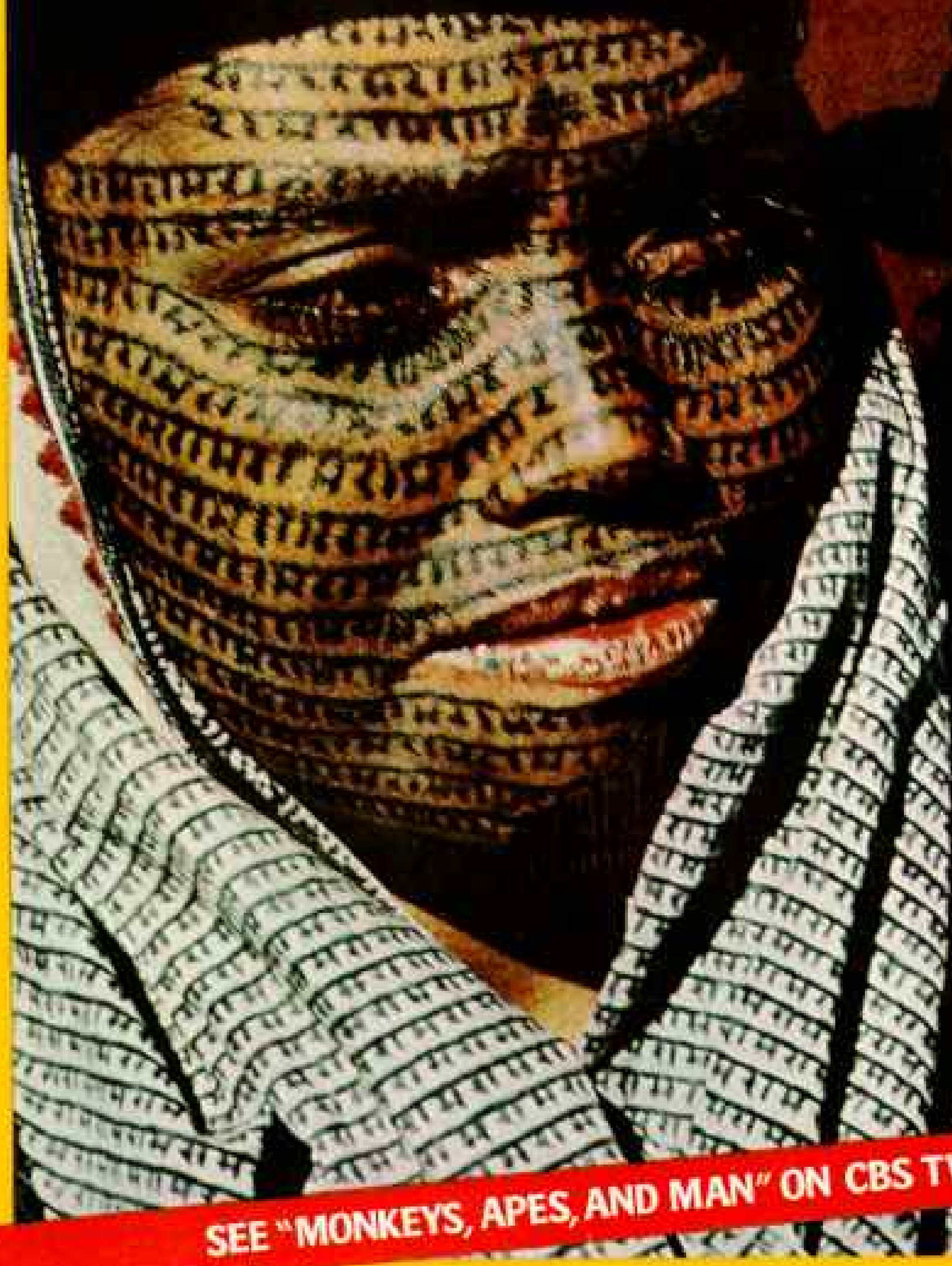
DOUBLE MAP SUPPLEMENT: THE ARCTIC OCEAN'S FACE AND FLOOR (page 518)

VOL. 140, NO. 4 OCTOBER 1971

NATIONAL GEOGRAPHIC

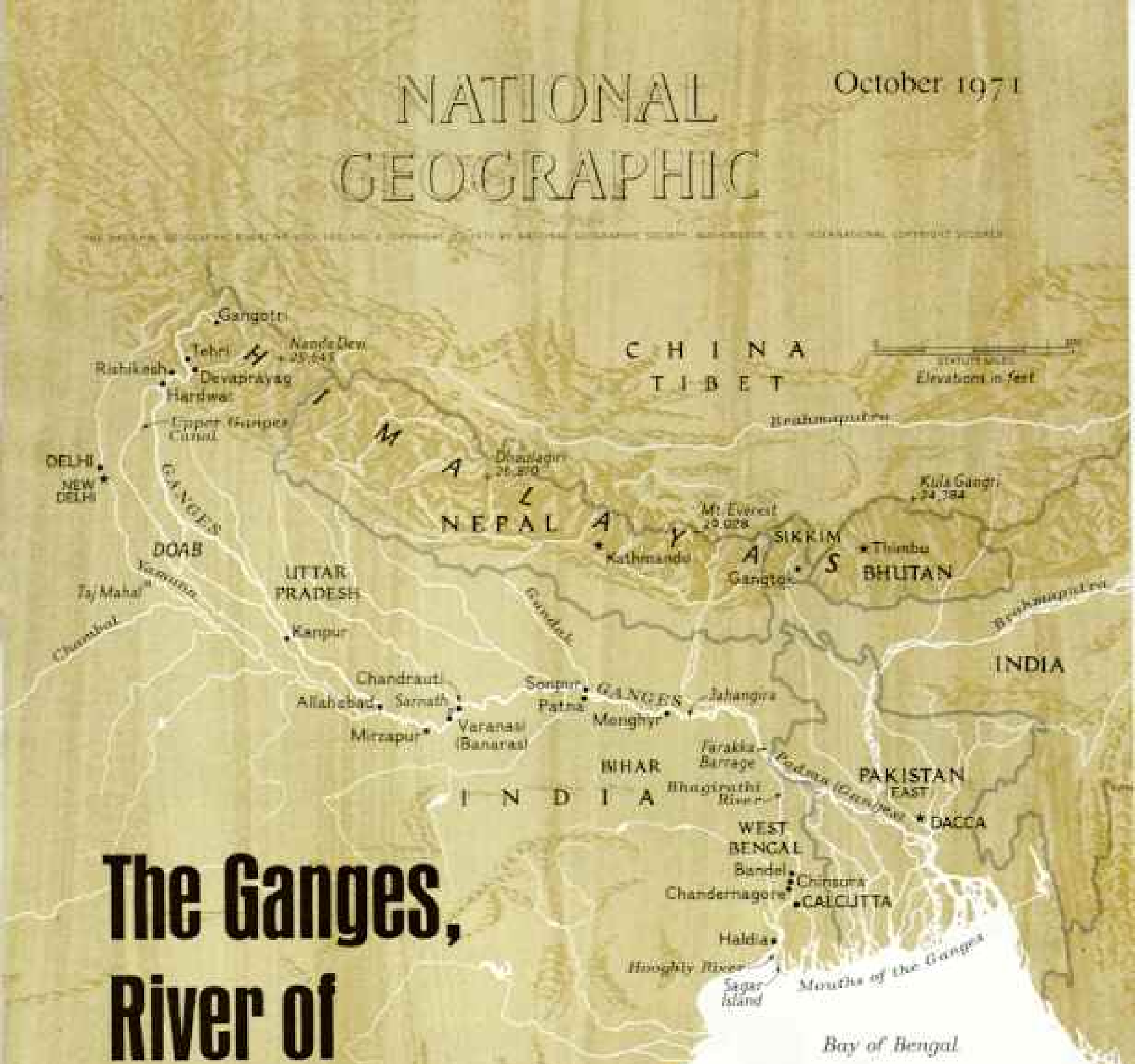


SEE "MONKEYS, APES, AND MAN" ON CBS TV (page 585A)

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

NATIONAL GEOGRAPHIC

October 1971



The Ganges, River of Faith

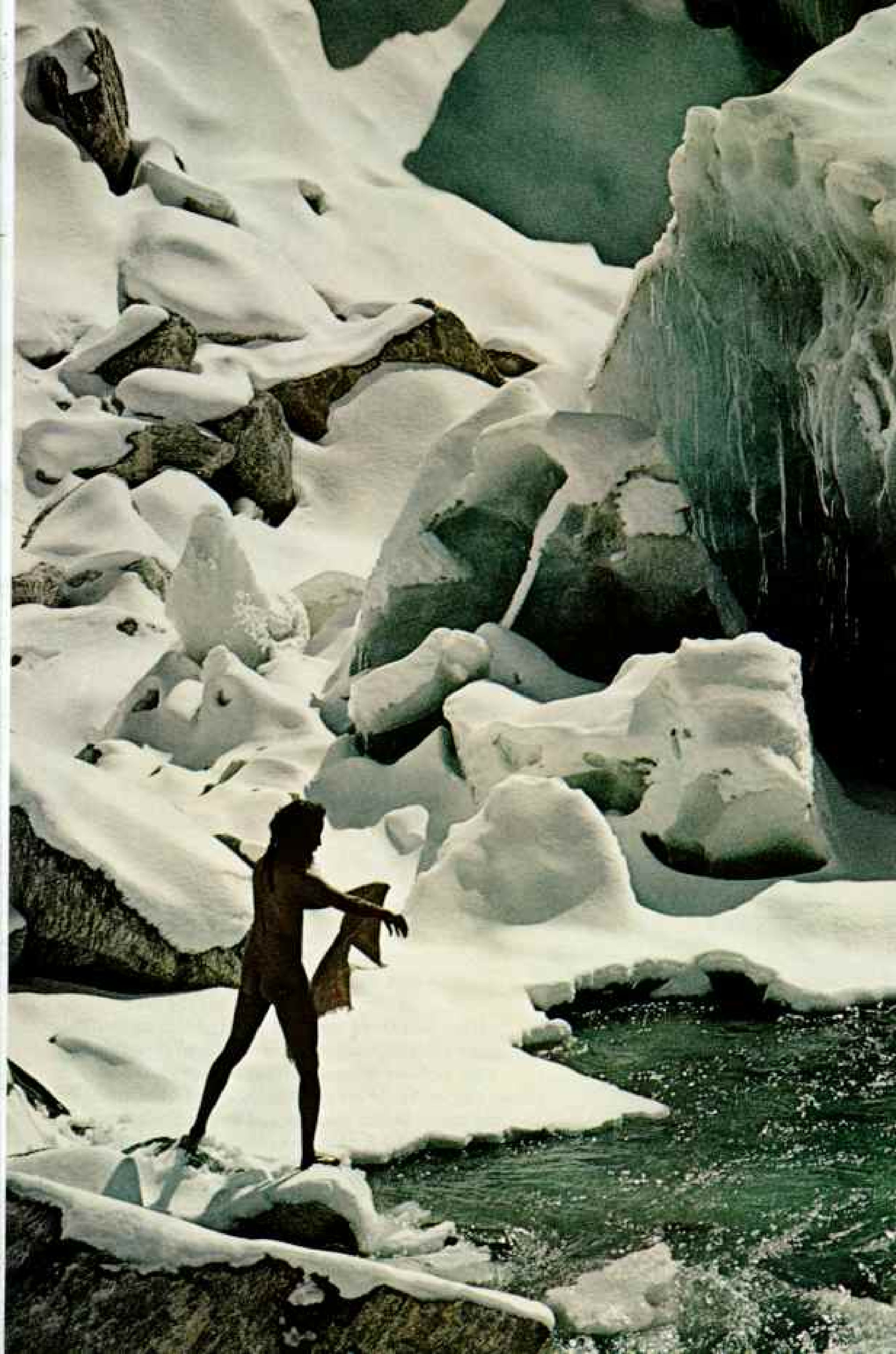
By JOHN J. PUTMAN
NATIONAL GEOGRAPHIC STAFF

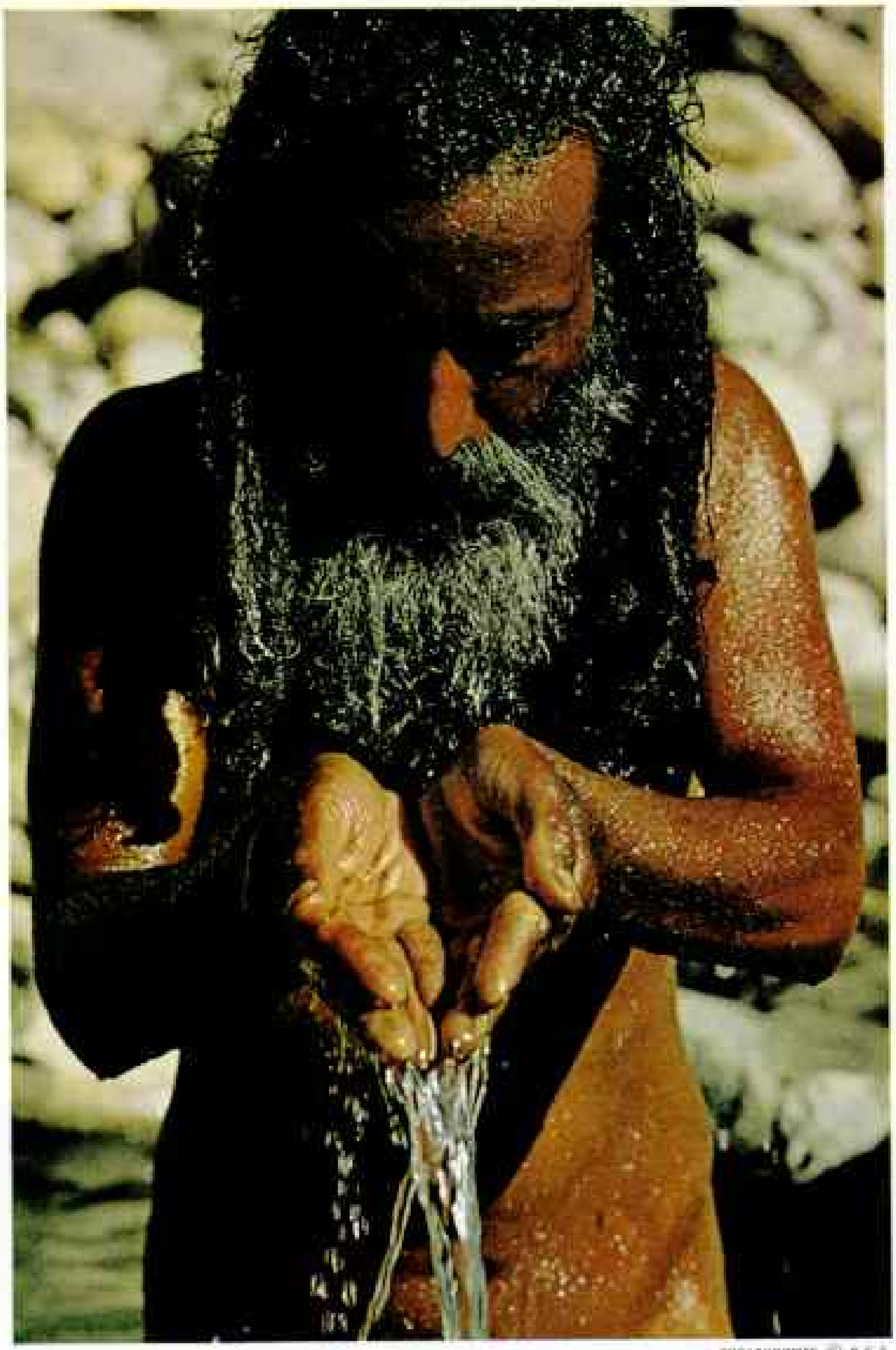
Photographs by
RAGHUBIR SINGH

I DROVE NORTH into the Himalayan foothills, past crying parrots and packs of pink- and black-faced monkeys that chattered their disapproval as they scampered from the road.

Here and there terraced paddy fields spilled down the mountainsides; amid them rose thin blue ribbons of smoke from village cookfires. Kites circled lazily on great wings, and herdsmen led cattle to the meadows. The road followed the gorge, twisting, climbing. Only now and then did the sun reach down to burn away the mist and reveal the river; a serpent of glittering silver, looping, bending, rushing past rock walls, sandbars, and heaps of boulders, questing for the sea.

Once, through a cleft in the mountains, I saw the

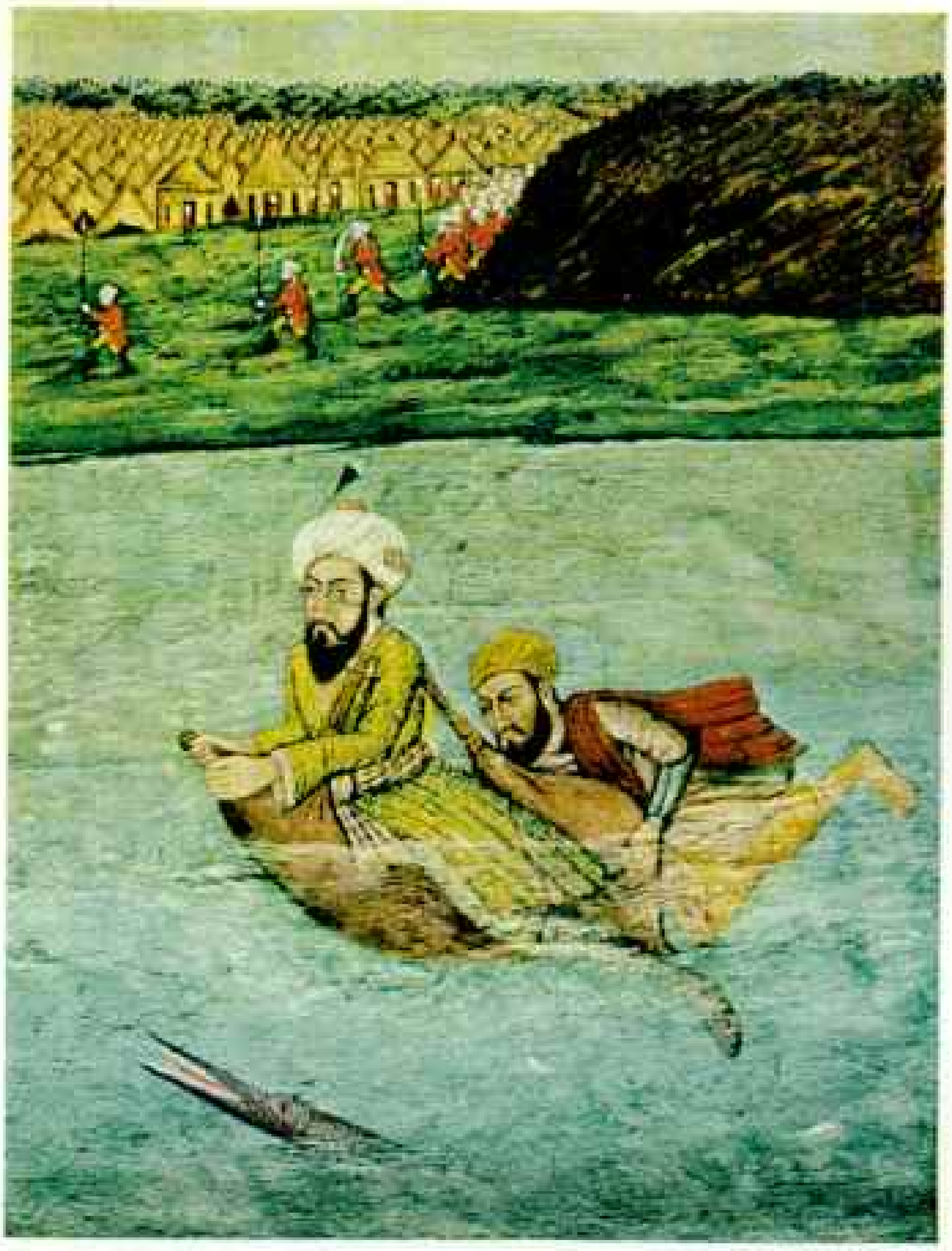




KODACHROMES © N.G.S.

Sacred headwaters of the Ganges spring from Gangotri Glacier's icy throat (**left**), more than 13,000 feet high in the Himalayas. On the snowy bank Swami Sharadananda, a Hindu ascetic, dries after a winter dip. Naked, his skin glistening with fragrant oils (**above**), he lifts water toward the sun in a rite that purifies body and soul. Thus does the goddess Ganga, personified in the river, bestow her bounty on believers in Hinduism, oldest of the world's great religions.

For 14 years this sadhu, or holy one, has lived in a cave near the river's source. Charity provides his food, which he must stockpile for snowbound winter months. Decrying materialism, he finds spiritual calm in meditation. He reveals his troubles to the river, he says, "like a child sitting in my mother's lap. . . . Mother Ganges always answers."



As turbulent as India's past, the 1,560-mile Ganges churns down a road of history. A canvas (**left**) in the Patna Museum chronicles the flight in 1540 of Humayun, Mogul ruler of northern India. The painting reflects the legend that a faithful water boy ferried the white-turbaned monarch on an air-filled skin across the river to safety, eluding Afghan enemies and a toothy crocodile.

The Ganges has challenged and served every invader of the subcontinent, from the Aryans 15 centuries before Christ, through the Moslem and Mogul dynasties during India's medieval period, to the Europeans of colonial years. Yet the river and her people keep to timeless ways.

In the style of Humayun, a lumberman uses an inflated buffalo hide (**below**) to ride the river's upper reaches, too rocky for rigid craft. A single oar helps him steer toward logjams, which he breaks up, sending the timbers floating on to a sawmill at Rishikesh, about 150 miles from the Ganges' source.

Himalayan peaks, pyramids of ice etched by sun and shadow, the river's source.

At Devaprayag, where two mountain torrents rush together to form the river, I crossed a cable footbridge, walked through a street of tailorshops and down to the ghat—the bathing steps—at the confluence.

With holy men and pilgrims in loincloths I stripped to my shorts, grasped the chains that prevent bathers from being swept away by the current, and stepped out into the glacier-cold torrent.

The water rushed into my ears and pulled at my body; in its chill I lost all feeling. Emerging, I stood wet and shivering in the warm autumn sun. An old pandit—a religious teacher—smeared a red *tilak*, a mark reputed to bring good luck, on my forehead.

Pilgrims prayed to the river and its sacred sisters: "O holy Mother Ganges! O Yamuna! O Godavari! Saraswati! O Narmada! Sindhu! Kaveri! May you all be pleased to be manifest in these waters with which I shall purify myself!" Onto its swift-moving breast they cast rose petals, sweetmeats, rice. They filled brass pots with its waters and capped them with mud and straw to take home.

"I have bathed in Mother Ganges and I am very glad," one girl said. Another pilgrim touched my arm: "Mother Ganges is holy and very beautiful and lovely. Do you not feel refreshed?" I had seen the little open channels that carry the town's filth down tier after tier of streets to empty into the river. Yet my answer was truthful:

"Yes, in body and in spirit."

IT SEEMED AN AUSPICIOUS WAY to begin a two-month journey that would become in its own way a pilgrimage. I had come to India to trace religious practices along the Ganges, "*Ganga Ma*—Mother Ganges" to millions of Hindus. Since long before the birth of Christ, they have come to worship it, bathe in it, drink it, and cast into it the ashes of their dead. A few drops on a man's tongue at the moment of death ensures salvation. A Chinese traveler of the seventh century reported that on certain auspicious days thousands gathered along its banks to bathe and worship, while kings distributed largess.

The Ganges is not a river of physical superlatives; more than a score of the world's rivers claim greater length or volume. Geologically, it is very young; a shallow sea may have covered its vast valley as recently as 10,000 years ago. Later, while great cities like Mohenjo Daro and Harappa flourished in the Indus Valley, the Ganges Valley slept, isolated and little known.

Yet the river is the heart of India and of Hinduism, the oldest of the great religions. Here nomadic Aryan invaders from western Asia settled and fused their culture with those of prehistoric peoples; here rose the empires of Asoka and the Gupta emperors; here settled the Moslem and Mogul invaders, who ruled India from the 11th to the 18th century; and here British soldiers won the battles that gained an empire.

Here too rose the great reform faith of Buddhism.

In the weeks ahead I would follow the river's course from the Himalayan foothills across the great plain to the labyrinthine delta and the sea (map, page 445). I would talk with scores of people—holy men, a maharaja, village fishermen, slum dwellers, widows, and body burners.

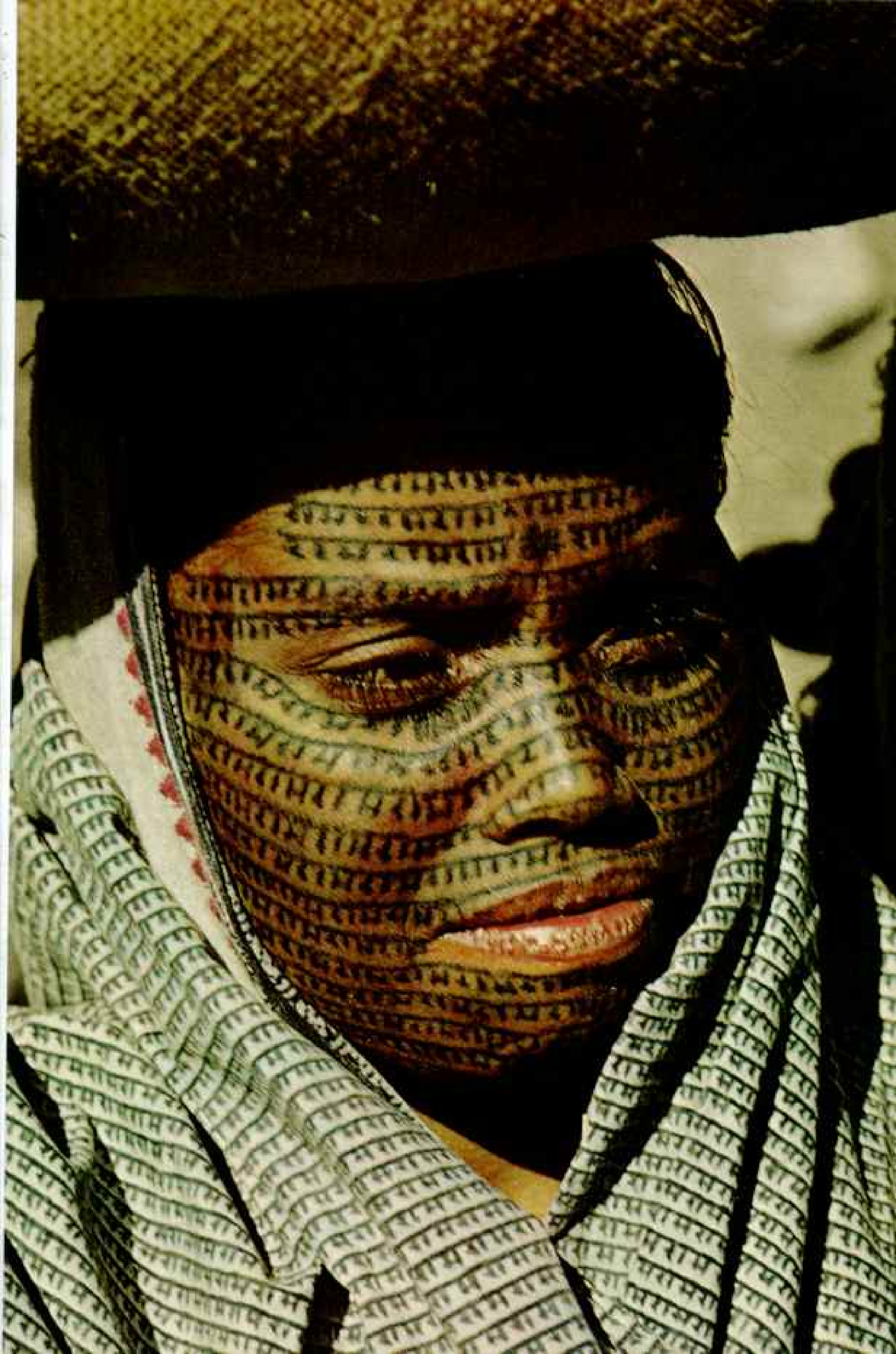
I would find Mother Ganges a vibrant and inseparable part of their daily lives, and I would learn much about India, a vast nation striving toward modernization.*

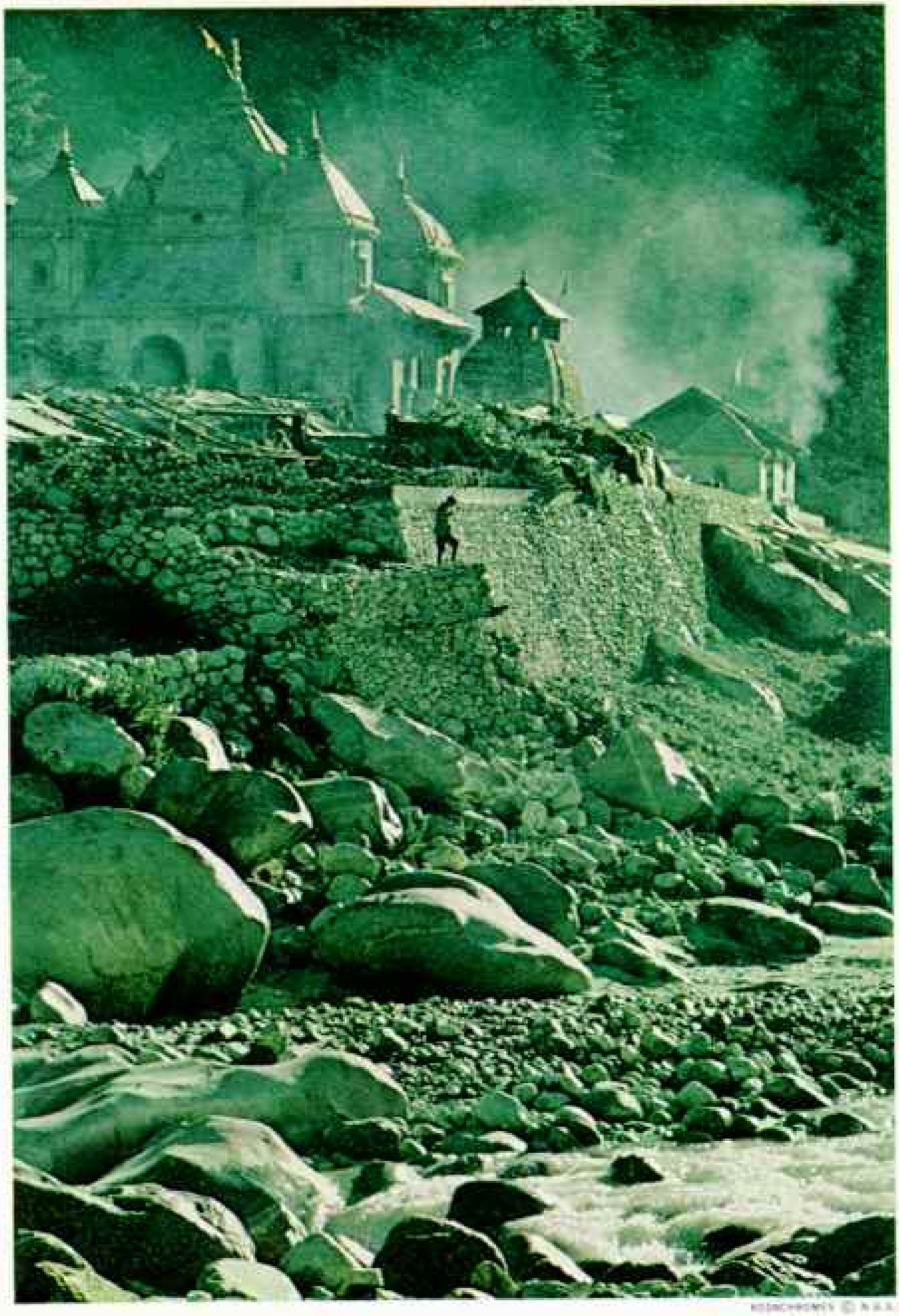
SWAMI SHARADANANDA appeared at my doorstep one morning, a bearded figure swathed in ocher robes. He had traveled for three days, walking through snow, riding jolting mountain buses, sleeping in rest houses. Now he laid down his staff and bundle. "I was reluctant to come, for I was gathering winter provisions. Then I realized you would have come to me if you could, and so I am here and will remain as long as I can help."

I had indeed wished to go to the swami, who has lived for 14 years as a hermit near the river's sacred source above Gangotri. But the Indian Government, wary of foreigners along its sensitive border with Communist China, refused permission. And so, through mutual friends, I had written the swami, asking him to meet me at Devaprayag.

Then I had rented a bungalow above the town and waited. It was a pleasant house, ringed with banana and guava trees, the haunt of cuckoos and crows. My neighbors were the local astrologer, an impassive man with a library of celestial computations inscribed on birchbark strips, and farmers

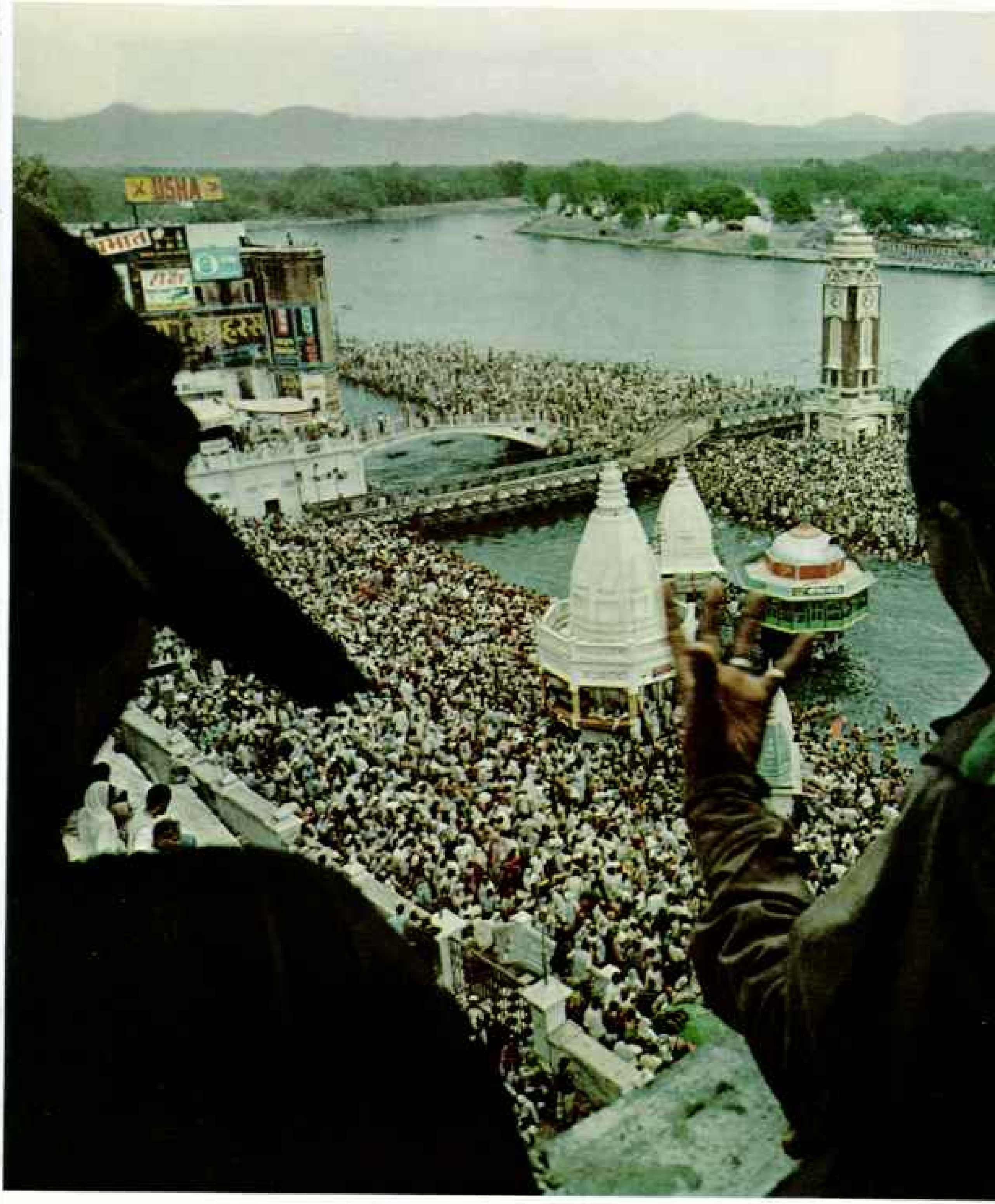
*Author John Putman's perceptive words and more of Indian photographer Raghubir Singh's pictures also form a chapter in NATIONAL GEOGRAPHIC's incomparable new book, *Great Religions of the World* (page 587).





Draped at dawn in the smoke of pilgrims' fires, Gangotri Temple (**above**) enshrines the goddess Ganga. One of many riverside sanctuaries, it draws thousands of pilgrims yearly. Many bear their food, utensils, and clothing in burlap packs such as that carried on the head of a female member of the Namdhari sect (**left**). The word "Rama," endlessly repeated in Sanskrit, emblazons her face and patterns her sari, reflecting devotion to that god, symbol of the ideal man.

Here at Gangotri pilgrims usually bathe, offer the goddess prayers and sweets, accept priestly blessings, touch the temple walls, or ask advice from sadhus. Hindus accord Gangotri water special sanctity, and many fill jugs and pots to take home.



Pilgrim hordes deluge Hardwar in April to celebrate the solar New Year with a day of temple visits and river baths. Thousands of Hindus obscure the island and crowd the ghat of Hari-ka-Charan—Step of the Lord—where the devout revere a depression in stone as a footprint of Vishnu, god of preservation.

The city plays host to an even greater festival every 12 years, honoring a mythical struggle between gods and demons for nectar that bestowed immortality. Drops of sweetness fell to the earth in several places, including the Ganges cities

of Allahabad and Hardwar, sanctifying them forever for all Hindus.

In addition to its religious importance, Hardwar marks the Ganges' departure from mountain confines onto a broad plain, once covered by water and still so level that the river drops only 1,000 feet in its remaining 1,400 miles.

who allowed me to help harvest their rice.

It was bitter toil to them, but I remembered only the moist smell of the black earth, the rasping of our hook-billed knives, the soft voices of the reapers, and, always, the gentle murmur of the river below.

The swami and I sat in the warm afternoon sun by the bungalow. In soft, rhythmic English he spoke of summers, when pilgrim columns march to the sacred source, more than 13,000 feet high, and of winters, when he huddles over a few charcoal embers in his cave and meditates for days, while snow piles six feet deep outside. In that season only five fellow hermits remain in the high mountains.

"God wanted me to do this spiritual work," he said, "to meditate and introspect on the spiritual truth of our scriptures. Why, for instance, is it written, and what does it mean, that Ganges washes away sin? Can I give any scientific interpretation? Only by committing my own body and mind to this research can I hope to find the answer.

"Often when I sit by the Ganges," he went on, "I slowly forget my surroundings and the river. A feeling comes into me that I am like a child sitting in my mother's lap, with my eyes looking up into her loving face. Then I slowly open my heart and pour out one after another my doubts. Mother Ganges always answers."

One day, after our usual morning bath in the river, the swami and I walked in the hills above. He told me of his college years at Madras University, the grief of his family at his parting, and of the uncertainty of his quest. "If God will reveal Himself to me, He will. If not—well, spiritual work is never wasted."

I drove the swami to Tehri, beyond which the road was closed to foreigners. At the bus station men bent in the dust to touch his feet. We were told the bus would leave only after it was filled with passengers. "Please don't wait," the swami urged. "It will be dark soon and your road is perilous." A bus window framed my last view of Swami Sharadananda, his ocher robes pulled about him, his little bundle in his lap, his face serene.

HOLY MEN give the foothills a special character. At Rishikesh the river's banks are lined with religious institutions, temples, and ashrams—lodging houses for pilgrims who come to study yoga and other disciplines, or who are passing by on the way to shrines upriver. Sadhus—holy men—abound. I saw them on the road with their staffs and begging pots, by the river locked in meditation,

or clustered in a crowd in the evenings for the free food at the Nepali Chatra Temple.

Most are simple men who choose to find God through ascetic meandering. Tens of thousands walk India's roads; the people respect them for their apartness and give them food and seek their prayers.

Some serve as gurus—counselors and spiritual advisers. Since 1947 many of the residents of Rishikesh and the surrounding area have climbed the hill above the river to lay their problems before Jat Wala Baba—"Long-haired Man"—Mahavir Das.

I found the guru in the little tin-roofed shed beside his cave. He sat on two stacked stones, his legs crossed, the hair, which reaches to his toes, now braided and coiled above his broad, handsome face. He wore only a loincloth, a gold bracelet, and a gold chain that glinted as it circled his dusky body.

I slipped off my shoes and sat at his feet. I asked him the difference between a Christian and a Hindu.

"You can fix no label on God, either Hindu or Christian. These are man-made titles. God is the same everywhere."

Our talk turned to values in the West, often criticized for its wealth and materialism.

"How many wealthy and comfort-loving men has this world known who lack peace of mind? These are comforts of the body, not of the soul."

He gave me his key to spiritual happiness.

"Control your desires, impose self-discipline; only then can you achieve eternal bliss." A man with family and job should set simple goals. "He cannot hope to realize all his spiritual capabilities until his responsibilities are over and he can leave the world."

He cited a treatise prescribing the time of life for renouncing worldly concerns: "When a householder sees his skin wrinkled, and his hair white, and the sons of his sons, then he may resort to the forest. . . . He should live without a fire, without a house, a silent sage subsisting on roots and fruit. . . ."

I thanked the Jat Wala Baba for his counsel and he gave me *prasada*, holy food—a banana, a sweetmeat, and a spoonful of Ganges water.

I LEFT THE FOOTHILLS at Hardwar, where the river breaks free of its gorge and moves in great loops onto the plain. Hardwar is an ancient and holy city. Here each year pilgrims by the hundreds of thousands gather to bathe (preceding pages) and to gaze on the footprint of the god Vishnu impressed in stone in the Hari-ka-Charan Ghat. Here begins the Upper Ganges Canal, which draws water from the river to irrigate the vast Doab, the land between the Ganges and Yamuna Rivers (map, page 445).

And here I first heard the sacred story of the Ganges and of the sage Kapila, who gave the city one of its ancient names. He was meditating one day long ago when the 60,000 sons of King Sagar came in search of a horse their father had intended to sacrifice.

They found it tied to the sage's ashram, a trick perpetrated by Indra, the mischievous thunderstorm god. The young men awakened the sage from his meditation and cursed him. He, in turn, cursed them—burning them to ashes with his gaze and condemning their souls to wander the earth.

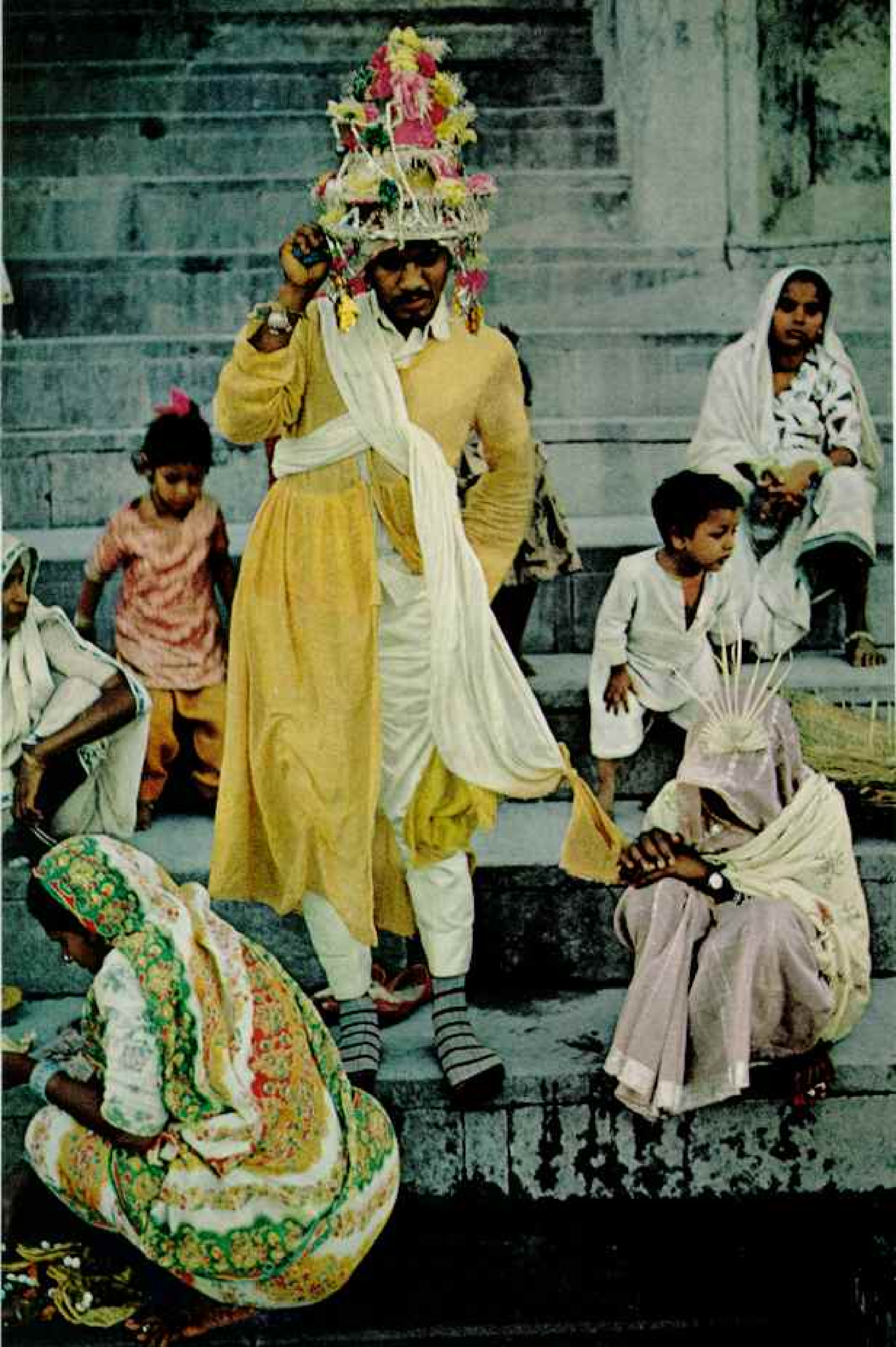
When the king learned of his sons' fate, he asked Kapila how their souls might achieve *mukti*, union with God. Kapila told him to persuade the goddess Ganga to come down from heaven and wash their souls. Sagar, his one remaining son, his grandson, and his great-grandson prayed.

The god Brahma heard them and agreed, but only on condition that the god Shiva break Ganga's fall; otherwise her waters would sweep away the whole earth. Shiva caught her in his hair, the Himalayan snow peaks, then refused to release her. For many years she wandered in the hair of Shiva until, escaping near Gangotri, she began her rush to the sea and, in passing, redeemed the souls of the 60,000 sons of King Sagar.

I heard the legend many times along the river, each time with a variation in detail, for that is the Indian way. The river itself has 108 sacred descriptions, compiled in a little book. My favorite, which includes an ancient name for India, was the 102d: "Roaming About Rose-apple-tree Island."

As befits the inhabitants of so holy a place,

"**Affording delight to the eye,**" one of the Ganges' 108 appellations, might mirror this bridegroom's feelings for his modestly veiled partner. With his spouse tied to him as a token of lifelong dependence, the groom parades beside the river bedecked in tinseled headgear, ocher robe, and striped socks. Newlyweds traditionally visit the river they will return to so often during their married life.



the people of Hardwar observe the strictest Hindu rules. Custom bars the eating of meat or fish, for to do so man must kill God's creatures. Even eggs are forbidden, since they might contain the beginnings of life.

Each day at dusk the people gather on the Hari-ka-Charan Ghat for the *arti*, the evening worship. Three little bridges link the ghat to a small paved island; the channel between forms a protected bathing pool. With its clock tower, strolling families, and closed-in atmosphere, the scene reminded me of a small Venetian piazza at dusk.

Vendors sold offerings for Mother Ganges, little boats fashioned from a single maljhan leaf stitched together with twigs and holding bits of marigolds, rose petals, and a dab of camphor with a wick.

I watched a father buy one for his daughter. The vendor lit the wick and she carried it carefully to the water's edge and put it in. Caught by the current, the little boat shook, the flame flickered; then, frail and brave like a youth setting out in life, it moved out to join an armada of similar vessels bearing their lamps down the darkening stream.

Afterward, amid the spine-tingling clang of bells, priests lifted multi-tiered lamps above the river's waters. Crowds pressed forward to touch the flames and then press warm fingers to their foreheads. "Long live Mother Ganges!" they shouted in exultation. Then, as suddenly as it had welled, emotion drained from the crowds. They drifted homeward, and I moved onto the plain.

