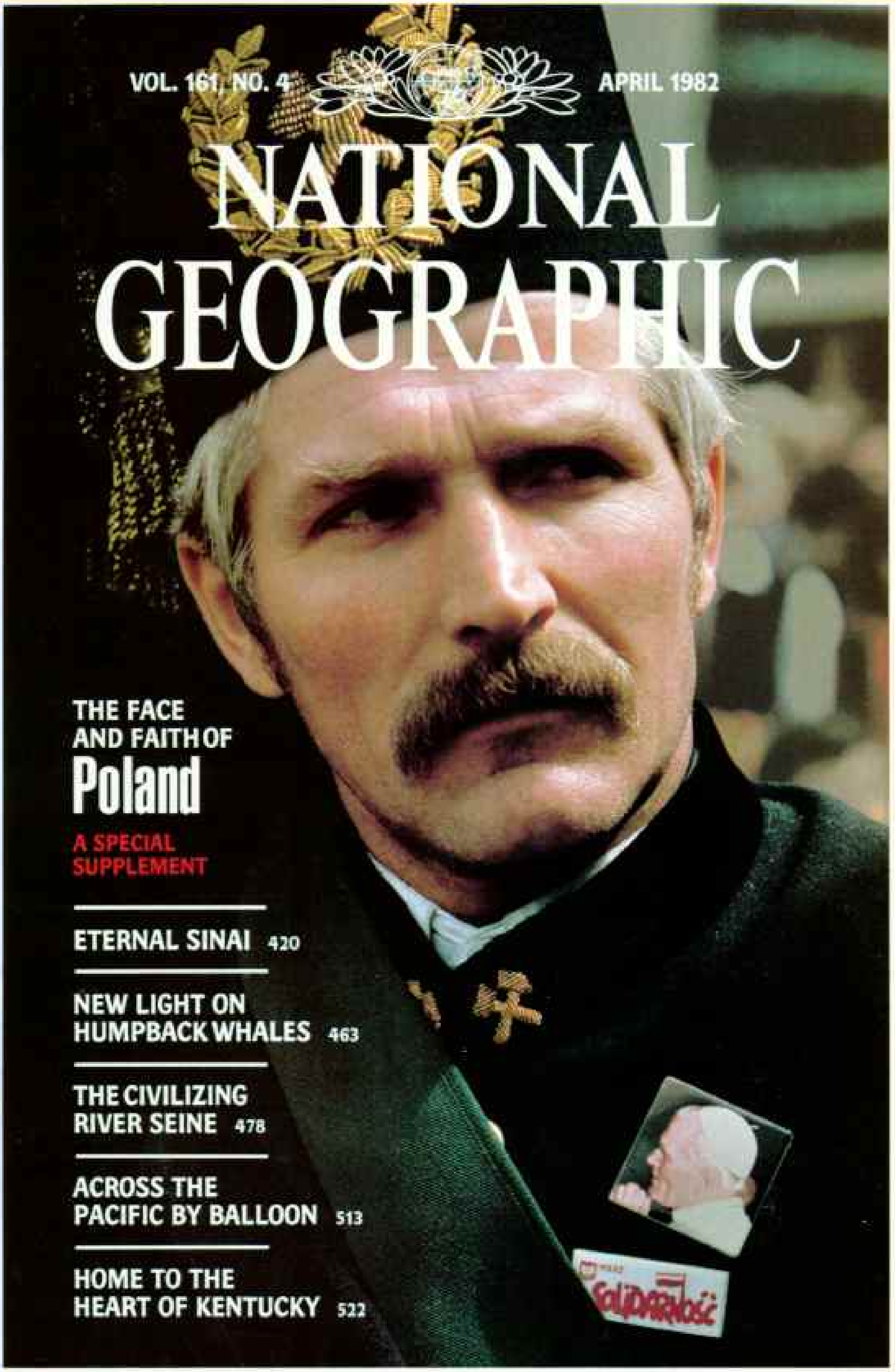
VOL. 161, NO. 4 APRIL 1982

# NATIONAL GEOGRAPHIC



## THE FACE AND FAITH OF Poland

A SPECIAL SUPPLEMENT


ETERNAL SINAI 420

NEW LIGHT ON HUMPBACK WHALES 463

THE CIVILIZING RIVER SEINE 478

ACROSS THE PACIFIC BY BALLOON 513

HOME TO THE HEART OF KENTUCKY 522


SEE "THE THAMES" WEDNESDAY, APRIL 7, ON PBS TV

THE LARGEST Polish population of any city is in Warsaw. The second is neither in Łódź nor in Kraków, but in Greater Chicago—4,600 miles from Poland.

Some 50 newspapers and 100 radio programs in the United States serve at least six million Americans of Polish origin. It was a fierce yearning for freedom and a better life that drew these people to America. The striving for these same values in Poland today has led to the death or imprisonment of many of its bravest citizens, and even threatens that nation's very existence.

In salute to the tormented Polish people, and as a bonus to our members, we have added a special supplement to this issue: an innovative broadside, dealing on one of its faces with the rich culture and history of Poland, and on the other with the profound religious faith that has always sustained the Polish people in times of trial.

The brilliant Polish poet and Nobel laureate in literature, Professor Czesław Miłosz, now at Harvard University, has written for us an incisive essay on his often overrun land and often persecuted people. Bruno Barbey's magnificent photographs, made during eight months of crisscrossing Poland before journalists' travel was restricted, give us a deeper appreciation of these indomitable people.

From the Vatican we have obtained statements—some of them little known—expressing the grief and concern of Pope John Paul II over the turmoil in his native land. Staff writer Peter Miller wrote the text that unifies the package.

Practically, this broadside format permits us greater editorial flexibility and a later deadline. In tradition, it echoes a device deeply rooted in our own independence movement: the Revolutionary broadside, protesting British persecution, posted in public quoting such patriots as Thomas Paine and Samuel Adams. Today in Poland the Solidarity trade union has presented its case powerfully and effectively through similar broadsides, posters, and handbills.

It is particularly appropriate at Easter—a time celebrated by both modern and pagan religions as a season of rebirth—to wish for our Polish friends a rebirth of freedom and happiness.

*Wilbur E. Garrett*

EDITOR


# NATIONAL GEOGRAPHIC

THE NATIONAL GEOGRAPHIC MAGAZINE VOL. 161, NO. 4



April 1982


## The Face and Faith of Poland

A SPECIAL SUPPLEMENT


Eternal Sinai 420

*Uprooted settlements and disrupted lives mark the final stages of Israel's return to Egypt of a land captured in the six-day Arab-Israeli war of 1967. Harvey Arden reports on this biblical "great and terrible wilderness." Photographs by David Doubilet and Kevin Fleming.*

New Light on the Singing Whales 463

*Courtship seems to move male humpbacks to song, and their music reveals broader migrations than had been thought. Zoologist Roger Payne sets the stage for remarkable photographs by Flip Nicklin.*

The Civilizing Seine 478

*Journeying along the River Seine and through 2,500 years of French history, Charles McCarry and David L. Arnold follow this stream of legend and love from its source in the hills of Burgundy to its end in the English Channel.*

First Across the Pacific: The Flight of "Double Eagle V" 513

*Despite the burden of tons of ice, a gigantic balloon successfully crosses the world's largest ocean. Ben L. Abruzzo, captain on the historic passage, describes the hazardous ups and downs of the flight.*

Home to the Heart of Kentucky 522

*Nadine Brewer returns to the land of her childhood and finds some timeless ways and values persisting amid growing towns and a prospering countryside. Photographs by William Strode.*


COVER: *The strength of Poland's character shines in the face of a coal miner, who wears a photograph of the Pope and the emblem of the Solidarity workers' movement. Photograph by Bruno Barbey, Magnum.*

# ETERNAL SINAI

DAVID DOUBILET

By HARVEY ARDEN
NATIONAL GEOGRAPHIC SENIOR STAFF

Photographs by DAVID DOUBILET
and KEVIN FLEMING

***Casualty of peace,*** *the new Israeli town of Yammit must be abandoned by the time Egypt reclaims the rest of Sinai. Planted among dunes near the Mediterranean coast, this modern community of prefabricated houses grew to be the largest of a score of farm and resort settlements created by Israel during its 15 years of occupation.*

**Time dissolves** *as a goatherd pipes a tune in the Sinai desert, home of Bedouin tribes for thousands of years. Foreign masters may come and go, they say, but the Bedouin remain.*

*National Geographic, April 1982*

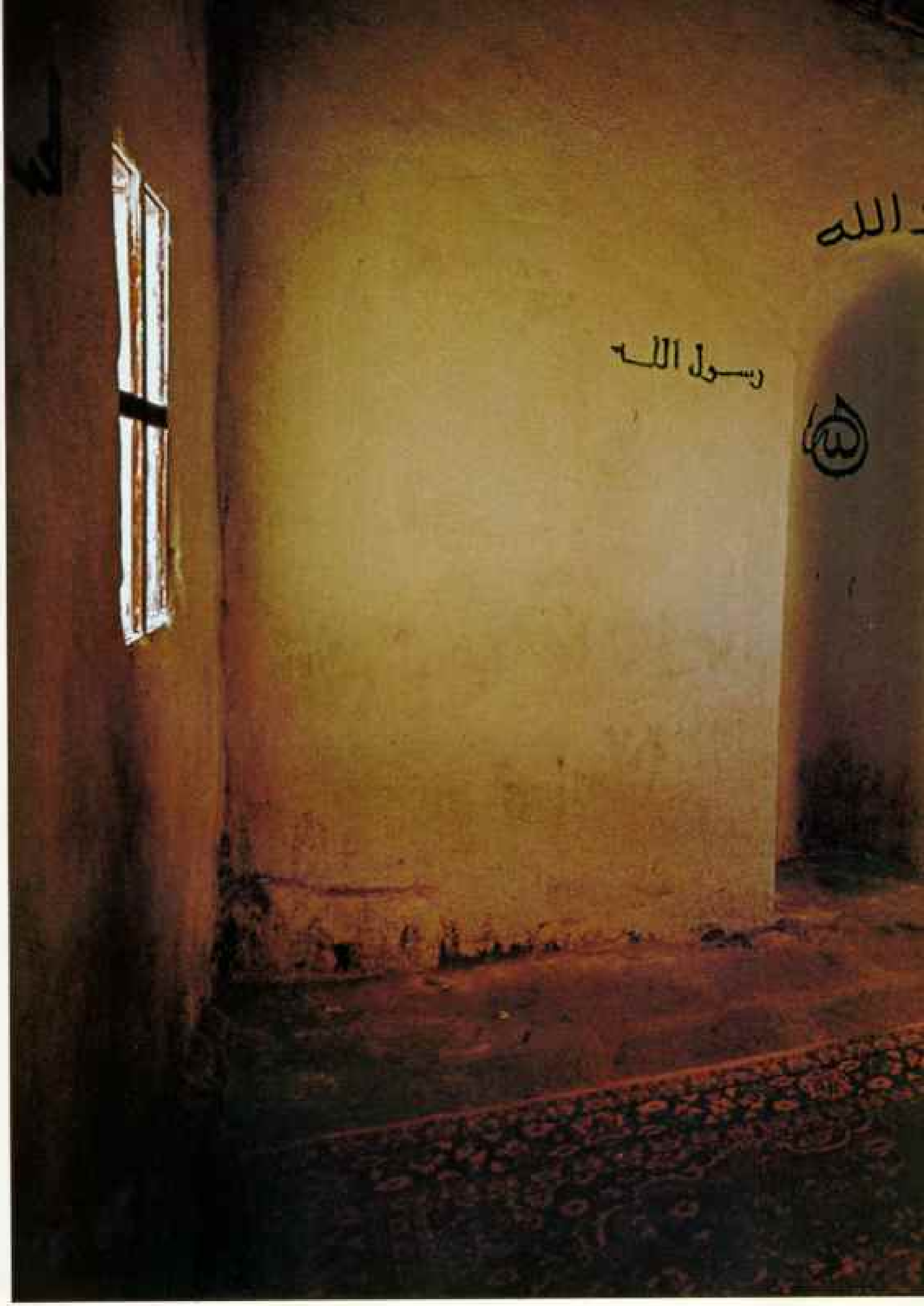
DAVID DOUBILET

*Migrating with their herds part of the year, some of Sinai's 50,000 Bedouin also harvest dates, cultivate grain, or grow vegetables. Under Israeli occupation, many have become less isolated from modern society, taking advantage of new roads, more jobs, new schools, and health care offered by clinics at new community centers.*

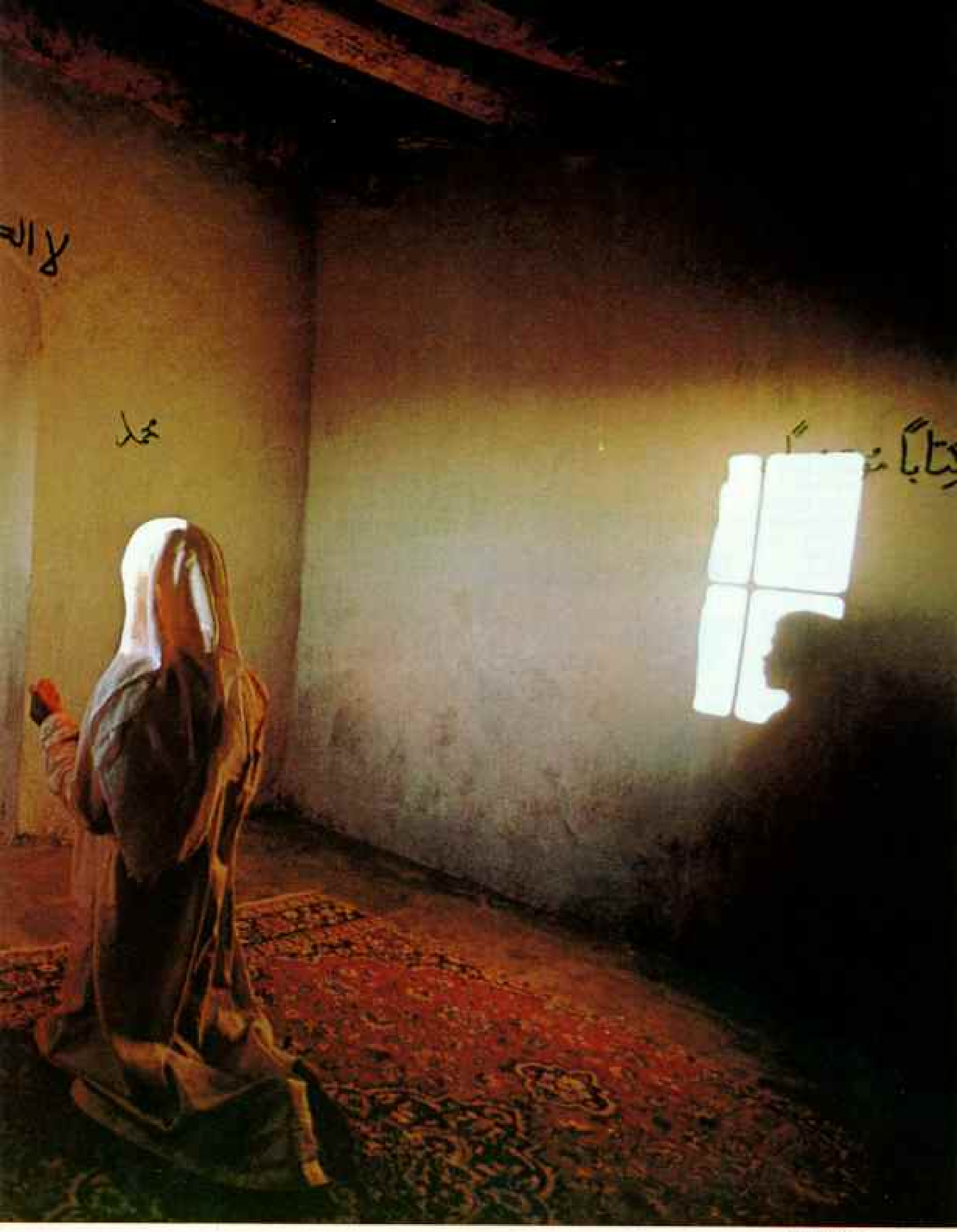
***Island of history*** *in a sea of desert, this Muslim fortress on Ras el Gindi was built in the 12th century by Sultan Saladin to stand guard against invasion from*

KEVIN FLEMING

*the east by the crusaders. Like countless foreign armies before and after them, the Christian warriors in the 1160s swept across Sinai to attack Egypt. To protect pilgrims on their way to Mecca, early Muslim rulers also built rest houses and water cisterns along the paths through the central desert, walked by the faithful for more than 1,000 years.*




**Closer to Allah,** *a Bedouin prays in a mosque at the summit of Gebel Musa, where, tradition holds, Moses received the Ten Commandments. Christians, Muslims, and*



KEVIN FLEMING

*Jews all revere Sinai, the Bible's "great and terrible wilderness" that the Israelites wandered, searching for the Promised Land. The Patriarch Abraham, the Prophet Elijah, and Jacob—progenitor of the tribes of Israel—also journeyed through this wilderness, into which Mary and Joseph with the baby Jesus fled from King Herod.*

# Sinai: Land of Conquest

*BONE OF CONTENTION between Egypt and Israel since 1967, Sinai is an arid wilderness of mystic beauty.*

*Dunes and marshes line its northern coast, where most of Sinai's 100,000 people cluster around oases, the largest town being El Arish. A limestone plateau with low hills stretches across the barren middle, barely supporting enough vegetation to feed the goats and sheep of the migrating Bedouin tribes. Rugged mountains in the south, between the Gulfs of Suez and Aqaba, form rows of granite walls that change color with each passing hour. These coastlines meet at Ras Muhammad in the Red Sea, where reefs of brilliant coral lie just below the water's surface.*

*Since the days of the pharaohs, armies have used this strategic peninsula as a bridge between Asia and Africa. Some of the routes through the northern desert crossed by Egypt's King Thutmose III to attack Palestine and Syria in the 15th century B.C. were recrossed in 1967 by Israeli tanks heading the other way.*

*Alexander the Great marched through Sinai in 332 B.C. to conquer Egypt, as did Amr ibn-al-As in 639 to bring Islam to Africa. Turkish Sultan Selim the Grim crossed in 1517 to make Egypt part of the Ottoman Empire. Napoleon swept through in 1799 during his brief adventures in the Middle East. And in 1917 British Gen. Edmund Allenby mounted his successful attack upon Turkish-held Palestine after building a railroad beside Sinai's Mediterranean coastal road.*

*Now peace may come to Sinai as conquerors have so often before. On March 26, 1979, President Anwar Sadat of Egypt and Prime Minister Menachem Begin of Israel signed a treaty ending 30 years of war between their nations. Under the terms of this treaty Sinai, after Israel's withdrawal, will be divided into three security zones (**right**) with varying restrictions of military forces monitored by a multinational peacekeeping force of troops and observers. The United States has agreed to bear 60 percent of the initial cost of the force—estimated at 225 million dollars—with Egypt and Israel each paying 20 percent. Thereafter, the cost will be borne equally by the three nations.*

*Though the treaty cannot guarantee peace, it holds out the promise. So the world watches—and hopes.*



**ISRAELI OCCUPATION**

*In a preemptive lightning strike, Israel took Sinai from Egypt in the Six Day War of 1967. The Yom Kippur War of 1973 saw Egypt regain part of Sinai, but then Israeli troops drove through Egyptian forces to occupy part of the Suez Canal west bank.*


**SEPARATION OF FORCES**

*Shuttle diplomacy by United States Secretary of State Henry Kissinger led to Egypt's reclaiming a strip along the Suez Canal in 1974. A 1975 agreement extended this strip south to include the Abu Rudeis oil field.*


**PEACE TREATY**

*In its 1979 treaty with Egypt following the Camp David accord, Israel promised to withdraw from Sinai in three years. Israel withdrew behind an interim buffer zone by early 1980 and pledged to give back the rest of Sinai by April 25, 1982.*

Mediterranean Sea

GAZA STRIP
(Israeli occupied)

WEST BANK
(Israeli occupied)

ISRAEL

NEGEV

SINAI

ARAB REPUBLIC OF EGYPT

JORDAN

SAUDI ARABIA

Red Sea

Gulf of Suez

Gulf of Aqaba

Port Said
Port Fuad
Lake Manzalah
Lake Bardawil
Romani
SUEZ
El Qantara
CANAL
Ismailia
Lake Timsah
Great Bitter Lake
Little Bitter Lake
AHMED HAMDI TUNNEL
Suez
El Shatt
Port Tawfiq
Suez to Cairo 120 kilometers (75 miles)
Uyun Musa (Springs of Moses)
Middle Pass
Ras el Gindi
Sudr
OIL FIELD
GYPSUM MINE
MANGANESE MINE
Abu Zenima
ABU RUDEIS OIL FIELD
Abu Rudeis
Abu Durba
OIL FIELD
OIL FIELD
SHAAB ALI (ALMA) OIL FIELD
Tur
Neot Sinai
El Arish
El Arish Airport
Wadi el Arish
Yammit
Sadot
Rafah
Beersheba
Netivha Asara
Taimei Yosef
Etam
Abu Awaigila
Nizzana
El Quseima
COAL MINE
Gidi Pass
Wadi el Brak
(Numerous watercourses)
Nakhl
Wadi el Arish
Wadi el Aqaba
El Kuntilla
El Thamad
Etzion
Eilat
Aqaba
Nevlot
Nuweiba
Dahab
Di Zahav
St. Catherine's Monastery
Gebel Katherina
2,637 m
8,652 ft
Gebel Musa (Mount Sinai)
2,285 m
7,497 ft
Naama
Ofira
Sharm el Sheikh
Ras Muhammad
Strait of Tiran
Tiran Island
Sanafir Island
(Part of Zone C)
Strait of Gubal

ZONE A
Limited Egyptian force of up to 22,000 troops with tanks and artillery

ZONE B
Egyptian border units of up to 4,000 personnel with light weapons

ZONE C
Egyptian civil police and a multinational peacekeeping force

ZONE D
Limited Israeli force of up to 4,000 troops

A multinational force of about 2,500 troops and observers will verify compliance with the 1979 peace treaty. The troops will be stationed near Etam in the north and Sharm el Sheikh in the south and patrol Zone C, while civilian observers will monitor all four zones.

Since 1976 the United States has performed a peacekeeping role in Sinai through its Sinai Support Mission. The mission's operations will end with Israel's final withdrawal and the establishment of the new multinational force.

The Israeli-occupied islands of Tiran and Sanafir, claimed by Saudi Arabia and used by Egypt in the 1967 war, are due to be returned to Egyptian control in April 1982.

Former Israeli air base

Israeli settlement established during occupation

Gebel ..... hill, mountain
Ras ..... cape, promontory
Sharm ..... bay, harbor
Wadi ..... streambed

KILOMETERS 30
STATUTE MILES 30

DRAWN BY IRANGHAN KASHI
COMPILED BY DAVID B. MILLER
NATIONAL GEOGRAPHIC ART DIVISION

THE UNTHINKABLE had happened: Peace had come to the eternal battleground of the Sinai Peninsula, and never had things seemed so confused or uncertain. It was late September 1981—a time like no other in this place like no other.

I had arrived in the midst of a dizzying transition. After 15 years of occupation and controversial settlement, the Israelis were in the process of preparing for their final pullout. The Egyptians, meanwhile, were still tentatively moving in.

Within seven months—by April 25, 1982, if the terms of the Camp David peace accords were to be kept—Israel was scheduled to have withdrawn its military forces and settlers from the third of Sinai it still occupied, returning the entire West Virginia-size peninsula to Egyptian sovereignty for the first time since Israel had seized it during the six-day Arab-Israeli war of 1967.

But in still occupied eastern Sinai, ultranationalist Israeli zealots, defying the embarrassed government of Prime Minister Menachem Begin, were moving into homes abandoned by outgoing original settlers, vowing to disrupt the withdrawal from Sinai at all costs, even to the point of outright physical violence.

In Cairo and other Egyptian cities, Muslim extremists were loudly shrilling their fanatic opposition to Egypt's unilateral peace with Israel, which they considered a betrayal of the Arab cause.

And, in just two weeks, the prime architect of that precarious peace—Egyptian President Anwar Sadat—would be dead, gunned down by assassins at the annual parade commemorating Egypt's breakthrough into Sinai in the 1973 war.

Amid such lurching and violent change I needed a handhold, something timeless to grasp. I found it among the ancient keepers of the land, the desert Bedouin.

I'd almost missed Sheikh Salam Saad Salem's meager encampment off the road south of Suez. Not far from oil-rich Abu Rudeis on the Gulf of Suez coast, this area had been returned by the Israelis to Egyptian civil administration a few years back (maps, pages 428-9).

Once off the road I could see a few shacks straggling up a bone-dry wadi—hardly more substantial than a mirage in the heat-rippled air. But several men and a group of young children were gathered there. Curious, I walked across a dune tangled with rusted remnants of barbed wire and entered the unexpected world of Sheikh Salam Saad Salem and his 400 or so Bedouin of the Al Sawaada tribe.

With his noble visage and graceful white kaffiyeh, Sheikh Salem might have been taken for some ancient desert prophet—but for the sun-faded suit jacket beneath his flowing Bedouin headgear and the rusted mid-sixties Chevy pickup parked beside him on the barren dune.

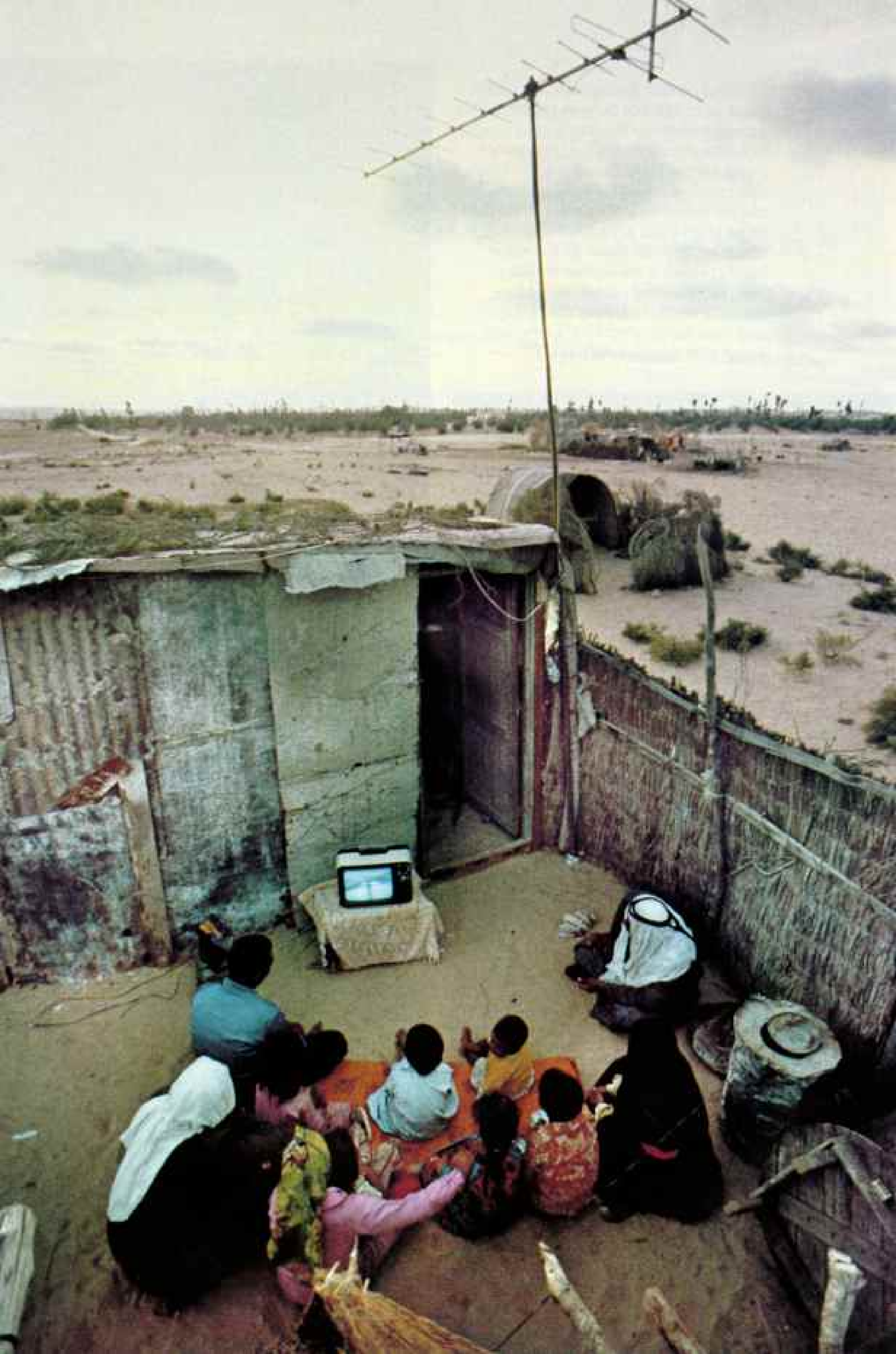
Yes, he told me, he had lived for many years under the Israelis, who had built a medical clinic for his tribe. When the Egyptians replaced the Israelis, little changed for the Al Sawaada tribe. The old days of free wandering were over. Numerous new roads and settlements built by the Israelis had inevitably constricted the Bedouin's old seminomadic life-style. Both Israelis and Egyptians, it seemed, preferred keeping the once wandering Bedouin in one place,

## ETERNAL SINAI

# Egyptian Sector

Photographs by
KEVIN FLEMING

***Down for the show,*** *a Bedouin family watches Israeli television in an enclosure at their home near El Arish. The battery-powered set fits in well with their traditional portable life-style. But their wandering ways have been curtailed as the Israelis built roads and settlements during their 15 years of occupation.*



**Biblical echoes** *reverberate in modern Sinai as a Bedouin woman (**right**) bakes unleavened bread similar to that made in haste and carried out of Pharaoh's Egypt by the Israelites of the Exodus. After their miraculous escape through the sea into Sinai, the fleeing multitude came to an oasis called Elim, set about by 70 palm trees. At a similar oasis (**below**) a woman sorts dates from surrounding palms. When dry, the fruit will help supply the family and their herds of camels, goats, and sheep with food for the winter.*

where their activities could be kept tabs on.

"In spring the women go out with the goats," Sheikh Salem told me. "We pick dates, do some trading. Some of the men get jobs building roads or at the oil fields. Some go off to Suez or Cairo to study, to work. They send money home but come back only for visits.

"Of course," he smiled, "we have many children! I myself have 17 by my two wives. What else can you do in the desert?"

I was led into a low three-room shack nearby, consisting of two schoolrooms and a teachers' dormitory. Through a thin wall at one end of the schoolroom came a chorus of children's voices chanting what sounded to me not unlike a liturgy.

"No, they aren't saying their prayers," I was told. "They say their arithmetic sums in unison!"

One of the teachers showed me a large framed and glassed document. It had been awarded, I was told, to a local Bedouin.

The graceful Arabic calligraphy was paraphrased into English for me:

TO ONE OF THE SONS OF SINAI
AWARD OF THE FIRST CLASS
IN APPRECIATION OF HIS SPECIAL EFFORTS
IN THE OCTOBER 1973 WAR
/signed/ ANWAR SADAT
PRESIDENT OF THE ARAB REPUBLIC OF EGYPT

But what had the recipient done to deserve such an award? I asked.

Neither the sheikh nor the teachers said anything. They averted their eyes.

"Did he work against the Israelis?" I asked. "Did he spy for the Egyptians?"

Silence was my answer—the usual close-lipped response by the ever cautious Bedouin to outsiders' probing questions. After all, who knew whether or not the Egyptian or Israeli authorities might take offense at whatever they said. Always in the middle—the Bedouin.

***Oil and water mix*** *on Sinai's Gulf of Suez coast. A gas flare* ***(left)*** *burns near Abu Rudeis, where an Egyptian oil worker* ***(right)*** *helps hoist drill pipe for a rig operated by a Japanese company. During its occupation, Israel not only expanded the Abu Rudeis field but also discovered the important Alma field to the south. Egypt continues its own expansion, and with new finds along Sinai's Mediterranean coast hopes to become a major oil exporter.*

There's a poignant sidelight to the story of Sheikh Salem and the Israelis. A few weeks later in Ofira, the about-to-be-abandoned Israeli settlement at Sharm el Sheikh in southern Sinai, I spoke with Dr. Amnon Tsvieli, an Israeli doctor who for six years has devoted himself to tending the Bedouin of Sinai.

