children of the Sun and Moon," by Harald Schultz, NATIONAL GEOGRAPHIC, March, 1959.

In the dim light of a jungle camp, women twist cotton strands to make hammocks. Suyá

country. However, through daily conversation we learn a little of the Suyá tongue, and when the sick are well again, they invite us to go home with them.

Three boats head up the river. Tomorrow we are to take the other two in tow with our outboard and meet at the Suyá village.

"*Suyá bekoomenenene!*" we cry as the three boatloads cast off. "The Suyá are fine, they are good!"

From every Suyá lip, big and little, comes the answering cry, "*Karaí bekoomenenene!*" "You whites are also fine!"

On the morrow we chug upstream, towing the other two boatloads of Suyá. After a mile or so we turn left into the Suiá Missu River, a tributary of the Xingu, and three hours later we enter a narrow, slowly flowing branch. Soon we find we have reached our goal.

From the bank there is no sign of an Indian village. Like a curtain, the forest hides any hint of human settlement. But narrow paths lead into the forest, and in the dim cathedral light that filters through the high crowns of the trees, we see that an area about 65 feet wide has been newly cleared. Long poles have been bound horizontally to tree trunks and covered with layers of leaves. Under these simple roofs hang rows of hammocks (above).

Entire Tribe Now Numbers Only 65

Fat fish are roasting on four-legged grills made of poles. Clay pots, wooden mortars and pestles lie about. Bows and bundles of arrows lean against the "house pillars" formed by live tree trunks.

Here live the only Suyá in the world, no more than 65 people!

Impressed by their first peaceful contact with the inhabitants of Diauarum, the tribe

women and girls never wear lip disks

Pentoti's son Kuyosi honors the author by decorating a tree in front of the house built for him.

Typewriter draws a fascinated spectator as author Schultz types his diary. For politeness he wears Suya body paint. A typical lip disk measures two to three inches wide, three-fourths of an inch thick.

left its village far up on the Suiá Missu River and established this temporary camp.

When they came to Dinuarum for the first time, the only steel implements they possessed were two old, dull stumps of axes, which they had received in barter from other Indian tribes. Now they own shiny axes, machetes, scissors, knives, aluminum pots.

"Where shall we live?" we ask. "Who will build a house for us?" Men and boys at once vie with each other to remove trunks and underbrush from a slight elevation near by. Then they drag logs out of the forest, make a framework of timbers tied with bark fiber, and cover the roof with banana and palm leaves. Before evening our hammocks are swaying in the shelter of the house.

From their former home the Suyá have been able to bring only a couple of baskets of cassava flour, some bundles of dried ears of corn, and a few sweet potatoes.

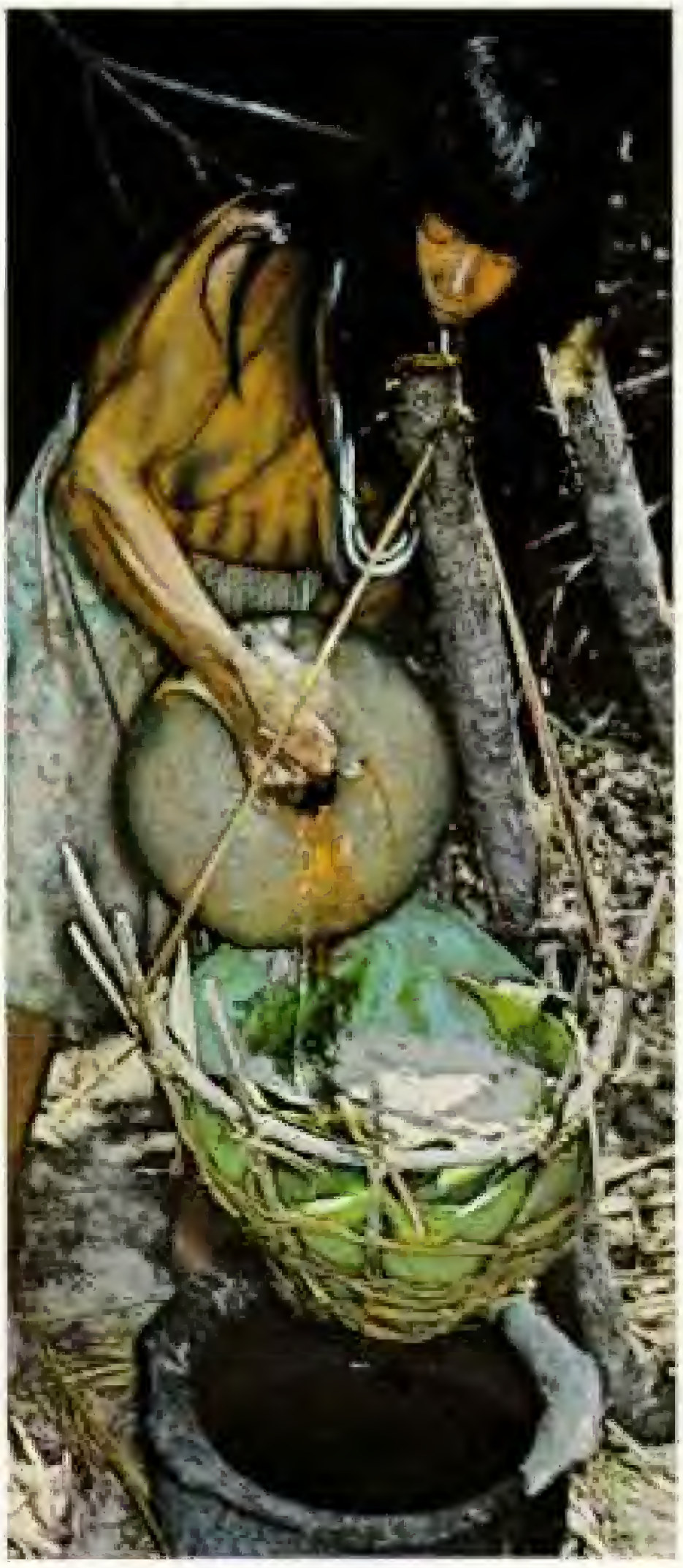
"The wild pigs ate up all our crops," they say.