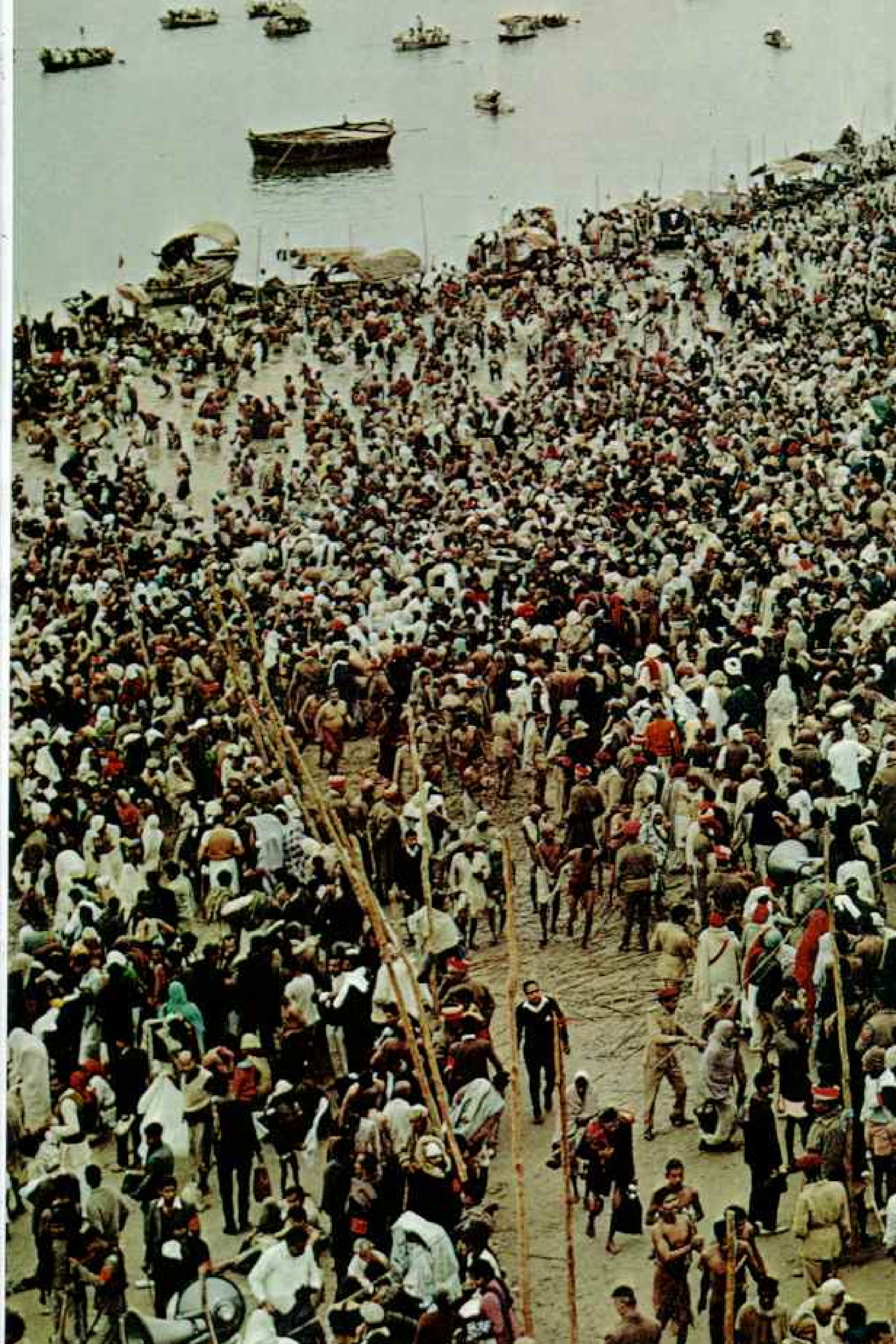
A THIRD OF INDIA'S PEOPLE live in the fertile Gangetic Plain. With as many as 1,000 inhabitants per square mile, it is one of the world's most densely populated areas. Nature sets its rhythms: Blistering April and May, when the temperature climbs to 115° and the earth cracks from dryness; the monsoon from mid-June through September, with its greening gift of rain and silt-rich floods; winter, clear and mild.

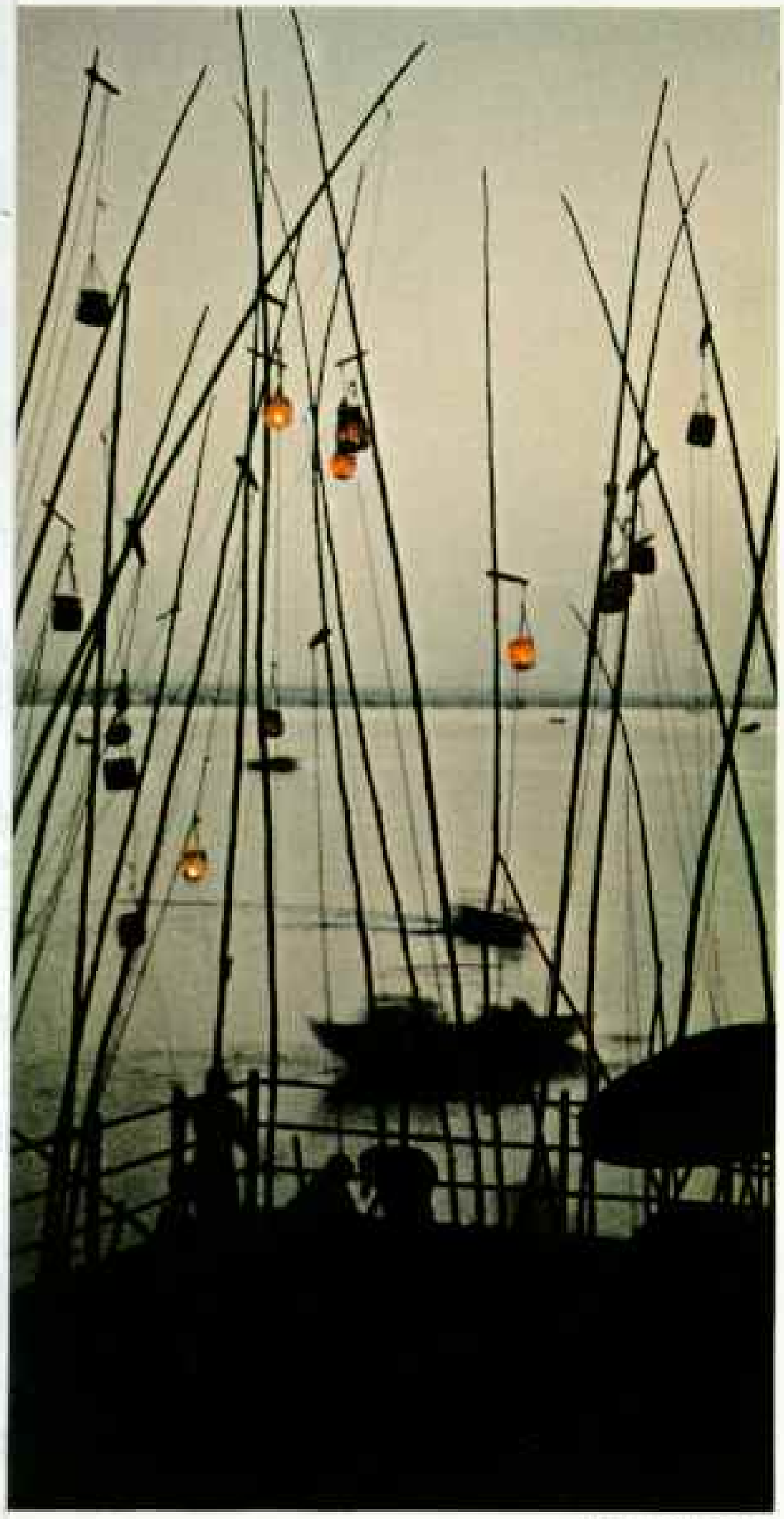
Ash-daubed and topknotted, sadhus (**left**) pass through Allahabad crowds to bathe at the holy junction of the Ganges and Yamuna during Ardh Kumbh Mela, held every six years. Sacred threads over the shoulder signify spiritual rebirth.

Beads and blossoms festoon a mahant (**right**), more revered than a sadhu. His brow gleams with the vermilion and ocher mark of Vishnu, the preserver.

Though fouled by sewage, the Ganges provides its people with drink, irrigation, and blessing. Hundreds of thousands attend this January festival to purify themselves in the river they believe cannot be sullied.

Human tides sweep toward the river during Allahabad's 1971 Ardh Kumbh Mela (**following pages**). In 1954 pilgrims eager to reach the confluence at the proper instant triggered a stampede that killed hundreds. Now police lines and cholera injections protect the masses of supplicants from themselves.





Butter lamps of Banaras glow in the autumn night during the holy month of Kartik, each illuminating the heavens for a departed soul. Some hang from bamboo poles; others float downstream.

Capturing centuries-old mysticism with modern photography, a double exposure (**right**) fuses two responses to a solar eclipse in Banaras. One pilgrim offers Ganges water while another watches the celestial drama through his shirt. Many Hindus revere the sun, according it prayers of praise.

I passed village girls, platters of still-steaming manure on their heads, bound for fields awaiting the planting of winter wheat. Bullock teams, trailing little clouds of dust, broke the soil. Stands of sugarcane drank in the warm autumn sun.

Great cities lie along the river: Kanpur, an industrial and rail center; Allahabad, where millions of pilgrims gather at the confluence of the Ganges and Yamuna Rivers for the great Kumbh Mela held every twelfth year; Mirzapur, famed for its handmade carpets and as a headquarters for the Thugs, devotees of the goddess Kali, who robbed and strangled their victims until crushed by the British in the 1830's; then, midway down the plain, Banaras. (Britain's empire builders called it Benares; modern Indian maps show it as Varanasi.)

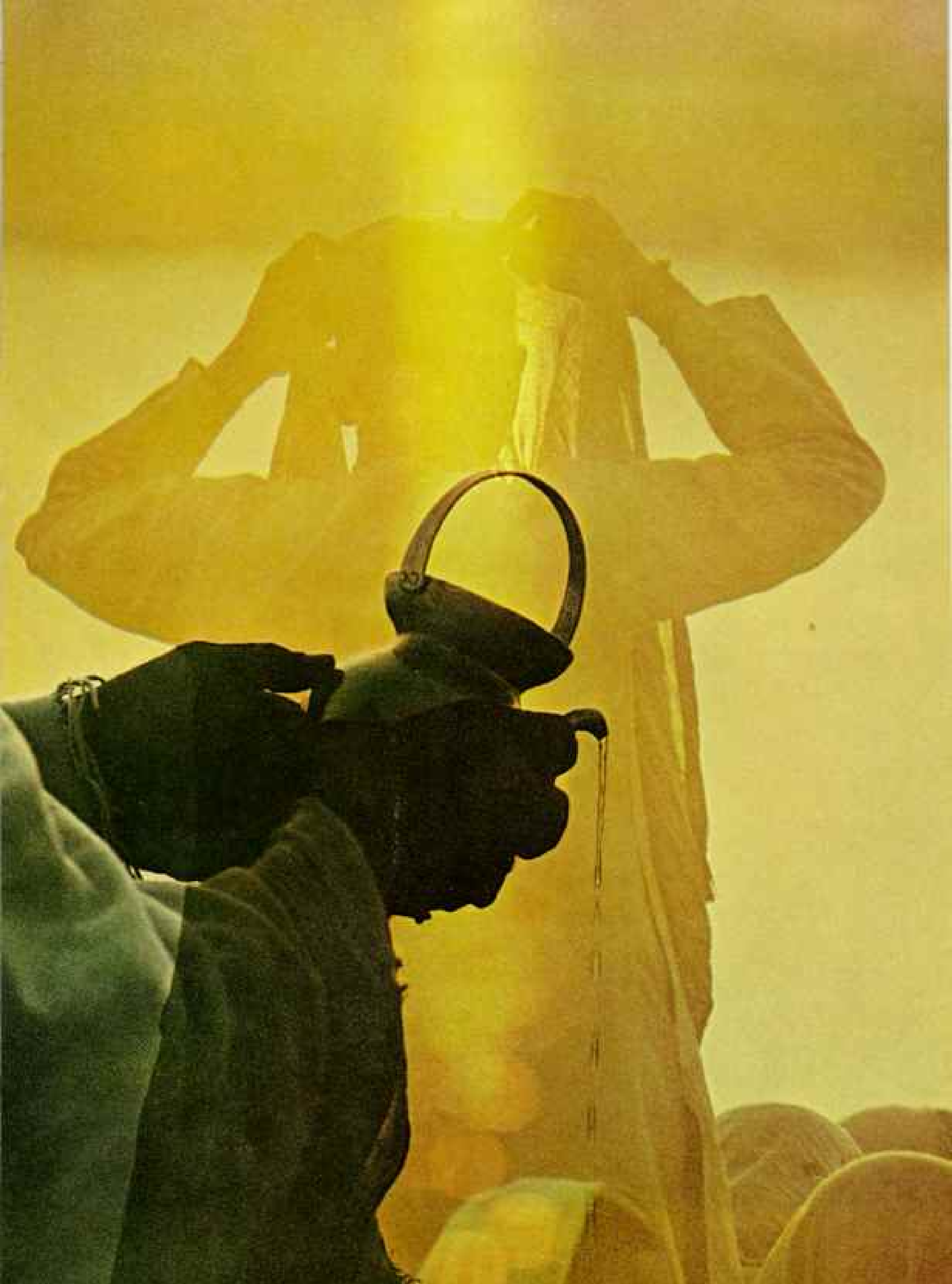
EVERY DEVOUT HINDU YEARNS to visit this holy city at least once; to die there is to be transported immediately to Lord Shiva's side in his Himalayan paradise. Its origin is lost in time, but it stood when Babylon ruled an empire. In 500 B.C. Gautama Buddha came here after his enlightenment and preached his first sermon at nearby Sarnath.

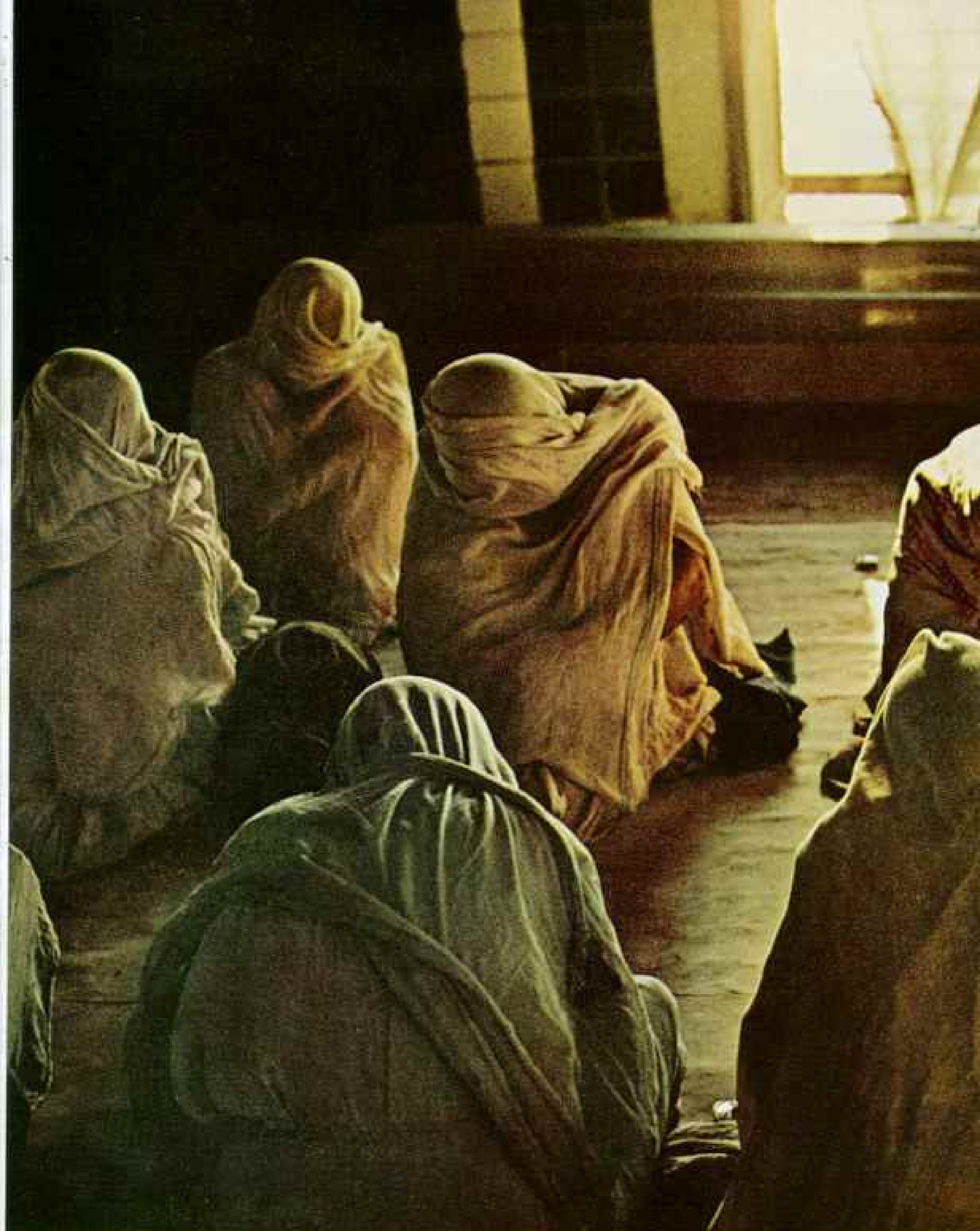
Aryan invaders settled the area some 3,000 years ago, bringing with them beliefs they had held as nomads in western Asia. These fair-skinned people sang hymns of praise: to the sky as heavenly father; to the earth, as mother goddess; to the all-embracing firmament, king of gods and men, who made the sun and moon to shine, whose breath was the wind.

He knows the path of birds that fly through
heaven, and sovereign of the sea.
He knows the ships that are thereon.
True to his holy law, he knows the twelve
moons with their progeny.
He knows the pathway of the wind,
the spreading-high and mighty wind.
He knows the gods above.

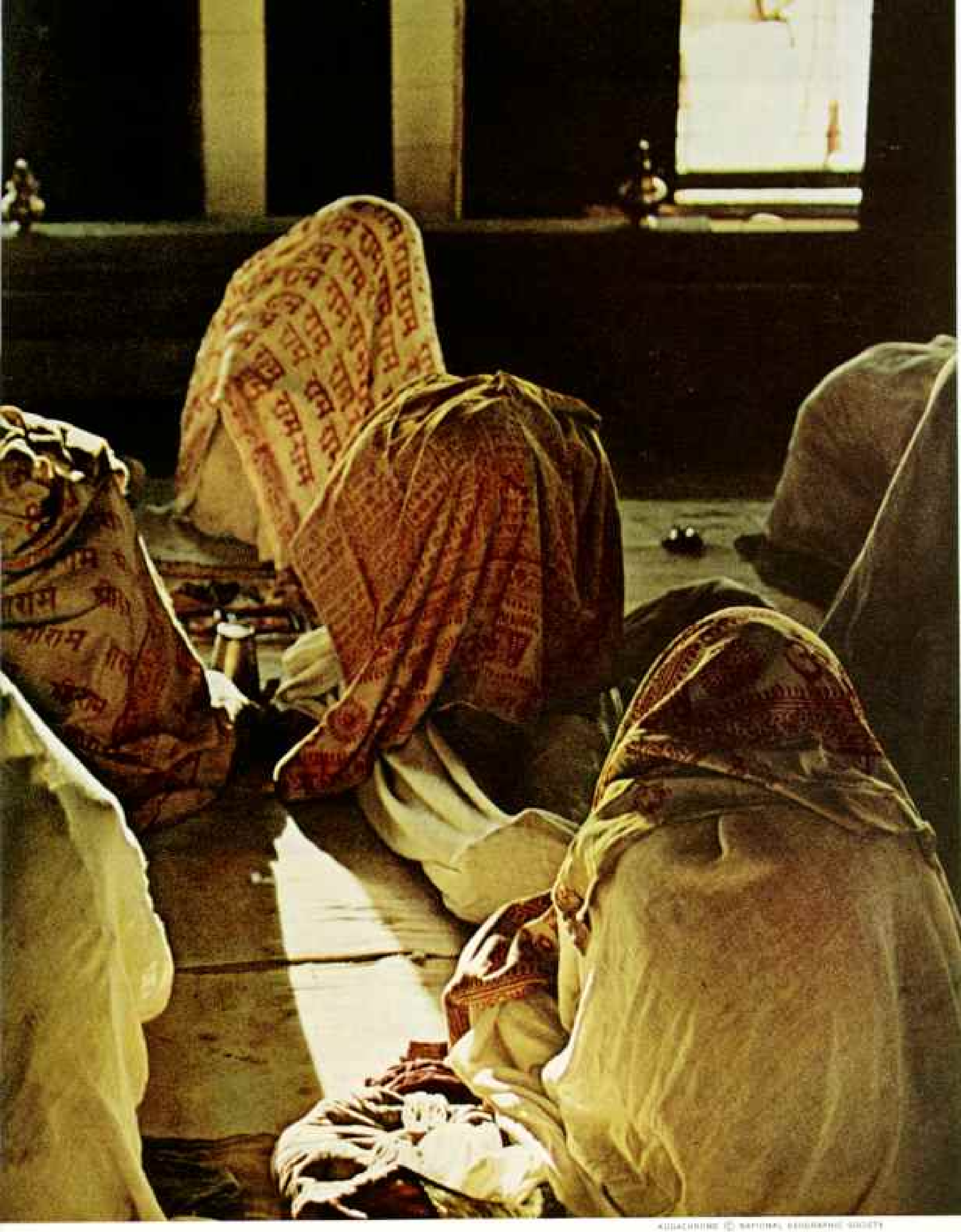
They prayed also to Indra, as brother, friend, and father; the fire god Agni, who protected them day and night; Surya, the sun god; and to Savitri, the goddess of movement. Their poets sang the glories of dawn —the beautiful Usha, daughter of the sky— and of her dark sister, night.

In time these beliefs and practices merged with those of the more ancient people of the area to form the tapestry of Hinduism.





Crypt for the living in a city where many come to die, a Banaras room harbors praying widows in shroudlike saris and shawls, some stamped with the name of Rama repeated over and over. The law permits them to take new mates, but tradition bars remarriage. Moreover, Hindu belief holds that a widow can contribute to her late husband's spiritual welfare and win a place near him in the next life



AUGACHRIME © NATIONAL GEOGRAPHIC SOCIETY

by living austerely and devoting herself to the gods. Subsisting on charity, these women spend hours each day in havens such as this, endlessly chanting *"Hare Krishna, Hare Rama."* Then they may visit the Ganges to hear singers retell great Indian epics before returning to their tiny rooms for sleep. And so pass their final days, as changeless as the sunlight that spills over these huddled forms.

THE ROOM ABOVE THE GANGES was light and airy with tall windows, and pigeons and sparrows fluttered in to perch or walk about. Twenty women sat in two rows facing each other, clashing finger cymbals and chanting over and over, "*Hare* [Lord] *Krishna, Hare Krishna, Hare Rama, Hare Rama*. . . ." The beat slowed; three women lit the sacred fire on an altar. One stepped to the balcony and sounded a conch shell, softly, for she was very old. Another brought Ganges water, sweetmeats, bits of mint.

The chanting resumed, then stopped. The women pulled the hems of their saris and prayer shawls over their heads and bent forward in meditation (preceding pages). The saris were white, for these were widows, and this room in the Bhajan Ashram was their last refuge.

The manager, a young college student, told me the ashram was built by a Calcutta businessman whose cargo was feared lost at sea.

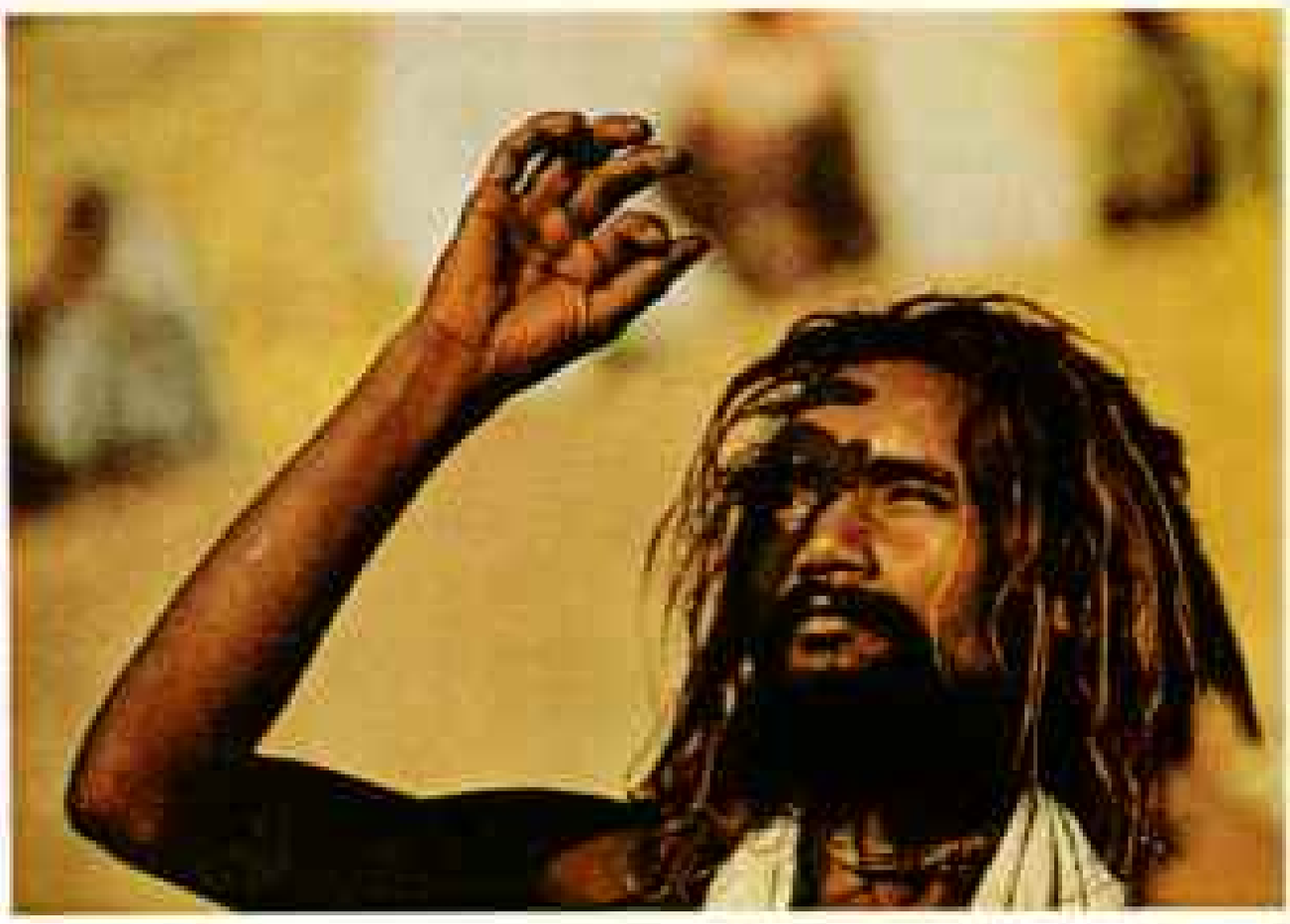
"The businessman prayed to the goddess Devi for its safe return. She then appeared to him in a dream and told him to build a house for widows on the Ganges. He began construction immediately, and the ship with his cargo came in. Now gifts from other businessmen keep the ashram going."

Bittersweet memories softened the faces of some of the younger widows, but the hard task of surviving consumed the thoughts of most. One told me, "We want food and we want God, and if you pray to God you get what you want."

They believe, as written in the Hindu scriptures, that repeating the names of revered deities leads to sanctification and ultimately to mukti—communion with God and escape from the cycle of rebirth.

Coppery glow of a solar eclipse bathes throngs gathered on Dasashwamedh Ghat in Banaras. In the celestial drama, Hindus see the demon Rahu taking his revenge on the sun and moon, deities who caused his decapitation. Since Rahu's presence taints the earth, supplicants ashore and in boats refuse all food and drink until the divine light looms forth once again. Beggars plead for alms; pilgrims—especially the handicapped, leprous, and barren—offer sandalwood, clarified butter, and flowers to spur the sun's return and cure their afflictions.

Unawed by the rampaging river, two priests serenely ride a rickshaw through Banaras streets, turned into canals by unusually heavy monsoon rains. Though the Ganges' summer overflow rarely attains this level, its silt regularly blankets the city's ghats and riverside temples.



Ring of fingers shields a sadhu's eye as he views the eclipse. When the moon shadows the earth, making it impure, holy men and pilgrims cleanse themselves by bathing in the Ganges. Prayers of thanksgiving and happy chants welcome the sun's emergence.

In the days and nights that followed, when I was on the river, I often heard their soft chant drift across the water: "Hare Krishna, Hare Krishna, Hare Rama, Hare Rama . . ."

AN AWARENESS OF DEATH, or rather of the transitiveness of life, pervades Banaras' waterfront. At night the water, the sandbar opposite the city, and the sky merge in darkness. The temples, houses, and great embankments rise like ghosts in the mist.

At Panchganga Ghat pale lamps flickered in bamboo baskets on 40-foot bamboo poles —"sky lamps" to guide the souls of the dead (page 460). And on Manikarnika Ghat the funeral pyres sent their reflections dancing across the waters; around them the tenders performed their macabre ballet, stoking, poking with long bamboo poles.

One hundred Doms, members of a subcaste who serve as cremation attendants, man the burning ghats night and day. They receive a fee—"from 5 to 100 rupees, depending on the family's wealth," one told me as we stood wreathed in the heavy blue smoke of the fires.

Male relatives and friends bring the shrouded bodies on litters, immerse them in the Ganges, and set them on the steps to dry. The bodies are then placed on cordwood pyres, together with sacred offerings—sandalwood, camphor, mango leaves, and ghee, clarified butter, which also fuels the fire.

The chief mourner, usually the eldest son, grasps a straw torch and circles the pyre five times, then sets it afire. Finally, with a large pole, he strikes the skull five times, breaking it to free the soul.

"We don't burn small children," the Dom explained. "The children are still innocent and do not need the purifying flames. We take the bodies to the middle of the Ganges, tie them to stones, and cast them in."

There is little sense of mourning at the burning ghats, for who that is born does not die? Boys bustle by with armloads of cordwood, dogs scratch and quarrel, funeral parties await their turn. About 30,000 bodies are cremated here each year (upper).

I noticed three men, knee deep in the river, sifting ashes and mud in baskets. "They look for gold, rings and such," the Dom said. "It is their concession."

A young man with shaven head and white clothing told me, "Yesterday my mother died and was burned. As the eldest son, it fell my duty to perform the rituals. Today I bring milk to pour over the pyre."

Flames pierce the nightly gloom of the Banaras funeral ghats, scene of 30,000 cremations a year. Relatives give red-draped corpses a final dip in the river, then anoint them with ghee—clarified butter. The deceased's eldest son usually lights the pyre and cudgels the skull to split it, releasing the soul. Later the family returns to scatter bones and ashes in the Ganges, a grave also for the unburned bodies of innocent children.

To die in Banaras is a lifetime desire for Hindus, because it means the soul is freed forever from the wheel of life—the endless cycle of birth and rebirth.

Eyes fixed heavenward, a Banaras bather floats his silent prayers from the Ganges up to the gods.

BOBSCHNEBLY © NATIONAL GEOGRAPHIC SOCIETY

I recalled a passage from the *Bhagavad-Gita*, the "Song of God," in which Lord Krishna consoles the warrior-prince Arjuna on the eve of a slaughter:

> *Worn-out garments are shed by the body:*
> *Worn-out bodies are shed by the dweller within. . . .*
> *New bodies are donned by the dweller,*
> *like garments.*

So in Banaras there is the exultation of life too. I heard it in the cry of the curd seller as he wanders the narrow, crooked streets with pots on a shoulder pole; in the bedlam of itinerant musicians who show up as if by magic at any house when a son is born; in the incredible jangling of bicycle ricksha bells; and in the fervent prayers of the devout who crowd the hundreds of temples, or circle the sacred mint plants, or adorn with flowers and Ganges water the uncounted linganis, short stone monuments representing Lord Shiva and the regenerative force of life.

I went often at dusk to the river to listen to the bards who sang and spoke the ancient Hindu epics as Homer once chanted the *Iliad* and *Odyssey*. On the great steps of the Munshi Ghat women clustered, their saris drawn close, house and trunk keys tied to the hem thrown over the left shoulder. Musicians began their sad melody with drums, cymbals, and hand organ. A dark frail figure in white dhoti and apricot shawl rose and began to sing the *Ramayana*, one of the two great Hindu epics, a tale of love and banishment.

The melody is sweet, repetitious, sad. For 12 years the singer has come here each day; completing the epic, he begins again, and the women never tire of it. Some place before him bananas and little sacks of food.

VIBHUTI NARAIN SINGH, Maharaja of Banaras, was moustachioed; a sandalwood tilak marked his brow, a purple-and-gilt cap crowned his head. The small office in his palace overlooked the Ganges, and a breeze shook the weighted papers piled on his desk.

Laden with wheat flour, a barefoot villager hurries homeward through monsoon rain in Bihar. Some 160 million Indians live in the villages and farms of the Gangetic Plain, where floods bring gifts of soil-enriching silt during summer. Webs of irrigation ditches route Ganges water to fields of rice, wheat, and corn in drier months.

Because of the prestige of his family and the sacred origin of kingship, the people of Banaras look to the maharaja for religious guidance. Some regard him as a god. If sages disagree on the most auspicious date for a festival, he may be asked to help resolve the deadlock. And no great festival is complete without His Highness's presence on the royal reviewing stand, on one of his elephants, or on the royal lotus barge.

Conscious of his responsibilities, he observes a strict personal regimen. "I drink only Ganges water," he told me. "It is holy and very healthful. You know of course that it can keep the longest without spoiling. The last Mogul emperor drank no water but that of the Ganges, and carried it with him in camp always. And he was not a Hindu like me, but a Moslem!"

I asked the maharaja about the orthodox Hindu precepts he follows. "These things evolved naturally and from a very ancient time. Castes, for instance, were linked to professions; a father would coach his son in his home and also give stability to society. If you have a son, can you train him better as a journalist or as a physician? Isn't it better for me to raise my son in my house as a maharaja rather than as a cobbler?"

I noted that the women of his family observe purdah, living their lives screened from profane gaze. A covered way leads from their quarters down to the Ganges and the barge with the trapdoor through which they bathe.

"Hindus always showed restraint in exhibiting their women," His Highness said. "But the system became more rigid after the Moslem invasions. Hindus had to protect their women from the conquerors to preserve their way of life."

His Highness told me that the precepts of untouchability presented no problem to him. "It is only after my ritual bath and while I am eating that I cannot touch anyone other than members of my household who have performed the same purification rituals. To do so would make me ritually impure.

"But goodness does not come only by touching and by eating with people; it comes from much more."

When the maharaja bade me good-bye in the palace compound, a bearer with an umbrella appeared to shield him from the sun. From the gatehouse came a shouted order, and the small military guard, provided by the Indian Government, snapped to attention with a rattle of rifles.

As I left the city, it was preparing for Divali, the Festival of Lights that greets the new moon in the holy month of Kartik, beginning late in October. I had chosen to observe the festival in a village, for in such communities live more than 80 percent of India's people.

Mukh Ram is a short, slim, dark man, 33 years old, married, a fisherman on the Ganges. His village, Chandrauti, sits on a bluff, encircling the ruins of a fort so ancient that the people know only that one of its kings gave their village the name of a daughter.

Its 600 houses hold some 4,000 people. Any villager can describe all their occupations in detail, for the millenniums-old caste system still marks their lives, despite the social and land reforms of the government.

HERE DWELL 22 HOUSEHOLDS of Brahmans, members of the priestly caste, and one household of Kshatriyas, the warrior caste, an old man and his daughter. Other households are identified by subcastes: 16 of Banias, merchants and businessmen; 40 of Mallas, fishermen and boatmen; 20 of Koiris, farmers; 25 of Telis, who crush oil seed with bullock-powered presses; 20 of Lohars, blacksmiths; 15 of Ahirs, cowherds; 10 of Dhobis, washermen; 10 of Khatiks, who deal in fruit and raise pigs; 5 of Gawals, sheepherders; 3 of Bhats, singers and dancers who perform at weddings and go into the fields at harvest; 2 of Nais, barbers; 2 of Doms, the cremation attendants; and 1 of Gonds, who fry and sell peanuts and other snacks.

There are 50 Moslem households, weavers and tailors, and 200 of untouchables—Gandhi called them the Harijans, "Children of God"—who now may own land but still dwell outside the village in their own compound. In almost every household, young men follow the trades of their fathers.

The farmers told me it had been a good year, with just enough rain and no pests or crop diseases. The millet stood high in the fields, where old women and children perched on watchtowers to guard it against marauding birds and animals.

Yet the land, carved into tiny holdings, could not produce enough to feed the villagers. They lined up weekly for wheat and rice dispensed at the government ration shop.

Diets are meager: a little *sag* (a green leafy vegetable), *chapaties* (flat pancake-shaped bread), *dhal* (a souplike lentil sauce poured over rice), *piyaj* (onions), *jaggery* (unrefined

Beehive of plastered brick, the 96-foot tall Golghar (**left**) at Patna serves a function its builders never envisioned. British engineers erected it in 1786 to house surplus grain for famine years, but the route to the loading hatch atop twin spiral stairs proved too arduous for porters. Worse, the granary's ground-level doors open inward, preventing full use of its 137,000-ton capacity.

Today, the little-used Golghar attracts streams of tourists. Just as Americans stand in line to ascend the Statue of Liberty, Indians snake up the Golghar (**above**) for a sweeping view of Patna and the Ganges.

PHOTOGRAPHS © NATIONAL GEOGRAPHIC SOCIETY

cane sugar), and—very rarely—goat meat.

I went fishing with Mukh Ram and his brother. Before boarding the slender double-ended *nauka*, they prayed: "O Ganga, O Krishna, give us fish and fill our stomachs." We poled upstream, hugging the bank to avoid the strong current. The sun went down swiftly, a small flaming ball in a distant corner of the sky, and we pulled ashore.

Mukh Ram explained, "Long ago six brave men fell here in battle. At dusk they come back to walk the shore. We make offerings to them." The brothers built a fire of straw and twigs and kneaded *ganja*, a narcotic, in their palms. They filled a *chillum*, a clay pipe, with the ganja and some of the burning embers, placed it on the bank, and prayed. Then they passed it between themselves. It would ease the long, hard night. We rowed out from shore, let out a long net suspended by tin cans and gourds, and watched as the current swept the rig along the shallows. An hour later we retrieved the net; it yielded two catfish and three smaller fish, worth about five rupees—65 cents—in the market.

The two men talked as they cleared the net. A year ago one of Mukh Ram's children had died, and not long after, two of his brother's children. He and his brother had consulted a guru, who advised them to pray to the Ganges and to their family god and to place offerings of limes and other fruits in a sacred tank, or pond, at Banaras.

Now, Mukh Ram told me, his brother's wife had noticed that her arm was beginning to wither and twist. The two men believed that the spirits of the dead children were troubled. They felt they had been lax in their prayers. They would go to the guru again.

The net went out and we drifted. The silence was broken only by the occasional rumble of a mudbank collapsing into the river, or the high-pitched howl of jackals.

The next day was Divali. Women and girls

mixed fresh batches of manure and mud to refurbish house walls pitted by monsoon rains; men gathered under a pipal tree to gamble, casting cowrie shells; the fishermen and I went down at dusk to scrub their boats and to set little clay lamps drifting down the darkening river.

When we climbed back up the bluff, we found the village transformed into a vision of beauty. At windows, doors, and the corners of houses flickered hundreds of small ghee lamps placed there by the women.

Mukh Ram entered his house. In the ruin of one room, reduced to knee-high walls by the rains, he knelt before two small images—Lakshmī, goddess of wealth, and Ganesha, the elephant-headed god.

Now Mukh Ram lit lamps and garlanded the two images with marigolds: "O Lakshmi, O Ganesha! Rid us of our troubles and raise

the walls of our house which have fallen."

Next door his brother knelt and struck his head against the earth. "May our problems cease!" An old woman beside him, an aunt, added a prayer for their surviving children. "May they grow to be men and women."

NEARLY 100 MILES below Banaras, the river, having coursed the length of Uttar Pradesh, enters the state of Bihar. I visited Patna, the capital; Sonpur, where thousands come to bathe and attend an annual fair at which cattle and elephants are bought and sold; and the sacred island of Jahangira, a jumble of boulders crowned by a cloud of white temples.

I traveled for a time by country boat. She was a rugged *bufa*, with a bluff bow, high stern, and a large triangular rudder. She plied as one of the ferries at Monghyr, but the captain was willing to make a downriver voyage for a good price.

The wind was upriver, so we rode the current. Only now and then did the two crewmen man the bamboo oars at the bow, so we often drifted sideways or sternfirst. We cooked our food and brewed tea on a dung fire in the bow; during the day we rigged shelters against the blistering sun, and at night, anchored by an island or sandbar, we shivered in the bitter cold.

But I forgot the discomforts in the fascination of life along the river. Wedges of geese honked overhead, pelicans and egrets strolled the mud flats; great vultures glided down to stand with wings half spread, as if drying some gray and awful garments, or gathered solemnly around a cadaver washed up by the stream.

AS IT APPROACHES WEST BENGAL, the river swings southward toward the delta. Just inside the state's borders, it splits into two main branches. The larger, the Padma, angles eastward into East Pakistan, absorbs the waters of the Brahmaputra River, and empties through multiple mouths into the Bay of Bengal.

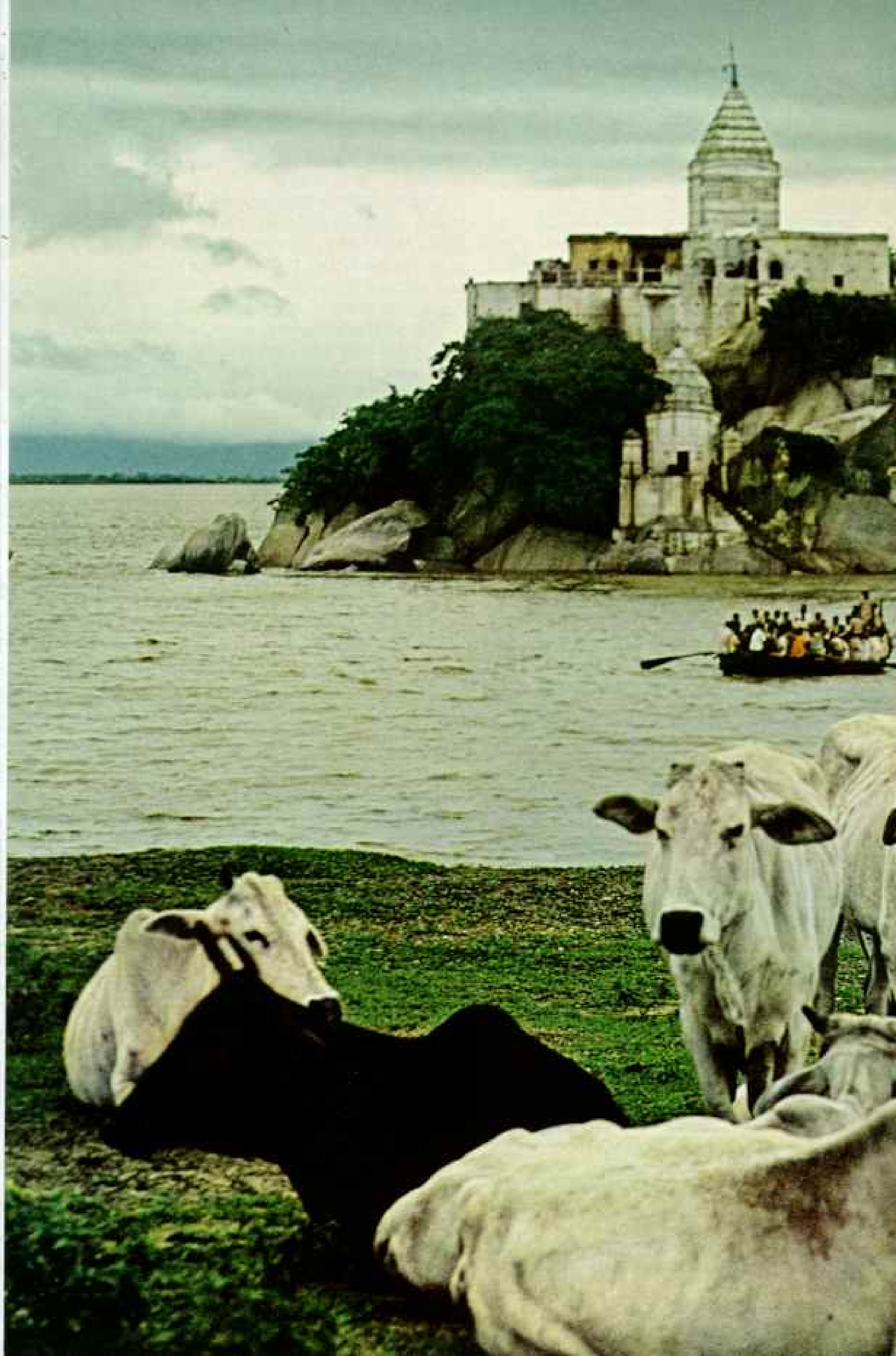
The Bhagirathi branch continues southward, becoming in its lower reaches the Hooghly. To Hindus, this branch is the continuation of Mother Ganges (map, page 445).

The land changes. The endless horizon of purple-brown fields gives way to lush tropical growth, tasseled stands of jute and sugarcane,

KODACHROME © N.G.S.

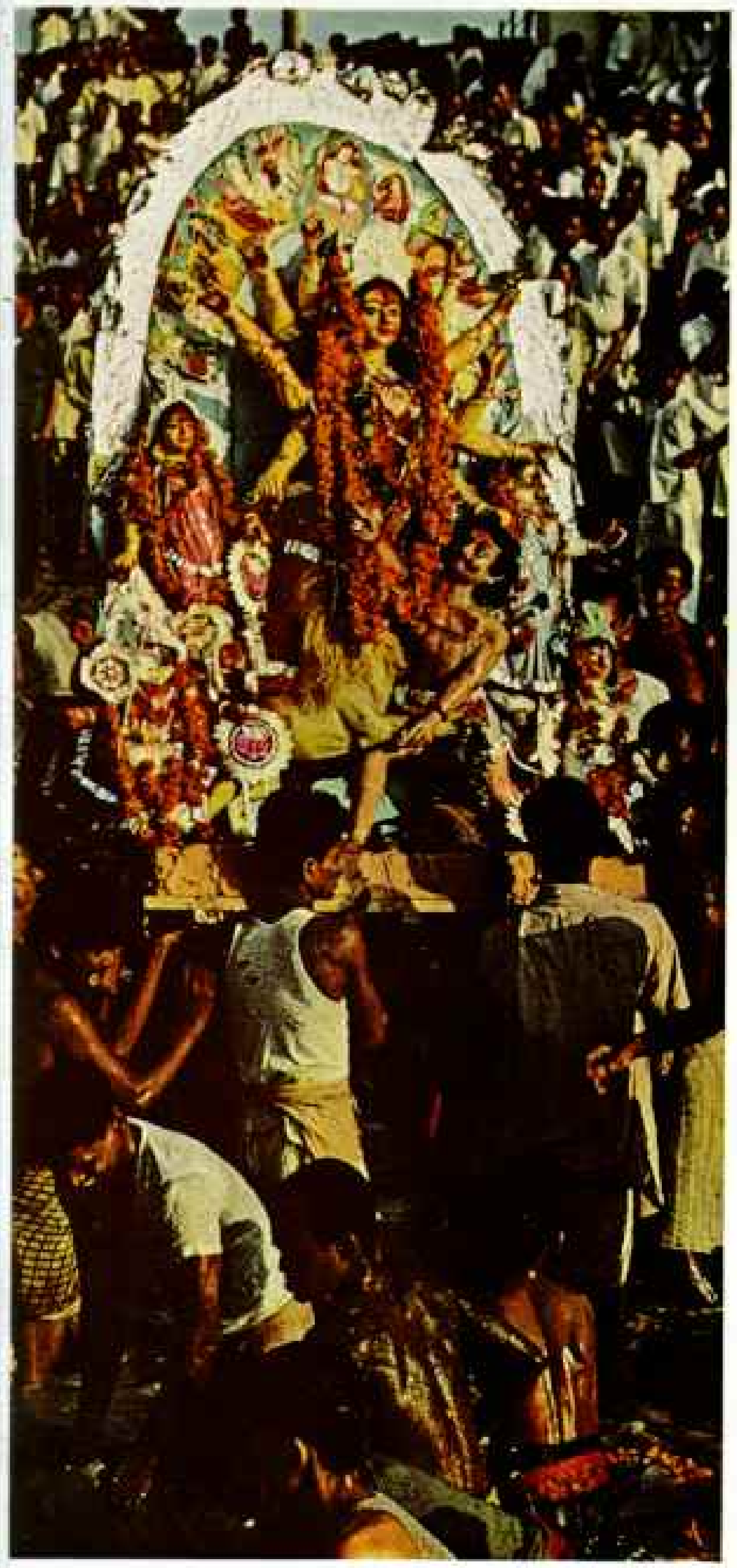
No dreams impassion the sleep of this mahout's helper, battered to death by an elephant after the boy teased it. Fellow workers ignore his fate as they water their huge charges in the river at Sonpur.

The incident illustrates the depth of Hindu belief in reincarnation. For what is the body but a temporary shell to enclose the soul on one of its countless journeys through rebirth and death before becoming one with the true and only God?



ROCKY FEET EVER WASHED BY THE RIVER, *a temple to Shiva crowds the isle of Jahangira, from which a boatload of pilgrims return. Humped cows loll as if aware of their respected status. Though they spread disease, disrupt traffic, and browse on crops desperately needed for human food, India's 200 million cattle can do no wrong, and national fiat forbids their slaughter. Many Hindus believe that a concoction of their five products—milk, urine, curd, butter, and dung—will cleanse the body inside and out.*

KODACHROME © N.G.S. 475



KODACHROME © N.G.S.

Hands red with her enemies' blood, the ten-armed goddess Durga triumphs over a moustachioed demon during a pageant in Calcutta. Each autumn the teeming city turns from its cares to celebrate the Durga Puja, nine days of merrymaking and family reunions. Making Durga statues as tall as 30 feet, celebrants parade them around the city, then ceremoniously cast them into the river, where they break up in a joyously macabre scene of floating heads and arms.

and shimmering paddy fields. Villages cluster beneath palm trees; families share ponds edged with lotus and water hyacinth; here they draw their water and raise fish, a staple of their diet.

Now the bluff country boats give way to long, slender naukas that ride the current as lightly as leaves.

It was along this stretch that Europeans established their first trading posts on the Ganges: the Portuguese in 1537, the Dutch, English, and French about a century later, the Danes, Flemish, and Prussians in the mid-18th century. Not until 1951 did the last of the colonial powers, France, leave the river.

