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

AS WE SEE in the lead picture of Michael Coyne's report on Iran (page 108), propagandists for Ayatollah Khomeini's Islamic regime have done something diplomats have seldom achieved—they have brought Israel, the Soviet Union, and the United States together in a single cause. All three are set up as the common enemy of the state of Iran. In other locations the flags of Britain and France are added.

Living by the slogan "Neither East nor West," leaders direct hatred at all foreign influences, equally rejecting Soviet Communism and Western capitalism. But the bitterest enemy is Iran's Muslim neighbor Iraq. To be more specific, it is President Saddam Hussein, who attacked Iran in 1980. At least 150,000 Iranians have died in Khomeini's ensuing vendetta war with Hussein.

The martyrs' cemetery in Tehran is jammed with graves of revolutionary volunteers, many in their teens, who died when sent in suicidal waves across minefields into the face of Iraqi fire.

Fundamentalist religious fervor tied to passionate political causes is not unique to Iran or to Islam. It exists worldwide but seems to have a particular virulence in the Middle East. Witness the continuing madness of Lebanon's religious war. In this part of the world, often called the cradle of civilization, leaders of all the major faiths—Muslim, Jewish, and Christian—can be found who preach not love but violence. One Shiite leader explained that, unlike Christians, they are taught not to turn the other cheek but to strike back.

Although the Islamic revolution gave many Iranians a sense of pride by throwing off foreign influences—particularly that of the U. S.—the war has strained Iranian patience. A recent news item reported that several people had been killed and scores wounded when more than 10,000 anti-war demonstrators filled the streets of Tehran. Sad as the losses are, it is reassuring that reasonable citizens are rising up against the excesses, just as they demonstrated against the shah's excesses.

Despite such glimmers of hope, I can't help but feel—especially after seeing Coyne's report—that civilization's cradle has fallen on uncivilized times.

Wilbur E. Garrett

EDITOR

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Israel: Searching for the Center 2

A young nation strives to maintain age-old traditions in a high-tech, high-risk world. By Priit J. Vesilind and James L. Stanfield.

16th-Century Basque Whalers in America 40

Among the first to reap treasures of the New World, Basque voyagers made the Labrador coast the center of a booming oil industry. Archaeologists James A. Tuck and Robert Grenier describe the discovery of a 400-year-old whaling station and sunken ships; Robert Laxalt traces the Basques' history and long record of exploration. Photos by Bill Curtsinger and paintings by Richard Schlecht.

Hampton Roads, Where the Rivers End 72

Since colonial times this protected Virginia roadstead has been a vital shipping artery. William S. Ellis and Karen Kasmauski explore rejuvenated Norfolk, Portsmouth, Newport News, Hampton, and their environs.

Iran Under the Ayatollah 108

Photojournalist Michael Coyne, with a team of Australian filmmakers invited to Iran by its revolutionary leaders, found a nation locked in religious fervor and an ongoing war.

Saving the World's Largest Flower 136

Deep in the rain forests of southeastern Asia, botanist Willem Meijer seeks rare specimens of a spectacular plant with yard-wide blossoms. Photographs by Edward S. Ross.

COVER: *Reading a new chapter in Canada's history, a diver lifts a timber from the stern of a 16th-century Basque whaling vessel found off Labrador. Photograph by Bill Curtsinger.*

THE NATIONAL GEOGRAPHIC MAGAZINE
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Searching for the Center ISRAEL

By PRIIT J. VESILIND

Photographs by
JAMES L. STANFIELD

BOTH NATIONAL GEOGRAPHIC STAFF

***Patterns of the past** mingle with a high-tech present as Israel seeks to preserve the best of both. A Yemeni Jewish bride **(above)** near Gaza wears a wedding costume styled centuries ago. Dots and lines of a circuit diagram frame Efraim Arazi **(facing page)**, imaginative founder of Scitex, a leader in computer-imaging technology.*

THE MESSIAH of the Jews will come one Friday afternoon. It is so written and passionately believed. He will come here, to the town of Zefat in the hills of Galilee, in the nation of Israel. He will come from Mount Meron across the valley, on His way to Jerusalem.

Go to Zefat, I had been told many times, to experience the Jewish faith, pure and unblinking. And so I sit on this hillside overlooking the sacred mountain on a summer evening. The breeze is tinged with the scent of pine, and only the clean, shy song of birds breaks the silence of the Sabbath. Meron darkens under the first stars, and . . . all things seem possible.

Long before the great ingathering of Israel, when Palestine was ruled by the Ottoman Turks, Jewish scholars made Zefat a seat of learning and mysticism. For almost 400 years their followers lived here piously and expectantly. But their Messiah did not come. What came instead were the 20th century and Zionists from Europe with their heresy of logic and their vision of a secular Jewish homeland.

Malka Piletski, now 74, was a Zefat schoolgirl when the first teachers came from Russia in the early 1900s.

"They were socialists, full of the revolutionary spirit," Malka told me at her small cottage not far from Tel Aviv. "They said that religion was old-fashioned. We should speak Hebrew, not Yiddish. They made us feel ashamed of our parents."

"Did you lose your religion?" I asked her.

"I remember that our new biology teacher gave us an essay assignment about plants," she said, "and we were to finish it at home. I knew it was a sin to write on the Sabbath, but I wondered if it was true. So I decided to test it myself.

"Early on Sabbath morning I took a single sheet of paper and a pencil and walked into the fields where the skies were wide open and God could see everything. Then I sat down and slowly wrote the words THE PLANT. I waited to see what would happen. Would God punish me?"

But the sky still hung fresh and blue, and the wildflowers smelled just as sweet. Malka left Zefat later to become a teacher herself. And she never looked back.

"They opened up the doors of the world

for us," she said of those young Zionists, "but they closed up the heavens forever."

THE CONFLICT between the will of God and the pride of man, between faith and reason, still swirls in Israel today, and some think God is winning.

Three generations, six wars, and entire eras have passed with compressed swiftness since Israel gained its independence in 1948. The frontier age is over; most of the kibbutzim have settled into self-conscious prosperity. Agriculture has given way to a high-technology future. Even the remarkable aliyahs, the historic waves of immigrants, have tapered off; in the past few years the incoming have been balanced by the outgoing of the disenchanted. Most of the Arab Middle East and Africa has been emptied of Jews. The Soviet migration of the 1970s has chilled to a trickle. Now come the Falasha, black Ethiopian Jews fleeing famine. They, too, await the Messiah.

The nation has been built. The new Jewish prototype, the Israeli, has been established. But what next? The Israeli, once preoccupied with survival, has turned inward to confront himself.

What does it mean to be a Jew in Israel? Most Israelis carry their Jewishness culturally, tolerantly. But others are returning to bedrock faith. Fundamentalism, bold and self-righteous, has made a comeback in Judaism as it has in Islam and Christianity, inserting itself into Israeli political life with simple answers to complex questions.

The Orthodox religion that developed largely in the Diaspora has not faded with nationhood, as the Zionists assumed, but has gained strength. And now a robust hybrid has grown, combining Orthodoxy with nationalism—the movement called Gush Emunim, the "bloc of the faithful," that has led the settlement of historic Jewish areas

***As dawn breaks** over Jerusalem, hundreds of Jews gather at the Western Wall, last massive remnant of the Second Temple, to observe the feast of the giving of the Torah. Behind the wall stands the Dome of the Rock, a mosque built on the site whence, Muslims believe, Muhammad leapt to heaven on a magic steed.*

צהל

War and peace—*realities in every Israeli life. A quiet moment together comes after a rigorous day for 19-year-old Osnat Abraham (***left,** *at right), a sergeant in the Israel Defense Forces, and her friend, Lt. Avi Hrbin. The two serve at the Bet El basic-training camp, where Osnat teaches recruits to fire automatic weapons (***above***). The platoon she trains is made up of immigrants from 14 different nations.*

*With Israel's forces locked in what seems to be perpetual conflict, danger becomes a way of life. Lt. Amos Almog (***below***) stepped on a mine in southern Lebanon and was rushed here to Rambam Medical Center in Haifa.*

of Samaria and Judaea in the West Bank.

The new strength of these fundamentalists has pushed moderates to choose sides, and Israel has begun to polarize into secular and religious camps. Today questions of theology join war, inflation, and Arab terrorism to test the fabric of the nation.

The heartaches of Lebanon continue, and war has long been part of life. Military service is mandatory for men between 18 and 21 and for women between 18 and 20. All men are in the reserves until age 55, with at least a month each year on active duty. Business and studies are suspended, affairs disrupted. And people are addicted to the radio news—on the hour. In a small nation with deadly problems, the next casualty may be someone they know.

Few Israelis enjoy military service, but they take great pride in their military. Through Israel's short and violent national history the common enemy has provided the social glue, and some speculate that an Israel at peace may be torn apart by its factions.

Says a Jerusalem rabbi, Chaim Lifshitz: "In an adolescent country there is a natural tendency for people to withdraw into one extreme or the other and lose their harmony of life. People are running to the extremes—there is a lack of center in Israel."

It is a dynamic society, alternately brilliant and pedantic, brave and petty, with the lump of exasperation in its throat.

Four million Israelis, more than three million of them Jews, live in Israel proper. In the West Bank and Gaza Strip 1.4 million Arabs struggle to remain Palestinians. Many Israelis are eager to remind visitors of the normality of their lives, their workaday worlds of families and television shows and trips to the grocery. Most are anxious for peace. All are packaged into a territory the size of Maryland. From Jerusalem it's only 45 minutes by highway to the beaches of Tel Aviv. To the port of Elat on the southern tip is a matter of hours (map, pages 10-11).

Three faiths, one city: In Jerusalem, Israeli soldiers in front of an Arab shop watch casually as a Christian pilgrim on his knees negotiates the Via Dolorosa, the Way of Sorrow that Jesus walked with the Cross on the first Good Friday.

IN ELAT, the town that tourism built where the Negev tapers to the Gulf of Aqaba, winter winds blow warm and tropical fish flash like neon on the reef. Jerusalem and its rabbis are 300 kilometers of wilderness and a mental light-year away.

From the balconies of luxury hotels, past the bright beaches and date palms, you can watch neighboring Aqaba, Jordan, turn on its streetlights. Egypt is only ten kilometers (six miles) out of town, and a six-dollar visa lets you wander down the coast of the Sinai.

At night the outdoor cafés blare their televisions at full volume in the new shopping centers, luring customers like competing carny barkers. The air is oleaginous with pizza and falafel, deep-fried chick-pea

dumplings, stuffed with salad into pita bread. I sip peach slush and watch boys meet girls. Conversation is optional. All are transfixed by a cassette movie starring Clint Eastwood and an orangutan. They are oases, these centers. From the distance you can hear their disco basses thumping like bullfrogs into the clear desert night.

Elat passes quickly into the desert to the north. Suspended above the Rift Valley in a small airplane, I can track the road that pushes from the gulf to the Dead Sea like a slim vine. Green patches of irrigated land—farming communities—hang to the road like so many leaves on slender stems. And each is decorated with its sparkling, blue swimming pool. To the west lies the Negev, 60 percent of Israel's land area.

In an era of expanding deserts, the Israeli desert is shrinking as orange groves and cotton fields march south. The wasteland that once washed the southern edge of Tel Aviv has ebbed almost to Beersheba.

David Ben-Gurion, Israel's first prime minister, envisioned the Negev as the nation's future, but most Israelis who live in the Negev have been *assigned* to it by immigration agencies. A handful of rawboned development towns filled by newcomers—Moroccans, Indians, Argentines, Iraqis—survive there like lunar colonies.

Israeli military bases and firing ranges, buried after 1967 within the vast Sinai wilderness captured from Egypt, have encroached into the Negev since the Camp David treaty returned Sinai to Egypt in 1982. The military now occupies much of the Negev's real estate. Most of the Bedouin, those legendary desert nomads, have been resettled into farms and townships, there to learn Israeli citizenship.

Negev development towns survive mostly by government subsidy. At Ben-Gurion University's research institutes in Beersheba and Sede Boqer, the search is intensive for ways to make them self-sufficient.

Israel has little oil and few minerals; it lies hostage to water. The bulk of fresh water must be transported to the Negev through the National Water Carrier, a 140-kilometer system of canals, pipelines, and tunnels from the Sea of Galilee. And most Negev crops are spoon-fed by an Israeli-developed drip irrigation system that delivers perfectly calibrated portions of nutrients and water to plant roots.

But Ben-Gurion University researchers have found that crops such as tomatoes ripen enthusiastically with brackish water pumped from aquifers recently discovered below the Negev. Some salt-tolerant desert plants like the oil-producing jojoba have been developed into cash crops. And a host of experimental crops, such as saltbush for

***Celebrating the festival** of Simchas Torah, a Jewish soldier holds a Torah while riding on a friend's shoulders. Orthodox Jews in Kefar Habad mark the end of the year's Torah readings and the beginning of another cycle.*

animal fodder, are thriving on the coast near Ashqelon, watered almost totally by the Mediterranean Sea.

"It's very exciting, very revolutionary to use pure seawater in agriculture," says Ben-Gurion botanist James Aronson. "If it works, it could drastically alter the geography and agriculture of all arid lands. All you need is a good pump."

In the Negev good ideas have practically outstripped their need. If only the people would come, as Ben-Gurion envisioned.