Here they have planted new crops on the other side of the river, but months must pass before the crops are ready. Meanwhile the 65 people live on what forest and water yield.

Fishing With Poison Insures a Feast

Nevertheless the Suyá are the most gracious and attentive hosts I have ever known. Every day we are served fresh wild fowl, golden hare, or some other delicacy. Women often bring a shellful of palm nut purée or wild bee honey.

"*Agatima gonyã!*" says Pentoti one day.

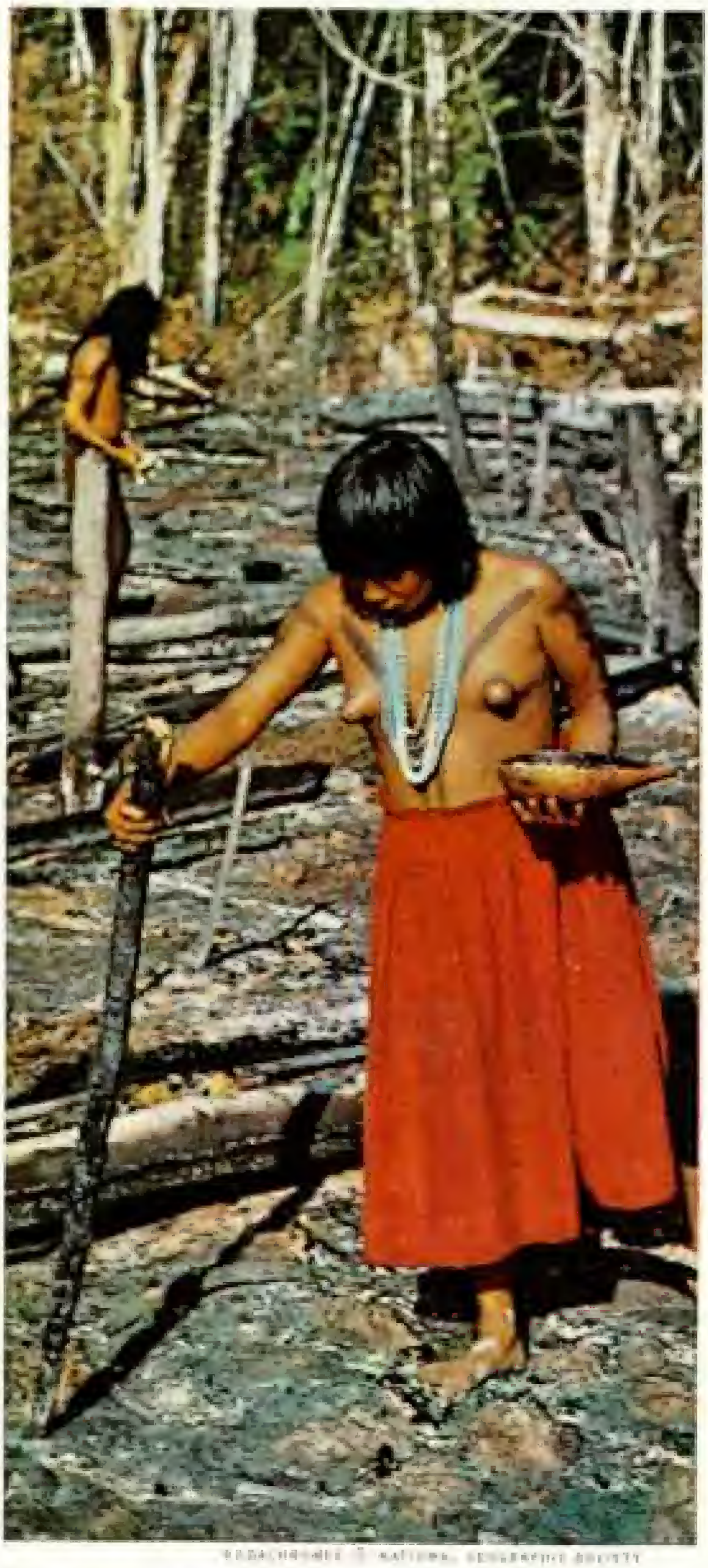


Water from a calabash trickles through the ashes and sieve to leach out salt.

Esteemed leader of one of two groups into which the villagers are divided, he always speaks as clearly and simply as possible out of consideration for his guests.

"Agatima" means "morning," but "gonyã" is a new word. One-eyed Robndó (page 119) helps me get the meaning by striking a bundle of twigs with a stick. Oh, that means "fishing with poison"; gonyã must be timbó, the famous fish poison of the Brazilian Indians.

Crossing the river in their canoes, Pentoti and his people go into the forest stretching out behind the planted field. Lithe and nimble Kayosi, chief Pentoti's eldest son, climbs high up the trunk of a tree and cuts off the timbó vines, thick as my arm. They are tightly twined, coiled like a snake, and it takes the strength of all the men to tear them to the



Planting seed corn carried in a gourd, a woman digs holes with a pointed stick. Her people cut and burned off the forest to clear the field.

Hip-deep in Water, Suyá Wives Gather Water Hyacinth Leaves to Extract Salt

Carried back to camp, the leaves will be burned and left to smolder all night. On the next day the ash is collected and the salt dissolved in water (opposite, left). Evaporation by boiling leaves a residue containing potash and potassium chloride. Tasting the crude, bitter salt, the author found that it made his tongue sting.

ground. Then they cut the vine into arm-long pieces. We hear the noise of timbó harvesting everywhere in the forest.

Before the gray of dawn, heavy blows resound from the shore. Men, youths, and boys are beating the timbó vines with axes, reducing them to golden-yellow strands. They tie them in bundles and lay them out in a long row like sheaves in a grain field. Then the owners of the bundles sit behind them, quiet and motionless for a while, in what seems to be some sort of ritual.

Now Pentoti comes, followed soon by Kwedkére, the leader of the other group. The men shoulder the bundles of vines and walk through the woods to a big lake, the women and children trailing behind with baskets and knives.