Dr. Tsvieli asked me where I'd been on the Egyptian side of Sinai—where he had been practicing until recently—and I mentioned my visit to the encampment of Sheikh Salam Saad Salem.

"Sheikh Salem! My old friend! We helped set up a clinic and train medical personnel for his tribe. Did he tell you?"

I reassured him that the clinic seemed well kept under the administration of the Egyptians, who continued to train paramedics.

***Bedouin builders*** *carry mortar for an addition to a tourist hostel at St. Catherine's Monastery* ***(left)****, built on the reputed site where God spoke to Moses from the burning bush. Many pilgrims each year climb nearby 2,285-meter Gebel Musa—the traditional Mount Sinai—topped by a small mosque and a Greek Orthodox chapel. Some 15 monks at the 1,400-year-old monastery grudgingly share their isolation with visitors who arrive by bus, car, and small plane. A planned Egyptian international airport on the site of Israel's former Etzion Air Base, in eastern Sinai, will facilitate tours by jet-setting pilgrims in the future.*

"I must tell you a story," Dr. Tsvieli said. "Sheikh Salem has a daughter born with severely bowed legs. It wasn't something we could treat out in the desert. We took her to Elat for several operations. Each time the bones had to be broken and reset. Each time new casts were needed for the growing child. Then, just as she was approaching recovery, the Egyptians took over.

"We sent a letter in Arabic to the Egyptian doctor in charge of her case, explaining to him that new casts would have to be made if Sheikh Salem's daughter was to recover fully. We asked the Egyptians to share any information on her progress with us. But maybe this doctor took offense at our suggestions. We later heard that the child visited a doctor, who removed her casts and declared her cured. You can't imagine how frustrated we felt!"

### Heartland of Three Religions

Sinai—the very word evokes divinity. Here man has spoken out to God—and God has spoken back. The name itself may signify a god: Sin, moon god of the ancient Mesopotamians, one of an endless array of peoples to shuttle across Sinai's sands. Among them walked Abraham, patriarch of Judaism, Christianity, and Islam, who lived at Ur and Haran, centers of worship to Sin, before journeying from Mesopotamia to Canaan's Promised Land.

Famine brought Abraham through Sinai on his way to Egypt, as it would later bring 11 of his great-grandsons to join their other brother, Joseph—eponymous ancestors of the tribes of Israel. To Sinai, Moses and the Israelites of the Exodus fled before Pharaoh's war chariots, and here the Prophet Elijah took refuge from King Ahab and Queen Jezebel. Through Sinai, Mary, Joseph, and the infant Jesus passed, fleeing into Egypt to escape the wrath of Herod.

Across this strategic land bridge between Asia and Africa—geographically a part of Asia—have passed conquerors beyond counting: Egyptians, Hyksos, Hittites, Assyrians, Babylonians, Persians, Greeks, Romans, Byzantines—the last spreading Christianity here in the fourth century A.D. Later came the Muslims, the crusaders, the Mamluks, the Turks, the British, who

gradually ousted the Turks and were themselves ousted by the Egyptians in 1954, and, most recently, the Israelis.

During their 15 years here, the Israelis gridded the desert with roads, found new oil off Sinai's western coast, discovered vast, still untapped subterranean deposits of fossil water, constructed some of the world's most sophisticated military bases, resettled many of the 50,000 or so Bedouin, founded a score of Jewish settlements with long-range plans for tens of thousands more inhabitants, and—in the process—won the near-unanimous condemnation of friends and enemies around the world.

### A Prize Long Coveted

Now Egypt prepares to resume control. But, it's worth noting, Egypt has exercised only intermittent sovereignty over Sinai through the centuries. Ancient Egyptians controlled only western Sinai, with its copper and turquoise mines, and major trans-desert routes—the rest being wilderness. Moses, remember, fled *into* Sinai to get *away* from the Egyptians. The Ottoman Turks controlled most of Sinai for centuries before being driven back to Palestine by Mohammed Ali in the 1830s. Later, after occupying Egypt in 1882, the British held varying degrees of control over Sinai until finally being ousted in 1954 by President Sadat's predecessor, Gamal Abdel Nasser. Just 13 years later Israel seized control.

Twice before 1967 the Israelis were tempted by Sinai's strategic real estate—first during the 1948-49 war of independence, when, already in Sinai, they backed off under pressure by Great Britain; and then in the 1956 war, when they actually occupied the peninsula for four months before being constrained by the United States through the United Nations.

I approached Sinai from the city of Suez, southern terminus of the Suez Canal. I'd been here before, in 1974, following in the footsteps of Moses.* Then the city was virtually depopulated, almost every building pocked with artillery holes from the 1973 war and the less known but even more damaging 1968-1970 war of attrition.

This time I found Suez booming anew, her population of 300,000 surpassing prewar levels, her buildings reconstructed in orderly phalanxes of shining native limestone, her economy flourishing from her role as southern guardian of the Suez Canal, transited by some 2,000 ships each month.

I arrived before the opening of the new Ahmed Hamdi Tunnel beneath the canal, 17 kilometers north of Suez. Named for an Egyptian general killed while directing assault-bridging operations over the canal in the 1973 war, this thoroughly modern two-lane tunnel becomes the first direct land link between Sinai and Egypt proper since the French entrepreneur Ferdinand de Lesseps divided Asia from Africa by building the Suez Canal in the 1860s. The canal, blocked since the 1967 war, was reopened in 1975.† The new tunnel noses far enough beneath it to permit deepening and widening. Already, dredging since 1975 has made the canal passable by U. S. aircraft carriers and even larger supertankers.

There's more than a touch of majesty in the slow-moving ships—Japanese, Soviet, Liberian, Scandinavian, even Israeli—as they ghost through the narrow milky blue waterway, flanked by desert, carrying cargoes from everywhere to anywhere.

Aboard a Swedish tanker heading north to Port Said, I witnessed a mild dispute between the Swedish captain and the Egyptian pilot who came on board to guide the ship.

"But," said the Egyptian pilot, "you must have an Egyptian flag flying up at the prow when you go through the canal."

"Well," barked the captain, "I've been through here eight times now, and I have never had a flag up there. We've got the

*The author's pilgrimage in the pathway of the prophet was reported in the January 1976 edition of NATIONAL GEOGRAPHIC.

†William Graves described Egypt's reopening of this crucial channel in the June 1975 GEOGRAPHIC.

***The veil still prevails** among Bedouin women, who sew coins onto their face coverings as a sign of wealth. Sinai's proud Bedouin were among the first converts to raise the burning brand of Islam during seventh-century Muslim conquests.*

Egyptian flag flying from the wheelhouse, isn't that enough? Am I supposed to rebuild my ship just to pass through your canal?"

"It is the regulation!" insisted the pilot. "Next time see that you have it!"

Cooling down, the captain turned to me and admitted: "Flag or no flag, we need the pilot. Navigating the canal is dangerous work—tricky currents in the narrow channel. Wouldn't want to block the Red Sea from the Mediterranean, would we?"

### Embankments Failed Trial by Water

Stretching along the Sinai side of the 179-kilometer-long canal are remnants of the Bar-Lev Line—a series of fortified observation posts and outposts scattered along the length of the canal; it was built by the Israelis to defend their side of the waterway after the 1967 war.

On October 6, 1973, President Sadat launched his oft scorned armed forces across the canal in a technically brilliant surprise assault that changed the course of Middle East history. At about 15 points from Suez city to El Qantara, Egyptians stormed across the canal in rubber assault dinghies, on ferries, and on segmented pontoon bridges to attack the Bar-Lev Line.

On this holiest Jewish day, the Israeli fortifications along the canal were defended by 600 troops brought in to relieve the regular garrison for the observance of Yom Kippur, Day of Atonement; the positions of another 4,500 Israeli soldiers lay within ten kilometers of the canal.

And what of the vaunted Bar-Lev Line? The Egyptians simply sliced their way through the sand embankments with an amazing "secret weapon"—high-power turbine-driven water cannon blasting out a thousand gallons of water a minute, originally used to strip away sand and soil for the Aswan High Dam. Within ten hours the Egyptians had hosed a number of gaps through the Bar-Lev Line, started shuttling ferries over to Sinai with men and equipment, and assembled ten vehicle-carrying pontoon bridges.

Sadat's troops carried the latest in Soviet antitank missiles and rockets and were backed by an integrated missile and artillery screen that rivaled the largest of either

***Link between worlds,*** *the Suez Canal—reopened in 1975 after having been blocked by mines and sunken ships in the 1967 war—has been widened and deepened by Egypt to accommodate vessels even bigger than the aircraft carrier U.S.S. America* ***(above)****. Plans call for further dredging to permit passage of ever larger supertankers. Building of the canal in the 1860s divided Egypt from Sinai—and hence Africa from Asia. A new tunnel* ***(right)****, 17 kilometers north of Suez city, relinks the two continents by land and opens the way for accelerated development of Sinai.*


U.S. NAVY PHOTO BY JIM PRESTON

**Although peace** *is promised to Sinai, military training goes on at a girls' school in El Arish (***above***). An estimated 35,000 Bedouin, Palestinians, and "town Arabs" make their home in dusty, bustling El Arish (***right***), Sinai's largest city, returned by the Israelis to Egyptian civil administration in 1979.*

*Barely developed during the years of Israeli occupation, the sand-swept city now undergoes a construction boom with several new tourist hotels being built to lure vacationers to the balmy, palm-dotted Mediterranean beaches nearby.*

*Making a last cast before dark (***above right***), a fisherman at El Arish works his net in the teeming waters of the Mediterranean. Fish caught here will soon be sizzling on platters in Cairo and Tel Aviv.*

*Known as Rhinocolorum to the imperial Romans, who established a major outpost here, the strategic crossroads city sits astride Sinai's Via Maris, or way of the sea, the historic route of commerce and conquest.*

*In the biblical story of the Exodus, the same road is called "the way of the land of the Philistines." The fleeing Israelites avoided this route, well guarded by Pharaoh's troops.*

(Continued from page 440) World War. And the Egyptian side of the canal bristled with an awesome array of defensive surface-to-air missiles.

Within three days Egypt had sent 600 tanks and 90,000 troops into Sinai. But the Bar-Lev Line delayed their advance long enough for 15,000 Israeli troops east of the Gidi and Mitla Passes to move westward and to be reinforced by 20,000 to 30,000 hastily mobilized troops.

With some 1,800 Soviet-built Syrian tanks and 60,000 troops simultaneously bearing down in a coordinated attack on the Golan Heights to the north, Israel was in greater danger than at any time since its founding in 1948.

### War Was a Bid for Peace

Sadat, however, had never planned Israel's extinction. This, he would later admit, was a war of "limited objectives"—aimed at upsetting the political status quo by reestablishing Egypt's presence in Sinai and precipitating the superpowers into settling the conflict before it went too far. In this he succeeded overwhelmingly.

But while the Egyptians were trying to consolidate their hold on captured terrain, the battered Israelis had time to recover and regroup. Within two weeks they counter-attacked across the canal, completely encircling and trapping the 25,000-to-30,000-man Egyptian Third Army. The troops also rampaged south toward Suez city, penetrating to 101 kilometers from the Egyptian capital on the Suez-Cairo road.

Alarmed at the volatile situation, both superpowers, now on nuclear alert, grappled with their sometime client states to hammer out a cease-fire. Finally, at the now famed Kilometer 101, where the Israeli counter-offensive halted, negotiations began. It was the first tentative step of a painful, on-again-off-again peace process that would lead to Sadat's historic visit to Jerusalem in 1977 and the subsequent Camp David agreements that culminated in the treaty signed in Washington, D. C., on March 26, 1979, by Sadat and Begin, and witnessed by President Jimmy Carter.

A swinging pontoon bridge took me from bustling Suez into the unreeling emptiness of west-central Sinai on the other side of the canal. One can hardly cross this water barrier at the northern tip of the Red Sea's Gulf of Suez without being reminded of another crossing that took place hereabouts more than 3,000 years ago.

Scholars will forever debate exactly where Moses and the Israelites, fleeing the 600 chariots of Pharaoh, crossed the sea into Sinai. Hardly a place-name in the Bible's Exodus narrative can be fixed on a map with any certainty.

Speculation focuses on the Hebrew phrase *Yam Suph*, traditionally translated "Red Sea," but literally meaning "Sea of Reeds." This is the sea over which Moses stretched his hand, "*and the Lord caused the sea to go back. . . . And the children of Israel went into the midst of the sea upon the dry ground: and the waters were a wall unto them on their right hand, and on their left.*

*And the Egyptians pursued. . . . and the Lord overthrew the Egyptians in the midst of the sea.*"

But where was this "sea"?

Was it the Red Sea proper—that is, the

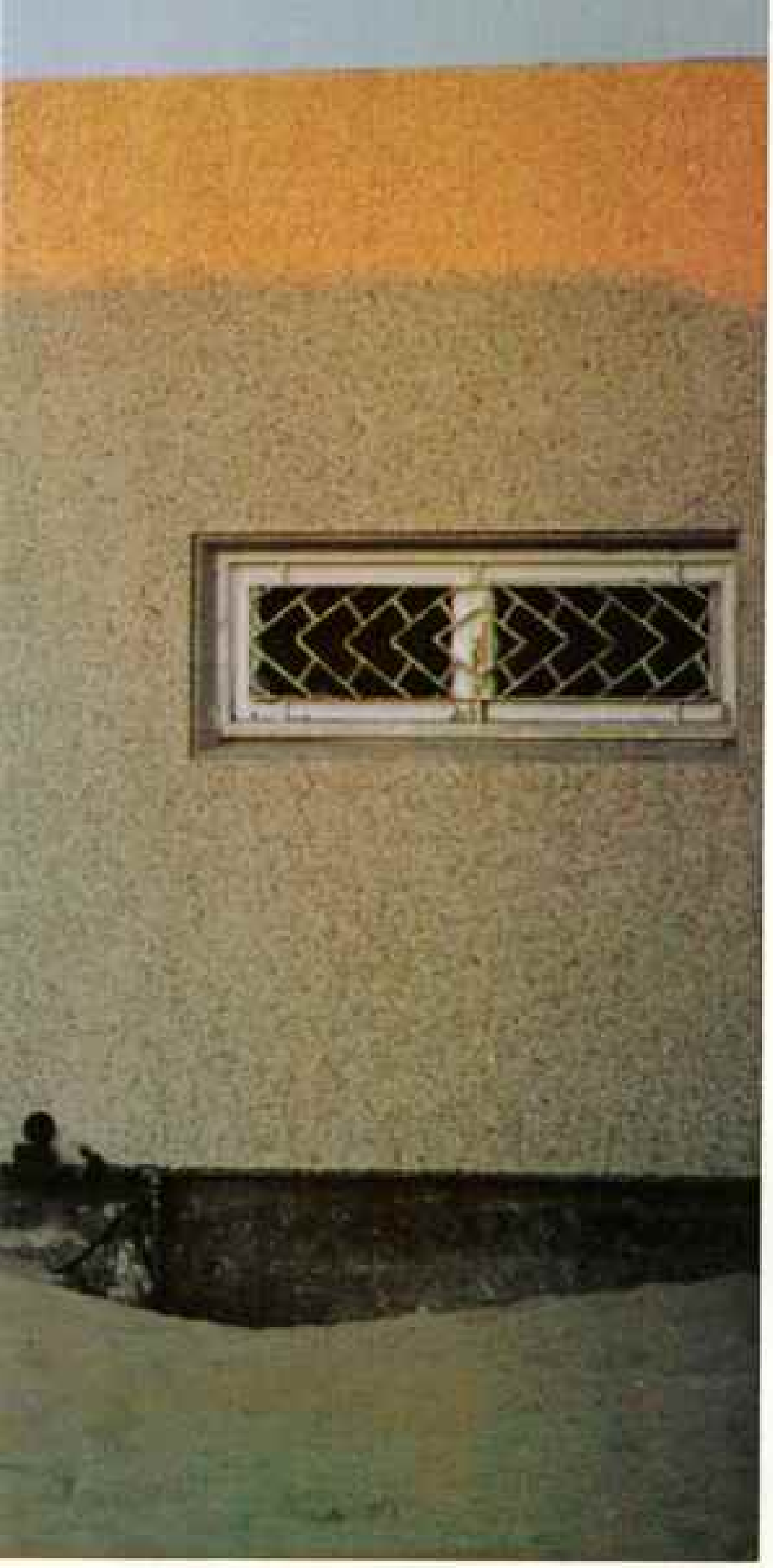
## ETERNAL SINAI

# Israeli Sector

Photographs by
DAVID DOUBILET

***Pioneer spirit*** *brought Alfredo and Susan Wachs to a moshav, or farm cooperative, near Yammit, where in a decade they have raised four sons and many crops of baby's breath flowers. With most of the moshav they plan to start over at a new settlement near Gaza. But they deeply regret leaving. "It's a big price to pay for peace," they say.*


WE DEMAND:
IN SINAI
A SMALL
PIECE
FOR A
LARGE
PEACE!



***Moving in*** *while other Israelis are moving out, ultranationalist squatters* ***(above)*** *carry belongings into an empty apartment in Yammit to try to prevent withdrawal from Sinai. Vowing not to leave, they may turn the town into a test case for Israeli settlements in other occupied territories. During a religious festival last October thousands of supporters* ***(left)*** *flocked to a Yammit demonstration. Residents moving out—many bitter about what they call betrayal by the government—have clashed with officials over compensation for their property.*

Gulf of Suez—as traditional interpretation has assumed? Or was it, in line with some modern theories, the Bitter Lakes, 30 kilometers north of Suez, or Lake Timsah near Ismailia, or even Lake Bardawil on the Mediterranean coast of Sinai? The possible routes of the Exodus are many, the reasonings behind them complex.

For instance, the Bible says God sent multitudes of quail to feed the hungering Israelites. Such flocks of quail are now common in Sinai only on the Mediterranean coast, which "proves" to some scholars that Moses must have taken a northerly route via Lake Manzala in Egypt or Lake Bardawil in northern Sinai.

On the other hand, God also fed the mysterious substance called manna to the Israelites. This is often equated with a sticky residue exuded by certain insects on the bark of the tamarisk tree—common in southern, but not in northern, Sinai. This supports various theories of a southern route.

Other speculations abound.

One recent theory asserts that in 1477 B.C. a stupendous volcanic eruption of the Aegean island of Thera produced the pillar of fire, which by night led the Israelites through the wilderness. This would put the date of the Exodus at least a century and a half earlier than most theories, which place it between 1300 and 1225. . . .

But enough.

As with conjectures about Sinai's mist-shrouded future, those about its equally unclear biblical past—whether the route of the Exodus, the location of the "real" Mount Sinai, or the origin of the pillar of fire—must be taken with a few grains—indeed, a dune—of desert sand.

Driving southeast along the Sinai coast on the Gulf of Suez, I came to Uyun Musa, "springs of Moses," about 15 kilometers from Suez. Tradition equates this with Marah, where Moses inexplicably threw a tree of some sort into the spring to sweeten the bitter waters. Was this also one of the places where he struck the rock and brought forth water for the thirsting Israelites? Again, only speculation. . . .

But there's nothing speculative about Uyun Musa itself—a scattering of half-dry springs and dusty date palm oases, with only

a few Bedouin living in shacks. A startling sight: Many of the towering date palms, some hundreds of years old, have had their crowns shot off—forlorn reminder that this area lay near the heavily bombarded southern end of the Bar-Lev Line.

To the north an open-air museum is proudly exhibited by the Egyptians—a huge crumbling complex of Israeli bunkers and artillery positions facing Suez.

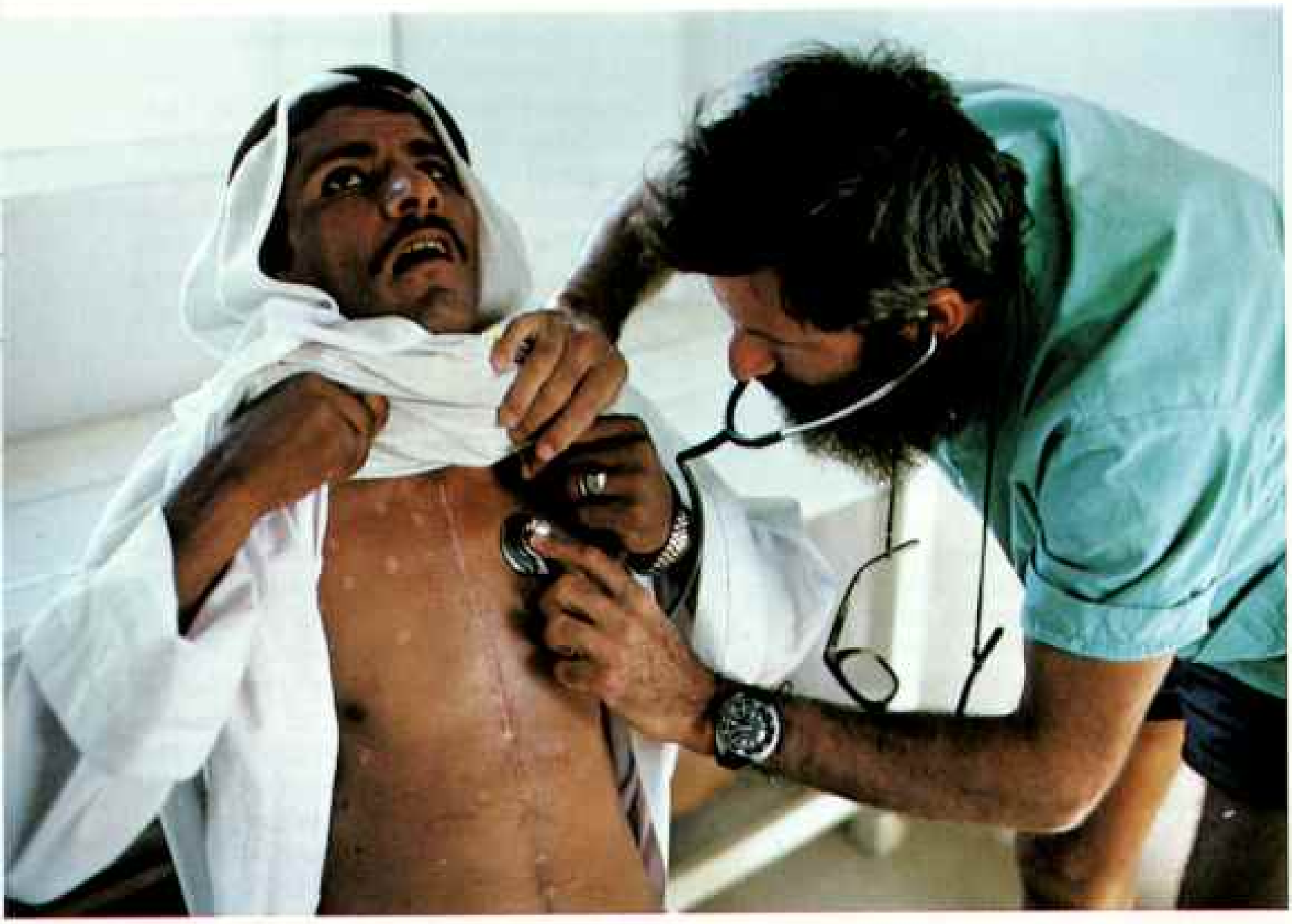
"From here the Israelis used to lob their artillery shells into Suez city before the 1973 war," recalled the Egyptian soldier who guided me through the site.

"We had our revenge in 1973 when our troops captured the southernmost tip of the Bar-Lev Line: The Israeli prisoners of war were paraded before the TV cameras for all our people to see!"

A helicopter lofted me above the Gulf of Suez coastline for a tour of the Sinai oil fields, which lubricate Egypt's economy with some 850 million dollars' worth of crude petroleum a year—about a fourth of the country's production.

Egypt has accused the Israelis of rampant overpumping during their occupation. The Israelis counter that they not only improved the Abu Rudeis field but also discovered and developed the Alma oil field farther down the Sinai coast.

During their tenure here the Israelis siphoned some 80,000 barrels a day from the Abu Rudeis and Alma fields—about half their energy needs. As part of the peace accords, Egypt has agreed to sell Israel 40,000 barrels a day of Sinai crude at market prices, and the United States has guaranteed to sell Israel whatever oil it might request in an emergency.



***When folk medicine failed***—*as burn marks on his chest testify—this 32-year-old Bedouin was flown to Tel Aviv, where surgeons replaced two valves in his heart. Because he will still need special treatment after the Israelis leave, Dr. Amnon Tsvieli, examining him at a clinic at Nuweiba, worries about his future.*

Below my helicopter, billowing gas flares beat back the gathering darkness, casting an infernal glow over the Gulf of Suez. Skeletal oil rigs marched stiff-legged against the western sky, where a fading fireball sun threw a wash of pale reddish gold over Sinai's oil coast.

To the east, tiers of mountains—purple, lavender, gold—dominate rugged south-central Sinai. Among them, at the mountainous southern apex of the peninsula, stands 2,285-meter Gebel Musa, or Mount of Moses—the traditional Mount Sinai (though the same distinction has been claimed for a dozen other peaks).

### Greeting Dawn on the Mount of Moses

In St. Catherine's Monastery, at the foot of Gebel Musa, I shared an evening meal of tinned squid, bread, cheese, and olives with some elderly Greek pilgrims. There was something almost Last Supperish about the setting in that upper room of the monastery—the long plain wooden table, the meager fare being shared by the gathered disciples, the warm soda pop poured into plastic cups with all the dignity of sacramental wine. At the center of the table presided bearded Bishop Irineos, Metropolitan of Khania, Crete, who was leading his flock here on a tour of the Holy Land.

"Tonight, at 2 a.m.," he said, "we get up and climb the mountain. Will you join us?"

Hours later, in the predawn darkness, as we hiked up toward the summit, photographer Kevin Fleming and I soon moved ahead of Bishop Irineos and his slow-hobbling flock. We wanted to catch the sunrise from atop the Mount of Moses at 5 a.m.—surely one of the spectacular sights on the planet. And we did. About 8 a.m., as we were making the descent, we finally sighted Bishop Irineos climbing entirely alone up the rough stone stairs about 150 meters below the summit. Plainly each step was an agony for him as he dug his wooden staff into the unyielding stone and pulled himself upward, his mouth a thin line of pure determination in the midst of his black, gray-streaked beard.

But where was his flock?

"Oh," he said, "they stopped one by one along the way. Too difficult for them. But you know . . . wherever one stops, that's the top of the mountain, isn't it?"

He dug his staff once more into the red granite and labored upward.

"I'll get there—just 500 steps more!" he called back, rounding a curve and disappearing from sight—but not from memory.

### A Puzzle for Biblical Scholars

There are perplexing discrepancies concerning Mount Sinai in the biblical narrative. The Book of Exodus, chapters 19-24, clearly recounts the Israelites' visit to the mountain, where Moses received the Tablets of the Law. Yet some references to the Exodus do not mention Mount Sinai, or Horeb, as it is often called. For instance, in the 33rd chapter of the Book of Numbers a detailed list of way-stops during the Exodus includes only a "desert of Sinai," with no indication that it might have been the climactic way-stop of the 40-year wandering.

An oversight on the part of ancient biblical scribes? Or, as some scholars have suggested, could the narrative concerning Mount Sinai have been inserted centuries afterward into an even older narrative about an exodus of Israelites out of Egypt?

Is it possible that there might have been two separate episodes, and might the two stories have been somehow braided into one by later scribes trying to weave a more cohesive narrative?

Such thoughts tease the mind as you look out over the soul-expanding vista of red granite peaks massed about Gebel Musa. Whatever the answer, standing on that holy summit, you have an almost insistent sense that this is unquestionably *the* Mount Sinai, that the events described in the Bible *did* take place right here . . . until your musings and certainty are rudely interrupted by a chorus of laughter from some tourists nearby, breaking the spell.

Alas, the Mount of Moses is desecrated by earthly litter—pop bottles and cans, orange peels, sandwich remnants thoughtlessly discarded by the visitors who climb up here. Moses and the elders of Israel also ate and drank on the mountain immediately after seeing God (Exodus 24:9-11)—but the Bible neglects to tell us whether they, too, cast aside their leavings.

***Relic of wetter times*** *and today's flash floods from the wadis, or river gullies, that drain these gaunt coastal mountains, a sandy delta fans into the Gulf of*

*Aqaba at Neviot. Farmers from the moshav here raise melons in rectangular patches, while vacationers enjoy the beach at a small village of cottages.*

Tumbled chairs. Tumbled dreams. The images return to mind again and again. Bodies sprawled like rag dolls. The moans of the wounded. The astonishing brightness of their blood. It has a dreamlike intensity about it even now.

I could hardly have conceived that the laminated plastic identity card issued to me the morning of October 6 in Cairo would be a press pass to an assassination.

Photographer Kevin Fleming and I had hoped to see Egyptian President Anwar Sadat at the annual military parade near Cairo—a display of pomp celebrating Egypt's 1973 breakthrough into Sinai.

Sadat's fate had been intertwined with Sinai ever since his early years as an army officer at El Qantara, El Arish, and Rafah. Into this desert, in 1973, he had launched the war that won him the title, Hero of the Crossing. Here he came to worship at the foot of Mount Sinai on the second anniversary of his bold visit to Jerusalem. Here, too, he built a lovely retreat where he could retire for rest and meditation. And here, he once said, he hoped to be buried.

At the parade grounds, after placing a wreath and praying at Egypt's Tomb of the

***Technology tricks the desert*** *into growing food for the Israelis. High-rise strawberry planters at moshav Sadot* ***(left)*** *exploit northern Sinai's steady sunshine while requiring relatively little water. Advanced agricultural techniques at moshav Talmei Yosef near Yammit turn the sand into fields of tomatoes under the supervision of Moti Cohen* ***(bottom)*** *with the help of Bedouin women. But the 20-million-dollar computerized tomato processing plant near moshav Sadot* ***(below)*** *now stands empty as Israel prepares to withdraw from Sinai.*

Unknown Soldier—built after the 1973 war—Sadat took his seat at the center of the reviewing stand. He seemed relaxed, chatted, puffed at his pipe, sipped tea. From his neck dangled a medallion commemorating the 1973 war. There was an exceptional beauty about his dark, complex face, noble as a pharaoh's. Removing his military hat to wipe his brow, he revealed on his forehead the *zabiba*—the visible dark spot common to devout Muslims who press their heads to the floor during prayer five times a day.

When the shooting started, Kevin and I had drifted about 25 yards to Sadat's right. Crowds blocked our view of the assassins as they leaped off a parade vehicle. Our first thought was that fireworks were being set off. But, no. . . .

Over the heads of the crowd near Sadat I saw objects flying—hand grenades. I never heard them go off because a squadron of jet fighters was screaming overhead, releasing rainbow trails of colored smoke. The thought crossed my mind: Might they be dropping bombs?