"This man realized that we need one strong challenge, a positive one, that could serve as a common denominator for the nation," university president Shlomo Gazit tells me. "His challenge was the Negev. Even if we didn't have the Negev—such a challenge should be invented."

Ben-Gurion, who died in 1973, lived out his life in Sede Boqer, a desert kibbutz on the edge of the Wilderness of Zin. He also kept an apartment in Tel Aviv but hated the city for its boisterousness and materialism. On occasion, while walking down the street to his flat, he was heard to mutter, "Nineveh!" in reference to the wealth and idolatry of the ancient Assyrian capital city.

TEL AVIV still astounds many older Jews simply by being a Jewish city. The Holy Land is nowhere to be found here, but a chain called McDavid's pushes cheeseburgers and French fries just off sparkling, faddish Dizengoff Street. Yet Orthodox Judaism keeps its hold: All Tel Aviv hotels keep kosher kitchens, and most set aside an elevator for the Sabbath.

I walked into one of these my first Saturday in town. "Some child's prank," I thought when I saw every button pushed, from 2 to 14. Only later did I realize that on the Sabbath Orthodox Jews are not permitted to push buttons, so elevators that stop on every floor stutter up and down the shafts.

Tel Aviv is home to the Israel Philharmonic, one of the world's outstanding symphony orchestras, and its theater life is

GOLAN HEIGHTS: Captured from Syria in 1967 and successfully defended by Israel in the 1973 war, the heights were annexed on December 14, 1981.

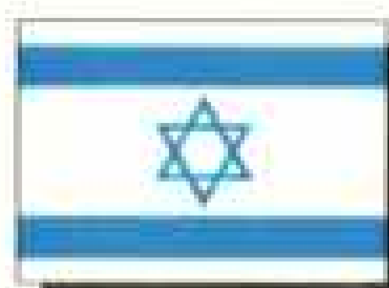
WEST BANK: Referred to as Judaea and Samaria by Israel, it was annexed by Jordan in 1950 after the first Arab-Israeli war. Israel continues to occupy the territory after capturing it in 1967.

GAZA STRIP: Occupied by Israel since the Six Day War of 1967. Under the terms of the 1979 peace treaty, Egypt relinquished its claim to the Gaza Strip and recovered the Sinai Peninsula.

Israel: the stalemate endures

A STATE OF WAR has existed between Israel and most of its Arab neighbors since 1948, when Israel's independence was proclaimed. Some of the conflicts—such as the Six Day War of 1967, the Yom Kippur War of 1973, and the move into Lebanon—have had global repercussions. Of the territories captured by Israel, only the Sinai has been returned. The others—the Golan Heights, West Bank, and Gaza Strip—remain sources of festering disagreements between Jew and Arab.

Though Israel has named Jerusalem her capital, most other nations do not recognize that designation, maintaining their embassies in Tel Aviv and regarding East Jerusalem as occupied territory.



AREA: 21,501 sq km (8,302 sq mi). **POPULATION:** 4.1 million, mostly Jewish. **LANGUAGES:** Hebrew, Arabic, English. **RELIGIONS:** Judaism, Islam, Christianity. **GOVERNMENT:** Parliamentary democracy. **ECONOMY:** GNP (1984): 22.3 billion dollars. Annual growth rate: zero percent. Per capita income: $5,320. Average 1984 inflation rate: 445 percent. In 1984 Israel exported 6.1 billion dollars' worth of polished diamonds, citrus, electronics, and arms and munitions. **CITIES:** Tel Aviv-Yafo urban area, 1.2 million; Jerusalem, 429,000; Haifa, 226,000. **CLIMATE:** Temperate, except in desert areas.

active. But for tourists, the main attraction is the beach. The sound of *raketot*, a tennis-like game played with no court and no regard for strollers, ripples like a Teletype, pockety-pockety-pockety, on summer Saturdays. Surfers jostle for wave space, soccer balls fly. Children drip watermelon and sabra, the fruit of the prickly pear cactus.

In the evening anglers gather on the rocky promontories to cast into the sunset. And long into the night thousands stroll the mosaic walkway by the beach, going no place special, stopping for ice cream or linguine, and showing off sleepy babies.

Much of Tel Aviv runs on an Arab work force—chambermaids, cooks, waiters, street cleaners—many recruited from the Gaza Strip and the West Bank to fill jobs that Israelis disdain. It is illegal for a West Bank Arab to spend the night in Israel, but Palestinian cooks and waiters crowd into small apartments and change jobs every few months to evade the authorities.

"I feel bad about it," says Zvika Semler, owner of a Tel Aviv night spot, "but as a businessman I don't want to hire Israelis. They won't work. They always want to be the boss. I can get an Arab worker cheaper, and they don't talk back to you."

THE CULTURAL CLASH between the Ashkenazi Jews of European origin and the Sephardic, or Oriental, Jews from Middle Eastern or African backgrounds is dissipating with education and shared military experiences. And now Oriental Jews constitute the majority, 60 percent, of the population. Sephardic groups no longer style themselves after the Black Panthers, as some did in the 1960s, and Israel's melting pot is cooking up "Jewishmen," as one Israeli put it, homogenized people like Englishmen. One quarter of Israeli marriages are between the two groups.

Israeli food, politics, and arts have become an East-West blend. Ashkenazi intellectuals are apprehensive about a future Israel that disappears into the Middle East with hardly a trace of Bach, Freud, or Willie Nelson. Levantinism, as this scenario is called, spreads fear that Israel as an outpost of Western culture is threatened.

Sephardim have also penetrated deep into politics, the Israeli national sport. "Too much democracy," I hear Israelis joke, as many voices—pro-Arab, anti-Arab, Communist, nationalist—bargain their way into influence in Jerusalem.

Sephardic stock rose dramatically when Menachem Begin and the right-wing Likud coalition came into power in 1977, ousting the left-leaning Labor Alignment for the first time in Israel's history. Begin appealed to the Orientals' nationalism and paternalistic sense of society, and symbolized change from the Ashkenazi-dominated Labor government under which they had suffered as new immigrants. David Levy, a Jew born in Morocco and raised in a development town, became deputy prime minister.

Israel embarked on a consumer spending splurge under the Likud that benefited the Sephardim. But the nation, burdened by enormous defense costs since 1973 (34 percent of the national budget), sank into economic crisis. Wage earners, long protected by a system that links salaries to inflation rate, were finally exhausted by the system when inflation peaked at 1,000 percent last fall. In many markets, the stable American dollar replaced the soaring shekel.

"Salary comes the first of the month," says Jerusalem economist Yechiel Bar-Chaim, "and people try to spend it all in the first few days, before the value goes down. If your money stays in the bank, you lose it."

In south Tel Aviv the Carmel Market of vegetables and frying pans, sandals and figs, winds for seven blocks to the edge of Yafo, the ancient port that adjoins the city. This is Likud country, and things, they say here, have been worse.

I stop to buy apples from three burly Jews of Soviet Georgian extraction and ask them how it's going. "Great, great," they say, and each pulls out a wad of hundred-dollar bills.

Executive treatment: *Chairman Avraham Suhami of Elscint Ltd. demonstrates the company's new computerized tomograph, or CT, a scanner that makes cross-sectional X-ray images. Another of the bright young men of Israeli technology, Suhami emigrated from Turkey as a teenager and earned a Ph.D. in nuclear physics.*

From an empty beach *75 years ago, Tel Aviv has risen to become Israel's financial and commercial capital as well as its most glittery playground. Five-star hotels bordering the Mediterranean, sidewalk cafés, and broad tree-lined boulevards, such as Ben-Gurion,*

center, give it a European flavor. Tel Aviv's rich cultural life features the world-famous Israel Philharmonic and the Museum of the Diaspora. Menial jobs in this metropolis of 1.2 million are performed largely by Arabs, many from the West Bank and Gaza Strip.

***Dusk descends** on Elat on the Gulf of Aqaba (**above**), whose year-round sun and clear waters bring a cascade of tourists on charter flights from as far as Scandinavia. Israel's southernmost city is wedged between Jordan—the lights at*

"How'd you get so rich?" I ask.

"I'll tell you," one answers, bushy eyebrows arching. "At three in the morning I'm there in the fields, me and my brothers. I buy the right to pick the crops and bring them to market. We're here until eight in the evening. Whoever wants to work in this country—he has money. Those who don't? They have nothing."

"Hasn't the Likud ruined your business yet, then?" I tease.

"The Likud knows what it wants," he says. "The left, they want to do things for the Arabs." He looks slyly at the Arab vendor on his right, who grins back at him. "But look, these Arabs have 21 states. We only have one. Where would I go?

"Jews," he says self-mockingly. "What are we? All our lives, when we've been slapped in the face, we've just gone away. But now we don't go so easily. Now it's war. Now they can't push us around."

The Arab butts in. "No, no," he says, "we have to live in peace together."

"Together—but he means together in the sea—that's what he means by together," says the Georgian. "He'll be in the boat, and we'll be in the water."

Everyone laughs at this, and the powerful Georgian locks his arms playfully around

top left—and the hills of Egypt's Sinai at right. On the eastern shore of the Sea of Galilee, Israelis on holiday plummet down a water slide enclosed in plastic (**above**). *The slide is near En Gev, a kibbutz that harvests the famous St. Peter's fish.*

the Arab and squeezes him. Fraternity boys.

"With him, I'm friends," says the Georgian. "But with the Arab situation, I'm not friends."

LIKUD was forced into an early election last July after a vote of no confidence. In the heat of the campaign I travel to Ashdod, south of Tel Aviv, where the "children of the Likud" have gathered to hear their own David Levy. Issues seem black and white in Ashdod, a town of new Israelis. "Begin, Begin, King of Israel!" they shout, even though the former prime minister has gone into seclusion in his Jerusalem apartment. And Ariel Sharon, the portly, swashbuckling general who engineered the war in Lebanon, is lionized.

"There's a lot of dirty politics in Israel," a cabbie tells me in downtown Ashdod. "But Sharon is the man who saved the country. He is a strong man, a very good man. He knows how to cut." The driver swishes the air with his arm, as if with a saber.

Loudspeakers blare Moroccan music. Parents raise children on their shoulders. The rally closes with "Hatikvah—The Hope," the national anthem. The crowd sings in many accents.

A factory worker collars me later. "The

Likud gave me what I didn't have eight years ago," he says. "Thank God we're progressing. When we came to Israel, we were afraid. People looked at us as foreigners. Now we look everyone in the eye. I feel a part of everything. A simple worker can build a private villa."

"Hah!" snorts a bystander, eager to argue politics. "A soldier who gets out of the army can't build a villa!"

An argument explodes about who can or cannot build a villa and spins off on a life of its own like a whirlwind, leaving me and my notebook. A noisy excess of democracy.

But neither bloc won enough seats in the July election to form a government. After weeks of wrangling they agreed to a "unity" government with rotating ministerships. First to serve was Prime Minister Shimon Peres of Labor, who is to relinquish his post

Green orchards, gray cotton fields *spread across Kibbutz Ashdot Yaaqov, threaded by the Jordan River (**left**). David Simons (**below**), who has no regrets after leaving a law practice in Scotland six years ago, has helped harvest record yields of cotton here.*

*Drip irrigation, rationing out a precise sip of water to a flower at Netiv ha Asara (**above**), revolutionized Israeli agriculture and brought farms to the harsh Negev desert. Now researchers are discovering that vegetables thrive on brackish water pumped from beneath the Negev and that some crops will give commercial yields even with pure seawater.*

after two years to Likud's Yitzhak Shamir.

In its first months of power the unity government froze prices and wages, reduced spending on government development projects, devalued the shekel by 9 percent, and announced more than a billion dollars in cuts that may soon eliminate 15,000 public jobs. Israel settled, grumbling, into an era of austerity, lower consumer expectations, and unemployment lines.

BUT ISRAEL'S standard of living remains comparable to those of Western democracies such as Ireland and Greece. And Israel's dependence on the United States is not as severe as, say, Cuba's dependence on the Soviet Union. Israel meets between 80 and 85 percent of its own needs. World Jewish contributions amount to only 1.5 percent, and the rest ($2.6 billion in 1985) comes from the U. S. government.

But many Israelis are unhappy with any appearance of charity.

Says Hillel Milo, a young executive from Haifa, "We've looked at the U. S. money as a gift from a rich uncle; we've gotten used to it. I think it's corrupting the country."

Hillel and his wife, Tamar, a human-resource manager, were both born on kibbutzim, but felt sheltered there.

"Each generation in Israel has its share of pioneering," says Hillel. "Today, strengthening the economy is the highest priority."

Israel is a world leader in at least two fields of medical technology—medical imaging and laser technology for surgery. Ironically, it is also a leader in the technology of devastation—the Merkava tank, the Uzi submachine gun, the Kfir fighter jet, whose development formed the base for much of Israel's nonmilitary technological success.

In the past 15 years Israel has moved almost directly from an agricultural to a post-industrial economy, aided by good timing. "In the 1970s and '80s, the most needed commodity in the world became knowledge," says Uzia Galil, president of Elron Electronic Industries Ltd., Israel's first multinational conglomerate. "For this we don't need natural resources, big machinery, or tremendous investments in factories. We need people who are capable of studying and who want to apply their knowledge. And this is a trait of the Jewish people.