When a deeply indented inlet is reached, the young men erect a loose screen in the water with branches and leafy twigs. This is to prevent the frightened fish from escaping into open water. Then, with a loud shout of *Hoouuh! Hoouuh!* all the men jump into the bay. They beat the shredded timbó vines and wave them back and forth in the water. The whitish-blue soaplike sap spreads out over the entire surface as the men wade ahead with wide movements of the arms.

Frightened fish attempt to escape, but the older men wait at the leafy barrier and shoot them with bow and arrow.

Now benumbed and dying fish begin to appear on the surface. Women wade into the water, finish them off with a bush knife, and throw them into their baskets.

The lake soon looks as if sprinkled with giant snowflakes—the white bellies of dead fish. On the bank are growing piles of them, a wide variety of species.

Each family gathers some for its needs. No envy, no haste, plenty for everyone! But there is nothing left the next day.

Tribe Gets Salt From Aquatic Plants

A few days later we saw the way the Suyá make salt, *katuyani*.

At a lake in the midst of the forest, the women wade hip-deep in water till they reach a mat of floating green water hyacinths (page 124). They drag festoons of them ashore and let them wilt in the hot sun.

Now a wood fire is lighted, and the women shove burning brands into the pile of plants. By morning only a tiny heap of ashes remains.

The camp stirs awake, and Pentoti fashions a funnel with flexible sticks. His eldest wife hangs it on the fork of a branch and lines it with banana leaves. Then she places a filterlike layer of plant fibers in the bottom, fills the funnel with the ashes of the aquatic plants, and sets a clay pot underneath. When she pours in water, it trickles through the ashes, leaching out the salt, and is caught in the pot. She then places the pot with the liquid on a wood fire and repeats the whole process with a second pot.

The liquid boils for many hours, evaporates, becomes dark brown, until finally a yellowish-brown crystalline powder remains—scarcely a couple of handfuls.

Men, women, and children come and take tiny pinches with the fingertips and put them in their mouths. They smack the tongue with pleasure and pronounce it good. Katuyani! Salt! Very fine!

It is bitter and stings my tongue. It is not common salt, sodium chloride, but mostly potash and potassium chloride.

PHOTOGRAPHED BY HARALD SCHULTZ © NATIONAL GEOGRAPHIC SOCIETY

Men Poison Water to Suffocate Fish

Elbow-deep in an inlet near camp, fishermen beat sheaves of the timbó vine until a milky sap covers the surface. Smaller fish smother and die, larger ones surge up for breath, only to be clubbed, slashed, or shot with arrows. Poison sometimes kills more fish than the Suyá can eat, but the supply never fails.

When the poison takes effect, boys and girls as well as men and women wade into the water to harvest dead and dying fish. This girl uses a handy vine as a fish string.

Proud Suyá boys carry home a catch of giant traira shot by their fathers

The salt of the Suyá is wholesome for man only in very small quantities. But because of the labor its preparation involves, there is little danger of overindulgence. Often the Suyá content themselves with eating the salt-containing ash instead of going through the tedious and laborious process of extracting the crystalline salt.

Sweetening also comes from the forest. In the late afternoon Pentoti returns from a reconnoitering expedition. His expressive face betrays satisfaction. He opens wide his arms to show that he has felled a mighty giant of a tree, with a big bees' nest on the trunk.

Even before the gray of dawn, everyone is up and about. Two hours of rapid walking bring us to the tree. In the cool of the morning the bees are still clustered on the nest.

Koyosi takes the lead, approaching the nest with some dry palm leaves blazing at the end of a long pole. The nest is dark in color and adheres to the tree trunk like a giant tumor.

These wild bees have no stingers, but their busy jaws seem to make up for the lack of armament at the other end.

While the more timid flee, Koyosi prepares a second torch and leads a new attack. Two daring youths rush forward together and knock the nest off with axes. Others join them and carry off chunks, trying at the same time to slap at the bees on their bodies.

Triumphant, they form groups everywhere, plunge the whole hand into the sweet, sticky liquid, and gulp down the precious honey — wax, pollen, larvae, and all. Today indeed life is sweet.

"Bad People Have No Songs"

When darkness falls, the young men gather and sing. The club-footed son of the leader Kwedkére has a rattle made of many wild pigs' hoofs. When he binds it firmly under the right knee and stamps the foot energetically, a glasslike clinking rises above the sound of the singing. All the others keep time by thumping their feet on the ground.

The songs are simple, generally low-toned and repetitious, their words incomprehensible to me.

Often the women join in the singing. Their voices ring like metal. They grab each other and do simple dance steps, one step forward, another backward.

Everyone sings till all are weary. Then

with bow and arrow. Dress is optional

Young parrots taken from a nest eat corn from the mouth of a girl who chews it to a pulp.

Monkeys swinging from the bow and arrows that killed them look pitiful to civilized eyes. But to the Suyá they are a delicacy.

comes the quiet of the forest night. As I fall asleep, I think how true is the saying, "Bad people have no songs."

The pig's hoof rattle is the only instrument I found among the Suyá.

"We used to have a lot of rattles," says old Ngeré. "At singing time everyone bound a rattle firmly under his knee. But then people came up the river and bargained away all our rattles. It isn't easy to make new ones."

Ngeré and I have become good friends. In fact Ngeré, my name for him, means "uncle." He calls me Itõ—"nephew."

"Don't you have any flutes like other tribes?" I ask.

The old man looks at me with squinting, cunning eyes and laughs softly, amused but considerate.

"No," he smiles and points eloquently to his lip disk projecting straight out in front. "We cannot blow the flute," he explains, and lets a stream of air escape, hissing through lips he cannot close.

"All our neighbors have flutes, but we Suyá have none."

Ngeré laughs at the very thought.

When in the early afternoon the sun has

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Old Ngeré, who adopted the author as his nephew, adjusts an earplug. On his wrist he carries a turtle-shell vanity case containing the red dye used to paint lip and disk.

warmed the water. Ngeré goes down to the shore and wades in. He takes the wooden disk from his pierced lip and holds it in the left hand, grasps his nose and face with the right hand, and dives deliberately and long. When he comes up again, one sees the pierced, greatly enlarged lower lip hanging down like a crumpled fishing worm.