We had no way of knowing whether this

***Prowling through clouds*** *of dust, an Israeli tank commander (**right**) trains his crew. Egypt and Israel fought one of history's largest tank battles in Sinai in 1973. High over southern Sinai, an Israeli pilot (**above**) twists his fighter-bomber into a climb in a supersonic world where half a dozen Arab nations are only minutes away.*

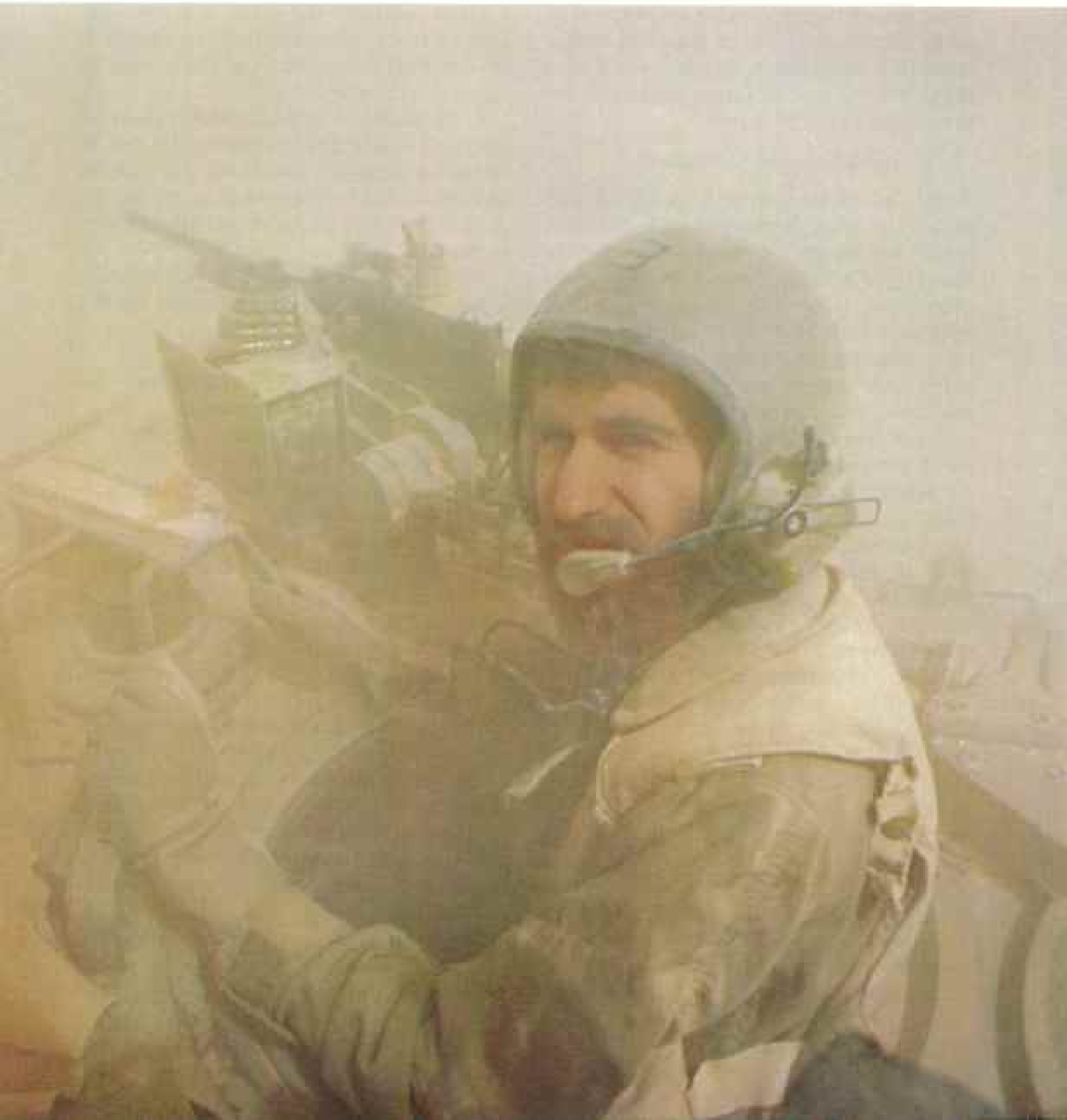
was an attack only on Sadat or a general insurrection. Crowds lunged out of the reviewing stand, tumbling over hundreds of wooden chairs. Bullets skipped off the tarmac. People lay wounded to both my right and left. Amid the fleeing spectators, a young man in army fatigues, his eyes wild, ran right past me, fleet as a gazelle. In moments half a dozen soldiers hauled him back, savagely beating his limp form. A suspect had been caught.

But where was Kevin?

I made my way back to the grandstand, where blue-bereted troops had formed a security cordon.

Kevin had slipped behind the cordon. While gunfire still crackled, he was coolly photographing the aftermath of violence: bloody bodies, captured assassins, stunned spectators. He had come to photograph a parade; he left with history in his camera.

History stands poised in Sinai now. Even as you read this, barring a late-hour hitch in the withdrawal, Israel's Sinai settlers will be gone from Yammit, Neviot, Di Zahav, Ofira, and more than a dozen others—left



now to the Bedouin, the incoming Egyptians, and the drifting sands.

The general world opinion is that these Jewish settlements, with a total population at their height of some 8,000 persons, were established in direct contravention of the Fourth Geneva Convention of 1949, which forbids occupying powers from displacing native populations or putting settlers into occupied territories.

There's no question of their underlying military purpose: to provide a buffer zone and first line of defense against an attack on Israel from Egypt. The cluster of settlements centering on Yammit, in northeast Sinai, guards the approaches to Gaza and Israel's heartland. Ofira, at Sharm el Sheikh in southernmost Sinai, stands sentinel over the strategic Strait of Tiran, bottleneck entrance to the Gulf of Aqaba.

### An Arena of Disruption

But, political judgments aside, a poignantly human if maddeningly complex world was planted here, and its uprooting should give us pause. Somewhere else, some other time, these settlements would have been seen as bold, innovative pioneer ventures—human ingenuity, toughness, and persistence transforming harsh desert terrain into a cornucopia of tomatoes and melons, cut flowers and strawberries, squash and green peppers.

"When my wife and I arrived in 1974, there was nothing here but yellow and blue—sand, sea, and sky—and a few date palms," recalled Israeli farmer Alfredo Wachs of the agricultural cooperative, or moshav, Netiv ha Asara, a satellite settlement of Yammit.

He waved his hand across a vista of irrigated fields, orchards, and greenhouses stretching south almost without interruption from Sinai's Mediterranean coast.

"Yes, we displaced a few hundred people in this area, but now those same Bedouin and many more have jobs that wouldn't exist but for us.

"When we came, the government told us it would be permanent. Prime Minister Begin himself had a house for his own retirement at Neot Sinai, just west of here.

"Our children were born and raised here. We've given our lives to this place. Now they tell us, sorry, you have to go.

"Well . . . it is painful for us. We want real peace, but that doesn't make it any easier to give up a world we have created with our own hands."

### Sadat's Death Sparked Varied Reactions

I arrived in Yammit barely 48 hours after Sadat's assassination. A few local zealots, I was told, had recited prayers thanking God for the death of Sadat—who had flatly refused all suggestions that Israeli settlers be allowed to stay on under the Egyptian administration.

Other settlers—the great majority—expressed shock, uncertainty, even dismay at the death of the man who had had so large an impact on their lives.

Local Bedouin, understandably cautious about offending either outgoing Israelis or incoming Egyptians, could still not restrain themselves from some open show of emotion at Sadat's death. They burned piles of tires on the road.

"Why did you do that?" I asked a Bedouin youth. "Because you were happy at Sadat's death?"

"Allah forbid," he said.

"Then, because you mourned him?" He shrugged. "Only Allah lives forever."

"Then . . . *why* did you burn the tires?"

"Because we are Bedouin!"

I wandered through the neat, modern, flower-bordered streets of Yammit, with their flanking rows of white prefabricated homes that can be detached from their foundations and hauled away by truck.

It was nearly sundown, beginning of Yom Kippur in the Jewish year 5742. From the open slit windows of the town's three synagogues drifted the minor-key drone of men at prayer. Women and children in their holiday best milled about outside.

Posters on almost every wall proclaimed in Hebrew: "Stop the withdrawal from Sinai" and "Don't uproot what you planted"—slogans of the vociferous, multifactioned movement to scuttle Israel's withdrawal from Sinai.

It was in the early 1970s that then Israeli Defense Minister Moshe Dayan (he would die only ten days after Sadat) helicoptered

**Supersecret** *Etam Air Base lies dismantled near Yammit as Israelis pack up control-tower equipment for shipment out of Sinai. The United States helped build two new bases in the Negev to replace the sophisticated airfields at Etam and Etzion, which can only be used as civilian airports when Egypt takes over.*


down here, planted his foot atop a dune, and declared that a city of 250,000 would be built on this unlikely spot. The grandiose plan was later scaled down to 100,000, but fewer than 3,000 settlers had moved into Yammit when the 1978 Camp David accord scheduled the settlement for oblivion.

Now, even as original settlers prepared to move out—with an average of $80,000 and possibly as much as $500,000 compensation per family—a new wave of settlers was moving into empty homes in and around Yammit (pages 446-7). These newest occupiers, hard-line Zionists both religious and secular—many of them from other settlements on the West Bank—were proclaiming in no uncertain terms that they planned to resist the withdrawal come what may, even to the point of violence.

To them this part of Sinai is a God-given part of the Promised Land, whose southern boundary, in biblical times, extended as far as the "river of Egypt"—referring not to the Nile but to the main watercourse of northern Sinai, the Wadi el Arish, which touches the Mediterranean near the Arab city of the same name, 40 kilometers west of Yammit.

In the months since Sadat's death, even original settlers like Alfredo Wachs, who once accepted giving up these settlements, have joined the resistance to final withdrawal from Sinai.

"We want peace as all people do, but we feel we can achieve real peace without giving up this part of Sinai. Not just because our hard work created these settlements out of the desert, but also because we believe they are necessary for Israel's security."

Would authorities force eviction?

Yaron Enosh, who covers the Sinai settlements for Kol Israel, the Voice of Israel radio network, gave me this answer:

"You can't expect the Begin government to send police in and start bopping devoted

Zionists, however misguided, on the head. These people may be extremists, but they're also the same ones who helped elect Begin in the first place. They're his own constituency! Not that he'll allow them to stay or stop the withdrawal, understand. But the government will probably try to let everyone else withdraw first, then come along some night and quietly drag the settlers out when the TV cameras aren't around."

Late that night, after the Yom Kippur services ended with the plaintive blowing of the shofar, the ceremonial ram's horn, the worshipers and their families—including both bona fide settlers and squatters—gathered for a special prayer meeting in Yammit's main square. Groups of black-frocked men with flowing beards and fluttering earlocks danced in snaking, boisterous lines through the streets. Finally, they gathered for an intense prayer vigil that ended with an uproar of shouting in Hebrew.

"What are they yelling?" I asked a man.

"Oh," he said, "it's a play on the old refrain, 'Next year in Jerusalem.' They're crying out, *'Next year in Yammit!'* "

I found a different world at Sharm el Sheikh, near the southern tip of Sinai. From here, in 1967, Nasser's troops closed the Strait of Tiran to Israeli shipping, precipitating the Six Day War that saw a triumphant Israel seize all Sinai along with the West Bank and the Golan Heights.

After the war, Israel established the town of Ofira and the nearby resort of Naama at Sharm. Just offshore, where the almost lifeless desert knifes into the Red Sea, lies one of the planet's most spectacular coral reefs.*

On the veranda café of the Red Sea Divers Center, overlooking the cobalt blue circle of Naama Bay, I listened to owner Howard Rosenstein, an American-born Israeli, vent his frustrations and concerns.

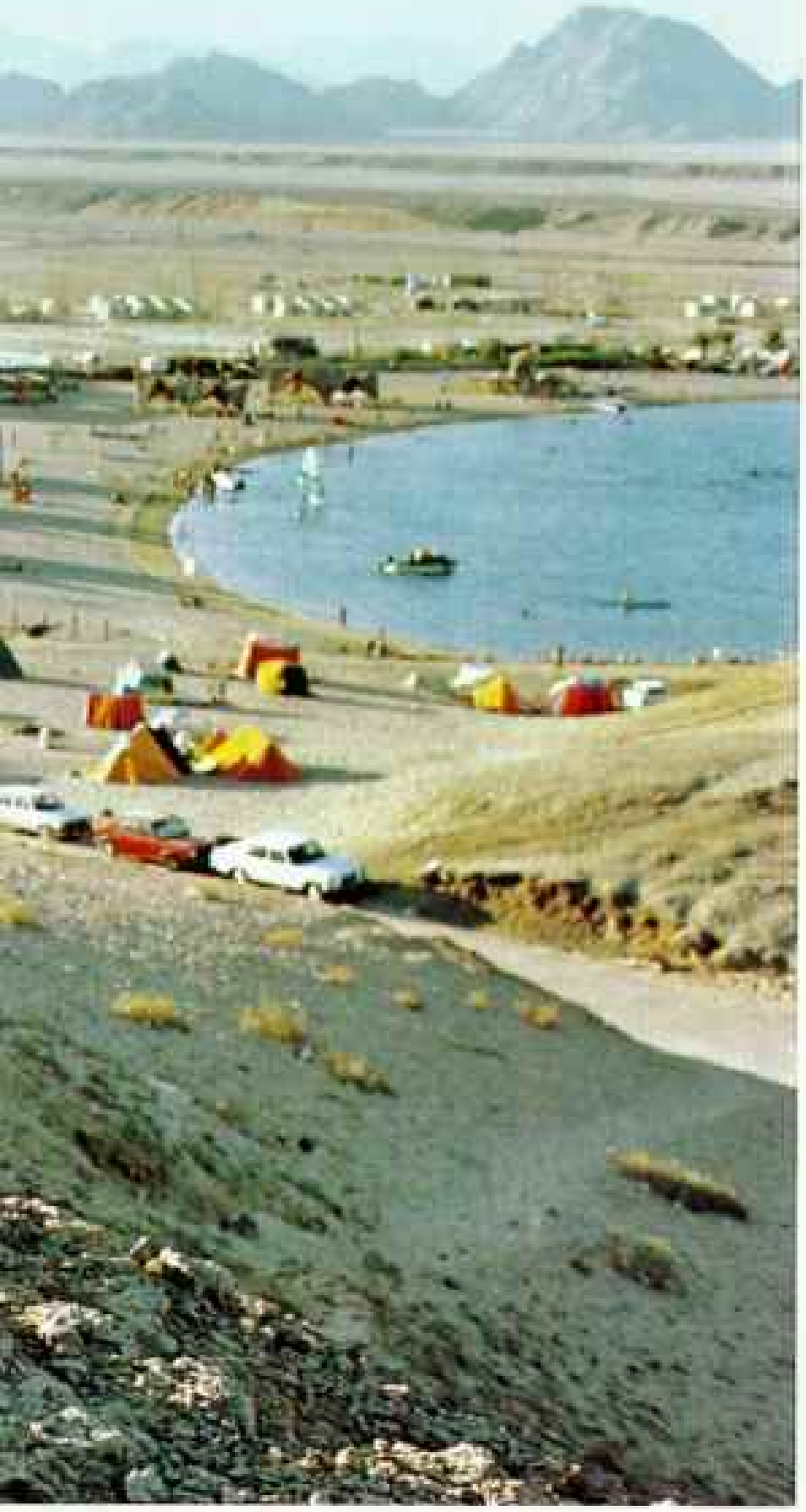
"What I'm worried about isn't politics, but ecology. These reefs are among the most delicate marine environments in the world. Even when someone fishes out there with a pole, I get upset. Each section of reef is a balanced ecosystem. Extensive fishing of any section would have irreversible effects.

"In 1979, when Israel withdrew from Ras Muhammad at the tip of Sinai, Egyptian boats began fishing the reef waters commercially. We put up a clamor, and finally the Egyptians interceded. But some fishing still

**Pressure point** *of war, the Strait of Tiran* **(left)** *funnels ship traffic from the Red Sea to the Gulf of Aqaba through a narrow passage between the coast of southern Sinai, background, and several dangerous reefs. The Egyptian closure of the strait to Israel-bound freighters—cutting off, among other things, oil shipments from Iran—precipitated the Israeli invasion of Sinai in 1967.*

*After delivering its cargo to the Jordanian port of Aqaba, this freighter* **(right)** *ran aground on Gordon Reef, where an Israeli patrol boat looks her over.*

*The September 1975 GEOGRAPHIC included a 22-page color portfolio by photographer David Doubilet of this remarkable marine kingdom.



**So beachgoers can relax,** *Israeli soldiers* ***(above)*** *keep watch at Naama Bay near the southern tip of Sinai. Though terrorism has never struck in this area, Israeli authorities don't ignore its threat anywhere.*

*Off the coast of Sharm el Sheikh, Sharon and Howard Rosenstein* ***(left)*** *share the waters of the Red Sea with their children and a friendly school of anthiases beside some of the world's most beautiful coral reefs.*

goes on." Since then the Egyptian government has begun efforts to declare the reefs a nature reserve. But Howard is hoping for more—that the reefs will become an international underwater preserve.

"These reefs are one of the premier diving spots in the world. When my wife, Sharon, and I came here in 1971, we set up our first diving center in a railroad car on the beach. There were only a handful of divers in those days. Now thousands come down here every year. If we pull out our equipment, the diving business is dead here. The Egyptians have agreed to buy our operation, but I'm concerned that they haven't developed the know-how to keep it going.

"We've been negotiating with Egyptian officials to let us stay on to manage the businesses like Red Sea Divers. But they have this thing—they want all Israelis *out*. Well, perhaps they'll change their minds."

### Eternal Sinai – A Place of Change

Howard rubbed his bristly black beard with the back of his wrist. An imploring look came into his eyes.

"Look, the world should understand what Israel is giving up in the name of peace. It's more than just these settlements. Sinai could have provided enough oil to supply all our future needs. From a security point of view, we are giving up a tremendous territorial advantage and have had to pull our forward military bases back to the Negev, where there's hardly even enough room to stage maneuvers.

"Even more important, Sinai has given our cramped little country breathing room, a psychological safety valve, a place to go on vacation, to hike, to swim, to dive, to explore—a land that's nearly three times as large as Israel itself.

"I ask you, what other nation in the world would give up so *much* for a tenuous peace?"

Howard and his wife have purchased a new home on the coast near Caesarea.

"We're resigned to leaving, unless the Egyptians finally decide to let us stay on and keep the diving business going.

"Whatever happens, I can tell you this. It will never be the same.

"Please tell that to the world . . . *never the same.*" □


# New Light on the Singing Whales

WITH A PHOTOGRAPHIC PORTFOLIO BY

FLIP NICKLIN

*As if in giant salute, a humpback whale off the Hawaiian island of Maui lifts a massive flipper. These elongated appendages, early noted by Yankee whalers, give the humpback its Latin name: Megaptera novaeangliae, "big-winged New Englander." During the past four years a research team off Hawaii has observed remarkable patterns of humpback behavior, resulting in the extraordinary pictures presented here.*

INTRODUCTION
BY
ROGER PAYNE

IT WAS THE RIGHT TAPE but the wrong whales. As my wife, Katy, and I played the underwater recording of humpback songs, we recognized the familiar patterns and variations peculiar to whales in Hawaii.

"But the label says 'Baja California,'" Katy remarked. "That's 3,000 miles east of Hawaii, and it's supposed to be a different stock of whales altogether. These songs are definitely from Hawaii. Somebody has mislabeled the tape."

Later we telephoned the friends who had sent us the recording, Mary Crowley and Angelica Thieriot. When Katy mentioned the faulty label, Angie's reply was stunning: "Katy, we don't own any tapes from Hawaii. We recorded those humpback songs right where the label says—in the Revillagigedo Islands off Baja California."

With that one remark Angie demolished a major theory on the population of humpback whales and raised questions about their migratory routes. Ten years ago a colleague, Scott McVay, and I had discovered that all the humpbacks in a given area sing the same underwater song. Later Katy found that, unlike other whale species that sing, humpbacks are inveterate composers, constantly tinkering with their song so that it changes completely in only a few years.*

Scientists have long assumed that humpback whales that winter in different locations follow separate patterns of migration. The humpbacks of Hawaii were believed to migrate in spring to some area of the Aleutian Islands, while those off Baja California were thought to transfer to a more easterly point, perhaps southern Alaska. According to the theory, the two stocks of whales probably would never meet.

If the theory was correct, then the songs of the two groups of whales should be totally different. Yet Mary and Angela's tape proved the songs were the same. The discovery revolutionized our entire concept of humpback population and movement. And there were more revolutions to come.

In the winter of 1978 a dedicated team of young researchers began a study of humpback whales off the Hawaiian island of Maui. One of the leaders of the team was Jim Darling, a Canadian graduate student of zoology who had helped me record humpback songs in these same waters. In addition to recording, Jim began a project of his own, photographing and identifying individual humpbacks by the distinctive black-and-white markings on the undersides of their tails. Jim later teamed up with a fellow graduate student, Peter Tyack, and a dozen other researchers. Together the group broadened their studies to include humpback singing and behavior.

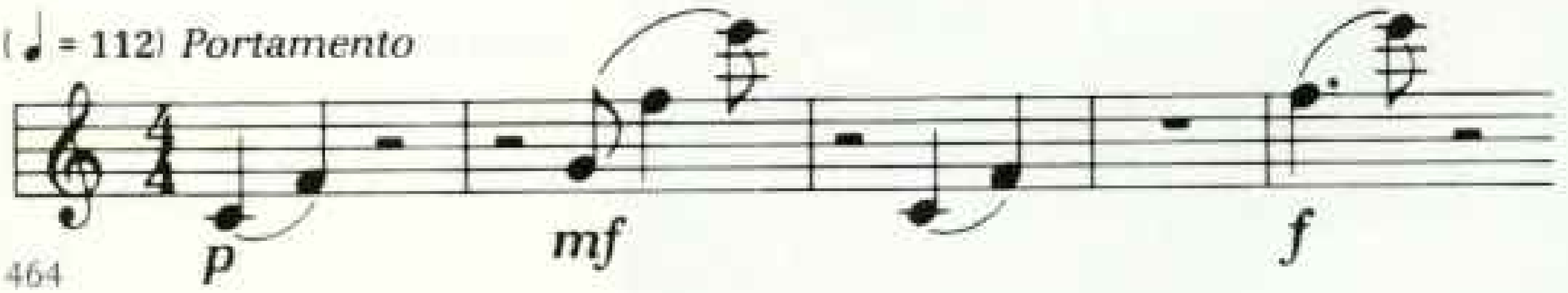
By May 1979 Jim had collected a file of 264 individual humpbacks, each identified by its tail markings. A colleague, Dan McSweeney, contributed photographs of 95 additional humpbacks from the waters around the neighboring island of Hawaii.

At that point I suggested that Jim compare his file with a similar one collected by Charles and Virginia Jurasz. The Juraszes had been photographing and identifying southeast Alaskan humpbacks for 12 years.

Since we had established a connection between the humpbacks of Hawaii and Baja California, it seemed time to explore the possibility of a similar connection between the Hawaiian humpbacks and those in southeastern Alaska. Jim Darling's and the Juraszes' picture files offered the perfect opportunity. If one or more whales appeared in both files, it would show a definite link between the Hawaiian and Alaskan populations.

To their delight Jim and the Juraszes found not one humpback but *seven* that appeared in both files. The discovery proved that at least some of the Hawaiian humpbacks migrate to southeastern Alaska, though of course others may go to the Aleutians and elsewhere.

*See "Humpbacks: Their Mysterious Songs," by Roger Payne, NATIONAL GEOGRAPHIC, January 1979.



Another exciting discovery was soon to come. At the invitation of the Ocean Research and Education Society, Katy made a voyage to the Revillagigedo Islands aboard the society's square-rigged research ship, *Regina Maris*. Katy and other members of the society photographed the tail flukes of 11 humpback whales and later showed the prints to Jim Darling. Matching them against his Hawaiian file, Jim found that two of the Revillagigedo humpbacks had also been identified off the island of Maui.

What all this meant was that our previous ideas about humpback migration had to be revised. Obviously not all humpbacks have set patterns of north-south migration between permanent grounds. Instead, they seem to range widely over their entire area of distribution in a given ocean. In short, humpbacks are far more nomadic than we had imagined.

The discovery is especially rewarding to me for two reasons. First, our new knowledge of humpbacks was gained without injury to a single whale. In the past, identifications have been made through the use of darts fired into the whales' bodies, to be recovered if and when the animals were harpooned and melted down for oil. The method provided only two data points—one where the dart was fired and the other where the whale was killed. Often the two points were very close in time as well as space.

This photographic technique of identification, used with humpbacks in the Atlantic as well, is not only more productive but also far more versatile. Instead of recording only two locations, Jim can plot the same whale at unlimited points. Best of all, the whales are still out there, waiting to be photographed and, no doubt, to surprise us again.

The second benefit from the discoveries is our modified concept of the word "stock" when applied to humpbacks. Back when humpbacks were a major target of the whaling industry, there were separate kill quotas for each ocean area. Now, however, we suspect that the humpbacks in each ocean mix freely, meaning that when a decline in a specific stock is detected, it may really signal an oceanwide decline. If significant hunting were to resume, this new knowledge could prove invaluable.

Migration was only one field of research at Maui. In just a few years Peter Tyack, Jim Darling, and their teammates have contributed enormously to our knowledge of humpbacks. Peter's doctoral thesis focused on why whales sing.

In order to plot the exact movements of singing whales, Peter and several assistants established a hilltop observation post on Maui and installed a surveyor's theodolite and a small computer. Other teammates in outboards offshore would locate a singing whale by means of hydrophones and report by radio to the observation post.

As the whale alternately dived, stopped singing, or surfaced, its moves and those of its neighbors were precisely recorded by the teams afloat and ashore. Over the space of three years the study produced detailed profiles on hundreds of individual whales and furnished valuable new insights into the significance of singing.

PETER'S GROUP also studied what are known as social sounds—vocalizations distinct from singing that appear related to male aggression and competition for females. When Peter replayed recordings of songs underwater to humpbacks, the whales simply moved away. But when he replayed social sounds, some whales seemed to be attracted; often a whale actually charged toward the speaker dangling beneath the boat and only veered off at the last moment.

From year to year membership in the Maui team changed, but those most closely involved in Peter's behavioral study included Jim and Mary Bird, Karen Miller, Margo Rice, and Chris Zabriskie. Jim Darling was joined in his identification project by Graeme and Linda Ellis (pages 462-3).

Others in the group studied related behavior among humpbacks. Gregory Silber and Beth Mathews recorded songs and

HAWAIIAN SONG (THEME 5) OF THE HUMPBACK WHALE, MEGAPTERA NOVAEANGLIAE, 1979

social sounds for further analysis. Debbie Glockner-Ferrari concentrated on the study of mothers with calves and on external anatomy. She developed a technique for determining sex from a lateral view as well as by examination of the genital area from below. The latter method was used by Flip Nicklin while making his superb documentary photographs of the team's discoveries.

Much of the data from Maui remains to be analyzed, but some general conclusions have already emerged. Not only are humpbacks more nomadic than we thought, they are also more aggressive, at least the males are. Evidence from Debbie and her husband, Mark Ferrari, supports the belief that some of the cows calve annually rather than every other year—good news in the sense of a higher birthrate.

Peter Tyack's team has showed that singing is probably an aspect of courtship, along with aggressive male behavior. If so, humpback bulls are like warriors of old, who had to demonstrate skill in the arts as well as with the sword to win their ladies.

None of this valuable knowledge would be ours today without the generous support given to the Maui team by nine organizations. In addition to the National Geographic Society, those who provided funds and assistance are the Clifford E. Lee Foundation, Lahaina Restoration Foundation, Maui Whale Watchers, the New York Zoological Society, Rockefeller University, Vancouver Aquarium, and World Wildlife Funds of the U. S. and Canada.

As we inch closer to understanding these fascinating creatures, we must search for ways to cement our ties with them and to coexist peacefully. Americans have a unique opportunity in that respect, for it now seems that we own both ends of one of the humpback's migratory routes—Hawaii and Alaska. If we were to create a dual sanctuary in those two areas, we would establish an important principle: protection throughout the range of a migratory species.

Such a move could spur conservation efforts throughout the world. I have proposed it to our federal government and to private organizations; I urge National Geographic members to support it, as they have other great conservation efforts in the past.

The whales are waiting. * * *

*DEEP-SEA GYMNASTS, a pair of humpbacks cavorts in company with a movie photographer off Maui (**above**). Of such acrobatics, zoologist Roger Payne observes: "Humpbacks are equally comfortable in any position. When you're weightless and live in a three-dimensional world, there's no such thing as up or down."*

*Every winter the whales migrate to Hawaiian waters from feeding grounds in the northern Pacific. These mature ones average 45 feet in length and 40 tons in weight, with flippers as long as 15 feet. The female humpback (**right**) differs from males in appearance because the genital slit is much nearer the tail.*

*TWISTING ON ITS BACK after thundering halfway out of the water, a humpback is about to splash down in a maneuver known as breaching. Though common among most of the great whales, breaching remains a mystery. Scientists speculate that it may be a form of communication or intimidation, or an attempt to dislodge whale lice or barnacles, the tan clusters on the whale's flippers and underside.*

*Whatever the cause, breaching seems contagious. If one humpback breaches, others may follow suit,*

*leaping explosively from the sea. "We've recorded as many as 40 breaches in succession by a single whale," says Gregory Silber, a member of the Maui research team.*

*This view reveals the humpback's pleated throat, which expands like an accordion as the animal draws in water to strain through its baleen plates for marine organisms. The eye socket appears as a white arc directly behind the bend of the mouth. Knobs protruding from the whale's head, each containing one or two short hairs, are believed to act as sensors.*



GRAEME ELLIS

CATARACT OF SPRAY streams from the massive tail flukes of a humpback male during combat with a rival. Such clashes, observed for the first time by researchers at Maui, stem from competition for females.

"When it comes to courtship rivalry," says Jim Darling, a team leader, "humpbacks are anything but 'gentle giants.' The males go at it with everything they have—tail lashing and body checking. It's an awesome experience to see a collision involving 80 tons of determined whale."

Two males (**above**) compete for the right to escort a cow and calf, another association first discovered by the Maui team. "Most cows with calves have escorts," Darling explains. "In the past, scientists assumed that escorts were females, sort of maiden aunts who helped the mothers raise their children. But close observation has proved that escorts are males, and that's what the fighting is all about."

An open wound near the base of one humpback's tail (**above right**) testifies to the ferocity of combat. Another male (**right**) employs a gentler tactic, blowing a stream of bubbles. Males occasionally blow bubbles, perhaps as a warning, or as a screen between a rival bull and a cow and calf.