Mementos of colonial days remain: "*Liberté, Egalité, Fraternité,*" proclaim gateposts at Chandernagore. The octagonal church built by the Dutch at Chinsura serves as a classroom for Hooghly College students, and here and there lie Christian cemeteries, crammed with monuments and the small plaques that tersely tell of wives and children who came out to an alien land, only to perish.

AT BANDEL the faith planted by these Europeans lives on. A high wall rims a Roman Catholic church, a monastery, and a new seminary.

Father Leo J. Heriot, a tall, pale Australian in a white cassock, led me to the roof of the church to show me the image of Our Lady of Happy Voyage. "When the Mogul Emperor Shah Jahan, who built the Taj Mahal, destroyed the original Portuguese church here in 1632, this statue was saved by a merchant who leaped into the river with it. Both vanished. Later the image was found by some Hindus. When the new church was built, it was placed here. Now we have two pilgrimages a year in which the faithful come to venerate it. They love to light candles before it and to touch it."

India holds some 12 million Christians, Father Heriot told me, but he and his fellow priests make few conversions nowadays. "Our task," he said, "is to build for the future through education."

He led me to the new seminary building, with its bright dormitories, classrooms, and chapel, and out through the tree-shaded grounds. He pointed out a large cement cross standing above the Ganges. "The river changes its channel often. One year it swung in toward us, flooding the grounds. We feared that one day we would be swept away. So we made that cross and placed it there. We

haven't been troubled by the river since."

The Ganges led now to Calcutta, India's largest city, greatest commercial center, its intellectual and artistic capital. More than seven million people live there—75,000 to the square mile.

On my first visit to the city I had arrived with the goddess Durga, who comes each autumn, weapons in her ten hands (left), to slay Asura, demon of evil, and then be cast into the river by her worshipers.

In Calcutta she finds ample evils to attack. Scenes of poverty and overcrowding assail the senses: pressing crowds, streetcars with passengers clinging outside to windows and doors; sidewalk hydrants where naked children bathe; grand old houses carved into tenement warrens.

A patina of filth covers bamboo and tarpaulin lean-tos built against walls and buildings; shrouded, still forms of thousands sleep on sidewalks and stairways; old women sit motionless in dark alleys, frail arms holding begging cups; lepers and congenitally deformed, misshapen and mute, stand pleadingly beside cars stopped at traffic lights.

Visions of religious piety merge with those of political turmoil: The Kali Temple, where priests sacrifice goats, and toss the heads into a pile for the poor—donors retrieve the carcasses—while barren women tie stones to a spiny tree in quest of fruitfulness; the portraits of China's Mao Tse-tung with the inscription "Chairman Mao is our chairman" stenciled on walls in the night; strikers marching under red banners; and truckloads of armed constabulary.

Amid the hubbub stand the monuments to Calcutta's British past: The white marble Victoria Memorial, with its treasures of Anglo-Indian history; the broad Maidan, a breathing space in the city's center, created by a British officer who desired a clear field of fire from Fort William; the King George's and Kidderpore Docks, their cranes lifted like dark, crooked fingers against the apricot sky.

The city's problems begin with the river that built her. Job Charnock, an agent of the East India Company, founded the first English settlement here in 1690 to tap the wealth of the hinterland. He chose as the site the farthest point upstream to which oceangoing vessels could sail.

But in subsequent centuries the Ganges has shifted more and more into its eastern arm—the Padma—and the Bhagirathi and Hooghly have withered. Without the spring floods, silt collects in the harbor and its approaches, barring Calcutta to deep-draft ships part of the year. Brackish tidal waters inch northward, threatening the city's reservoir and its countless wells. Ten-foot bores, walls of surging tidal water, rush unchecked up the river and beyond the city.

Government officials and representatives of the Ford Foundation who assist them described other problems: the loss of markets and sources of jute and other raw materials when Bengal was partitioned in 1947 to create East Pakistan; the flood of refugees and villagers fleeing famine and crowded farmland; the difficulties created by labor unrest, and by India's limited financial resources.

Arthur Row, chief of the foundation's Advisory Planning Group in Calcutta, spoke hopefully of new government-aid programs and metropolitan agencies, of the new deep-water port of Haldia, 65 miles downstream, and of the opening of the Farakka Barrage. Built above the bifurcation into the Padma and Bhagirathi, it will capture Ganges water and channel it through a 26-mile canal to revitalize the Bhagirathi-Hooghly. "The chances for catching up with the city's problems are greater now than ever before; I am hopeful," Mr. Row said.

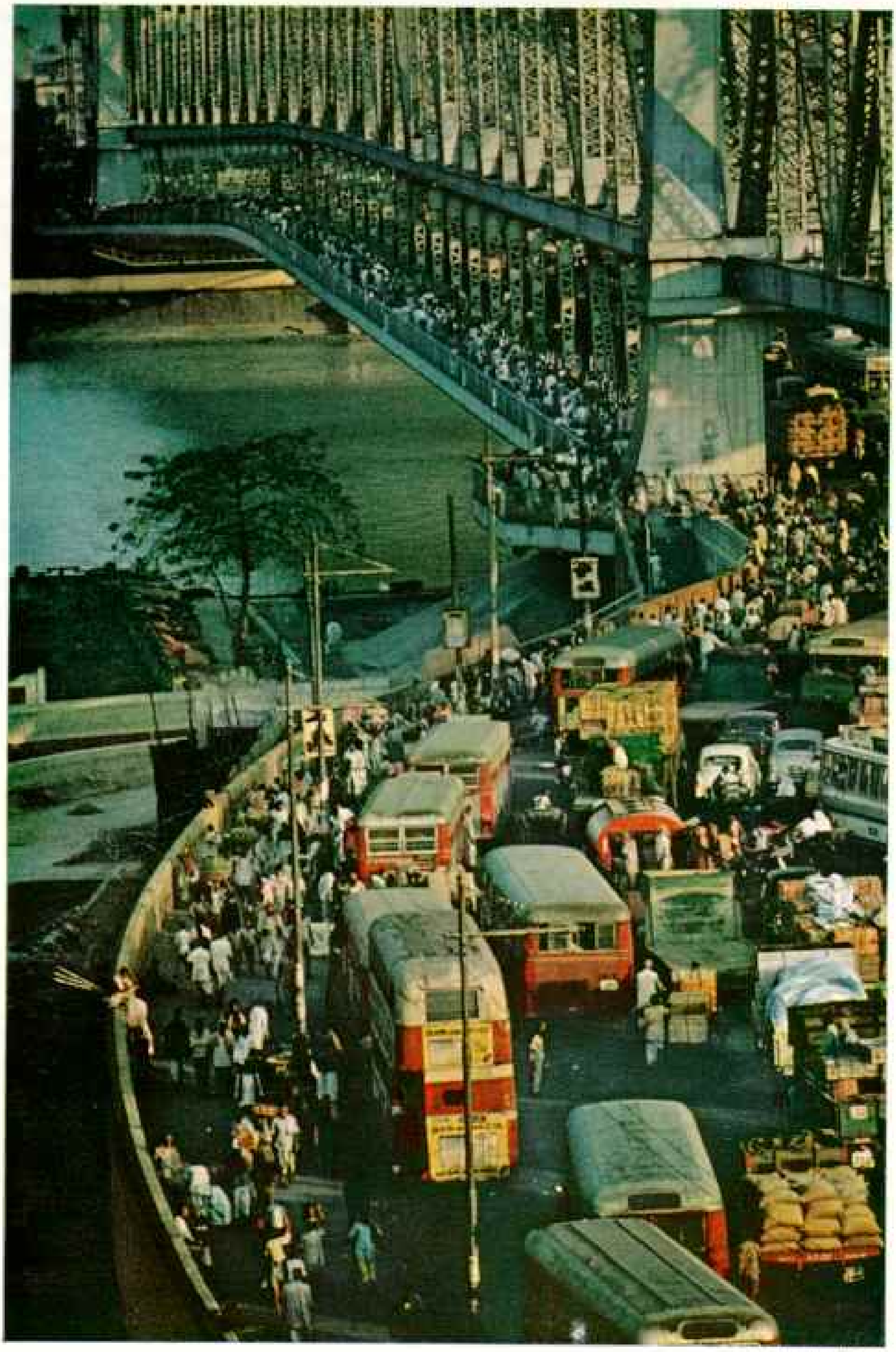
But something always seems to dash Calcutta's hopes. The tragic uprising in East Pakistan earlier this year sent millions more refugees into West Bengal and the Calcutta area, upsetting again the city's desperate efforts to achieve equilibrium.

DURING DURGA PUJA, the festival of the goddess Durga, Calcutta seeks to forget its problems. Grudges are put aside, families buy new clothes, exchange gifts, promenade, and meet old friends in the community pandals—temporary pavilions for shrines—that blossom throughout the city.

Each day priests come to the shrines with cymbals and clouds of incense to awaken the images of Durga within; they offer her food and precious silks, and in the evening lull her to sleep with the rhythmic swish of lion's-tail fans and soft chants:

To the goddess Durga, difficult of access,
and difficult of understanding
The destroyer of wickedness,
I render my salutation,
Buffeted as I am by the tumultuous
troubles of life.

I was welcomed everywhere, and received



Needle's eye in a city of more than seven million, Howrah Bridge funnels Calcutta traffic (**above**) across the Hooghly, a lesser outlet of the Ganges. Beneath the span, worshipers of the monkey god Hanuman, source of strength, exercise before work (**right**).

Once India's busiest port, Calcutta now ranks behind Bombay in tonnage. Sandbars clot its 80-mile channel to the sea, barring deep-draft ships most of the year. Worse, Calcutta feels the burden of East Pakistani refugees, who have fled by the millions into West Bengal and its already crowded capital city, bringing the threat of cholera.

many invitations to participate in the climactic ritual, the casting of the goddess into the river on the final night.

When that evening arrived, I drove north through the city to a neighborhood beside the Circular Canal, where mud-brick houses merge into a score of similar communities—the slums in which a third of Calcutta's people live.

Pools of dark water splotched the black-mud lane. Pigs rooted amid coconut husks and other garbage. Children swarmed; the infants, as everywhere in India, without diapers, and the young girls beautiful with wide eyes and little gilded studs in their noses.

At the end of the lane lay a courtyard with an ancient pipal tree, an altar to the smallpox goddess, and a community pandal.

"Welcome," said a young man with a small, thin moustache. He was T. R. Das, one of the leaders of the *sangha*, or neighborhood fraternity, organizing the pandal festivity.

Young men brought a chair from their clubhouse. One offered a cigarette; another left for a soft drink. "You must be patient," Mr. Das said. "We live in a slum area, you know, and we must walk far to buy even a Coke." He spoke English well. He had

attended technical school, but like most of the young men, he was now jobless.

But they had been determined to make this a memorable puja for the neighborhood. They had sold subscriptions far and wide; with the money they had bought an image and, at considerable cost, rented a screen and projector to show a Durga film which the community had yearned to see.

As darkness fell, the film began. Durga appeared on a lion and moved jerkily toward the demon Asura; Durga vanished, then reappeared as Kali, the goddess of death. From the third eye in her forehead she shot forth a trident-shaped beam. It struck the demon and severed his head amid much blood. The film ended. In a few moments it began again. We watched it over and over.

In time, the crowd grew restless. Mr. Das left now and then to confer with some of the young men. Finally, he rose. "I'm sorry, but we cannot go to the immersion tonight. The musicians and the lorry won't budge without their money, and we don't have it. The film took too much." As I left, the goddess Durga once again moved across the screen to destroy the demon of evil.

I crossed back over the little bridge and

Makeshift armada returns pilgrims from marshy Sagar Island, where Ganges and sea meet (**left**). Each January half a million Hindus gather on the island to worship and bathe at the river's final temple.

Seemingly oblivious to pain, an ascetic lies on a cactus bed (**above**) near Sagar's temple; his blanket catches pilgrims' offerings of coins and food. Other sadhus bury themselves neck deep in sand or pierce their tongues with spikes. Bhang, a narcotic derived from hemp, often blunts their suffering.

walked in the darkness along the canal. From nearby neighborhoods I could hear the roar of trucks, the beat of drums, and the cries of celebrants.

Suddenly two crowded trucks swung down the road. In one a great Durga image swayed and rocked against her lashings. In the other stood the lesser images of Lakshmi, Ganesha, Hanuman the monkey god, and Saraswati, goddess of wisdom.

The director of the group, a portly magistrate in a white dhoti, invited me aboard. The trucks toured the neighborhood and returned to the pandal, where most passengers got off. Only the magistrate, a few young men, and I would accompany the images on their journey to the river.

"Many do not come now," the magistrate said. "They are afraid." Rumors had swept the city that terrorists planned to disrupt the festival by throwing bombs.

We moved out into the long line of trucks inching down Rabindra Street. Crowds lined the sidewalks, fathers held up children to glimpse the images, women looked down from balconies and half-shuttered windows. The wham of firecrackers added to the bedlam of backfires and pounding drums.

On Strand Road North, the approach to Nimtala Ghat, the trucks pulled up two abreast. The riverfront was jammed.

After an hour our truck moved to the ghat. I went with the lesser images down the dark steps to the slender nauka hired to take us onto the river. Then the young men, with hired helpers, manned ropes fore and aft to move Durga down the steps. "Hurry! Hurry!" came the shouts from waiting trucks.

Durga slipped, her ten arms quivered, and the men below jumped aside. She did not topple. But when at last she stood on the muddy bank by the boat, the captain refused to take her aboard. "She is too heavy, she will sink us." Some of the young men would have to immerse the heavy clay-and-papier-mâché image from the bank.

Our boat slipped out into the dark river and we slid the images of Lakshmi, Ganesha, Hanuman, and Saraswati over the side. Other boats ghosted past: "Ganga Ma! Ganga Ma!" their occupants cried. Scores of images bobbed and drifted slowly downstream. Tomorrow, Calcutta would turn back to her problems.

ONE EVENING at dusk a village boat put me ashore on the south tip of Sagar Island, where the river meets the sea 80 miles below Calcutta (preceding pages). Along the beach a few fishermen set up their nets in the shallows. The little temple of Gangasagar, which draws thousands of pilgrims, seemed deserted; and then I heard the ringing of cymbals for the evening arti.

The three priests, all far from their homes, welcomed a visit. They marked my head with the tilak, gave me holy food, and told me again the story of the Ganges. It was here at Gangasagar, they said, that King Sagar had sought out the sage Kapila to ask him how to redeem the souls of his sons, and here that the king worshiped the river.

Early next morning I walked the beach alone. Along it lay fragments of pottery, brought down by the river and washed up by the tide, mementos of cookfires and puja lamps and granary pots. With the shattered crockery lay seashells from the Bay of Bengal. I picked up several and washed them free of sand in the river until they gleamed. Their conical shapes reminded me of the towers of the Hindu temples I had visited; their dusky purple-brown stripes seemed to mirror the very soil of the gentle and problem-wracked land through which I had journeyed.

I thought of those who had shared with me moments of life and death along the river: the swami, the widows, the maharaja, the fishermen, the slum dwellers. Above all, I thought of an infant I had seen on a Calcutta sidewalk. In her sleep she had rolled away from her mother and covers and lay naked and apart in the night.

What would be their future?

I took the finest of the seashells and hurled it far out into the mingling waters of the sea and the river. "Mother Ganges," I whispered, "take care of your Rose-apple-tree Island." Only the wind and the sea answered. □

As if tossed on a wave of worshipers, a boy gets a boost to view the Sagar Island shrine, periodically dismembered and rebuilt as erosion gnaws the beach. A good-luck cord girdles the lad's hips. Though too young to realize it, he has already begun a life of homage to the Ganges and to Hinduism, the pivots around which so many of India's varied people fashion their lives.

WILL OIL AND TUNDRA MIX?

ALASKA'S NORTH SLOPE HANGS IN THE BALANCE

By WILLIAM S. ELLIS

Photographs by EMORY KRISTOF

BOTH NATIONAL GEOGRAPHIC STAFF

FOR MORE THAN TWO MONTHS the demons of Arctic winter have been lavishing darkness on the land. Even now—a Wednesday stilled by the paralytic cold of mid-January—night has lingered into the morning, and once again, it seems, there will be no dawn.

Still, an Eskimo friend assures me that the sun will appear today for the first time since the past November. He has detected a thread of color on the horizon. He points, and I see it too: A wash of yellow starting to push up and spread out, until soon it hangs in the sky like the reflection of a buttercup under the chin of heaven.

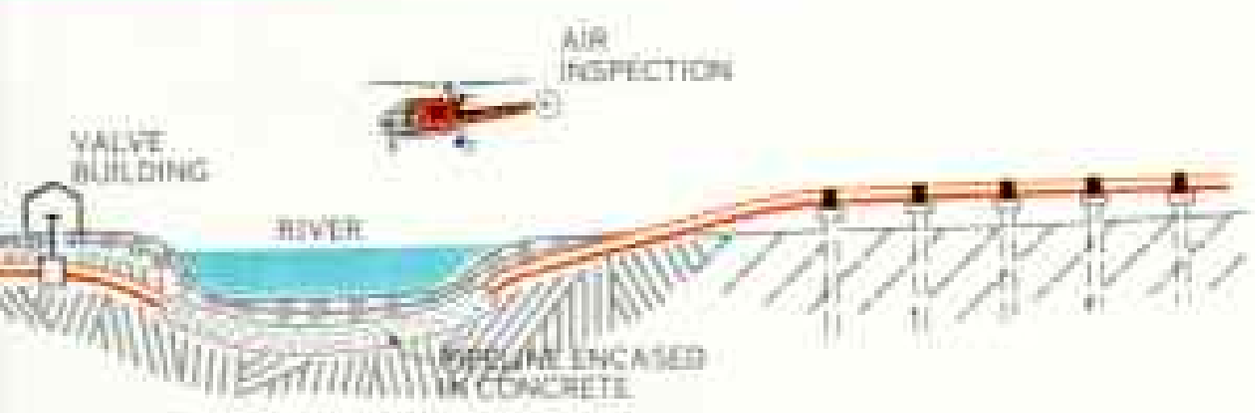
By noon the sun has climbed just above the horizon, where it remains for less than two hours —hardly time enough to work any miracles of

Goggled against icy wind, Peter Stern tracks caribou by snowmobile near his adopted home, Arctic Village, where he served as a VISTA volunteer. The discovery of oil, bringing a flood of men and equipment to Alaska's frozen wasteland, breeds concern for the last great wilderness in the United States.

Edmonton
ALBERTA
Existing pipeline carrying crude oil from Alberta to Canada and the United States
PROPOSED TRANS-CANADA PIPELINE
NORTHWEST TERRITORIES
Mackenzie River
YUKON TERRITORY
CANADA
ALASKA
Fairbanks
Barter Island
Kaktovik
Beaufort Sea
Prudhoe Bay
PROPOSED TRANS-ALASKA PIPELINE
North Slope
Brooks Range
Cape Simpson
Colville River
Point Barrow
Barrow
Naval Petroleum Reserve No. 4
Wainwright
Yukon River
Point Hope
ARCTIC CIRCLE
Nome
Chukchi Sea
Bering Strait
U.S.S.R.
St. Lawrence Island
Prudhoe Bay
Valdez
Proposed pipelines
Existing major crude-oil pipelines
CANADA
Edmonton
Seattle
Montreal
Ottawa
Portland
UNITED STATES
Chicago
New York
Washington
St. Louis
San Francisco
Los Angeles
New Orleans
Houston
STATUTE MILES

Across ice-rich permafrost the pipeline will ride above an insulating layer of gravel, below, or will be supported by deep-seated pilings, far right.

Fossil fuel for modern living, estimated at ten billion barrels, underlies Alaska's remote North Slope, which spreads between the Brooks Range and the Arctic Ocean. Oilmen propose an 800-mile pipeline to move the crude to the year-round port of Valdez (**map, above and left**). With oil waiting in their own Mackenzie Delta, Canadians suggest an alternate route via Edmonton.



Threading the tundra, either pipeline would carry crude still hot from the earth's depths (**diagram, above**). Friction and pumping would keep the heat at about 180° F. Tests have shown that the conduit, if buried in permafrost, would thaw the frozen ground; sagging, the line might break and spill tons of gummy liquid. Fault zones also pose the danger of breakage by earthquakes.

warmth. The temperature rises only two degrees (to 51 below zero); the coast is still a gallery of ice-heave sculpture; the brittle air is no less painful to breathe.

But in that brief period of soft light, when shadows tailgate prowling foxes across the tundra, the promise of spring is reborn in northern Alaska, on that vast and treeless plain called the North Slope.

Until recently the drama of sun and seasons played here only to a few thousand natives. Now, men and machines from the Lower Forty-Eight have moved into this largest of the Nation's wilderness areas to challenge an environment of extreme hostility.

The attraction is oil. Indeed, the proven reserves underlying the permafrost of Alaska's north equal about a third of the combined reserves of all our other oil-producing states. Guesses as to the extent of this mineral wealth have ranged as high as 100 billion barrels, but ten billion may come closer to the mark. Either way, this distant and deceptive land has emerged as the brightest jewel in the Arctic crown that rims the top of the world. (See the **Arctic Ocean,** a double map supplement distributed with this issue.)

Last Virgin Wilderness at Stake

For the most part, the oil activity centers around Prudhoe Bay, on the Beaufort Sea. This area, about 200 miles southeast of Barrow, where the crude lies at depths of nearly ten thousand feet, represents only a small patch on the North Slope expanse of 76,000 square miles. Over this immensity of tundra, the silence is sometimes broken by nothing louder than the fragile squeaks of lemmings.

Even at Prudhoe Bay, amid the industrial bustle, the awesome presence of the wilderness is felt. Thus a rawboned Texan with 20 years of experience in oil fields could gaze out over the frozen land and find the poet within himself. "When I look at those clouds pushing down low over all that ice," he told me, "I see a beautiful cathedral."

The Brooks Range, alone with its splendor and its varied wildlife, is quite possibly the last piece of the United States still contained within its membrane of wilderness birth. Vast herds of caribou migrate from there onto the North Slope. Foxes and wolves, grizzlies and moose, and Dall sheep—these also make their home in the range.

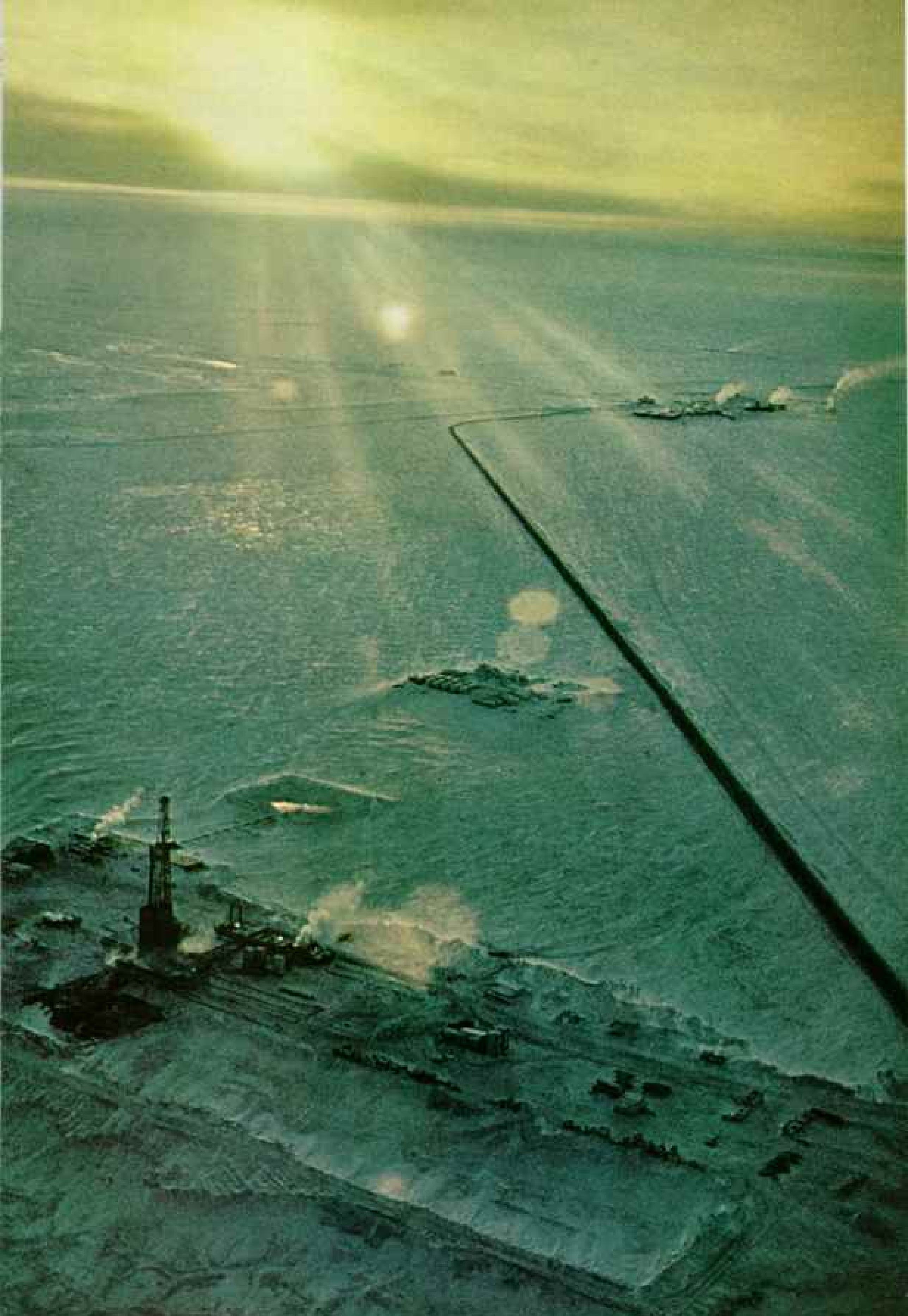
Since there is no year-round surface transportation to the North Slope, the usual way in is by air. Many times I have looked down

EXTRACURRICULARS (ABOVE) AND NOTEWORTHIES (C) N.G.S.

Outposts of tomorrow spring up on empty Arctic plains, noisily piercing the frozen silence of the north.

February's muted sun half-lights an oil rig near Prudhoe (**right**). The sun remains hidden from mid-November to mid-January. The rig drills five slanted holes to reach pools as far as two miles apart at depths of nearly 10,000 feet. Wells are capped to await the pipeline.

In temperatures that may dip to −70 degrees F., roustabouts work 12-hour shifts before retiring to comfortable living quarters (**top**). Recreation at the base camp, operated jointly by the Atlantic Richfield and Humble oil companies, includes films, cards, and pool (**above**). These amenities, plus high wages, help compensate for the long, dark winters, the cold, and the isolation.



on the peaks from a jet-sustained 25,000 feet, and at other times from the window of a single-engine plane weaving through one of the passes. I have seen the mountains locked in snow. I have seen them in summer, pressing down against rivers heavily freighted with char and whitefish and grayling.

But best of all I have seen spring come to the Brooks Range as it comes to few other places in the world, a spring that double-times its way through the valleys to a drum roll of cracking ice.

Because of widespread sentiment to protect the Brooks Range and the North Slope against man-inflicted damage, sides have been drawn for a highly charged confrontation over an environmental issue. Prospectors find they are striking oil and ecologists in almost equal concentrations. Focal point of the controversy is a proposed pipeline to move the oil from Prudhoe Bay to the ice-free port of Valdez, on Prince William Sound on the south side of Alaska.

Following the first major find at Prudhoe Bay in 1968, in a layer of sandstone some 220 million years old, application was made to the Department of the Interior for a permit to construct a pipeline system largely across public lands. Lawsuits brought by native and environmental groups, followed by injunctions, have delayed granting of the permit. Meanwhile, increasing opposition to the pipeline has arisen across the Nation.

The 48-inch pipeline (nowhere on this continent is there a line this large for the transportation of crude) would run for 800 miles across the tundra and through the Brooks Range (maps, pages 486-7). Some segments of the line would be buried, others elevated. It would cross 350 streams and rivers. Its construction would require thousands of workers, fleets of heavy machinery, and massive quantities of materials. For example, gravel for the pipeline bed and a nearby road would total perhaps as much as 80 million cubic yards, enough to cover a football field to a depth of seven miles.

The latest estimated cost of two billion dollars would set a new record for a privately financed oil-line project.

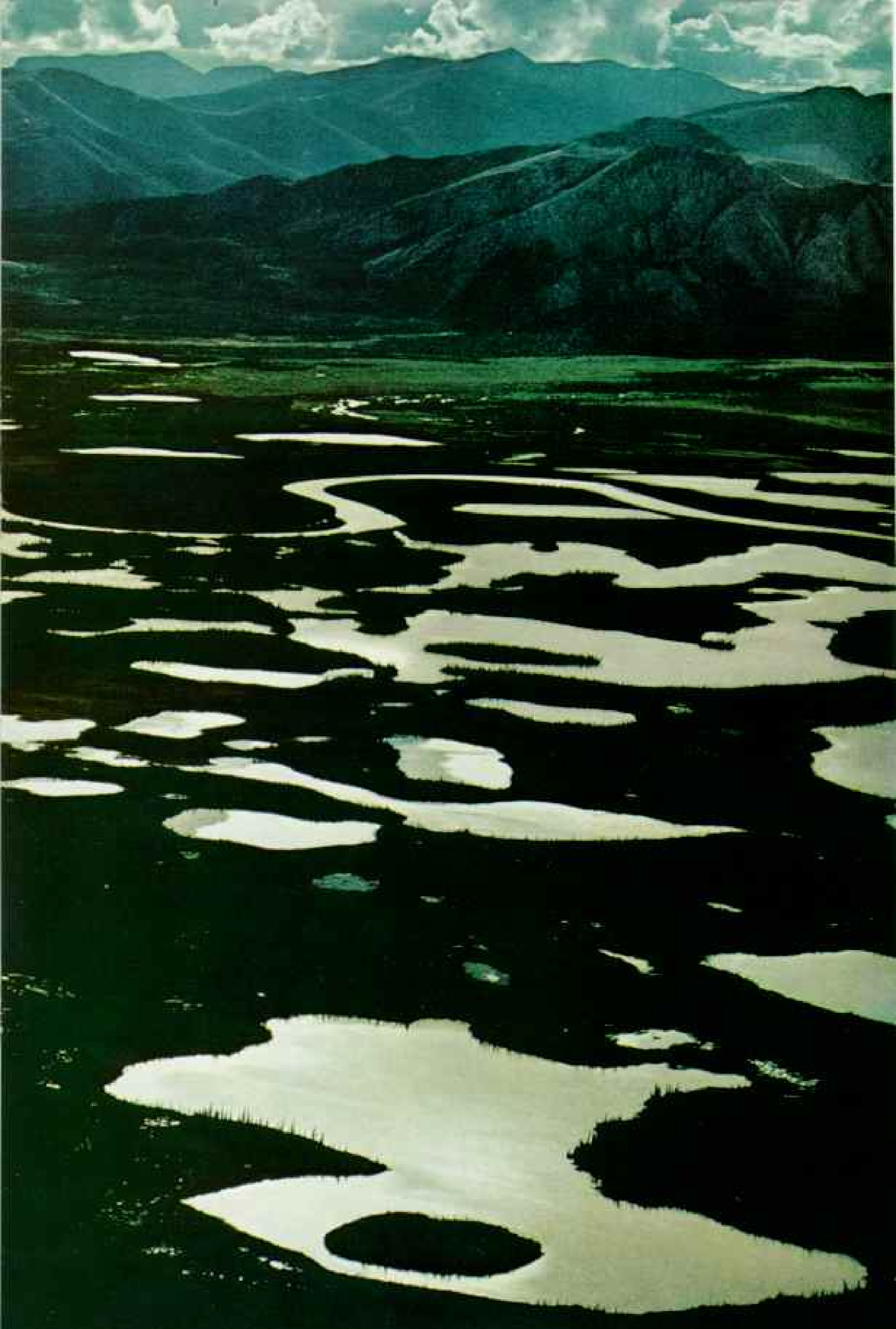
Many Questions Remain Unanswered

Opposition to the pipeline embraces a wide variety of concerns. Will it alter the migration patterns of the hundreds of thousands of caribou? Since the line will cross several fault zones, can it be made to withstand earthquakes? How much oil is likely to escape into Prince William Sound, where it will be loaded onto tankers, and into other Pacific harbors, where it will be unloaded?

Also disturbing is the fear of a break in the line, each mile of which would be carrying nearly half a million gallons of crude. "If the worst came to pass—several million gallons spilled, say—it could pretty well destroy the

Like shattered glass, lakes pock the tundra in summer near the meandering East Fork Chandalar River. Permafrost keeps melted snow from soaking deep. The rugged Brooks Range towers over virgin lands described by hiker John Milton, who wrote *Nameless Valleys, Shining Mountains,* as "... nature at its untamed, uncivilized best."

Over summer's carpet of lush tundra lope a moose calf and its watchful mother. Amid winter snows, many of the animals die of starvation each year. In addition to such natural threats, North Slope wildlife may feel increasing pressure from man as new airstrips and roads come to the region.



fish and wildlife in the region that captured the oil," said James Brooks, a research biologist in Anchorage. "With a large enough spill on the North Slope, the crude might make its way to the Beaufort Sea and form an oil film all the way to Point Barrow."

Brooks does not say that the pipeline should not be built; rather, like many others, he feels the work should not start until the maximum number of safeguards are incorporated into the plan. Dr. Robert B. Weeden of the University of Alaska, a wildlife biologist and a leading spokesman for conservation causes in Alaska, also hopes that the delay caused by the lawsuits will result in additional study and research.

"If and when the pipeline is built," Dr. Weeden said, "it will be built better and with a lot more safety factors because of the delay in issuing a permit."

Oil-company officials with whom I spoke voiced a similar attitude. Said one, "I have no quarrel with this deep concern for the environment. I'm rather pleased with it."

At first, however, as the state took fire with the excitement of garnering the North Slope's riches, profit was the overriding consideration. Burdened with a history of financial woes, Alaska suddenly had 900 million dollars in the bank, proceeds from the sale of oil and gas leases on the North Slope. And there was a promise of much more to come—royalties the state would collect once production started; thousands of new jobs; the proliferation of boom-time service industries.

Oil Fields Depend on Airborne Fleets

By 1969 the skies were heavy with planes and helicopters heading north from Fairbanks and Anchorage. The largest civilian cargo operation in aviation history was underway. During that year, the number of daily takeoffs and landings at the North Slope averaged 1,000. To transport just one drilling outfit, a Hercules aircraft—capable of carrying a 30,000-pound payload—had to make 72 round trips between Fairbanks and Prudhoe.

Not surprisingly, there were crashes; flying conditions on the North Slope can be hazardous. For one thing, there is that harsh conspiracy of snow-covered land and overcast skies known as the whiteout, when the horizon disappears, and with it, all natural sense of direction. Even under normal

conditions, pilots seldom enjoy long-range visibility in the Prudhoe area.

But there was little room for slack in the production schedule. More and more wells were being brought in and capped. Sections of the 48-inch pipeline were arriving from Japan and being barged up to Prudhoe Bay from Washington State.

"This is the largest commercial barge movement undertaken since World War II," said an official of Arctic Marine Freighters, a company formed specifically to move materials to the North Slope. "Just this summer we've brought up 187,000 tons of equipment, some of it all the way from Houston."

That was in late August 1970. As I walked with the official around the dock area, I could sense the urgency in all the activity about us. Soon—by mid-September, certainly—the ice would be moving in again; any barge still off the slope in early October would be trapped for the winter.

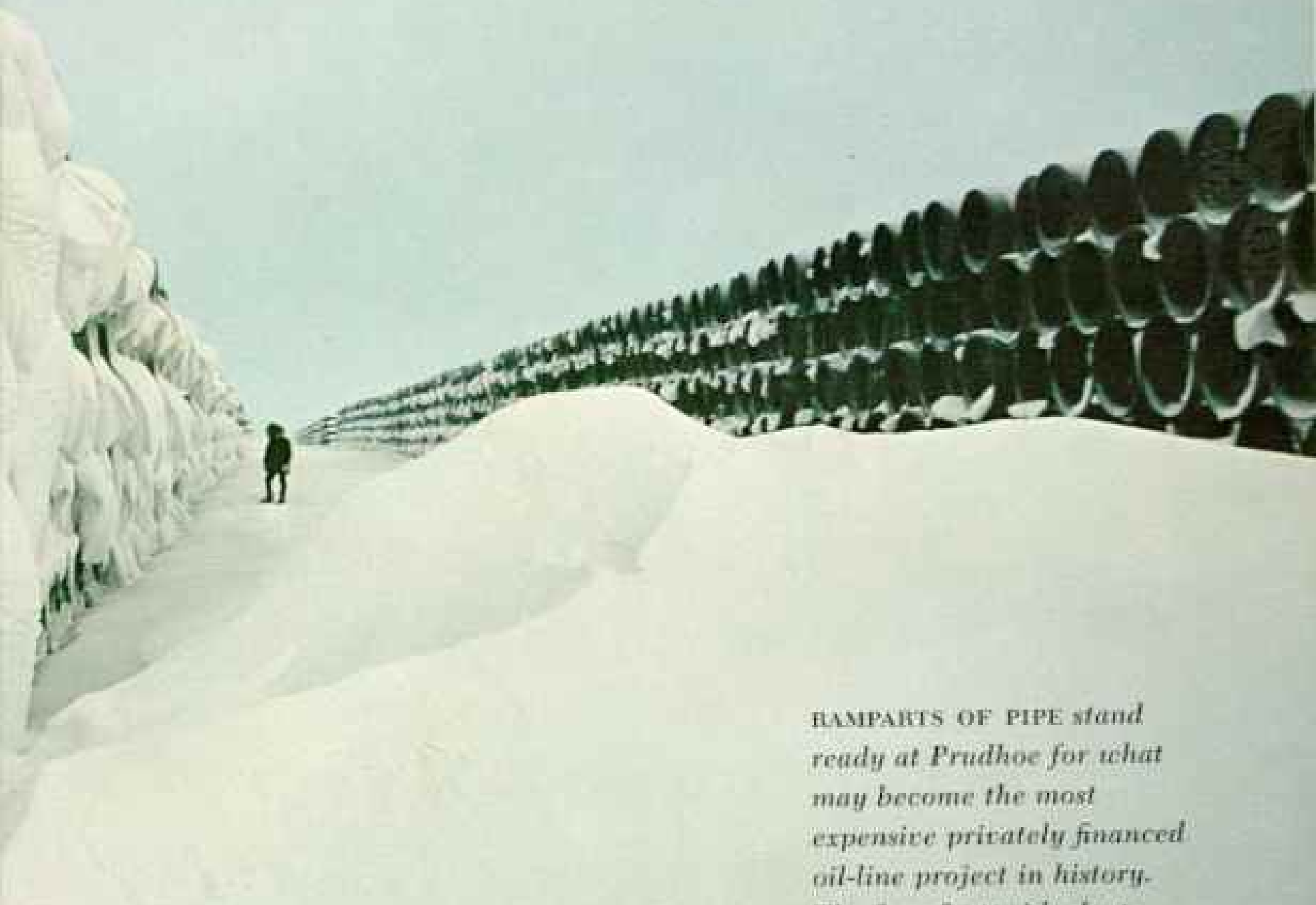
During the brief summer the ice breaks with the roar of cannons and, as it shifts, lanes open up in the sea. Only then are waves free to lap at the tundra on a shoreline strung

(Continued on page 499)

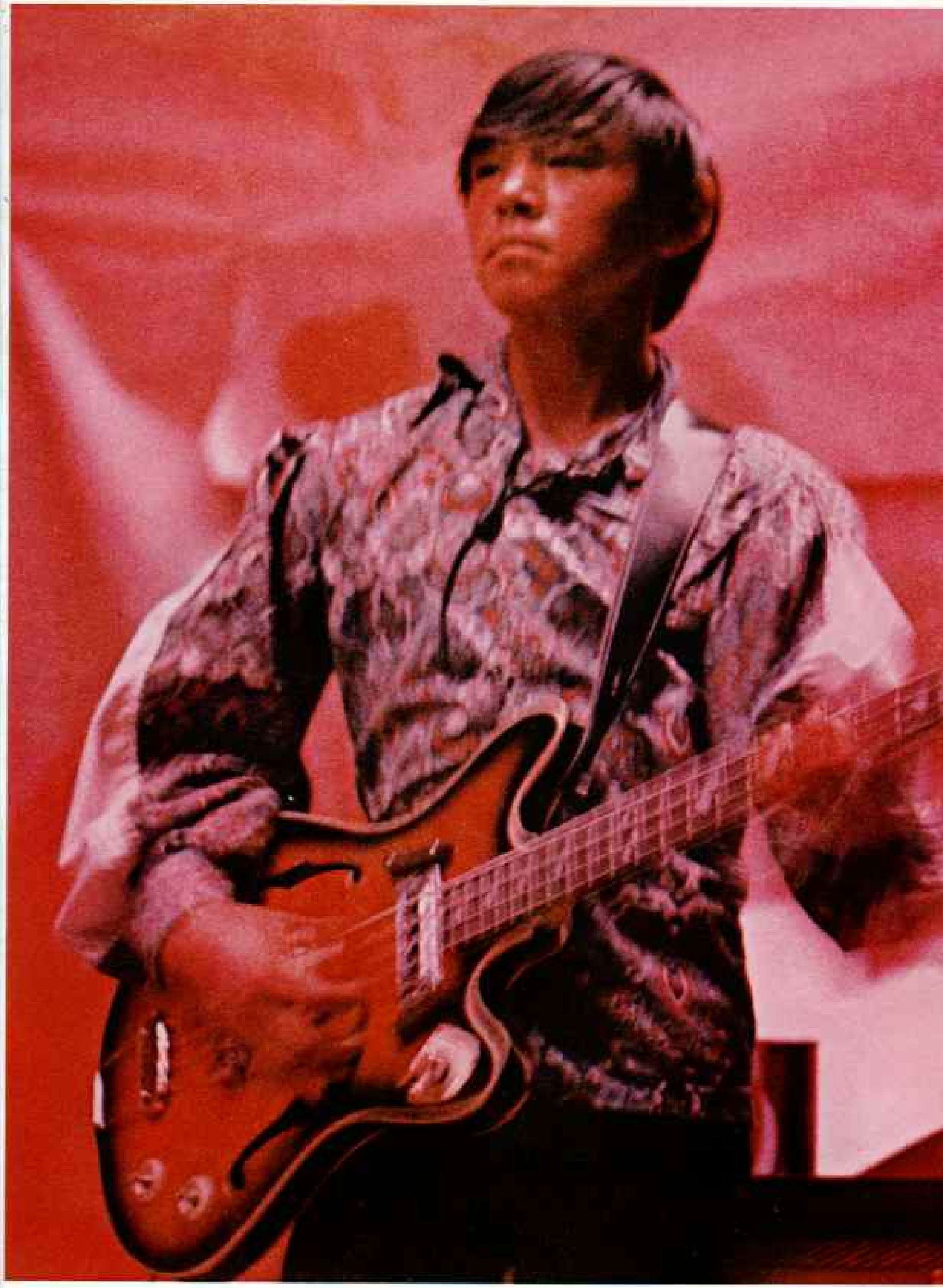
Scouting by telescope from Arctic Village, an Athapascan Indian looks for caribou. The Alaska Federation of Natives was formed to protect the claims of the state's 53,000 Eskimos, Indians, and Aleuts to the land on which they depend.

In last winter's threadbare coats, caribou thunder past an oil camp. The Arctic tundra supports nearly half a million of these migratory deer, a mainstay of the native diet.

PHOTOGRAPHS BY CHERY KNIGHT (ABOVE) AND ARTHUR ROTHER © N.G.S.



RAMPARTS OF PIPE *stand ready at Prudhoe for what may become the most expensive privately financed oil-line project in history. The four-foot-wide ducts piled up when native claims and environmental concern stalled a permit for building the pipeline over public lands.*



Bingo eases the monotony of the long Arctic night at Barter Island off the northern coast. An Eskimo and his wife gather with other employees at a Distant Early Warning Line station.

New rhythms throb in the Arctic: An Eskimo teen-ager plays rock guitar for a Valentine's Day school dance at Barrow. To a people barely removed from a hunt-and-eat existence, new ways have come with bewildering speed. The young, who can complete their education only by leaving the villages, return to find themselves in a no-man's-land between two cultures.

A scratch becomes a gash on the North Slope's fragile face. A bulldozer operator in the early 1960's scraped the initials of an oil exploration firm in 200-foot-high letters above an arrow pointing to a fuel cache (**upper**). Exposed to the sun, permafrost beneath the tundra thawed, creating a jagged ditch that has eroded to a depth of eight feet (**lower**). The company responsible is reseeding the entire area in an effort to restore the tundra.

with sandbars and lagoons of brackish water.

The bays are all shallow—1½ to 9 feet in the case of Prudhoe—and nowhere along the coast is there a deepwater port. So it was that the tanker-icebreaker S.S. *Manhattan*, having completed her epic voyage through the Northwest Passage in September 1969, had to drop anchor about 20 miles offshore from Prudhoe Bay.* The symbolic barrel of oil taken aboard was flown out by helicopter.

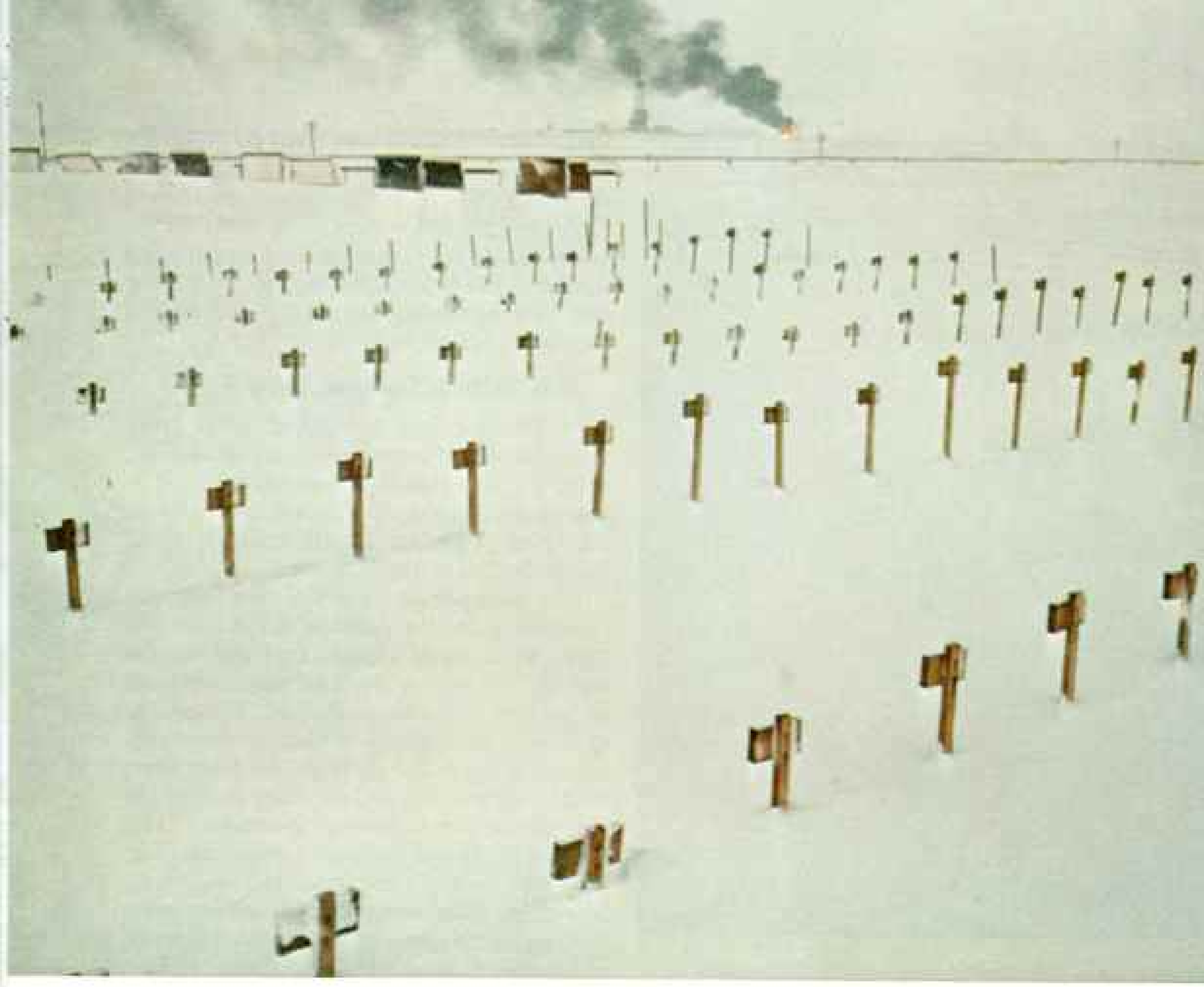
Slanted Holes Cut Cost, Guard Tundra

At Prudhoe Bay I watched a rig being moved into position on a gravel pad to begin drilling a well that would be brought in at a cost of $1,500,000. "We'll drill five wells on this pad. Together they'll produce about 50,000 barrels a day."

Tom Brennan, a congenial cigar-smoking spokesman for the Atlantic Richfield Company, went on to explain that the rig was mounted on rails to allow for easy movement to the next well site on the pad. Though the drill holes are little more than 100 feet apart on the surface, the distance between them widens to as much as two miles by the time the oil-bearing sandstone is reached. This method of slanted drilling serves a dual function. The surface work area is reduced, thereby cutting down on the cost of road construction; equally important, less tundra is exposed to possible damage.

Tundra is an undulating plain usually covered with grass, lichen, sedge, and moss. Below this thin layer of vegetation lies permafrost—rock or soil whose temperature remains below freezing. In some areas the permafrost has a high ice content; in others there may be no water at all. Underlying 20 percent of the world's land, permafrost in some places extends only a short distance below the surface. But on the North Slope it reaches depths of 2,000 feet.

*Bern Keating described that epic voyage in "North for Oil," National Geographic, March 1970.



In search of harmony with a hostile environment, researchers study the North Slope's uniquely adapted plants and animals. Ranked like cemetery crosses, placards at Prudhoe (**above**) mark experimental plots of grasses that may help heal the land's man-made scars. Native tundra grasses grow slowly, so researchers seek fast-growing strains from other Arctic regions to stitch wounds cut by heavy machinery.