The wearers of lip disks seem to be ashamed to be seen by others when the disks have been removed. Bathers usually turn toward open water, but Ngeré is not ashamed to face his nephew. He pulls the crumpled lower lip outward and washes it carefully. He then reinserts the disk, which immediately protrudes stiffly forward.

With his body shiny with water, Ngeré sits down in a hammock that his niece made for him from palm-leaf fibers. He takes down a little basket from a post and unties a small receptacle of tortoise shell. It contains a thick, oily, blood-red *urucu* dye.

Ngeré inserts his index finger into the red dye and smears the upper side of the lip plug, making it a bright red. Then he paints the extended lower lip surrounding the plug.

"Do you not find it beautiful?" he asks me. "The Suyá paint their lip disks a beautiful red, but our neighbors, the Shukahamae, who also have lip disks, do not do so. Their disks are colorless, ugly" (page 118).

Carefully and with vanity Ngeré dyes the upper surface. The underside is painted white, and in the middle a double ring is traced in delicate lines with fine black designs.

Frequently I see one of the men carving a new lip disk. A round piece of light wood is left lying in the water till saturated. To prevent its being carried away by the current, the Suyá place a heavy log upon it.

Anyone needing new disks is welcome to cut off a couple of slices (opposite).

Lip Disk Serves as Wedding Band

The disk is worn only by married men or widowers. As soon as a man is married, his lip is pierced and a small disk inserted. Progressively larger ones stretch the hole.

Every married man has several lip disks on hand. He wraps them tightly in pairs and stores them in the little straw basket in which he keeps all his personal belongings: chisels made of animal teeth, a piece of petrified wood for sharpening arrows, rough leaves for sanding new lip disks, monkey bones, caudal spines of the fresh-water sting ray for making arrow points, a ball of cotton thread, red or black resin, beeswax, strips of inner bark for arrow ties, lower jaws of piranha fish for cutting thread, wild pigs' hoofs, mussel shells, an old knife, a rusty nail. These are the whole of his riches.

Chief Pentoti is the only Suyá with more than one wife. He has three. His eldest wife usually accompanies him on his journeys. The second spins, weaves, and braids. The youngest nearly always prepares the meals. But each helps the others when necessary.

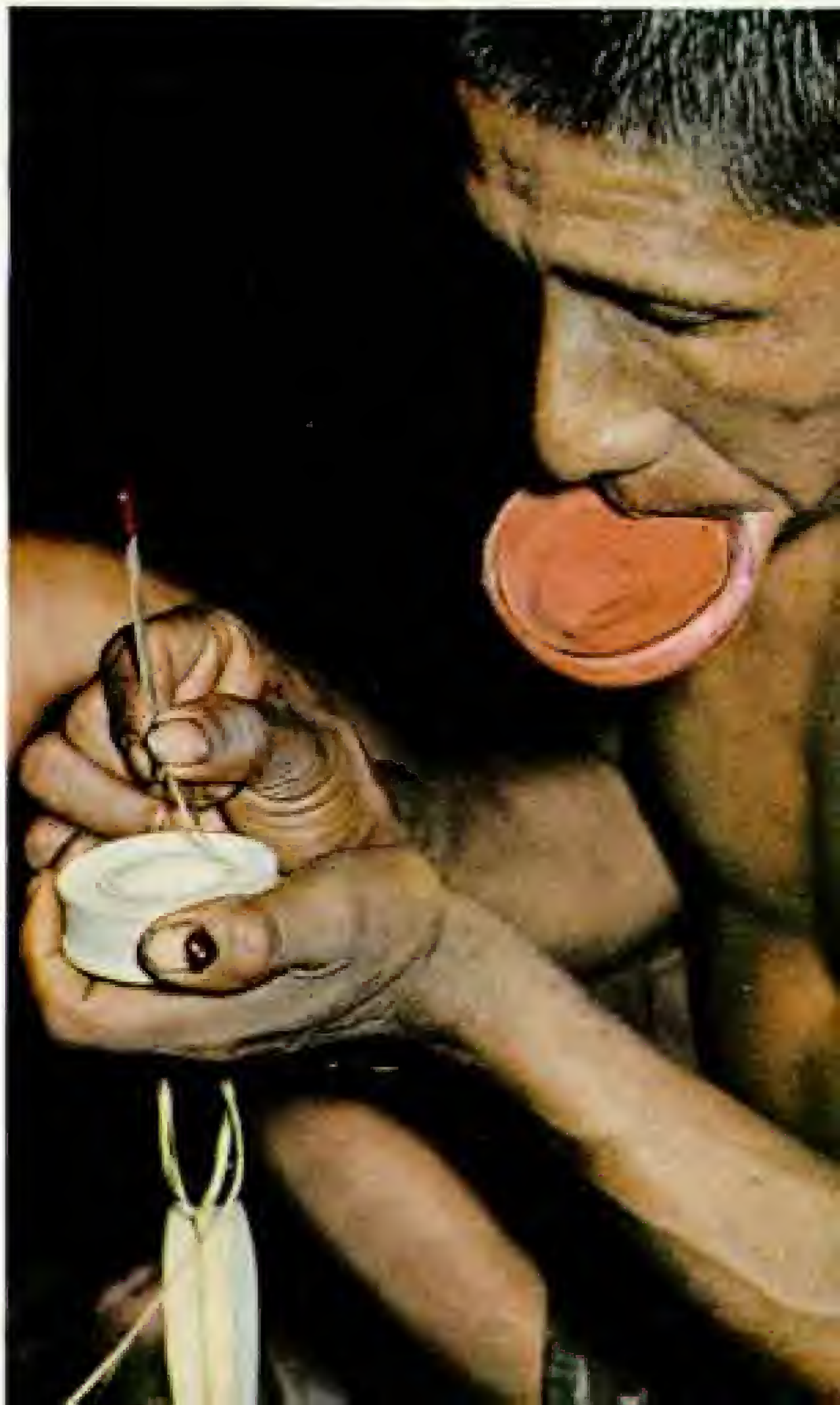
BY HARALD SCHULTZ © NATIONAL GEOGRAPHIC SOCIETY

With a prized knife newly obtained from white men, a Suyá slices a fresh lip disk

To drink, a Suyá tucks disk and tongue under the rim of the gourd. To eat, he cuts or breaks his food into bits. Cigarettes obtained by gift or barter are smoked in the extreme corner of the mouth.