"In any society there is a critical mass. Our population of four million is not a critical mass for a state that has to perform all the functions and become economically independent. So Israel must be extremely attractive to those who would come here."

The nation must attract, in other words, part of that untapped reservoir of Jewish brains and labor (about eight million) in North America and Western Europe.

"The Israeli pioneer of today," says Mr. Galil, "is exactly the same guy who sits in Silicon Valley in California. This is now the opportunity of the Jewish people to attract them here, this is the opportunity of Israel."

I DRIVE from the steamy pleasures of Tel Aviv to the holy and unhappy city of Jerusalem on a four-lane thruway. It leads across the broad fields of the coastal plains, escalates into the Judaean Hills through dry valleys flanked by pine groves.

At the end, awash in mountain breezes, surrounded by remnants of Arab Palestine, is the eternal city, sacred to three of the world's great religions—Christianity, Islam, and Judaism. Israel has named Jerusalem its capital, but in spirit the city is universal, alive in another dimension.*

It is Ramadan when I arrive, the Islamic month of fasting between sunup and sundown. From the minarets, cassette tapes of muezzins extol the glory of Allah. I wander in the Arab suq of the Old City, through dank alleyways and dimly lit arches, stale with centuries of civilization. Merchants hawk brass platters and brilliant ceramics, spices and Bedouin daggers, olive wood carved into crucifixes and Stars of David, charming tourists with the old charade: "This your wife? Ahhh! I give you six camels for her. No? OK, seven, but that is final."

A gentle rivalry bickers between Israel's two big cities. New and raucous Tel Aviv has no soul, I'm told in Jerusalem. Jerusalem used to have nightlife, I'm told in Tel Aviv, but she moved to Haifa.

Jerusalem is a citadel of faith and fanaticism. On any given day half a dozen self-styled Messiahs wander her streets. War divided the city in 1948, leaving East Jerusalem in Jordanian hands and West Jerusalem with the Jewish state. In 1967 it was reunited under Israel, and East Jerusalem was officially annexed in 1980.

Jerusalem, regarded by Palestinians as their own capital, has now been ringed with high-rise housing developments on former Arab land. These are not political bargaining cards. Israel is here to stay, and the wounds of cultural humiliation remain raw.

Five Israeli Arabs sit in the Israeli Knesset, and others serve in city government. Arabs are free to practice their religion, operate schools, and keep customs. But they are exempt from Israeli military service, and thus excluded from trust. Social mixing is rare; intermarriages singular and courageous. The reality remains: To be a full citizen of Israel, one must be a Jew.

Israel's tenuous relations with the Arab world were dramatically altered when Egyptian President Anwar Sadat came to

*See "This Year in Jerusalem," by Joseph Judge, in the April 1983 NATIONAL GEOGRAPHIC.

Jerusalem in 1977, beginning the process that ultimately led to Egypt's formal recognition of Israel.

"It was a watershed," Israeli President Chaim Herzog tells me in his West Jerusalem office. "We are now accepted in the Middle East. And it's not a dirty word among Arabs to talk about peace with Israel or about negotiations with Israel; the principle is accepted. . . ."

ISRAEL'S burden remains the West Bank of the Jordan River and the Gaza Strip, where 1.4 million Palestinians, 300,000 in refugee camps, have lived under Israeli occupation since 1967, when the territories were captured from Jordan and Egypt.

Jewish nationalists promote the concept of an Israel that stretches from the Jordan River to the Mediterranean. The military pushes for neutralization of the West Bank on security grounds. Hardly anyone wants to give it back to Jordan, not even the West Bankers, who tasted Jordanian occupation from 1948 to 1967, and who dream of an independent Palestinian state.

Israel fears such a state would be a staging area for terrorism from the Palestine Liberation Organization. And outright annexation of the territories presents immense difficulties: Arab citizens could soon outnumber Jews, negating the concept of a Jewish state.

A generation of Israelis has grown up to accept the occupation as normal and

***Learning the language of hope,** black Ethiopian Jews study Hebrew at an absorption center in Atlit, near Haifa. Regarded by some as descendants of the tribe of Dan, these so-called Falasha have lived largely isolated from other Jews since biblical times. When warfare hit Ethiopia in 1974, Israel began smuggling them out. Last fall the Israelis organized a clandestine airlift called Operation Moses for 8,000 Falasha, who had fled to Sudan. The airlift was suspended when news of its existence leaked. Last March another airlift by U. S. Air Force transports evacuated most of the remaining Falasha from Sudan. Some 10,000 remain in Ethiopia.*

Citadel of courage, *the hill of Masada* (**right**) *near the Dead Sea was occupied by Jewish Zealots besieged by the Romans in* A.D. *70. The Roman general, Flavius Silva, commanding the Tenth Legion, finally breached Masada's wall in* A.D. *73. With defeat imminent, the Jewish commander, Eleazar ben Yair, exhorted 960 of his followers to commit suicide rather than surrender. The men complied, first killing their families. Today recruits in the Israeli Army go to Masada to swear an oath: "Masada shall not fall again."*

Using a metal detector and a Boy Scout knife, a stockbroker on vacation from Manhattan in 1975 located a bronze head and breastplate of the Emperor Hadrian (**below**) *in a field near Bet Shean,*

PHOTOGRAPHED AT ISRAEL MUSEUM

130 kilometers from Masada. In the second century Hadrian decreed that a Roman city would be built on the ruins of Jerusalem, thus helping to incite the bloody Bar Kokhba revolt in which the Jews were crushed.

justified. To many of them, Palestinians are an inferior brand of people who sweep the streets and pick fruit. A young Georgian Jew had told me in Ashdod, "Listen, maybe it's not right, but if we are there, it wasn't our fault. They started the war. So we conquered them, tough luck for them."

Others feel only shame. Deddi Zucker, a founder of the Peace Now movement that has protested against the war in Lebanon, tells me a fundamental Israeli dream: "To wake up and find the Arabs have disappeared. We didn't transfer them, we didn't expel them, they just disappeared."

In a suburb of East Jerusalem I talk to Ziad Abu Zayyad, Arab lawyer and former editor of the Palestinian newspaper *Al Fajr*. "There is a deep change in the area," he says, "and inside our people. Until 1977 no Arab was ready to speak with Israel. Now, we are talking with them and arguing with them.

"Israel is a fact. I can't tell the Jews, 'Take your suitcases and go home; this is my own, my country.' And I can't force them to accept the idea of a democratic state for both Arabs and Jews. And therefore I say, let's divide it. I am after a Palestinian state *beside* Israel, not *instead* of Israel."

Nothing infuriates Palestinians more than Israel's 135 West Bank settlements and the permanence they imply. The settlements began under Labor in 1967 as a defense along vulnerable borders and were vigorously pursued by the Likud, which supported the religious nationalism of the Gush Emunim. But the Gush movement peaked

***Passion for energy** in a country that lacks oil drives scientists like Renata Reisfeld **(above)** to collar the rays of the sun. Reisfeld, professor of both chemistry and solar energy at the Hebrew University, led a team of researchers that produced a highly efficient sunlight collector of plastic and glass—the bright pink panels on Reisfeld's model house.*

*On the north shore of the Dead Sea a promising technique produces electricity from brine (**right**). Trapped under a layer of clear water, the brine is heated by the sun nearly to boiling and is then piped to a generator, where its energy drives turbines.*

in 1981, and the most recent West Bank settlers, especially those within commuting distance of Jerusalem, go because the government offers cheap rent.

New settlements have now been stalled by budget cuts. And many religious settlers are dispirited by the disclosure of a terrorist underground among them.

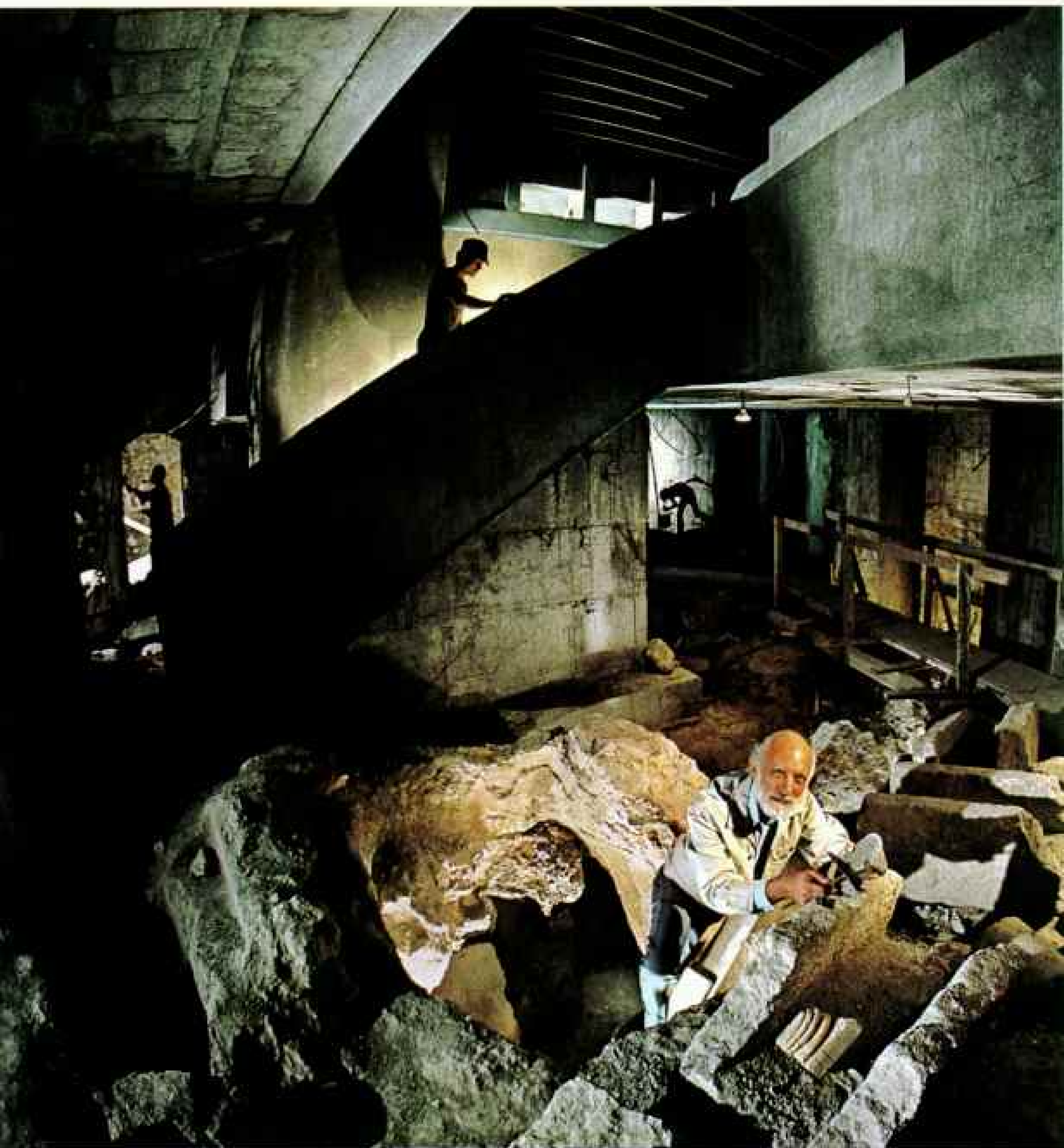
All Israel searched its soul when 25 settlers were arrested in May 1984, charged with setting explosives that crippled two West Bank Arab mayors and with plotting to bomb Arab civilian buses. They were responding to the Arabs, they say—terror for terror. There is no other cheek to turn; Israel can lose only once. Passiveness led to the Holocaust. Never again.

Says one Jerusalem rabbi, "Some say, 'Look, we'll be bad guys, we'll push the Arabs around. New generations of Jews will be happy somebody did it. Just this generation. We have a special job to be a little nasty.' "

Chief among these tough new Israelis is Rabbi Meir Kahane, a member of the Knesset who opposes Israeli democracy and campaigns to boot all Arabs out of Israel.

Kahane's posturing has drawn indignation from nearly every quarter, even the Gush Emunim. Haifa Mayor Arie Gurel tells me, "Racism is an extreme contradiction to Jewish belief, philosophy, and spirit. I don't agree that we should ignore him. This was the attitude people had about Nazis."

But many Israelis feel that the liberal generation has grown too flaccid to respond, and that the right wing has picked up the



***Do-it-yourself** archaeologist Theo Siebenberg (**above**) spent 15 years and three million dollars of his own money digging underneath a house he had built in Jerusalem. Explaining that he was searching for his own roots, the son of a Belgian diamond merchant supervised the excavation to bedrock.*

*Found: hundreds of artifacts, such as first-century glass vessels (**bottom right**), ritual baths, and burial chambers dating from the time of the First Temple 2,900 years ago.*

*Beneath the home's dining room (**above right**) and the*

rest of the first floor stand reinforced pillars and a retaining wall. Here Siebenberg is completing a four-story museum that will include a partially preserved dwelling as well as an audiovisual program explaining the exhibits to visitors in five languages.

Israeli torch. After all, say the settlers, we're just doing what our parents did—pioneering on the Jewish homeland.

THE GROWTH of right-wing extremism coincides with an upsurge in traditional religion, including the minority Hasidic and other ultra-Orthodox religious communities, whose fervent, all-consuming faith plagues nearly every secular Israeli with feelings of cultural obligation and guilt.