JOHN FORD (BELOW)

*SERENADE IN BLUE echoes through the twilight depths as humpbacks sing the haunting song peculiar to their species. Although other whales and dolphins make sounds underwater, none equals the song of the humpback for complexity and precision. In a given area, such as Hawaii or off Baja California, all humpbacks sing the same song, composed of two to eight recognizable themes in the same sequence.*

*Research at Maui revealed that singers follow the same pattern of behavior, performing alone within 150 feet of the surface, head down, flippers outstretched, and body inclined at a 45-degree angle. To determine the sex of singers, photographer Flip Nicklin trained himself to scuba dive as deep as 130 feet while holding his breath. Approaching a singer from the rear, Nicklin was able to photograph the tail and genital area before exhaling the bubbles that might disturb the whale. The singers proved to be male, and nearly all surfaced for breath during the same theme of the song.*

*"Singing," observes Peter Tyack, "appears to be related to courtship. Singers often interrupt their song and dash off to join other whales, usually including females."*

*A diver (**left**) photographs a singer whose heavily scarred dorsal area suggests countless battles over females. The flukes of another singer (**right**) display circular scars left by barnacles that dropped or have been scraped off. Small fish known as leatherbacks browse along the whale's back.*

*SEA'S PRISM lights the glide, in unison, of a cow and calf, which holds its station above its mother. Unlike most females with young, humpback cows occasionally allow divers and surface craft to approach within a few feet of their calves. The trait cost humpbacks dearly at the hands of 19th-century whalers, who harpooned calves and held them as decoys to draw the mothers within range. So great was the slaughter and so perilously close did humpbacks come to extinction that an international treaty in 1966 forbade commercial hunting of the species worldwide.*

*Research at Maui by Debbie Glockner-Ferrari and her husband, Mark, revealed that some humpback cows calve annually rather than every other year, as some people had believed. Conservationists welcome the discovery as evidence that humpbacks may be increasing faster than had been estimated.*

*"Like most young creatures the humpback calf is insatiably curious," observes Jim Darling. "It will leave its mother's side to inspect a diver nose to nose, then rejoin the cow in slow motion like a spacecraft docking with the mother ship."*

*TRIO OF TAILS* (**right**) *identifies a calf, cow, and escort, the latter swimming beneath the female. Researchers at Maui believe the escort's motive is neither to defend nor to help care for the calf but to mate with the cow, an event they have yet to witness. Escorts may change partners during the winter season, and sometimes cows have been observed unescorted. The calf* (**above**) *momentarily parts company with its mother to breathe at the surface, where harpooners no longer lie in wait.* □

# The Civilizing

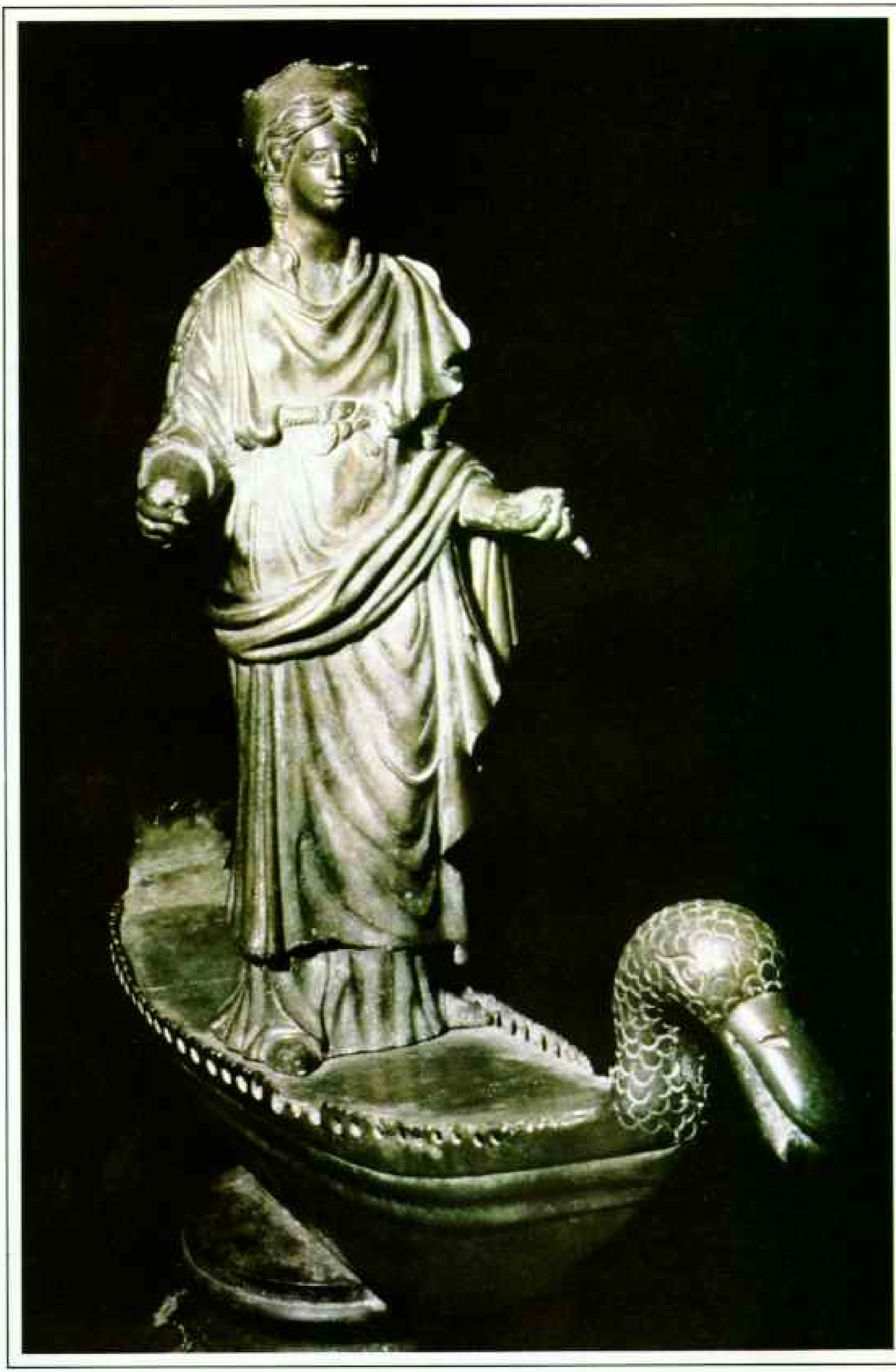
*Lined with tourists, a bateau-mouche slips under*

# Seine

By CHARLES McCARRY
Photographs by DAVID L. ARNOLD
NATIONAL GEOGRAPHIC STAFF

*Paris's Pont St. Michel, built by Napoleon III in 1857.*





THE CAFÉ RANG with the jokes and laughter of the fishermen of Honfleur, that lovely port which lingers like a dream of the 16th century at the mouth of the River Seine.

Daniel Le Cesle, captain of the fishing boat *Annick*, drained a glass of milky *pastis* and asked me: "Do you get seasick?"

"Never!" I responded, with a confidence born in the airless holds of troopships and on the plunging decks of oceangoing sailboats. "*Bon*," said Daniel. "We sail at quarter to four in the morning."

Now it was morning, a slate gray morning scribbled with rain, and I was a chastened man. Her diesel engine chuffing, *Annick* leaped from wave to wave in a six-foot sea, encouraged at every crest by a watery slap on her flat bottom. Clinging to a shroud with my back to the wind, I most heartily apologized to every victim of seasickness to whom I had ever given a condescending smile.

In the wheelhouse Daniel spotted a school of fish on sonar. He turned *Annick* into the wind and with the help of his mate, Paul Vallae, deployed the nets in the heaving waters of La Manche. (As a guest aboard a French vessel, one does not call the English Channel by its English name.) In the hours since I had come aboard in velvety darkness, climbing down an iron ladder to the deck of the boat, just barely afloat on a rising tide, we had let out the nets and brought them in all but empty three times. Now it was nearly noon, and our last chance to go home with a decent catch.

*Annick* rocked crazily in the trough of a wave. The net was winched aboard. Foot by foot it rose dripping from the sea. It seemed that it must be empty again. And then we saw the mackerel, black and symmetrical, with a few mullet and flounder gleaming among them like coins in the fat purse we had snatched from the sea.

With the fish packed in baskets and lashed to the deck, we headed for port. Paul busied himself mending nets. Daniel lifted the microphone of the boat's radio to his lips and began to sing: "*J'ai de beaux maquereaux, six cents kilos.*" On the horizon, rising and falling in the swell, we could see the masts of the Honfleur fishing fleet. Its captains returned Daniel's song, telling of their own catch, and the marine frequency was filled with a hallelujah chorus of men of the Seine, happy to be steering for home.

As we entered the estuary, the waters of the Seine, brown with the soil of France, came out to meet us. In the pale light I glimpsed the bleak skyline of Le Havre, like a sad concrete marker to the old Le Havre whose stones were scattered by the bombardment of 1944. Across the river, on the left bank, Honfleur lifted her silhouette of bell tower, sail, and mansard roof.

This is the gate to France. More than a thousand years ago, Vikings sailed into this estuary. They married themselves to the girls of the region and to the fat land, and Norsemen became Normans. In 1603 Champlain sailed from the Seine with a Norman crew to plant, in Nova Scotia, the first significant French settlement in the New World.

Just upriver lies Conteville, where a bastard of the Duke of Normandy, afterward to be known as William the Conqueror, may have spent part of his childhood. At Rouen, a night's passage on a rising tide, smoke drifted across the Seine as the body of Joan of Arc burned at the stake on May 30, 1431.

Nine hundred years before the Vikings, Julius Caesar encountered fierce Celtic people on an island in the Seine that the Romans called Lutetia Parisiorum and envisaged as a major city of their empire. In 52 B.C., on Mount Auxois, Caesar had defeated the great Gaul Vercingetorix at the siege of Alesia. Where the sword of Vercingetorix fell at Caesar's feet, Gaul began to die and Latin France began to live.* Some would say that the two are still locked in ambiguous embrace, myth kissing logic, tribalism

*Merle Severy described the world of the Celts in the May 1977 NATIONAL GEOGRAPHIC.

***Gliding silently*** *through the centuries, the goddess Sequana presided over the Seine, a river sacred to both Gauls and Romans. Discovered in 1937, this bronze figure, riding a duck-shaped barge, may have graced a temple built in Roman times at the river's source, where sick pilgrims journeyed in search of cures.*

caressing enlightenment, and that the result is French civilization.

The Seine rises in a wood some ten miles from the site of Caesar's victory. It is said that the river, which begins as a spring bubbling from the earth, was formed by the tears of a nymph pursued by a satyr into this grove on the Plateau de Langres, which forms a watershed between streams that debouch into the Mediterranean and those that run toward the Channel. The Seine flows 496 miles to La Manche, draining 30,000 square miles as it passes through Burgundy, Champagne, the Île-de-France, and Normandy. It becomes navigable at Marcilly, 165 miles from the source, where it is joined by the Aube (map, pages 484-5).

"THE AUBE? What is that?" The speaker was a Frenchwoman, a formidable intellectual. We were chatting at a dinner party in Paris. I explained that the Aube was the first of the Seine's main tributaries, the others being the Yonne, the Marne, the Oise, and the Eure.

"Well, it's no wonder I've never heard of the Aube," said my companion. "Nothing in France becomes interesting until it passes through Paris." To the French, who dislike leaving things unnamed and unexplained, the Seine is *le fleuve civilisateur*—the civilizing river. Had it not passed through Paris, they undoubtedly would have called it something else.

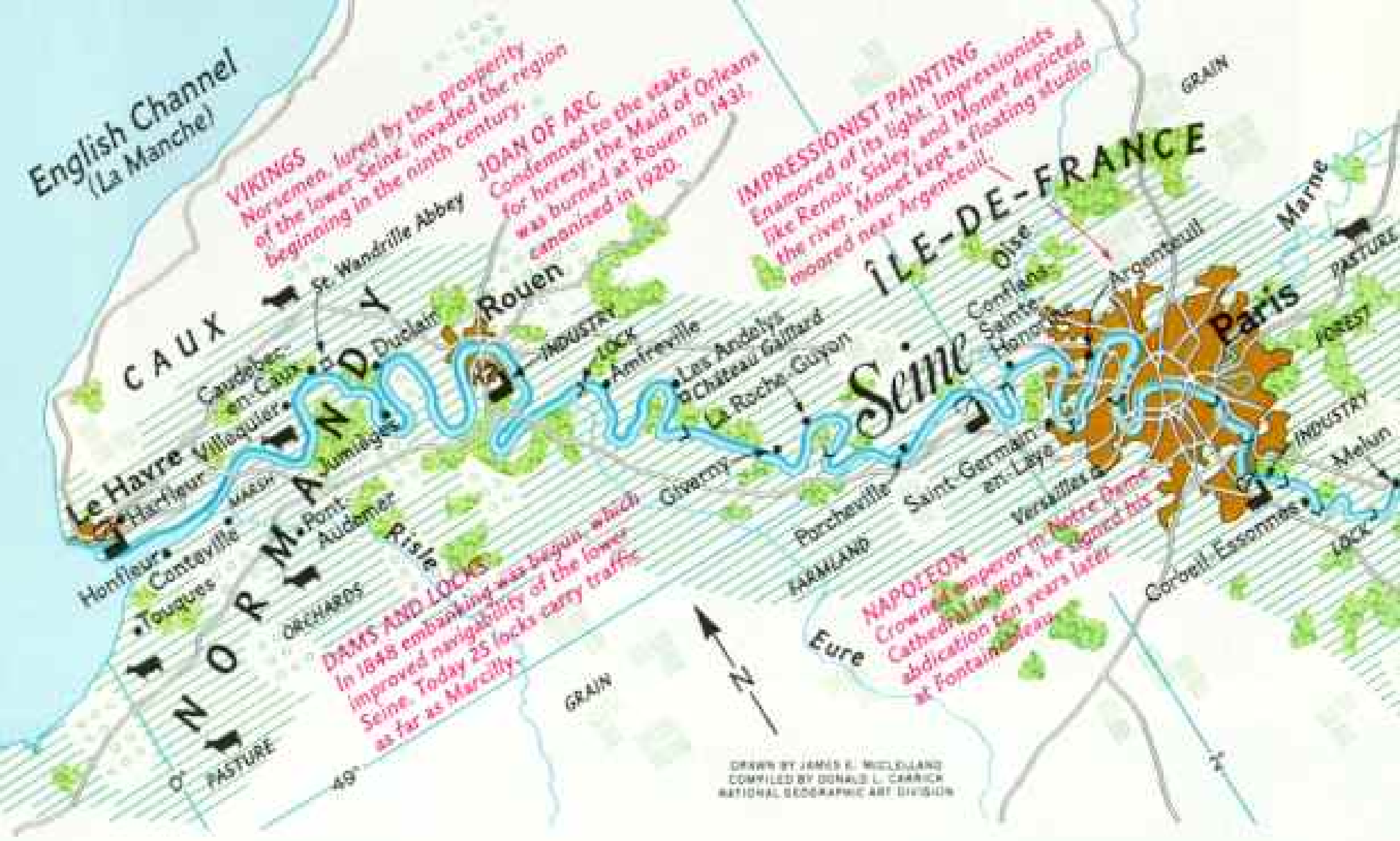
I first saw the Seine with my own eyes when I was 18 years old. By then I already knew it well: I had seen it through the eyes of Hugo and Balzac and Dumas, Corot and Manet and Pissarro. In those days, just after the Second World War, no howling packs of automobiles raced along the quays. Instead, elms and chestnuts and plane trees dotted the greensward that stretched from the Cathedral of Notre Dame to the Bois de Boulogne, a green ribbon of shade and tranquillity binding the city to its people.

It was a Sunday morning in May. As yet the sun gave off no great heat. I came on a family seated round a blanket. A long brown loaf of bread lay in a basket. A man was opening a bottle of red wine; it was ordinary rough wine, and the bottle had no label. He poured two glasses and gave one to a girl, who was sunbathing. They

***Wellspring of legend**—and of a river—lies 18 miles northwest of Dijon, in a copse of firs, where a 19th-century statue of the goddess Sequana presides over a trickle that marks the Seine's birth (**right**). According to myth, the river springs from the tears of a nymph pursued by a satyr. Paris bought this site in the 1800s and made it part of the city, despite its distance.*

*In infancy the river meanders past dandelion-flecked fields, catfish-angling young boys, and picnickers like these near the village of Billy-lès-Chanceaux (**below**), some four miles from the source.*


LA SEINE




***Like a grande dame*** *gathering her trailing skirts, the Seine collects volume from five main tributaries (**below**) and bustles along to the English Channel, 250 miles northwest of the source. It follows a course so convoluted, however, that a fish headed downstream would actually travel 496 miles.*

*In its passage the Seine drains 30,000 square miles. Only 1,545 feet above sea level at the start, it flows so placidly that a stiff breeze at certain points can reverse the current.*

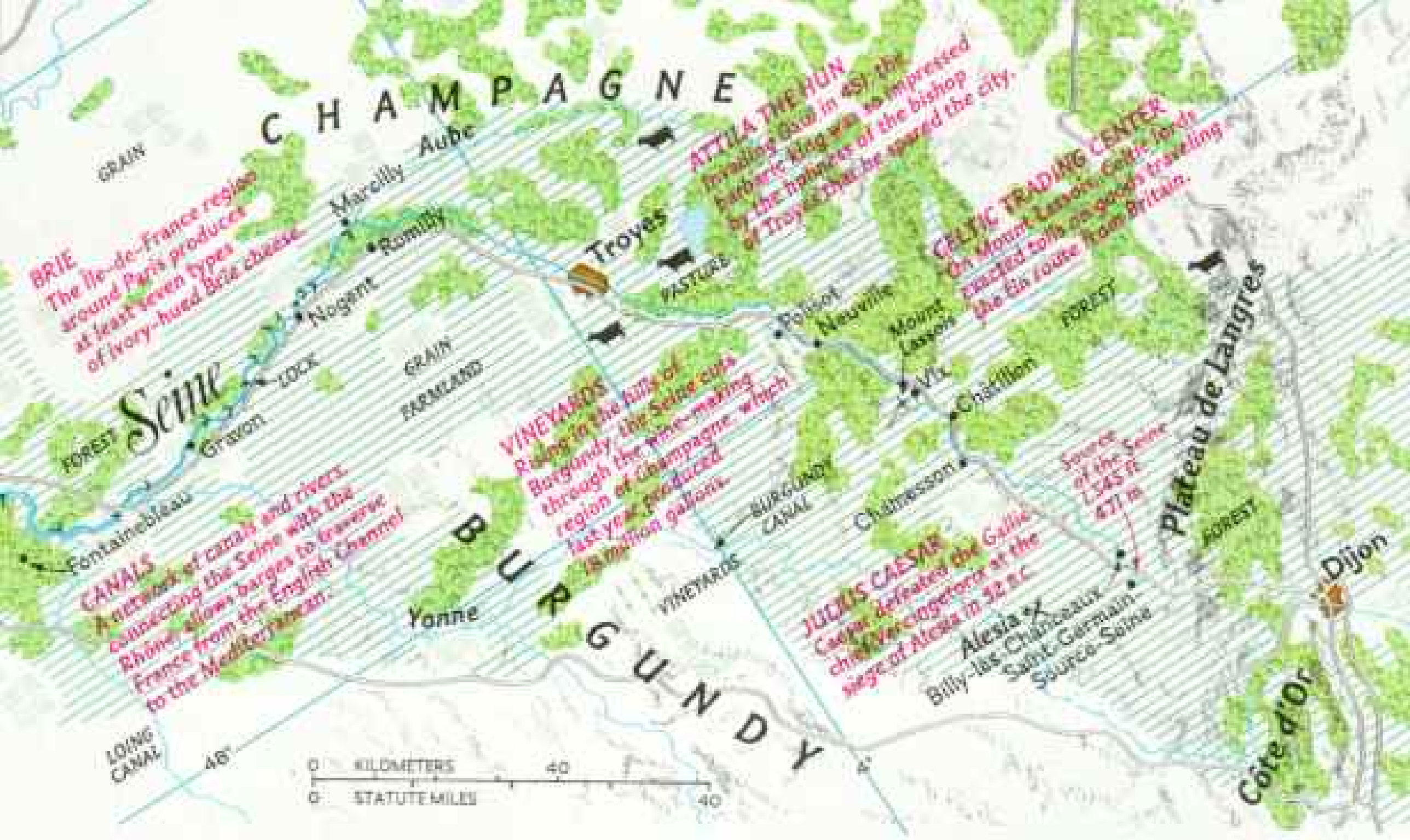

drank, talking animatedly. They kissed.

The girl saw me staring. I expected her to be angry that a stranger should dare to take pleasure in her happiness. But she smiled. "Bonjour, monsieur," she called. "Is it not marvelous?" Indeed it was—the towers of Notre Dame at my back, the great facade of the Louvre on my right, the frieze of chimney pots on the Left Bank, all suffused in the light over the Seine, like sunshine reflected from a very old coin, which no painter has ever truly captured.

In the three decades since, hardly a year has passed when I have not lived in France or visited her, and I know that there is more to her than picnics beside the Seine and wine and kisses. But when I hear the word "France," I see the Seine as I saw it on that first luminous morning.

Technically, the Seine rises in Paris, for the little grove of poplars and firs in which the spring bubbles from the earth was purchased in the 19th century by the Commune de Paris and made a part of the French capital. There, on a rainy morning, I encountered a very angry young woman who rushed out of the grove, tossing a mane of crackling black hair, and locked herself into a car with Paris plates. Her young male friend rapped on the windshield and called her name through the glass in vain.

I was gazing at the statue of Sequana,




goddess of the Seine, which was erected in 1865 at the order of Napoleon III, when the young man rushed into the grove with a Perrier bottle in his hand. He threw himself to the ground, reached through the iron bars into the grotto where Sequana reclines above the source of the Seine. Filling the bottle, he saw my puzzled look. "This water is supposed to be good for love," he said, and dashed out of the grove.

In the days when Burgundy was a great forest, a temple to the river deity stood here; it had healing properties, and in the times of chivalry was renowned for the efficacy of its love baths. When I returned to the road, the car doors had been unlocked. The waters had not lost their power—or lovers their ingenuity, as you wish.

*FROM THE SOURCE* to Châtillon, 30 miles to the north, the Seine trickles through forest and meadow, sometimes no more than a string of puddles that in hot summers evaporate into the air. In few places is it too broad for leaping. In the village of Saint-Germain-Source-Seine, a very old man found me gazing at the obelisk commemorating the five young men of the village who had died in the Great War. I was a bit embarrassed, and asked, "Does anyone catch trout in the Seine?" The old man nodded at the weatherworn monument. "*They* did," he said. Others still do.

At Châtillon the trickle is swelled by the Douix, an underground torrent bursting from a limestone cliff. The first bridge downstream is 12 paces long, and as the Seine flows beneath graceful bridges through this gray-stone town, it ceases to sparkle and begins to glow, like a tomboy realizing that she is turning into a beauty.

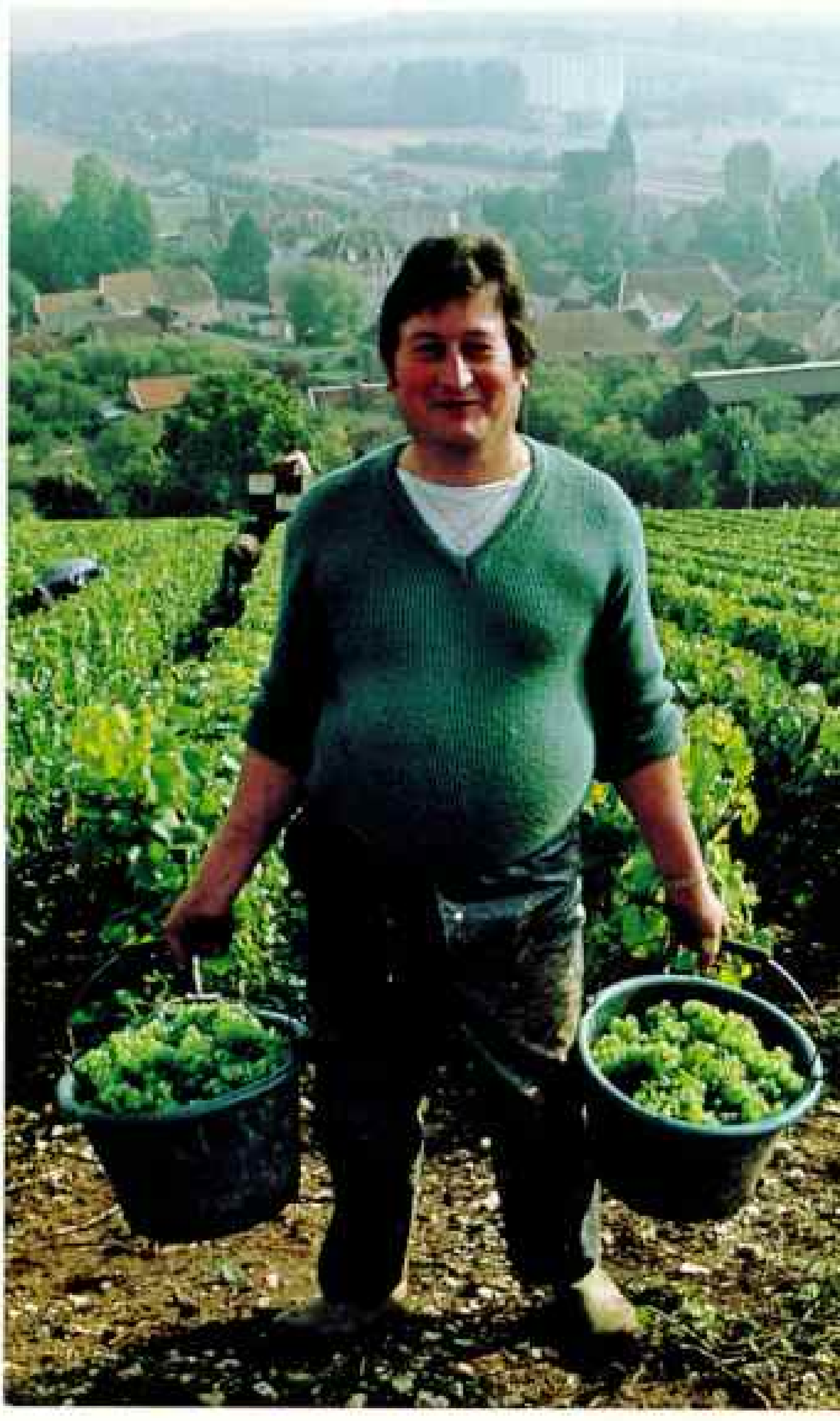
Châtillon is the keeper of an object of surpassing beauty and mystery, the Vase of Vix. When I came upon this burnished message from antiquity, schoolchildren were dancing around it, and the guard in the municipal museum, Louis Dupars, was looking a trifle nervous.

"After all," he said, "those who knew how to create such an object have been dead since perhaps six centuries before Christ." The bronze vase was found in 1953 in the funeral mound of a woman who had been buried on Mount Lassois, about four miles north of Châtillon, in the second half of the sixth century B.C. Made by Greek artisans, it is the largest urn of its type and period yet discovered. It stands five feet four inches high, and Monsieur Dupars assured me that it would hold 1,100 liters (290 gallons) of wine.

Richly decorated with a frieze of warriors and chariots, perfect in its symmetry, it took away my breath. *(Continued on page 490)*

***The hand of man*** *shapes the landscape near Gravon with water-filled gravel pits, two canals, and grainfields (**left**). The Seine coils around stands of timber at center. Hand-selected grapes from the Champagne region fill a vineyard worker's pails at Polisot (**below**).*

*Though grapevines have flourished here since Roman times, champagne was a 17th-century invention, often credited to Dom Pierre Pérignon, cellar master of an abbey. Sipping his discovery for the first time, the monk reportedly exclaimed: "I am drinking stars!" In less gentle times, clouds of lethal gas and lumbering tanks rolled over this countryside during some of the bloodiest campaigns of World War I.*



**The loveliest street** *in Paris* ***(above)****, in the regard of her citizens, the Seine curves beneath the Debilly footbridge, left, and the Pont de l'Alma in a view taken from the Eiffel Tower.*

*France's capital began as a scattering of Celtic fishing huts on the Île de la Cité. Conquering Romans linked the island village to the empire by bridge and road.*

*"One drinks its limpid water with pleasure," the fourth-century Roman emperor Julian the Apostate reported.*

*Not now. "It's polluted," says author McCarry, although young and old with great expectations still pull carp from its waters in Paris. Lovers, who once lingered on the quays, have dwindled in numbers. "With prosperity and the automobile, they've gone indoors," McCarry explains. Now expressways sidle up to both banks, giving forth a cascade of traffic that drowns the quiet.*

*Yet, the joie de vivre of the city endures. Two contestants in a cross-city waiters' race find the pace no deterrent to the enjoyment of ice-cream cones* ***(right)****.*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But not, happily, that of Monsieur Dupars: "I wonder if those children, who know only things made by machines, can understand what miracles men once created with nothing but their hands."

The Vase of Vix, together with the large collection of other objects dug up at Mount Lassois, is a relic of a trading center that existed at least as long ago as the sixth century B.C. The Romans always had a bit of an inferiority complex about the Greeks. Is it possible that the blood of the Hellenes flowed in the veins of the "barbarians" Julius Caesar defeated near the headwaters of the Seine?

It is not inconceivable that those merry corpuscles dance in the capillaries of Mlle Alice Chirion, whom I encountered in the brasserie of the Europa Hotel in Châtillon. Dining on a young duck with peas and a glass of the good red house wine, I noticed at the next table a group of convivial gray-haired ladies. They joked and sang, they gave each other second helpings from heaping platters of chicken and fried potatoes, they were obviously the greatest of friends. When one of them squeezed the neck of an empty inverted bottle and made a joke about a cow gone dry, I sent over another bottle of the rosé they had been drinking.

One of the ladies, a tiny person, left the table amid jokes and nudgings. In her absence I learned that the ladies were members of the Foyer des Capucins, a club for retired women. The tiny person returned. She wore a homemade bear costume, baggy, shaggy, the color of cinnamon. Her "paws" were black socks, with "claws" of white yarn. A dog, asleep beneath his owner's table, woke barking. The "bear" danced with the patron, sang a song, and lent its head to a little girl and posed for a picture.

I asked the name of the tiny person. "Mademoiselle Alice," she said. I thanked her for the pretty surprise. "Not at all," said Mademoiselle Alice. Then, realizing that I was not French and probably could not understand, unaided, that everything was all in fun, she explained to me: "The costume, the buffoonery, they are only for Tuesday night, you understand, monsieur; our time to have a good time."

*BETWEEN* Châtillon and Troyes, the Seine flows through hushed villages, past disused mill wheels and broken weirs, and passes out of Burgundy and into Champagne.

Standing before the walls of Troyes in 1429, Charles VII wavered; the great medieval city was in the hands of the English, and it seemed impregnable to the timid monarch. Beside him stood Joan of Arc. "Noble King of France," said the Maid, "this city is yours. Before three days have passed, she will submit either by force or out of love." Joan spoke of destiny, not luck; the king agreed to give fate a week to do its work. The next morning Troyes surrendered, and Joan led the king's army through its gates.

In the old quarter of Troyes, half-timbered houses have been inching toward a kiss above narrow streets since the 16th century. In the most famous of these dim cobbled passages, the Rue des Chats ("cats' street"), I came on a white kitten taking a bath. Above it, the raddled faces of the splintery old lovers touched at last, and the kitten's fur was dampened only by its tongue though a heavy rain drummed on the roofs.

At Fontainebleau, country château of French royalty, I encountered Louis Prost, fencing master and curator of the Musée Napoléonien, who purchased his first saber at the age of 12. Now he has 800 of them: "Sabers of the monarchy, sabers of the revolution, sabers of the empire." The museum's astonishing display of weapons, uniforms, and memorabilia is built on Monsieur Prost's private collection. "This includes," he declared, "the most beautiful hat of Napoleon in the world." Indeed it is a fine bicorne, one of a dozen known to have sat upon the head of the emperor; he lost it, according to Monsieur Prost, after being wounded on April 23, 1809, at the Battle of Regensburg (Ratisbon).*

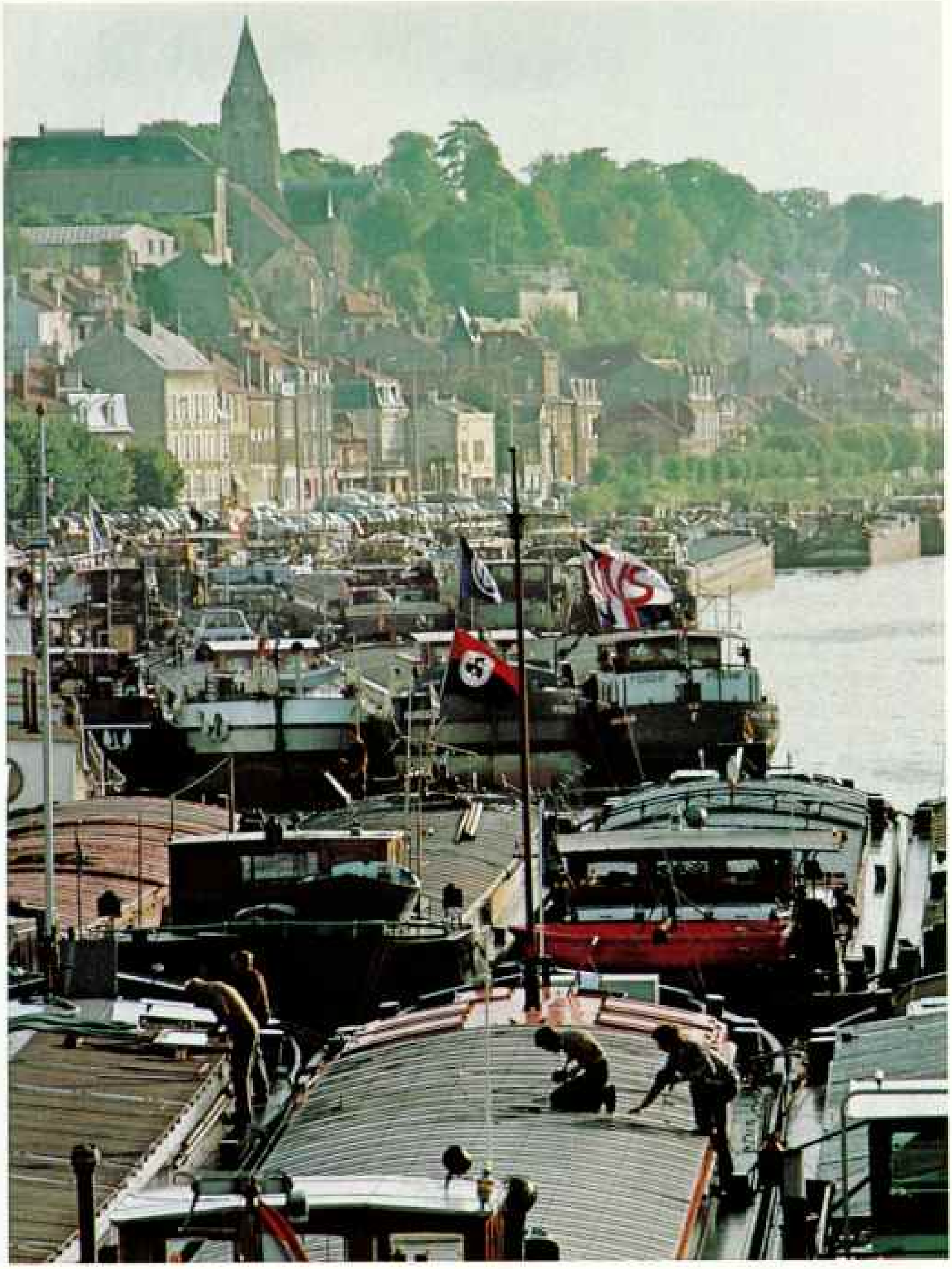
*John J. Putman told of Napoleon's life in the February 1982 NATIONAL GEOGRAPHIC.