"Lip disks are worn always," says the author, "even during sleep. Many tilt them upward at night so the face is partly hidden and the delicate ornamentation of the underside is visible."

Robudó decorates a disk. He holds a feather quill and applies juice stored on a thumbnail. Using a pig's tooth, he carved the disk from a slice of log (top), making it concave on both sides.



Armed with bow, Robudó fishes in a lake. He made his arrows from reeds, tipped them with spines of fresh-water sting rays, and fletched them with jungle-bird feathers.

Pentoti has children by all three wives. It is difficult to tell which child belongs to which mother. They call each other brother and sister and are called by all the women irrespectively *Iéwá*—my son, my daughter, my child.

Pottery and Wives Stolen in Raids

Gaisográ, the eldest wife, is the only one who knows how to make clay pots. Gaisográ is not a Suyá but a Waurá. The Waurá live far upriver on the Culuene, a branch of the Xingu. They make pots for all the Indians in the region—wonderful ones, brown and black, portraying in a stylized, highly artistic manner the animal world of the Xingu.

In former times the Suyá attacked the Waurá, stealing their women as well as their pots. There are several Waurá women among the Suyá, but none seems even to think of returning to her tribe.

Strangely, none of the Suyá women have learned the craft of pottery making, in spite of having had these Waurá among them for many years.

Pentoti, without my asking him, calls my attention to the fact that several Indians of other tribes live with the Suyá.

"That quiet, observant young man who is married to my pregnant daughter is a Yuruna. The young fellow there with the small wooden lip plug is a Shukahamae; the Yuruna cap-

tured him when he was a small child and since then he has lived with us . . and Sauku, who is married to Robndó's sister, comes from the village of the Trumai."

It is truly international here in the forest camp of the Suyá!

Rainy Season Rings Down the Curtain

Heavy downpours of rain come more and more often. The forest ground is soaked through, softened. The water level of the river is rising rapidly. The sun appears for only a short time each day and then is half hidden by clouds.

When the ground becomes softer, aircraft will no longer be able to land at Diauarum. If we stayed any longer, we would perhaps have to remain here throughout the winter.

Ngeré is carving a cassava cake turner. It is to be his farewell gift to me. Our friends are happy with all the beautiful things which we can no longer use: cooking pots, knives, trousers, bed linen.

"Now thou art leaving us. . . The water will rise and rise and flood everything!" Ngeré raises his hand to the level of his head. "But when the shore appears again, when the sun becomes hot and beautiful, I shall be waiting for thee here."

Men, women, and children go down to the water. They shake our hands in farewell and follow our boat a while along the bank.

"*Suyá beikoomenenene*," we call.

"*Kowi beikoomenenene*," comes the reply.

Children of nature, Suyá boys and girls play like minnows at the water's edge. "They wrestle, laugh, and run after each other," says the author, "but never quarrel."

The author crouches in a blind to photograph the rare and beautiful cock-of-the-rock in a British Guiana rain forest. Entranced, he spent hours in these cramped quarters on 20 consecutive days.

STRANGE COURTSHIP OF THE Cock-of-the-Rock

Article and photographs
by E. THOMAS GILLIARD
Associate Curator of Birds
American Museum of Natural History

ONE MORNING last March I stood with two Macusi Indian companions on a windy mountaintop in British Guiana and gazed out over a vast panorama of savanna, jungle, and braided rivers.

As I gazed, I saw in imagination the boldest adventurers of Spain, Portugal, and England questing through steaming jungles for the storied Lake Amuku, its beaches littered with gold. I thought of the two great expeditions which Sir Walter Raleigh led in 1595 and 1617 in a vain effort to find for Queen Elizabeth the land of a legendary chief, El Dorado—"the Gilded One"—which for centuries lured the conquistadors.

What was the lure that had brought me to this remote spot so long after the myths of El Dorado were exploded? It was, I reflected, a far less practical gold. I had come to search for an elusive orange-colored bird, one of the most beautiful in the world—the golden cock-of-the-rock (*Rupicola rupicola*).

With the support of the American Museum of Natural History and the National Geographic Society, I hoped to solve a scientific riddle—the intriguing puzzle of courtship behavior attributed to this bird by two of the greatest of South America's explorers, Robert and Richard Schomburgk.

According to their journals, the Schomburgk brothers had made their discoveries in this same region—the highlands of British Guiana and southeastern Venezuela—in 1839 and 1842. However, despite world-wide references to their reports, even by Charles Darwin in *The Descent of Man*, nothing had been added to these observations of more than a century ago, and no films, not even black-and-whites, had ever been made of this brilliant bird in the wild.

Males Caper and Dance Until Tired

Robert Schomburgk, later knighted by Queen Victoria, reported finding a dancing arena "which appeared to have been cleared of every blade of grass, and smoothed as by human hands." On it capered an orange bird, to the apparent delight of several others:

"Now spreading its wings; throwing up its head, or opening its tail like a fan; now strutting about . . . [with] a hopping gait, until tired, when it gabbled some kind of a note, and another relieved him. Thus three of them successively took the field, and then with self-approbation withdrew to rest. . . ."

Three years later Robert's brother saw a similar performance and added:

"The females in the meantime uttered a peculiar note, watched unweariedly, and on the return of the tired performer uttered a scream denoting applause."

In 1961, alas, the Macusi Indians whom Schomburgk knew as magnificent woodsmen and hunters had all but passed into oblivion. Today they are prosaic cattle hands.