Graduation delayed *three years, an Arab student* **(above)** *finally dons cap and gown at Bir Zeit University, near Ram Allah on the West Bank. Claiming that the school supports terrorist activities, Israeli authorities frequently shut it down.*

Earlocks left unshorn to conform with Hasidic beliefs, a boy **(facing page)** *studies the Hebrew alphabet in Jerusalem.*

In the Mea Shearim district of Jerusalem they appear as aliens in the rich Middle Eastern sun, pale of face, side-curled, some swaddled in the heavy black frocks and fur hats of 18th-century Polish merchants. Many speak only Yiddish. On the Sabbath they do not drive cars, cook food, or turn on light switches, and they hope to visit these practices on the rest of Israel.

I talk to Efraim Alkichen, secretary of the Torah Temima Elementary School of the Breslov Hasidim, and ask about the reason for their studied apartness.

"I came to Israel to be a Jew," he says flatly, "and I want to be a Jew. My grandfather in Poland was killed by the Germans. When the Germans came to the little town where he lived, they tore his beard away from him, by force. This beard that they tore away from him—I want to wear it."

Ultra-Orthodox leaders have successfully lobbied for stricter observance of the Sabbath nationwide, and Orthodox rabbis exert power over all Israeli Jews. By their control of the Rabbinical Courts, which adjudicate Jewish religious and personal matters, only they can sanction rituals of marriage, divorce, and burial. Reform and Conservative rabbis have no authority.

Jerusalem is filled with yeshivas, religious schools, for the penitents—born-again Jews returning to the fold. But conversions often leave family and friends cold. Says Sarah Yinon, a young woman in Haifa, "I've had friends change, and the minute it happens, you feel like they've gone to the other side. It's becoming us and them."

Why does an observant Jew have to dress and act differently in Israel, his own land? I ask one ultra-Orthodox man.

"We have to justify our being in this country," he answers. "So how come people sit around and behave as if they were in Paris? They should behave as Jews."

But the differences between Jew and Jew grow profound with time and separation. I visit the Jerusalem suburb of Ramot Polin, recently occupied by the ultra-Orthodox, and find an elderly Jewish-American tourist couple sightseeing. The man is questioning a group of bearded, earlocked Hasidim.

"Let's go, honey," says his wife, a bemused smile on her face. As she tugs at her husband, her sleeve pulls up and reveals the

Beards and hats *identify Hasidim* (**right**)*, members of an ultra-Orthodox Jewish sect. The men appraise chickens in a Jerusalem market for a Yom Kippur-eve ritual in which they wave a bird over themselves and their families, believing that their sins will thus be transferred to the chicken. After being killed and plucked, the fowl goes home* (**left**)*, to be consumed in soup.*

A sign (**below**) *on a building in Jerusalem's ultra-Orthodox Mea Shearim district defines modesty in dress for women.*

Fundamentalists are on the increase and wax more vocal, confronting Israelis with a choice for or against the halakah—rules that govern everyday life. The voice of the fundamentalist sometimes prevails. For example, El Al, Israel's national airline, does not fly on the Sabbath.

terrible blue tattoo of the Nazi death camps.

The man shrugs, turns to me, and says in passing, "You know, they always remind me of the Amish."

THE ROAD NORTH from Jerusalem falls from the hills toward the desert oasis of Jericho, the lowest and one of the oldest cities in the world. Archaeologists sift through the ancient tell here, tourists search hopefully for the rubble of tumbled walls, and roadside vendors troll for travelers with falafel and soda.

The road knifes north through the West Bank along the valley of the Jordan, past the shell of a deserted refugee camp, the barbed wire of military compounds, and anxious knots of uniformed Israeli soldiers, hitching rides between duty and home.

By the shores of Lake Kinneret, the Sea of Galilee, the Roman-built town of Tiberias prospers. Campers and boaters by the thousands unwind under the date palms, and busloads of Christian pilgrims arrive daily to gaze and wonder over the waters.

New hotels tower above the shoreline strip of outdoor restaurants, where I sit one evening and dine on St. Peter's fish, a local delicacy. The air is soft, warm; the water satin. Two hooligan kittens eyeball my fish from the stone seawall. A ferryboat, spouting merry music, putters toward the kibbutz of En Gev across the lake. A string of settlement lights curves reassuringly across the escarpments of the Golan Heights, once Syrian territory but now controlled by Israel.

The Golan, the rock-strewn tableland

that overlooks Galilee, is a virtual wilderness today, a landscape of shell-pocked and deserted villages, and the debris of warfare left from the savage struggle between Syria and Israel in 1967 and again in 1973.

In Qasrin, Israel's new development center of the Golan, planner Eli Melamed unfolds his master sheet, showing an elaborate new educational complex intended to help attract a projected 50,000 Israeli settlers, the critical mass to keep this region forever Israel. Forty thousand more are needed.

Only four villages of Druzes, many torn between allegiance to Syria and acceptance of Israel, remain of the old population. On the edge of Kibbutz Mevo Hamma, hang gliders sail out over Galilee near the emplacements where Syrian gunners, I was told, were found chained to their posts.

Today's critical northern border is with Lebanon. Israel has nearly finished with its unpopular, protracted occupation of southern Lebanon, but the stalemate was at its most intense when I arrived in the border town of Metulla and entered the country in a convoy of journalists.

We wear flak jackets, and no one talks much. About 40 kilometers into Lebanon we stop at a bunker overlooking the Bekaa Valley. Through powerful binoculars I watch two Syrian soldiers moving abstractly in the compression of distance, planting mines below the village of Sultan Yaqub.

"Look how beautiful the valley is," says one middle-aged reservist in the bunker. "Why don't we all go home and let the farmers cut the wheat?"

But Lebanon has left its brutal imprint on

Tending his flock *on the West Bank just five miles from Jerusalem, a Bedouin shepherd reins in his ram, colored for easy visibility. Here nearly a million Arabs uneasily coexist with 30,000 Jewish settlers subsidized by the government.*

On the hill's crest sits the Jewish suburb of Maale Adumim, designed for 12,000 people. It will be the largest of 135 West Bank settlements, steel-and-stone reminders of Israeli intent to maintain a presence in this controversial zone.

a generation of young soldiers. Etay Shilony was only 20 when he led his infantry squad into West Beirut to calm the sectarian fighting that erupted after the murder of Lebanese President Bashir Gemayal.

They had held off an attack, and wounded guerrillas were lying on the dark, suddenly quiet street ahead. Pushing forward and fearing that the wounded, still armed, would shoot again, Etay ordered his men to fire at them once more.

"I don't know where I got the power to give that command," he says to me. "I didn't want this power. As a Jew it was against everything that I have ever been taught. But I fired the first shot, as an officer is supposed to do."

Etay looks at me calmly, with the face of a college freshman.

"Lebanon is madness itself," he says. "I don't know if a soldier can stay there for two years without having that madness influence him. There are no laws; everyone is shooting everyone else."

MY FRIEND Naomi Kaplansky of Jerusalem, a television producer, has a son who in 1969 became the first Israeli to down Egyptian airplanes with U. S.-built Hawk missiles. Later he was lauded for the feat at a banquet.

"He came home that night," Naomi tells me one evening, "and he didn't say a word, just sat down in this chair, looking straight ahead, for three or four hours. And I finally said to him, 'You want to talk?'

"'*Ima,*' he said, 'Mother, I thought suddenly about those Egyptian pilots, and who was waiting for them at home.'"

Naomi's eyes misted over: "Golda Meir was right. She said she would never forgive the Arabs for one thing: They have forced our sons to be killers."

Jerusalem educator Marc Silverman had told me, "For a long time this nation has been under civil stress. There's a limit to how long you can maintain humane, open values if you're constantly under siege."

The mood of Israel's young people has shifted from the storied cockiness and arrogance that followed the Six Day War to introspection and doubt.

Jerusalem university professor Joshua Arieli sees a vast difference in the soldiers leaving the army today. "They're packing into the humanities," he says. "Philosophy, art, and religion are swamped. These men have seen the other side of life."

And some note that the days are gone when young men from the kibbutzim, who considered themselves the cream of Israeli society, would despair because they didn't pass the pilot-training course.

***"Bizjets" for peace,** a fighter for war, and other aircraft take shape **(facing page)** near Tel Aviv. Meanwhile, the country works on the Lavi, a new fighter whose performance promises to challenge the world's best aircraft. Israeli-designed Merkava tanks **(above)** shattered Soviet-built Syrian armor in Lebanon in 1982.*

The people with no address, *Palestinian refugees live in such West Bank camps as Balatah (**left**), near Nablus, population 11,000 souls. Or in Beit Hanun in the Gaza Strip (**below**), where family members sit with Abdul Hafiz Yousif Afifi after he suffered an apparent slight stroke.*

Since 1967's Six Day War, 1.4 million Palestinians have been subject to an Israeli occupation that, while relatively benign, does not satisfy the Arabs' desire for a homeland.

"We are living on hope," an Arab lawyer told the author. "We feel at home only in this land. We've become the Jews of the Arab world. One day the Israelis must realize that without giving us our rights, there will be no peace here."

ONLY 3 PERCENT of Israelis live in the self-sufficient, communal societies called kibbutzim, but they have often supplied the nation with its leaders—generals, politicians, teachers.

Most of today's 250 kibbutzim remain socialist and agnostic, predominantly Ashkenazi, and closely linked to the nation's all-encompassing trade union, Histadrut. But they have mellowed with age and gone through a significant transition.

In the early 1970s they were criticized by the Likud as elitist. "Those kibbutzniks and their swimming pools," Menachem Begin would thunder. And the kibbutzniks had undermined their own credibility by building factories and hiring outside labor, changing their image from communal workers to capitalists.

What was worse, 50 percent of their children were leaving kibbutz life, and many younger members were chafing at the dormitory sleeping system that kept children apart from their parents. Now most outside work forces have been replaced, and many children's dormitories abandoned.

At Kibbutz Kefar Giladi in upper Galilee, spokesman Zvi Mann tells me: "In the beginning men and women were equal. And now? Women work only four or five hours a day. And they work around the children and the school. Private property? It was nonexistent in the old days. If you had a cup of tea in your room, you were antisocial."

I ask Zvi about religion.

"You know," he laughed, "in the beginning years they used to work *harder* on the Sabbath. Now we celebrate all the holidays. On Passover, nobody is working. And boys are having Bar Mitzvahs."

Kibbutz Kefar Giladi suffered from rocket attacks when the PLO moved into southern Lebanon in 1970. Five years ago 42 Soviet-made Katyusha rockets pounded the kibbutz in one day.

For Ella Gaffen, who emigrated here with her family seven years ago from Canada, all was not lost. Finally, she could move the piano she had brought from Montreal into her upstairs flat. The kibbutz crane simply lifted it up through the new hole in the wall.

I drive back through the hills of Galilee and the city of Nazareth, where Jesus spent His boyhood, toward the Mediterranean.

Milk and honey carpets the coastal plain between Tel Aviv and Haifa in thick green fields and orange groves. The ancient land of the Canaanites is today the center of Jewish Israel, where an Arab or a black-robed Hasid is seldom seen. On the coast, beach resorts bake between the Roman ruins and the shattered outposts of Crusader kings, and Israel's only golf course doglegs around sand dunes at Caesarea.

On the slopes of Mount Carmel southeast of Haifa, another proud and ancient people, the Druzes, have lived in small villages since the 11th century. They feel at home in the Jewish nation, are esteemed as warriors in the Israeli Army, and if you ask their opinion of Israelis, will look you in the eye and say, "We are Israelis too."

In Haifa, Israel's third largest city, life, heroism, and death descend daily in the army helicopter, bringing casualties from Lebanon to Rambam Medical Center. The hospital, only 40 kilometers from the Lebanese border, has treated thousands of wounded—Israeli soldiers, PLO guerrillas, Syrians, United Nations troops—since that nation was rent by violence ten years ago. And hundreds of Lebanese civilians whose way to hospital care in Beirut has been blocked have been routed here.

Hospital deputy director Dr. Zvi Ben-Ishai takes me to the emergency ward, where a 16-year-old Lebanese boy lies paralyzed, injured when he dived into the Litani River and hit a rock. His head is shaved and clamped by a device that looks like ice tongs, but he speaks clearly.

"I'm in love with one of the nurses," he says to Dr. Ben-Ishai with a faint smile when we approach. "*Inshallah,* God willing, when I get better, I could stay around, if you need, and help with the carpentry."

Seeing that those Lebanese families who followed their injured sons and husbands to Haifa were lost in a strange land, Baptist minister Ibrahim Siman, an Arab, opened a free inn to accommodate them.

He tells me of their ingrained fear, and of one Lebanese woman who watched in horror as a nurse took a blood sample from her boy, then broke into screams: "The Jews are sucking out the blood of my son!"

Mr. Siman has faced intense pressure from Arab extremists, but he takes it in stride. "When a Palestinian refugee camp is bombarded," he says, "I'm first a Palestinian. When an Israeli innocent is attacked, then I'm first an Israeli. And in all cases I try to be a human being."