Living fur collar, a tranquilized wolf (**left**) rides to tests at the U. S. Navy's Arctic Research Laboratory in Barrow. How the animal's bare footpads resist freezing on Arctic ice puzzles scientists. Studies of wildlife survival secrets, they hope, may aid man in his own struggle against the cold.

Field testing a "hot line," Canadian scientists run heated crude through 2,000 feet of pipe set above and below ground near Inuvik in the Northwest Territories (**right**). Even when wrapped in insulation, buried pipe can turn frozen subsoil into muck.

When summer comes to the Arctic, the sun warms the tundra until it thaws and becomes spongy muck, held together only by its covering of vegetation. When a bulldozer, say, removes the covering, the sun's warmth can penetrate to the permafrost. Then, like a black, watery cancer chewing through the earth, the damage spreads. As the ice melts, a scratch widens into a ditch, a ditch into an ugly, oozing trench.

In the early days of oil exploration on the North Slope, seemingly minor injuries to the tundra were ignored until they developed into large and permanent scars. Thus a channel ten feet wide and six feet deep may have started as a shallow, narrow ditch—but a ditch deep and wide enough to have destroyed the tundra and allowed the sun to go to work on the ice crystals of the permafrost. In the beginning, too, roads on the slope were made out of bulldozed tundra. Again, the delicate Arctic earth came apart.

These were among the early mistakes made (and acknowledged) by the oil companies. Another and possibly greater one has been avoided. As originally planned, all but 50 miles of the pipeline were to be buried in the ground. The crude that would run through it comes up hot from the depths of the earth, and friction and pumping keep it hot. That heat would thaw the supporting permafrost until there was nothing to prevent the steel tube from sagging and breaking. The Department of the Interior recognized the problem and has recommended that 400 miles, about half of the line, be elevated or otherwise kept out of the permafrost.

A study of the strange properties of permafrost has indicated that the proposed Prudhoe-Valdez pipe, carrying oil at temperatures up to 180° F., within a few years would thaw a cylinder of soil 20 to 30 feet in diameter.

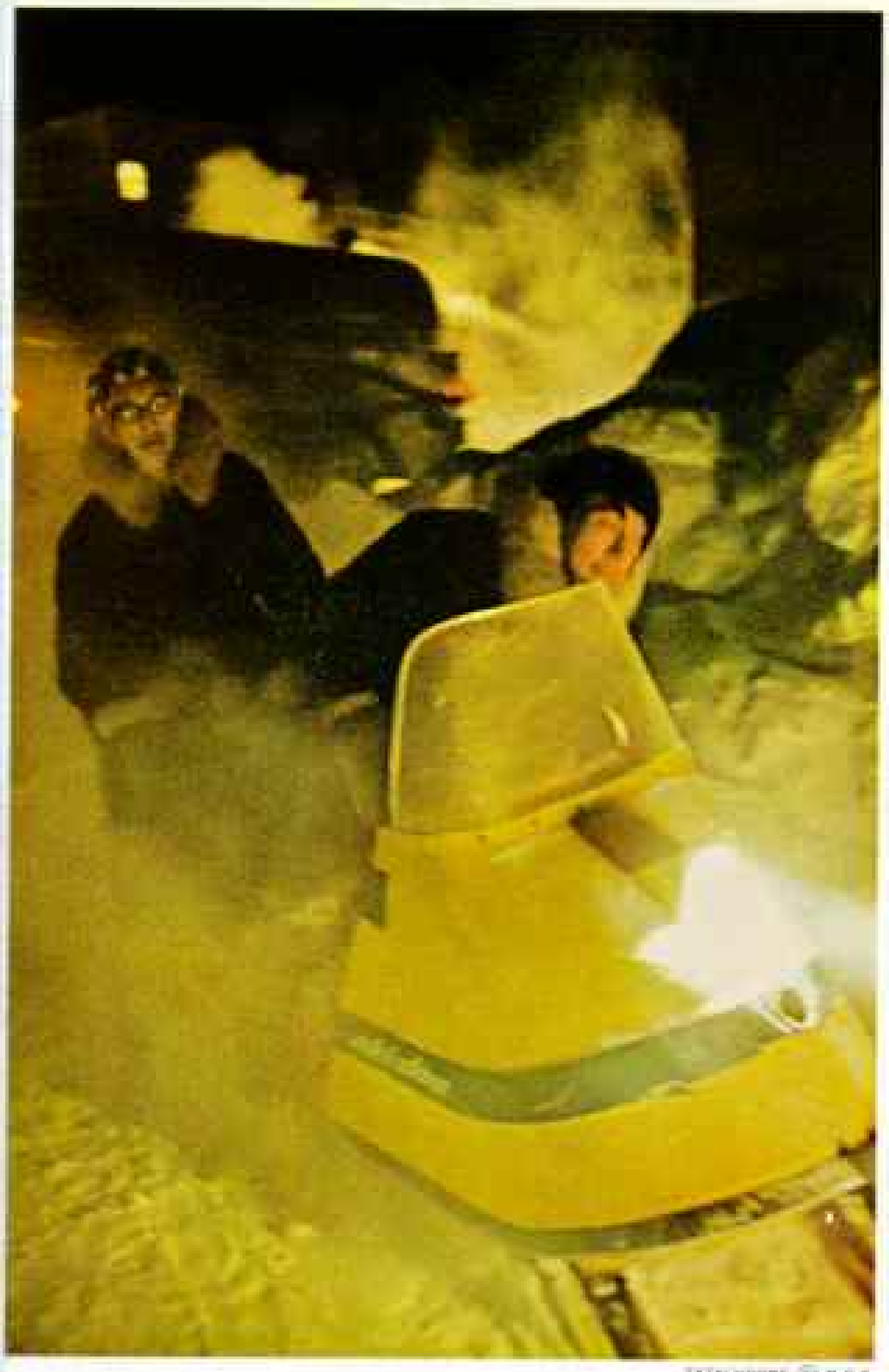
Another Pipe Dream—in Canada

A test involving 48-inch pipe is being conducted outside the town of Inuvik, in Canada's Northwest Territories (below). There, Mackenzie Valley Pipe Line Research Limited, a consortium of 16 oil companies, carries out a study of the technical and economic feasibility of running a line from Prudhoe Bay into Canada, then up the Mackenzie River Valley, and on to Edmonton, Alberta (maps, pages 486-7). There it would connect with existing lines on both sides of the border.

Such a pipe would span 1,700 miles and cost three to four billion dollars, an amount that fails to gain much favor with the companies engaged in the Prudhoe Bay exploration. However, as opposition to the all-Alaska line gains strength, the Mackenzie Valley route emerges as a possible alternate.

Canadian concern about the Prudhoe Bay-Valdez route centers on fear of an oil spill off the coast of British Columbia as the tankers move south to the refinery at Cherry Point, 85 miles north of Seattle. But, of course, Canada's interest in a pipeline through her own territory is closely tied to the continuing search for oil in the Mackenzie Delta. Thus, a Prudhoe Bay-Edmonton line could pick up the delta oil along the way.

The petroleum reserves in the Mackenzie Delta are believed to be on the grand scale also—twenty billion barrels is a figure often mentioned—but so far the search has produced a series of dry holes and two discovery wells. However, some government and oil company officials there are convinced that the big strike will come, not only in the delta, but also in the islands of the high Arctic, where large deposits of natural gas have already been found.



Night matinee: Darkness reigns at 3 on a December afternoon as an Eskimo couple heads home following a movie on Barter Island. Modern technology has replaced most dogsleds with snowmobiles—and brought plastic curlers to the hair of this woman.

Companies Launch a Cleanup Campaign

Returning to the North Slope this past winter, I found the oil companies embarked on a concerted campaign to treat the land as kindly as possible while going ahead with their exploration. Experimental reseeding of tundra grasses had healed some of the scars left by the early mistakes. Cleanup crews were forever on the prowl, and I rarely saw so much as a chewing-gum wrapper on the ground.

"We made some mistakes up here in the past, but I guarantee you we're as ecology-minded as anyone else right now," said a high-ranking official of an oil company with an extensive (and expensive) stake in the North Slope. "It's costing millions of dollars to keep the place tidy."

Because of uncertainty about the pipeline, activity on the slope has tapered off. The total work force there now numbers fewer than 300, as compared to about 5,000 a couple of years ago. But what hasn't changed are the ways of working—wrestling the whirling, driving, clanking, muddy, steam-belching tools of the oilman in weather cold enough to freeze antifreeze.

On my first winter flight to Prudhoe Bay I sat next to Charles Wark, lease superintendent for BP Alaska Inc. Stocky, tuba-voiced, and with a festival of muscles playing on his arms, Wark has been an oil worker for 23 years, most of them in the Canadian Arctic.

"The coldest I've experienced on the North Slope was 68 below zero," he said. "But, you know, the weather up here is like hanging—you get used to it."

Ah, well, my parka was fat with down, and my feet were swaddled in socks and boot liners enough to anchor me to the ground like a beanbag ashtray. When the plane landed, I managed to walk off—right into the face of a wind that drove the temperature on the North Slope that day to 62 below zero. The wind punished my eyes until they wept, and when I blinked to clear them, the lashes held fast, frozen together.

"Walk backward!" someone yelled. "Walk with your back toward the wind!"

From that moment, when I turned, I think I walked backward for two consecutive days. If the Arctic teaches anything, it's how to move in reverse, stepping boldly backward while watching where you've been.

Workers on the North Slope are well paid. And well fed; for when the temperature falls, appetites soar. At the joint base camp of the Atlantic Richfield and Humble oil companies I joined a group of workers for lunch in the spacious dining hall. The line moved slowly past the steam tables as men pondered the many choices: three meats and twice as many vegetables; potatoes and salads and soup; and a range of desserts from cream pies to chilled fresh grapes.

There are numerous tales of legendary eating bouts on the North Slope, but it wasn't until I met Fred Walsh, a cook who has worked in the Arctic since 1964, that I heard about the six-steak man. "Yes," Fred said, "there was this fellow who put away six steaks and a whole leg of lamb at one sitting. Of course it wasn't a very large leg."

It Takes 27 Times Longer in the Arctic

Because of the severe weather conditions, workers on the slope operate at greatly reduced efficiency. Bill Lines of Anchorage, an instructor in Arctic survival, recalled that an oil worker once spent 4½ hours changing a part on a water pump. "The part was held by just eight bolts," he said, "and normally, at most any place but in the Arctic, the job could be done in ten minutes."

Dr. Gerald Hogan explained that one of the reasons it's so difficult to work at Prudhoe Bay is the high energy requirement. "When you're inhaling air that has a temperature of 40 degrees below zero, and exhaling it at 98 degrees above, the body has to generate an awful lot of heat," he said.

As might be expected, the common cold accounts for most of the ailments among the workers. A more dangerous threat is frostbite, which occurs when the wind and cold attack an exposed place on the body, causing it to lose all feeling and color.

"Frostbite is sneaky," Dr. Hogan said. "We encourage the workers to look at each other when outside and try to detect signs of frostbite, such as a white spot on the face."

From the window of his base-camp office, Dr. Hogan can look out on many miles of frozen desert. And that is what he does when there is no one to treat in the modern, well-equipped clinic.

He is enthralled with what he sees:

- A large and handsome Arctic fox, its winter coat fluffy and white, with an ear seemingly cocked to the tundra. Then its paws are scratching at the thin snow cover, and before long it uncovers a meal—a lemming, probably.
- A sky festooned with the magnificent streamers of light called the aurora borealis.
- A morning so clear and still that it seems

Frozen dinners draw an Eskimo wife to a store at Barrow, where the outside temperature is −31. A covered hole in the permafrost near her kitchen will preserve the perishables. Transportation costs make Far North food prices among the highest in the U. S.

Open-air deep freeze tempts a tethered watchdog, stretching toward caribou carcasses destined for family kitchens in Barrow. In summer, salted meat dries on roofs. The 55-gallon fuel drums, which still litter the tundra, remain from oil explorations of the 1940's.

Northernmost community in the United States, Barrow's 2,100 people live at the edge of the Chukchi Sea —still ice-dotted in August. Government jobs, such as those offered by two schools, a hospital, and the Arctic Research Lab, provide opportunities for some of the 600 available workers. Seasonal occupations like fishing absorb others. But in the slack winter months unemployment soars to 80 percent.

possible to eavesdrop on Greenland, followed by an afternoon when a 50-mile-an-hour wind combines with −20° cold to create the effect of 85 below and propels snow crystals with such force that they penetrate the seams of a worker's parka.

Most of the oilmen are housed in temporary quarters at rig sites. Others return to the base camp at the end of each 12-hour shift. Awaiting them there, in addition to food, are pool tables and a library, a card room, and a different film each night. There are fresh linens on every bed, and a carpeted floor to drop their boots on (page 488).

Opened in July 1970, at a cost of 12 million dollars, the camp complex is in effect one of the finest hotels in Alaska. It represents a remarkable construction achievement in the Arctic. Everything is here, from a laundry to a secondary sewage-treatment plant.

Incredible Contrasts Mark Oil-camp Life

The walls of the camp's connected module units stand like partitions between two worlds, one of creature comforts and the other of raw, unbridled nature. Where else, I wonder, can men listen and watch as stereophonic film music heralds the arrival of the cavalry, and then step outside to find some 2,000 caribou—cows, calves, bulls, and yearlings—ambling past? Or to overhear a roustabout, pausing between shots in a game of pool, tell about the gymnastic grizzly bear he saw one day bouncing up and down on one of the huge rubber bags used for fuel storage near Prudhoe Bay?

Where else does a flood of light and warmth shut out a crackling cold night, but not the sadness of knowing that somewhere out there on the endless tundra a man is lost?

His name is Nat Olemaun. Traveling by snowmobile, he set out from his home in Barrow one December day. His destination was his hunting camp, about 50 miles south of the town. When he failed to arrive on schedule, a search was started. At the end of 13 days, ground and air parties had covered 11,600 square miles in a fruitless effort to find the 54-year-old Eskimo.

Then his snowmobile was found and the search was reopened. "I still think he's alive," one of his friends told me in Barrow. "Don't forget, he's a hunter!"

Barrow, the largest settlement on the North Slope and the largest Eskimo settlement in Alaska (left), is seldom free from the sorrow of losing one of its own through

accidental death. Even as the search for Nat continued, word came that a plane piloted by a Barrow bush pilot had crashed. Happily, the plane was found next day, the pilot and his two passengers uninjured.

Nat Olemaun would be found, too. But, unhappily, not alive.

"Oh, there's been so many, so many," said Mrs. Sadie Neakok as she refilled my cup with coffee. "Some carried away by the ice, and others, like Nat, frozen to death."

I called on Sadie whenever I visited Barrow during my travels on the North Slope. As the state magistrate, and also as a very wise and gentle woman, she has a deep concern for the well-being of the 2,100 townspeople, of whom all but a couple of hundred are, like herself, Eskimos. They come to her for advice, and from morning to evening her modest house is overrun with friends. Her telephone rings frequently, but it's not likely she'll receive another call as exciting as the one that came a couple of years ago.

"When I answered the telephone that day, I was told to stand by for a very important call to follow," she said. "The next time the phone rang, I answered it and the man on the other end identified himself as the President. The President of the United States."

So there she was, Sadie Neakok, just back from stringing some caribou meat on a drying rack, telling President Nixon that, yes, she would be proud to serve on a special Presidential commission on health.

"For about a week I couldn't get down to earth," she said, laughing. "Imagine talking to the President of the United States on the phone here in Barrow. Well, he asked me to come to Washington, so I got out my mail-order catalog and ordered the best woman's suit they had. But you know, it wasn't delivered until five months later, so I arrived in Washington wearing my parka."

1886 Discovery Hinted at the Future

About 50 of the Eskimos who live in Barrow work at Prudhoe Bay. But the smell of oil is nothing new to them. A piece of the North Slope almost as large as the State of Virginia was set aside in 1923 as Naval Petroleum Reserve No. 4, or simply "Pet 4." Embracing Barrow and half of the North Slope, the reserve extends 230 miles inland from the Arctic Ocean.

During the 1940's, when oil shortages threatened to hinder the war effort, the government started punching holes in the permafrost of Pet 4, but no significant development resulted. The work stopped, and most of the 180,000 oil drums brought in were left scattered across the tundra. More of the 55-gallon drums were abandoned in the late 1950's during construction of the Distant Early Warning Line in the Arctic, and they remain spread over portions of the North Slope like some ugly pox.

Nor was Pet 4 the first introduction of oil to Eskimos in Alaska. Charles Brower, Sadie's father, found oil on the North Slope as long ago as 1886. In his book *Fifty Years Below Zero* Brower writes about the summer of that year when he and a friend were at Cape Simpson, about 50 miles southeast of Barrow. "Pat and I took our guns and headed

Cold, the Eskimo's age-old adversary, claims a victim at Barrow. This ragged line of mourners turns out for the burial of a girl who froze to death. Eskimos have battled the slope's vicious

inland towards a distant hill. . . . No sooner had we reached the top of the rise than a small lake spread out before us, its water curiously dark and ranging from a liquid center to an asphalt-like substance around the edge. 'Oil,' I guessed.

"Pat disagreed. He'd never heard of such a thing. Nor had I. A match touched to the 'asphalt' convinced us both. It burned with intense heat and lots of greasy smoke."

Before natural gas was piped into Barrow from Pet 4, some of the Eskimos would travel to Cape Simpson and gather pieces of frozen oil seep for use as fuel. Sadie Neakok did that many times.

"We would cut the frozen seep into chunks by using a blade heated until it was red hot," she told me. "That was hard work, but it kept us warm. There were other days when we had nothing to burn. It would be 50 below and not a bit of fuel in the community. All we could do was put on as many clothes as possible and gather in a shelter."

Understandably, the availability of natural gas in Barrow since 1965 has had a major impact on the lives of the people. Wrenching poverty remains widespread in the town, but the houses are warm, and in the Arctic few things are more important than that.

One afternoon I accompanied Mrs. Ruth Ward, a State Itinerant Public Health nurse, as she made her rounds in Barrow. Our first stop was at a squalid one-room dwelling in which a woman, her husband, and seven children lived.

The woman sat in the middle of the floor, knitting. Her back was close to a heater fired by natural gas. Of the three large bunk beds in the room, one was claimed by a fat black Labrador who looked as if he had no intention of stirring before spring. But the children were scurrying around, and one of them stopped long enough to tell me that if I could kiss my elbow I'd turn into a girl.

Ruth bent down and, with her lips close to the woman's ear, said, "Janice, I want you to come to the hospital tomorrow to have an X ray. Janice, can you understand what I'm saying? Janice?" The mother (Janice is not her real name) smiled in agreement, but said nothing and kept knitting.

Water Waits Outside—in a Pile

Janice is one of the hundreds of Eskimos in Barrow who have arrested cases of tuberculosis and must have periodic chest X rays. She is also mentally ill, but in Barrow only limited treatment is available.

Leaving the house, I noticed blocks of ice stacked outside, near the door. Chopped from one of the nearby ponds, the ice was a source of fresh water, to be brought in and melted as needed. Also near the door was a covered hole in the permafrost—the icebox.

To Janice, the natural gas that fills her home with heat each winter is a luxury, perhaps the only luxury she knows. Born in Barrow about 40 years ago, she has lived there all her life—with never a tree to see or a lilac to smell. In grammar school (there is no high school in Barrow) she tried to comprehend the "Dick-and-Jane" readers, but they only confused her, as they did most

(Continued on page 514)

climate for centuries, armed with an ingenuity for keeping warm and a cheerful view toward stress. Now alcoholism, spurred by a new kind of stress—cultural upheaval—presents another threat.

Under sleeping caps of snow, unused three-year-old vehicles sit idle at Dietrich Pass (**below**), a gateway through the Brooks Range. Holdup of pipeline construction left rows of winterized trucks, bulldozers, and road graders.

Building a bridge of ice, a workman pumps water onto the already frozen surface of the Yukon River (**above**). Alternate layers of logs and water create a structure 10 to 12 feet thick—strong enough to support trucks loaded with heavy equipment bound for the oil fields.

BULLDOZING (TOP) AND DETACHED

The glassy span slowly spreads from bank to bank (**right**), a link in the road carved in 1968-69 between Fairbanks and the North Slope. Spring revealed the price of careless construction: Uncovered permafrost along the bulldozed route thawed into an impassable trench.

(RIGHT) BY W. L. BARRETT; KODACHROME BY EMORY KRISTOF © N.G.S.

1

SLICING AN OCEAN *of tundra, a seismological team crosses featureless terrain south of Prudhoe. The mobile rig drills holes for underground charges; prospectors study the "earthquake waves" set up by the blasts to locate oil-bearing substrata. Then the rig moves along its tractor-made trail to another exploratory site. Probed only in winter, the frozen tundra sustains no damage.*

In endless battle with the cold, oilmen add modern technology to old-fashioned determination while camping in unoccupied North Slope wasteland. Conscious of criticism about defacing Alaskan terrain, these seismologists tow their own garbage incinerator (**above**); an Eskimo crewman stuffs in a day's burnable trash. In Arctic air, even organic matter remains as unsightly litter for years.

At a "village" of tracked mobile units (**upper right**), expedition members fight through 60-mile-an-hour winds that combine with −28° F. cold to create a chill value of −101°. In such conditions, exposed flesh freezes in less than thirty seconds, and deep breathing can painfully frost the lungs. When working outdoors, men check each other frequently for signs of frostbite. Under heavy layers of clothing, work efficiency plummets. Photographer Kristof, wearing cumbersome mittens, had to operate his camera with a special cable release to make these pictures.

While efficiency drops, appetites soar. Inside, workers down huge servings (**lower right**) to store up calories that will be rapidly expended in the cold.

Eskimo children before a more relevant series of readers was brought into use in native schools. The father of Jane and Dick came home from work carrying something called a "briefcase." Janice's father came home carrying freshly killed meat. Jane and Dick are happy because they are eating something called "cookies." For Janice, a post-school snack meant a piece of black whale skin and blubber called muktuk.

But Barrow is changing; and with so much attention being focused on the Arctic and all its riches, the town is certain to benefit. Already, the dog teams are gone, replaced by snowmobiles. The stores now stock TV dinners and, in the summer, watermelon. Such foods are expensive—$8 for a medium-size watermelon—because of the high shipping costs, but the stores accept payments in such things as pelts and whale meat.

For Ned Nusunginya, changes can't come fast enough. "When I was a boy, we burned blubber to keep warm," he said, "and we used whale oil in lamps. Now we've got electricity—from whale oil to electricity in my lifetime. Imagine that."

Ned was the last person to deliver mail by dog team between Barrow and Kotzebue. He made the 340-mile run in about a month, sleeping in houses of friends along the way.

"I started with a seven-dog team and finally wound up using a team of 15," he told me as we sat in a cafe in Barrow, almost shouting at each other over the din of a jukebox. "I had some good dogs; they had to be good to cover as much as 50 miles a day, sometimes 60.

"One year the weather was worse than ever before. It was snowing and blowing and the sky was gray all the time. I don't remember how cold it got that year, but I know I lost five lead dogs before winter was over. They just fell over dead."

A book that hits home to Alaskan children teaches this Indian girl how to read. Former texts told of "Dick and Jane," whose urban life in the Lower Forty-Eight confused frontier pupils. Here young readers at Arctic Village see a husky chasing a parka-clad boy instead of an unfamiliar dog fetching sticks for a child in short trousers.

Good People Change a Dancer's Life

Now 73 years old, Ned is the ordained minister of the Pentecostal Church in Point Hope.

"You see, I went into the ministry this way: My dad and mom, now they were Presbyterian, I mean really, really Presbyterian. At home I never seen any cards or smoking. Nothing. But when I got to be moving around myself, then I got into this mess where I started dancing. But I got to meet some good people, and I changed my life. I was ordained in 1966."

I asked Ned if he still has dogs. "No," he replied, "I get around by snowmobile now. I've seen enough dogs in my life, and almost always from the wrong end."

Now, of course, the mail is flown into Barrow, where it is distributed from a modern post office. The post office, like the two schools and the U. S. Public Health Service hospital, are among the few places in the town where salaried jobs are sometimes available. Another is the Naval Arctic Research Laboratory.

As the only U. S. facility in the Arctic devoted to full-time support of basic research, NARL has played major roles in such projects as the construction of the DEW Line system.* It has established and operated floating research stations on drifting ice in the Arctic, and currently operates one on Fletcher's Ice Island, known as T-3.†

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

†This project was described in "Scientists Ride Ice Islands on Arctic Odysseys," by Lowell Thomas, Jr., NATIONAL GEOGRAPHIC, November 1965.

Dr. Max C. Brewer, who has since moved from the director's desk at NARL to become commissioner of Alaska's Department of Environmental Conservation, told me that about 25 research projects were being conducted at the laboratory. "In any one year," he continued, "upwards of 20 federal agencies or subcontractors work here in such fields as geology, the study of light, geophysics, hydrology, meteorology, marine biology, heat flow of oceans, wildlife, and others."

For its studies in zoology, the laboratory has many cages of Arctic animals—wolverines and wolves, polar bears, foxes and owls, reindeer and weasels and marmots. Much of the research deals with the adaptation of the animals to the punishing northern climate, particularly as regards body heat and pulse rates. How, for example, can the hibernating Arctic ground squirrel survive with an average temperature of only 34 degrees and only a few heartbeats every minute?

To the Eskimos of Barrow, NARL offers an important personal service. When someone is lost, the laboratory volunteers light aircraft for search duty. In many cases, these planes are first to find a lost hunter or someone who has disappeared in a boat.

One mission involved a ten-day search for two Eskimos missing at sea. They were found 100 miles from Barrow after they had drifted 75 miles out to sea, dragged their small motorless boat over 25 miles of ice, and then paddled to shore.

Eskimos, Indians Go Their Own Ways

Among the native people of northern Alaska, only Eskimos turn to the sea for their main source of food. The Indians, such as the Athapascans at Arctic Village, look inland for salmon and game. In the winter the men of this small settlement in the foothills of the Brooks Range devote themselves to gathering wood for fuel, for there is no natural gas in Arctic Village. They set out by snowmobile for the trees that stand a few miles from the village. When the supply they return with runs out—in about two days, usually—they go back to the woods for more.

At 64, Isaac Tritt finds he is too old to be chopping down trees and hauling wood when the temperature is 50 below. He has his wood delivered at a cost of $45 a cord. "I use between 20 and 30 cords a year," he said.

Nearly everyone in the village is an Episcopalian, and Isaac Tritt is the minister. He has ten children, and as we sat on an empty oil drum by the store, he pointed to a girl and a teen-age boy and some other youngsters. "That one's mine," he said proudly, "and that one, and the one over there."

This was in the summer. Just as Barrow wears winter best, the rich, soul-stirring beauty of the setting of Arctic Village is highlighted in July and August. Then, the East Fork Chandalar River has lost its ice and is showering the gold dust of reflected sunlight on its banks as it flows past the village. In the distance the mountains are touched with green (page 491), and the aprons of land sloping down to the village are flushed with the brilliance of wild flowers.

Oil Issue Strengthens Native Bonds

However, it wasn't the scenery that held the young Indian's attention as he pressed his eye against a scanning scope resting on an oil drum in the center of the village (page 493). He was watching for caribou in the mountains.

The Indians of Arctic Village are caribou hunters. The Eskimos of Barrow are maritime people. The cultures are different, but Indians and Eskimos, together with the 6,000 Aleuts in Alaska, have a bond that in recent years has grown stronger. They comprise the 53,000-strong native population of the state, the people whom Congress decreed, in the Organic Act of 1884, "shall not be disturbed in the possession of any lands actually in their use or occupation or now claimed by them."

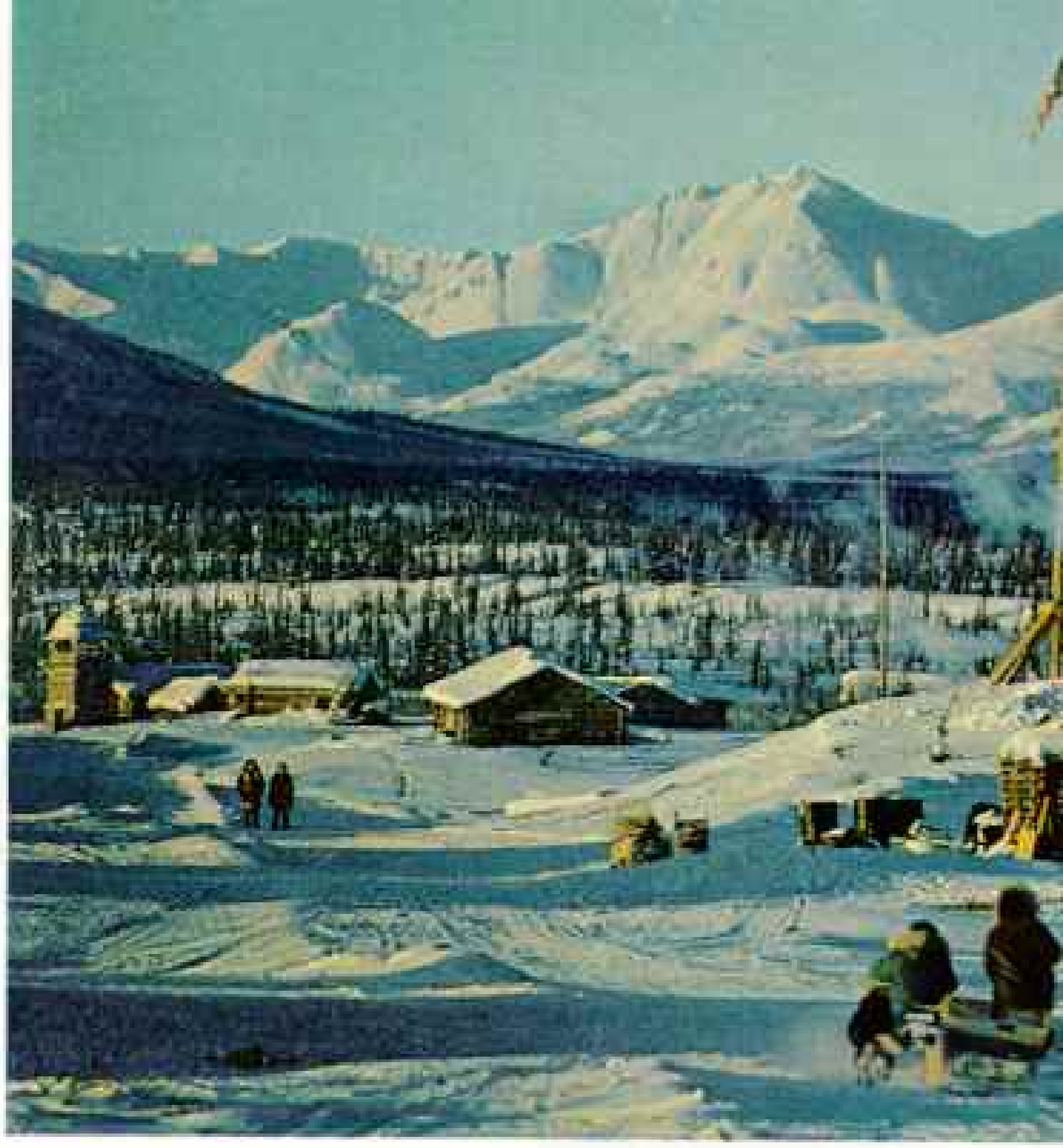
The final settlement of these claims was left for some future Congress to make. Such action has yet to be taken.

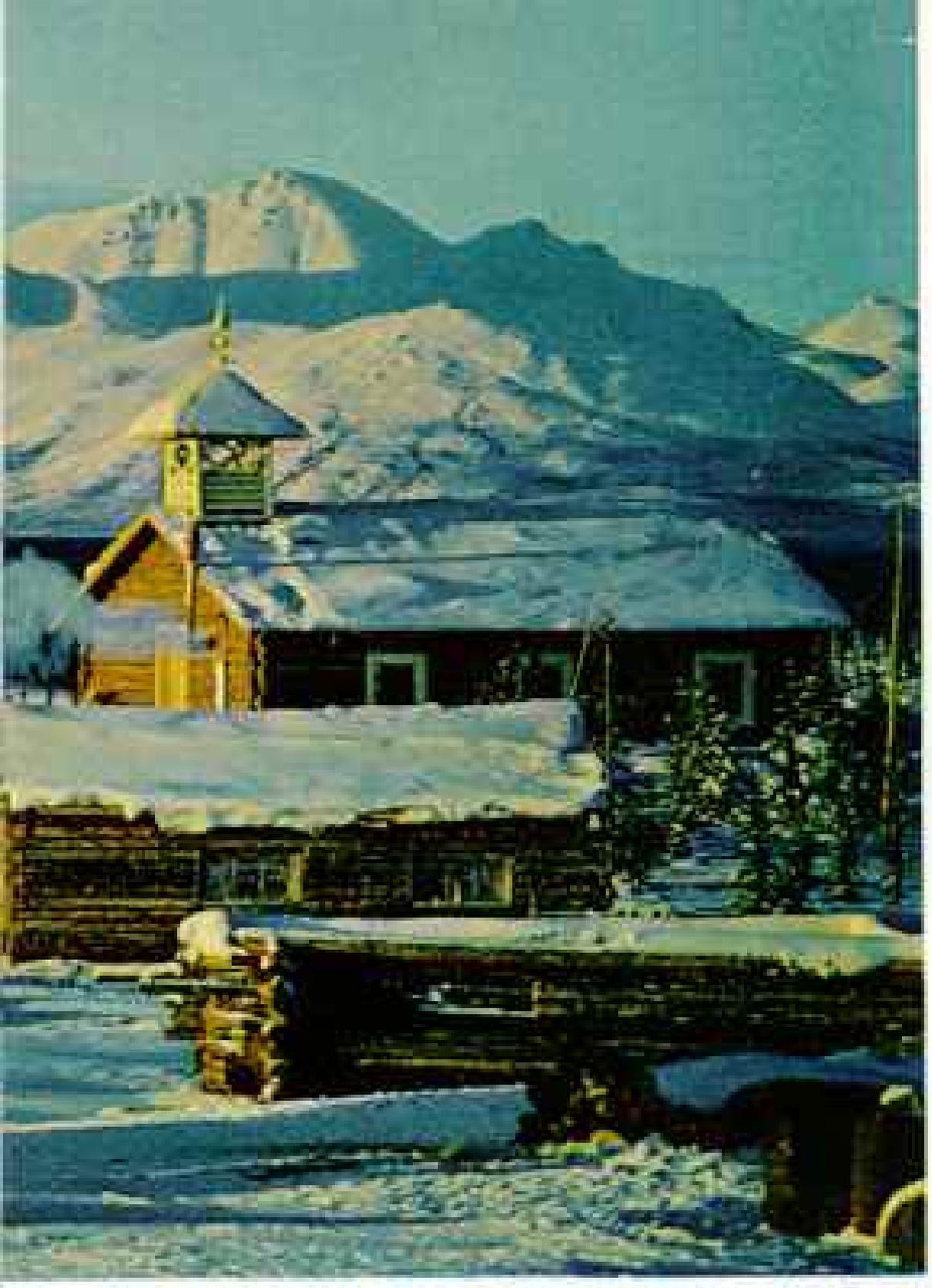
An Alaska Federation of Natives has now been formed, and its leaders vow that there will be no oil pipeline from Prudhoe Bay to Valdez until their claims are settled. What they are asking for is full title, including mineral rights, to 60 million acres of land. They are willing to forfeit claim to the 315 million other acres in Alaska, which they maintain are rightfully theirs, provided they receive 500 million dollars in cash and can retain the right to collect a perpetual 2 percent overriding royalty on all revenues derived from natural resources. An earlier proposal was passed by the U. S. Senate in 1970, but the House failed to act on it.

Joe Upicksoun, president of the Arctic Slope Native Association, a division of the

Frontier town of the north, Arctic Village sprawls on the doorstep of the snow-robed Brooks Range. A snowmobile chugs past log houses and church in this settlement of 110 Indians and four whites. Most of the residents live by hunting, trapping, and fishing; a few work in the post office, school, and store.

Change challenges tradition—and loses. Walter Newman and his family were the first in Arctic Village to heat their house with oil. But the oil heater left him idle through the long winter. Newman, a summertime forest-fire fighter, used to combat boredom the rest of the year by cutting wood for fuel. He switched back to the wood-burning stove and is busy again the year round.





EKACHROME (YELLOW) AND KODACHROME © N.G.S.

statewide federation, explained that 12 regional corporations would be established, with each corporation receiving eight million of the 500 million dollars. The balance would be distributed among the corporations on the basis of population.

Like many of the other champions of native unity, Joe Upicksoun is young, educated, and filled with pride in his Eskimo heritage. I met him in Washington, D. C., where he had come to lobby for the settlement.

He told me that his North Slope organization has 4,000 members. In addition to Barrow, other settlements represented are Wainwright, Point Hope, Anaktuvuk Pass (whose residents are the only remaining group of inland Eskimos in Alaska), and Kaktovik, a village on Barter Island where the Eskimos are well integrated into the activities of a DEW Line station (page 497).

Methods Change, but Goal the Same

"With unity, our means to an end have changed," Joe said, "but the end has remained the same: to continue to live off the land, the rivers, the lakes, and the sea. Some of us work for wages, and we now use snowmobiles instead of dog teams, and rifles instead of bows and arrows, but we remain committed to living off the land."

As he talked, I recalled having heard of Eskimos who dropped out of school in their senior year to return home in time to take a caribou or join in a whale hunt.

I asked Joe about his thoughts on the oil discovery and the proposed pipeline, but his interest in these matters seemed dulled by a deeper concern, not only for his own Eskimo people but also for all the natives.

I could see him as an Aleut, pained by the memory of his ancestors being forced into virtual serfdom by Russian fur hunters.

I could see him as a maritime Eskimo, watching as the first whalers arrived on the northern coast, bringing with them the ravages of tuberculosis and venereal disease.

And I could see Joe Upicksoun as an Indian who finds his stream being depleted of fish for the benefit of some cannery many hundreds of miles away.

"In the 17 years I was away from Barrow, I had only acquaintances," he said. "Not until I returned home did I find friends."

Then he rose, put on his parka with the wolverine ruff, and said he was going home. Not to his hotel in Washington. Home to Barrow. □

In another unique double map, National Geographic portrays two faces of the world's least known, most mysterious ocean. A fact-packed surface view (**detail, left**) shows earth's frozen topknot, plus a wealth of notes that chronicle the epic struggles—many of them fatal—to penetrate the ice-locked north. On the opposite side (**detail, below**), Austrian artist Heinrich C. Berann strips away the Arctic Ocean's ice and water to reveal an awesome and unfamiliar sight: a vast ridged basin lying amid the globe's widest continental shelves. White cross locates the North Pole; yellow indicates land above sea level.

Unveiling an Ocean of Ice

EARTH GUARDS few features more jealously than her icy crown. So remote is this forbidding realm that even into the present century some explorers believed landmasses reared from the Arctic Ocean.

Like a magician yanking aside his cape, a new National Geographic map rolls back the canopy of ice and water to bare a panorama still unknown to human eyes—the bottom of the Arctic Ocean. It and its companion map, on the opposite side of the double supplement distributed with this issue, complete a bold cartographic program that has portrayed earth's three other oceans: the Indian in October 1967, Atlantic in June 1968, and Pacific in October 1969. And, like those portraits, this view of the five million square miles of ocean bed was painted by Heinrich C. Berann, on the basis of depth soundings analyzed by geophysicists Dr. Bruce C. Heezen of Columbia University's Lamont-Doherty Geological Observatory and Miss Marie Tharp of the U. S. Naval Oceanographic Office.

Though the runt of the ocean family, the Arctic basin poses enigmas of Pacific proportions. What stupendous forces raised the 1,000-mile-long Lomonosov Ridge, discovered by the Russians in 1948? Its steep flanks, climbing 10,000 feet above the abyss, neatly partition the ocean into the Amerasia and Eurasia Basins. What explains the ridge's strangely flattened crest? What forces north of Iceland dislocated 600 miles of the world-girdling Mid-Oceanic Ridge, causing an eastward detour in its march across the Pole?

Glaciers Give Birth to Icy Hazards

Surprisingly, the ocean-floor map shows the pale blue of continental shelves occupying roughly half the total area. In fact, the Siberian shelves are the world's widest, extending seaward some 700 miles.

The companion map depicts the Arctic's frozen cloak—including the two-mile-thick Greenland icecap, whose glaciers calve most Arctic icebergs. Of the 7,500 sizable bergs that fall each year into Baffin Bay, an average of about 400 drift into Atlantic shipping lanes. One, in 1912, sank the *Titanic* with a loss of more than 1,500 passengers and spurred the creation of the International Ice Patrol.*

A vast ice shelf thrusting north from Canada's Ellesmere Island is believed to breed most of the Arctic's colossal ice islands, sometimes 200 feet thick and covering many square miles. Glacier-deposited boulders, dumped during the thousands of years the ice accumulated, litter some islands.

Beginning with a Soviet experiment in 1937, Russian and United States scientists have occupied a score of laboratories on drifting Arctic ice; their soundings contributed substantially to the Berann map.

Men Reach Pole by Varied Means

Like modern Klondikes, obscure Arctic locales leap into headlines with discoveries of mineral deposits: the Mary River area of Canada's Baffin Island, rich in iron ore . . . oil and gas underlying the Mackenzie River Delta . . . and Alaska's North Slope, with its prodigious petroleum reserves (pages 485-517).

Man's long search for sea routes between northern continents comes to life in map notations: the traverse of the Northwest Passage by the tanker S.S. *Manhattan;* the track of the U. S. Navy nuclear submarine *Nautilus* across the Pole beneath the ice; and Soviet shipping lanes along her vast Arctic coastline.

The map also outlines the ice pack itself—awesome still, but no longer an impenetrable barrier. Since Robert E. Peary's daring dog-sledge dash in 1909, the North Pole has surrendered to a variety of assaults. Adm. Richard E. Byrd flew over it in a three-engine monoplane in 1926. A dirigible with an international crew duplicated the feat the same year. In 1959 the nuclear sub *Skate* surfaced through the ice, and Comdr. James F. Calvert and his crew became the first men to stand at the North Pole since Peary. In 1968 a four-man expedition led by Minnesotan Ralph Plaisted struggled to the Pole by snowmobile. Dramatically reverting to dog sledge, a four-man British expedition led by Wally Herbert trekked from Point Barrow, Alaska, to Spitsbergen in 1968-9, becoming the first ever to walk across an ocean. □

*See "Tracking Danger With the Ice Patrol," by William S. Ellis, NATIONAL GEOGRAPHIC, June 1968.

Pushed to near extinction by fur traders in the 18th and 19th centuries, sea otters have staged a dramatic comeback in recent decades. This bewhiskered individual lives off the California coast. Protected since 1911, the animals now face new perils—marine pollution, limited feeding grounds, and the ire of abalone fishermen, who see their harvest depleted by the diving mammals.

Return

By KARL W. KENYON

RESEARCH BIOLOGIST, U. S. BUREAU OF SPORT FISHERIES AND WILDLIFE

Photographs

of the Sea Otter

by JAMES A. MATTISON, JR., M.D.

A DARK FORM slipped through Constantine Harbor's clear waters, just below the glassy surface. I gave a hand signal, and my Aleut assistant Tony Bezezekoff gunned our outboard motor. In seconds we pulled even with our frantic prey, a four-foot sea otter critically needed for our scientific studies.

Front paws pressed tightly against its chest, the otter slid into an evasive turn. We kept pace. I wedged my knee into the dory's bow and leaned out with a long-handled dip net. The animal's nose broke the surface, and I swung the net downward, snaring a hissing bundle of fur that I quickly pulled aboard.

Susie Shed Light on Many Mysteries

"How will we ever get that live wire into this?" Tony asked, looking at the otter and at a three-foot-long cage beside it. Unexpectedly, the otter obliged us. It stopped struggling and began investigating the net.

First it tried to push the mesh away with mittenlike prehensile forepaws, then bit it. Chewing proved useless. An otter's jaws can crush the shells of mussels, snails, crabs, and sea urchins, but the teeth—lacking sharp cutting edges—are ineffectual on soft strands.

While the animal concentrated on the net, Tony held the open end of the cage upright, and I grabbed the otter's hind legs. Quickly I lifted the startled animal from the net, lowered it into the cage, and closed the door. The hissing captive took a characteristically defensive position, reclining on its back with forepaws placed against its cheeks. Noting the two abdominal nipples, we promptly named our prize Susie.

Tony started the engine. We headed for Kirilof dock 600 yards away. Susie watched every movement, her eyes wide.

Twenty-eight-pound Susie proved to be a good pet and an excellent teacher. Her capture that day off Alaska's Amchitka Island occurred in September 1955; for six years

UNDERWATER QUARTERBACK,
an otter juggles a football-shaped sea cucumber. The sleek forager, propelled by webbed hind feet, will carry the rubbery prize 30 feet to the surface before devouring it.

EKTACHROME BY JAMES A. MATTISON, JR., M.D. © N.G.S.

thereafter, until her death in October 1961, she enjoyed constant care and attention—scientific and popular—at Seattle's Woodland Park Zoo, near my home. During those years she reigned as the only sea otter surviving in captivity over an extended period. Though her untimely death came at the age of about seven years—far short of an otter's normal 15- to 20-year life-span—Susie provided the key to many mysteries of this little-understood animal.

In 1741, when Vitus Bering sailed into the sea that now bears his name, sea otters ranged from Baja California to Alaska, and along the North Pacific rim to northern Japan (map, right). After Bering's expedition brought back lustrous pelts of otters and fur seals, hunters from Europe, Asia, and North America nearly exterminated both. In 1903, high-quality otter skins were bringing more than $1,100 on the London market.

In 1911 the United States, Great Britain, Japan, and Russia agreed to stop killing sea otters. Research on the animal and its behavior began in the 1950's, by which time the otter population had already begun to recover.

Since the early stages of this research, the sea otter has absorbed much of my time. Studies for the U. S. Fish and Wildlife Service

Before man's exploitation, sea-otter colonies flourished from Mexico north to Alaska and west to the Kurils and Japan (**left**). Today, the estimated 50,000 northern and more than 1,000 southern, or California, otters occupy perhaps a quarter of their original range, and some groups are outgrowing their food supply. Since 1962 Alaska has harvested varying numbers—ranging as high as 950—in overpopulated areas, such as Amchitka Island (**lower left**). Here Amchitka otters display their awkward hump-along gait on land. The creatures' luxuriously soft pelts (**lower right**) commanded an average of $96 each in 1971.

During the past few years wildlife biologists, including the author, have captured surplus Amchitka otters with nets (**below**) and airlifted them to former Alaska and Pacific Northwest habitats.

EKTACHROME (TOP) AND AQUACHROME (ABOVE) BY ROBERT F. DIXON;
AQUACHROME BY KARL W. KENYON © N.G.S.

took me principally to Alaska, where perhaps 50,000 sea otters live today. On occasion I've investigated a closer colony in warmer waters, off the California coast, home of more than a thousand—the same animal found in the northern waters, as far as I can observe. Certainly it is not possible, without additional study, to conclude that distinct races exist.

At the turn of the century, even before federal protection began, the southern, or California, sea otter was believed by many to be extinct. Wardens, however, kept seeing a few off central California. To protect them, the California Department of Fish and Game avoided publicizing the observations.

In 1938 a resident sighted about a hundred on the rugged Big Sur coast in Monterey County. It proved to be the only colony remaining south of Alaska. The sea otters of Baja California, Oregon, Washington, and British Columbia had vanished.

Voracious Eaters Dote on Abalone

To guard its remaining otters, California in 1941 set aside 25 miles of coastline as a refuge, and expanded it to 100 miles in 1959. Not all Californians rejoiced at the otter's survival, however. Dan Leedy, my supervisor in Washington, D. C., brought the controversy to my attention in the early 1960's. "Abalone fishermen want sea otters removed from the commercial abalone beds," he said. "They claim the otters destroy their fishery."

I already knew something of an Alaskan otter's appetite. Daily it eats a fifth to a quarter of its body weight in fish, mollusks, and sea urchins. That equals about 15 pounds of food for an adult male and 8 to 10 pounds for a female. In their Menlo Park laboratory, I asked Mel Odemar and Earl Ebert, biologists for the California Department of Fish and Game, how serious the problem was.

"There's no question about it," Mel said. "Sea otters can severely deplete an abalone bed. Wherever otters feed in large numbers, abalones survive only in cracks in rocks where otters can't reach them."

Abalone fisherman Ernie Porter put the problem this way: "If we're to feed our families, we must remove the otters from fishing places. California law limits us to only larger abs, but the otters take all sizes."

At Big Sur I heard the other side of the story from two staunch supporters of the otter: Margaret Owings, wife of noted architect Nathaniel Owings and an outstanding artist in her own right, and Dr. James A. Mattison, Jr., Salinas, California, surgeon and talented underwater photographer.

"They're wonderful animals," Margaret said, "but they have so many problems." To support her cause, Margaret in 1968 formed Friends of the Sea Otter, a nationwide group with a current membership of 2,000.

Water pollution is especially dangerous to the otter, Jim Mattison said. "North of Big Sur, raw sewage flows into Monterey Bay near an otter feeding place. We've found infectious lesions on otters that apparently interfered with their eating and caused their death."

A more direct threat is the occasional sniper. "I've examined several otters with bullet holes," Jim said. When this occurs, suspicion falls upon abalone fishermen, who want a program of otter population management.

California otters have continued to expand their territory. Besides appearing in Monterey Bay, they have lately been seen in the Cambria area, just south of the refuge.

"The 100-mile reserve probably now supports its maximum otter population," Mel Odemar told me. "If the refuge could hold more, they'd remain there."

California biologists tried to move otters from commercial abalone beds back to the refuge in 1969. An observer recalled, "It was like trying to pour more water into a full glass. The otters just 'ran over' and spilled from the refuge again."