One of the rare exceptions was Atti, to whom I shall be forever indebted for guiding me to the display grounds. A quiet, dark-skinned man of 40 with a quick, penetrating smile, Atti is a professional hunter who supplies meat for sawyers he takes into the forest to pitsaw lumber. Like the jaguar, he habitually hunts alone at night. Custodian of a priceless treasure of Indian lore, he knows all the signs of the forest and its occupants, plus many tricks of stalking and hunting.

After we had chatted a few minutes, Atti opened his shirt and pinched his shoulder,

ACCACHROMES © NATIONAL GEOGRAPHIC SOCIETY

In Bright Courtship Raiment, a Cock Perches Above His Display Court

This pigeon-sized male awaits the dull-brown female. Their unusual arena-type courtship remained unconfirmed by photography until these pictures were taken. The cock turns one eye toward the camera. Helmetlike crest conceals a yellow bill.

forcing up a bony mass like a shoulder pad that floated in the flesh.

"That," he said, "is from 25 years of carrying a shotgun."

After flying to Lethem on the Brazilian border, I started into the forest on February 6 with Atti and three Indian woodcutters. We traveled first by truck and then on foot.

A little-used trail of Atti's led us past Elliway Creek on the western slopes of the Kanuku Mountains (map, page 136). Here the virgin forest trees reached 100 feet, and rocks the size of houses gave the region a kind of shadowy Disneyesque atmosphere.

Twice Atti showed me specimens of *wuri*, an innocent-looking hairy vine (*Strychnos toxifera*) whose bark extract is more deadly than the dreaded bushmaster. Boiled, it is used to coat arrow tips for blowguns.

Once he raised his eyebrows and pointed to

a tree whose bark produced a potion which, I gathered, made old men feel like Captain Blood as played by Errol Flynn.

From Atti I learned such things as why it is best to stalk a jaguar in bare feet. When crushed vegetation underfoot feels warm, the jaguar has just slunk away!

One night a jaguar growled not more than 50 yards from my tent, and next day we found the footprint of one in a cave we were searching for cock-of-the-rock nests.

At our camp, dozens of giant ants—the *arak* of the Macusis—wandered about on solitary hunting expeditions. Nearly an inch long, these fierce insects can incapacitate a man with their stings. Outside the mosquito-net walls of my tent flew swarms of bats, many of them blood-lapping vampires.

The most eerie night sounds were those of howling monkeys, whose jungle concert can chill the spine of the most hardened traveler. By day the constant metallic peals of the bellbird (*Procnias alba*) made the forest ring as if filled with little churches.

Stalking by Night on Hands and Knees

As yet we had not seen a single male cock-of-the-rock, but in a cave on a rugged slope we succeeded in finding four nests. They were glued to the rock with saliva and mud.

When I discovered that the females roost on the rims of their nests at night, I decided to try flash photographs. We crept the last 50 feet in the dark, groping our way.

Once a bird burst from her nest into my face, and we usually flushed them all prematurely. We finally got a picture or two (page 138), but the female is the color of the rocks and hence very hard to distinguish.

Quite frankly, I was always afraid on these night hunts, for it meant crawling in total darkness in an area where Atti had shot and killed a bushmaster. This deadly snake, which reaches a length of seven feet or more, sleeps by day and wanders about in search of warm-blooded prey at night.

I was almost beginning to doubt the existence of the male cock-of-the-rock when suddenly, as we climbed a steep hill, Atti grasped my arm. He nodded ahead and dropped to all fours as we closed in.

There had been some bitter disappointments. Only that morning we had crawled up the same hill to a display arena—40 bare spots of ground amidst the brown debris of the forest—and found it deserted.

Even now I was not fully prepared for what I saw. Through my binoculars, I beheld

Color flames amid jungle gloom in the British Guiana home of the rock-of-the-rock. Sunlight, filtering through lush greenery, highlights *Heliconia* (right), with red flower bracts shaped like lobster claws. Monkey-throat orchids (*Catasetum*) blossom below.

Author and Indian guides pause on the trail beneath feathery fronds of a palm.

Expedition's goal, the golden cock-of-the-rock (*Rupicola rupicola*), lives in the shaded area of map at left. A related redder species (*Rupicola peruviana*) inhabits highlands from Venezuela and Colombia southward through Ecuador and Peru to Bolivia.

a dazzling golden-orange creature with a crest like that of a Roman helmet, and a fan-shaped back. It postured on one of the bare spots in a twisted, static position. The bird remained in this pose for a long time, as if hiding, but of course it had no more chance of hiding than a lump of coal on a snowfield.

I held my glasses on this extraordinary creature until my arms were numb. When I shifted my position slightly, not one but two cocks-of-the-rock leaped into the air and disappeared.

Clearly the day was saved. The next step was to build a blind and gradually move closer to the birds – first 38 feet away, then 25, and on the 15th day our third blind stood exactly 15 feet from the displaying males.

For 20 consecutive days I spent many hours in these cramped quarters. Primarily I watched three males who habitually defended the display arena and spent most of the daylight hours near, over, and on their individual clearings. It was almost ludicrous to behold a male posturing like a little patch of golden carpet on the brown floor of the forest, and I pondered the frustration of it all. Day after day the patient males remained in the arena, displaying, waiting, and eventually breaking into late-afternoon sessions of fighting. The blows of their wings could sometimes be heard 50 feet away.

About once every second day a female appeared briefly. Dark brown and smaller than the male, she seemed a plain Jane indeed, but

PHOTOGRAPHED IN COLOR BY [illegible], AND BY AUTOCHROME BY T. THOMAS GILLIARD © NATIONAL GEOGRAPHIC SOCIETY

A photographic first! Three cocks-of-the-rock vie with one another for mates. Upon hearing a female's low *kawee*, each drops like an orange stone to a private display court he has cleared on the forest floor and begins a posturing, trancelike dance. She chooses one by diving suddenly from her perch and thumping the ground beside him; then she flies away with him, leaving the rejected rivals to recover from their trance. Excited young bird on the ground dances first, older ones hold their perches. Typical dance stage in right foreground is cleared solely by blasts of air produced by the birds' wings on take-offs and landings.