Monsieur Prost's intimacy with Bonaparte made the great man more real to my wife, Nancy, and me as we walked that afternoon through the gloomy rooms of the Palace of Fontainebleau. The current building, on the site of an earlier royal hunting lodge, was begun in the 16th century, looted during the revolution, and eventually refurnished by Napoleon. According to some historians, he preferred it to Versailles because he could not bear the glitter of an earlier, more glorious monarchy. I think the plainer atmosphere simply suited a man who was fascinated by conquest but impatient with flirtation. Nancy and I imagined this intrepid genius, who led his soldiers into the sands of Egypt and the snows of Russia, finally signing his abdication in these rooms.

That night we slept across the street from the palace. Or rather, *I* slumbered peacefully. Nancy was awakened by an overwhelming sensation that someone was in the room. Whoever it was sat on her bed, depressing the mattress, and gave a long, sorrowful sigh. Nancy's eyes flew open. No visible being sat at the foot of her bed, but she felt the weight of a person there and heard the sigh again. "Monsieur Prost has got your hat," Nancy whispered. The ghost went away. Yes, said a hotel employee next morning, there *is* a phantom; he sighs and sits on beds. We moved on to Paris.

*PARIS*, bride of the Seine, is the symbol of France. It was not always so. Many of the great cities of Roman Gaul grew up along the Rhône. Attila, on his way to the Loire to besiege Orléans, did not pause to conquer Paris. Charlemagne abandoned her for Aix-la-Chapelle (Aachen). Twelfth-century Capetian kings transformed Paris into a center of Western politics and culture, but civil revolts and occupation by the English, who crowned their Henry VI king of France in Notre Dame, again led to her decline. Meanwhile, French kings and nobles favored their flashy châteaus on the Loire. In the 16th and 17th *(Continued on page 498)*

***A scrim** of smog obscures stacks of the oil- and coal-fired Électricité de France generating plant at Porcheville. Upstream, construction has begun on a nuclear power plant at Nogent to provide 5 percent of the country's power by 1987.*



# At home on the Seine

A FLOATING CITY exists side by side with terrestrial Conflans-Sainte-Honorine (**above**), where Seine and Oise Rivers meet.

The harbor becomes a fairground each June, when families paint, polish, and rig their waterborne homes with banners for a barge people's festival known as the Pardon National de la Batellerie. A service held on a barge-church during the 22nd annual festival honors bargemen war veterans (**right**).

*HOME IS WHERE the harbor is for the 6,000 or so barge families who live, work, and play on the Seine and its system of canals.*

*Family ties are strong among bargemen, or bateliers. Children, required by law to attend school from ages 6 to 16, usually live ashore but spend vacations on board with their families.*

*Too young for school but old enough to fall overboard, a youngster is secure inside a playpen fastened to the cargo cover of his family's barge* (**right**). *Of an age for pilot-playing dreams, six-year-old Phillipe Degrave peers through binoculars in the cabin of his floating home* (**below left**).

*Television sets and cars carried on barges maintain links with the outside world, but life remains family focused. "Barge people don't go ashore much," the author says. "They want their daughters to marry bargemen and their sons to marry daughters of bargemen."*

*Though camaraderie flourishes among the water folk, friendships can often be difficult to maintain because of the transient life-style. More often it's a case of cordial—but necessarily brief—contact, like the over-the-stern backyard chat between two women* (**below right**).



*BARGE BORN AND BRED, Abel and Monique Degrave have lived on their floating home, the Notre Dame de Lourdes II, throughout their 22 years of marriage. Several years ago they bought a second, larger barge, the Lorna Lille.*

*With intentions as steady as his hand on the wheel, eldest son Jean-Marc, 17* **(above)**, *hopes to buy the smaller barge from his father after completing studies for a pilot's license.*

*Jean-Marc and three younger siblings attend school in Rouen but spend summers working on the family's two craft.*

*As the population aboard temporarily increases, so does the load of laundry. Madame Degrave strings out the wash over the barge's cargo cover* **(above right)**.

*To contract for cargo, Abel Degrave attends one of three weekly sessions at a bourse, or exchange, in Paris, where freight and barges are matched.*

*Using a wooden pusher to distribute the cargo, Degrave loads 260 tons of rapeseed* **(right)** *destined for Le Havre.*

*Although France's 5,000-mile system of rivers and canals links up with waterways throughout Europe, the Degraves usually refuse work that may take them out of the country because "we try to keep the family together."*

(Continued from page 491) centuries Paris again became a center of French culture. In the end, the city gave birth to the revolution and became the immortal queen of France, girt by her shimmering river.

To me, the most symbolic spot in France is a bronze medallion sunk in the pavement in the shadow of Notre Dame. This is the point, the mystic center, from which all distances are measured. In all things French, Paris is the standard of measurement.

A *LOVELY GIRL* is a rare sight in the provinces, but Paris teems with beauties from the provinces. One may encounter rudeness in a Parisian, but seldom stupidity: Citizens of Paris owe it to their city, which is a monument to the variety of the mind, to behave intelligently, to add their daily digit to the sum of excellence. At a flower stall on the Île de la Cité, Nancy gasped at the array of roses and chrysanthemums—and of exotic tropical flowers selling at a hundred dollars the stalk. "Each one is perfect!" she exclaimed. "Naturally," the proprietor replied. "Perfection is our métier."

There are not so many lovers along the quays of the Seine as there used to be, nor *clochards*, those bleary, ragged tramps who once slept beneath the bridges. Now nobody sleeps under the bridges except young foreigners, who are equipped with sleeping bags, guitars, revolutionary sentiments—and purses filled by indulgent fathers.

During my Paris visit the youth of France was working seriously on its politics. The presidential election was taking place, with Valéry Giscard d'Estaing, third president of the Fifth Republic, opposed by the Socialist François Mitterrand and a Greek chorus of minor candidates. Late one night, near the church of St. Germain des Prés, I came on platoons of muscular young men dashing through the streets. They carried rolls of paper, brushes, and buckets of paste as they darted like troops in an enemy city from doorway to doorway.

They were posting pictures of their candidates on the hoardings provided by the government for this purpose. As soon as one group put up posters, another would dart out of a darkened street and cover them with pictures of their own man. As Giscard was

***Frail but formidable,*** *the 81-year-old Duchesse de La Roche-Guyon stands in her château on the Seine* ***(below)****. German Field Marshal Erwin Rommel used it as a command post late in World War II. "I just moved upstairs and left him the downstairs," the duchess says.*

*Near Les Andelys a symbol of earlier struggles, Château Gaillard, lies in ruins* ***(right)****. It was built by Richard the Lion-Hearted as a strategic redoubt against the king of France. In 1204 French soldiers storming the castle broke England's grip on Normandy.*

***River of romance,*** *the Seine languorously curls by Le Petit Andely, upstream from a hill made famous by lovers enshrined in a 12th-century tale. To prove his worth, Raoul carried Caliste up the hill, only to die at the top. Near the Seine's*

banks in Paris, ashes of the ill-fated lovers Héloise and Abelard rest in the same sepulcher. In one of the more brutal legends of passion, 13th-century Queen Margaret of Burgundy killed her discarded lovers by dumping them in the river.

*"I perhaps owe having become a painter to flowers," said Claude Monet. His gardens at Giverny, near the Seine—given an impressionistic look by the photographer (**above**)—inspired many canvases, including his "Water Lilies." In his bedroom (**left**), Jean-Marie Toulgouat, a relative who grew up in the house, and Jean Lavenu, son of Monet's cook, pause at the foot of the bed where the cataract-plagued artist died in 1926. He was carried from the house and buried quietly nearby, attended by friends and family and surrounded by flowers.*

masked by Mitterrand, as Mitterrand was obliterated by Jacques Chirac, the Gaullist candidate, the people seated at the sidewalk tables of the Café des Deux Magots lifted cheer after jovial cheer.

A day or two later, strolling in the Rue Jacob, near the Seine, I encountered François Mitterrand, the next president of France. He had thrown a tan raincoat over his shoulders, he carried a book in his hand, and like any other Parisian on a Saturday in spring, he was enjoying the mild bright pause between showers. He was quite alone and quite undisturbed.

Earlier rulers of France kept their persons safe by bribing the Vikings, who had invaded Normandy in the ninth century, to attack others, leaving the monarch in peace. In A.D. 911, Charles the Simple gave the Viking leader Rollo the rich lands that are now Normandy, and the hand of his daughter in marriage. This transaction worked out well; Rollo was baptized and became a fervent Christian lawgiver and builder. It was he who undertook the first important works to stabilize the Seine, dredging, diking, and draining the marshes.

In 1848 work was begun to improve the navigability of the river below Paris. Embankments and new locks were built. In 1850 barges and other small craft carried 500,000 metric tons of material to Paris. Today some 30 million metric tons of river freight pass through Paris in a typical year.

THE SEINE is not a turbulent river. From the source to the sea, it falls only 1,545 feet (471 meters), and the descent from Marcilly, where the first of 25 locks is located, is 220 feet. Above Marcilly the wind may cause the Seine to flow *upstream*, as I discovered when I rented a rowboat at Romilly and found myself rowing as fast as I could in order to stay in the same place. Below Rouen, tides run in from the Channel at up to 5 knots, fast enough to make downstream progress a questionable proposition for old, slow rivercraft.

Nancy and I were carried out of Paris aboard a sturdy British boat called *Rosehearty*. We boarded her at her mooring near the Pont de la Concorde at the invitation of her cordial owners, Alan and Joan Davis of Yarmouth, Isle of Wight. A Frenchwoman

who lived aboard a neighboring barge joined us for a sundowner. From the deck of *Rosehearty* the snarling combat of rush-hour traffic along the quays and in the Place de la Concorde sounded like the sough of wind in treetops. "Ah," said the Frenchwoman, who had been describing the joys of life aboard a barge, "how one hates to fall overboard into the city each morning!"

Next day, as we chugged sedately downriver beneath the bridges between the steep riverbanks, Paris looked like a buried city, with only the roofs visible from the water. Entering the first great curves of the lower Seine, gazing at the bluffs of Saint-Germain-en-Laye and the forest beyond it, I understood for the first time that the Seine is a natural barrier. For centuries it separated rival Celtic tribes on its left and right banks.

*THERE WAS* little opportunity for such musings when *Rosehearty* was under way. Our helmsman, Lt. Anthony Walton of the Royal Navy, on leave from duty aboard one of Her Majesty's aircraft carriers, maneuvered our handy craft through a swarm of barges.

These flatboats are home to a floating nation; the family aboard is as likely to be Flemish or German as French, for Europe's rivers are connected by a vast system of canals that makes it possible to pass from the North Sea to the Soviet Union or the Mediterranean, using no wheel except the one that moves the rudder. We passed barges on which children played on swing sets and teeterboards, on which women hung out the wash, on which men worked on the motors of cars lashed to the humped decks of their vessels. A bit farther downriver, at Conflans-Sainte-Honorine, we steamed past a city of barges—there was a church aboard one barge, a clinic on another.

The barges carry everything, picking up loads at depots at Le Havre, Rouen, and the Quai d'Austerlitz in Paris. Tying up alongside a huge barge, we were warned by one of the crew, who spoke French with a vigorous German accent, to be careful not to fall into the pool of liquid in the center of the deck.

"It's mud from the river bottom, stickier than honey, and it will suck you down," he cautioned. His barge worked with a dredge, keeping the river at its proper depth; in this

***With heavenly aspirations,*** *a 495-foot-high spire soars above the Cathedral of Rouen* ***(above)****, damaged by Allied bombs during World War II. Workers engaged in renovations scale a scaffold* ***(right)*** *wrapped around the cast-iron spire, a 19th-century addition to the cathedral.*

***Tradition*** *steps out each year in late spring when Rouen citizens in Norman costume celebrate the Festival of Joan of Arc. Tried and convicted of heresy, she was burned at the stake at the behest of the English. According to legend, her heart remained untouched by the fire. It and her ashes were thrown into the Seine nearby.*

part of the river the maximum draft for boats is 3.5 meters (11.5 feet).

It is a wondrous thing to see the barges, two or three of them lashed together and pushed by a single tug, as they negotiate the curves of the river. Anthony taught us that a blue flag flown on the starboard side of a barge's wheelhouse is a request for oncoming traffic to pass to the left, instead of going by on the right in the usual way. This permits barges to keep to the inside curve of the river, reducing the amount of maneuvering needed. The steersman often can't see the prow of a string of barges hundreds of feet ahead of the wheelhouse; he steers by radar.

Even more wondrous it is to follow such a behemoth into a lock: The boats chug in, fenders down to keep from smashing against the sides of the structure, and then the lower gates are opened, the water gushes out, and several hundred tons of barge sink majestically (or rise if it is headed upriver) the 15 or 20 feet to the next level of the river, and the craft motors on.

*OUR DAYS* on the river passed like a dream. To watch the setting sun pour molten light on the water of some placid anchorage was to understand what it was the Impressionist painters were trying to capture on their canvases.

The Seine is the mother of Impressionism: perhaps the Honfleur painter Eugène Boudin began it in 1858, when he sat 17-year-old

Claude Monet at the water's edge and commanded him to paint the light. Monet spent the rest of a long life in the attempt. He painted the Cathedral of Notre Dame at Rouen more than 30 times in order to observe the changes in the light playing over its face.

The Allied air forces, attempting to destroy the bridges across the Seine in 1944, inadvertently bombed Rouen's cathedral and many of its other historic churches and buildings. A great fire in 1940 had ravaged the city, and whole quarters of half-timbered Norman houses were destroyed.

Bernard Toutain, a Rouennais who was taken to Germany to perform forced labor after the defeat of France, returned to find his beloved city in ashes. "I had been in Munich, a French prisoner among Germans, when that city was firebombed," Bernard told me. "The pavement melted, the air caught fire, many died. Rouen was no more beautiful than Munich, her dead women and children were equally innocent. War itself is the enemy."

Happily, Rouen has been rebuilt, and the crew of *Rosehearty* wandered through her streets among happy throngs. At a brasserie on the old marketplace we feasted on the *plateau de fruits de mer*—oysters, clams, sea snails, periwinkles, crayfish, prawns. From the window we could see the new Church of St. Joan of Arc, shaped like a wimple, next to the place where the saint was burned.

**A city reborn,** *Le Havre rose from ruin after being relentlessly pummeled by German demolition squads and 156 Allied bombing raids in 1944. Michel Nottale, a city official, displays a photograph of the ravaged city (**right**), which bears the forlorn distinction of being the European port hardest hit by the war.*

*Reconstruction began two years later, with plans for a model city. Today a skyline of concrete—criticized by some for its monotony—rises beside the estuary of the Seine (**above**). "People don't really apologize for the looks of the city as much as tell you how lovely it once was," the author explains.*

*This busy port last year handled some 79 million tons of cargo. The man-made harbor is constructed of dikes and breakwaters extending into the estuary of the river.*

*Le Havre was built on a marshy site in 1517 by Francis I to replace the silted-up port of Harfleur to the northeast. In the summer of 1779 the city saw an eager young Lafayette raising troops to aid the American Revolution.*

*The young United States shipped cotton, coffee, sugar, and tobacco to Le Havre for distribution to the rest of Europe.*

Joan was not canonized until 1920. Wasn't that rather late? "Well," said a man opening oysters outside the brasserie, "she caused a lot of trouble, and you have to take into account the fact that she was not a Norman."

A thick fog settled on the Seine at Duclair, pinning *Rosehearty* to her mooring, and we sadly took our leave of her. Nancy and I wandered at leisure by car and afoot along the bank. At Jumièges, blackbirds spilled from the shattered towers of this old monastery, one of the most haunting ruins in France. A few miles farther on, we lit a candle for a devout friend in the 15th-century Church of Notre Dame at Caudebec-en-Caux. Henry IV called this masterpiece of flamboyant Gothic "the most beautiful chapel in the kingdom"; the centuries have confirmed his judgment.

At Villequier we discussed with M. Claude Nanquette, manager of the Musée Victor Hugo, the melancholy events of September 4, 1843, when Léopoldine, daughter of Victor Hugo, drowned with her young husband, Charles Vacquerie, while boating on the Seine. From the windows of the Maison Vacquerie, we could imagine the gay young people, setting off with parasol and picnic hamper in the glitter.

"Victor Hugo was the most famous man in the world, but Léopoldine drowned, and his other daughter, Adèle, died mad," said Monsieur Nanquette. "Only a poet, perhaps, could have borne such sorrow."

At the Abbey of St. Wandrille, high above the Seine in the Caux country, we passed through the gates as the Angelus was sounding. The abbey was founded in 649 by Wandrille, a nobleman renowned for his beauty and skill at arms, who decided on his wedding day to consecrate his life to God. Destroyed by the Vikings in the ninth century, the abbey was rebuilt in the tenth; after the revolution it again fell into ruin.

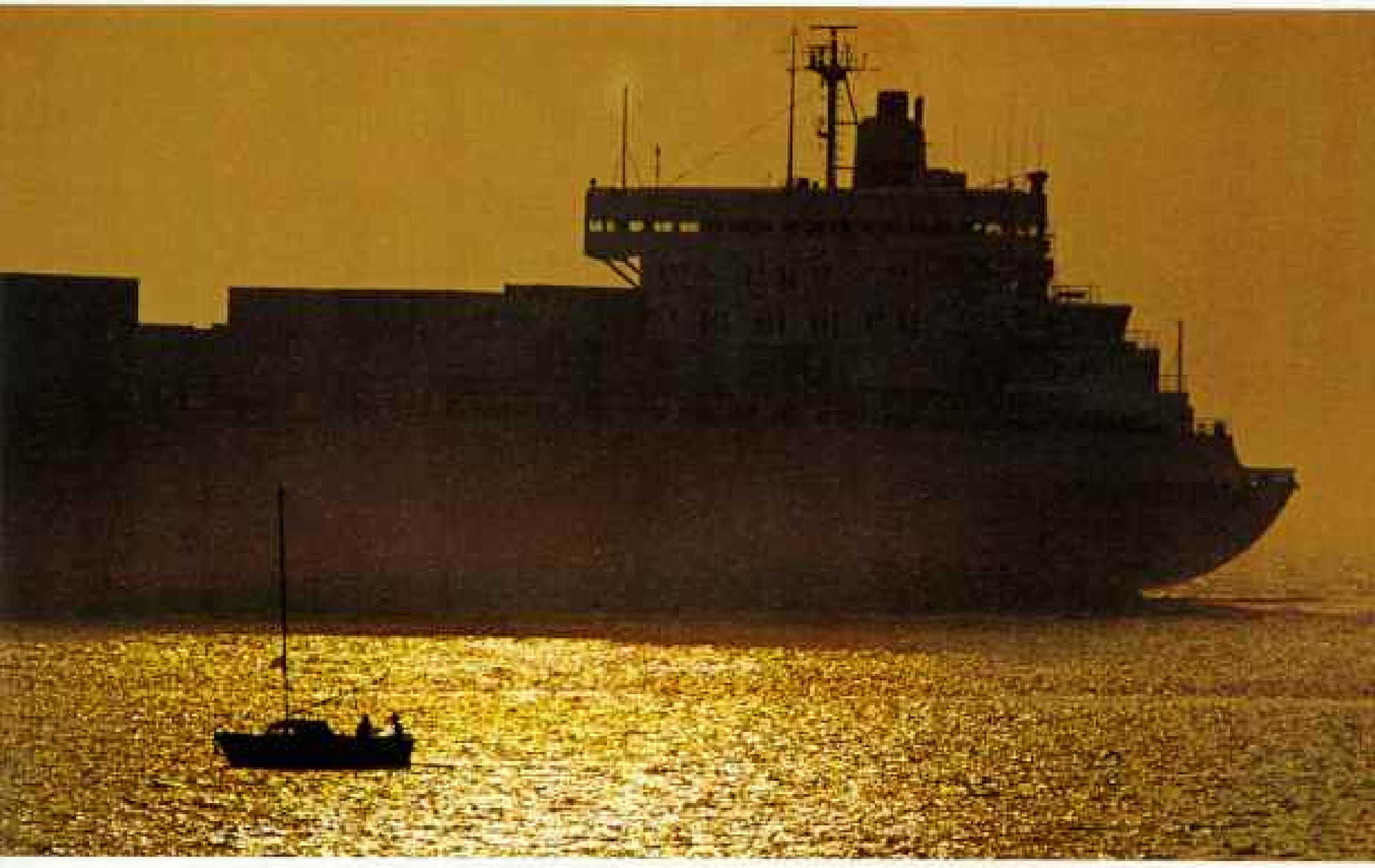
The Benedictine monks of the abbey knew prosperity, terror, exile. Always they returned. On this gray night, beneath the roof of the present church, we listened to them lift their voices in Gregorian chant. The monks were very old men, most of them, but when I closed my eyes and listened to their joyous praise of their Maker, they sounded like boys.

*ONE STEPS* from age to age with ease along the Seine. On market day in Pont-Audemer, a town at the edge of the Marais Vernier, the marsh that lies between the Seine and its last tributary, the Risle, we heard a tale of witchcraft: A man in a village near Honfleur had died when a sorcerer put a curse on him. Animals perished of witchcraft all the time. The marsh is important, for Norman sorcery makes much use of the spit of frogs, who live in boggy places.

Soon the mood changed. Lunching with us in the Café des Sports, a man I shall call François, a former mayor of a nearby village, recounted the circumstances of his marriage: "It was 1939. My class was about to be conscripted. I was in love with Marie. My grandmother said: 'You may be killed by the Germans, so you must marry and have a son quick.' My beloved Marie, in my arms before I march away! I thought. 'Not Marie,' said *Grandmaman*. 'I don't blame you for loving a pretty girl who is poor, but you must marry someone more suitable. Tomorrow morning you will be wed to Annette; it's all arranged. And mind you leave a son behind you!' "

And did he obey his grandmother and marry Annette? "Of course," said François. "I was young, a romantic. I was sure I would be killed in the war, and Marie would spend her life in mourning. Instead, she had five children of her own, I have a son I love, and I became the mayor. One must accept fate."

This willingness to accept fate, to float on the tides of history, is surely the reason why civilization is such a hardy growth on the fertile banks of the Seine. To say good-bye to the river, I returned to Honfleur, at the mouth of the Seine, my favorite town in France. During the Hundred Years' War the town was twice taken and twice lost by the English.



***Business and pleasure*** *share Le Havre's harbor, second in France after Marseille, where a containership dwarfs a day sailer. "Paris, Rouen and Le Havre are all the same city and the Seine is their main street," Napoleon said of the river that links not only a noble succession of cities, but the past and present of French civilization as well.*

After the *goddons*, as the French called the English because of their habit of taking the name of the Lord in vain, were driven out for good in 1450, the people of the Honfleur waterfront decided that they must have a church to replace the one the war had destroyed along with much of the rest of the town. The boat carpenters of Honfleur, employing their usual tools and timbers cut from the nearby forest of Touques, built the Église Sainte-Catherine in the form of two overturned ships' hulls.

In similar hulls, the men of Honfleur would touch Brazil and Newfoundland, found French America, follow the flight of migrating birds to the far reaches of the Pacific. In similar hulls, their Northmen ancestors came into the estuary. In similar hulls, the men of today, such as Daniel Le Cesle of the *Annick*, raise up new generations with a living earned by toil and danger.

Standing within the great fragrant old wooden structure of Sainte-Catherine, one does not ask as in the great stone cathedrals, "How did men make such a wonder?"

One murmurs instead, "Ah, I see how they did it!" And in seeing one's fellow men, so small in the distance of time, one understands how the Seine, which is no more than the tears of a nymph where it rises in a forest far away, can become in its long course the symbol of a civilization whose mysterious light no human eye or hand has ever quite captured. □

# First Across the Pacific: The Flight of "Double Eagle V"

By BEN L. ABRUZZO

SOARING SERENELY past Japan's snow-crowned Fujiyama on easterly winds, our four-man helium balloon, *Double Eagle V*, embarks on the historic first manned flight across the world's greatest ocean—a distance of nearly 6,000 miles. The time is early morning of November 10, 1981, roughly three years since a predecessor, *Double Eagle II*, made the first manned crossing of the Atlantic.*

*Double Eagle V* is a giant compared to the earlier balloon and to two interim models built for shorter distances. *Double Eagle V*'s polyethylene gasbag—a mere 4.5 millionths of an inch thick—contains 400,000 cubic feet of helium, compared to *Double Eagle II*'s 160,000 cubic feet. *Double Eagle V* stands 13 stories high, two more than *Double Eagle II*. Yet the designs are basically similar, featuring bubble-shaped gasbags and gondolas shaped like boat hulls as a precaution against ditching at sea. Twin inflation tubes loop down from the larger balloon to an enclosed foam-and-fiberglass gondola. With four men and all gear aboard, *Double Eagle V* weighs better than seven tons, more than half of it ballast in the form of sand, lead shot, surplus water, and expendable items such as empty oxygen cylinders.

Unlike the Atlantic, which was challenged by balloonists a dozen times before it was finally conquered, the Pacific has been largely ignored. The only successful transpacific balloon flights occurred during World War II, when the Japanese launched small unmanned balloons carrying incendiary bombs into the high-altitude jet stream to be borne eastward toward the Pacific Northwest. Though ingenious, the flights caused very few deaths and, in any case, offered little precedent for manned attempts to cross the Pacific.

Now, four hours into the flight and at 15,000 feet (***left***), we climb slowly toward our goal of 26,000 feet, where we hope to pick up strong easterly winds.

We never reached that goal. Two hundred miles east of Japan, at around 19,000 feet, we encountered an unexpected danger: ice accumulating on top of the gasbag, perilously weighing us down.

Ice was to plague us throughout the flight, limiting us to an average speed of 68.3 miles an hour, far less than we would have achieved at higher altitudes, where the winds reached 150 miles an hour.

But other more welcome things accompanied us on the long flight. As we drifted east from Japan toward North America, transpacific jetliners raised us on the radio, reporting winds and weather at varying altitudes and, perhaps equally important, lifting our spirits at unexpected moments.

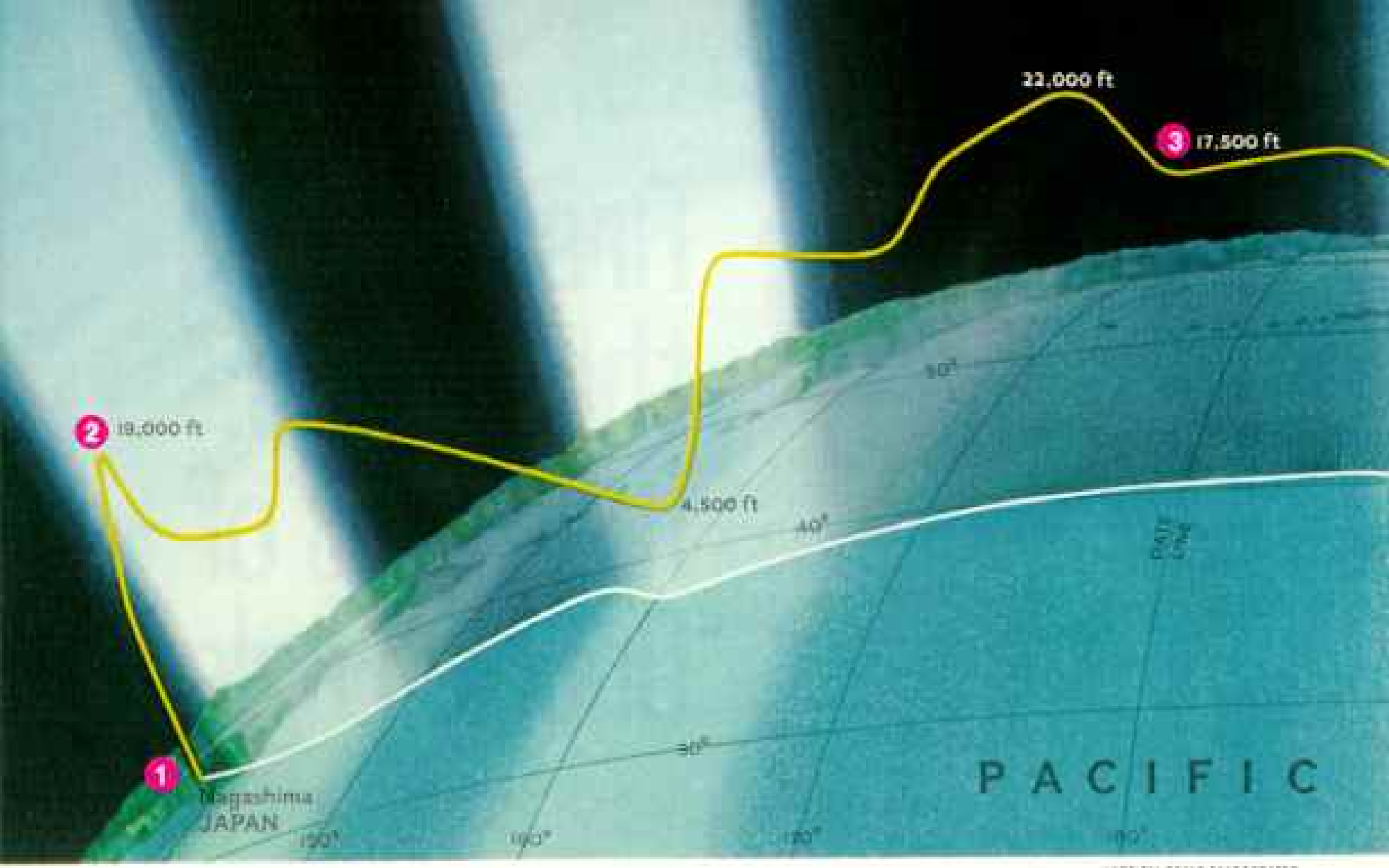
One Pan American jet carried our families on the return flight from Japan toward the projected landfall in California. The Pan Am pilot spent a busy few minutes relaying messages across the five vertical miles that separated us.

Such aspects of long-distance ballooning were familiar to me, as captain, and to Larry Newman, co-captain and radio navigator, both of us veterans of the transatlantic flight. Our two pilots were rookies—Ron Clark, a New Mexico real estate developer, and Rocky Aoki, the Japanese owner of the Benihana restaurant chain. Despite their limited experience, both men performed superbly on a flight as difficult—and, at times, as dangerous—as any in my experience.

Teamwork more than anything carried *Double Eagle V* to victory.

*See: "*Double Eagle II* Has Landed!" by Ben L. Abruzzo with Maxie L. Anderson and Larry Newman in the December 1978 NATIONAL GEOGRAPHIC.

CHUNICHI SHIMBUN




VERTICAL SCALE EXAGGERATED

① *LAUNCH*
*November 10, 1981*
*Double Eagle V lifts off from Nagashima at 3:05 a.m. local time. The flight plan calls for a gradual climb to 26,000 feet to catch high-altitude easterly winds.*

② *November 10, 9 a.m.*
*At 19,000 feet ice begins to accumulate atop the gasbag, forcing the balloon to lower altitudes and less favorable winds. The condition limits Double Eagle V to a maximum of 22,000 feet throughout the flight.*

③ *November 12, 2 a.m.*
*Crossing the date line — a first in manned balloon flight — the crew turns the calendar back one day. Storm clouds and icing combine to limit the balloon to lower altitudes.*

"DOUBLE EAGLE V"


PRINTING BY WILLIAM H. BOND. COMPILED BY ROSS H. ARNETT. NATIONAL GEOGRAPHIC ART DIVISION

④ *November 11 and 12*
*A sustained period of nearly level flight conserves precious ballast and indicates that ice has not punctured the gasbag. Eastward speed, however, remains a disappointing 42.6 miles an hour.*

⑤ *November 12, noon*
*Extreme icing threatens to terminate the flight. Under the weight of three tons of ice and snow Double Eagle V sinks to 4,200 feet before melting action and release of ballast lighten the balloon.*

⑥ *TOUCHDOWN*
*November 12, 10:36 p.m.*
*In a violent storm Double Eagle V lands near Covelo, California, after 84 hours and 31 minutes aloft. The flight sets a new world's distance record of 5,768 miles.*

# Seesaw flight path spans the Pacific

DURING OUR FIVE nights and four days aloft, *Double Eagle V* changed altitude almost constantly, ranging from a high of 22,000 feet to a low of 4,200.