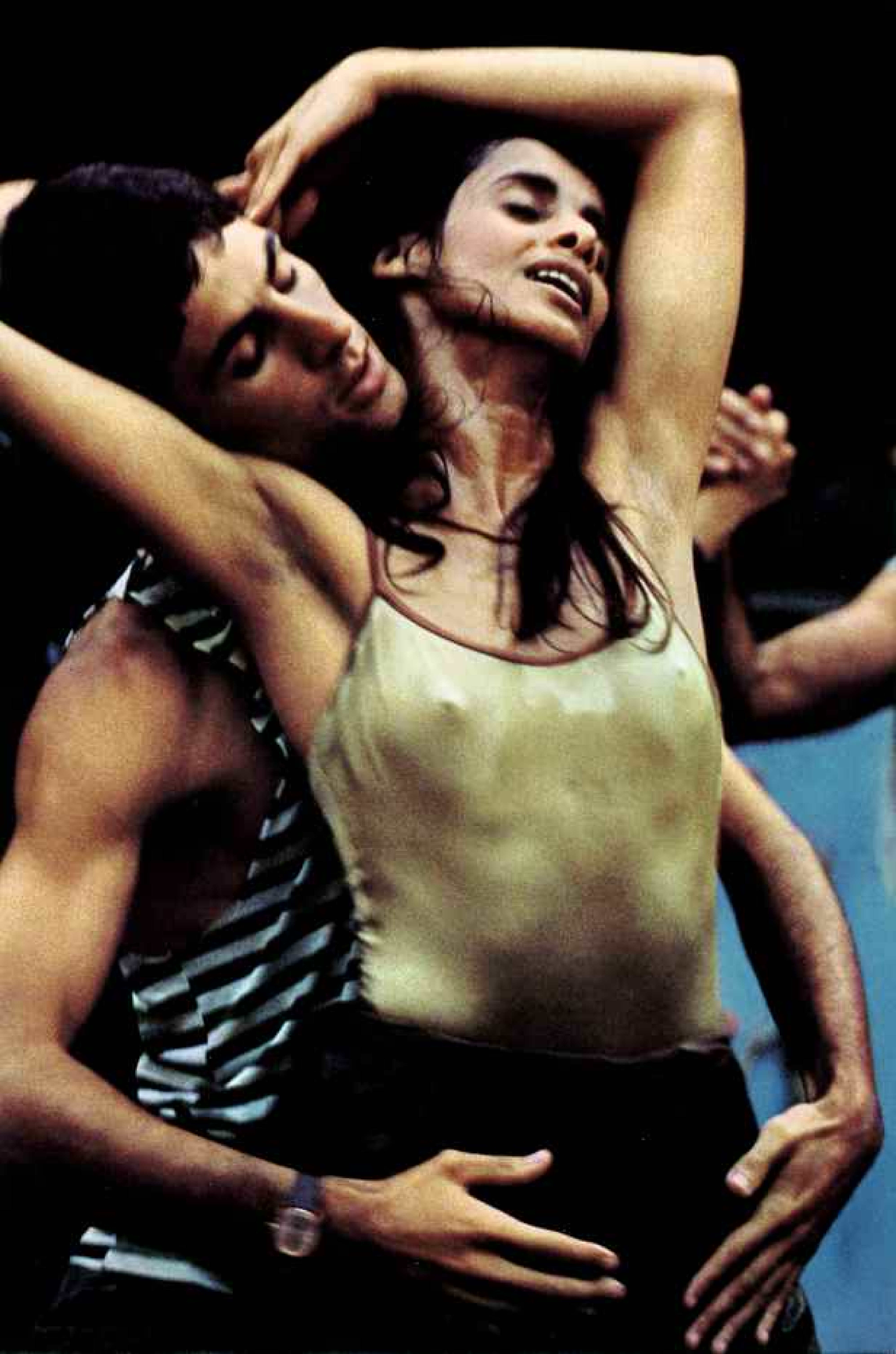
IT SEEMS A MODEST GOAL for a man or for a people, but that balance, that center, seems lost in the centrifugal force of extremism. Many feel the center will not be found until the Palestinian question, like a tumor, has been excised.

The nation still lives in an uneasy fortress, surrounded by bitterness and threats. By all dispassionate measures Israel has accomplished the remarkable—building a successful democratic society in a landscape hostile as a distant planet. But its success is also its curse: The planet was inhabited, and the natives have been routed. In the 20th century such a winner is out of fashion, and even its most admirable deeds are met by the sound of one hand clapping.

But a new, unapologetic age stirs as Israelis return to the strength of their Jewish past. In the rough settlements of Judaea and Samaria they dream of the ancient kingdom. In Jerusalem some of the priestly clan, the Cohanim, study the archaic laws of animal sacrifice in preparation for the rebuilding of the Temple.

And the wheel has turned in the village of Zefat, where hundreds of ultra-Orthodox Breslov Hasidim have moved back into the old Jewish quarter to await the coming of the Messiah. Each Friday at sunset the pious ones gather in the synagogues to sing the "Lekha Dodi—Come My Beloved," to welcome the Sabbath. And the first stars of evening glow above the darkening sacred mountain, in the hills of Galilee, in the nation of Israel. □

Embracing each other *and their art, dancers of the Inbal troupe rehearse in Akko. Begun in 1949, the well-known group achieves its identity through a meld of Yemeni and Jewish traditions, with inspiration from the Bible and folklore. Says founder Sara Levi Tanai, "We paved the road as we walked it." So does Israel.*



Discovery in Labrador: Whaling Port and

A 16th-Century Basque Its Sunken Fleet

NO ONE KNOWS who got there first: sixth-century Irish monks, Norsemen, or even earlier seafarers. But among those who knew it as Terranova—"new land"—and tapped its rich seas, perhaps before 1500, were Breton and Basque fishermen, the latter from the border region of France and Spain.

On his "voyage of discovery" in 1534, explorer Jacques Cartier recorded meeting a French fishing vessel in a Labrador harbor. One inlet had already been named Hable de la Ballaine—"harbor of the whale"—foreshadowing an industry that soon would produce the New World's first oil boom.

Though the Basques' early presence in the New World had been recognized by a few scholars, it remained for historical geographer Selma Huxley Barkham (page 49) to reveal the scope of their operation. In 1977 Mrs. Barkham persuaded archaeologists James A. Tuck and Robert Grenier to explore Red Bay, a small harbor on the south coast of Labrador.

The results of that teamwork include the discovery of three Basque galleons; archaeologist Peter Waddell helps raise the heel of one (**left**)*. Thus the musty volumes of the archives open to reveal—with the help of trowel, spade, and scuba gear—the unique record of a virtually unknown chapter of Canadian history.*

Photographs by BILL CURTSINGER

Paintings by RICHARD SCHLECHT

FORTUNE AFLOAT, Basque galleons ride at anchor in Red Bay, Labrador, in this artist's reconstruction of the largest 16th-century whaling port in Terranova. Smoke billows from massive stone tryworks built to render blubber into whale oil.

At peak operation in the 1560s and '70s, Red Bay occupied nearly 1,000 men during the five-month whaling season, producing as much as half a million gallons of whale oil. The average ship carried a cargo of some 50,000 gallons of oil, rivaling the Spanish treasure galleons of the Caribbean for sheer monetary value.

Drawn first by incredibly rich codfishing grounds such as the Grand Banks, Basque mariners stayed on to hunt the even more lucrative bowhead and right whales. The celebrated explorers

John Cabot and Jacques Cartier, official discoverers of Terranova and the St. Lawrence River, were in all likelihood merely formal claimants to coasts already known to their humbler predecessors, the fishermen.

Like New England whalers three centuries later, Basque crews earned shares in the season's catch rather than fixed salaries. Typical payments ranged from 30 barrels of whale oil for a ship's captain to five barrels for an ordinary seaman. In poor years crews received next to nothing.

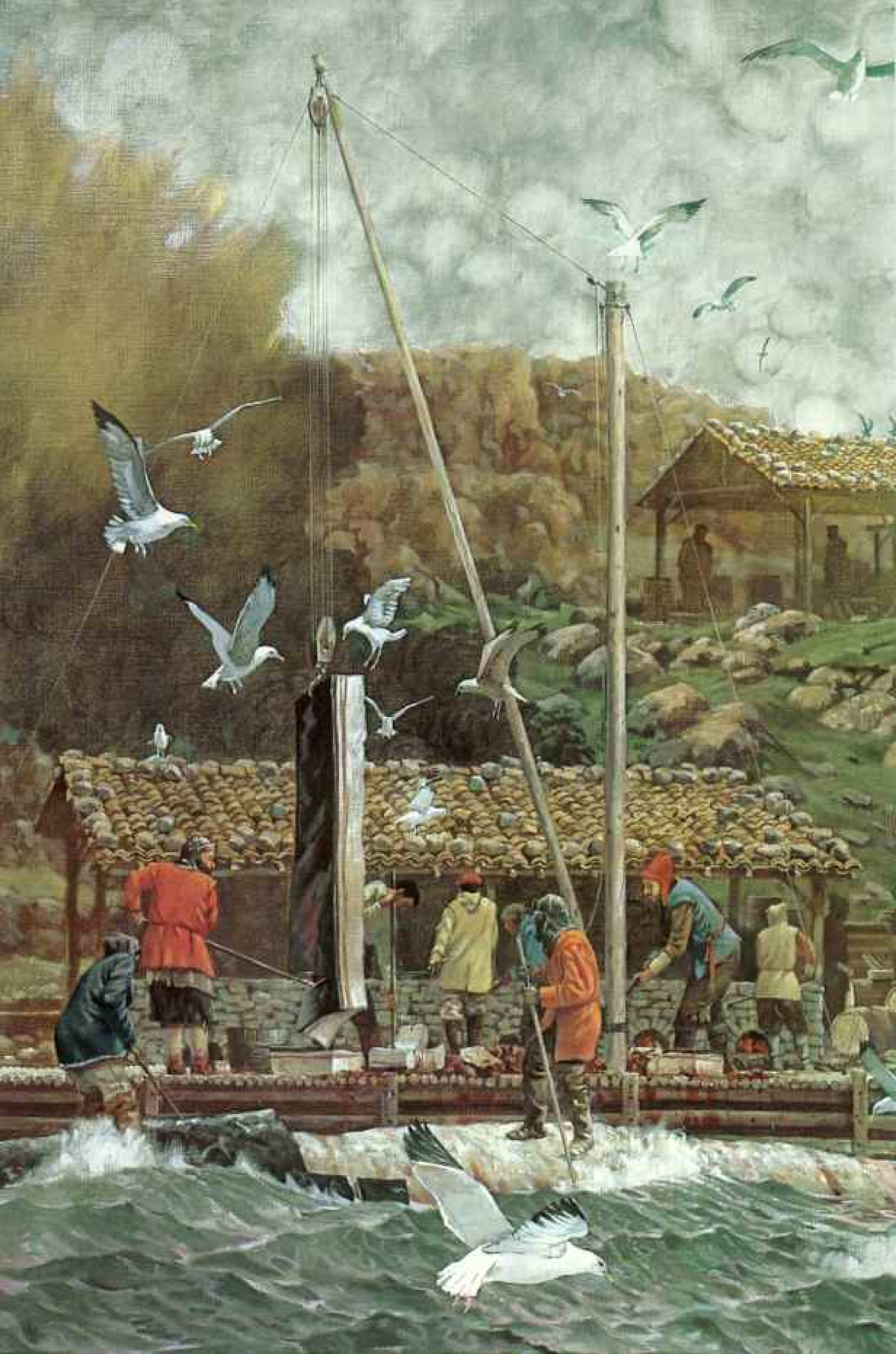
Once loaded with oil, the galleons weighed anchor for ports in Europe, 2,000 miles and normally a month's voyage across the Atlantic. Delayed departure could be costly. Ships that remained in Labrador until late fall ran the risk of being frozen in and forced to winter there under terrible conditions.

THRUST OF DEATH drives a lance deep into the back of a right whale as it sounds near Red Bay. The 16th-century Basque whaleboat, or chalupa, was too fragile a craft to withstand a Nantucket sleighride—the wild tow that often ensued centuries later when sturdier New England boats made fast to a whale with a harpoon line. Instead, Basque crews attached a drogue to the end of the line and threw it overboard when the whale was struck. Thereafter they had to follow the whale until it surfaced and could be lanced to death.

Towing the quarry ashore to the tryworks, or cooking furnaces, normally required several chalupas, either rowed or sailed in tandem. The job could take hours, sometimes forcing crews to remain at sea long after dark. At such times workers ashore lighted signal fires at the lookout stations to act as homing beacons for the

exhausted whaling crews.

Archaeologist Jim Ringer inspects the beautifully preserved remains of a chalupa (**right**) *that was discovered beneath the hull of a sunken galleon at Red Bay. The 26-foot-long craft contained six thwarts for as many rowers, one more than the standard New England whaleboat. Archaeologist Grenier believes the extra man was needed for additional power to tow dead whales to shore.*



CRUCIBLE OF WEALTH, a tryworks operates round the clock to render blubber into the liquid gold of whale oil. As flensers strip away a whale's blubber, a boom transfers it to the platform to be cut into smaller blocks for the copper caldrons atop the fires. Scraps of blubber feed the flames below.