Plain-Jane object of the male's dance, a drab brown female, her crest in shadow, perches on her mud nest in a cave at night. Wary of deadly bushmasters, Dr. Gilliard crawled in total darkness to get this rare flash picture.

Bill thrust out below his crest, a suitor perches above his dancing floor. In the ensuing courtship ritual he uses many motions akin to those of nesting, a task he does not share with his mate. He may inherit these instinctive movements from remote grandsires who did household chores, the author suggests.

Ornamental dress, in contrast with the female's camouflage, makes the male easy prey for jungle appetites. But polygamous behavior requires only a few males to preserve the species.

Rejected male holds an uncomfortable grip on a vertical perch—a position he used off and on for weeks. Though he displayed fine feathers, love's labors were lost: No female chose him.

BY [illegible] (BELOW) AND [illegible] © NATIONAL GEOGRAPHIC SOCIETY

Plumage swollen, a suitor drops to the ground and begins his dance to win a female

the effect of her coming was electric. Often she cried *kawer* as she approached, and instantly the males dropped like stones to their individual stages.

There they stood stiffly, their backs nearly parallel to the ground, as if standing over a nest, and quiet save for an occasional hop. Their ornaments were spread to the fullest extent, and the little tassels that extended from the fragmented inner wing feathers hung out over the sides of the body like decorations on the edges of an ornate parasol. These waved back and forth in the eddies of air (pages 138-9).

Spread out and motionless on the forest floor, the males seemed in a trance. Their eyes were unblinking and rather glassy, their heads and necks somewhat contorted, their movements in slow motion.

Usually her ladyship turned her back on them and flew away.

Female Dives at Her Choice for Mate

The high point of my observations came one afternoon when I saw a female choose her mate. Eight feet up and 20 feet away, she perched for about five minutes while she surveyed the three brilliant males contorting themselves before her. Suddenly, without warning, she dived toward the ground, aiming at the male in the center.

She struck the earth a few inches from him, hitting it so hard that I heard the sound distinctly from 25 feet away. There was an immediate loud squawk, probably from the male, who then flew in pursuit. The female had not paused for even a moment, but rebounded like a skipped stone. They flew out of sight together and presumably mated.

The rejected males shook themselves as if awakening, then renewed the frustrating cycle of battle, display, and the long patient wait for the female.

What possible explanation could there be for this strange kind of courtship? What could be the advantage of a behavior pattern that forces males and females to live apart for all but a few minutes of the year instead of sharing the chores of nest building and rearing of young?

How did such an unusual behavior pattern evolve?

A possible answer came to me after I had observed the manner in which the males settled down as soon as they arrived on their clearings; they acted vaguely as if tending a nest. This idea was reinforced by the fact that the display stages are grouped in somewhat the manner of the nests built by the females in caves.

But the final clue came when I removed a nest from the cave 625 feet away and discovered that it weighed eight and one-half pounds. It was largely constructed of little droplets of mud that must have been carried there by the female, and to carry such a large amount the bird must have visited the ground hundreds of times.

Suddenly I saw the male's strange actions as an instinctive, ritualistic reenactment of long-forgotten duties—ground-visiting to gather mud for nests, helping incubate and care for young. Even the fighting in defense of a display territory has its basis in the instinct to defend the nest.

Weird as they seem, these posturings are merely redirected instinctive movements that go back tens of thousands of years.

Although the female now carries a highly unequal work load, the species benefits in greater nest security and hence a higher rate of survival.

The development of brighter plumage in the male would seem to go hand in hand with this change in division of labor. Brighter plumage attracts more mates; and bright plumage in the males of a polygamous species is not a detriment to survival of the species, even though it makes the males much more vulnerable to predators.

Note in Cairn Brings Quick Reply

As we left this fascinating place, I built a stone cairn and placed in it a note saying, "I should be glad to hear from anyone who might make additional studies of the cock-of-the-rock on this dance area."

I wondered how many years would pass before anyone would come to this lonely spot to study the cock-of-the-rock.

Two months later, back in New York, I received a letter from a British ornithologist, Dr. David Snow. He and his wife Barbara had discovered my cairn before it was a month old. They had found the cocks still displaying, and I was much pleased to learn that on March 30 they had found two new-laid eggs in the nest I called No. 4 (page 138).

Thus, after more than a century of supposition and hearsay, the spotlight of scientific observation was being focused on this strange and beautiful bird.