Like all gas balloons, it was affected by alternate high and low temperatures of daylight and darkness. Under the sun's warming rays helium inside the gasbag expands, increasing buoyancy and producing lift. Conversely, as the helium cools overnight, it contracts, causing us to release ballast as a countermeasure. The first law of ballooning is that you stay aloft only as long as you have expendable ballast.

In our case the normal up-and-down flight pattern was broken, first by heavy cloud cover that blocked the sun's rays and second by the frequent accumulation of ice and snow. Though we maintained periodic radio contact with our weather service—GRD in Denver, Colorado—we occasionally had to pass up their advice because of ballast limitations. At one point some 800 miles northwest of Hawaii, we were unable to climb to the recommended altitude of 22,000 feet because it would have required release of thousands of pounds of ballast—more than we had left. Instead, we compromised on 500 pounds, climbed to 17,000 feet, and reached a speed of 100 miles an hour.

We used oxygen during most of the flight, as demonstrated by Larry (***facing page***), who wears a mask beside an open window looking toward Fuji. The oxygen not only made breathing easier but also helped purge our systems of nitrogen as a protection against the bends, should we suddenly climb to an extreme altitude to catch favorable winds.

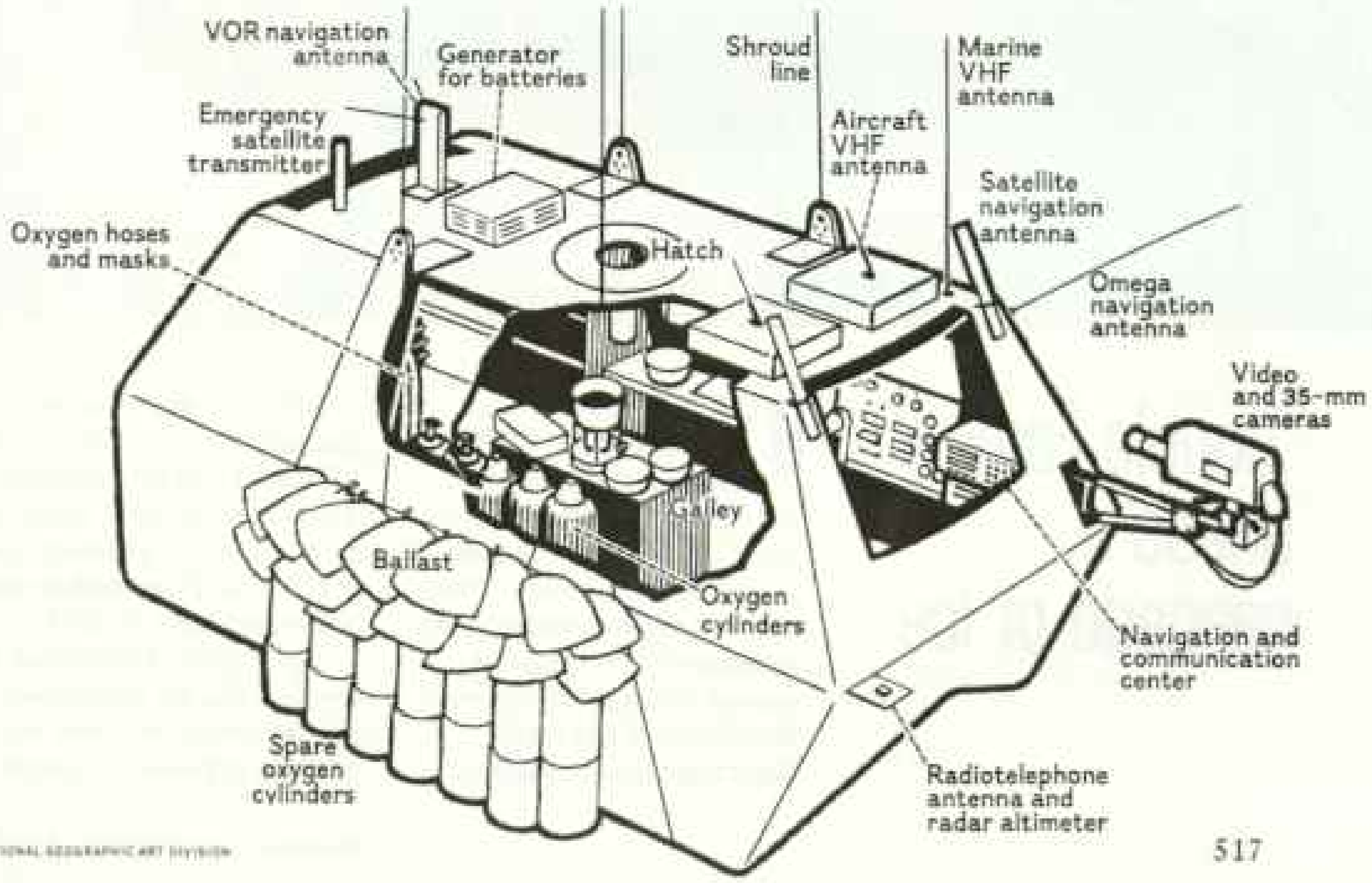
BOTH BY "DOUBLE EAGLE V"

# Life without luxury at 17,000 feet

OUR GONDOLA was basically a life-support system, without a single cubic inch devoted to frills. The interior measured 17 feet long, seven feet wide, and seven feet high. Designed with Larry's technical help, the compartment contained enough oxygen and supplies to sustain four crew members for a maximum of ten days. Though the gondola was equipped with a propane heater, insulation proved so effective that we seldom used it. At our peak altitude the outside temperature dropped to minus 19°F, while the inside stood briefly at 20°F.

The flight plan called for two men to stand watch while the other two slept. But because of bad weather, I managed to sleep only 9 out of the 84 hours aloft. Here standing our watch (*left*), Ron Clark in fur hat and oxygen mask monitors the navigation panel while I inspect the gasbag from the bow window. The gondola's circular hatch overhead serves as an emergency escape exit and provides access to the gasoline generator mounted on our floating home's roof.

Our diet aloft was as austere as it was nourishing—energy bars, dried beef, oranges, peanut butter sandwiches, and gallons of Gatorade. Halfway through the flight we had all had enough of that fare. Then Rocky pulled a surprise. Donning a Benihana chef's outfit, complete with red hat (***below left***), he produced noodles, vegetables, and succulent bits of fresh beef—and within minutes whipped up a banquet on our small propane stove.



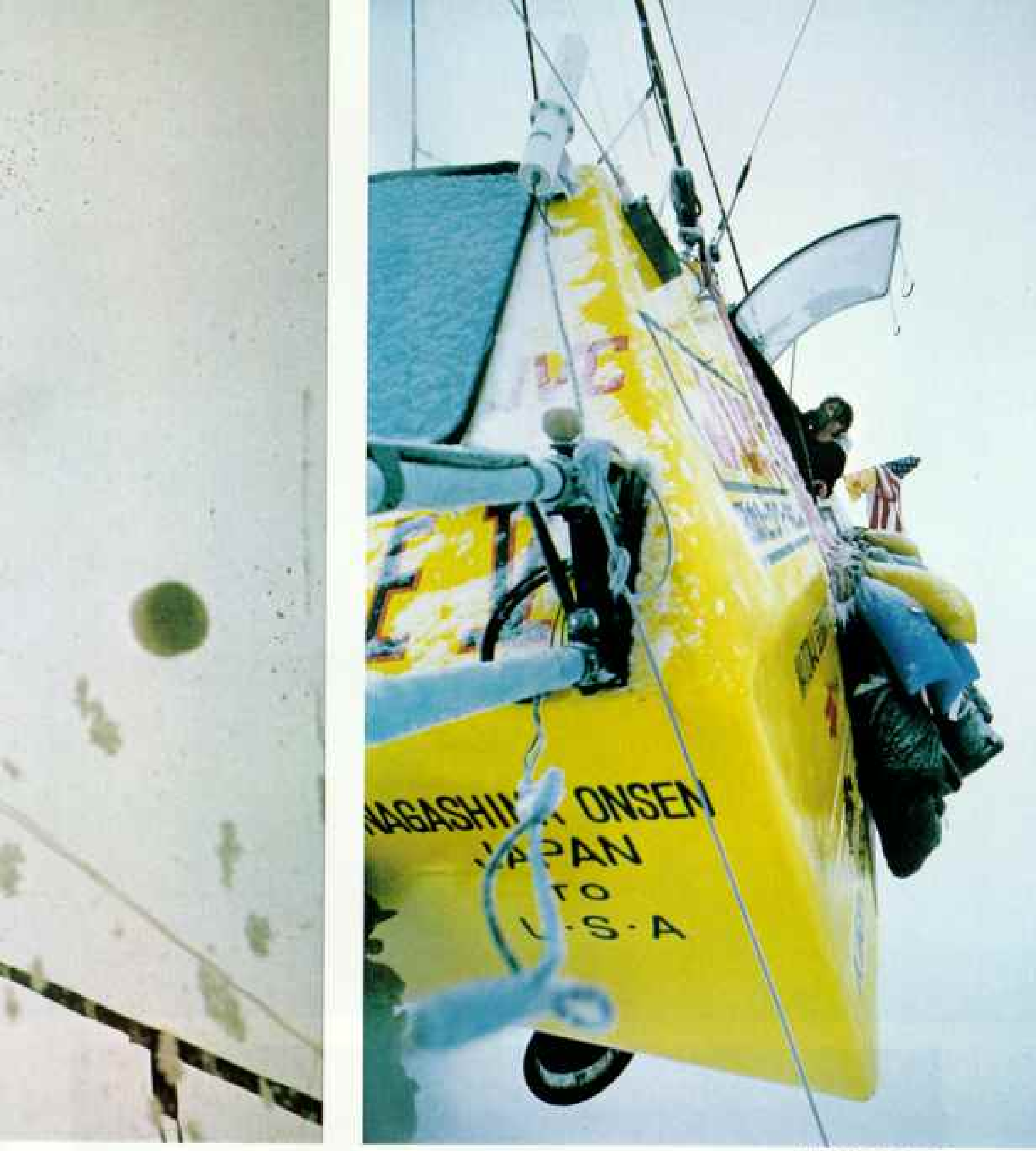

NATIONAL GEOGRAPHIC ART DIVISION

# "Double Eagle V" sheds a cascade of ice

DANGER! As we approached the California coast on our final day, we encountered such heavy icing that I feared the gasbag might split or collapse from the tremendous weight—an estimated 6,000 pounds spread like a solid cap over the crown of the bag, flattening it out of shape.

Although we released 825 pounds of our meager store of ballast, we still dropped 12,000 feet in little more than two hours—to a record low of 4,200 feet. It seemed certain we would have to ditch.

But finally the warmer air at lower altitudes took effect. The ice cap began to break up and the bag regained its shape,




BOTH BY "DOUBLE EAGLE V"

loosing a barrage of platter-size chunks (***above***). I snapped this picture through a Plexiglas window panel; anyone outside the gondola would have been injured.

Free at last of its enormous burden, *Double Eagle V* regained altitude, climbing swiftly to 13,000 feet, where we picked up a light dusting of snow (***above right***). Ron leaned out a side window to inspect the gondola and to check our remaining bags of ballast—we had less than 1,500 pounds left, but only 500 miles to go.

As our hopes revived, I thought once more of the organizations that had backed us against sizable odds. Our gondola bore the name of one, Nagashima Onsen, a Japanese resort that offered us unlimited hospitality at the launch site. Many other firms and individuals had provided equipment, services, and financial assistance.

Yet the flight was far from over, and during the final hours we were beyond all human assistance.

STEPHEN FRISCH (BELOW LEFT); JOHN SIANNONI


PAINTING BY WILLIAM H. BOND

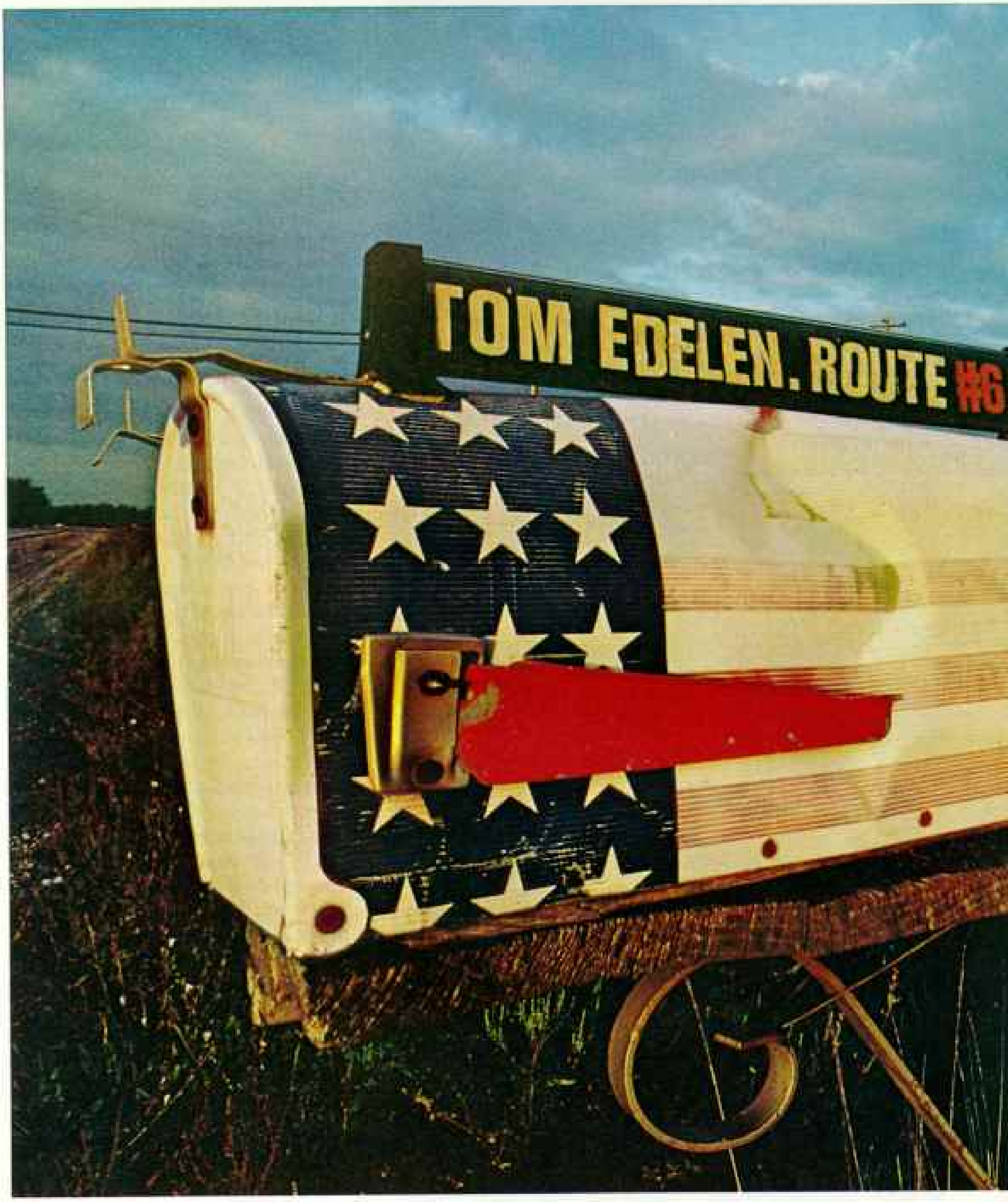
# Darkness and danger before triumph

WE NEVER SAW our final goal, the California coast, but through the clouds and darkness below us we caught the unmistakable sound of victory—the roar of surf at Point Arena. Then suddenly we found ourselves caught up in a new and violent storm—the worst to strike that coast in 20 years.

After skimming above the clouds at 6,900 feet (***diagram***), we made our first attempt to land. It was very nearly fatal. Approaching the town of Willits through torrential rain, we navigated down through the clouds and saw a valley stretched beneath, with a row of houses directly ahead. But our descent rate appeared to be too great, and we seemed on a collision course with the houses. Dropping all the ballast within reach, we climbed again.

Choosing another valley near the town of Covelo, we let down once more, and this time the approach was perfect. I fired the explosive charges that separated the gondola from the gasbag, and we landed with a massive jolt on a brush-covered hillside (***top***).

At a press gathering in Covelo (***facing page***), my son Benny looks on from far left beside Ron in his flight jacket. Larry hugs Mrs. Aoki, I hug my wife, Pat, and the irrepressible Rocky serves as master of ceremonies. □




*Patriotic note strikes a basic chord of values for a people*

# *Home to the*

By NADINE BREWER

*unified by beliefs rooted in central Kentucky's nurturing soil.*

# *Heart of Kentucky*

Photographs by WILLIAM STRODE

IT WAS A PERFECT DAY for stripping tobacco. Splashing across the steeply rolling central Kentucky hills and up the deep hollows, orange, gold, and red leaves of maple, oak, and hickory trees hung motionless in the damp air. Leaden skies intermittently sent a fine rain plunking out a tune on the barn's tin roof.

"Weather's got to be daimp to work tobacca," Houston "Nuddy" Clark observed, leaning over to use the straw-covered dirt floor as a spittoon. He gave his words a twist I remembered from girlhood, a soft-edged drawl now increasingly hard to find.

In the pale light from the barn's open door the scene could have been hanging in a museum. Nuddy, four of his grown children, and a friend, Thomas Murray, had set up an assembly line: Daughters Alice and Elva Doris picked off the trash (lower ragged leaves), son Ralph and Thomas helped Nuddy strip off large leaves, and son James yanked off the tips, then bundled stalks to be spread on pastures as fertilizer. Behind them rose stacks of the precious reddish brown leaves of high-quality burley.

"You're from around here. Cain't you do this?" Nuddy's blue eyes were teasing.

Eager to prove my heritage, I grabbed a gummy stalk. The leaves were like fine broadcloth, and the sharp odor stung my nostrils. Thirty years dropped away. I was again a child, watching wide-eyed as my grandparents, aunts, uncles, and cousins performed this same task in the same way.

Although Louisville-born, I spent childhood summers and holidays here in Green, Taylor, and Larue Counties, where my parents had grown up (map, page 529). Though we had finally left when I was barely in my teens, it was the warm memories of a fiercely self-reliant, albeit gentle people that evoked loyalties to family and to these hills even after I was transplanted to the foreign soil of Colorado and later Iowa.

I was now back home, looking for my roots, as they say these days, in the good red dirt of Green County. And I wished I hadn't been so quick to show off. But finally I managed, clumsily, to tie off one hand of tobacco under six pairs of smiling eyes. The girls assured me I'd done "jist fahn," and James politely changed the subject.

"You say you wont to be here when we hitch up them mules? You'll have to come back." His freckled face split in a wide grin. James is the eldest of Nuddy's five children, who range from 25 to 37, all still at home, a traditional family pattern in this region. He was referring to the team of rare cream-colored mules grazing on the hill behind the modern brick home. I asked him whether they used them because feed was cheaper than gasoline.

"Yeah, and because when you yell 'whoa' to a tractor, it won't stop," James explained.

It was too wet to hitch up the mules, but wanting to see them work—they are planters of corn and cultivators of tobacco—I promised to return another day and stay for dinner (at noon, of course).

I drove along the narrow roads that snake through forested hollows and across hills toward Greensburg to see how the old town had changed, and to try to sort out my feeling about this paradoxical pocket of civilization that has been home to my family since before Kentucky became a state in 1792. To me central Kentucky loosely means a strip from Louisville to the Tennessee line, bordered by the Bluegrass to the northeast and the Kentucky plains to the west. Between Muldraugh Hill—part of an ancient escarpment—and the treeless Barrens near Mammoth Cave lies a beautiful maze of knobs, hollows, hills, caves, and meadows proudly proclaimed to be central Kentucky—or the "heart of Kentucky"—by those who live here. A relatively unknown region of the state, the fastness of its geography and of its people is revealed in a local saying: You have to come here on purpose.

Purpose is what the central Kentuckians have plenty of. Stubbornly independent, resourceful, hardworking, they have built a solid economy while remaining free from

*DAUGHTER OF THE LAND: Alice Clark ties hands of burley tobacco, a native "weed" that accounts for half the earnings on predominantly family-size farms of 100 to 200 acres. With autumn's damp, growers turn to binding hands of cured leaves or, in a new technique, packaging leaves in bales.*

poverty, slums, and polluted air. Though steeped in religious and family traditions, they welcome newcomers. A simple, relaxed people, they are an unexpected meshing of past and present, inviting progress but not at the cost of old-time pleasures and values.

Central Kentuckians strongly resent their heartland's being confused with other regions of the state. "We are not like other Kentuckians," said Betty Jane Gorin, a Taylor County teacher and historical society president. "There is neither the old money here that settled in the Bluegrass, nor the dire poverty and political feuds you see in eastern Kentucky. We never had the racial problems of Louisville, and western Kentucky is like another state."

What sets the region apart in the eyes of its people is the way it has pulled itself up by its bootstraps in a few decades. Former county

extension agent John Ewing told me, "This country was hurtin' in 1940. We had very little except pride. It was lahk buildin' a house one brick at a tahm." Looking back to the 1950s, I could see that even then "this country" had barely entered the 20th century.

But now as I drove toward Greensburg along paved roads I remembered as mud lanes, or nonexistent, I saw cornfields and broad pastures dotted with cattle where I

*OLD-FASHIONED "FIXIN'S" make a morning's work worthwhile when three generations of Clarks gather for noon dinner, presided over by Maggie Clark. Five adjoining Clark farms cover 1,100 acres, including the 1785 homestead. Mrs. Clark's oldest sons flank her, George "Chunk" Clark on her right facing Houston "Nuddy" Clark. The families pitch in to work as a clan.*

remembered only worn-out soil thick with saw briers and sassafras. On land that had known only thickets and rocks, lawns grew, spacious homes had replaced humble cottages, and small industries sprouted.

On another day I turned down a lane outside Red Fern to see the farm of James Smith, my mother's double cousin. Here I had spent many happy summer days as a child, but again I felt like a stranger. New brick homes, new barns, and a modern milking parlor confronted me.

It was a warm July afternoon, and I found James indulging in the summer pastime—"settin' out in the front yard" of his new brick home. The 20th century notwithstanding, it is still apparent to most central Kentuckians that life was meant to be taken leisurely. Sitting in the middle of change, James at 70 was delightfully unchanged: Blue eyes still twinkled in an unlined face, and he teased in his melodious drawl as he did when I was a child and pestered him "with more questions than blackberries have got chiggers."

To my latest pesky question: What had been the big change here? he answered, "The roads. Whah, I remember when you couldn't hardly get outta this country. Two-ten wa'nt paved 'til nahnteen-forty. [That road became the region's major lifeline.] It was mostly mud, but years before they put rocks own it, big rocks. When your great-grandpa Perkins dahd in '28, I went to Luh-vuhl to bring back yore daddy and mother in a old T-model Ford that was force-fed [by gravity]. Ball Holler Hill was so steep that the old car wouldn't pull forward, so Emmett and Alice got out and I backed it over


*MORNING in the heartland: Limestone hills enfold forest and farm (**left**). Three core counties lie between Bluegrass horse farms to northeast, coalfields to northwest, and flatter land westward.*

the hill, over all them rocks," James chuckled. "That was some trip, taken all day."

Thinking of all the prosperous farms I'd seen, I asked James whether the change had also been as marked as it seemed.

"Lordy, yes," he declared. "Whah, this was pore country. Most of the land was plumb wore out."

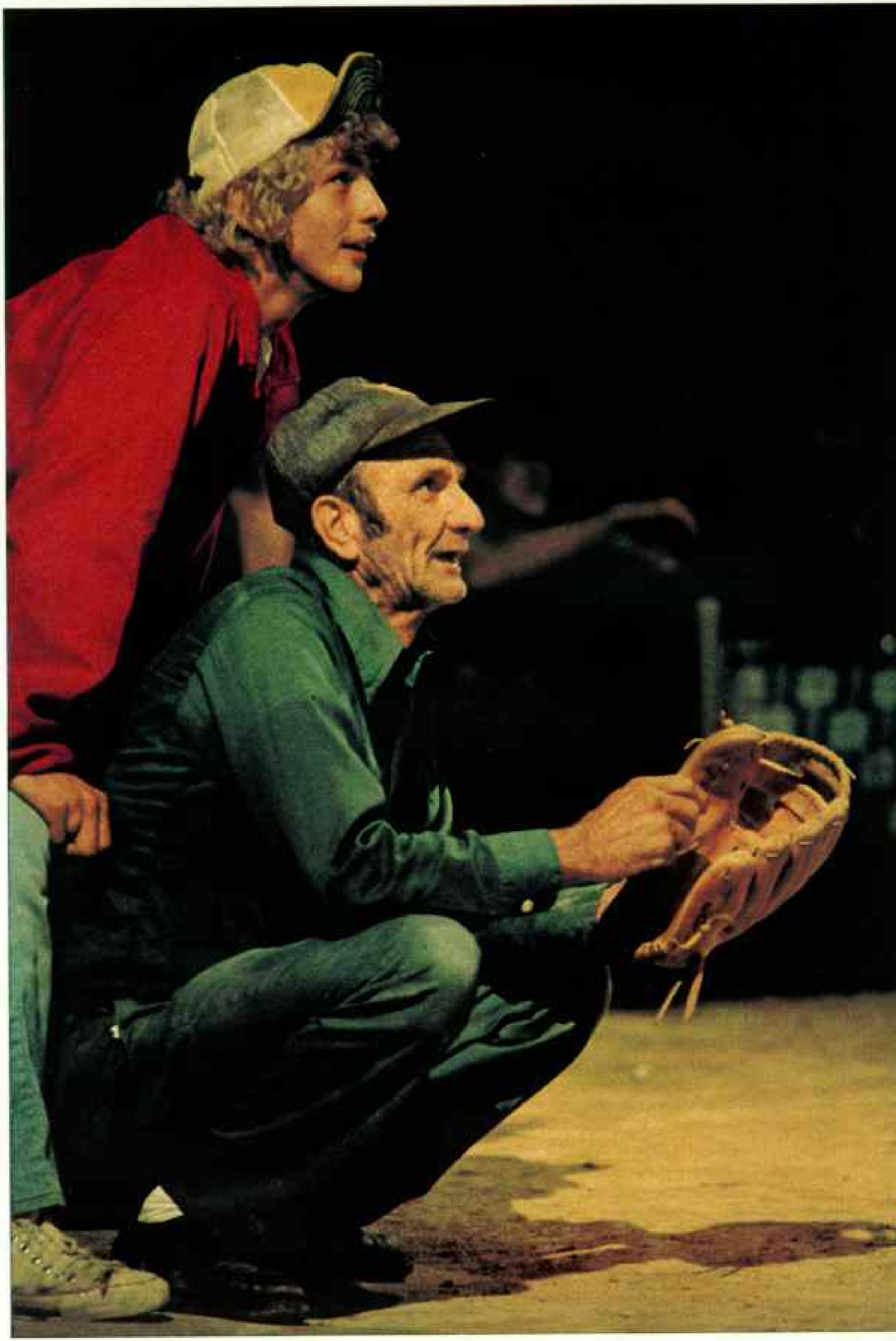
### Area Boasts Famous Near Natives

"Wore out" land, and bad roads that made getting produce to market too hard, prompted an exodus every few years from about 1820 into the 1950s. Mark Twain and Abraham Lincoln would have been called central Kentuckians, natives point out, had their parents not emigrated. Twain's parents moved before the birth of their famous son, but the future President was born near Hodgenville right in Larue (then Hardin) County and spent his first years here.

My own parents were among those who went to find work in the cities during the 1920s. When the Depression hit the cities hard, many returned.

Farm economy began a slow reversal about 1940. The U. S. government decided to subsidize the cost of fertilizer, and the University of Kentucky sent agents to instruct farmers in building up the eroded limestone land. But it was men like James Smith, stubborn men, who were determined to stay with the land, Depression or not, that made it work. "I stayed 'cause I lahked it, I reckon," James told me. "Neva' thought 'bout goin' nowheres else."

One early morning, as the sky above Red Fern turned a bright pink and the night



mists still lay in the hollows, I joined Mike Bland in the milking parlor of his grade A dairy. Mike was attaching milking machines to the first of 40 or so waiting Holsteins. The oldest operating dairy in Taylor County, which is among the state's top 20 dairy counties, this one had changed a bit since I sat on the fence and watched James Smith and his father-in-law milk by hand. Beginning as a sharecropper 47 years ago, James later bought the place now being purchased by stepsons Mike and J. T. Bland.

Like many farms around here, the Smith place is lived on by four generations. Tradition held that farms be handed down in the family. But, Mike said, "Now it's the *only* way a young farmer can get a start. With the cost of land and equipment, if your daddy don't own the farm, there's no way you can afford it."

Like farms, dairies are usually family owned and run, but they add up to big business. Dairies accounted for 10 percent of last year's statewide agricultural receipts.

I gazed out the door of the milking parlor toward the encroaching subdivisions that had replaced cornfields and the one-room schoolhouse I had often visited with my cousin Norma Jean Smith. Crops were being threatened by more than tobacco hornworms and rootworms, as Roger Blair confirmed when I visited his lovely old farmhouse in Saloma.

Making a sweeping gesture toward his fertile fields, he said, "If they don't stop using prime farmland for houses, the whole country's gonna be in trouble."

Roger, who farms with his father and brother, is concerned that Kentucky's land-use legislation leaves planning to the local jurisdictions. With rising property values (double what they were eight years ago), a retiring farmer who has no children to take over is often forced to sell to the highest bidder, usually a developer.

Roger, who is 26, is a native wood-carver whose work graces handmade dulcimers. He would rather spend more time sculpting and less farming. But to find a better market for his carving, he and wife Donna and young sons Ben and Andrew would have to move away. They don't think they can afford the risk. "We gross $15,000 a year on the farm, with the house and some food throwed in," Roger said. "Besides, I don't reckon we'd want to live anyplace else."

### Equal Opportunity More Than a Slogan

I was to hear that expression often. It was usually followed by "This is the land of opportunity."

Was it? Wondering how the only minority group, blacks, felt about opportunity, I went looking for H. R. Richardson, and found him on a sun-splashed Saturday morning dressed in a yellow jump suit ready to do some work around the house. As finely built as a poplar sapling, the articulate H. R., 59, is a high-school biology teacher and a member of Campbellsville's Housing Authority.

Like other blacks here (5 percent of central Kentucky's population), H. R. is descended from slaves but disclaims any bitter memories of discrimination. "Wherever different races exist, there has been discrimination, but here the dignity of man was manifested in daily actions, no matter what color he was," he told me.

What about schools and churches, only recently desegregated? H. R. smiled. "We always did like to do things our own way."