Alaskan Otters Die Mysteriously

Long before this controversy erupted, sea otters had aroused my interest. In 1947 the noted marine mammalogist Dr. Victor B. Scheffer and I, aboard the fur-seal research vessel *Black Douglas*, noticed otters in Constantine Harbor at Amchitka. Vic, then in his early forties, was known as "that young-looking, white-haired seal doctor"; he was biologist in charge of fur-seal research for the U. S. Fish and Wildlife Service.*

Elmer Hanson, the harbor master, greeted us when we landed at the dock.

"We're surveying the migration route of fur seals," Vic explained to him, adding, "We'd like to see some sea otters while we're here."

"You're in the right place," Elmer laughed. "We've got hundreds, maybe thousands."

His face darkening, he added, "Lately I've been finding dead otters, but I don't know what's killing them. It's a mystery."

In his jeep we drew up on a point and

*See "The Fur Seal Herd Comes of Age," by Victor B. Scheffer and Karl W. Kenyon, GEOGRAPHIC, April 1952.

PHOTOGRAPHED BY KATE LITTLEFIELD © N.G.S.

Hungry as a teen-ager, this young otter spends most of its waking hours plunging as deep as 180 feet to forage for edibles—chiefly mollusks, sea urchins, and crabs—amid boulders on the sea floor. It usually spurns starfish as unappetizing. Adult otters, weighing 45 to 100 pounds, gulp the equivalent of a fifth or more of their body weight in food every day. Able to remain submerged more than four minutes at a time, the otters usually stay underwater less than 90 seconds.

stepped out onto spongy sphagnum moss. A hundred yards away, a dozen otters fed in a kelp bed. A mother floating on her back propelled herself toward us with her hind feet. A pup slept on her chest (page 536).

"When I see a mother and sleeping pup gliding along on a calm sea," Elmer reflected, "it looks for all the world to me like a loaf of bread aboard a tiny stern-wheeler."

Farther on we came upon a dead otter, lying in a sleeping position on a grassy bank. A youngster, it weighed no more than 20 pounds, a third of an adult's full growth. We saw no wounds, but it seemed terribly emaciated.

Soon we found four more. "What do you think is killing them?" Elmer asked. We had no answer, and no immediate hope of finding one. Federal policy, intent on protecting wildlife, prohibited collecting otters, dead or alive, even for biological studies.

Science Joins Fight to Save the Otter

Despite these scattered deaths, the otter population slowly increased. By 1951 government policy had changed, and Aleutian refuge manager Robert D. Jones, Jr., captured 35 animals to transplant to parts of their former habitat. Tragically, each died within a few days of capture. Subsequent attempts in 1954 and 1955 proved equally unsuccessful. Otters, obviously, adapted poorly to captivity.

With Tony Bezezekoff's aid, I began studying otters in July 1955. Tony had herded sheep on Umnak Island before joining me. "Those sheep were so stupid," he remarked one day, "that I got tired of taking care of them. They went out on rocks at low tide to eat kelp, and didn't know enough to come back at high tide. So some drowned. That's why I decided to work with smarter animals."

I loaded supplies aboard a chartered halibut schooner, the *Paragon*, in Seattle. Picking up Tony at Nikolski on Umnak Island, I charted a course for the then-deserted national wildlife refuge island of Amchitka.

Susie's capture occurred about a month after our arrival. Though she settled down quickly, she declined to eat when we were near. Tony accepted this as a personal challenge. Just two days later, he proudly announced, "She's eating out of my hand."

After studying other otters, we learned that the animals would tame very quickly, and even take fish from our hands if we placed them in a pool within minutes of capture.

One wild otter that we hand-fed soon was following us around—standing on its hind legs, forepaws pressed against us, beady eyes searching our faces in an open plea for food.

The begging otter demonstrated an interesting trait: No matter how far from the water we fed it, up to a hundred feet, the otter never consumed a morsel on land. Clasping the food tightly to its chest with its left foreleg, the animal would hump its way to the water on three feet. Then, floating on its back, it would dine at leisure.

Susie helped us understand why otters prefer water to land. We kept her in a cage with excelsior for bedding, and a month later I transported her to Seattle. Ed Johnson, director of Woodland Park Zoo, put Susie into a pool there. To our shock, her fur soaked up water like a sponge, and she sank!

Scraps of food and excelsior had penetrated her delicate fur, destroying the waterproofing blanket of air. She tried floating on her back, but only constant swimming kept her head above water. She turned nearly rigid with cold. Ed and I pulled her from the water and hurriedly gave her a warm bath in a heated room. Then we dried her with towels.

For several hours each day, we washed and

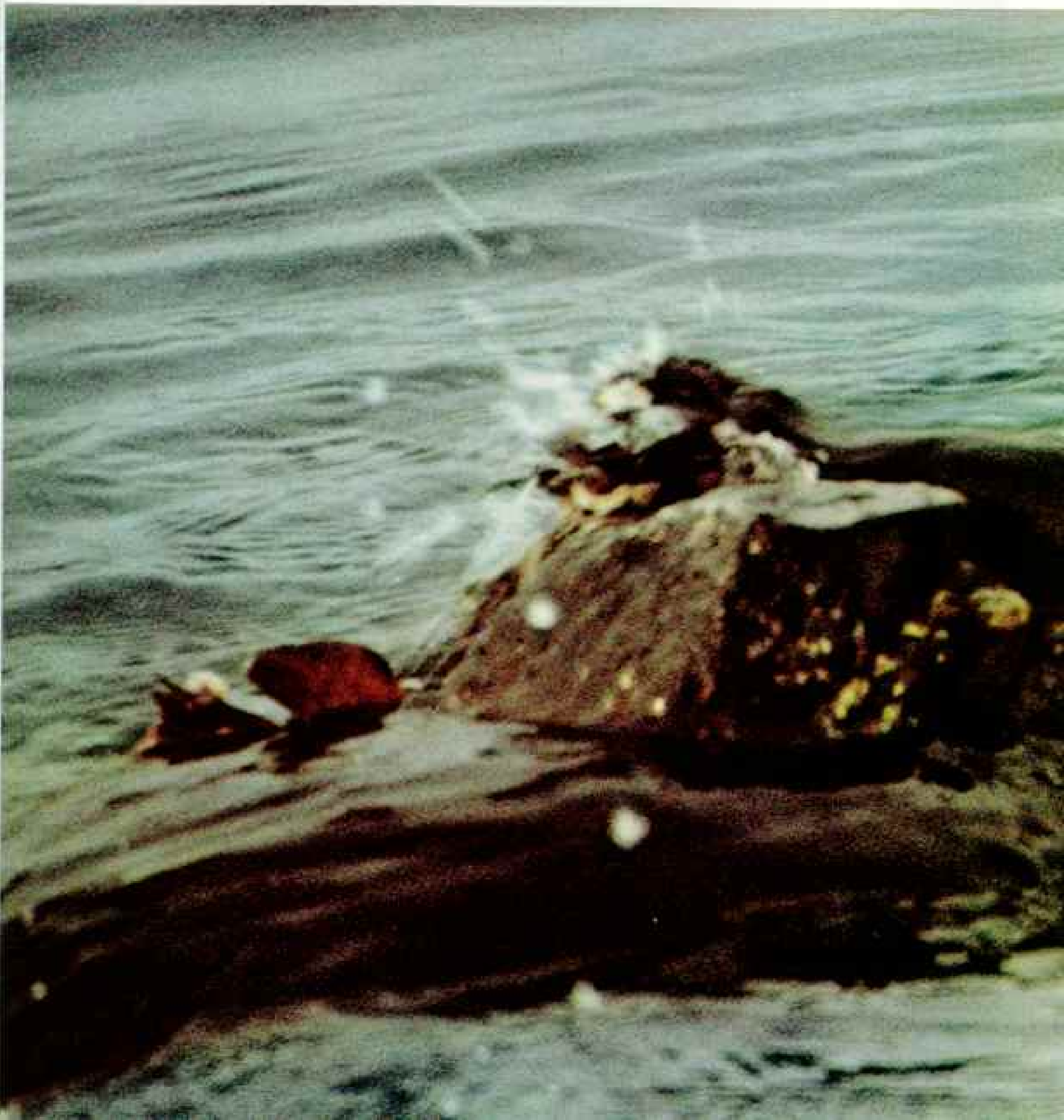
ENTACHROMES BY JAMES A. WATTERS, JR., N.G. (ABOVE) AND BATES LITTLEHALES © N.G.S.

Floating on its back, a California sea otter (**above**) scoops the flesh from an abalone, one of its favorite foods. In characteristic fashion, the otter broke the creature's tenacious grip on an underwater rock by smashing the shell with a stone.

Sea otters haul food to the surface both with their sensitive prehensile forepaws and on their chest in a pouchlike fold of skin looser than a hound dog's. A successful hunter (**right**) comes up clasping a big abalone.

Smashing performance: Face averted to avoid splatter, a five-foot otter (**below**) shatters a shellfish on a large rock balanced atop its furry stomach. It brought the rock and the morsel to the surface at the same time. Breaking open a mussel, studies in California reveal, requires an average of 55 whacks; a sea urchin, nine. The phenomenal habit puts sea otters among a select group in the animal kingdom, for the only other known habitual tool users are man, the chimpanzees, the Galapagos woodpecker finch, and an Egyptian vulture. As it eats, the otter rolls over in the water every half minute or so to wash away food scraps that dribble onto its chest (**right**).

Such fastidiousness, enhanced by regular preening, safeguards the animal's life. The otter's dense fur traps air that insulates the creature from water and chill breezes, much as blubber protects other marine mammals. It also creates the great buoyancy that allows otters to float effortlessly from birth. Too long an absence from the sea or contact with even a thin oil film can mat the animal's fur, allowing water to pierce the air shield and spread across the skin. Such exposure to chill water and winds causes death.



dried her fur. After ten days, we returned her to the pool. She floated happily on her back. There was good reason, obviously, why otters in the wild begin and end each meal or sleep with a thorough grooming.

Good Grooming Keeps Otters Warm

Since she had no worries about obtaining food, Susie had plenty of free time and devoted nearly half her daylight hours to preening. A wild otter, though more occupied with finding food, nevertheless spends at least a tenth of its time tending its fur. Vanity plays no role in the preening. Because its body lacks the blubber layer found in all other marine mammals, the sea otter relies for warmth as well as buoyancy on the air trapped in the estimated 800 million fine fur fibers of its coat. Paradoxically, the pelage remains waterproof only when it's regularly kept in water.

The experience with Susie taught me a lesson. When I returned to Amchitka, I asked Tony's cousin, Fred Bezezekoff, a carpenter, to build an otter pool, two feet deep and six feet by eight on the sides. While Tony and Fred salvaged lumber from abandoned military supplies, I spent days in a cliff-edge blind on Kirilof Point.

Gusty blasts of as much as 70 to 80 miles an hour shrieked around me, but the tiny blind held firm. Calm days, though, proved best for otter-watching. The animals fed just below me in a small kelp patch.

Through my telescope I saw otters feeding, diving, sleeping, and mating. One dived no fewer than six times in 14 minutes, staying underwater from 42 to 80 seconds on each descent. When it emerged, it ate ravenously, mostly sea urchins carried to the surface under a foreleg.

One morning I watched a female otter floating on her back. A young animal lay at right angles to her, its head on her chest. Both were sleeping. The mother awoke and began to

KODACHROME BY JOYCE CHURCH © N.G.S.

Enticed by a sea urchin, an otter off Monterey, California, clings to the arm of diver Ron Church. Oceanographer Jacques Cousteau developed the Monterey otters' trust in man by hand-feeding them (**opposite**) during filming of a 1971 television documentary. The otters' appetite for kelp-eating urchins preserves the seaweed forest and its community of other creatures.

lick the pup's fur and rub it with nimble forepaws. Soon the pup awoke. Together the animals somersaulted in the water and dived for food.

The pup surfaced first, and I could see that it was nibbling on a brownish starfish. The mother burst into view ten feet away, half a dozen sea urchins and three large rock oysters clasped to her chest. The pup swam to her side and snatched away the largest urchin. Pressing the urchin between its paws, the infant broke the shell. With its lower incisors and tongue, the pup scooped up the soft egg masses within.

The mother, meanwhile, used a canine tooth to pry open a rock oyster. Twisting sharply with her paws, she separated the valves and dropped the empty one to her chest. The other she held in both paws and licked up the orange-and-white body mass. Then, clutching the remaining urchins and oysters, she rolled over and washed herself.

Mating Is an Aquatic Affair

The waters I viewed were frequented mostly by females, alone or with young. Adult males came only to seek mates.

One bright afternoon, I watched an otter—its heavy neck and shoulders marking it as an adult male—approach a female. She was dining while floating on the surface. Her sleeping pup floated nearby. The male dived, came up between the mother and pup, and clasped the female about the chest.

The female, uninterested in courtship, slapped his face with her hind feet. The male remained persistent. Again diving, he grabbed her, and they rolled about together while the awakened pup screamed in fright. Repeatedly the female snapped at her aggressor. Finally, he gave up.

The male turned to a more willing partner, a lone female who preened his fur as they curled together on a rock. Slipping with her into the water, the male held her nose with his teeth, and they mated. When they had finished, the female's nose was bloody (page 537).

As the days passed, I waited in vain for an otter to break a mollusk against a rock on its chest, as California otters often do (pages 530-31). Perhaps, I speculated, the Alaska sea otter differs from the California variety.

Back in Seattle, I mentioned my theory one day to Ford Wilke, my Fish and Wildlife Service field director. "Why don't we try it with Susie?" Ford responded.

We dropped a small flat stone and a dozen clams into Susie's pool. Without hesitation, Susie dived and brought up the stone under one foreleg and two clams under the other. Placing the stone on her chest, she gripped a clam between her forepaws and smashed the two objects together—at once shattering the clam and my theory.

The test had unfortunate consequences. Susie grew overly fond of her rock, never letting it out of her sight.

"I'm afraid we're going to have to take the rock away from her," zoo director Ed Johnson told me one day. "I'll show you why." At the pond we found Susie enthusiastically pounding the rock against the cement edge.

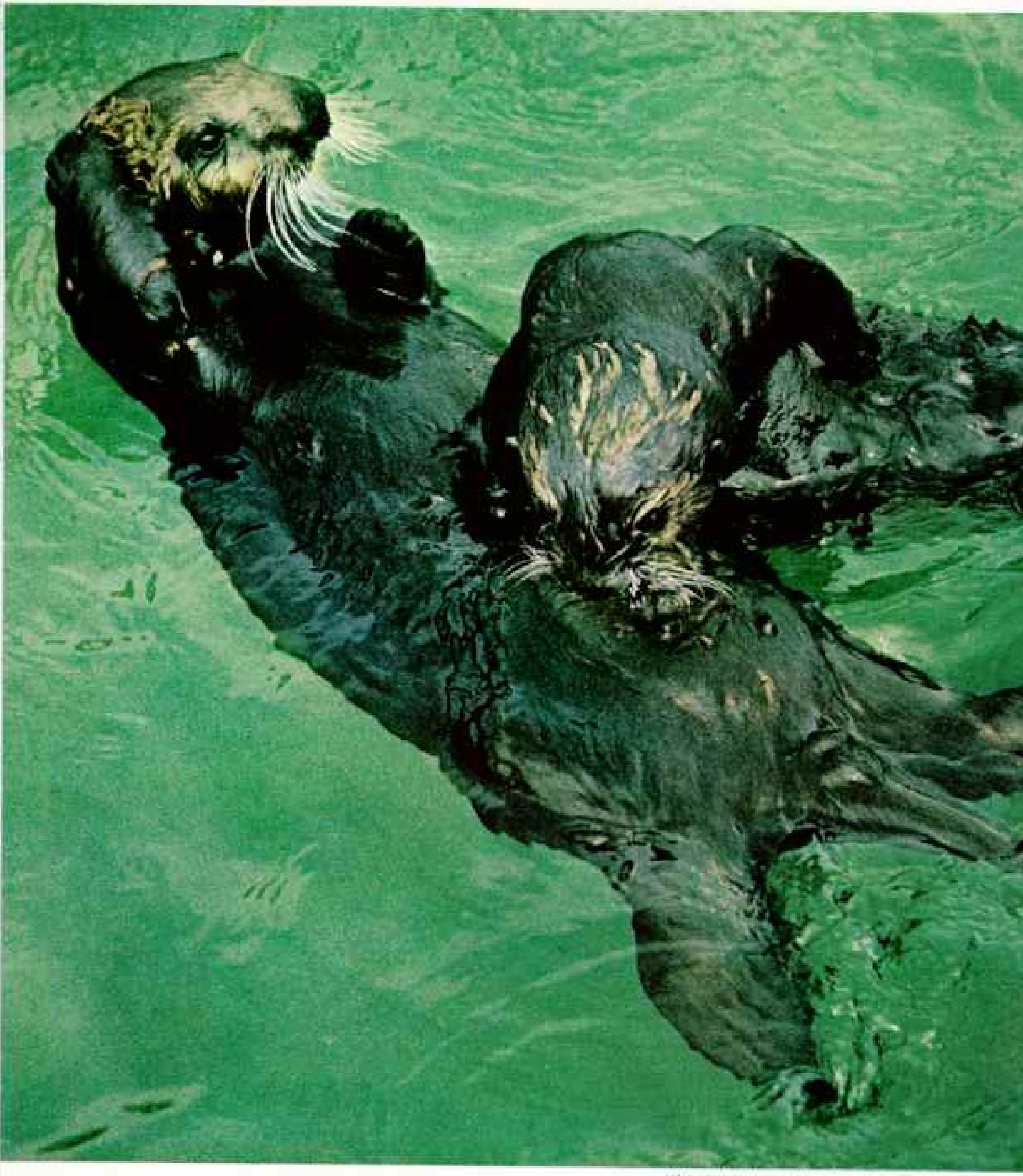
"She's already taken off nearly half an inch of concrete in some places," he said. "But that's not the whole story. We've kept a cover

Water-slicked otter accepts a squid. Naturally tame until made wary by man's harassments, otters rarely snap at humans except when their lifesaving coats are touched.

Riding the waves off Monterey, sea otters display their aquatic skill. Yankee eagerness for the sea mammals' fur contributed to U.S. interest in acquiring California. Otters also played a role in the purchase of Alaska, for only after the northern herds had been decimated was Russia willing to sell the vast territory.

Southern otters, considered extinct by 1900, reappeared near Monterey in 1938. Today federal, state, and international laws protect the furbearers.

Sheltered amid kelp that smoothes the sea, otters lounge off the California coast. Before snoozing, they moor themselves by wrapping strands of the brown seaweed around their bodies. Mothers often leave their young cradled on the kelp while diving for food. Both sexes, with life-spans of 15 to 20 years, tend to become lighter in face color with age.



PAINTING BY JAMES A. MATTISON, JR., W.C. © N.G.S.

Mother serenely reclines as her pup nuzzles toward the two nipples on her lower abdomen (**above**). Females usually give birth to a single offspring every two or three years, and remain inseparable from the youngster for about a year. Early hunters, capitalizing on the mother's fearlessness in defense of her young, would first nab a pup, then wait for the approach of its frantic parent.

Male otters, which normally live apart from the females in the colony, may go searching for mates at any time of the year. The female, her face gripped by the male's powerful jaws, often gets a bloody nose (**opposite**) during an in-the-water mating ritual. Though males often attempt to stay with their partners after mating, the females usually manage to sneak away within a few days.

over the drain in the bottom to prevent food scraps from plugging it. Susie used to remove the cover with her paws, so we bolted it down. Now she's pounded the bolt with her rock and broken it."

I suggested that perhaps Susie was lonely, and we might capture a companion for her.

"I don't know if we could afford that," Ed said. "With seafood prices rising, it costs nearly $1,500 a year to feed Susie. Though she's a small female, she eats eight to nine pounds a day. The unhappy truth is that an otter eats more than a lion and costs more to feed than an elephant."

I dropped the idea. Susie would have to be satisfied with the constant stream of human friends who came by each day.

Change of Diet Solves a Mystery

On my return to Amchitka, I turned my attention to the puzzle that had haunted me for years. What had killed the otters that Elmer Hanson showed Vic Scheffer and me that day when we first observed the animals close up? The deaths continued during the following winters; still we had no answer.

One season of especially severe winter and early-spring storms took a toll of more than 200 otters. Oddly, every victim was an old-timer with worn-out teeth or a young, half-grown otter. All were emaciated. Autopsies revealed the remains of small sea urchins in their stomachs, but no fish or mollusks.

I had a hunch. Two Aleut assistants, brothers-in-law John Nevzoroff and Innokenty Golodoff, helped capture four young, ill-looking otters from the beach. We put them in our home-made otter pool and treated them to a generous feeding of fresh fish. Afterward, we offered their customary diet of sea urchins. The otters declined the urchins.

With fish diets, three of the otters regained their health in a week; the fourth, smallest and weakest when captured, died.

The answer was clear. The otters, lacking predators to reduce their numbers or new habitat in which to expand, had overpopulated their environment. They were starving on a diet of immature sea urchins, abundant but nearly valueless nutritionally.

The aged otters had ground down their teeth through years of chewing hard-shelled organisms. They were too old to catch fish in stormy weather, and ill equipped to chew what little food they found. The larger juveniles, while yet too young to fend for themselves, were too big to be supported by their mothers in the season of storm stress. So the youngsters stuffed themselves with immature sea urchins.

Plainly, the otters couldn't get to the fish, so we had to bring the fish to them—or, at least, to those otters occupying our pool. During one especially stormy period, however, we ran short of fish.

Three otters occupied the pool at the time —a honey-colored adult female we had named Blondy and two large juveniles. We put each on a reduced daily diet of six pounds of fish, down from eight pounds. I handed each animal its share, but crafty Blondy stored hers under a foreleg and, with her superior strength, snatched the fish from the others.

Obviously, the youngsters needed protection from this bully. I found a 12-foot-long bamboo pole and stood by the pool during meal hours. Whenever Blondy approached one of her pool companions, I banged her on

SKETCHBOOK BY ROBERT F. SISSON, © N.G.S.

In a topsy-turvy romp in a kelp bed, frisky otters cavort again in the Pacific waters where

the head. The cracked pole created more sound than pain, I'm sure, but it seemed to impress Blondy. Soon I could simply stand by the pool, pole at the ready, while Blondy sulked with her food.

One day, feeling overconfident, I laid the pole aside. Before I could reach it, Blondy stole all the food in sight.

After that, I remained armed during all feeding hours. But Blondy still managed to keep a step ahead. One day she dived and, ostensibly seeking food scraps on the bottom, darted under an unsuspecting youngster. Her foreleg shot above the surface, claws extended, and raked the fish from the paws of the astonished victim.

The swindled youngster swam to me with pleading eyes, while Blondy surfaced in a far corner to consume her booty. There was little I could do. Until the fish supply improved, this duel of man and otter continued—with the otter too often winning.

Now that we'd learned something about keeping otters alive, we tackled the challenge of transporting them to less-crowded regions. Eight healthy otters, fresh from our pool, were loaded aboard a Reeve Aleutian Airways DC-4 bound for the Pribilofs. Their cages shared the cabin with a handful of amused passengers.

Too Much Heat Dooms an Airlift

An unexpected storm forced the pilot to change course, greatly prolonging the flight. The otters, overheated in their heavy coats, panted and shrieked at 75 degrees F. I doused them repeatedly with cold water, but that helped only a bit.

Finally we landed at Cold Bay on the Alaska Peninsula. Aleutian refuge manager Bob Jones helped us rush the otters to a cool shed. But the heat stress had been too severe. All eight otters perished.

In 1959 another attempt by charter plane,

PAINTING BY JAMES A. MATTSON, JR., M.D. © N.G.S.

man—now working to ensure their survival—once hunted them to the verge of extinction.

with the temperature controlled at 48 degrees, successfully transported seven young otters from Amchitka direct to St. Paul Island in the Pribilofs.

In 1967 the Atomic Energy Commission selected Amchitka for underground nuclear weapons testing, and agreed to finance the transplanting of large numbers of the island's sea otters prior to the project. The task fell to Alaska state biologist John Vania and his assistant Karl Schneider, who had been experimenting with the capture and transport of otters from Prince William Sound to the coast of southeastern Alaska. Vania and his colleagues began moving otters from the test site; by July 1971 they had moved 417 within Alaska waters and 180 to points off the coast of British Columbia, Washington, and Oregon (map, page 524).

For me personally, perhaps the most exciting transplant occurred in July 1970. I recall watching the approach of a chartered Alaska Airlines Hercules cargo plane at the Quillayute, Washington, airstrip. Aboard were 62 otters flown 2,500 miles nonstop from Amchitka for release off the Washington and Oregon coasts, where the species had been wiped out 60 years earlier.

When the plane landed, John Vania and I helped Washington state fish and game employees move the otter cages onto truck beds cooled by layers of cracked ice. Some animals whistled softly; others remained silent and completely calm. A good sign, I thought; they're going to make it.

They did make it, as anyone who today watches the colonies in Oregon and Washington waters can attest. Meanwhile the Alaska population has almost doubled since the early 1960's. Years of research, often difficult and discouraging, have brought their reward. Notwithstanding many problems, the sea otter, once nearly extinct, can expect a promising future. □

Eyes on the main chance: Hong Kong's residents delight in the pursuit of profit. At the Happy Valley Race Course, two girls (**right**) stake their hopes on a horse. A. H. Potts (**left**) pins his faith on the Hong Kong Stock Exchange, of which he is chairman. Here he relays the price of a share from the board.

Lacking natural resources, Great Britain's Crown Colony booms today as an emporium of trade and light industry. Colorful and courageous, it survives by its wits, a coin's throw from the leviathan of Communist China.

SATURDAY'S CHILD HONG KONG

By JOSEPH JUDGE

Photographs by BRUCE DALE

BOTH NATIONAL GEOGRAPHIC STAFF

Saturday's child works hard for its living.

"Considering that the good Lord gave us only rocks, fish, and a few men to go on, we haven't done too badly," said my friend Arnold Graham. He could speak for the Crown Colony of Hong Kong, having been on the China coast for 43 years; his remark ranks as a memorable understatement.

Parts of those rocks have been shaved off, dumped into the sea, and made to form land sold for an icy cool $800 U. S. per square foot, the highest-priced real estate on earth.

Who would want it? Men of several continents, races, and ideologies, all of whom appreciate the value of a small colonial government that administers a shattered archipelago of nearly 240 islands, mostly barren, and a hilly chunk of the Chinese mainland, and that has astutely put pennies away against a rainy day until it has banked an astounding ten percent of all the world's sterling reserve.

How does it do it? Of four million people, more or less, living in 398 square miles, the vast majority are Chinese, most of whom speak very little English; some 32,000 are Europeans who speak very little Chinese. But they manage by a strange osmosis, and are bound together by a powerful, almost mystical, desire to profit, each to his own standard.

"The cult of money," commented one British author, James Pope-Hennessy, whose grandfather had once governed the place.

I sat in a room filled with quiet people, refugees who had come over the border from

(Continued on page 547)

Watery crescent of commerce divides Victoria on Hong Kong Island, foreground, and Kowloon beyond. Here, in one of the world's great harbors, ships in a steady stream load and unload, mainly by lighter.

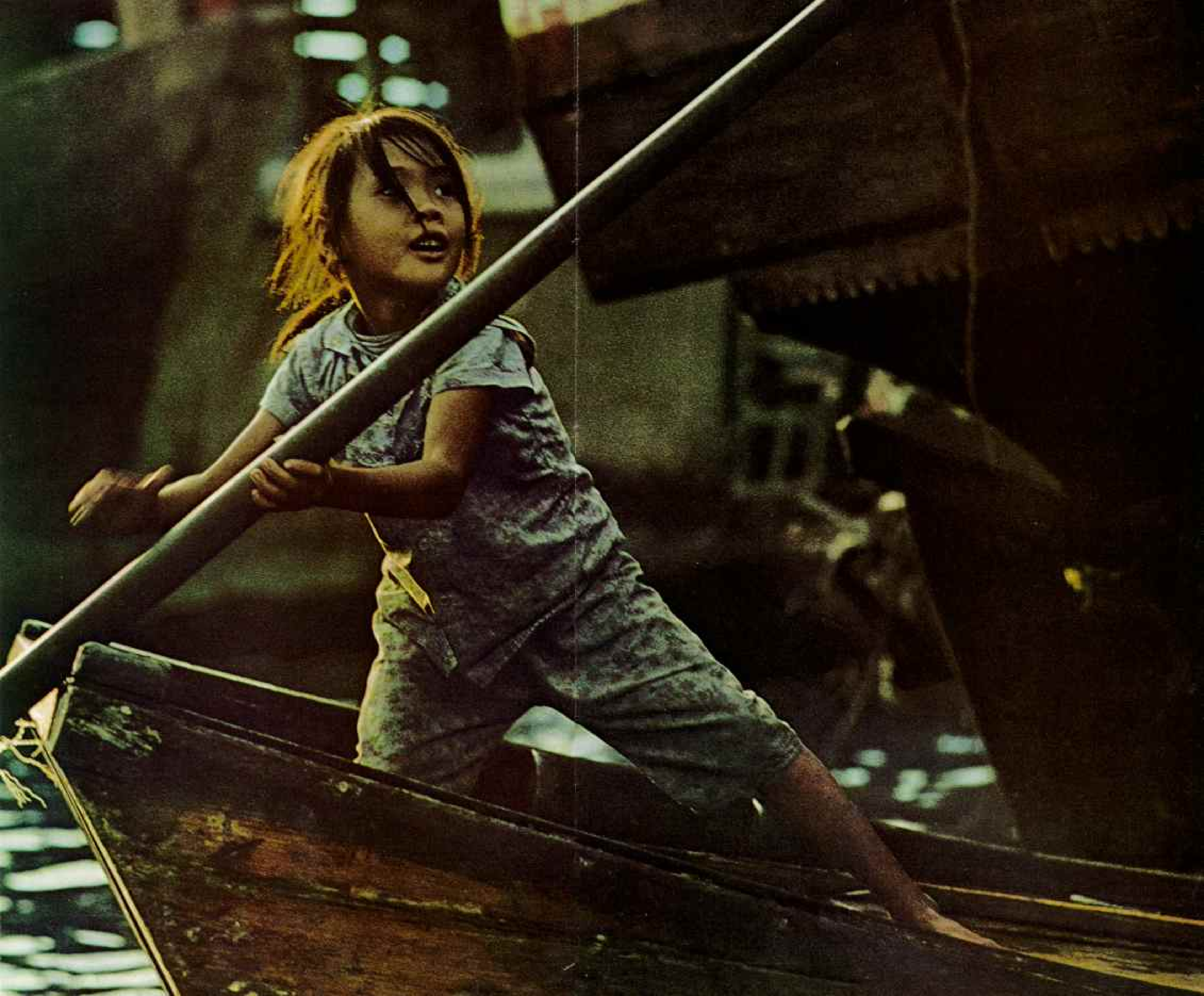
From a curbside jewel box, a hawker offers handfuls of jadeite and soapstone (**left**). Such merchants, filling the streets with their chants, charge what they can get. The scene recalls 1841, when the colony was founded and a journalist observed, "Hawkers of every description abound . . . fortune-tellers, jugglers, quacks, and actors." Hong Kong still puts few restrictions on free enterprise; there are no controls on minimum wages or hours worked by men. The workweek of women, however, now is restricted to 48 hours.

OPPOSITE PAGE
FOLDS OUT

Asian city with the look of London: In Victoria (**left**), a girl dodges amid double-decker buses and noonday crowds to deliver hot lunches to office workers. Of the colony's four million residents, nearly 99 percent are Chinese. More than half are Hong Kong born.

One of the last of Hong Kong's rickshas (**right**) hauls a housewife and her purchases. Authorities issue no new licenses —declaring the ricksha puller's job demeaning.

Caught in a gale, a woman finds a collapsed umbrella better than none. Typhoons pass near Hong Kong from May to November, sometimes causing severe damage.



China in the coldest of winters, and chatted in low tones with a fisherman.

"I came for work," he said, "and for my family, and for hope. My family is my hope."

He had escaped from a country that also entertains high hopes in Hong Kong. The Communist Bank of China wears gaudy red propaganda banners on October 1—the birthday of the People's Republic—and a solidly black balance sheet all the time. Mao Tse-tung annually dips out of that "cesspool of capitalism" a full third of China's foreign exchange. With the money, the People's Republic buys Canadian wheat, maintains embassies, builds railroads in Africa, and shops for gold and diamonds in London.

Yin and Yang Rule Colony's Life

"Baffling, infuriating, incomprehensible," wrote author Han Suyin of Hong Kong, "and [it] works splendidly."

Indeed it does. I spent several weeks last spring in this brilliant mirador of capitalist colonialism on the edge of China; it finally took a 79-year-old soothsayer, Chiang Chang Fai, to explain the place to me.

"Can you tell a city's fortune?" I asked.

"No, but I can tell you about cities."

"Hong Kong?"

"Yin and yang, of course."

Yin—female, negative, dark, north. Yang—male, positive, light, south. Centuries before Christ, Chinese philosophers had explained nature's harmony in terms of complementary, not competing, opposites. The Westerner finds Hong Kong romantic and fabled, like Samarkand and Timbuktu—and a baffling set of contradictions.* But Mr. Chiang and his four million brethren who live there find it as it should be, beautifully yin and yang.

I discussed with a multimillionaire the fact that a six-million-dollar stock issue that morning had been oversubscribed by a mere 75 million. On the same day, an official told me there were at least 50,000 people living on less than 70 Hong Kong dollars a month—about $12. In fact, no one knows how many poor there are; a 1969 survey placed the figure as high as 600,000.

Yang. Yin.

I saw a Western businessman being fitted for an $80 suit. "This suit," he said, "would cost me $130 at home." On a piecework basis, a man may have earned $10 for making the suit. A part of that profit he used wisely: He bet on the lottery.

Yin. Yang.

Please follow: After Britain wrested the island of Hong Kong from China to protect its opium trade, it acquired the Kowloon Peninsula across the harbor and later leased the New Territories beyond (map, following pages). Modern Peking does not recognize the legality of that lease. Yet when the colony tried to tear down some shanties in the old Walled City of Kowloon, Peking objected so loudly that the bulldozers were called off. The Walled City, China declared, was exempted from the lease—the lease that China does not recognize.

Yang. Yin.

Walk west on Queen's Road Central and you may shove your way into narrow streets with names like Wing On, Tung Man, Gilman's Bazaar, Wing Kut. Then up "Cat Street," with its shops stuffed full of antiques and porcelains, and you are in territory where people crowd a thousand to the acre, where you might step on somebody's dinner, and where the warm air sizzles with the friction generated by the passage of so many human beings. But climb up Victoria Peak and you find a solitude where hawks swoop and the South China Sea seems an empty space of cloud and sun to the world's end.

Communists Wrap Goods in Propaganda

Small wonder that Hong Kong, child of adversity, has become a legend in its own time.

Businessmen come, seeking to double their money in three years, and sailors come to sport with Suzie Wong, and refugees come, many swimming for ten hours across Deep Bay. But mostly, these days, tourists come with fat wallets and fallen arches. Their Hong Kong is Nathan Road in Kowloon (page 558) and the plush shopping arcades of Victoria.

"They buy both what we make, and what

*John Scofield wrote "Hong Kong Has Many Faces" in the January 1962 NATIONAL GEOGRAPHIC.

Boat for a bicycle, the harbor her classroom, a girl sculls through Aberdeen's floating city to deliver messages, visit friends, or transport tourists. "Water-borne People," as the junk-dwelling folk call themselves, strive to save enough money to send their children to school. Increasing numbers get there, though education in Hong Kong is neither free nor compulsory.

we import," said Robert Locking, a manager of the Hong Kong Trade Development Council. "This is a free port. You can buy Japanese cameras, Swiss watches, and British woolens for less here than almost anywhere else."

The Ocean Terminal and nearby Harbour Centre in Kowloon offer a dazzling promenade past 150 or more stores selling jewelry, watches, ginger jars, television sets, fine silks, furniture, shoes, handbags, pearls, and other many-splendored items. Only books seemed to elude me, and when I found them, they cost more than gold bracelet charms.

Exceptional buys may also be found in Hong Kong's Communist stores. The mainland goods are inside, the windows being reserved for portraits of Chairman Mao and monotonous sloganeering.

The Westerner who makes his way past the propaganda finds Shantung silk, Swatow lace, Peking carpets, fine ivory—always genuine, unlike that in some Hong Kong stalls—and sometimes agricultural delicacies, such as Ch'ingtao apples. Superb jade

HONG KONG

CROSSROADS OF THE ORIENT, Hong Kong coexists with a giant that could take it over any day; Chinese Premier Chou En-lai considers the colony an integral part of his nation. In 1839, when the Chinese sought to end the lucrative opium trade carried on by British merchants, war broke out. Britain, coveting Hong Kong's harbor as "a perfect shelter on all sides," won the enclave. In 1860 Britain acquired the Kowloon Peninsula, and in 1898 added more islands and the New Territories on a 99-year lease. Trade withered during the Japanese occupation of World War II. When the Communists came to power in China in 1949, Hong Kong saw refugees flood in; some were penniless, others enormously wealthy. Both contributed to today's industrial prosperity. British lion and Chinese dragon support the colony's shield.

British Crown Colony. **AREA:** 398 square miles. **POPULATION** (1971 census): 3,950,800, 80 percent of whom live in 15 square miles. **LANGUAGE:** English official; Cantonese, Mandarin. **CURRENCY:** $6.06 H.K. equals $1 U. S. **CLIMATE:** Subtropical, with temperatures averaging 60° to 80° F.; monsoons bring seasonal change. Summer is hot and humid, early winter sunny and drier.

at reasonable prices is also offered, but the work is modern; there is precious little antique jade left in all Hong Kong.

I had arrived at the beginning of New Year, the 4,669th spring of the ancient Chinese lunar calendar, the Year of the Pig. A huge, fat figure of a boar, glittering in golden neon, hung over busy Chater Road. There was a special scurry in the streets as women carried home small fruit trees just about to blossom, symbols of hoped-for bounty. Red envelopes of "lucky money"—a traditional New Year's gift—seemed to flutter in every hand. Businessmen made the rounds, honoring the custom that all debts must be paid at New Year. Every shop wore a banner proclaiming "*Kung Hei Fat Choy!*—May You Be Blessed With Prosperity!" The railroad station in Kowloon was jammed with exceptionally stout *amahs*, house servants, who were on their way to China to visit relatives —wearing four coats, three of which they would leave behind.

More than once I took that train from

BOUCHERIE © N.G.S.

Curtained hat identifies a Hakka farmwoman. A distinctive group of immigrant Chinese, Hakkas till hillsides in the New Territories, while Cantonese plow the richer valleys. Rice can be imported from Thailand and China at such low cost that most farmers grow vegetables instead, a variety for every soil and season, and as many as eight crops a year: cabbages, eggplants, chili peppers, maize, leeks, watercress. By tradition, field work falls to women; men more often seek jobs in Hong Kong's growing number of factories.

Kowloon and sat by the window as the people boxes of Hong Kong clattered by; then, after the streaking dark of the tunnel under Lion Rock, the waters of Tolo Harbour opened a wide blue horizon and the fresh green fields of the New Territories rolled by.

I came to know this rural region of the colony well, and I loved to wander its fields or sit in a silent monastery grove overlooking the lovely inlet called Sha Tin Hoi. There I could ponder the fact that when the lease for the New Territories runs out in 26 years, its 365 square miles will revert to China. Is Hong Kong worried about this?

"If China wanted the New Territories, Mao could have them tomorrow," a realistic Briton told me. "That lease is one of those 'unequal treaties' that China has rejected. Besides, 26 years is a long time off by Hong Kong standards."

What is left of old China is tucked away in the New Territories. I went out one day in a helicopter carrying a medical doctor on his rounds. His services were paid for by the Royal Hong Kong Jockey Club. The annual amount the Jockey Club spends on charity is never announced. It derives from the earnings of the Saturday horse races and lottery, and that is a lot of money.

We visited a village in the far northeast of the colony, Wu Kau Tang, swooping down upon it like a bird of prey. The rotor blades whack-whacked to a stop, and the women and children came out of the grass. Beyond, the gray-brick town, a small hive of streets where wandered an occasional dog or goat. Around, emerald fields, hand tended.

The villagers would not talk to this odd stranger who had come out of that loud machine. While the doctor looked down throats and took temperatures, I sat on the hill and listened to the silence, the buzzing of a fly. Mute before me lay the oldest of Chinas, dozing away the centuries. The men had gone away to the factories of Hong Kong, or even to Britain to work in Chinese restaurants.

Looms Pound Out the Colony's Pulse

If the capital flowing in and through Hong Kong's veins has a pounding heart, it is in the huge textile mills that have been running nonstop, 24 hours a day, 361 days a year (they close only on Western and Chinese New Year holidays) for more than 20 years.

One of the largest of them is the South Sea Textile Manufacturing Company, Ltd., a vast complex of spinning, carding, and weaving

mills scattered along Castle Peak Road.

Mr. Ditmar Y. M. Chang, the mill manager, guided me through labyrinthine weaving rooms, where a thousand shuttles smacked back and forth like well-hit baseballs.

"We started with about 5,000 spindles," he shouted above the roar. "We now have 58,700. Nearly half of Hong Kong's industrial workers make textiles and garments."

We reached a haven of quiet in a room displaying shirts, dresses, and tablecloths, made from the mill's river of fabric.

When the company had been in Shanghai, I learned, its trademark was a double fish. Now, I saw, it was a flying fish. The mill had flown away from Shanghai in 1948, as the Communists were taking over China.

So did many others, with names like Nanyang, Wyler, East Sun—and the bankers and power-company and insurance executives came with them, shepherding enormous wealth. Their arrival coincided with two other events that would bring great changes to Hong Kong. First, refugees flooded into the colony looking for ways to make a living. Then the Korean war imposed restrictions on trade with China. Overnight Hong Kong, the entrepôt, lost its reason for being.

But Shanghai money and talent soon went to work, and Hong Kong, whose traders and wheeler-dealers had never manufactured anything, started making almost everything and underselling almost everybody.*

Business Easy in Asia's "Switzerland"

To this day, the phrase "He came down from Shanghai" indicates influence and wealth. Among those who came were two remarkable brothers, Lawrence and Horace Kadoorie, sons of Baghdad-born philanthropist Sir Elly Kadoorie.

Like many Hong Kong men of means, the Kadoories devote much time and concern to improving the lot of the less fortunate. The Kadoorie Agricultural Aid Association in the New Territories has, by both gift and example, made successful capitalists out of once poverty-stricken farmers.

Today, Lawrence heads the China Light and Power Company, Ltd. I called on him in a suite atop his new skyscraper overlooking the harbor. "My father arrived in that harbor on May 20, 1880," the soft-spoken industrialist said. "Hong Kong is simply the easiest place on earth to do business. Everyone needs a Switzerland, a neutral place where nations and men can trade goods and ideas. This is such a place. There is no public debt. Taxes are a straight 15 percent, and only on money made in the colony. There are 70 banks dealing in all currencies. Everything is on a cash basis; a five-year investment is a long one."

Almost anyone can play the Hong Kong game, I already knew. It costs only 25 dollars ($4.12 U. S.), and the time to fill in a few forms, to set yourself up in business.

Practically deafened by the clashing of coin and crinkle of bills, I left the executive suites and descended to the Star Ferry ramp, where I slumped down beside one of the last of the rickshas. This old trademark of the Orient is doomed to disappear; the government issues no more licenses, since almost everyone (except ricksha men) considers it a degrading occupation. There are only about 170 left in the colony (page 544).

There Are Many Ways to Meet a City

Moving around in any form is one of Hong Kong's pleasures. I never tired of riding the upper deck of a streetcar, especially at night, when the trolley swam through the neon and the crowds flowed beneath my view. I liked even more the squat little boats called *wallah wallahs* that bounce back and forth across the harbor after the Star Ferry closes down for the night. They hold about a dozen people each and introduce the visitor to some of the more interesting of the hometown folk.

Hong Kong's most famous ride is that to the top of Victoria Peak on the tram. It takes about 10 minutes as the car crawls up at a horrifying 45-degree angle; the vista from the top is among the supreme city views in the world (pages 542-4).

But the only way really to discover the city is by foot, walking the ladder streets where thousands cook, sleep, chatter, and sell luscious fruits and crisp vegetables; where boys skitter down slopes so steep that no wheels are needed on their flat boards; where barbers snip and snap in tune with the click and clack of mah-jongg pieces (as the action gets hot, the game sounds like a machine gun), and wizened old ladies, clutching frayed messages from the mainland, crouch beside a fat, bespectacled letter writer, or *shu shun lo*.

There was always something touching in the scene. *Please tell my beloved brother that I am well* . . . The small brush skims over the paper the lady has provided. At the end she would give him a few cents. I thought, always,

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

Cotton of many colors, fresh from dye vats, dries at a Kowloon towel factory, one of thousands of small plants that help make textiles and clothing the colony's major enterprise. In most shops, men labor 10 hours a day 6 days a week. The per capita annual income of $700 U. S. is third highest in the Far East, after Japan and Singapore.

Getting a glint in her eye, a plastic doll called "Dawn" acquires painted highlights at a Victoria factory. Such firms import synthetic compounds and mold toys, flowers, and household items. The United States is the major customer.

of Ssu-k'ung Shu's fine eighth-century poem:

Remember my head growing white among strangers,
When you look on the blue of the mountains of home.

Sometimes I started before dawn and climbed the hill past the U. S. Consulate General on Garden Road. Like everything else in Hong Kong, it has a whopping statistic —it is the world's largest consulate. Why?

"With 450 U. S. firms doing business here," a banker had told me, "there is a tremendous amount of trade. Also, the place is packed full of China experts, looking toward the day when relations improve."

Ballet at Dawn Brings Inner Peace

I went my solitary way to the top of the hill and joined others waiting for dawn under a huge looking-glass tree. At first light, the men near me would stretch their arms and begin a flowing series of exercises which Westerners call by the ludicrous name of Chinese shadowboxing. It is a personal, individual, beautiful ballet based on the idea that all life is change, and to change from one posture to another through the 108 succeeding forms puts the participant in touch with the rhythm of the universe and renders him the gifts of inner peace and tranquillity.

A woman with a little English gave me a rudimentary lesson, knowing full well it was hopeless. She taught me a form called "Finding Needle at Bottom of Sea," and one known as "Grasping the Bird's Tail." As day spread a high blue sky, flecked with shining pink clouds, and the city's towers rose from night below us, my companion smiled and said, "Now, Step Up to Form Seven Stars."

Finding needle at bottom of sea—a good motto for that band of Westerners who practice the craft of China-watching.

"I am convinced you can find out more about China by careful watching from Hong Kong than you can on a guided tour of the country," said a veteran wire-service reporter.

In every foreign correspondent's office, a teletype spews New China News Agency stories, in English direct from Peking. Radio and TV programs in China are monitored from various outposts around it (page 561).

"The regional broadcasts," one watcher told me, "really give you the news. These are programs broadcast in Hunan, or Shansi, or Tibet, aimed at local people to give

(Continued on page 559)

Chinese waters:

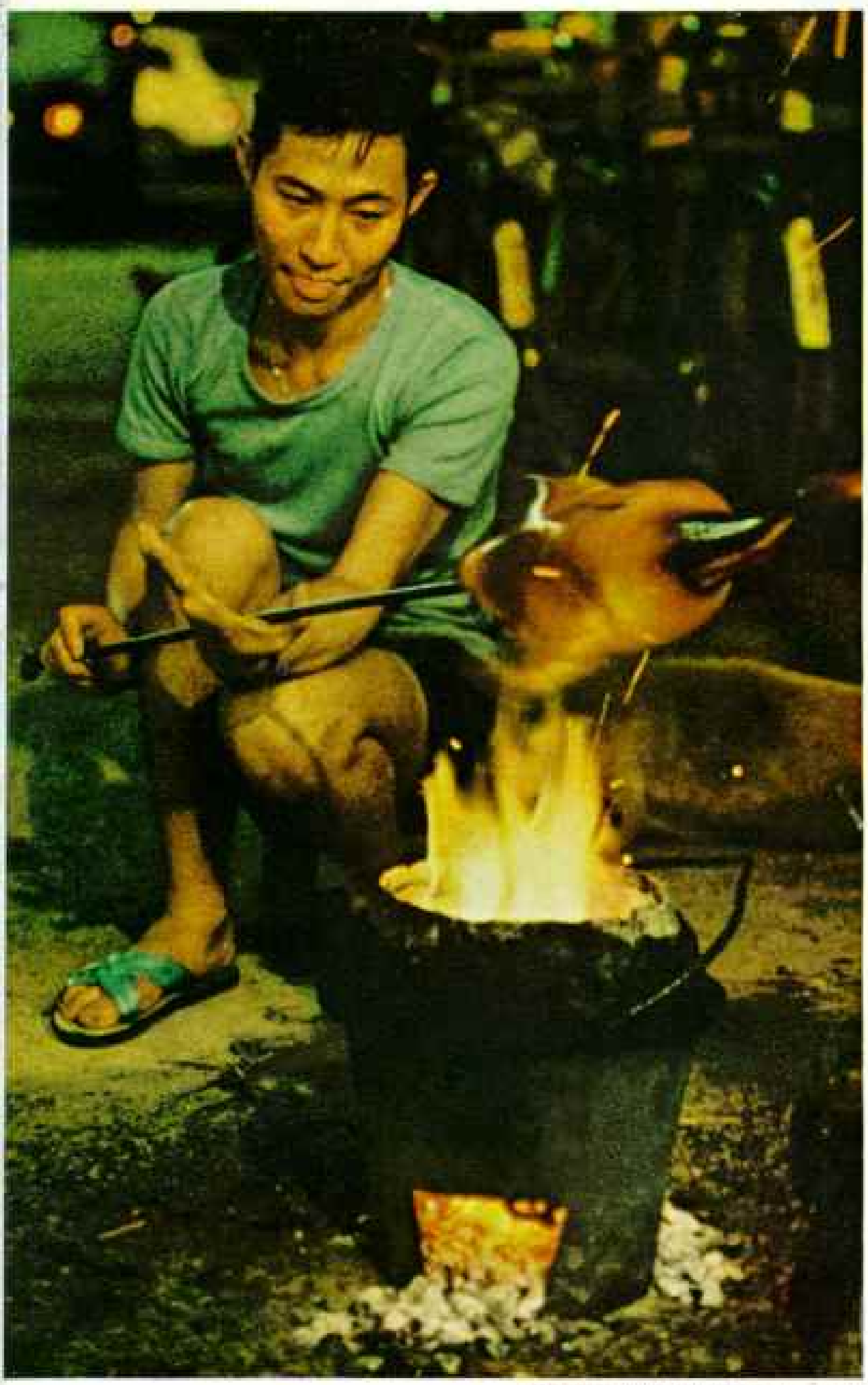
"GRASP REVOLUTION" urges the slogan painted on a junk from China (**above**). The sail-powered vessel brings inexpensive raw materials and foodstuffs to feed Hong Kong's factories and kitchens. China, in turn, benefits from the capitalistic outpost on her doorstep; a third of her foreign currency flows in from Hong Kong.