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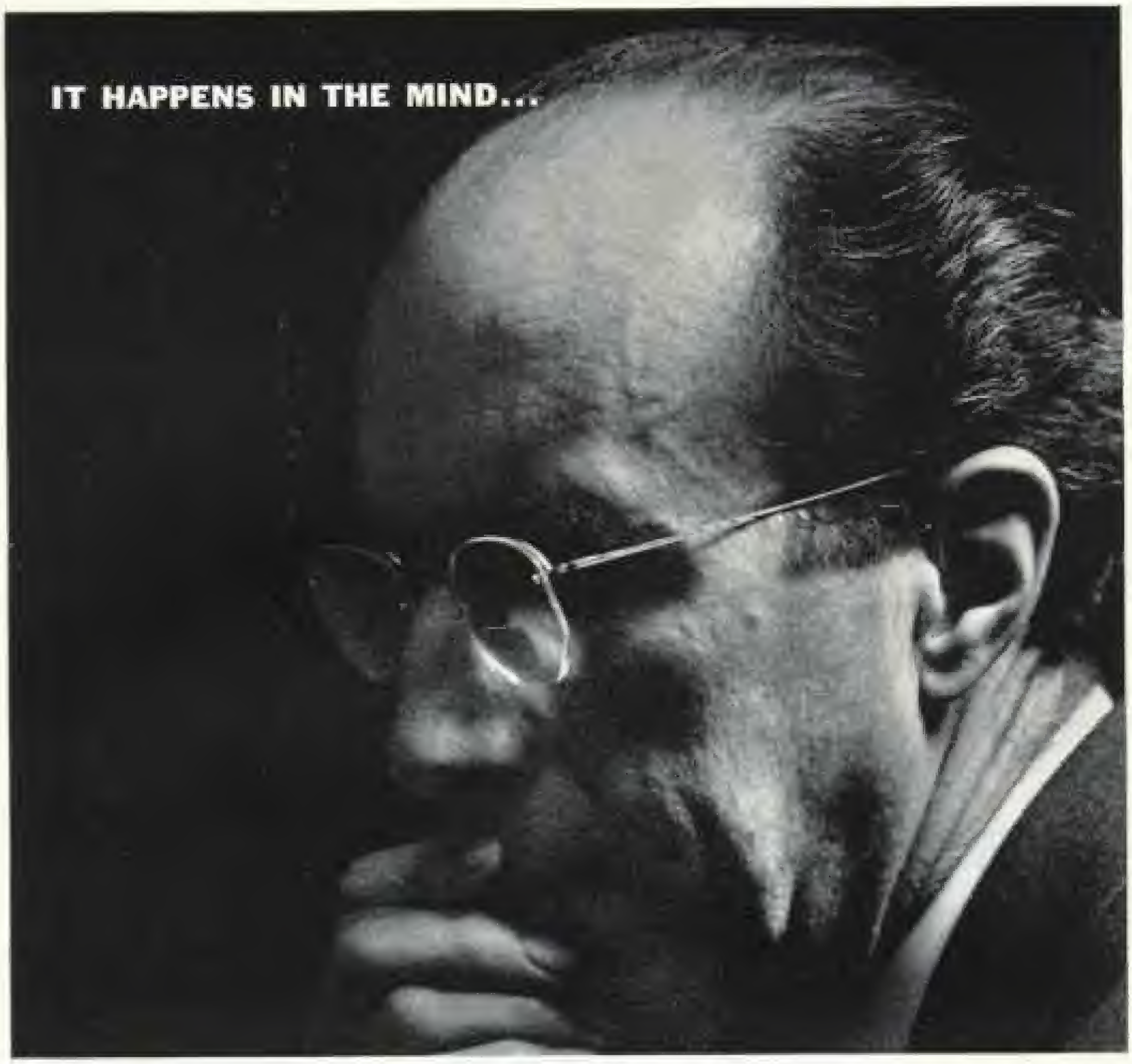

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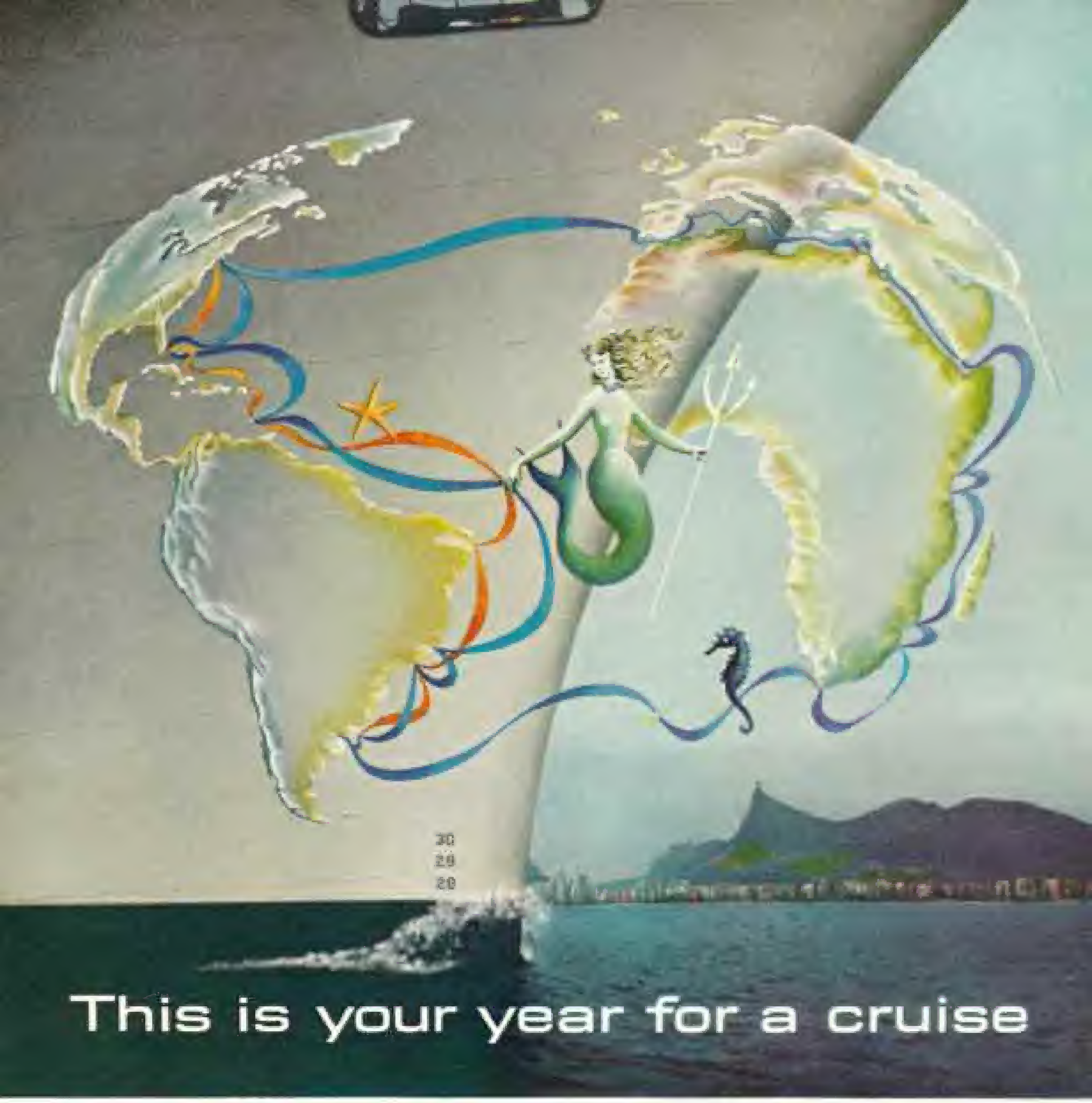

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