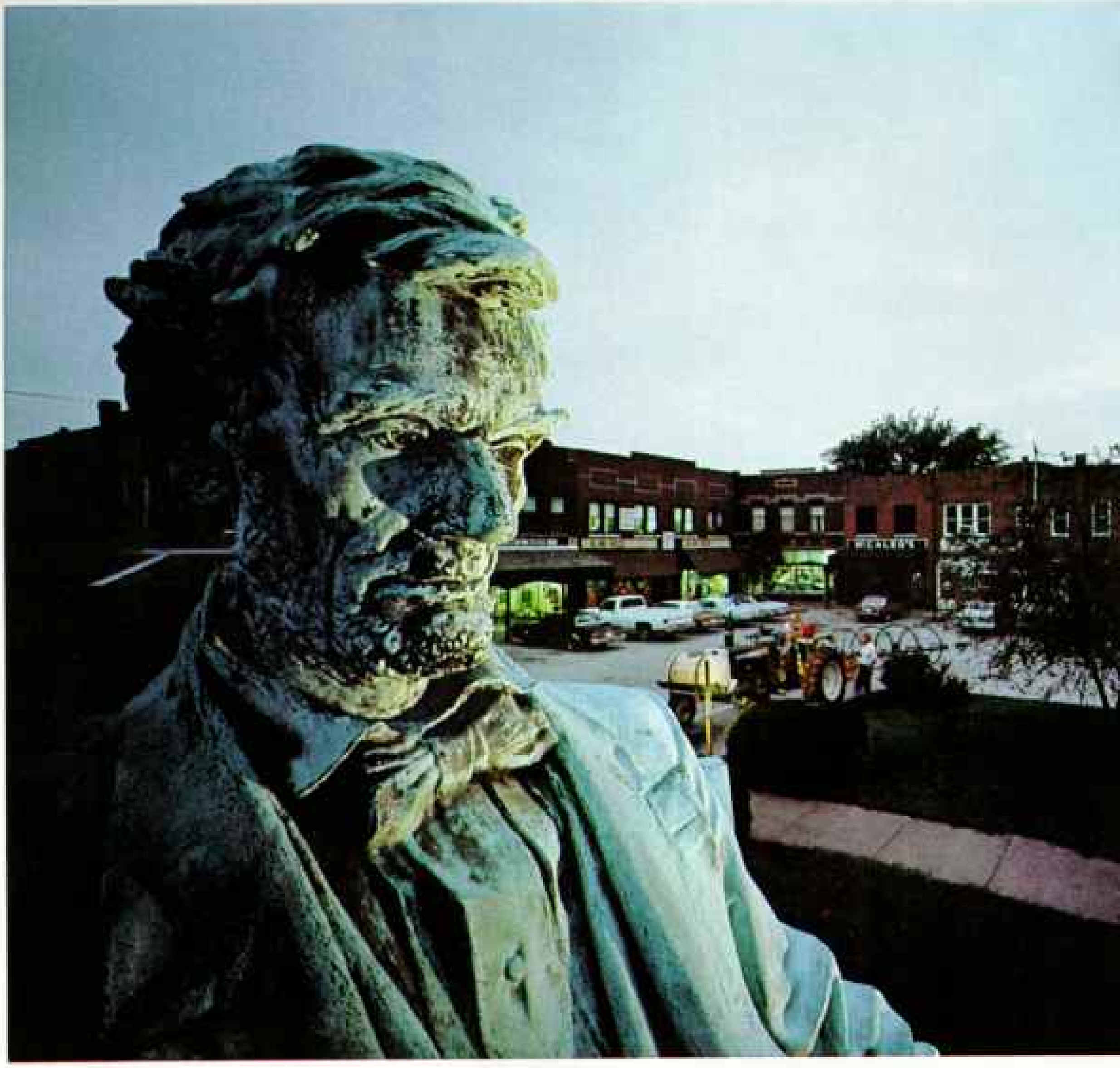
Some blacks feel that their "own way" meant better education for blacks when schools were segregated. "I reckon we had to mix the schools, but I don't think we ought to carry this mixin' too far," said 74-year-old Bessie Richardson, whom I had met earlier on a drizzly day in the country. She was no kin to H. R.

Bessie told me how her grandmother had nursed the baby of a white neighbor. "We only had whaht neighbors." When I repeated this to H. R., he said, "That's the way it was. We lived with whites, played with white children. Black people were

*THE BOYS FROM GRAB, a Green County hamlet, umpire and catch for their church team in a weeknight softball game against a bridge-building crew. Grab won. Social as well as spiritual centers in the primarily Baptist counties, 146 churches serve a population of 44,000.*

*SHORT WALK and a big step await Ellen Edwards—now Mrs. Nelson Blakeman—poised with her father, Brooks, at her front-yard wedding. It's summertime, and tobacco is high in Edwards's fields across from his home on Greensburg's outskirts. A large farmer by local standards, Edwards plants 55 acres under the all-important tobacco allotment that keeps burley production*

*controlled—and sometimes profitable. Son of a sharecropper, he owns or rents 2,500 acres of cropland and pasture for 800 brood cows, handles a large cattle-order business, and manages one of Greensburg's three tobacco warehouses. The agri-entrepreneur started when, on leaving the Marine Corps in 1951, he purchased 50 acres. He attributes success to "good friends, good credit, and hard work."*

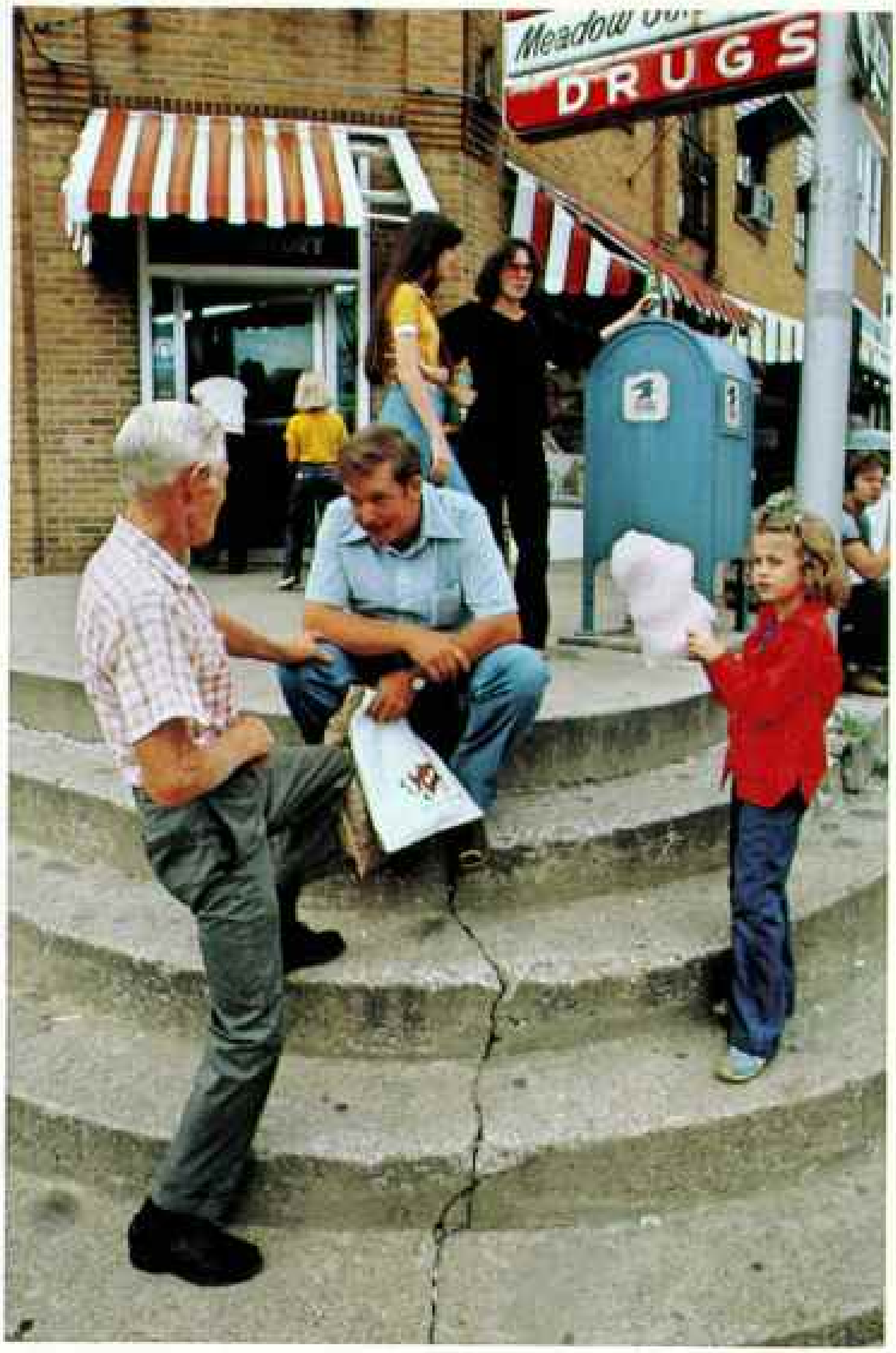


*ABE KEEPS WATCH in Hodgenville's town square (**above**), a few miles from his birthplace and a second boyhood home. Compatriots of his parents, from Virginia, North Carolina, and Pennsylvania, peopled the game-rich hills in the late 18th and early 19th centuries; their descendants number in the majority today. A sense of belonging brings strollers and jaw-waggers to a corner in downtown Greensburg (**right**). An early river port, railhead, and industrial town, the Green County seat now quietly serves the needs of the surrounding agricultural community.*

encouraged to own their own land and to get an education."

One of the first blacks admitted to the University of Kentucky in Lexington, in 1949, H. R. did graduate work at Michigan State. He passed up a chance for a teaching position there and came home. He reminded me that another black, Clem Haskins, local basketball hero who has played for the Phoenix Suns, Chicago Bulls, and Washington Bullets, had just become coach at Western Kentucky University, "as close to home as he can get."

H. R.'s eldest son, Tadarro, was president of his high-school class for four years. Now a physician in Lexington, he plans to follow the beaten path back home to set up




practice. Unlike most of rural America, central Kentucky keeps its young people: Taylor County 70 percent, I learned from local authorities, and Green and Larue Counties better than 50 percent.

One reason is that family roots run as deep as springwater here. Traditionally the family and church have been the fulcrums of life in both urban and rural communities. The practice of marrying someone in the same neighborhood continues. Most social events still revolve around a wedding, funeral, church homecoming, or a church athletic league game. And everyone has known everyone else's family for generations.

"But it's more than that," said Brian Rattliff, between terms at the University of Virginia Law School. "When I finish, I'm comin' back because I like the laid-back atmosphere. I prefer to practice where instead of 'I object, Your Honor,' I can say, 'Now Your Honor, that jist ain't raht.'"

About half the students in a sophomore biology class at Campbellsville High disagreed. They couldn't wait to leave. The other half felt like Susan Burress. She had actually left, had stayed away two years. Then she came home, to complete studies at Campbellsville College, and, at 25, was beginning work at the University of Kentucky Medical School.

"This is the friendliest place in the world," she told me emphatically. "Everyone is *somebody* here."

*SHOW AND TELL: A young visitor draws the attention of her mother's fellow seamstresses among the 3,000 sewing machines of Union Underwear's Campbellsville plant, the area's largest employer. Three out of four of 4,300 workers are women, drawn from a 40-mile radius. Campbellsville leads in population, also providing jobs through numerous small businesses. "We're kind of an uptown little town," says Union's factory manager John Waldrop.*

This attachment to the region infects transplants as well. Ginny Flanagan, the director of public relations at Campbellsville College, and her husband, Danny, vice president of student life, were outlanders from Pulaski and Russell Counties who turned down better paying positions elsewhere because they liked the life here.

"American values are alive and well here," Ginny said. "The family is the most important institution, the church a close second. The work ethic is strong, and everyone is friendly. You can be anything here—eccentric, poor, rich—and everyone accepts you. Security is not in fine cars and homes, but in the maintenance of these values."

### Newcomers Grow Modern Moonshine

Many back-to-the-simple-life young people found their way here during the campus unrest of the early 1970s. Jim Green and Steve Cobb, now thirtyish, settled with their families in Mannsville. "Land was cheap, and there was freedom," Steve told me. He is a farmer today, and Jim, a carpenter, lives happily on odd jobs. Natives accepted the newcomers easily.

In "Hippy Holler," near Mannsville, one recent arrival raised his own marijuana, and the idea was picked up by local entrepreneurs. Soon the "weed" was sprouting between rows of corn and tobacco, and police helicopters were hunting it where they once hunted stills.

One 24-year-old resident was caught raising an acre of the stuff. "I planned to make a quarter of a million. But I wished I would'na done it," he said. "My dad had to pay a fine because it was on his property. He was so mad he'd probably run me off if he didn't need me to help on the farm." The young man served a 3½-month jail term.

Green County Sheriff Elam Perkins claims that marijuana farming has been

stamped out; others say it's here to stay. It's disturbingly in line with those old attitudes of self-reliance cultivated by the early settlers and carried on by their descendants.

To the Indians and French trappers, self-reliance was the best means of survival. The "long hunters," who first came here from North Carolina about 1769, saw not only survival but also promise in this land rich in timber, water, and game. They took so many hides in one autumn—about 2,300 deerskins alone—that they had to build a skin house to store them. They went home to get their families, gave up their long hunts for short hunts, and settled mostly into a life of farming and trapping. Fast on their heels came veterans of the Revolutionary War, holding land grants. They poured through Cumberland Gap and down the Cumberland Trace looking for unclaimed territory, and they found it here.

Dr. Richard Allen Sanders, whose family "has been here from the beginning," credits the early isolated wilderness life with today's economic success and family strength. "We made what we had to have. We produced our own doctors, lawyers, dentists, and craftsmen, because, unlike in the West, none ever came this way."

This self-reliance produced an obstinate pride that still rejects any hint of meddling. "When people want to do somethin' here, we don't borra' from the gova'ment," Gibbs Layton told me. At past 80, he is still active in the Campbellsville Chamber of Commerce. "When we wanted to build a hospital, the state wanted to tell us what to do and how to do it, so we voted a hospital tax and did it the way *we* wanted to."

### Underwear Holds Down Unemployment

When Gibbs came here in 1932, Campbellsville, the Taylor County seat, had a population of 1,600. Now 8,700 live in the flourishing town, and 5,000 nearby. Gibbs credits much of the growth to industries that make compressors, screws, clothing, furniture, caskets, and church steeples.

Green and Taylor Counties had an unemployment rate of only 5.7 percent last year during the recession, thanks mainly to "the factory." Sprawling at Campbellsville's edge, Union Underwear employs 4,300, 3,380 of them women. It is by far the area's largest industry. Opened in 1948 with five employees, it now has a monthly payroll of four million dollars, which helps a lot of families keep their small farms.

William E. Baxter, executive vice president of Union Underwear, said, "Our employees enjoy benefits unmatched in the textile industry. We try to stay three steps ahead of the unions and OSHA [Occupational Safety and Health Administration]." Which may be why all efforts to unionize have failed.

Many small industries, employing from 10 to 200, have sprouted up like blackberry brambles. Probably the oldest, McMahan Furniture makes antique reproductions from local solid cherry, in the same style as the originals were made 200 years ago. The furniture is used in homes and also in motels, as it was in the inns of the 18th century.

Thomas McMahan, Sr., launched this industry 38 years ago and his son now runs it, under constant pressure to expand—which he successfully resists. "If I did that," he says, "it would cut down own mah huntin' and fishin' tahm. Besahds, the handmade quality would be lost."

### Geology Provides Spelunker Paradise

McMahan's Kentucky cherry is hand-picked, too, mostly from woodlots, fencerows, and sinkholes. Trees thrive in the moist sinkholes, or sinks, deep depressions where underground streams have dissolved away the limestone. There are more than 10,000 sinks in this ancient eroded rump of a plateau. They are related to the hundreds of caves that also honeycomb the landscape, including the 215 miles of mapped passages in Mammoth Cave National Park.

The cave's cathedral-size chambers and broad, vaulted galleries were formed over the past several million years by seepage that feeds the Green River. The now placid old river, once given to rampages that destroyed thousands of acres of crops each year, has been dammed, creating the huge Green River Lake. People displaced by the dam a dozen years ago still curse it, while those downstream praise it every time they put in a crop.

On a hot July day I canoed down this once noble, now drought-shallow waterway, to be startled by the disfigurement that years of

consumerism had worked. Along treelined bluffs leaping up sharply from the water's edge, disposable diapers hung from giant trees in a burlesque of Spanish moss. Discarded washing machines, TVs, sofas, a stainless-steel tank from a milk truck made the scenic route into a nightmarish jungle of failed technology.

"Dumping is the number one problem," said Russell Lowe, Green County agricultural agent. "People are becoming more aware of environmental problems, but bad habits still prevail. We have a new landfill, but some people won't drive 40 miles round trip to dump."

It was hard to imagine the dynamic force the river had once been. By 1798, 300 flatboats each carrying 20 hogsheads of tobacco were leaving the port of Greensburgh (formerly Glover's Station, now Greensburg) to float down to New Orleans. Beginning in the mid-1800s, millions of logs were taken down the Green to towns along the Ohio and Mississippi. Pig iron, lime, hog meat—and slaves—traveled the same route.

"That's where the expression 'sold down the river' comes from," Sam Moore told me. Sam, 70, is a farmer whose passion is central Kentucky history and geology. He tells the tale of how, in 1792, Greensburgh lost out to Frankfort to be named state capital—by one vote.

I was sitting with Sam and his family on the screened veranda that stretched across the front of their gracious old home at Clover Lick Farm, just outside Greensburg. The old ceiling fan turned, ice tea with fresh mint appeared in frosted glasses, and Sam was telling one of his famous anecdotes: "Easy to get lost around here. Best directions I know of is the fella told a visitor, 'Best way I know to get there is to go to the end a' the road and turn around. When you come back, it's the second house own the right.' "

Few locals would need such directions to the Moore family enclave. Sam's grandfather spent 68 years in this same spot. His wife, Lib, grew up just down the road. Daughter Mary Ann and family live next door, and son Sam lives just up the hill. That's typical extended family life here.

"People just don't leave," Sam said. "And if they do, they often come back. Take the old fella who bought a train ticket from Greensburg to Whitewood. He got off there and walked 15 mahls back to Fry Ridge and said, 'If the world's as big the other direction as it is that one, it shore is a big place.' "

When Lib asked from the kitchen if we wanted supper, Sam prompted me with a reply I hadn't heard since I was a child, "If you're offered somethin' and want it, you say, 'I ain't carin' ' because that means yes." I called back, "I ain't carin'."

### The Oil Will Rise Again

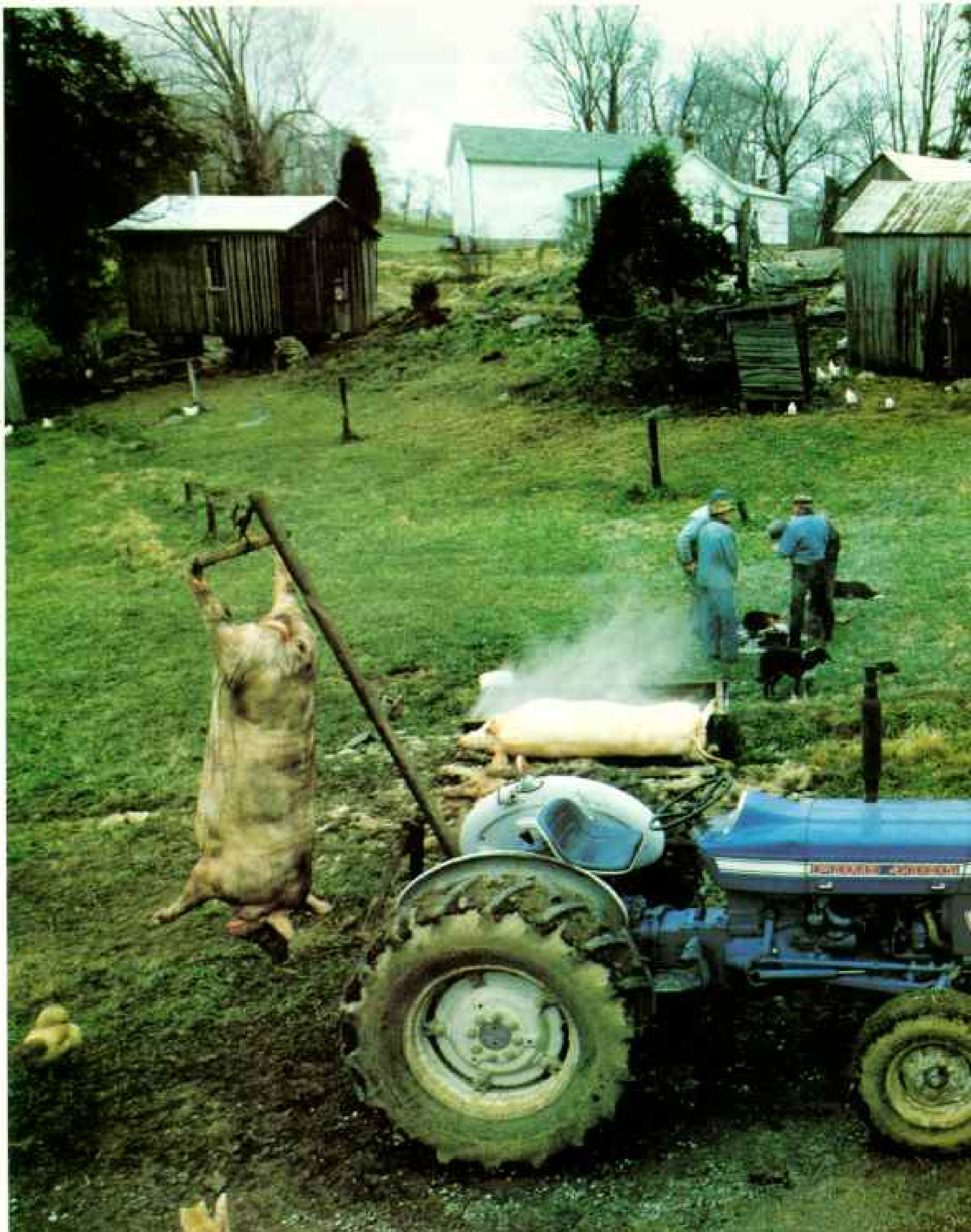
I drove into Greensburg, a homey town of 2,400, a few mornings later just as daily activities began at the courthouse—checker games, knife and tale swapping, and "jist settin'." Enormous tobacco warehouses and antebellum homes and buildings on the historical register dominate the townscape.

The old limestone courthouse, finished in 1804, oldest west of the Alleghenies and the "only visible sign of the law in 75 mahls when it was built," according to Sam Moore, graces the main square. It was all just as it had been when I went into town to shop with my grandmother. Despite inflation, at the famous café around the corner I could still have country ham, fried apples, scalloped bell peppers, salad, tiny biscuits, and all the coffee I wanted for $3.25.

Lorene Edwards's Kozy Korner is famous not only for its food but also for the oilmen who ate and schemed there. During the oil boom of the late 1950s and early '60s, the town's population exploded to 3,000. "I used to ask them to go somewhere else, but they wouldn't." Lorene shook her head. After a few meals I understood why she couldn't run them off.

"A lot of dreams and plans were discussed around these tables," said oilman Gene D. Manno, who was raised in a monastery in

*CROWNING ADDITION for a church in New Jersey travels back roads from the I. T. Verdin Company's steeple works, one of two aluminum steeple makers in Campbellsville. Improved roads in the 1930s and '40s opened the way for homegrown businesses as well as outside employers.*



"MAKIN' BACON" is an annual rite when December frosts set in on the Clark family enclave. The Clarks visit each of their farms in turn, butchering hogs through a procedure that, except for the welcome addition of tractors, is as old as ham. Animals are slaughtered, then scalded in a steaming vat to loosen hair for scraping. Hung from the tractors' lifts, the hogs are gutted,

*then cut into portions, background right. Men grind sausage and women trim fat for lard in the shed at left. Hams and bacons are salt cured in smokehouses; cold weather provides essential refrigeration. Clark hams are prized by neighbors who might smile at Chunk's modesty: "We Clarks hold our own. We started with nothin', and we've done a pretty good job of keepin' it."*

Italy, then returned to Chicago and became an accountant.

"In 1959, the peak year, nine and a half million barrels were taken from Green County wells that ran no deeper than 550 feet," Gene said. "Twenty million barrels have been taken out of this area, second in quality only to Pennsylvania crude. But"—he slapped the table, his black brows going up and down—"there's still 40 or 50 million barrels in this one nine-by-two-mile stretch—and I've spent a small fortune to find that out."

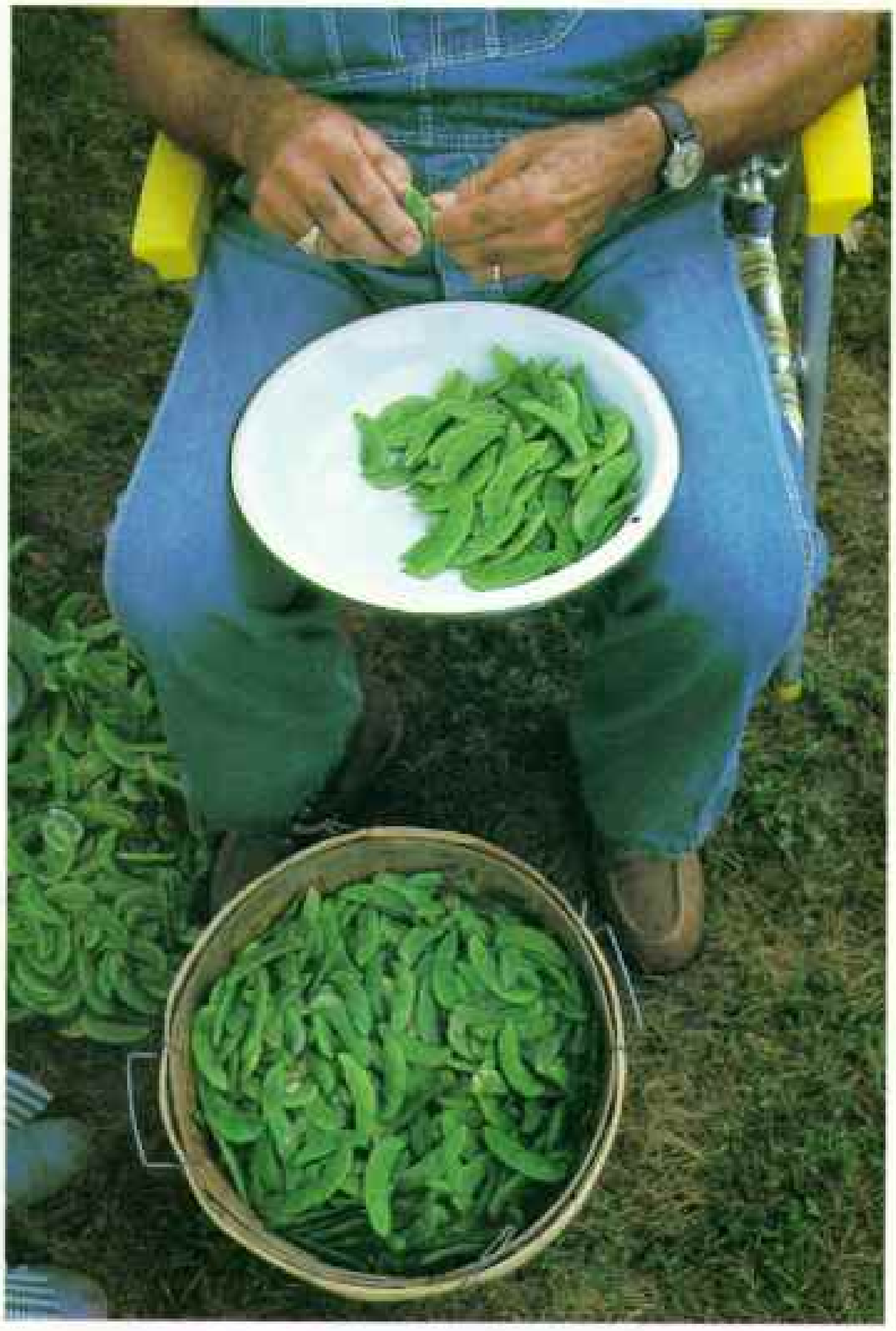
The problem is to get the oil economically. In this shallow field there is little subterranean pressure, and the solutions authorized by state and federal governments are too expensive for today's market.

"New laws and regulations have put the little man out of business," said Gene, a Green Countian for 22 years. He thinks the farmers should organize to approach big producers. But the big producers can get oil cheaper in the Middle East—and farmers are suspicious of big corporations anyhow.

Gene has sold out, though many of his wells are still pumping. "But I'll keep my home base here. Once these great people get their hooks into you, they don't let go."

### Land Retains Sense of Timelessness

Neither could I let go. I drove past the red dirt lane that turns into my grandfather's old farm. It's still called the "old Jeff Brewer place," though my grandfather died more than 50 years ago, a decade before I was born. Its 150 acres are now grown up in thickets, but it's still a living place in the



minds of the people here. They talk about yesterday as if there were no intervening dates of "born" and "died." Time's passage through these hills is as unnoticed as the countless springs, creeks, and rivers that carved this ancient eroded land, old as the birthday of the Appalachians.

Down through a sweet-smelling hollow, across the creek and along another lane, I found the old Zion Church. Small, beautifully tended churches punctuate nearly every creek and grove. Green and Taylor Counties have 113 churches—for 32,000 people. But with membership around 80 percent, they need that many.

Fundamentalist religion is a tie that binds life together. It tolerates no argument. When I pointed out to adherents that some of their ministers had been famous moonshiners, in

*HOMEGROWN BUTTER BEANS head for the pot (**above**); dinner is what the land brings forth for a people rooted in traditions of self-sufficiency. Nuddy Clark and son James wheel a two-row corn planter (**left**) toward mules that Nuddy uses for much of his field work. "Mules don't pack the ground like a tractor," Nuddy says. He also happens to like mules.*

*Nuddy's Uncle Jimmat, 84, remembers destructive practices that denuded vast tracts of prime land before conservation techniques, new grasses, and fertilizer restored the soil in recent decades. "They'd clear a patch of woods, fence it, wear it out, and clear another."*

counties primarily made dry by fundamentalism, they told me, "It was a matter of temperance, not of abstinence." Besides, it was the practical way to get the corn out of this roadless territory.

Zion Church is Separate Baptist, a small sect whose adherents are mostly in Kentucky. Wandering about the clearing, I could still see my Grandpa Bonta, a lay preacher, standing tall behind the pulpit, his white hair flying and mustache bristling, as he thundered out the message of God.

It was growing late when I left. Night doesn't fall in the hills and hollows of central Kentucky. It rises from the depressions and clefts of mother earth, smudges contours and outlines, cloaks the hills in dark velvet, and reaches to embrace the luminous sky.

At the southern edge of Larue County, in the rising night, I honked the horn as I passed the home of Garlen and Sadie Skaggs. Just farther on I stopped to see

*QUEEN FOR A YEAR, Cynthia Stearman, with escort Joey Houk, prepares to pass her title as Green County High School homecoming queen to her successor. Cynthia and Joey are now engaged; she hopes to earn a nursing degree from Eastern Kentucky University, while Joey, a craftsman at Greensburg Manufacturing Company, lives on the family dairy he may someday take over. Here in Green County, as in Larue, more than half of the young people settle in the area. In Taylor County an astonishing 70 percent remain, although many commute to jobs in Louisville, Lexington, and Bowling Green. Most small farm households, caught in today's agricultural price squeeze, rely partly on income from full- or part-time jobs outside the farm. From far-reaching parts of the country, urban admirers of the region's easygoing hospitality and hardworking ways have migrated here, some to retire, others to raise families where family comes first.*

Sadie's parents, Katie and Willie Sprowles. Katie demonstrated that I was related to her by three different branches; Willie showed me pictures of his Simmental cattle "somewheres from over the water [Switzerland]."

"Here is the cow," Willie said, handing me a photo, "and here is the male cow." "Simmental Bull" was written on the photo, but Willie keeps to the old gallantry that forbids certain words in the presence of a lady.

Around the curves, past Levelwood Church, is the home of their granddaughter, Elvon Skaggs, and her husband, Randall. Three generations in as many miles. Elvon is a Skaggs who married a Skaggs, and Randall Skaggs's family had married other Skaggses several times. It all makes sense when you realize that four of those long-ago long hunters were the Skaggs brothers.

Following a spooky dirt road, I found Elvon waiting in a clearing, eager to show me the farm. She told me that Randall's six

*"SETTIN' OUT" on a summer afternoon, a farmer and his wife catch the breeze. Weatherboarding on the house covers an original two-story log cabin, built on a homestead around 1800. Glispia Leach, local log-cabin expert, believes there are "more standing log structures here than anywhere else in the country," a legacy of pioneer beginnings.*

years in military service had taken them to Hawaii and Colorado; then they had returned to buy the run-down farm next to Randall's homeplace. Randall clears a bit as he can, since both work at full-time jobs, but eventually the farm will be paid for.

Why had they returned? Elvon smiled and looked off into the distance. "I don't know. There's somethin' about these hills."

Beyond the pasture, white mists were rising from Otter Creek. The sun was like a flaming ball falling into the hollow. The tobacco patch was tall and clean. I watched the expression in Randall's eyes as he dreamed about the future of "these hills," and that hardy self-reliance of those early Skaggses came to mind. I recalled a remark by Taylor County agriculture extension agent Jim Perkins: "The amounts of fertilizer have changed and the tractors have changed, but the people haven't."

That was apparent back at Red Fern where the "bluegrass singin' " at the James Smiths' had begun. All kinds of central Kentuckians were sharing in the old-time fun: the tenant farmer and his wife, the mayor of Campbellsville and his family, a preacher or two, and some Hippy Holler folk.

As I hummed along on the old tunes, dairyman Mike Bland caught my eye, "You ready to move back home?"