Junk owner submits a colony license to a Hong Kong harbor

byways to profit or doom

patrolman (**left**). Despite policing, illegal traffic in drugs and refugees often goes undetected in the crowded harbors.

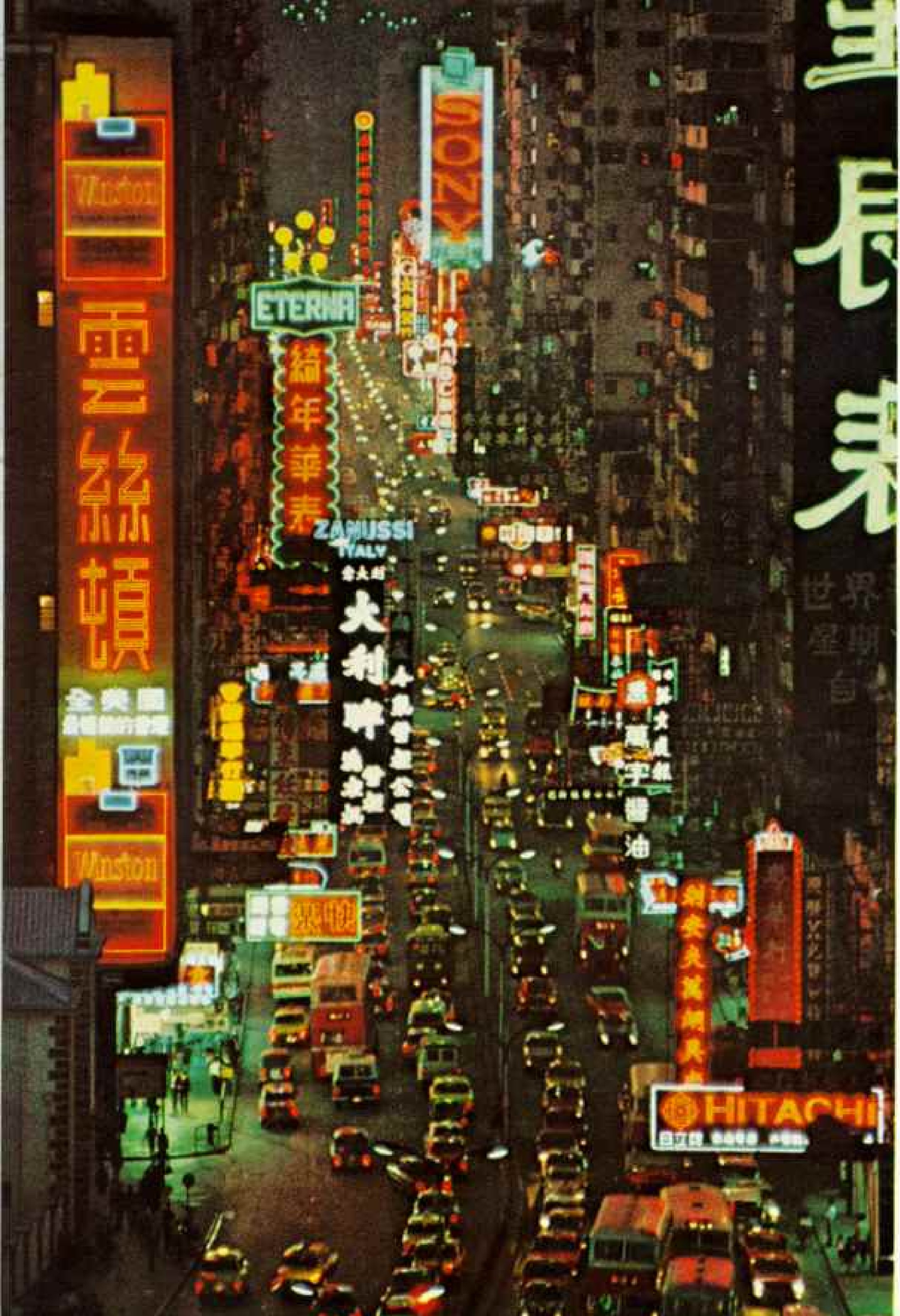
An escape route for China's disaffected, Deep Bay spreads beyond an oyster gatherer (**right**); she speeds across bay-side flats on a mud scooter, her kerchief bulging with her catch. Fugitives hiding in the looming hills of China chance death to swim this three-mile stretch. Still, open water offers more hope than the heavily guarded land border. In 1962 the refugee flow peaked at 142,000; even now 10,000 reach Hong Kong annually.



Culinary art of China, in all its regional varieties, flourishes in Hong Kong. Sidewalk vendor in Sha Tin (**left**) roasts a succulent duck over charcoal. A passerby will enjoy it at a nearby table or take it home.

Eggs, appearing in markets and on tables in many guises, symbolize tranquility, fertility, and good luck. Those aged in black mud (**right**) become partially hardened; they add seasoning to pork dishes. Forks that scraped off the mud created the stripes.

Golden yolks (**below**), salted and dried in the sun, keep without refrigeration. They are steamed with rice or cooked in Cantonese moon cakes, served at festival time.


Winston
ETERNA
ZANUSSI
ITALY
HITACHI

them the word. You get straight stuff—names, policy statements, texts of editorials."

A lot of material flows through Hong Kong itself. Chinese propaganda films fill many of the local screens. I went to see one called *The Red Lantern*—a stilted opera full of posturing and moralizing that left me exceedingly dry. Afterward, I stopped in a teahouse owned by a Communist who was making a tidy profit, at least that evening, from the parching effects of his party's ideology.

For some watchers, those who hold hard-to-come-by memberships, a good source of news is the Marco Polo Club, where Communist businessmen and journalists gather.

To each his own watcher. My choice has to be Mr. Guy Searls because, when I came upon him, he was actually watching something, and through a telescope! As I stepped into his cluttered top-floor apartment, in a building near the Causeway Bay Typhoon Anchorage, he was hunched behind the eyepiece, gazing intently toward mysterious China.

"Come in," said Guy. He laughed at my suggestion and said, "No, quite the opposite. I'm looking for the moon, not Mao."

Guy is the hermit among China-watchers, and his bachelor cave is something to behold. The ticker from Peking chatters away in a study; more than 3,000 books on things Chinese elbow each other off the shelves, a small radio studio occupies a corner near a smashing collection of Mao buttons, and huge mounds of studies, releases, transcripts, and memorandums seem to have drifted into careless piles on every flat surface.

"I've spent 19 years here, watching China for various newspapers and broadcasters," Guy told me, glancing instinctively toward the window. "More particularly, the whole of the Communist world. You can't tell much about China unless you keep an eye and an ear on Albania and Russia."

Example: Guy pieced together from speeches by cadre members, news releases, and party statements—some delivered in Europe—the story of a Chinese incursion into Tibet, although that country was never mentioned in any of the documents.

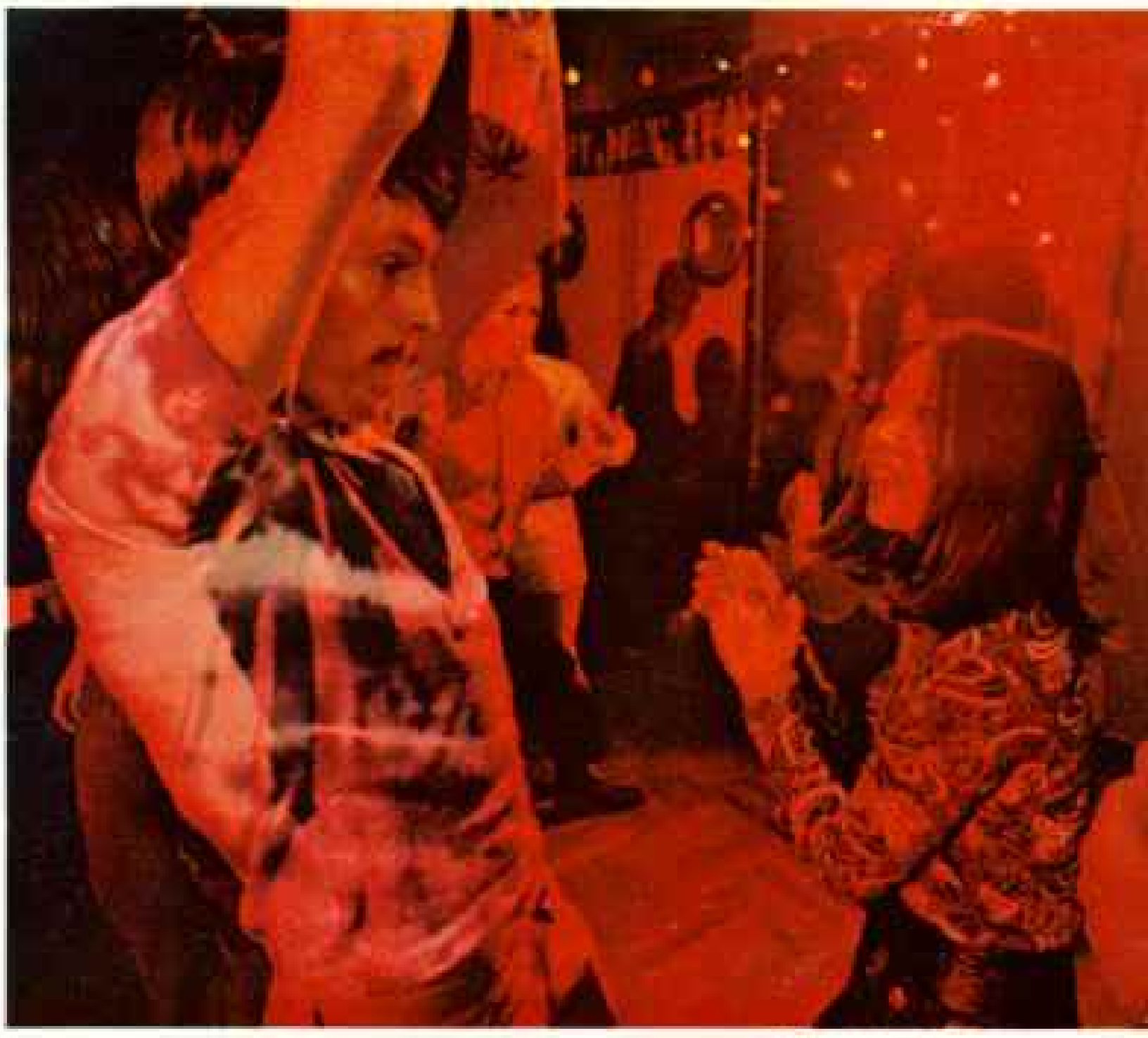
Riots Helped Hong Kong Grow Up

As we talked, a sudden fog welled up in the harbor, and the lights of Hong Kong were slowly, one by one, misted over.

"I've never seen it quite this bad," Guy said, "but then I'm used to looking into fog."

During the riots of 1967, the local Communists needed a seasoned Hong Kong-watcher.

"They badly miscalculated the temper of this city," a Chinese lawyer told me. "When the government stood firm and the demonstrations and strikes failed, the Communists



Neon-coated heart of Hong Kong, Nathan Road in Kowloon (left) throbs with shoppers purchasing imported goods at free-port prices: Japanese radios and cameras, British tweeds, French perfumes, Swiss watches. Such bargains lure visitors to Hong Kong; their number jumped to a million last year.

Grooving to a Western beat, dancers gyrate at the Yellow Submarine in Kowloon. Here and in the waterfront district of Wan Chai, real-life home of the fictional Suzie Wong, scores of bars cater to servicemen on leave.

On side streets peddlers openly offer heroin in neat packets, though the traffic was outlawed in 1946. More than 80,000 residents take drugs, contributing to a growing crime rate.

resorted to bombs and killed innocent people. They have never lived it down."

No one who agonized through the long crisis of 1967 will ever forget that tense summer. The subject reappears constantly in Hong Kong conversations today. The colony, in coming through that turmoil, achieved an identity it had never had before.

"We grew up in 1967," Hugh Barton, a longtime resident told me. "Before that, anyone who was here had come to make his pile and then move on somewhere to enjoy it. In '67 we all began to think, this is *our* place. A lot of pride came out of that mess."

Water People Gradually Come Ashore

If Hong Kong is anyone's place, it belongs to the Shiu Sheung Yan, the Water-borne People. I first came upon them when my car turned a high curve near Aberdeen and I looked down on a vast forest of rafted junks and sampans, bearing for New Year a foliage of red banners. The floating city, home to 20,000 people, had a look of natural permanence, as though it had grown like driftwood from the very sea (pages 566-7).

Indeed, as many as 140,000 water people have lived at Aberdeen, and at Tai Po and Castle Peak Bay and other places along the South China coast, since time immemorial. Increasingly, however, they are being lured ashore by industry and better housing.

More importantly, the population of Hong Kong has all but emptied local inshore waters of fish. The family junks that worked those waters once numbered near 10,000. Now fewer than 5,000 are left.

"Our total catch is still as large," Mr. E. H. Nichols, Director of the Department of Agriculture and Fisheries, had told me. "But it is now made with big motorized junks equipped for longline fishing, and with an expanding fleet of modern trawlers and seiners that work grounds 150 miles out, all the way from Hainan to Taiwan. I am the man who is taking the romance of the batwing sail out of Hong Kong waters, I suppose, and it is a shame to see the old boats go. But consider the fishermen's welfare and the problem of feeding this colony. Every day we consume 6,000 pigs, 100,000 chickens, 1,000 metric tons of rice, 1,200 metric tons of vegetables, and 300 metric tons of fish. Every day! No wonder we are fishing in 60 fathoms."

The water people, whose whole life-style is suffering because of modern technology, have also run head on into modern politics. Their nets have always followed the fish, wherever they led; their junks have always run before a gale to shelter, wherever it offered. Today, that might well be Communist China. So most of the Hong Kong fishing fleet is also registered in China, and a certain portion of the catch must be landed there.

A light drizzle was misting along the beach, but Lai Luk Kwok was waiting, standing as easily as a gull in the bow of his sampan. I jumped aboard and greeted his handsome wife, Lai Yau Kin, and two daughters.

Working a long sweep from the port side, Mr. Lai sculled us into a watercolor—a cool gray wash of sea and sky.

"When my father fished for garoupa," he said, "and caught a pomfret instead, he apologized to the fish and threw it back."

Yau Fook, aged 9, is the first girl of five generations of the Lai family to attend a school. Other daughters are now living and working ashore, two in a transistor factory, two in a garment factory. The children's earning ability is the only social security the family may ever know.

Who Would Live on the Wobbly Land?

Late in the morning a mist near Tsing Yi Island thickened imperceptibly into a fine rain, then low clouds and gray sea melded and a steady rain slanted across the dry sides of the island. Little Yau Tak, aged 4, helped roll down the bamboo roof, then cupped her tiny hand to catch a silver fall of raindrops. Fishing junks near us loomed in the mist, then passed silently as clouds, all sounds and colors muted.

"It's better to live on a boat," said Mr. Lai.

I asked Lai Yau Kin if she did not want to move ashore, like her daughters.

"Why?" she replied, obviously embarrassed at such a stupid question from a foreigner. "To live on land costs money. Everything you do not need, you must pay for. Besides, a friend of mine moved to land and she was always landsick. She tried to chop firewood, but the logs kept moving and she couldn't hit them straight. Everything on land is so firm, a person can hardly stand up straight."

I agreed it was no place for a person to live out her life. But already 40,000 of her people have gone to that wobbly shore, where they live in square rooms and watch TV, beyond

EXTRAORDINARY © N.B.C.

China-watchers know no hours. At sundown a crew from NBC News assembles a TV antenna on 3,144-foot Tai Mo Shan, the colony's highest peak, to monitor broadcasts from Canton. Often they see only propaganda films, such as this one about workers reading Mao's sayings (**right**). Sometimes the screen shows celebrations, receptions, and military training maneuvers—albeit five to seven days old. The most significant news events are rebroadcast in the United States.

The 120 foreign journalists living in Hong Kong also talk to refugees and local Communists and read reports from around the world; thus, they believe, they learn more about China than if they lived under censorship restrictions in Peking.

Spider-web scaffold of bamboo—sturdier than it looks—satisfies construction workers, who distrust any other kind. This man helps build a luxury apartment house on Victoria Peak. Demand for building sites encourages creation of new land like that in Wan Chai, beyond. A prime site nearby sold for more than $800 U. S. a square foot.

With builders unable to keep pace with demand, many residents—despite rising incomes—still live as squatters or in simple cottages, such as these on a Kowloon hillside (**left**). In the poorest sections, eight or more people may share a room, sleeping in shifts. The colony has one of the world's highest tuberculosis rates, but struggles to curb it.

Freed from a teeming tenement, a factory worker's family enjoys a modern one-bedroom flat in Wah Fu Estate near Aberdeen. Laundry flaps from a balcony pole. The government-financed estate houses 54,000 people, providing them with shops, clinics, and markets. One of more than 30 huge developments, Wah Fu accepts artisans, tradesmen, and office workers who earn the equivalent of $66 to $150 U.S. a month; rent takes $15 to $22. Thousands of applicants await openings in such instant cities.

the reach of the typhoon—or the grandeur of a silver drop of rain in a small palm.

When the water people become a part of what economists jargonize as "labor-intensive" industries, they will live in resettlement estates, huge barracks swarming with people who provide the power to run the profit machine.

"It takes a disaster to move this city," said resettlement official Har Chan-Kwok. The disaster in point occurred on Christmas night, 1953, when a torrent of fire swept through a squatter area, and more than 50,000 people found themselves homeless.

Before the fire the colony had hoped that all those people would somehow go home. "But we realized then we had to redouble efforts to house them," Mr. Har said.

Thus far the colony has built close to 500 massive housing units for more than a million men, women, and children (pages 566-7). Despite the Herculean effort, there are still 360,000 people living in shantytowns.

Vendors Clog Steep-walled Streets

I went out, more than once, to Wong Tai Sin in Kowloon, wandering between walls of apartments aflutter with Hong Kong's "national flag," laundry flapping from poles.

In the 2.2-square-mile district around me 620,000 souls were divided up in a nightmare game of monopoly into resettlement estates, low-cost housing projects, three cottage areas, factories, and one vast squatter area.

I called upon Mr. Lau Kwok Leung, the officer in charge of the Wong Tai Sin Resettlement Estate's 78,268 persons. He was interviewing a distressed woman. Her complaint was the usual one—6½ people in her family were living in 120 square feet, a space little larger than the average U.S. rug.

"How do you measure half a person?" I asked Mr. Lau.

"A child under 10," he replied.

There are only two main streets in the district, and both are clogged with the carts and counters of hawkers. The few stores in the resettlement estates are inadequate to supply the needs of the people, so the hawkers congregate in such numbers that they make deliveries to and from the factories impossible.

Superintendent Ko Chun, one of the highest ranking Chinese in the police force, greeted me, and we set out in his Land-Rover.

"I'll show you our problem," the superintendent said, but the problem came out to show itself. We turned into a narrow street

and a tide of humanity began to flow past our windows, a flood of bodies that made the going all but impossible. Only by continuous resort to the horn and pushing into the mob were we able to inch forward.

"In this industrial area there are 1,300 factories, making transistors, artificial flowers, television sets. Right now there are about 100,000 people on the streets around us. It is lunchtime. But there are few markets and restaurants. So they buy from hawkers, and you can see what happens."

The colony's yin and yang were never more apparent. If the workers did not eat and did not work, what goods would be moving out of the factories?

I mentioned this problem to a police official on the Victoria side, and he smiled.

"Yes," he said. "Exactly."

Quiet Reigned in the "Good Old Days"

The twilight of the Victorian "sun that never sets" falls across the ornate white facade of the Hong Kong Club and immaculate lawn of the nearby cricket pitch. The three-acre field will soon become a public park, to the intense distaste of the members.

"I remember Hong Kong," said a longtime member, "when it was the best-lit cemetery east of Suez. This was once such a beautiful quiet place, dear God! It's far too late for me to go to England now. So, here I am, what's left of the empire.

"Yes, I'm an imperialist, by God I am, an unregenerate one. I've lived one, and I'll die one. I am doing some writing and reading, and I would not own an infernal television set if you gave me one. Why should I—the news has been bad for more than thirty years!"

Hong Kong is almost callous to Cassandras; it has heard so many dire portents that it finds them slightly boring. There is, however, one troublesome trend in the growing restlessness of the young. A large part of crime is due to Teddy boys, jazzy young drifters who leave the family authority behind, adopt "mod" dress, and regularly pounce on each other or a chosen victim for robbery and assault.

I met two boys on the train at Fanling one day. I asked if they were students. The brighter one scoffed.

"No, I'm a Teddy boy. Give me a cigarette. We're going dancing and have some fun."

"Where do you go?"

"Wherever we want to, man!" They both laughed louder than was necessary.

The train rolled along in silence for a while. Then my seat companion, an older man who lived in the country, spoke:

"They are *not* Chinese," he said, with finality. "But, then, what are they?"

The question nagged at me, and later I asked Lily Kwan, a young city district officer, about it.

"We do have a tremendous generation gap," she replied without hesitation. "Close to half our population is under 20. These are not people who fled from China, but boys and girls born and raised and educated in Hong Kong. They are frustrated and bored with the life here; they want something more than a sewing machine eight hours a day for the rest of their lives. The old people are content with having found a refuge. But the young want more than that."

What?

A man with a controversial answer is Ma Man-Fai, who runs the United Nations Association of Hong Kong, a private organization that supports U.N. ideals. His old cluttered office occupies a long room above a barbershop on Wyndham Street, but there is nothing cluttered about his mind. He is one of the few who believe that Hong Kong should be a self-governing, open city, controlled by neither China nor Britain.

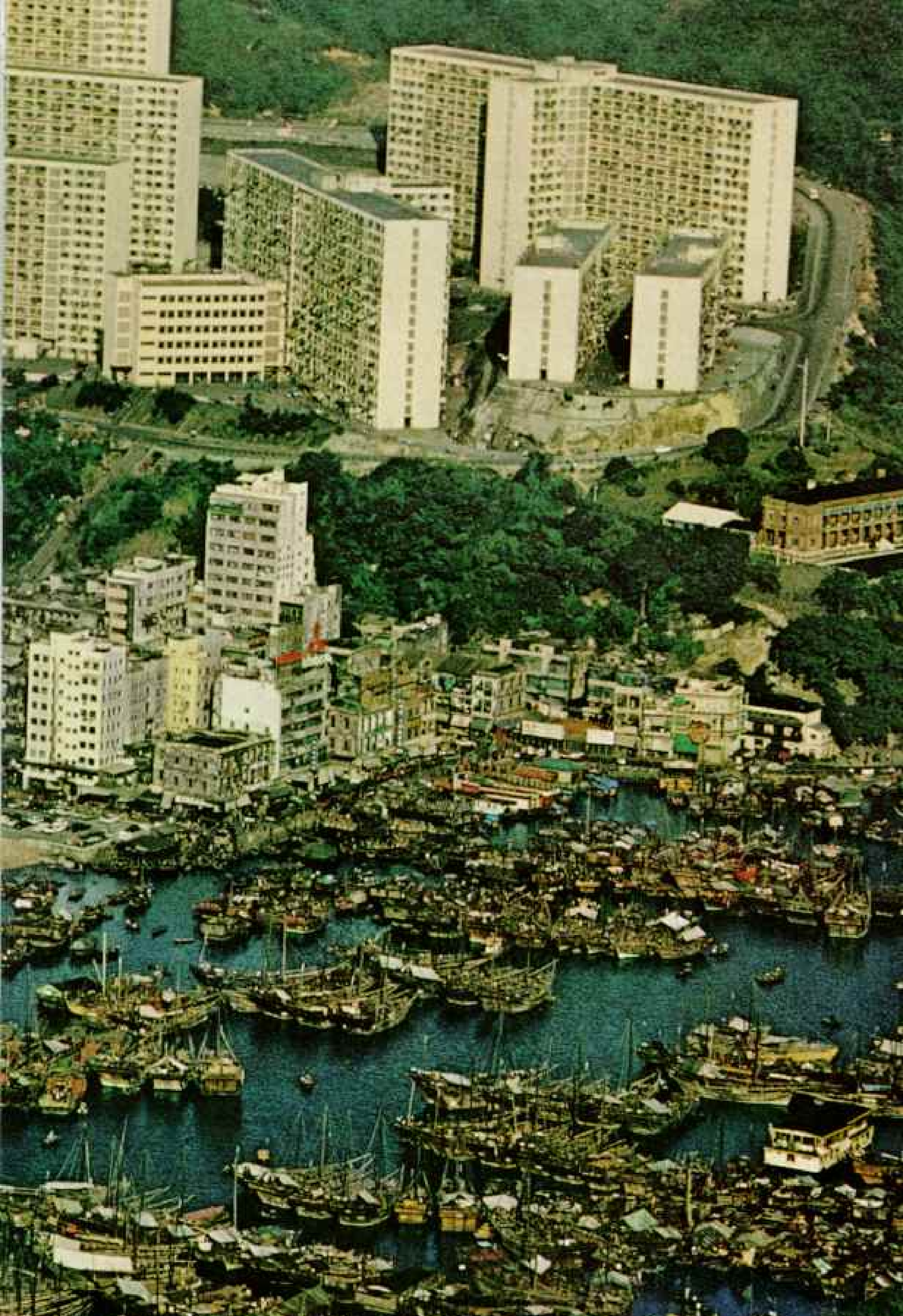
"Why shouldn't the local boys run the city?" he asked. "Everyone wants to be master of his own fate. If China tolerates a colonial government here, why wouldn't it tolerate a better government? This is a Chinese city. But I'll tell you what kind of chance the local boys have of running their own affairs—not a Chinaman's chance.

"All I ask is for the government to reduce the disparity between rich and poor, to make the poor here lead less desperate lives. Is that too much to ask?"

I made my way through the usual hullabaloo of Queen's Road Central one morning, past shops where pressed ducks hung in translucent rows and wide baskets offered

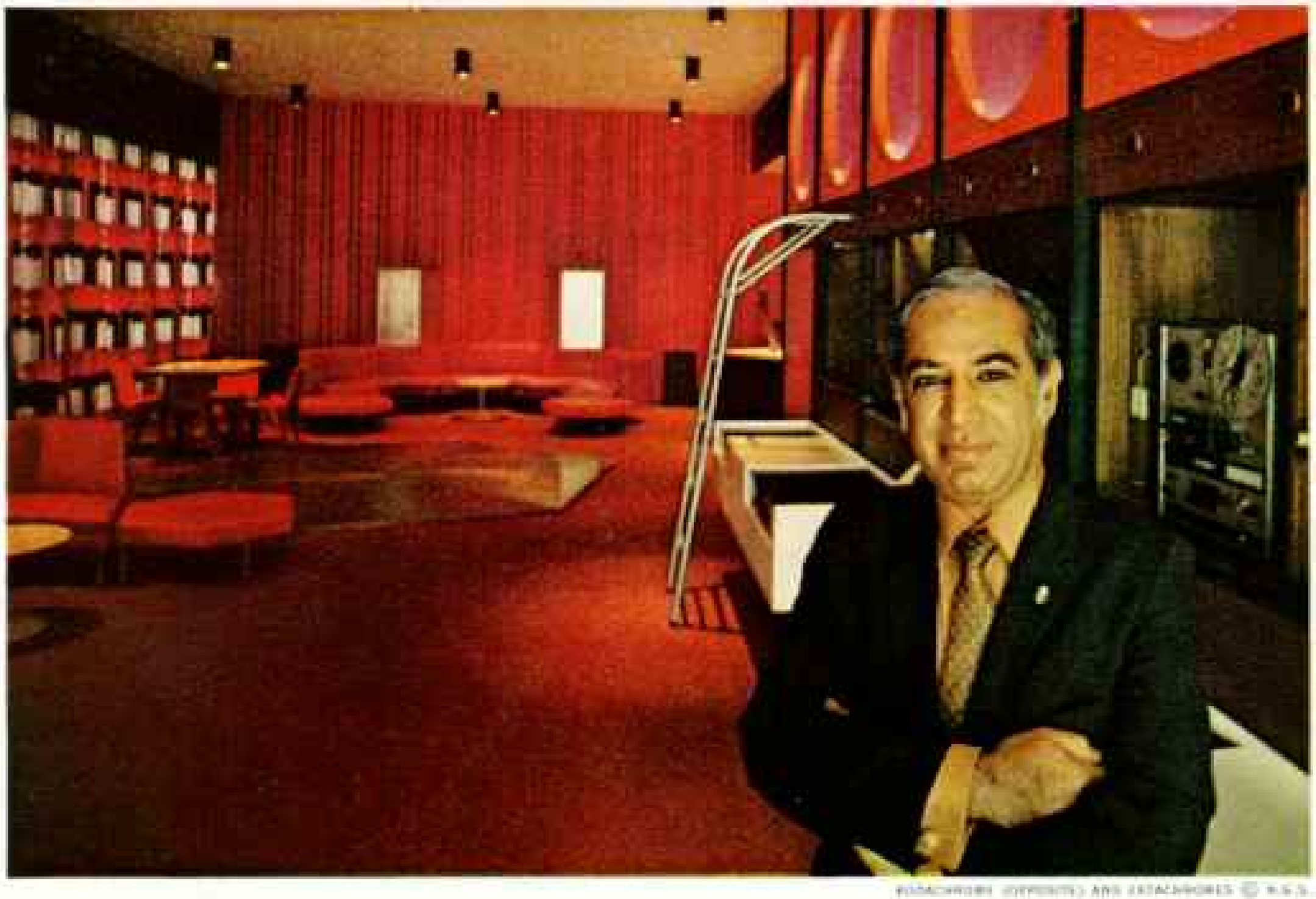
(Continued on page 571)

Nowhere to go but up: Aberdeen junk and sampan dwellers gradually desert their life on the water, many for the massive towers of Shek Pai Wan Resettlement Estate (**following pages**). The complex scarcely relieves congestion; with an average of 2,500 people per acre, such estates crowd together as many people as do the slums.



Car of kings, a Rolls-Royce brings quick status, even if it's only rented. The doll heralds a wedding procession. Hong Kong's Chinese spend lavishly on such family ceremonies.

Palatial playroom in the new 40-bedroom, 39-bath mansion of Hari Harilela and his five brothers entertains their children with television, music, and psychedelic light shows. Ladder reaches overhead storage cabinets. The hotel and real estate magnate, born in India, came to the colony in 1934 from Canton. He typifies the people of many nationalities who seek fortunes in Hong Kong's freewheeling business atmosphere.



Size doesn't count, a terrier seems to say at a children's pet show (**left**), as Susan Simpson leads her distracted Afghan past the judge. Pet owners parade on grounds of the H.M.S. *Tamar* Royal Navy Base.

Most of the British in Hong Kong—about 15,000—are temporary residents, families of government and military personnel.

Beauty between two worlds: A Chinese model lends glamor to a hotel fashion show. Women of Hong Kong increasingly find jobs in expanding factories; they attend school and birth-control clinics, and many invest in real estate. At the same time they may defer to ancient custom, seeking out a Chinese herbalist for medical advice or a fortune-teller for help with personal problems. A few still abide by their parents' choice of a husband.

rice and skin and stomach linings and livers, to the office of Choi Park Lai, geomancer.

Mr. Choi, an immaculate man in a blue silk gown, was seated at a desk placed at an angle in one corner. A row of plants on a small balcony cast a relaxing green haze over the room. Before the geomancer were a large brass compass and an ancient edition of the *I Ching*, that mysterious classic of divination and philosophy from the dawn of Chinese literature. Parts of it may be 3,000 years old.

Wind and Water Bless a Burial Place

Like his father before him, and his grandfather, Mr. Choi is learned in the arcane mystical science known as *fung shui*, a phrase that translates literally as "wind and water."

"The prevailing winds and the location of running water," said Mr. Choi, "are of primary importance for proper burials. So are the presence of nearby hills, the contour of the land and its direction. Important because the price for an improper burial site is very high—nothing less than misfortune visited upon sons and their sons. A proper burial keeps the spirit at rest, and beneficent influences flow from it like rays from the sun."

Choi Park Lai walks the hills and valleys with his compass and decides on the exactly proper spot and orientation of a grave. He does the same for desks, houses, and chairs, for gardens and walks, and for entire buildings, including skyscrapers.

Ridiculous, oh ye of Western mind? I visited a grave just off Twisk Road, a site selected long, long ago by Tang Foo-hip, a fung shui expert of extraordinary powers. It is called "Crescent Moon Shining on the Lake," and once, so they say, had a commemorative tablet by the poet Pai Yuk Sin Sze. The poem, written some 2,000 years ago, read in part:

In deep night throughout the harbor
a thousand lights appear;
And in their paths, ten thousand
ships pass.

The fleets of the world have indeed found this superlative anchorage, and the sailors have found Wan Chai, that traditional world of all the Suzie Wongs. (Of the 44 pages of Wongs in the telephone directory, there is no Suzie.) And it is something else, as they say, along Hennessy Road.

One evening I looked up a China hand who knows the terrain, and we set off around midnight to make an informal sociological survey of the neighborhood centered on the China Fleet Club. There were scores of bars filled with visiting sailors; each had its huge, garish neon sign, its jukebox or tired band, and its complement of ladies. An American aircraft carrier was anchored in the outer roadstead that night, and most of her crew, it seemed, was anchored in Wan Chai.

The representative bars have an institutional figure called "mama-san," a matronly, amiable, garrulous, and straightforward woman who permits the sailors to fraternize with any of a covey of young ladies. The price of the chatter—a small glass of tea or Coca-Cola for the lady, at ten Hong Kong dollars. To sailors who had been staring at the Viet Nam horizon, that seemed a bargain, even if the English was sometimes limited to "Hi ya, Joe! How's tricks?"

One of the girls was thinking of marrying an American sailor and asked me how to go about it.

"I think his ship has sailed," said her friend sadly.

Respite From the Money-go-round

Wan Chai's endless parade of gaudy dives and tawdry nightclubs points up a feature of the city that escapes the transient tourist: It is one of the most redundant places in the world. Whatever is profitable is multiplied tenfold, a hundredfold, a thousandfold.

Then must the jaded journalist repair to a haven of refreshment and calm. In my case it was to the west, where the archipelago throws off a large humpbacked island named Tai Yue Shan, or Lantau (map, page 548). Its barren but breezy highlands offer space and light, a lustrous beach spreads along the southern skirt, and a narrow road climbs steeply upward, past Shek Pik Reservoir,

Chinese classic lives on in a maiden's pose; Amy Yip portrays the heroine in a hotel restaurant's adaptation of the opera *Long Escorting Journey*. The Hong Kong-born 19-year-old began her dancing career at 14, the usual age for entering the colony's job market. Few young people show interest in the traditional arts, but all—even the most rebellious—find common ground with their elders in the pride of being Chinese.

toward the remote serenity of the clouds. There, under the brow of the highest peak, the Buddhist Monastery of the Precious Lotus turns its back on the colony's frenetic money-go-round and stares out over the South China Sea, as though lost in eternal contemplation of the ceaseless patterns of wind and wave.

I made my way there at night. The bus left me in starless darkness and coughed and rattled back down the mountain. I acknowledged a silent guide and followed his floating shape along this path and that. From somewhere ahead, in the cold dark, the long roll of a temple gong resounded. A distant bell tinkled, a dog barked, and a door I had not anticipated opened and cast a beam of light toward us. Standing in it was one of the most beautiful women I will ever see.

Lantau's Nuns Await a Higher Life

The *fa shih* (teacher) Liu bowed her head and welcomed me to the Shrine of the Bamboo Grove. It was impossible to tell from her clear, open face how many years my hostess had lived. Long ago she had entered the monastic life in China. When the Communists swept the mainland, she and many others fled, but their leader had stayed behind.

"They tortured him to get the names of his disciples," she said. "They put him in water in a gunnysack. He did not tell."

"Where is he now?" I asked.

"In a higher life," she said. "He endured."

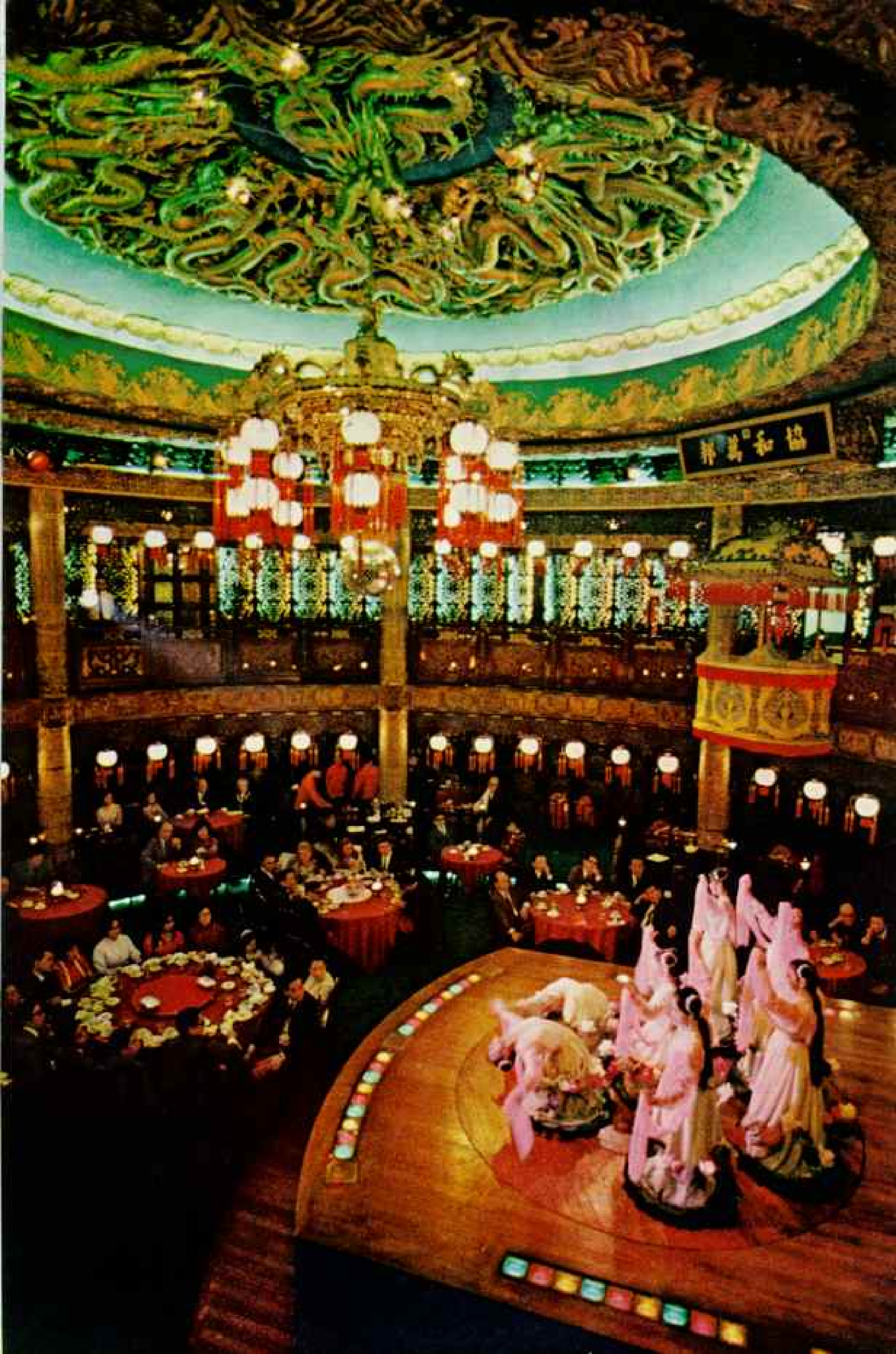
In Hong Kong, she had worked as an amah and in a basket factory; through saving and self-denial, she had been able to establish the small nunnery and bring to it a community of nuns. Now they were with her at this remote shrine, praying three times a day and waiting to die. But they were content; the nunnery would attend to their souls.

We had a vegetarian meal in a cold room while the other nuns, perhaps half a dozen, bustled about in the smoky but warm kitchen. Then I crawled between stacks of blankets and fell into untroubled slumber, until the distant temple bells woke me before dawn.

I spent the day ogling the extremely ornate Temple of the Precious Lotus; I rubbed shoulders with the devout, shaking sticks in canisters to determine their futures; and I climbed far up the top slope and looked out over the whole width of the ocean—but I brought back only one memory that will always be, for me at least, a part of the Hong Kong legend: the ageless, merciful face of Liu, fa shih, she who also endured. □

On guard for guests, a hotel doorman in Kowloon grasps handles that form the Chinese character for Asia. Labor costs are so low in the colony, a popular stop for world travelers, that some hotels have a ratio of two employees for every visitor.

Graceful lotus dance, explained in English, Japanese, and Mandarin, entertains diners at the Miramar Theatre Restaurant. Vignettes from Chinese opera also unfold under the teak ceiling, hand carved with nine dragons. The serpents represent both Kowloon and the good luck that has sustained Hong Kong throughout its history.



More Years With Mountain Gorillas

By DIAN FOSSEY

Photographs by ROBERT M. CAMPBELL

TWO BLACK hairy arms circled the tree trunk. A moment later a furry head appeared. Bright eyes peered at me through a lattice of ferns.

I occupied a branch of another tree, slightly downhill from the gorilla who stared at me. We were both in a forest on Mount Visoke in Rwanda, where I have been studying gorillas in the wild.

The face was familiar, not only by its features but by its impish expression; it belonged to Peanuts, one of my favorite gorillas. He is a member of one of the groups I have studied closely, and that have grown used to my presence among them.

Peanuts was wearing an expression I think of as "fun and games"; I have learned to recognize it in gorillas when they want to prolong a contact with me. Slowly, I left the tree and got down into the foliage to make feeding noises to reassure him.

The moments that followed are among the most memorable of my life. They were particularly important to me because this was, in a sense, a farewell visit to the mountain slope. I was shortly to leave Africa for a prolonged stay in Cambridge, England, where I would begin working on a doctoral thesis and other technical reports on gorilla behavior.

Peanuts left his tree for a bit of strutting before he began his approach in my direction. He is a showman. He beat his chest; he threw leaves into the air; he swaggered and slapped the foliage around him, and then suddenly he

Shy vegetarian dines on *Galium* vines in the shrinking wilds of Central Africa. Largest of the great apes, mountain gorillas were widely feared when Dian Fossey began to study them in 1967. After thousands of hours of observations, she reports them to be among the gentlest of creatures.

ECKACHROME (ABOVE) AND KODACHROME BY N.G.S.

Mist-blurred base camp in Rwanda's highlands takes on a cheerful glow from Miss Fossey's kerosene-fueled lantern, framed by her cabin window (**above**). Fog and rain in the Parc des Volcans (**map, right**) often hamper her observations of *Gorilla gorilla beringei*. When not shadowing her roving subjects through dense forest, the American scientist pores over field notes and studies for a doctorate in zoology. This particular evening (**below**), she reviews gorilla anatomy, using skulls and skeletal fragments gleaned over the years.

was at my side. His expression indicated that he had entertained me—now it was my turn. He sat down to watch my "feeding" but didn't seem particularly impressed, so I changed activities. I scratched my scalp noisily to make a sound familiar to gorillas, who do a great deal of scratching.

Almost immediately Peanuts began to scratch. It was not clear who was aping whom. Then I lay back in the foliage to appear as harmless as possible, and slowly extended my hand. I held it palm up at first, as the palms of an ape and a human are more similar than the backs of the hand. When I felt that he recognized this "object," I slowly turned my hand over and let it rest on the foliage.

Peanuts seemed to ponder accepting my hand, a familiar yet strange object extended to him. Finally he came a step closer and, extending his own hand, gently touched his fingers to mine. To the best of my knowledge this is the first time a wild gorilla has ever come so close to "holding hands" with a human being (following pages).

Peanuts sat down and looked at my hand for a moment longer. He stood and gave vent to his excitement by a whirling chest beat, then went off to rejoin his group, nonchalantly feeding some eighty feet uphill. I expressed my own happy excitement by crying. This was the most wonderful going-away present I could have had.

Human Pressures Shrink Gorilla's Domain

My farewell handshake with Peanuts came after more than three years of study of the mountain gorilla *(Gorilla gorilla beringei)*, largest of the great apes. The animal is already classified by international conservation authorities as "rare." Under constant pressure from man—hunter and farmer—it is being driven into ever-smaller, more-remote mountain areas. Extinction is a real threat.

My studies are conducted from a camp in Rwanda's Parc des Volcans (map, right), on the saddle between Mount Visoke and Mount Karisimbi, two of the eight volcanoes in the Virunga range. Camp, which consists of several sheet-metal cabins, stands at 10,000 feet (opposite, upper); a rough jeep road starts up the mountain, but the last 2,000 feet must be climbed on foot, a winding, three-mile hike. In addition to the gorillas, local fauna includes duikers and buffalo, and elephants frequently visit a creek in front of my cabin. The nearest store is 19 miles away.

My work began in 1967 with help from Dr. Louis S. B. Leakey and aid from the Wilkie Brothers Foundation. Shortly thereafter the project gained the support of the National Geographic Society, which has continued to sponsor my research. A report appeared in the GEOGRAPHIC of January 1970. Much has happened since, but my job is far from finished.

There had been scientific observations of wild mountain gorillas in the past, notably a research project by Dr. George B. Schaller in 1959-60, a classic in its field. My objective was to take up where these had left off, to form more intimate contacts with gorilla groups and individuals, to observe from close up their behavior, their interactions—and to do this in such a way that my own presence did not affect that behavior. To accomplish this I decided, in a word, to act like a gorilla.

One of the first things I learned about my

subjects was that despite their great bulk—400 pounds or more—and the many tales of ferocious attacks on people, they are in fact among the gentlest of animals, and the shiest. Like most wild creatures they will try to protect themselves when attacked, and to guard their young. But in some 3,000 hours of contact I encountered only a few minutes of aggressive behavior. These incidents were generally initiated by protective adults when their young approached me too closely. In all instances the "charges" proved to be bluff.

A good example of their gentleness and sense of mischief occurred one day when Bravado, a young male, tried to climb past me down a tree trunk where I had settled myself on a limb to observe and take some

Most rewarding moment: In early years among the gorillas Dian won their grudging tolerance, but in early 1970 she at last achieved overt acceptance.

The breakthrough came when Peanuts, a blackback, or young mature male, approached to within a few feet of Dian. Showing off, he thumped his chest, strutted about, then moved directly up to her.

Dian, using a gesture that gorillas find reassuring, scratched herself vigorously (**left**). To her delight, Peanuts did the same. Becoming bolder, Dian slowly proffered her hand (**above**). The ape stood up, hesitated, then touched her fingers with his.

So quickly was the electric moment over that the photographer's shutter clicked an instant too late, just as Peanuts retracted his hand (**below**). Dian's face registers her emotion.

Gorilla eyrie, hastily fashioned by bending the branches of a tree into a crude platform, makes a cozy day nest for a blackback named Bravado. Like most younger gorillas, he often clambers into trees in search of food or a napping spot. Older gorillas, sometimes weighing 400 pounds or more, climb only rarely and with great deliberation. Primarily ground dwellers, the animals come crashing down at any sign of danger while aloft.

pictures. Bravado made his way up easily enough, brushing past me as if I were not there. But on the way down he apparently decided I was in the way and should move. Once his head filled my viewfinder, I decided it was time to turn my back to him. Just as I got a good hold on the tree, I felt two hands on my shoulders, pushing down.

I had often seen gorillas do this to one another when they wanted the right-of-way on a narrow trunk. Not wanting to risk a fall, I refused to budge. After another moment of gentle pressure—only a fraction of the mighty shove he could have given me—Bravado moved back. He beat his chest, then jumped out onto a side limb. He hung there by two arms, bouncing deliberately, knowing that his weight would break the branch and thus provide a satisfactorily loud snapping noise. He succeeded; the branch broke with a crash and Bravado landed eight feet below, where he calmly began feeding.

Learning to Sound Like a Gorilla

In my years of study I have watched nine groups of gorillas, but for closeup contacts have concentrated on four. The groups vary in size from 5 to 19 members; the average is 13. In my field notes I identify groups by numbers, and individuals by names I have chosen, usually trying to match names to the personalities of the animals.

Each group is ruled with unquestioned authority by a dominant male—a silverback, so-called because with age a gorilla's dorsal hair turns silvery gray. Below him may be one or more subordinate silverbacks, then the younger mature males—blackbacks—the females, juveniles, and infants.

During my observations, I have learned much about the animals' feeding habits, their range and movements, their bickering and play. I have watched them build day nests to rest in and night nests to sleep in—crude beds of boughs, leaves, moss, or even loose dirt—sometimes in trees (left) but generally on the ground.

Early in my study I decided that one of the best ways to persuade gorillas to accept my presence was to imitate the sounds they make. In this I had a stroke of luck—though the event itself was most unfortunate. Two young gorillas, captured for a European zoo, had been so mishandled that they were near death, and I volunteered to nurse them back to health. While I cared for them I learned much about gorilla vocalizations.

Popular literature generally describes roars, screams, and "*wraaghs*" as the main components of gorilla vocabulary. I was to learn there is a lot more to the subject than that.

From my two charges, for instance, I learned an infant's version of a sound that I later came to call the "belch vocalization." Their rendition, "*naoom, naoom, naoom*," was usually associated with eating, and I have since heard this sound many times among wild groups. It does not carry far, and has often been mistaken for a stomach rumble. But in fact it is a distinctive type of gorilla communication, exchanged in situations of maximum contentment.

Typically, one animal expresses his feeling of well-being by giving a belch vocalization. This brings a chain of similar responses from nearby animals. On occasion I have been able to crawl undetected into the midst of a contentedly feeding group and begin a belch vocalization series of my own and have it answered by animals around me.