*A dying Basque whaler, Joanes de Echaniz (**below**), dictates his will on Christmas Eve, 1584, aboard a galleon near Red Bay. The document declared Echaniz "fearful of death from which there is no escape" and divided his property between his family and his church.*

PRIVATIONS salved by handsome profits, hundreds of Basques in quest of whales flocked to the Labrador coast each year from about 1540 to 1610. Of 12 whaling ports named in Spanish archives, archaeological evidence for ten has thus far been found (**left**). *Most frequently documented is an early name of Red Bay, still called by fishermen the best harbor on the coast* (**right**). *Islands gave shelter from the wind, their lee side often the site of tryworks and cooperages. Structures on the mainland also played a major role, but their function remains uncertain.*

CHRONICLER of a vanished age, Selma Huxley Barkham (**facing page**) *inspects Basque documents with Floriano Ballesteros Caballero, director of the provincial archives in Burgos, Spain.*

As a historical researcher for the Canadian government in 1965, Mrs. Barkham encountered vague references to Basques in Labrador. "No one seemed to know much about the early days," Mrs. Barkham recalls. "I couldn't read Spanish, let alone Basque, but I was determined to explore this overlooked side of history."

Moving her family to Mexico, she taught English and studied Spanish until ready to conduct original research in Spain. She spent the next few months in Bilbao and Burgos, mastering the archaic form of Spanish used in 16th-century documents. Finally she moved to the university town of Oñate, site of a major Basque archive, to continue her work.

Over the next ten years Mrs. Barkham identified the sites of 12 previously unknown Basque whaling ports along the Labrador coast (**maps, above**). *Through painstaking search and translation of old Basque wills, lawsuits, mortgages, and insurance policies in more than 20 archives, she drew a detailed portrait of Basque operations in Terranova*

Archaeological finds
Basque shipwreck
Tryworks
Cooperage
Other structure
Lookout
Cemetery
Whale-bone concentration
Present settlement areas shown in light green

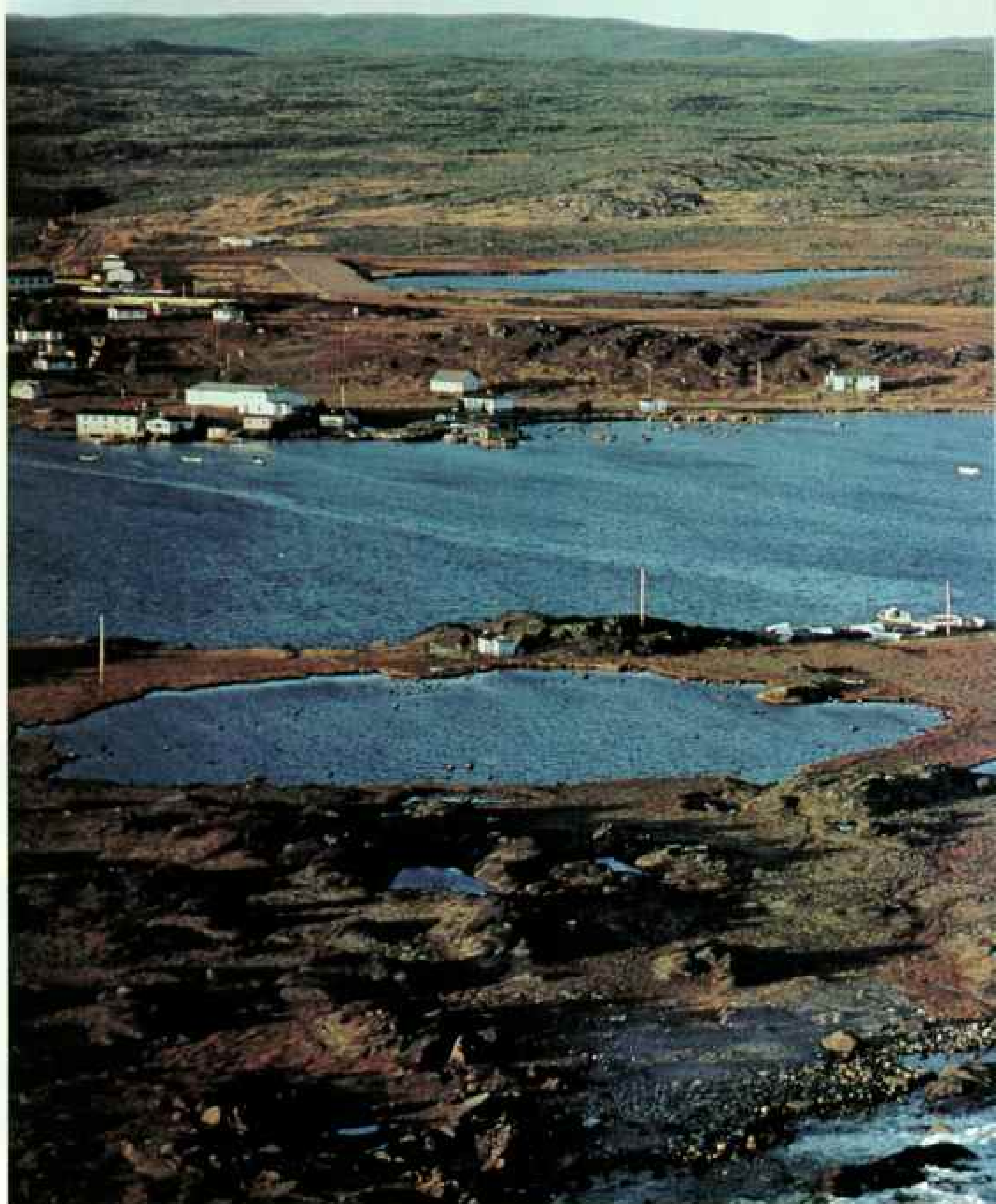
RED BAY
Red Bay
The Harbour
Moore Point
Penney Island
SAN JUAN?
Saddle Island
Lighthouse
Saddle I. Rocks
Twin I. Rocks
Twin Island
Contour interval: 4 meters

over the course of nearly a century.

A citation awarded Mrs. Barkham by the Royal Canadian Geographical Society said of her discoveries: "Her ships were manned by real people: in many cases she knows the names of the owner, the captain, and some of the crew, the number of sailors aboard, the cargo, the number of whales killed, the captain's hopes to get home by Christmas . . . and the years they failed and had to stay in Labrador."

Archaeologist Grenier says simply, "Without Selma Barkham's spirit and determination we might never have turned a shovelful of earth or made a single dive at Red Bay."

STEPHANIE MAZE



Unearthing Red Bay's Whaling History

By JAMES A. TUCK

CENTURIES came together in 1977 at Red Bay on Labrador's coast (**above**) as archaeologists explored the area with Selma Barkham, seeking evidence to confirm her research. It was not hard to find. Gardens tended by today's 300 residents contained as many fragments of red Spanish roofing tiles as they did cabbages and potatoes. Those tiles had

sheltered some 900 Basques who sailed to this port each summer in the heyday of whaling in southern Labrador.

With my co-workers from Memorial University of Newfoundland and colleagues from the National Museums of Canada, I have spent the past eight summers at Red Bay. On Saddle Island, foreground, we have excavated portions of several whaling stations.

A breakthrough came with the discovery of a low stone wall near the shore. It was encrusted with a curious black granular substance almost as hard as concrete. In my work on prehistoric Inuit sites in the Arctic I had come across it many times—it was charred blubber. Here had stood a stone tryworks where whale blubber was rendered into marketable oil.

UPON THE COOPER'S SKILL depended the wages of the crew and the success of investors who financed joint whaling ventures. Coopers and their assistants were charged with the assembly and repair of casks called *barricas* (***above***), each of which held about 55 gallons of whale oil. They were rough-cut and fitted in Spain or France, then shipped in knocked-down form to conserve cargo space.

The original cooper usually scribed a spiral around the outside of the assembled staves, enabling his counterpart in Terranova to match them in proper sequence. Relatively leak-proof, the barricas were secured with about 20 hoops of split alder branches, the ends wrapped with willow bindings. Staves and headpieces like these retrieved by divers (***above center***) littered the first galleon they discovered and provided a major clue to the barricas' origin: The wood is mostly oak, a tree not found in Labrador.

Shore excavation first revealed personal artifacts such as knives, coins, and rosary beads, suggesting living rather than working sites. Although interesting, they provided no hint of their owners' status or occupation. Which members of the Basque community lived here?

Then, as often happens in archaeology, abundant proof appeared and provided an answer. One of our crews had been working on what appeared to be a living site bounded by a terrace. Suddenly, on the slope beyond the

terrace, the team began uncovering dozens of iron tools, all woodworking implements and all plainly part of the cooper's trade. There were adz heads for rounding the insides of casks, croze blades for cutting grooves to secure barrica heads, and drawknives for smoothing staves.

Other sites are more mysterious. On both Saddle Island and its small neighbor, Twin Island, we recovered bits of burned whale bone and scraps of baleen, plus the bones of birds and small mammals that probably had been eaten there. The added presence of iron nails suggested some sort of structure, but the familiar fragments of roofing tiles were absent. I believe these may have been camps where the *chalupa* crews waited to launch as soon as whales were sighted offshore.

From Twin Island came this wooden artifact (***above***), which may be a tally stick, used by Basques until the mid-19th century. The upper carving could have identified the owner or his trade, while the lower markings might represent receipts, debts, or even whales killed.

Did Basques and the indigenous Inuit trade on Twin Island? Unmistakably Inuit artifacts found there include a slate harpoon blade, a drill bit made of chert, a bow with arrows, and seal vertebrae strung like beads on two seal ribs. However, the people who made them may have simply visited the island to scavenge the whaling stations during winter and spring, when the Basques were absent.

PORTRAIT of Canada's first industrial complex and of the men who founded it has emerged in remarkable color and detail. An 18-inch portion of a double-barbed harpoon head (***right***) stamped with an "M," possibly an owner's mark, was preserved in the silt of a pond on Saddle Island. It fit into a six-foot shaft and was attached to coils of line that ran for at least 90 fathoms. At Red Bay the harpoons were wielded by short, powerful men who often rowed for miles until their quarry was dispatched.

Amid final agonies lashing flukes may well have capsized some chalupas. One whaling group, exhausted by struggling against wind and currents, anchored their prize temporarily in a cove and continued home. When another crew claimed the whale and boiled it down, the first ship's owners brought a suit that dragged on for nearly 20 years and was finally settled by the widows of the two captains involved.

Such archival revelations complement discoveries on land, where we have thus far excavated four tryworks. The best preserved is about 30 feet long and could have accommodated six huge caldrons. Although we have yet to find one intact, we have found numerous fragments of fat-encrusted copper. Many lay in the fireboxes, suggesting that occasionally a caldron would burst and spill its contents into the fire. Now and then such fires must have spread to surrounding oil-soaked structures, but we have not found either documentary or archaeological evidence of such disasters.

Some of the artifacts we have recovered bespeak a desire by whoever owned them to carry a touch of home into cold, fogbound, blackfly-ridden Red Bay. From a Twin Island pond came a six-inch-tall one-piece glass (***facing page, left***), so called because its body and base were blown as a single element. Reassembled with epoxy by Judith Logan of the Canadian Conservation Institute, it weighs only three ounces, and its fragile walls are not much thicker than an eggshell. Someone of substance owned this piece, perhaps a harpooner who quaffed cider at his lonely outpost.

Pieced together from Saddle Island, a four-inch-high two-handled jug made of tin-glazed Spanish earthenware called majolica (***lower right***) may have held medicines or condiments such as mustard. Underwater link, a fine majolica porringer (***above right***) was discovered beneath the remains of the first wreck's sterncastle, quarters of the ship's officers, and may have graced the captain's table.

All three artifacts date from the 16th century. They represent only a sampling of the finds thus far excavated from several Saddle Island whaling stations—and we have located more than a dozen stations at Red Bay.

The best may be yet to come. In 1534, when Cartier explored this coast, he was not impressed with the landscape, pronouncing it "*la terre que Dieu donna à Cayn*—the land God gave to Cain." It was from the sea that the Basques took their treasure, and it is from the land Cartier disparaged that we continue to reap riches.

IN THE POURING RAIN on a summer day in 1982, my assistant Tip Evans and I were working a living site on Saddle Island. Soon we couldn't even take notes. I drove my shovel one last time into soggy earth. There beneath the blade, miraculously undamaged, lay a human skull.

Nearby, in the island's cemetery, we located 125 male skeletons, including these. Almost without exception, the men ranged in age from the early 20s to the early 40s. Starvation and disease would hardly have spared those older or younger. This leads me to believe that many of these men were killed

during the dangerous business of hunting whales, with multiple graves resulting from the loss of entire crews in the chase.

But most intriguing is that first skeleton and the dozen others found with it. Only a thin layer of sod covered them; they had not been buried. We know that crews who stayed too long on station became icebound and faced a brutal winter of starvation or disease. Did these men perish thus, to be laid out on the frozen turf by mates who also died awaiting spring and a sail on the horizon that never appeared? ★ ★ ★

Excavating a 400-year-old Basque Galleon

By ROBERT GRENIER

ROBERT S. PATTON, NATIONAL GEOGRAPHIC STAFF

***Oldest New World wrecks** north of Florida are studied by the author **(above)**, head of marine archaeology for Parks Canada, who prepares to connect his hot-water suit to a boiler. The innovation triples the time his team can spend in the near-freezing waters of Labrador's Red Bay, where they have focused on the remains of what is thought to be San Juan, a Basque galleon known to have sunk in Red Bay amid violent winds in 1565. In a reference grid **(facing page)** divers map and excavate timbers that have shed new light on shipbuilding evolution.*

DESPITE HER SIZE and seaworthiness, the galleon was no match for the terrible arctic wind. Sweeping south, the autumn storm caught the ship at anchor, severing lines and driving the vessel toward shore.