"I reckon I jist ain't carin'," I answered, and thought that maybe, just maybe, coming here on purpose, to write this story, wasn't such a bad idea.

*Kentucky, you are the dearest land outside of heaven to me.*
*Kentucky, your laurel and your redbud trees.*
*When I die, I want to rest upon a graceful mountain so high,*
*For that is where God will look for me.*

—"KENTUCKY," BY CARL DAVIS.

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TRACY LYNCH

# Tracking the clown of the desert

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"It was love at first sight," Bruce recalls. "He offered me a twig, then came back later with a cigarette butt and perched on my camera case." As sometimes occurs with wild animals, the bird apparently had been around humans before. "He seemed fond of me," Bruce said, "and I returned the feeling. He was the first roadrunner I ever met, and he was so photogenic and cooperative."

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*Use EPA est mpg for comparison. Your mileage may vary depending on speed, weather and trip length. Actual highway mileage will probably be less. Calif. ests. vary. **Sticker prices exclude taxes and destination charges. NSW $38 extra on Aries K, Omni Miser and 024 Miser. Deluxe wheel covers $53 extra on Aries Coupe and Sedan.

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Even if you have insurance on your own life, you could be leaving your wife and children only half protected.

Here's what often happens: Upon the husband's death, a wife receives the proceeds of his Whole Life Policy. Now she should have insurance on her own life as new head of the family. However, she may not want to spend that money now. Or she may find insurance unaffordable because of her age, or unavailable because of her health. She's uninsured and the children now are unprotected.

But Metropolitan and you can keep that from happening to your wife.

Metropolitan is introducing a "Surviving Spouse" rider available with our Whole Life *Plus* policy. So your wife would not only get the full proceeds of your policy, she would then automatically receive term coverage on her own life equal to what you had on yours. She would have that coverage until age 65, at no extra cost to her and regardless of her state of health. It makes good sense.

You can take this step for only about $15 a year, plus a premium of generally less than a dollar for each thousand dollars of term coverage.

Why not call a professional Metropolitan representative soon. Let Metropolitan make sure that your wife is better prepared than most.

Metropolitan Insurance Companies

## METROPOLITAN REALLY STANDS BY YOU.

Life/Health/Auto/Home/Retirement

# Members Forum

## WOLSTENHOLME TOWNE

Ivor Noel Hume and his article "New Clues to an Old Mystery" (January 1982) reaffirm the close kinship of diligent detective work and archaeology. Who would have expected a small 17th-century English settlement in the New World to share similar practices with a 20th-century village in Turkey or Pakistan?

Paul F. Warms
Buffalo, New York

I find myself puzzled over the conclusion reached by Mr. Noël Hume that "Granny" was scalped. I thought scholars were in agreement that scalping was a European practice, introduced to the Indians during the French and Indian War. Is there, in fact, evidence to support Indian practice of scalping as early as 1622?

Diana Jeanne Haugh
Red Lion, Pennsylvania

*The theory that scalping was introduced to the Indians by Europeans has generally been discarded. Capt. John Smith reported that the Powhatan Indians of the Virginia Tidewater area took hair. Mr. Noël Hume discusses this subject in his book "Martin's Hundred," published this spring by Alfred A. Knopf, Inc.*

On page 77 you nicely reproduced the holograph of John Bishopp and took the unwarranted liberty of bringing Exceter into the present Exeter without bringing Gonner forward in like manner to today's Gunner.

Joe Wickenden
Wenatchee, Washington

I was struck by your trouble interpreting the message in the lead found among Martin's Hundred's artifacts. It is no message as such. It is the stamp of the inspector, or conner.

Mac McCrory
Berkeley, California

*The author has received dozens of letters speculating on the inscription. He and his staff had considered both "gunner" and "conner" as distinct possibilities, but further research is necessary to resolve the mystery.*

## BERLIN

The January 1982 article about the Two Berlins is excellent, pointing out the significant differences and the fact that today's Berlin is really two cities. The erection of the Wall helped West Berlin as much as it did the East. One probably has to be born and grow up in Berlin to understand this rather strange kind of attitude.

Sebastian J. Rechenberger
West Berlin, Germany

The picture on the cover had the effect of glorifying that goose-stepping symbol of repression. My first impulse was to rip the cover off.

E. Parker Severson
Los Angeles, California

Never did I expect to read in your good and proper publication such an ungrammatic statement: "In the district of Köpenick, a million and a half children a year glory. . . ." What does a half child look like? The statement would have been more nearly correct if it had read: "one and a half million children."

Harold A. Gangloff
Seabrook, Maryland

*You're half right. Strict grammarians would agree with you, but our author's usage is now widely accepted as clear and unambiguous.*

## FROG-EATING BAT

Mr. Tuttle's article on the frog-eating bat (January 1982) was fascinating. Does he know that the NATIONAL GEOGRAPHIC once published an article on a bat-eating frog?

Walter Poor
Great Mills, Maryland

*Your memory is omnivorous. "A Frog That Eats Bats and Snakes" appeared in the May 1938 NATIONAL GEOGRAPHIC. It told of the voracious smoky jungle frog, Leptodactylus pentadactylus, also a denizen of Panama.*

## TAIWAN

One can say what one will about Taiwan (January 1982), but one thing is clear: It resembles Israel, Yugoslavia, Sweden—nations that wish to rely only on their own resources for defense and basic industry. The article was a timely reminder of how some nations can do much with very little.

Frank W. Goheen
Camas, Washington

The article is an unusually fair report. However, there are several points that need to be made. The political system on Taiwan may not be as democratic as some of the Western countries, but the Nationalist Chinese have come a long way. Remember that China has been a totalitarian country for more than 3,000 years. The Chinese Communists have driven the economy backward at least 50 years since they took over the Chinese mainland.

Allen W. Chen
Bellevue, Washington

Those parading girls are not air force cadets. They belong to the Quemoy-Matsu Self-Defense Force, which consists of civilians trained as militiamen on the two tiny islands within sight of Fukien Province in southeastern China.

Wei C. Cheng
State College, Pennsylvania

*Several others have pointed out that these are not air force cadets, although women serve in Taiwan's air force. The women shown are indeed in the Quemoy-Matsu Self-Defense Force.*

## ACID RAIN

I wonder whether any other old-time chemists were astonished to read (November 1981) that sulfur dioxide from burning sulfur forms sulfuric acid with moist air. Surely I remember being taught in high school 55 years ago that $SO_3$ plus water, $H_2O$, yields $H_2SO_3$, which is sulfurous acid, a far weaker, far less corrosive, far less hazardous compound.

Lyman W. White
Gainesville, Georgia

*As a note in the article indicates, scientists do not completely understand the complex processes by which acid rain is formed in the atmosphere, but they agree that it is sulfuric acid, $H_2SO_4$ (in conjunction with nitric acid), that is the problem.*

From one smokestack: 2,500 tons of sulfur and nitrogen oxides per day. What a terrible waste of fertilizer. If this smoke were united with ammonia gas, 10,000 tons of valuable plant food could be manufactured each day. Why can't our chemical engineers solve this seemingly easy problem?

Harold A. Sheldon
Tampa, Florida

Several companies are working with processes to reduce pollutants in coal, including the acid content from sulfur. A process called solvent-refined coal refines coal in its raw state to remove impurities before it is burned.

Charles B. Jones
Atlanta, Georgia

## ZIMBABWE

The author emphatically states that Great Zimbabwe (November 1981) was built by the Shonas. It is generally accepted as being of unknown origin. The Shonas have never built in stone and to this day have no such architecture.

Georg Adams
Duchesne, Utah

*The most up-to-date scholarly works support the belief that Great Zimbabwe is a Shona ruin, built during a high point of Shona culture.*

## POKOT PEOPLE

I liked Elizabeth L. Meyerhoff's "The Threatened Ways of Kenya's Pokot People" in your January 1982 issue. I agree with the author when she says, "I only hope that modernization will be carried through with an understanding of, and sensitivity to, Pokot beliefs and values."

Bob Mallya, M.D.
Nepean, Ontario

One thing I have noted over the past two decades, and have been especially impressed by, is the number of articles in your magazine by women. How wonderful it is to see such a well-established social institution as the National Geographic Society support so many female scientists, field researchers, and photographers, without motives based on either favoritism or apologetics.

Francis Baumli
National Board of Advisors to the Institute for Advanced Philosophic Research
Columbia, Missouri

## GEOGRAPHIC STYLE

Although I continue to hold your publication in high esteem, I consider your articles, of late, overelaborated, sophisticated, and stereotyped journalism. Please give us more personal identification with the people we meet and places we visit. We need more earthy stories that "stop to smell the flowers." Mankind has not too many channels of continuing education available to him that we can easily give up an institution like yours to sophistication.

George L. Sceblo
Boynton Beach, Florida

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

THE BUSINESS AIRPLANE REPORTS
NUMBER SIX IN A SERIES

OF DISCUSSIONS WITH EXECUTIVES
ABOUT TO BUY AN AIRPLANE

6

# HOW TO CALCULATE THE REAL COSTS OF AIRPLANE OWNERSHIP: PURCHASE PRICE, DEPRECIATION, TAX CREDITS.

*If the key people in your company are traveling more than 300 hours a year, a company airplane could save you some real time and money.*

*Especially now that recent Federal tax legislation and investment incentives have made the actual costs of ownership the lowest they've been in years.*

## THE TAX ADVANTAGES OF BUSINESS AIRPLANES.

*Thanks to the major tax reform measures enacted by Congress during the past year, business depreciation schedules have been streamlined to permit accelerated write-offs of capital equipment.*

*In the case of business aircraft, the new schedule allows a company to completely write off its investment to a zero residual value in just five years.*

*In addition, Congress has reduced to five years the length of time required to justify the full 10 percent investment tax credit on airplanes and other major capital investments, (while lessening the tax recapture provisions for investments held less than five years.) The net result: A direct reduction in corporate income taxes and, thus, an effective decrease in the real cost of aircraft ownership.*

*For example, let's assume you're considering a jetprop like the Beechcraft King Air F90 shown here. To illustrate the tax benefits of ownership we'll also assume: (1) that your company's taxable income is subject to a 50% Federal and State tax rate, (2) that the purchase price of your King Air is $1,488,000 (which includes average optional equipment), and (3) that you elect to depreciate the airplane over five years using the new accelerated cost recovery system. Your tax savings might look something like this:*

| Year | Depreciable Base | Depreciation Rate | Depreciation Expense | Tax Savings |
|---|---|---|---|---|
| 1 | $1,488,000 | 15% | $223,200 | $111,600 |
| 2 | | 22% | 327,360 | 163,680 |
| 3 | | 21% | 312,480 | 156,240 |
| 4 | | 21% | 312,480 | 156,240 |
| 5 | | 21% | 312,480 | 156,240 |
| TOTALS | | | $1,488,000 | $744,000 |

*As you can see, the tax savings on depreciation alone are enough to reduce the actual cost of the airplane to half of its original purchase price. And when the added savings of the 10% investment tax credit, the interest expenses on the amount financed, and the various deductible expenses related to operational costs are figured into the total, your capital recovery from tax allowances can reduce the bottom line even more significantly.*

*What's more, since the biggest share of these savings accrues in the first years of ownership, your cash flow gets plenty of help right up front.*

*Of course, your actual tax situation may vary considerably from the sample used here. So consult your accountant or tax advisor for specific information on the tax options available to you.*

## MORE FACTS FOR THE ASKING.

*If you'd like to know more about the advantages of putting a Beechcraft to work for your company, we've assembled a free and comprehensive portfolio of Business Airplane Reports. To receive yours, simply write on your letterhead to: Beech Aircraft Corporation, Dept. A6, Wichita, Kansas 67201. If you'd rather call, phone collect and ask for Del Chitwood: 316-681-8219.*

50 YEARS
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1932-1982

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# Do you know what your body knows about vitamin C?

**Cut your arm. Burn your hand. Break a leg.**
None of these will heal properly without adequate vitamin C along with other essential nutrients. Nor will severe bruises or wounds heal properly.

**Sore throat. Earache. High fever.**
All can begin with an infection that overwhelms your body's natural defenses. Vitamin C, along with other essential nutrients,optimizes your body's natural capacity to resist illness and helps keep your tissues healthy.

**Up tight or up in smoke.**
With both acute stress and heavy cigarette smoking, the plasma levels of vitamin C in your blood may be lowered. So, you could be robbing your body of this essential vitamin without even knowing it.

**Up your iron.**
Vitamin C increases your body's ability to absorb iron from food when they are taken together. Iron is the most common deficiency in the diet, and may be related to a loss of energy.

There are many reasons why your body needs an adequate intake of vitamin C. Yet your body doesn't make it. Vitamin C must come from food or vitamin supplements. So, eat a balanced diet. You can also look for fortified foods when you shop or take a supplement containing vitamin C every day just to be sure.
Vitamin Communications, Hoffmann-La Roche Inc., Nutley, N.J. 07110

**Vitamins. Something you can do for your health.**

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# Producing stronger, lighter steels for fuel-efficient cars.

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For example, we now produce 78 high-strength sheet steels used to make automotive parts. And we've just committed $70 million for an advanced technology, continuous heat-treating line to produce even more sophisticated high-strength steels.

Bethlehem Steel and America's automakers: on the move...to compete successfully...now and in the years ahead.

**Bethlehem**

Bethlehem Steel Corp., Bethlehem, PA 18016

# Everything fits beautifully. Including you.

Hardly looks like a small car, does it?

That's because what it is, is a small Buick. Specifically, the new front-wheel-drive Buick Skyhawk.

Being a Buick, it's big on luxury, room and comfort. In fact, it can carry five. In an interior that's well laid-out. Well thought-out. And enormously well appointed.

But at the same time, it's small enough to fit into small parking spaces and garages with very little trouble. Its appetite for fuel is miniscule.

And when it comes to the way it's put together, the tolerances are tiny indeed. In fact, it's designed to pass muster in one of the most stringent quality control programs in the industry. And pass inspection by X rays, gamma rays, and batteries of steely-eyed, unforgiving robot probes.

| EST. HWY. | EPA EST. MPG |
|---|---|
| 41 | 25 |

The new Buick Skyhawk. A car that's big in all the right places. And small in all the right places.

Fittingly enough, it's at your Buick dealer's now. Drive it soon. And be sure to buckle up for safety.

Use estimated MPG for comparison. Your mileage may differ depending on speed, distance, weather. Actual highway mileage lower. Estimates lower in California. Some Buicks are equipped with engines produced by other GM Divisions, subsidiaries, or affiliated companies worldwide. See your Buick dealer for details.

BUICK

Wouldn't you really rather have a Buick?

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*Green-winged teal*

Plates shown smaller than actual size (9" diameter)

*Announcing*

*a major new porcelain plate collection . . .*

# WATER BIRDS OF THE WORLD

by Basil Ede

*An exciting new series of twelve collector's plates*

*by Europe's foremost wild bird portraitist.*

*Each plate bearing an original work of art created by Basil Ede exclusively for this collection.*

*Each decorated with a border of pure 24 karat gold.*

Available by subscription only.
Advance subscription deadline:
April 30, 1982.

**THE ARTIST.** Basil Ede, of Sussex, England, has been called "the outstanding wild bird portraitist of his generation, and perhaps of his century." He is widely regarded as Europe's most distinguished bird artist. Indeed, the authority of his style and the distinction of his work have profoundly influenced the way birds are portrayed by artists throughout the world.

After notable exhibitions in London and other major European cities, Basil Ede was honored by a one-man show at the Smithsonian Institution's National Collection of Fine Arts in Washington, D.C. This was followed by important exhibitions at New York's famous Kennedy Galleries.

His paintings have been commissioned by the National Audubon Society and the World Wildlife Fund, among others. And he is represented in many prominent public and private collections, including the Smithsonian Institution and the collection of HRH Prince Philip, Duke of Edinburgh.

Now, at the height of his career, Basil Ede has created an important new series of superlative works of art in fine porcelain — *Water Birds of the World*. A series of twelve collector's plates portraying the wild beauty and majesty of water birds in precise, authentic detail and with his own inimitable flair for color and composition.

Each of these twelve plates is, in itself, a masterful work of art. Together, they form an incomparable collection that will be a proud acquisition for every subscriber . . . a focus for conversation and admiration when displayed in the home.

**THE WATER BIRDS PLATES.** The plates will be large in size — 9 inches in diameter — to provide full scope for Ede's finely detailed portrayals of water birds in their natural habitat.

And they will be crafted under the supervision of Franklin Porcelain in Japan, by craftsmen schooled in the delicate and demanding art of fine porcelain.

The jewel-like quality Ede brings to the birds' plumage . . . the delicate hues of each bird's varied coloration . . . the wonderfully natural colors of its environment . . . the precise articulation of the wings . . . the sense of *motion* . . . all will be captured *exactly*.

Franklin Porcelain has devoted more than two years to meticulous preparation for the issuance of these plates, and every detail will be of the highest quality. For example, each plate will be decorated with a border of pure 24 karat gold. And each plate will incorporate as many as sixteen separate ceramic colors.

Ede's very beautiful and marvelously accurate works of art — created especially for this collection and available only on these fine porcelain plates — make this an acquisition that will be enjoyed and prized by all who love the beauty of birds, of art, and of porcelain.

**THE SIGNATURE EDITION.** The first edition of this collection will be a special Signature Edition. Each collector's plate in this limited edition will bear Basil Ede's signature on the back in 24 karat gold. This signature will appear *only* on the plates in this first edition.

The plates will be crafted exclusively for individual subscribers. The edition is available only until the end of 1982. And the limit of one collection per subscriber will be enforced without exception. Thus, the Signature Edition will be forever limited to the exact number of original subscriptions entered during the offering period.

**ADVANCE SUBSCRIPTION DEADLINE: April 30, 1982.** The Signature Edition will be issued to subscribers at the convenient rate of one plate every other month. The original issue price of just $55 per plate is payable in two convenient monthly installments of $27.50 per month. Each plate will be accompanied by specially written reference material and a special wall mount. And a Certificate of Authenticity will accompany each collection.

To enter your subscription, mail the application below by the advance subscription deadline of April 30, 1982. There is no need to send any payment now. But your advance subscription application is valid only if postmarked by April 30th.

The back of each plate in the unique Signature Edition will bear Basil Ede's signature in 24 karat gold.



ADVANCE SUBSCRIPTION APPLICATION

## WATER BIRDS OF THE WORLD

by Basil Ede

*Valid only if postmarked by April 30, 1982.*
*Limit: One collection per subscriber.*

Franklin Porcelain
Franklin Center, Pennsylvania 19091

Please enter my subscription for the *Water Birds of the World* porcelain plate collection, bearing new and original works of art by Basil Ede and his signature in 24 karat gold.

I need send no payment now. The twelve plates are to be sent to me at the rate of one plate every other month, and I will be billed for each plate in two equal monthly installments of $27.50* each, with the first payment due in advance of shipment.

**Plus my state sales tax.*

Signature _____
ALL APPLICATIONS ARE SUBJECT TO ACCEPTANCE

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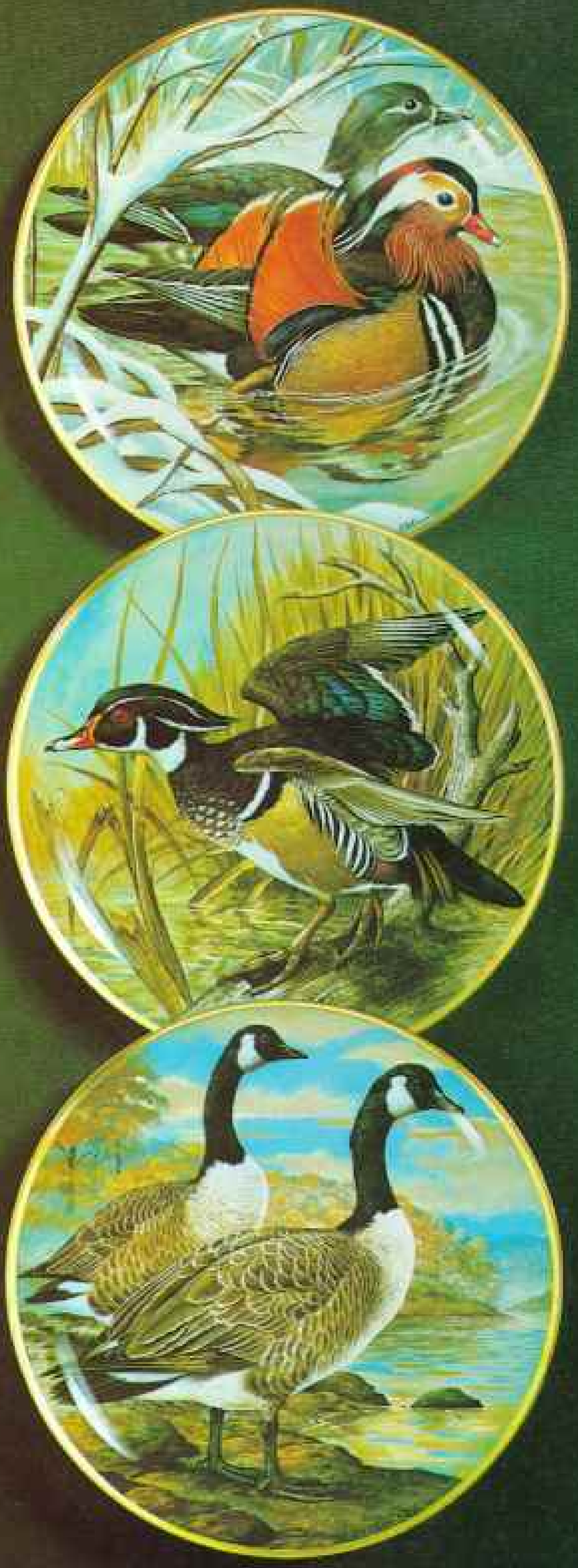


*Mandarin*
*Wood duck*
*Canadian goose*




# THE RIGHT SHAPE FOR RIGHT NOW.

Right now, you need a car that does more than just look good. It needs to have an efficient shape too. Like the new Celica GT Liftback. Now that's the right stuff!

**Engineers say it's right.** Celica's shape is so aerodynamically slippery it cheats the wind. Celica actually has a lower coefficient of drag — just 0.342 — than the Porsche 928!

And the right shape, plus Celica's high-torque 2.4 liter single overhead cam engine, equals the right performance.

**Experts say it's right.**

As Motor Trend noted, "Celica's shape is clean and highly contemporary — strong angularity diluted with just a little organic roundness."

**Celica GT-S: the right stuff, plus....**

Add the optional S package to a Celica Liftback and you've got the stuff dreams are made of! Super-wide 225/60 HR14 steel-belted radial tires on 7-inch wide alloy wheels. Wide fender flares. Rack and pinion steering. And inside, custom-adjustable sports seats, even map pockets on both doors!

The 1982 Toyota Celica GT Liftback. The right stuff, and more!

# On Assignment

HARVEY ARDEN (ABOVE) AND KEVIN FLEMING

HISTORY CROSSED PATHS with freelance photographer Kevin Fleming while he was covering the Sinai Peninsula for this month's issue. On only his second foreign assignment, the 28-year-old Delaware farm boy was eyewitness to the assassination of Egypt's President Anwar Sadat. And, he later learned, if the attack in Cairo had not taken place, the assassins may have intended to try at Mount Sinai, where Sadat was scheduled to attend a ceremony a day later—the next stop also for Fleming and author Harvey Arden.

Fleming was only 25 yards from Sadat when the attack started. Was he hearing fireworks or gunshots? A grenade exploded. He knew.

"I told myself: 'Kevin, you have to hold the camera still,' " he recalls. "It was chaotic. Bullets came from everywhere. People tumbled over chairs as they dived for cover. I saw Sadat's photographer take his last breath."

A soldier suddenly pointed a gun into his face and screamed "No!" Fleming backed away. Another excited guard fired his pistol into the air, creating the danger of ricochet from the grandstand roof.

"I would make a picture, put the camera behind my back, and move on," he remembers. "Because I had on a coat and tie and was carrying only two cameras," he says, "I looked like everybody else in the reviewing stand."

This shot of a wounded ambassador, along with the rest of his film, was immediately released by NATIONAL GEOGRAPHIC for publication. Fleming's photographs appeared in *Newsweek* and some 15 other magazines around the world; for his coverage he has been named 1981 runner-up Magazine Photographer of the Year by the National Press Photographers Association.

On a previous GEOGRAPHIC assignment, Fleming was smuggled by Somali guerrillas into the Ogaden over a road often mined by the Ethiopians. "One thing I have learned," he says: "Don't go with a preconceived idea. Try to keep calm. Let things happen."

In Cairo, Egypt, they did and, unlike some others, he kept his cool.

# The whole World is a stage...

# of surprises and excitement for everyone!

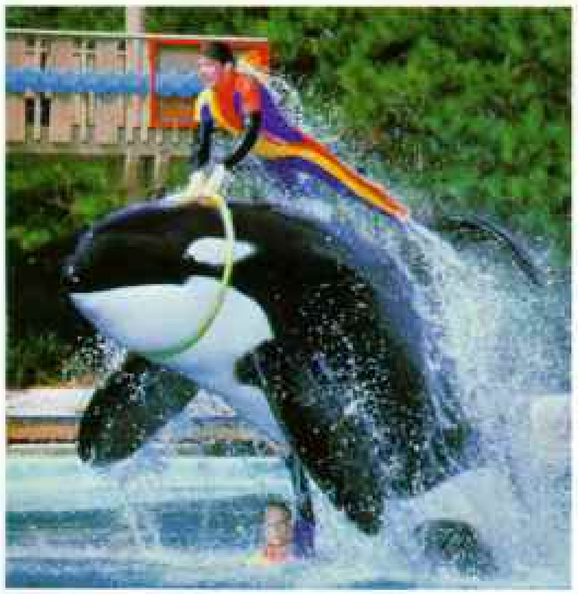
The stage is set for a summer visit to the **Walt Disney World** Vacation Kingdom! There, you'll find elegant resort accommodations and spacious campgrounds ... first-class facilities for just about any under-the-sun recreational activities ... and top-notch shopping, dining and live entertainment. Along with, of course, the Magic Kingdom: At least two full days' worth of fun, made even more magical this year by the Tencennial, our 10th birthday celebration, highlighted by a sensational new parade and all-new shows. This year, make Walt Disney World your summer Vacation Kingdom!

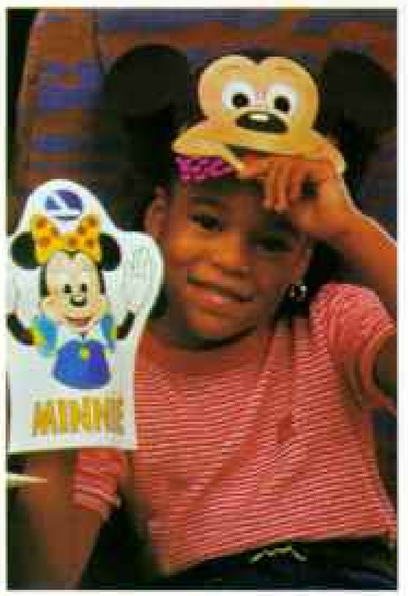
The Vacation Kingdom's friends invite you to play a leading role in all the summer festivities!

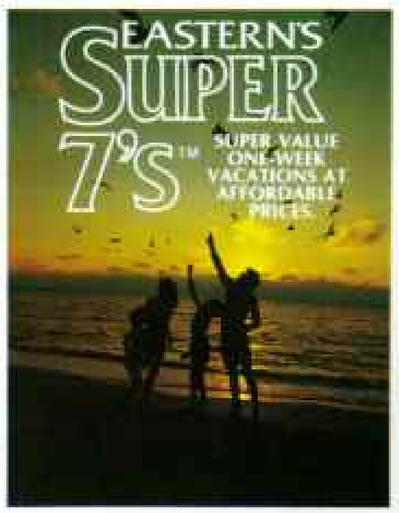
After Walt Disney World, more people visit **Sea World** than any other attraction in Florida — and for good reason. The world's largest and finest marine life park, Sea World astounds, charms and entertains your family all day with: Shamu™ the killer whale, with his whale and dolphin friends in a one-of-a-kind, years-in-the-making show ... Shark Encounter™, bringing you within arm's-length of a swarm of the deep's most fearsome predators ... Spooky Kooky Castle, a rib-tickling seal, otter and walrus show ... "The Hatfields and the McCoys," feudin', fussin' and flyin' in Florida's most spectacular waterski show and much more! Make your third summer vacation day a Sea World day!

**Super 7's™ on Eastern.** Eastern Airlines, the Official Airline of Walt Disney World, has the best way for you to enjoy your Florida vacation at a price that's hard to beat. It's an Eastern Super 7™ vacation package. For one surprisingly low price, you get round-trip discounted airfare, a quality hotel for seven nights, a subcompact rental car for a week (seven 24-hour periods) with unlimited mileage and a Two-Day Passport good for unlimited use of the more than 40 Magic Kingdom attractions! It's the complete Walt Disney World vacation at an affordable price. Plus, all kids flying to Orlando get a Walt Disney World Fun Flight Bag with puppets, games and puzzles ... exclusively Eastern! No wonder Eastern's America's favorite way to fly! For more information, and prices from your hometown, call your travel agent, or Eastern Airlines.

**Greyhound,** the Official Motor Coach Carrier of Walt Disney World, offers the perfect way to visit any of Florida's fantasy lands — economical tours to Walt Disney World, Sea World and other popular attractions, from many locations throughout Florida. Tours of the Vacation Kingdom include transportation, accommodations, baggage handling, tips and admissions ... all covered by one terrific tour price. If you want to "radiate" from your Orlando "base of operations," remember that nobody goes more places in Florida, more often than Greyhound! For more information and great travel "tips," write Greyhound Lines, Inc., Public Relations, Greyhound Tower - #1810, Phoenix, Arizona 85077.









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So all the natural tastes of fresh foods come through. That's why Mazola is a natural with fresh vegetables and today's lighter eating.


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We promise to build and sell only
good quality, honest appliances
designed to give you your money's worth...
and we promise to stand behind them.

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CLASSIC BLACK.

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SINCE 1846

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Nothing beats the fun and relaxation of camping out. And nothing as affordable as a Coleman Folding Trailer adds more comfort and convenience to your campsite. And now when you buy a new Coleman Trailer you'll get a matching Canopy and Coleman Propane Smoker-Grill, FREE!

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*Offer good only at participating dealers April 1 through June 30, 1982, and, on while promotional supplies last, and applies to all new Coleman models except Jamestown™, Jamestown Limited™ and Columbus™.

# Watch A River Paint A Portrait Of England.

For a thousand years the Thames has colored the flow of English life. With flood and pestilence tranquility and beauty.

Let a river carry you through images of warriors and swan keepers, picnics and pageantry. From the days of blood, sweat and tears to England's finest hour.

Watch *The Thames*—the last of this season's new National Geographic Specials—and journey with us through a panorama of English lore, legend, and ceremony.

Produced by the National Geographic Society and WQED Pittsburgh, the award-winning National Geographic Specials continue to be one of Public Television's most popular series. And for the seventh consecutive year they're underwritten by Gulf Oil Corporation.

Gulf

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PUBLIC TELEVISION

PARTNERS·IN·DISCOVERY

Watch *The Thames*
April 7th at 8 p.m.
(E.S.T.) on PBS.
Check your local listings.


Photographed by Andrew Laurie. *Great Indian Rhinoceros: Genus: Rhinoceros Species: unicornis*
*Adult size: Average 168cm tall at the shoulder Adult weight: Average 2 1/2 tons*
*Habitat: Grasslands, swamps and forests in Nepal and northern India*
*Surviving number: Estimated 1,000 – 1,500*

# Wildlife as Canon sees it: A photographic heritage for all generations.

In ancient Roman times, the Indian rhinoceros was a popular sight in circuses to which it had been introduced by Pompey. After the fall of the empire, it disappeared from Europe, later leading to the opinion that it had never existed, and not until 1513, when an Indian potentate sent one to the king of Portugal, did it return.

Today, this unaggressive herbivore could disappear again, and this time there would be no way to bring it back. And while photography can record it for posterity, more importantly it can help save it and the rest of wildlife.

A convenient and dependable research tool, photography can help gather the information wildlife conservationists need. And as a means of communication, it is at once accurate and expressive, opening people's eyes to the great beauty of nature. Looking at a photograph of the Indian rhinoceros, for instance, with that unique horn and that armor-like hide, one cannot but marvel at and gain a better understanding of nature.

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


Canon
Images for all time