The belch vocalization is the most common form of intragroup communication. Others include what I call "pig grunts" and "hoot barks." The pig grunt is a harsh staccato sound used in disciplinary situations, as when a silverback settles a squabble or orders his group to move on. Females also use it, in a softer tone, to control their infants.

The hoot bark is more often heard when an animal is curious or alarmed. When given by the dominant silverback, it usually attracts the immediate attention of the group.

Gorilla vocalization has been a particular interest of mine. I have spent many hours recording these sounds, and the tapes have now been taken to Cambridge University for further study. But my prime interest is still the original one: To use the sounds to gain acceptance by the gorillas, and so to study behavior and ranges.

Research Can Help Save Big Apes

Why do gorillas go where they do? Do their routes remain stable or do they vary? How many still survive? What is their present territory? I have compelling reason for wanting to know. If we are to save the animals from extinction, we must find answers to these vital questions. We must learn the areas of known population concentration before we can provide protection—and thus my interest in both an accurate census of gorilla numbers and a study of gorilla ranges.

Over many months I have had a rare, perhaps unique, opportunity to watch, close up, three of my gorilla groups in a state of flux. The studies involve:

Group 4, headed by a silverback named Uncle Bert, who was nervous at first in his leadership role.

Group 8, five bachelors led by Rafiki and including my friend Peanuts.

Group 9, led by Geronimo.

Over the past 3½ years I have charted the movements of these groups. The resulting range maps are amoebic in outline. But as I revise them to keep them up-to-date, I see that my amoebas are moving, and two of them are showing signs of merging. The changes began almost imperceptibly, but have recently speeded up.

Tragedies May Have Altered Ranges

I cannot yet be sure of the reasons for these changes, but two apparent causes must be considered. Both were small tragedies, mentioned in my earlier article.

One was the death of Koko, the elderly, sole female of Group 8. The remaining five males have increasingly sought proximity with the other two groups that shared the borders of their range—Group 4 to the south and Group 9 to the north. Obviously bachelorhood isn't all it is cut out to be, for the males of Group 8 are no longer content with their own company.

Unfortunately, the members of Group 4 were having their own troubles. Their dominant silverback, Whinny, died, leaving his followers under the nervous authority of the second dominant silverback, Uncle Bert.

In his new responsibilities Uncle Bert was —especially at the outset—overly strict and domineering. One of his early moves was to eject a subordinate silverback named Amok.

Poor Amok. For a time it appeared he might join the five bachelors of Group 8, but he has now become a loner. He leads a solitary and silent life, roaming in what seems to be a haphazard fashion. When occasionally I see him in the woods, his only vocalization is a wraagh of alarm as he flees.

As an overprotective leader, Uncle Bert fled from the advances of the burly bachelors of Group 8. This he did by leading his own group away to the relatively empty southern slopes of Mount Visoke.

The result was that the "terrible five" concentrated solely on following Geronimo's group. In 1969 and 1970, the two patterns that represent the ranges of Groups 8 and 9

merged into almost the same blob—a trend that appears to be repeating itself in 1971.

This is not to imply that Geronimo has welcomed the advances of Rafiki's bachelors. With the proximity, aggression has increased among the silverbacks, not just with members of rival groups but within their own band. Chest beating, branch breaking, ground thumping, and bluff charging are all used as substitutes for direct clashes.

Sometimes, after prolonged hounding by Group 8, Geronimo would keep his group on the move for hours, covering miles with little or no time out for feeding or day naps. In such forced marches they often succeeded in losing Group 8—but only for a few days at a time. Should this trend continue, both groups may eventually move north out of my study area to the opposite side of the mountain. I hope not, for then I may never learn the outcome of this drama—whether Groups 8 and 9 will really merge, or whether the bachelors will somehow take away one or more of Group 9's seven females.

Swinging Feast Takes Toll of Branches

Slowly, as Groups 9 and 8 head north, Group 4 is returning to the western slopes where they previously ranged and now have almost free run of the mountain.

The subject of ranges and the reasons they change is proving to be complex. Group interaction is the most likely cause (outside of human intervention). Certainly the quest for food is not a major factor. Seasonal food favorites cause slight fluctuations in range, but most items of the gorilla's staple diet—leaves, vines, wild celery, and other succulents—abound in the mountains.

The fruit of *Pygeum africanum* is a delicacy on any gorilla's menu. The tree resembles a large oak, favors ridges, and bears a fruit like an oversize cherry. Because of the relative scarcity of the tree and its brief fruiting season—only two to three months a year—the ridges that support it attract gorilla concentrations, and the many broken branches after a raid bear witness to the acrobatics of the great apes. It is an awesome sight to see them, especially the bulky silverbacks, maneuvering in treetops better suited to chimps or monkeys.

One day during the height of the fruiting season, I returned to a grove of *Pygeum* trees that had been shared by Groups 8 and 9 for more than a week. Photographer Bob Campbell (who eventually became as familiar to the gorillas as I did) was with me. But when we reached the trees, we found them empty.

"I'm not surprised," said Bob as he looked at the totally trampled area. "There's barely enough foliage left for even a single day nest." We agreed that the two groups must have gone higher up on the slopes. As we continued to climb through the clutter of broken tree limbs, I spotted a branch still bearing several ripe fruits. On a whim I picked three of them and put them into my pocket.

Some twenty minutes later we met Group 9, contentedly sunbathing and feeding. Geronimo gave a few mildly curious hoot barks that brought several animals forward to stare momentarily. Then all was silent as they resumed their day rest period.

We found Group 8 about 200 yards away, sunning and napping. We settled down quietly to watch their interactions.

About two hours later we heard Group 9 feeding through the thick undergrowth, moving slowly in the direction of Group 8. But then, to our disappointment, Geronimo led his group off downhill in the direction of the *Pygeum* trees, and Rafiki's bachelors followed at a discreet distance.

When they were all out of sight, Bob and I reluctantly began to pack up our gear for the long trek back to camp. The day seemed a total failure.

Impish Trick Prompts Exciting Contact

Suddenly Peanuts popped up just behind me from the side of a log. He seemed quite pleased with himself! His impish expression seemed to say, "Well, I put one over on you, didn't I?" Indeed he had, and I longed for some way to reward him for his visit.

Then I remembered the three *Pygeum* fruits in my pocket. Slowly I put one on top of the log—expecting him to back off. Much to my surprise he popped it into his mouth. He then looked me straight in the face as if to ask for more. I extended the other two fruits on my flattened palm. His rough-skinned fingers grasped them without hesitation.

At that moment I would have traded the boots on my feet for more *Pygeum* fruits. After waiting politely for several seconds, Peanuts strutted to my other side and leaned toward me as if to say, "What a miserly provider you turned out to be!" Then off he whirled in pursuit of his group.

On other days Bob and I enjoyed wonderful contacts with Groups 8 and 9. On one occasion Geronimo, in his role as guardian of

Burdens of motherhood are borne lightly by Old Goat—so named for her sometimes sour disposition—who clambers about with an infant perched jockey fashion on her back. Though often given a helping hand, babies manage to hang on without assistance when only hours old.

Impromptu nursery, a nest of branches, harbors a mother and suckling infant. Young gorillas are usually weaned during the latter part of their second year.

Group 9, had stationed himself on a log directly below us where he could keep a watchful eye on all of us. He issued small alarm barks when the show-off, branch-breaking displays of the bachelors of Group 8, who were directly above us, became too loud. An infant of about a year and a half followed him onto the log to strut and swagger in a very important manner—but at the same time took care not to get too far from the huge form of security that Geronimo represented.

Slowly the other members of Group 9 began to feed down in his direction, most of them pausing in turn to sit on the open trail in front of me, stare, and feed. I welcomed the chance to observe the growth of the infants, some of whom I had first seen when they were only little pink-skinned dependent squiggles. Now they were fluffy miniatures of adults, strutting on the trail before me. While I was taking notes as fast as I could, I heard an excited whisper from Bob.

"Look at the new infant!"

At that moment I was watching a tiny creature of some 3 months clinging to its mother's chest hair while she ate *Galium* vines. Then the foliage parted and an elderly female plopped down before me. Slung over her right arm was a brand-new infant, limp as a pink rag doll. Its head hung backward over her arm, eyes closed, mouth opened slackly, and all four limbs were drooping. It appeared lifeless. When she shifted its weight, the little one made no response.

As the group moved off across the gully, I watched this female through my binoculars until she reached the mother with the older infant, and sat down beside her. Much to my relief, I could see that both babies were wiggling with typical spiderlike movements.

Tree Climbers Let Infants Dangle

Then to my dismay I saw that both mothers were eyeing two fruit-laden *Pygeum* trees that towered 80 feet. "They wouldn't dare," I whispered to Bob indignantly.

I was wrong. They stood, placed their infants higher on their chests and began to climb, using all four extremities, letting the babies hang on as best they could.

Fifty feet up, the two infants had slid down below the mothers' abdomens, and I feared for their safety. No need—just in time, the females stopped, repositioned the babies, and climbed on up to the fruit. The descent was equally breathtaking; again, the infants slipped lower and lower, until they were almost around their mothers' ankles by the time they reached the ground.

In Group 4 I have observed "aunt behavior," with a designated baby-sitter. A female named Flossie has received this dubious honor; she sits contentedly with the youngsters playing over and around her while the mothers are some distance away feeding or sunning. One young female frequently stays with her. This one will sometimes "kidnap" older infants to carry them in a somewhat awkward fashion some yards away from the aunt. There she builds a nest in which she tries to settle down with the infant. One thinks of human children playing house.

Slaughter Portends Survival Perils

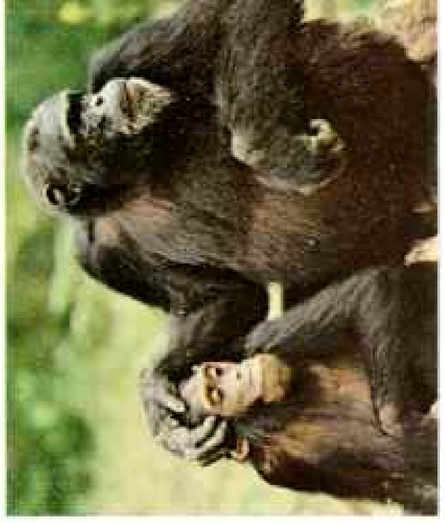
As I write this article, I am back in my camp on Mount Visoke, my term at Cambridge ended. My long-planned census of gorilla population is beginning, with the help of four courageous young recruits and some cooperative Rwandan assistants. It will be an arduous, even grueling job.

The physical challenges will include covering each of six of the Virunga Mountains from saddle to summit, exploring every gully, ravine, and slope. The work will require an accurate count of the members of each gorilla group, as well as estimates of range.

One reason for the census is to underscore the need for protection of these rare creatures. As if to underscore it further, when I returned to camp I was greeted with news of a wholesale gorilla slaughter just south of my study area. The bodies of five animals were found scattered about in an arc of some 75 yards. They had been mauled by dogs, pierced by spears, and battered by stones, apparently just for the excitement of the hunt.

I think of the gorillas I have written about, whom I have come to regard as friends, and I wonder—will some of them be next? □

A scene doomed to fade? Taking the sun on an open slope, gorillas maintain a sharp lookout. Farmers and herdsmen whittling away at the mountain domain of these shy creatures drive them into ever-smaller areas. In the uphill fight to ward off extinction, Dian Fossey's Geographic-sponsored study provides much-needed information on habits, numbers, and range.



APES FASCINATE PEOPLE—as any day at the zoo will prove. The amazing range of primate behavior gives significance and moments of hilarity to "Monkeys, Apes, and Man," first show in the Society's 1971-72 series of color television documentaries.

On Tuesday evening, October 12, journey to Gombe National Park in Tanzania and again meet attractive blonde scientist Jane Goodall, now the Baroness Jane van Lawick-Goodall. Six years ago the Society's TV special, "Miss Goodall and the Wild Chimpanzees," won wide acclaim. Here she shows her delight in an infant monkey (**center, right**). One of her chimpanzee subjects at Gombe, a grizzled male, gives a pat of assurance to a youngster (**right, below**).

At the Cincinnati Zoo see a chimp named Angel paint her latest masterpiece (**right, above**). And take to heart a baby monkey at the Primate Center in Madison, Wisconsin (**left**). He was given a choice between two substitute mothers—one with a body made of bare wire but fitted with nipple and bottle, the other wrapped in comforting terry cloth. In moments of stress and fear, he clung to the latter.

Narrated by Stephen Boyd, the hour-long program is produced by the Society in association with Wolper Productions, Inc.

WATCH "MONKEYS, APES, AND MAN" ON MOST OF THESE CBS TELEVISION STATIONS

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

ALABAMA
Birmingham WBMG-TV (13)
Dothan WTVY (4)
Huntsville WHNT-TV (19)
Mobile WKRG-TV (5)
Montgomery WCOV-TV (20)
ALASKA
Anchorage KTVA (11)
Fairbanks KTVF (11)
Sitka KIFW-TV (13)
ARIZONA
Phoenix KSAZ-TV (10)
Tucson KOLD-TV (13)
ARKANSAS
Fort Smith KFSA-TV (5)
Little Rock KTHV (11)
CALIFORNIA
Bakersfield KBAK-TV (29)
Chico KHSL-TV (12)
El Centro KECC-TV (9)
Eureka KIEM-TV (2)
Fresno KFRE-TV (30)
Los Angeles KNXT (2)
Monterey KMST (46)
Sacramento KXTV (10)
San Diego KFMB-TV (8)
San Francisco KPIX (5)
Santa Maria KCOY-TV (12)
COLORADO
Colorado Springs KKTV (11)
Denver KLZ-TV (7)
Grand Junction KREX-TV (5)
CONNECTICUT
Hartford WTIC-TV (3)
DELAWARE*
DIST. OF COLUMBIA
Washington WTOP-TV (9)
FLORIDA
Fort Myers WINK-TV (11)
Fort Pierce WTVX (34)
Jacksonville WJXT-TV (4)
Miami WTVJ (4)
Orlando WDBO-TV (6)
Tampa WTVT (13)
GEORGIA
Atlanta WAGA-TV (5)
Augusta WRDW-TV (12)
Columbus WRBL-TV (3)
Macon WMAZ-TV (13)
Savannah WTOC-TV (11)
Thomasville WCTV (6)
HAWAII
Honolulu KGMB-TV (9)
Wailuku KMAU-TV (3)
IDAHO
Boise KBOI-TV (2)
Idaho Falls KIDI-TV (3)
Lewiston KLEW-TV (3)
Twin Falls KMVT-TV (11)
ILLINOIS
Champaign WCIA-TV (3)
Chicago WBBM-TV (2)
Peoria WMBD-TV (31)
Quincy KHQA-TV (7)
Rockford WREX-TV (23)
Rock Island WHBF-TV (4)
INDIANA
Evansville WEHT-TV (25)
Fort Wayne WANE-TV (15)
Indianapolis WISH-TV (8)
Lafayette WLFI-TV (18)
South Bend WSBT-TV (22)
Terre Haute WTHI-TV (10)
IOWA
Cedar Rapids WMT-TV (2)
Des Moines KRNT-TV (8)
Mason City KGLO-TV (3)
Sioux City KMEG-TV (14)
KANSAS
Ensign KTVC-TV (6)
Goodland KLOR-TV (10)
Hays KAYS-TV (7)
Topeka WIBW-TV (13)
Wichita KTVH (12)
KENTUCKY
Lexington WKYT-TV (27)
Louisville WHAS-TV (11)
LOUISIANA
Baton Rouge WAFB-TV (9)
Lafayette KLFY-TV (10)
Monroe KNOE-TV (8)
New Orleans WWL-TV (4)
Shreveport KSLA-TV (12)
MAINE
Bangor WABI-TV (5)
Portland WGAN-TV (13)
Presque Isle WAGM-TV (8)
MARYLAND
Baltimore WMAR-TV (2)
Salisbury WBOC-TV (16)
MASSACHUSETTS
Boston WBZ-TV (4)
MICHIGAN
Cadillac WWTV (9)
Detroit WJBK-TV (2)
Kalamazoo WKZO-TV (3)
Lansing WJIM-TV (6)
Marquette WLUC-TV (6)
Saginaw WNEM-TV (25)
MINNESOTA
Duluth KDAL-TV (3)
Mankato KEYC-TV (12)
Minneapolis WCCO-TV (4)
MISSISSIPPI
Columbus WCBI-TV (4)
Jackson WJTV (12)
Meridian WTOK-TV (11)
MISSOURI
Cape Girardeau KFVS-TV (12)
Jefferson City KRCG-TV (13)
Joplin KODE-TV (16)
Kansas City KCMO-TV (5)
St. Louis KMOX-TV (4)
Springfield KYTV-TV (10)
MONTANA
Billings KOOK-TV (2)
Butte KXLF-TV (4)
Glendive KXGN-TV (5)
Great Falls KRTV (3)
NEBRASKA
Lincoln KOLN-TV (10)
Omaha WOW-TV (6)
NEVADA
Las Vegas KLAS-TV (8)
Reno KOLO-TV (8)
NEW HAMPSHIRE*
NEW JERSEY*
NEW MEXICO
Albuquerque KOAT-TV (13)
Roswell KSWS-TV (10)
NEW YORK
Albany WTEN (10)
Binghamton WNBF-TV (12)
Buffalo WKBW-TV (4)
New York WCBS-TV (2)
Rochester WHEC-TV (10)
Syracuse WHEN-TV (3)
Watertown WWNY-TV (7)
NORTH CAROLINA
Charlotte WBTV (3)
Durham WTVD (11)
Greensboro WFMY-TV (2)
Greenville WNCT (9)
NORTH DAKOTA
Bismarck KXMB-TV (12)
Dickinson KDIX-TV (2)
Fargo KXJB-TV (4)
Minot KMOT-TV (13)
Williston KUMV-TV (11)
OHIO
Cincinnati WCPO-TV (9)
Cleveland WJW-TV (8)
Columbus WBNS-TV (10)
Dayton WHIO-TV (7)
Toledo WTOL-TV (11)
Youngstown WKBN-TV (27)
OKLAHOMA
Oklahoma City KWTV (9)
Tulsa KOTV (6)
OREGON
Klamath Falls KOTI-TV (2)
Medford KOBI-TV (5)
Portland KOIN-TV (6)
PENNSYLVANIA
Altoona WFBG-TV (10)
Erie WICU-TV (35)
Harrisburg WHP-TV (21)
Johnstown WJAC-TV (19)
Lancaster-Lebanon WGAL-TV (15)
Philadelphia WCAU-TV (10)
Pittsburgh KDKA-TV (2)
Scranton WDAU-TV (22)
York WSBA-TV (43)
RHODE ISLAND
Providence WPRI-TV (12)
SOUTH CAROLINA
Anderson WAIM-TV (40)
Charleston WCSC-TV (5)
Columbia WNOK-TV (19)
Florence WBTW (13)
Spartanburg WSPA-TV (7)
SOUTH DAKOTA
Rapid City KOTA-TV (3)
Sioux Falls KELO-TV (11)
TENNESSEE
Chattanooga WDEF-TV (12)
Johnson City WJHL-TV (11)
Knoxville WBIR-TV (10)
Memphis WMC-TV (3)
Nashville WLAC-TV (5)
TEXAS
Abilene-Sweetwater KTXS-TV (12)
Amarillo KFDA-TV (10)
Austin KTBC-TV (7)
Beaumont KFDM-TV (6)
Big Spring KWAB-TV (4)
Bryan KBTX-TV (3)
Corpus Christi KZTV (10)
Dallas KRLD-TV (4)
El Paso KROD-TV (4)
Harlingen KGBT-TV (4)
Houston KHOU-TV (11)
Lubbock KLBK-TV (13)
Odessa KOSA-TV (7)
San Angelo KCTV (8)
San Antonio KENS-TV (5)
Waco KWTX-TV (10)
Wichita Falls KAUZ-TV (6)
UTAH
Salt Lake City KSL-TV (5)
VERMONT
Burlington WCAX-TV (3)
VIRGINIA
Norfolk WTAR-TV (3)
Richmond WTVR (6)
Roanoke WSLS-TV (7)
WASHINGTON
Bellingham KVOS-TV (12)
Pasco KEPR-TV (19)
Seattle KING-TV (5)
Spokane KREM-TV (4)
Yakima KIMA-TV (29)
WEST VIRGINIA
Charleston WCHS-TV (8)
Huntersville WSAZ-TV (9)
Weston WBOY (5)
WISCONSIN
Green Bay WBAY-TV (2)
La Crosse WKBT-TV (8)
Madison WISC-TV (3)
Milwaukee WISN-TV (12)
Wausau WSAU-TV (7)
WYOMING
Casper KTWO-TV (2)
Cheyenne KFBC-TV (5)
Riverton KWRB-TV (10)

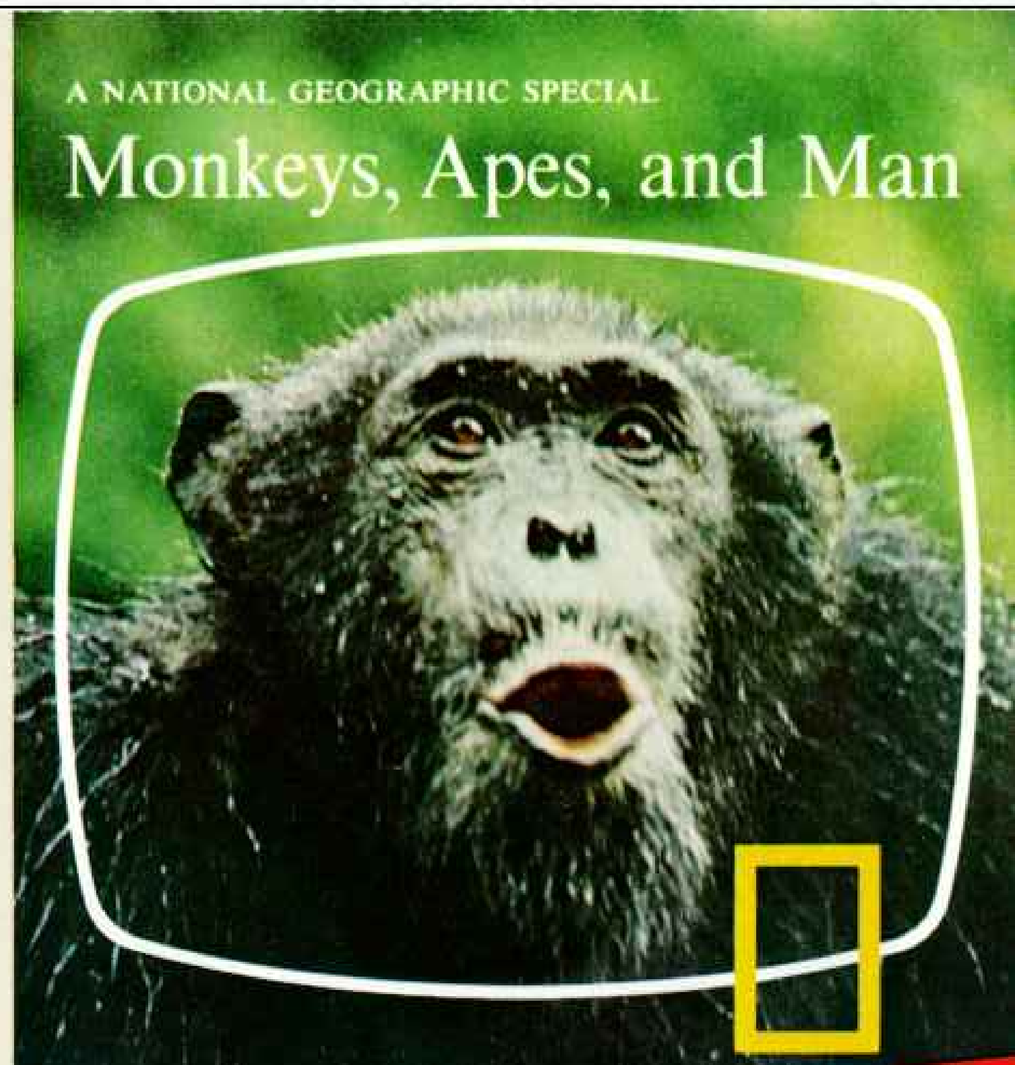
*See neighboring states

A CHIMP NAMED HUGO HOOTS A WELCOME TO A FELLOW APE IN A TANZANIAN FOREST (RIGHT). © N.G.S.

THIS PAGE FOLDS OUT. Tear it off and keep it by your TV as a reminder

A NATIONAL GEOGRAPHIC SPECIAL

Monkeys, Apes, and Man



SEE IT IN COLOR, TUESDAY, OCTOBER 12

In the newest volume of its Story of Man Library, National Geographic captures in glowing detail man's quest for the meaning of life.

"Great Religions of the World"

By HUSTON SMITH, Ph.D.

PROFESSOR OF PHILOSOPHY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

THE VACANT LOT beside our house in the Chinese town where my parents served as missionaries held a special fascination for me. On the day of a funeral, wealthy families would build on it an elaborate, full-scale paper house, fill it with paper furniture, paper effigies of servants, and piles of paper "ghost money." Sometimes there would even be a paper motorcar parked on the street out front.

Later, they would heap straw against the house. Then, as monks circled it, chanting and playing cymbals and flutes, a torch would be applied. In an instant the flames would destroy the paper symbols, making the amenities they represented available to the departed in his new life.

Not far away stood a large building I called the "hotel for the dead." Actually, it was a mausoleum in which the bodies of the wealthier townsmen lay for several years before burial. Here people came regularly to pay homage to their ancestors. How spectral that dark hall seemed, with its racks of tightly sealed wooden coffins.

Some of its occupants may have arrived sooner than expected as a result of having purchased from Taoist alchemists elixirs intended to prolong life. These costly and secret brews, however, sometimes achieved the opposite effect, for they often contained such deadly "tonics" as arsenic and mercury.

Folk superstitions mingled with Taoist precepts. The streets of our town curved for no reason apparent to me; I was told that this was to thwart demons, who could move only in straight lines.

The parents of my Chinese friends took their problems to wizened priests, whose logic, gleaned from musty books, defied my young mind. And the elders also consulted fortune-tellers.

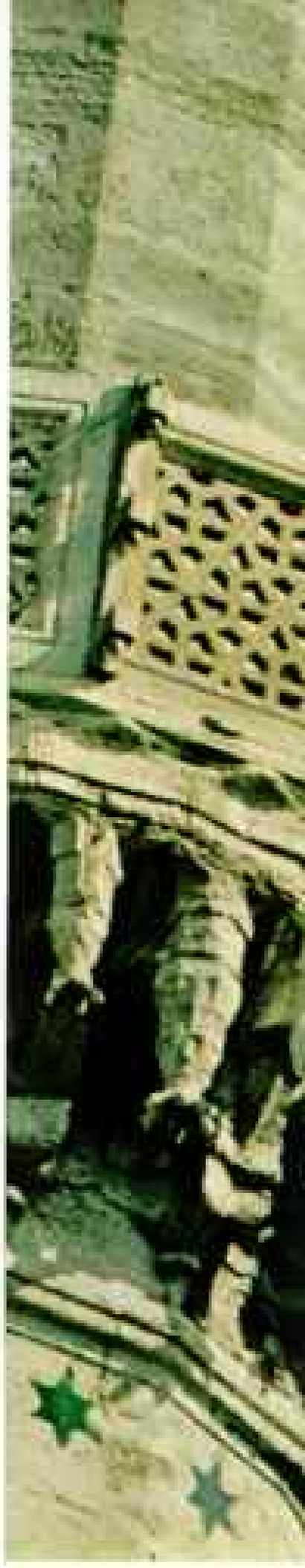
I liked, respected, even loved the people of my town, but I could not understand their beliefs. When I left China to attend college in the United States, these old friends slipped from my mind. I was busy trying to learn American ways. But as the years passed and I devoted my life to the study of philosophy and religion, I found myself remembering my Chinese friends with a new understanding.

Their rituals and beliefs—however distant from our own—dealt, after all, with matters that concern us all: Awe of death and what lies beyond, the necessity to cope with life's hazards, and the need to know who we are, why we are here, and where we are going. My fascination with such basic human preoccupations led me to accept with enthusiasm the National Geographic Society's invitation to join in shaping its intriguing new book, *Great Religions of the World*.

"**Oh how glorious . . . is thy Name**" sing choir boys moving toward the altar in the Washington Cathedral. Representatives from nearly 80 countries assembled last November for this World Fellowship Service.

KODACHROME BY MICHAEL KOU

EKTACHROME BY THOMAS NEBBIA



Amid the various rituals and creeds that distinguish religions, the same themes recur again and again. Recognition of the inevitability of death led a pampered Indian prince to renounce his throne and become the Buddha, the "enlightened one." Tradition tells that he had been shielded from all unpleasantness until he accidentally glimpsed three men—one aged, another diseased, a third dead. "Where is the realm of life in which there is neither age nor death?" he cried. His quest for an answer led to one of the world's great religions.

Every faith seeks help from the Divine. The Pueblo Indian dances for rain, the Tibetan Buddhist spins a prayer wheel, the Christian kneels to pray.

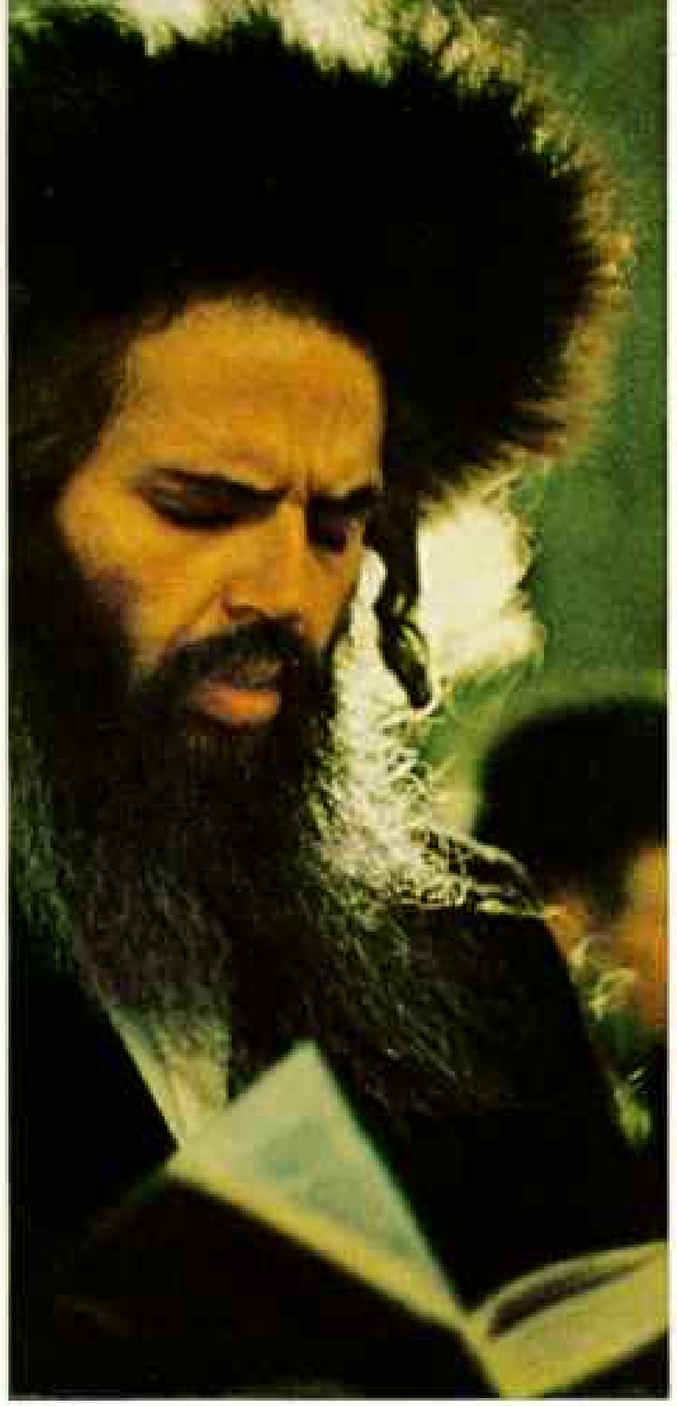
Islam, youngest of the great religions, answers questions of identity and direction with remarkable precision. The Koran tells man he is the servant of his Creator, then delineates the path he should take, in detail sufficient to help in every human endeavor. The very word "Islam" connotes the "peace that comes when one's life is surrendered to God."

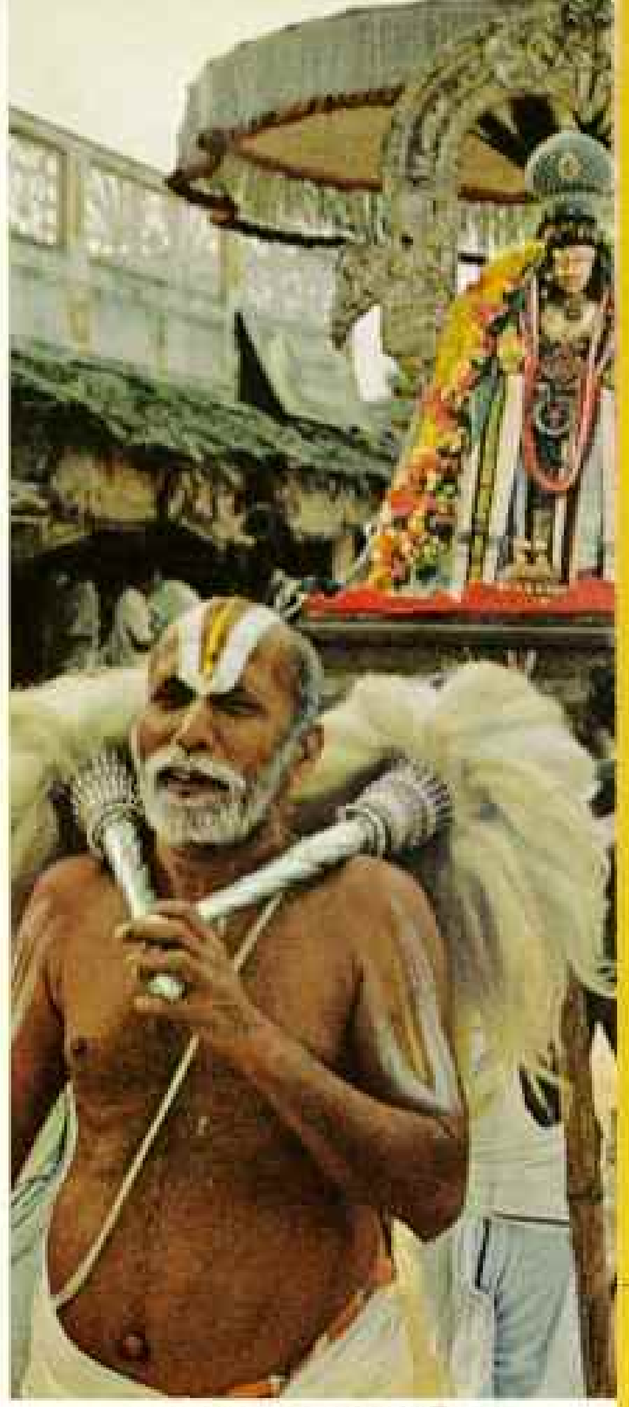
Reasoning about God and ethics came late. Primitive man sought his answers in myth and ritual; he danced out his faith before he thought it out. By ritualizing behavior that imitated the original creative acts of the gods —such as planting seed or digging a water hole—he sought to partake himself of the timelessness of the gods.

Ethics Agree, Whether One God or Many

In the period beginning about 800 B.C. and ending around A.D. 650—only a moment in human history—religion gained a new dimension. Geniuses arose whose lives and works molded the great religions we know today: the prophets of Israel, Buddha and the Upanishadic seers in India, Confucius and Lao Tzu in China, Jesus in Palestine, and Mohammed in Arabia.

The faiths taught by these men share many ethical concepts: Christianity's "Do unto





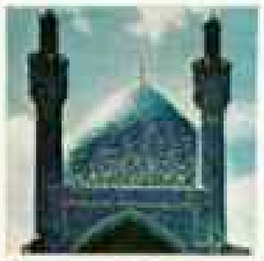
The gift of faith: A Buddhist monk meditates at Wat Chedi Luang, one of Thailand's 24,000 monasteries. In a cathedral on the island of Crete, a Greek Orthodox worshiper kisses a reliquary enshrining bits of a saint's bones. High in a minaret in İstanbul, a muezzin proclaims the Azan, or "announcement," that calls Moslems to worship five times a day. Bearded Hasid, a member of a pious Jewish sect, reads his prayer book in Jerusalem. Bearing silver-handled fly whisks, a Hindu parades through the streets of Kanchipuram, India, to honor Vishnu, a major deity among Hinduism's millions of gods. Though they follow different faiths, all five share many ethical concepts, including a belief in justice and mercy and love for fellowmen.

others. . . ." Judaism's "What the Lord doth require of thee: Only to do justly, and to love mercy. . . ." Islam's man who gives of his "substance . . . to kinsmen, and orphans, the needy, the traveller. . . ."

But vital differences separate them. The stark monotheism of Judaism contrasts with the popular Hindu pantheon of 33 million gods; the Christian envisions a personal God who knows and loves each of us and intervenes in history, while the Buddhist may adhere to an impersonal God who remains aloof from human scramblings.

In the centuries since their founding, these faiths have shaped nations and individuals; they have permeated political systems, social codes, ways of thinking, and daily life. My young playmates in China showed for their parents a respect bordering on reverence—an attitude rooted in the Confucianism that has molded Chinese history for 25 centuries.

The Zen monk sitting motionless in meditation reflects an outlook common to Eastern



Some chapters in *Great Religions of the World*

Hinduism

Quest for the Universal One
Down the Teeming Ganges, Holy River of India
Brahma in Bali

Buddhism

The Eightfold Path to Nirvana
Saffron Robes in Gilded Thailand
Pilgrims' Path in Buddhist Japan
Zen's Disciplined Way to Sudden Light
Demons and Lamas in the High Himalayas

Judaism

"Hear, O Israel"
A Kibbutz Where Work Means Worship
Days of Joy and Lamentation

Islam

Mohammed Is His Prophet
The Sweep of Islam
On a Holy Trek to Mecca

Christianity

"I Am the Resurrection and the Life"
Where the Fathers Preached and Martyrs Bled
The Reforming Spirit
Renewal in Rome
New Directions in the Church Today

faiths, a view voiced in the Taoist writings known as the *Tao Te Ching*:

Those who would take over the earth
And shape it to their will
Never, I notice, succeed.

Forgoing the Western impulse to remake the world, the monk seeks instead to bring himself into harmony with it.

The Hindu, believing his soul passes through a series of bodies, may see death as no more final than a change of clothes. Indian literature lacks the tragic element of Western writing because, in the Hindu view, no one lifetime determines achievement or failure.

There is no better way to know the world's peoples than through an understanding of their religions—an understanding of why a Japanese may marry in a Shinto ceremony but be buried with Buddhist rites, of why a Balinese reveres a volcano, and why a Thai maiden regards as "unripe" a suitor who has not spent a portion of his life as a monk.

But there is another gain to be drawn from such understanding. Every ritual, every altar, every image reflects some hope or fear that dwells within our own hearts.

In this human sense, religions—however distant in miles or different in details—are all "closer than breathing, nearer than hands and feet." In seeking to understand them, we explore not only our world but also ourselves. □

KODACHROME BY LOWELL GEORGIA © N.G.S.

At Easter sunrise service, thousands congregate in the Park of the Red Rocks at Denver, Colorado.

COVER: A god's name, inked on face and shawl, proclaims a Hindu's faith (pages 450-51). RAGHUBIR SINGH © N.G.S.

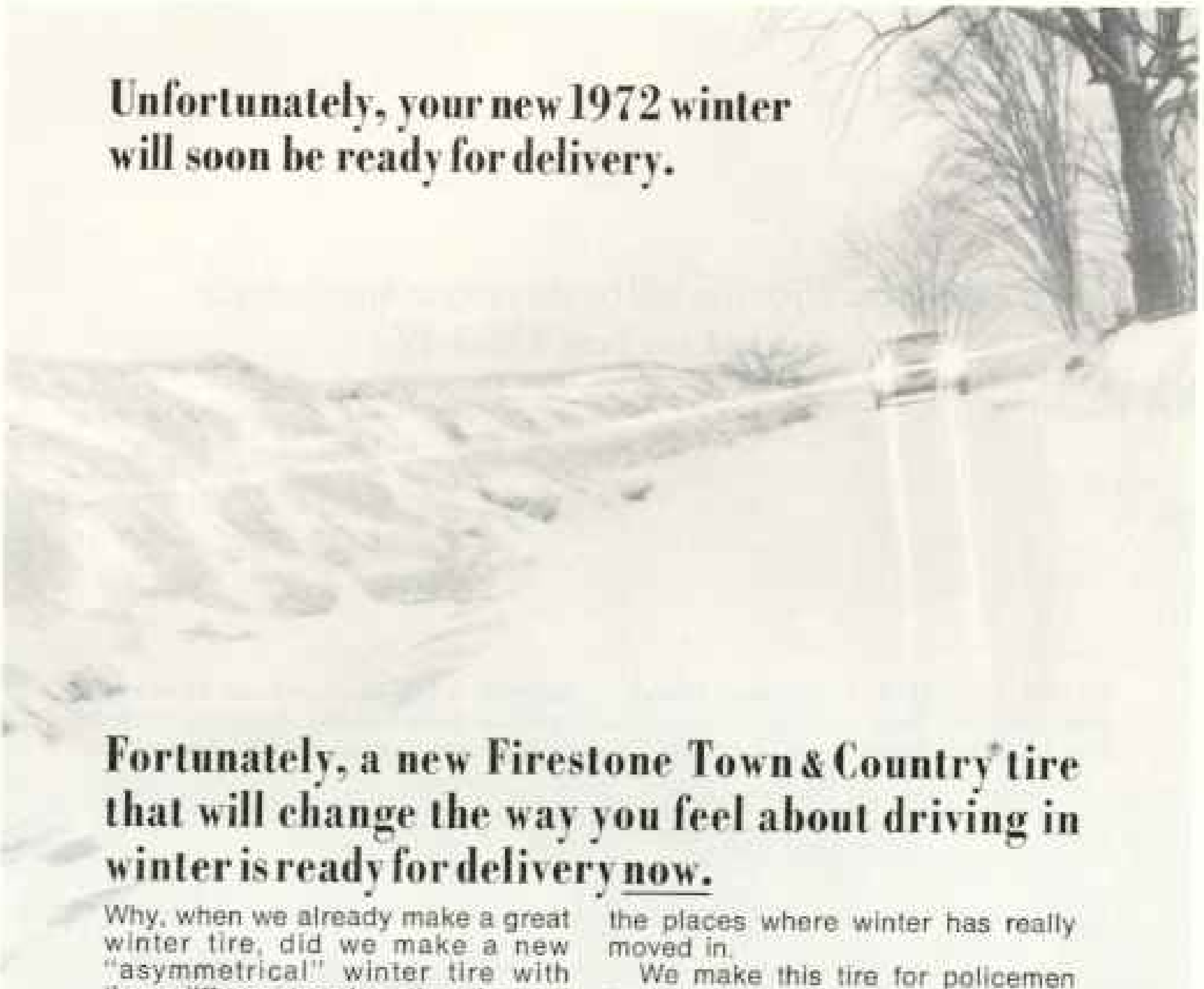
POSTMASTER: SEND CHANGE OF ADDRESS FORM 3579 AND UNDELIVERED COPIES TO NATIONAL GEOGRAPHIC MAGAZINE, 17TH AND M STS. N.W., WASHINGTON, D. C. 20036

In all the 1970s, this will be the unique American car.
The Continental Mark IV.

For 1972, a new Mark. Evolutionary changes in the grille. A longer, lower hood. More ample room inside. Still America's fully equipped luxury car: Sure-Track braking, all-weather Michelin tires, Automatic Temperature Control, and Cartier timepiece. Continental. The final step up.

CONTINENTAL

LINCOLN-MERCURY DIVISION Ford



Unfortunately, your new 1972 winter will soon be ready for delivery.

Fortunately, a new Firestone Town & Country® tire that will change the way you feel about driving in winter is ready for delivery now.

Why, when we already make a great winter tire, did we make a new "asymmetrical" winter tire with three different tread sections instead of two, designed to hold eight rows of studs* instead of six, with such a unique tread design that it can be put on the front wheels, too?

We make this Town & Country tire for days when the temperature is low and the snow is drifting and the wind is whistling and the roads look like a tile floor.

We make this tire for people who ski and snowmobile, people who get out in winter and go looking for the places where winter has really moved in.

We make this tire for policemen and doctors and everyone who has to get out and get going when the bell rings.

We make this Town & Country tire for you if you worry even a little about driving in winter, to work, to school, to the store.

And we make it available wherever you see the Firestone sign—at most locations you can even charge them.

**Studs not available where prohibited by law.*

Firestone

The "asymmetrical" Town & Country

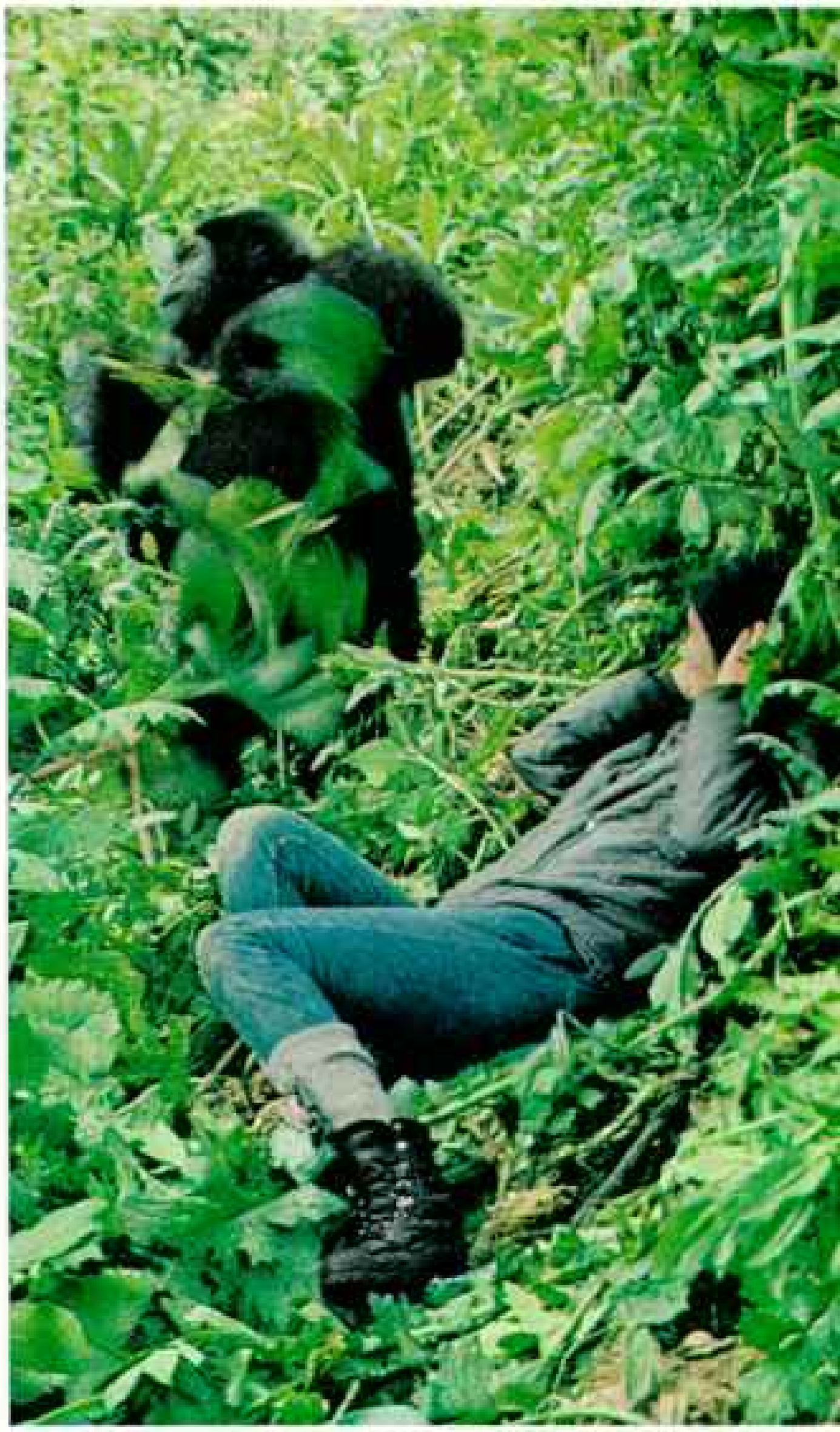
You go through ice, mud, or snow or we pay the tow!

At home among mountain gorillas

A NEW NOISE joins the forest chatter in Central Africa's Rwanda—the metallic voice of Dian Fossey's typewriter (**below**), on which she transcribes field notes for her National Geographic-supported study of the endangered mountain gorilla (page 574). Cindy, her dog, and Kima, a pet monkey, sit by.

At right, Peanuts, one of her subjects, beats his chest—a sign not of menace but of bravado and suppressed excitement. Miss Fossey reclines to show him that she, too, means no harm.

Your friends can also aid such research if you propose them for membership (below). Each month the GEOGRAPHIC will remind them of your thoughtfulness.



PAINTINGS BY ROBERT E. CAMPBELL © N.G.S.

Introducing a crimestopper so advanced

Digicom is made by the Sochesystems Products Organization of GTE Sylvania, P.O. Box 188, Mountain View, Calif. 94040

Dick Tracy doesn't have it yet.

It should come as no news flash to you that there's no one easy way to stop crime.

But it may surprise you to know that a lot of the job is wrapped up in one man. The guy whose job it is to get the police to the scene fast. The police dispatcher.

As the calls come in, he has to track down the radio car closest to the scene.

And that's just for openers.

Because next he has to find out if it's available.

And then get in touch with it by radio.

Which is exactly where our new crimestopper comes in. The digicom system from GTE Sylvania.

Digicom records the availability of all radio cars on a TV screen down at headquarters.