The galleon grounded stern first, bounced several times along the shallow bottom, then split her keel, opening her starboard side. The sea thundered in, and she quickly found her grave less than 30 yards from shore. By sheer good luck, those aboard managed to make their way to land.

For the ship's owners her loss was catastrophic. Though she carried neither gold nor jewels, her cargo was as rich as many a treasure galleon's. Beneath her decks, stowed in casks of stout Spanish oak, lay 55,000 gallons of whale oil. Its estimated value by today's standards was four to six million dollars.

The year was 1565 and the site a sheltered harbor on Canada's Labrador coast now known as Red Bay (maps, pages 48-9). The ship's owner and crew were Basque, that incredible breed of men from the border region of France and Spain whose little-known seafaring exploits Robert Laxalt describes in his accompanying article, "The Indomitable Basques" (pages 69-71).

For four centuries the galleon at Red Bay lay undisturbed, her hull largely preserved by Labrador's icy waters and by accumulating layers of silt. There we found her in the summer of 1978, where historical geographer Selma Huxley Barkham said a Basque whaler had sunk. With a team of underwater archaeologists from Parks Canada, the organization that manages Canada's federal parks and historic sites, I had extended Jim Tuck's land archaeology search below the waters of Red Bay.

On our very first dive off Saddle Island we brought up an oaken plank obviously not of local origin; oak doesn't grow along the Labrador coast. On the other hand, oak was the principal material used by 16th-century Basque shipwrights.

In the seven years since that first dive we have learned a great deal about the Basques' early presence in Canada. We have found the remains of two more ships at the bottom of Red Bay, plus sections of four smaller craft. These are the oldest

IN THE CHILLING GLOOM *of Red Bay the remains of the three-masted, 90-foot vessel presumed to be* San Juan *lie bare of the coverlet of silt that helped preserve them. The huge timber of the keelson, marked by the rectangular hole of the mainmast step, runs toward the stern, background. Winter ice massing atop the ship finally crushed her, ribs collapsing outward like a fan.*

wrecks so far discovered in the New World north of Florida.

To me an equally valuable find is the complete hull of a 16th-century Basque *chalupa* (page 45), which almost certainly was used as a whaleboat. That would make it the earliest example of such use of those craft, renowned for their speed and seaworthiness. Whaleboats were a key factor in a period of early Canadian history that corresponds in many ways to the great Middle East oil boom of modern times.

To 16th-century Europe, whale oil was a vital substance, not only as a prime source of light but also as an all-purpose lubricant, an additive to drugs, and a major ingredient of a score of products such as soap and pitch. So great was the demand that a 55-gallon *barrica*, or barrel, of whale oil delivered to a Spanish port sold for the equivalent of about a fifth of a shipyard carpenter's annual wage. (I roughly translate this, based on a comparable U. S. salary today, as $4,000-$6,000.) Following the disastrous winter of 1574-75, when the whalers were bedeviled by ice, the price soared beyond $10,000.

Yet the risks of whaling were as great as the rewards. Terranova lay 2,000 miles from Spain across seas beset by treacherous winds and currents, as well as by icebergs half the year. Scientific navigation as we know it was still in its infancy. One set of directions for reaching Terranova gave a French cape as the starting point and then simply advised, "Keep the North Star on your right."

Some galleons in the whaling trade returned home with their holds not full after an entire season, and others never returned at all. Still others lost their cargoes but not their crews. In such instances the survivors often sued the owner or the outfitter for compensation. One document in the Spanish archives concerns a ship's outfitter who accompanied his galleon on a particularly stormy return voyage from Labrador. Safely home at last, he filed a claim with his insurance company not only for damage to the ship and for lost cargo, but even for his travel expenses to a well-known shrine to give thanks for his deliverance. Unfortunately the company's response is lost to history.

Though we have no absolute proof, we presume our first ship to be *San Juan*, known to have sunk at anchor in Red Bay during a terrible storm in 1565. The wreck is that of a three-masted ship of 250 to 300 tons' burden, measuring nearly 50 feet long at the keel, dimensions well within the range suggested for *San Juan* in contemporary documents.

We have devoted 90 percent of our time at Red Bay to excavating this ship we call *San Juan*. In archaeological terms her value is enormous, for she is the first largely intact 16th-century merchant ship ever excavated and studied in the Americas.

As our diving team slowly removed layers of silt above the galleon, she emerged almost as though laid out in a blueprint. The vessel had sunk in 30 feet of water and had come to rest tilted at a 20-degree angle to starboard. Over the course of one or more years, masses of ice forming or drifting above her had pressed down with enormous weight. Eventually the pressure had split the ship lengthwise, flattening her out on the bottom.

FROM THE FIRST it was obvious that *San Juan* was strictly a working vessel. Those who built her had wasted no time on frills or refinements such as one occasionally finds among contemporary vessels like the English warship *Mary Rose* or Sweden's 17th-century *Vasa*.* The latter were extravagant and few in number—in effect, the nautical Cadillacs of their era. By contrast *San Juan* and her kind were the lowly trucks, bulk carriers in large number that did the world's business.

While these workhorses of the 1540s to 1580s were generally called *naos*, the Spanish word for large ships, most were more specifically designated in shipbuilding documents as "galleons," a term that would later become associated with warships or large armed merchant vessels.

Whatever *San Juan* lacked in refinement, she made up for as a fascinating laboratory of shipbuilding methods. The prefabricated and self-supporting frames amidships, which made for faster and stronger construction, forecast the technology of coming

*NATIONAL GEOGRAPHIC published "Henry VIII's Lost Warship: *Mary Rose*," by Margaret Rule, in May 1983, and "Ghost From the Depths: the Warship *Vasa*," by Anders Franzén, in January 1962.

Strange carved puzzle *found near San Juan's bowsprit may contain the hawsehole* (**above**) *through which a heavy line raised and lowered the anchor. An eight-inch-tall frame* (**below right**) *held a sandglass that was probably used with a device called a log reel to compute the ship's speed. A wooden compass with lid and brass gimbal* (**below left**) *was found near the stern. Timbers of two more Basque ships discovered nearby await detailed study.*

centuries. The carved keel, prodigal in use of labor and wood, looks back on a thousand years of tradition.

Over the years of diving and excavation of *San Juan* we came to feel a personal kinship with those who had fashioned her. During one dive when I was inspecting a row of treenails, or massive wooden dowels, I noticed a drill hole that had been started and then abandoned. "Aha, a mistake," I thought and then looked more closely. Encountering a knot in the plank, the carpenter had moved his drill an inch or two and there had sunk his hole.

Unlike many a lost galleon, *San Juan* was no sunken storehouse of valuables or crew's personal belongings. Selma Barkham's documents may reveal the reason: *San Juan*'s outfitter, Joanes de Portu, managed to salvage much of the ship's gear and perhaps half her cargo of whale oil soon after the storm and during the following season.

THE SAME ICY WATERS that had helped preserve *San Juan* for four centuries presented major problems in our diving operations. Despite the use of insulating dry suits, we could withstand the numbing cold no more than an hour and a half at a time. As a result, the average diver spent no more than 100 hours underwater in a three-to-four-month season.

Eventually we solved the problem with a system of heated suits adapted by my assistant, archaeologist Peter Waddell. The suits were warmed by water fed through flexible hoses from a central boiler on our diving barge. The water emerged from the boiler at 120°F and cooled to a cozy 105° by the time it reached the diver. Caution was required, however, for if the boiler suddenly failed or a hose connection broke, a diver could die of exposure within 10 to 15 minutes.

The heated suits delighted my Basque friend Manuel Izaguirre, an architect and marine archaeologist who came several times from his home in northern Spain to work with us during the summer at Red Bay. After his first dive in a heated suit, Manuel surfaced with a beatific smile. "Oo la-la, Robert," he exclaimed, "it is like diving in the same suit with a beautiful woman!"

The heated suits nearly tripled our diving time to a total of 3,500 hours each season. The development not only helped broaden our study of *San Juan* but also led to marine archaeologist Willis Stevens's discovery of the remains of the two other ships in nearby areas of Red Bay. Both show similar techniques of construction. One contained evidence of charred wood, suggesting that she may have been lost by a fire on board.

What we have found in nearly every instance bears out the documents that Selma Barkham has translated. From them we know that *San Juan* was loaded with as many as 1,000 barricas of whale oil and was almost ready to sail home when the storm caught her. Accounts of her grounding mention no loss of life. It is likely that most of the crew of perhaps 70 men were still ashore, with merely a skeleton crew on board.

We know that Joanes de Portu recovered a good deal of *San Juan*'s supplies, equipment, and whale oil. Since whale oil has a lower specific gravity than water, loaded barricas floated. In fact, the barrels were often transferred from shore to ship simply by towing them through the water.

Thus to recover barricas stowed in the upper portion of *San Juan*'s hull, Portu had only to pull planking and hatch covers loose with grappling hooks and let the barricas float to the surface. Casks stowed farther down beyond his reach remained entombed with the ship.

As we worked our way down through the collapsed layers of *San Juan*'s hull, that is precisely the situation we found. From the lower levels we recovered scattered staves and heads of an estimated 450 barricas trapped amid the ballast, part of the cargo that had eluded Portu.

THOUGH WE FOUND no human remains with *San Juan*, the wreck claimed at least one life. In a lower level of the hull we came across a wicker basket with a scattering of codfish bones, plus an assortment of equally delicate bones we couldn't identify. I sent the latter collection to Stephen Cumbaa, our faunal analyst at the National Museum of Natural Sciences in Ottawa.

Within a week Steve was on the phone. "Robert," he exclaimed, "you may have the earliest black rat ever recorded in North America! He was probably snacking on the

salt cod in the basket when the storm hit and he was trapped below deck. He might be *San Juan*'s only casualty."

That rat and others like him left ample proof of their presence on board. Among the great stern timbers we found hundreds of tiny tooth marks made by rats that were drawn by the pungent aroma of whale oil that had permeated the timbers.

The tens of thousands of codfish bones we found in association with the wreck testify not only to the crew's staple diet but also to the manner in which it was prepared. The codfish bones are so perfectly preserved that they still reveal knife marks from heading and splitting techniques identical to those used by Labrador fishermen today.

Despite their best efforts, the salvors of *San Juan* left us several priceless articles of ship's gear. One is a wooden reel, a spool-like device believed to be used for measuring the ship's speed. If true, the reel from *San Juan* would be the oldest such item recovered from any wreck in the New World. The same is so of *San Juan*'s wooden compass and binnacle and a sandglass frame.

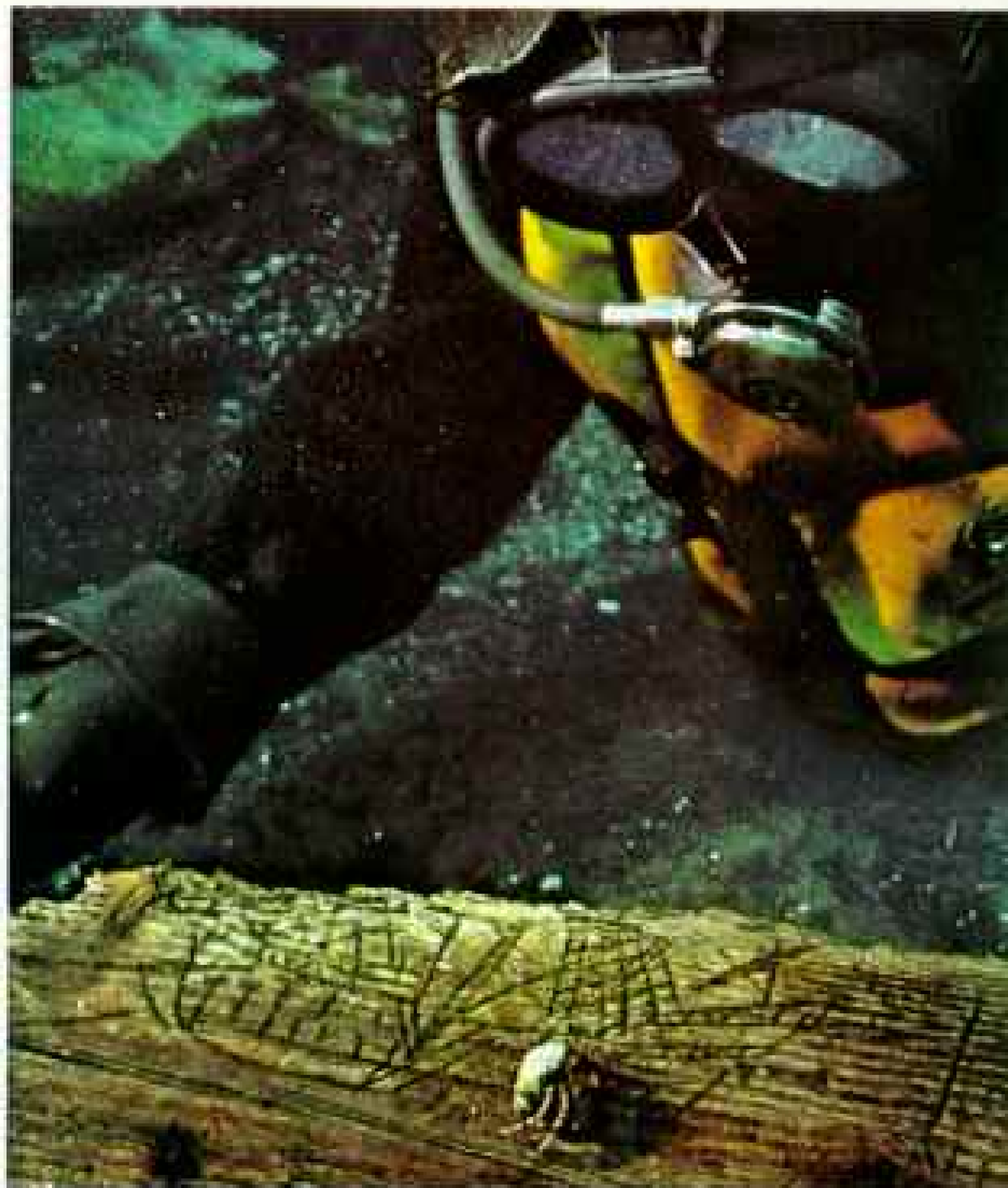
It remained for the second ship, found in 1983, to yield the greatest nautical prize. From among the charred hull fragments we salvaged a brass astrolabe, a primitive forerunner of the sextant. The find proves that at least one pilot aboard a Basque whaling ship knew considerably more than the old adage about the North Star. It also seems to confirm the vessel's destruction by fire—an astrolabe was far too rare and precious an instrument to have been abandoned except in a dire emergency.