It even records their exact location. (When the radio patrolman touches a spot on his digimap, the same spot lights up on the dispatcher's duplicate map.)

As for the cop on patrol, with digicom in his car, he can actually run five license plate checks a minute directly through the state computer file. And check up on suspicious characters.

Unlike conventional radio, nobody can listen in, and the channels are never congested. Because digicom doesn't transmit voices. It transmits data. Electronically.

Naturally, all of this means a lot to the police, who need all the help they can get nowadays.

The cop on the spot can make faster decisions, because he's better informed.

That goes for the dispatcher, too.

But it also means something to the average citizen.

Knowing which car to send where can not only save time, but lives. And at the very least, can just plain get help to a lot of people fast.

Of course, the police can't carry digicom around with them like Dick Tracy's wrist-radio.

Yet.

GTE

GENERAL TELEPHONE & ELECTRONICS

AMERICAN MOTORS INTRODUCES THE GUARANTEED CAR.

If anything goes wrong with one of our 72's and it's our fault, we'll fix it free. Anything.

AMERICAN MOTORS 1972 BUYER PROTECTION PLAN.

For years, car buyers in this country have been saying that instead of shiny new chrome every year, what they really want is a good car they can count on.

That's why American Motors and its dealers put together their 1972 Buyer Protection Plan.

Here's how it works:

A STRONG GUARANTEE IN PLAIN ENGLISH.

When you buy a new 1972 car from an American Motors dealer, American Motors Corporation guarantees to you that, except for tires, it will pay for the repair or replacement of any part it supplies that is defective in material or workmanship.

This guarantee is good for 12 months from the date the car is first used or 12,000 miles, whichever comes first.

All we require is that the car be properly maintained and cared for under normal use and service in the fifty United States or Canada and that guaranteed repairs or replacements be made by an American Motors dealer.

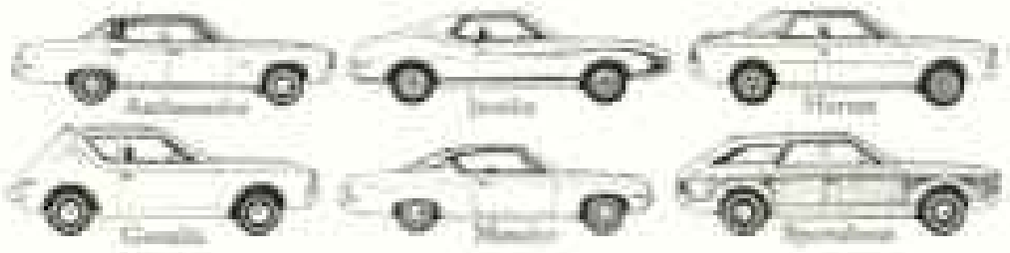
This guarantee gives you 12-month or 12,000-mile coverage on a lot of things most car warranties don't. It covers air conditioning, battery, radio, wiper blades, front end alignment, light bulbs—literally everything we put on the car except tires.

In other words, if something we did goes wrong with one of our '72's, you won't have to pay for the parts or the labor. We will.

A MORE THOROUGHLY-CHECKED CAR. FROM THE FACTORY AND THE DEALER.

Naturally, we wouldn't be backing our cars like this if we weren't more sure of them than we've ever been before. For 1972, we've put in more quality control steps, more tests and more people to see that every car leaving our factory is as perfect as man and machine can make it.

At the dealer's, it's checked over again.



Every car (not one of 50, one of 5, every one) is road-tested for starting, handling, braking and overall performance. When the serviceman completes the test, he signs his report and slides it over the sun visor, where you can see it.

And, when a man signs his name to something, you can be sure he's done his job. And done it right.

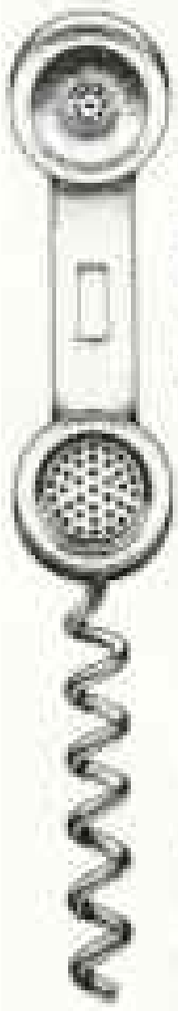
A LOANER CAR WHEN YOU NEED IT. FREE.

Not only do we offer you a strong guarantee, we've set up a system to back it up without inconveniencing you.

If you have to leave your '72 overnight for guarantee repairs, over 2,000 dealers will loan you one of their cars. A nice, clean, well-equipped car in good condition.

Free.

A DIRECT LINE TO DETROIT. TOLL-FREE.



We're making some big promises, and we fully intend to keep them. But, just in case you have a problem, we have a way of handling it. When you buy a '72, you get the name and toll-free number of a person in Detroit.

If you call, we promise you you'll get results. And fast.

These aren't just fancy words.

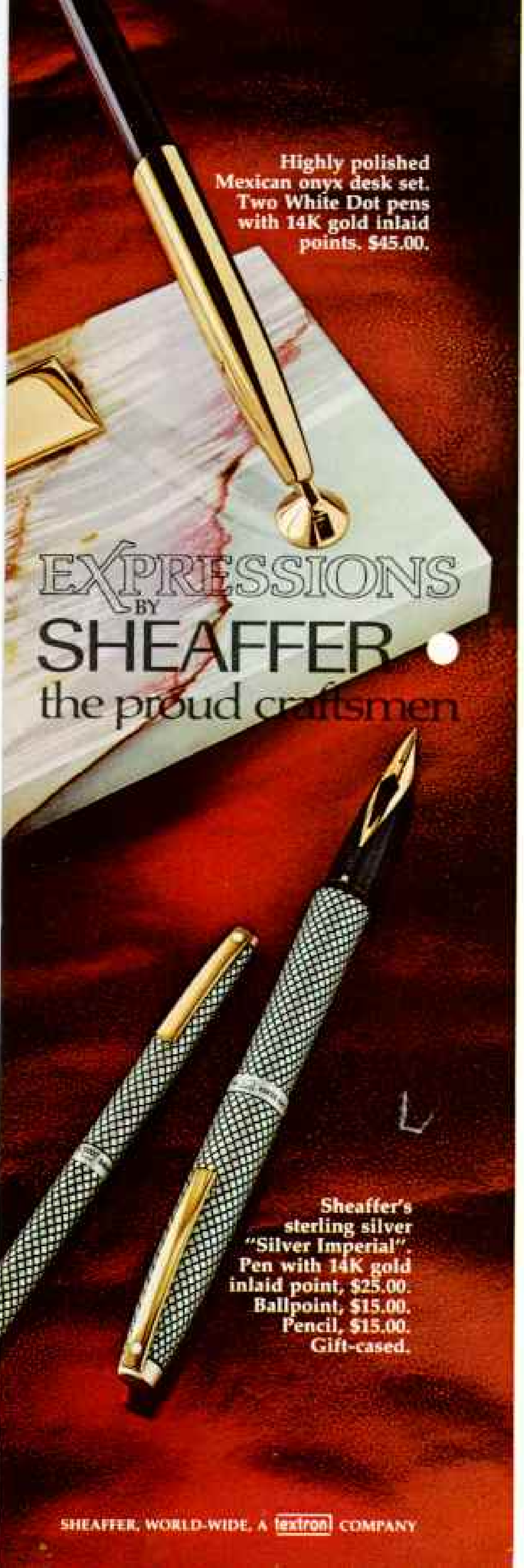
We mean it.

Nobody in the business does as much for you after you buy a car, and it takes a lot of time, men and money to do all of these things.

But we think it's worth it.

Since we're giving American car-buyers exactly what they say they want, we should sell more cars than we've ever sold before.

American Motors



Mickey Mantle caught the wheat germ from Pancho Gonzales

Kretschmer Wheat Germ helps supply the nutrition you need for energy and stamina. So rich in protein, vitamins and minerals, it's the world's most nutritious natural cereal.

Fly 'N Drive Australia.

Starts at $795. It's the best deal on wheels Down Under.

Our new low price includes your jet economy round-trip from San Francisco or Los Angeles. *Plus* an Avis sedan with automatic transmission for 14 days. *Plus* 400 free miles. *Plus* 14 nights lodging at first class motor inns all over Australia.

FLY 'N DRIVE AUSTRALIA.
Free brochures. Mail to: Qantas, 555 California Street, San Francisco, CA 94104.

Name_____

Street_____

City_____

State_____ Zip_____

QANTAS

treats you better all around

Price based on economy class 14/35 day ITX fare from West Coast.

The summer sun seems to like it here, too. And stays through November.

The sun does lovely things in Bermuda.

It plays on the sea around us, painting an exquisite water colour. On land, it brings out the best in our coral-pink beaches, not to mention a surrounding flush of floral hues.

But best of all, for people who may miss their summer vacations, it stays late into November. You can summer here in Fall while enjoying another kind of warmth that's always here.

A climate of courtesy, unique in a world that is something else. Of course, there's much more to do here than enjoy the artistry of the sun and the congeniality of our people. Golf. Shop. Dance. Or take it all in by motorbike, at a pace that's easy to take.

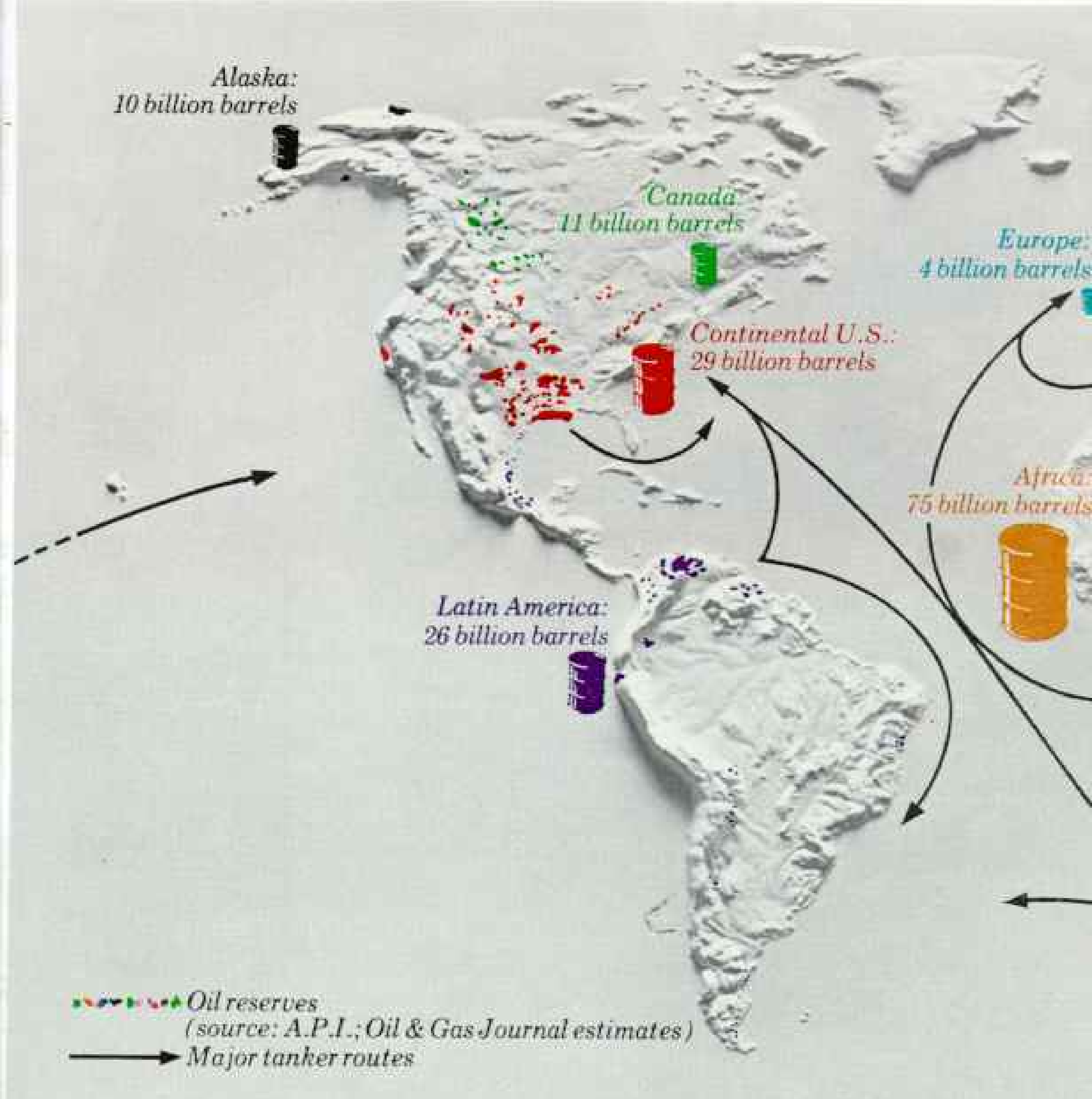
This Fall, come to where you can still find Summer.
To Bermuda, 90 minutes near.

Bermuda

For a change, come to where things haven't changed.

CALL YOUR TRAVEL AGENT, OR WRITE BERMUDA, 630 FIFTH AVE., NEW YORK, N.Y. 10020—6 NORTH MICHIGAN AVE., CHICAGO ILL. 60602

The world's known oil reserves.



There is a lot of talk about oil these days. For good reason. Oil now supplies more of the world's commercial energy than any other single source.

Since oil can only be found where nature has placed it, our search now takes us to increasingly remote places. To deserts. To arctic barrens. To the bottom of the sea. But finding oil has always been an uncertain business, demanding long-range planning and huge investments.

Once found, we then have to move it. By

And the search goes on.

pipeline. By tanker. And then we have to refine it into useful products. Finally, we must deliver these products to the consumer.

To help you follow the news and draw your own conclusions, we thought it would be helpful to publish this map. It shows the major oil supply routes and the world's proved oil reserves which have resulted from years of search to date.

Standard Oil Company
(New Jersey)

Esso

Chef Eric Morrell is the only British member of the Academie Culinaire de France.

He's also head chef with BOAC.

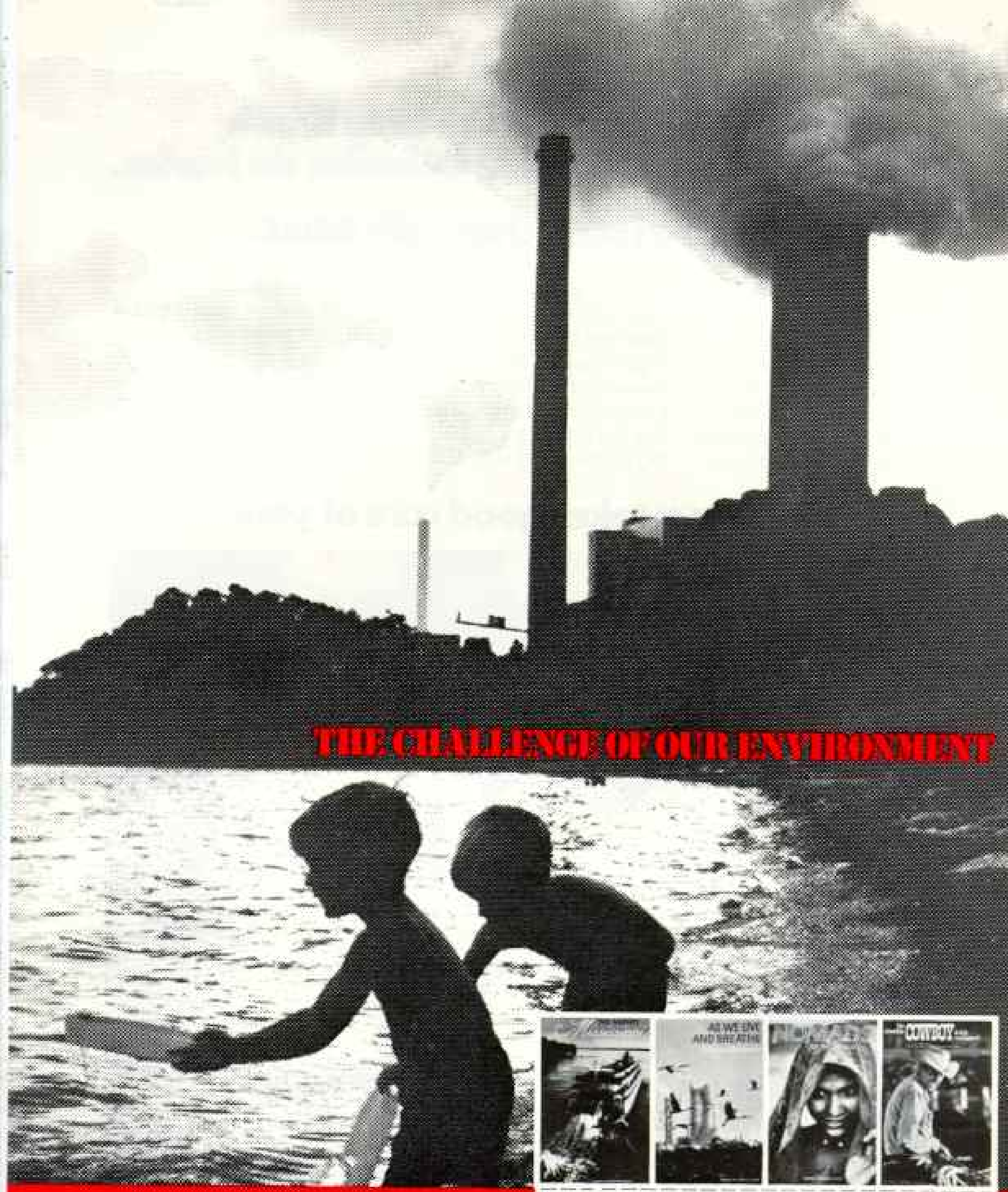
So the British aren't noted for their food? Well, our BOAC head chef, Eric Morrell, has won over 60 gold medals for his cooking, two of them in New York for a buffet that took him 72 hours to prepare.

Eric Morrell supervises the meals you eat when you travel with BOAC. Ensuring the roast beef lives up to its good English name. Planning the menus. And working 70 hours a week. Because in the area that the British are famous for, tradition and service, Eric is a supreme example.

So next time you're bound for Britain, or for any of the other 53 countries around the World we fly to, let us take good care of you with Chef Morrell's meals. See your Travel Agent or contact us for reservations.

BOAC takes good care of you.

British Overseas Airways Corporation



Choking fumes smother our cities. Chemicals and wastes contaminate our lakes and rivers. Litter piles up. Beaches are closed. Fishing is banned.

What is happening to nature's life-renewing cycles? What can we do to maintain them?

Find the answers to these urgent questions in an important new volume from National Geographic's latest Special Publications series, *As We Live and Breathe: The Challenge of Our Environment.*

Also, you may examine *without obligation* the three other absorbing Special Publications of the new series: *The Mighty Mississippi*, *Nomads Of The World*, and *The American Cowboy*.

Each hard-bound 7⅛" x 10¼" book contains 200 or more pages lavishly illustrated in Geographic color. The cost is just $4.25 per volume, plus postage and handling, but you pay *only* for the books you decide to keep. To reserve your first edition copies, simply complete and mail this form.

NATIONAL GEOGRAPHIC SPECIAL PUBLICATIONS
Department 60, Washington, D.C. 20036

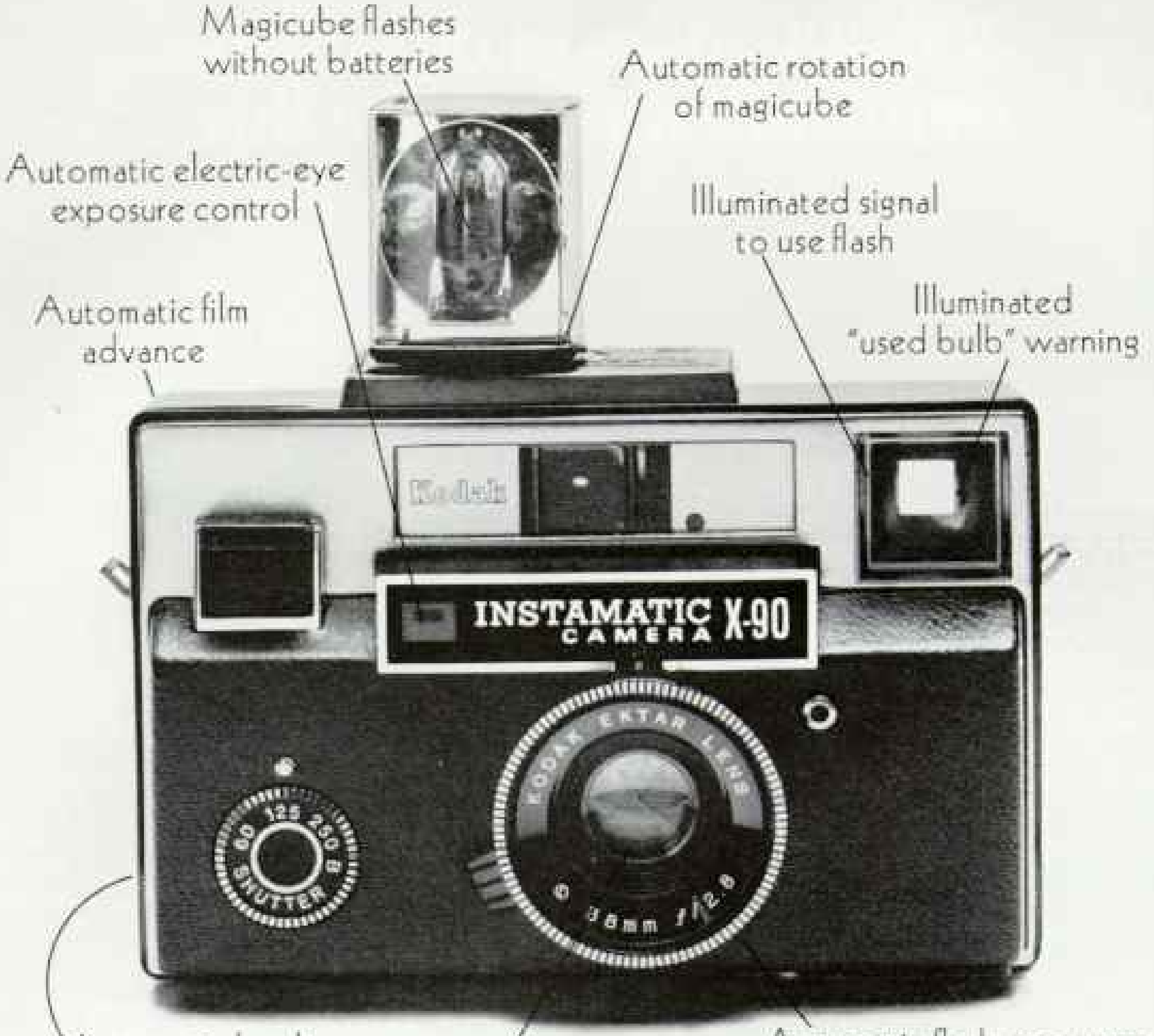
Please send me the four new Special Publications:
The Mighty Mississippi
As We Live and Breathe
Nomads of the World (available in December)
The American Cowboy (available March 1972).

Bill me $4.25 plus postage and handling for each book at time of shipment.

Name _____

Address _____

City, State, Zip _____



The most automatic automatic: latest edition.

The Kodak Instamatic® X-90 camera takes care of just about everything. Automatically.

Choose your subject. Focus in on it through the rangefinder. And shoot. That's all there is to it.

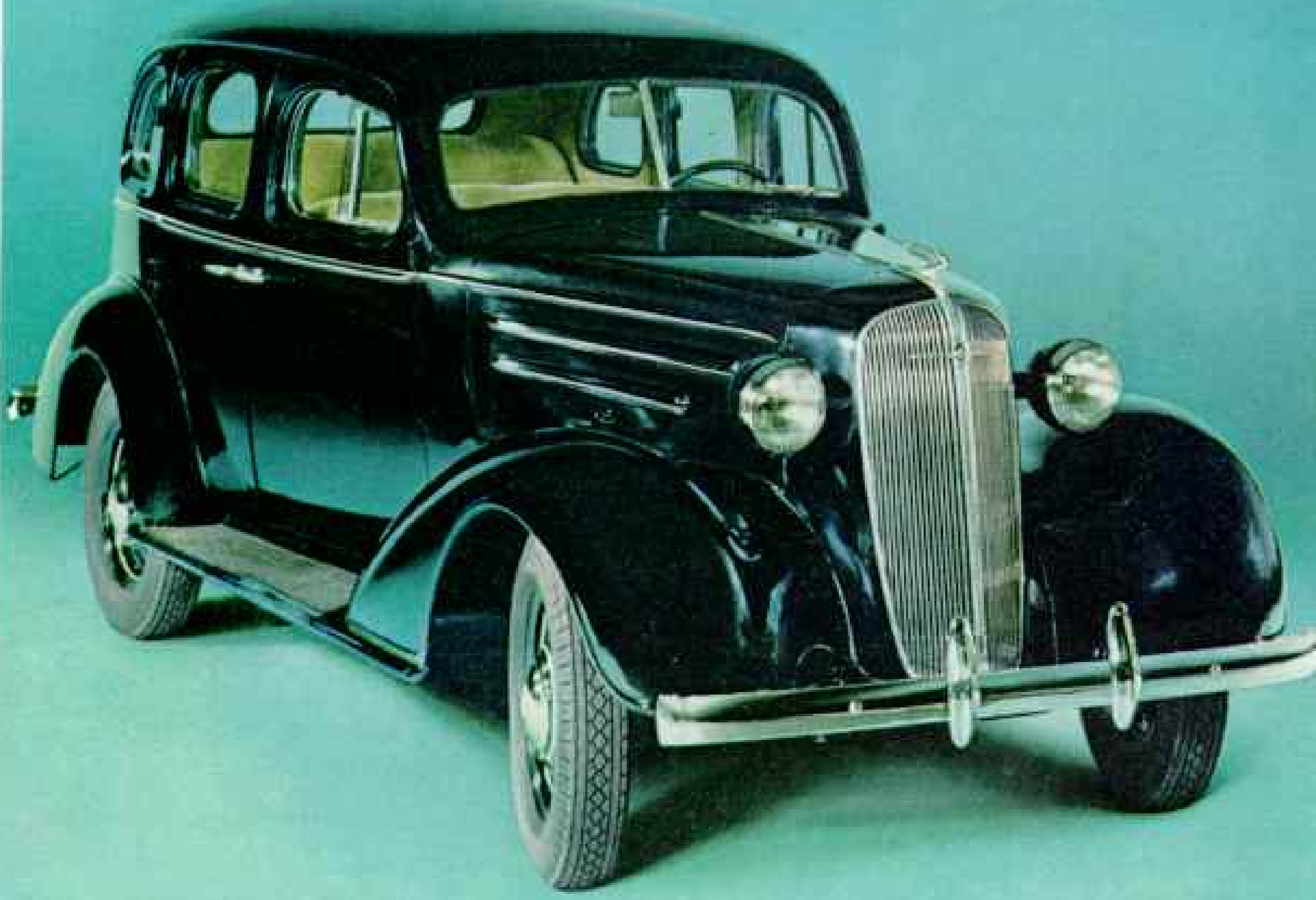
See the latest "most automatic automatic" at your photo dealer's. All of it for less than $145.

KODAK MAKES YOUR PICTURES COUNT.

Kodak

Price subject to change without notice.

200,000 miles of our roads were built for cars like this.



If you've ever come close to sideswiping an oncoming semi on a narrow stretch of road.

Or started off a vacation stuck behind a snake of creeping cars.

Or swerved around a hairpin curve that was tighter than it looked.

Then you know a lot of our highways have problems.

Old age problems.

200,000 miles of primary roads were built 30 to 40 years ago over old horse and buggy routes. For cars that seldom went faster than 40 mph.

Since then, the number of cars has tripled while total highway mileage has increased about 20%—mostly in urban areas.

As a result, driving has become a pain.

Even worse, extremely dangerous. Last year's death rate on old highways was more than double that on the modern Interstate.

So what can we do about it?

For a starter, complete the Interstate as soon as possible. And at the same time, update the old roads. Widen them. Straighten out dangerous curves. Increase visibility.

It'll make driving safer. Maybe even fun again.

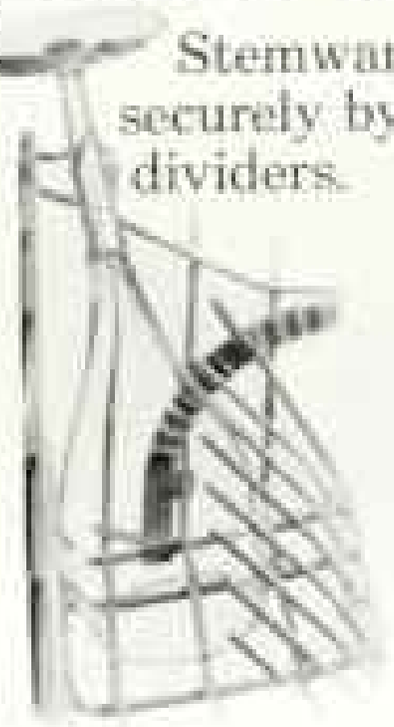
We can make the world a better place to live in. Caterpillar machines will help.

CATERPILLAR

Caterpillar, Cat and the Cat are Trademarks of Caterpillar Tractor Co.

Your meals change every day. So should your dishwasher.

Adjustable dividers hold glasses in place, fold flat for larger items.



Stemware is held securely by adjustable dividers.

Small-items basket holds measuring spoons, corn cob holders and pickle forks.

The top rack adjusts to 9 different positions. Lower it. Raise it. Or tilt it to make room for big things in both racks.

Line up a tableful of plates in the lower rack. Or fold down the dividers in the back for an extra casserole. Pans fit easily along the sides.

This new KitchenAid Superba is the closest thing yet to a custom made dishwasher. See the Yellow Pages for your KitchenAid dealer. Or write to KitchenAid Division, Dept. 1DNG-10, The Hobart Manufacturing Company, Troy, Ohio 45373.

KitchenAid

Dishwashers and Disposers
Hot-water Dispensers

Chevrolet. Building a better

Caprice Sedan in Yosemite National Park.

We want your 1972 Chevrolet t

The best.

No qualifications, no reservations.

We want it to be the most beautiful, most trouble-free, most comfortable car you ever owned.

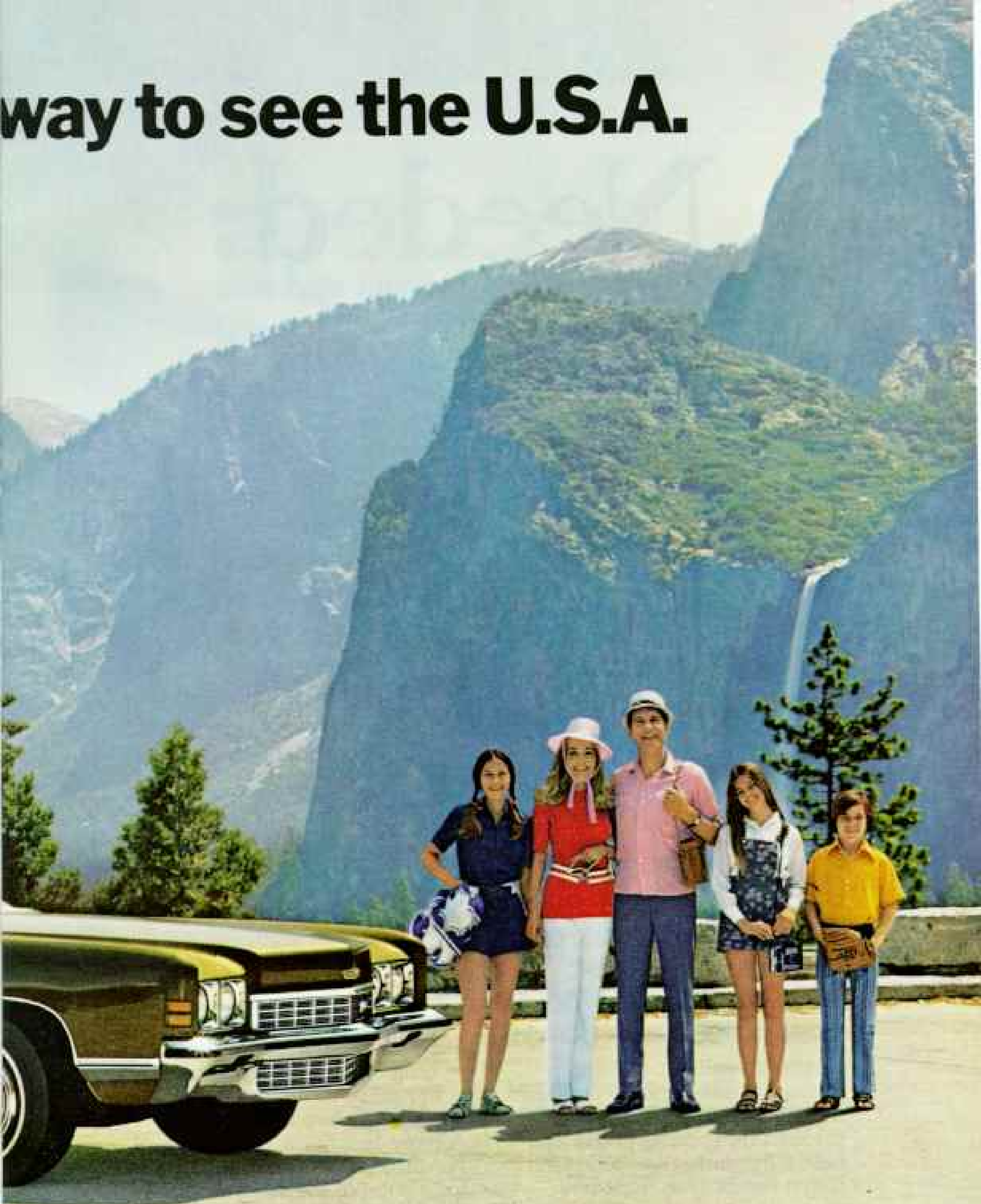
And because we want this for you, we've given every big new Chevrolet power steering and fade-resistant power front disc brakes.

We've given it a refined power ventilation system that keeps a controlled flow of outside air moving inside, even when the car isn't moving.

We've given it an improved front bumper to provide added front-end protection.

Along with all this, Caprice, the most luxurious Chevrolet, brings

way to see the U.S.A.



be the best car you ever owned.

you even more.

A 400-cubic-inch V8. Turbo Hydra-matic transmission. Plus an abundance of other niceties you expect with a luxury car.

All standard.

For we want you to ride relaxed, arrive refreshed, and look forward to your next vacation in your new Chevrolet, whether it's a full month seeing the sights of our country or a long weekend in the country around home.

We want your new Chevrolet to be the best car you ever owned.

No less.

Chevrolet

Needed:
tougher bumpers front and rear

Front-end damage $208

In tests conducted by the Insurance Institute for Highway Safety, 1971 model sedans were crashed into the rear of an identical model at 10 mph (equivalent to a barrier crash at 5 mph). Front-end damage averaged $208.

Rear-end damage $260

Same tests revealed average damage to the rear of cars to be even higher—$260.

Photo from I.I.H.S. crash test film.

Tougher bumpers on cars are the surest way we know to hold insurance costs down.

Allstate will cut collision insurance rates 20% for any car the manufacturer certifies, through independent tests, can take a five-mile-an-hour crash into a test barrier, front *and* rear, without damage.

Allstate is concerned about the big cost of little accidents. We say cars need bumpers that protect the way they're supposed to protect. The sooner it happens, the sooner we can act to hold down insurance costs.

For more information, write the Safety Director, Allstate Insurance Company, Northbrook, Illinois 60062, for a copy of the action booklet "Let's make driving a good thing again".

Allstate®

Let's make driving a good thing again.

The new American LaFrance is here! by Norman Rockwell

A-T-O.
Fire Chiefs know us.
So do little boys.

But they know us as American LaFrance,
the world's largest and oldest manufacturer of quality
firefighting apparatus.

It's a big day for everybody in town, welcoming the new American LaFrance. During its decades of service, it will lead countless parades and be inspected by scores of big-eyed little boys. But most of all it will protect the homes, schools and businesses in the town. Because protection is what this new American LaFrance fire engine is all about.

And so are hundreds of other products and services of A-T-O, Inc., parent company of American LaFrance.

A-T-O is now the world's largest integrated firefighting, safety and security company. It includes names like *"Automatic" Sprinkler, Advance Industrial Security, Badger-Powhatan,* as well as *American LaFrance.*

But A-T-O's protective umbrella extends much further. For example, *Rawlings* (protective sports gear); *Scott Aviation* (oxygen life-support systems); *Interstate Electronics* (protection of our country). There are many more. Protection, one of A-T-O's primary interests. At home. At work. At play.

ATO

For a 23 x 23 print of this Norman Rockwell painting, "The new American LaFrance is here!", suitable as a poster or for framing, fill out and mail this coupon, along with a check or money order, to: A-T-O, Inc., P.O. Box 120, Willoughby, Ohio 44094.

Quantity _____ print(s) @ $2.00 each.

Name _____
please print

Address _____

City, State, Zip _____

Offer void where prohibited

The Oldsmobile Ninety-Eight is more than just plush elegance and a big back seat.

As the years go by, you look for something more substantial in the car you drive. Size and luxury alone become meaningless. So, we offer an immensely comfortable car that is more than big, more than plush.

The 1972 Ninety-Eight runs on innovation. It's enhanced by 75 years of Oldsmobile history. It's what you've always wanted in a car, all in one car.

Room to stretch.

The Ninety-Eight is big. Big engine. Big space. Big comfort. You can carry people, packages, presidents or pets, and still have room to stretch. In comfort. And the trunk is big enough for more than an overnight trip.

The seats are soft, the feel is luxury, the windows are easy to raise, to lower, to look out of. There's plush on the ceiling and plush on the floor, and you only know how rough a road is by looking.

A soft-spoken engine.

Zero to cruising speed is a smooth, effortless movement. Its 455-cubic-inch Rocket V-8 is always ready with the power you need, when you need it. Nevertheless, it runs efficiently, and with lower exhaust pollutants, on no-lead, low-lead or regular gasolines.

The Ninety-Eight and security.

All the GM safety features have been built into this car. Side-guard beams in the doors, a cargo-guard that separates trunk and passengers, a double-steel roof overhead.

The Ninety-Eight ride is special, too. Because of Supershocks, computer-selected springs and other interrelated components, it handles bumps, stiff winds and rough roads with superb ease.

Behold....our bumper!

The new front bumper absorbs minor impacts, but in a new way. It's mounted on spring-steel bars; so it flexes, gives a little, then comes back to position.

To make it stronger, the bumper is made of heavier-gauge steel, with a protective vinyl insert to guard it from nicks and scratches.

Easier driving: standard.

What may be extra on many cars is standard on the Ninety-Eight. A Turbo Hydra-matic transmission changes gears, power front disc brakes stop you, power steering steers, power ventilation continuously circulates the air; the Ninety-Eight helps do many things for you.

What you want in a car, all in one car.

Driving should be a dependable means of moving from one place to another. A car can be a gem of engineering, a big back seat, or simply beautiful.

The 1972 Ninety-Eight is all of these.

OLDSMOBILE NINETY-EIGHT. QUITE A SUBSTANTIAL CAR.

Introducing the Toyota Celica ST.
(Some economy car.)

A tachometer and radial tires aren't usual on an economy car. A dash, console and shift knob, all of woodgrain, aren't very common either. Nor are hood vents and rally stripes.

But they're all on the new Toyota Celica ST. And they're all standard.

Economy cars don't usually do a standing ¼ mile in 17.5 seconds. But the Celica can. With power that comes from a single overhead cam engine that's red-lined at 6200 rpm. And a transmission that's fully synchromeshed through all four forward gears.

The Celica has what it takes to stop, too. Front disc brakes. Also standard.

Inside, the Celica comes with an electric rear window defogger, fully-reclining bucket seats, vinyl upholstery, padded dash, wall-to-wall carpeting, an electric clock. Even an AM radio is standard.

Of course, there are a few options. But very few. Air conditioning, stereo tape deck and AM/FM radio.

Then how can we call it an economy car?

It gets great gas mileage. About 25 mpg. It has a surprisingly small price. $2598†. And for the most obvious reason of all. It's a Toyota.

Some economy car.

TOYOTA
We're quality oriented

†Manufacturer's suggested retail price. (Price and specifications subject to change without notice.) Freight, dealer preparation, options and taxes extra.

If sugar is so fattening, how come so many kids are thin?

Next time you pass a bunch of kids, take a look. Kids eat and drink more things made with sugar than anybody. But how many fat kids do you see?

The fact is, if you constantly take in more food than your body needs, you'll probably get fat. If you eat a balanced diet in moderation, you probably won't. And sugar in moderation has a place in a balanced diet.

For kids, eating or drinking something with sugar in it can mean a new supply of body fuel. Fuel that can be used in not too many minutes.

There's a useful psychological effect, too. The good natural sweetness of sugar is like a little reward that promotes a sense of satisfaction and well-being.

The thing is, good nutrition comes from a balanced diet. And a balanced diet means the right amounts and right kinds of protein, vitamins, minerals, fats and carbohydrates.

Now, what's one important carbohydrate? Sugar.

Sugar. It isn't just good flavor; it's good food.

For more facts about good nutrition, and sugar's role in it, write:

Sugar Information, General P.O. Box 94,
New York, New York 10001.

FACE TO FACE

To meet the whole world face to face—as you are now meeting this white gorilla—might require more time and money than you could afford. But it doesn't necessarily have to! Through National Geographic magazines, special publications, books, maps, and school bulletins, you can now go where you choose—when you want to. You spend no time in getting to and from your destination, and no money on lodging, food, and transportation. Yet, you experience all the joy and excitement that come with meeting the world face to face. Use the form on the third page of this issue to become a member of the National Geographic Society.

Dept. 60, Washington, D.C. 20036

NATIONAL GEOGRAPHIC SOCIETY

A good friend is now easy to come by.

Everybody needs a good friend. One that will stick with you through thick and thin.

That's the Opel 1900 Sport Coupe. And it's easy to come by because it won't cost you a fortune to buy or to own. Besides being economical, the Opel 1900 is dependable and reliable. Just like a friend. It has a 1.9 liter engine that you can call on when you need it. With hydraulic valve lifters that keep the engine running smooth and quiet and cut down on the need for adjustments. So it's a considerate friend, too.

For smooth, quick stops, front power disc brakes are standard. Rack and pinion steering is standard, too. No real friend would be without them.

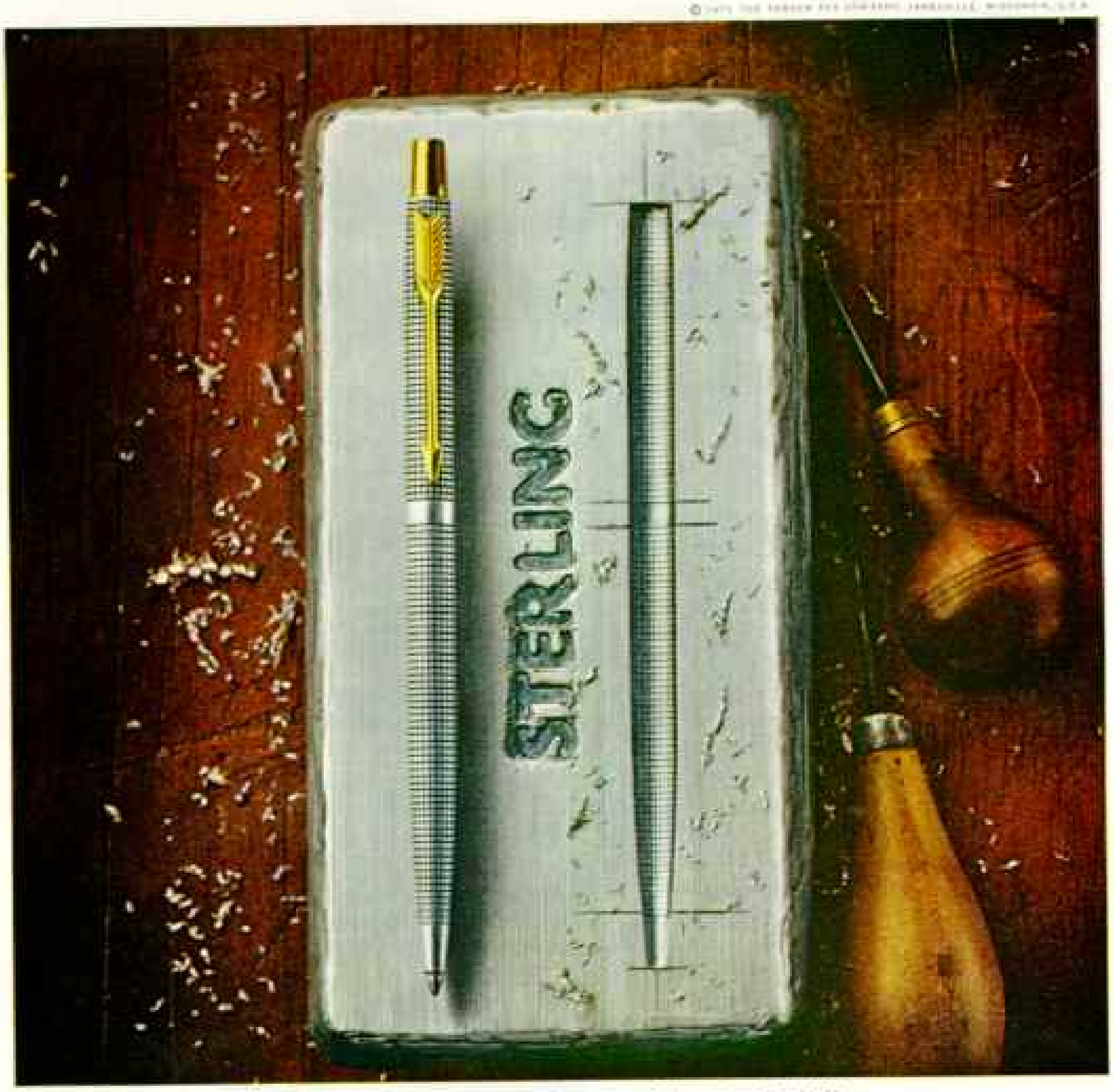
Then there's a standard four-speed manual transmission fully synchronized in all forward gears. Or if you wish, you can equip your friend with an available three-speed fully automatic transmission.

The Opel 1900 has a long list of friendly comfort and convenience features, too. Things like full carpeting, durable vinyl-covered front bucket seats with lots of padding, an abundance of head room, shoulder room and hip room front and back. There's even full-flow ventilation plus the convenience of swing-open side windows. And its 11.5 cu. ft. trunk has more luggage space than some larger size cars.

A good friend that's easy to come by. That's the Opel 1900 Sport Coupe.

Make one your friend soon at your Buick/Opel dealer's.

Buick's Opel 1900 Sport Coupe. Your friend.



The sterling silver Parker 75 Classic Ball Pen. Give it to someone who's economy-minded.

The Parker 75 Classic Ball Pen sometimes overwhelms people who get it as a gift. It looks a good deal more expensive than the $12 it costs. People tend to say "But you *shouldn't* have."

So, calmly point out the economy features of this obviously extravagant pen.

Tell the person who gets it that he'll never have to buy another ball pen ever. Because we guarantee this one against defects for the owner's lifetime, or we'll repair or replace it—free.

Tell him that the 75 Classic writes better months longer than the ordinary ballpoint—three times longer—and then refills with a cartridge for months more writing.

Most important, ask him what price he puts on exasperation. In this area, the 75 Classic costs nothing. It starts writing instantly, and puts down a crisp track at less than four ounces of pressure. That's because the ball in the tip is microscopically textured to glide effortlessly.

What price does he put on pleasure? Here's where this pen really delivers. That slim, solid sterling silver case isn't just for show. It gives the pen the proper heft and balance in the hand. He'll write comfortably with it for hours.

After you've convinced him what an economical gift you've given him, why not go back to the store and buy another 75 Classic for yourself? After all, you're economy-minded too.

PARKER

Maker of the world's most wanted pens

The sterling silver Parker 75 Classic Ball Pen or matching Cartridge Pencil, $12. A memorable gift for personal or business friends.
Other fine Parker pens to own or give from the $3.98 Jotter Ball Pen to the $150 Parker 75 Presidential Pen.

If one cassette could do it all, we'd only make one cassette.

When we first introduced the cassette a few years ago, one type of cassette did everything. Now, however, the cassette has grown up. You've found more uses for it. Some demanding greater range and frequency. Others which are just for fun. One cassette can't do it all anymore, and that's why we're introducing an entire line of cassettes. It takes four grades of tape: speech to symphony.

The Challenger: For voice recording and other work that doesn't demand wide range and frequency. A quality cassette...at a surprisingly low price. P.S. The Challenger is perfect for your children in school.

The Norelco 100: Here is a good all-around cassette for people who enjoy recording but don't want to spend the time and money for high fidelity. It comes with a factory lifetime guarantee.

The Norelco 200: This is the famous Norelco cassette that is the standard of the industry. It's perfect for fine music recording. The finest quality Low Noise tape most people will ever need. Of course, it comes with a factory lifetime guarantee.

The Norelco 300: This is the highest quality tape cassette we've ever designed. For those who demand sound perfection. It's a High Output-Low Noise cassette with extended frequency and dynamic range. Plus a factory lifetime guarantee. If you really appreciate fine quality sound, you'll love it.

Cassettes by the people who invented them. *Norelco*®

North American Philips Corporation, 100 East 42nd Street, New York, New York 10017

(Too little flash.)

(Focused Flash.)

One of Polaroid's Focused Flash 400s made this difference. No more burnouts. No more blackouts. For shots as close as 3½ feet, the louvers close down for perfect exposures. For group shots as far as 10 feet away, they open wide to let out all the light from the Hi-Power Cube. (Just shoot normally. It's automatic as you focus.) There are four models in our 400 Land camera line and prices start at under $60 without Focused Flash, under $70 with. Spend the extra $10 and see the light.

Polaroid's Focused Flash 400s.

POLAROID®