Perhaps our most colorful find is a wooden version of scrimshaw—a plank bearing the carved portrait of a ship that may well be *San Juan* herself (right). Recovered at the end of the 1983 season, the design appears to have been made with a sharp, double-pointed instrument, possibly navigator's dividers.

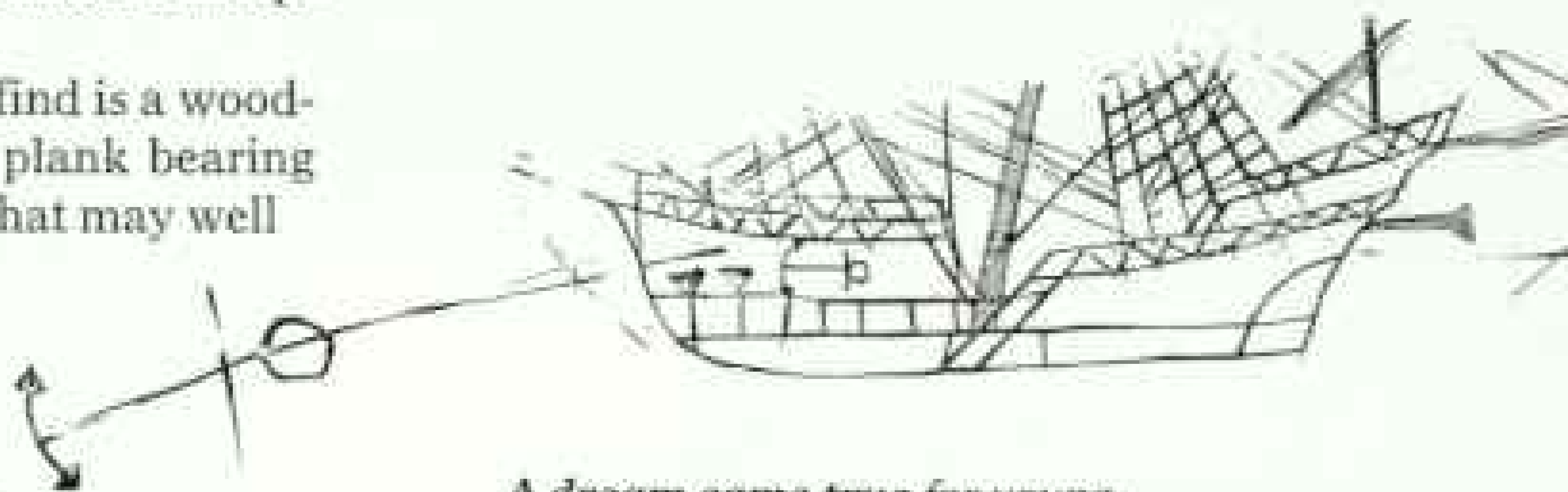
Besides its artistic value, the carving gives us what seems to be an accurate rendition of a 16th-century whaling galleon, not by some inexperienced landsman but by one who knew every spar and timber of his subject intimately.

WHEN we have completed work on the wreck at Red Bay, she will be reburied on the floor of the harbor. The dismantling and detailed analysis of the hull tell us more than we could learn by raising the ship intact.

In fact, we have something almost as good as the actual galleon in the form of precise replicas of her vital parts. From thousands of drawings of well-preserved



DENIS PAGE, PARKS CANADA



A dream came true *for young archaeologist Marianne Stopp* **(top)** *in 1983 when she discovered a portrait of a ship* **(above)**, *perhaps the same galleon it was carved on, showing a single cannon astern. Although borers had chewed the edge, most details, possibly scribed with navigator's dividers, remained intact.*

planks and timbers we are building an exact model of the ship's hull before it was crushed by the ice (page 68). In addition, two of our conservators in Ottawa, Lorne Murdock and Tom Daley, have developed an extraordinary method of making rubber casts underwater in temperatures hovering near the freezing point.

When applied to planks and timbers, the revolutionary technique produces such faithful copies that even veteran marine archaeologists mistake them for the real thing. What the casts amount to is the actual death mask of a ship.

Still another intriguing process may answer the question of whether our wreck is truly *San Juan*. Dendrochronologists in British Columbia and Quebec are currently testing oak samples taken from the hull as well as locally cut wood used in the stowage of the cargo. By matching the samples' growth rings against others whose dates are known, the scientists may be able to fix the time when the wood was cut. If they do, we will know when the ship was built and when she went down.

WHATEVER HER NAME, this 16th-century Basque merchant vessel is helping rewrite the history of shipbuilding during the age of discovery and exploitation of the New World. The ship also represents an era as colorful and fascinating as any in Canada's early history. If the Basques did not discover America, they surely were among the first to visit it on a regular basis and to exploit its natural wealth. As skilled whalers, they continued to do so for a century.

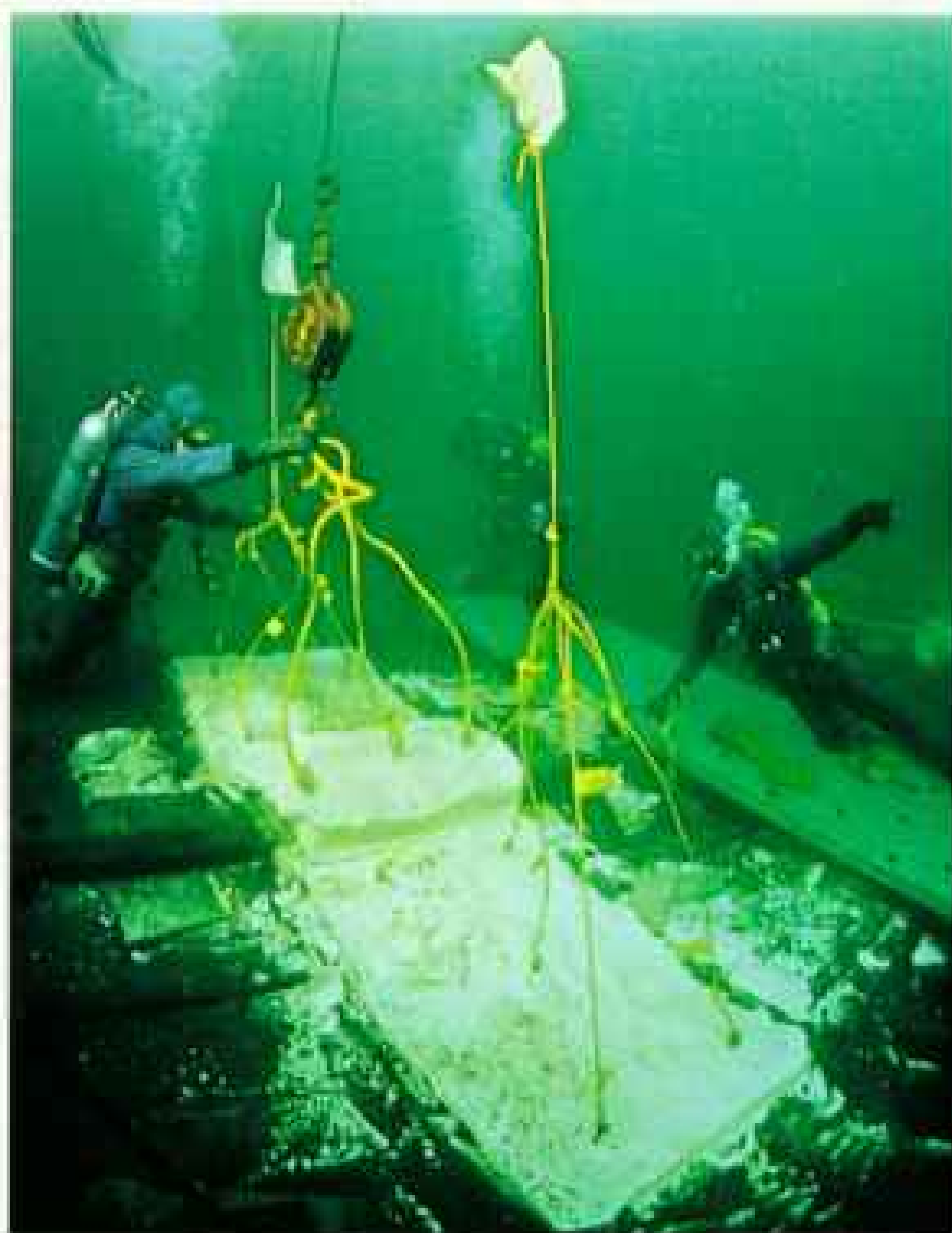
What ended the whaling boom? There are

several possible answers. The Basques severely reduced Labrador's stocks of whales, just as they had done a century before to the whales in their home waters. We estimate that within less than half a century the Basques killed 15,000 or more whales off the Labrador coast—a feat that may well have contributed to the endangered status of the northern right whale in the North Atlantic today.

There are indications, too, that the Terranova whaling industry grew more hazardous and less rewarding as time passed. Early freeze-ups in the mid-1570s cost galleons and crews heavily, as is apparent in soaring oil prices in those years. But perhaps the heaviest blow to the Terranova fishery was an event far removed in character and distance—the Spanish Armada of 1588. That ill-fated venture absorbed Basque ships and seamen and took a heavy toll of both.

Had *San Juan* not fallen victim to the storm at Red Bay, she might conceivably have sailed with the Armada 23 years later and been lost in an unknown grave. From Canada's and from history's point of view I am extremely glad she did not, for instead she has taught us a great deal about Canada's first large-scale entrepreneurs—the indomitable Basques. * * *

The marine excavation at Red Bay was undertaken by Parks Canada under an agreement with the Province of Newfoundland and with the collaboration of the government of Spain's Basque region. Contributors to the land excavation include the National Museums of Canada, the Research Council of Canada, the Province of Newfoundland, and the National Geographic Society.



***Death mask** of a cross section including the keelson was taken by undersea molding. A rubber compound was first impressed onto the area to record details such as tool marks. After placing a metal screen over the rubber, divers pour plaster (**left**) to make a "mother mold," recording the section's contours in reverse. After setting (**above left**), the mold awaits a hoist to a barge, from which it will be transported to the Parks Canada laboratory in Ottawa. There conservators applied a layer of epoxy and foam to make a positive cast (**above**).*

***"The ship explains to us** how she was built," says Robert Grenier, a philosophy that guides Marcel Gingras's one-tenth-scale pearwood model, partly complete; warping of the actual timbers has precluded the vessel's reconstruction. Unusually, the stern contains only one gunport. Just forward of the massive rudder is the heel, or junction of the sternpost and keel, shown on page 40.*

The Indomitable Basques

By ROBERT LAXALT

FOR DAYS ON END the fearsome tempests had raged in the Bay of Biscay. Gigantic waves had roared in from the Atlantic, leaping the breakwater barriers to pound against the stone seawalls of the French port of St.-Jean-de-Luz. The Basque tuna fleet of 24 ships, manned by ruddy seamen bound for the coasts of Africa, lay helpless in the harbor.

Then one morning the thunderclap of a cannon reverberated through the village, signaling that the storm had subsided enough for the fishing fleet to chance a dash for the open sea. They went out in groups of four with pennants flying. Their gaily painted colors—red and green and blue—gleamed amid the great gray waves that tossed them about like toys and at times seemed about to swamp them.

The scene I was witnessing must not have been unlike a day centuries before, when *atalayas*, signal towers perched on promontories overlooking the bay, had smoked with burning wetted straw, announcing that whales had been sighted. Ancestors of these same sailors had put to sea to hunt the whales, at first from their home ports and later from bases in the New World. Almost certainly, they were Europe's first commercial whalers.

Who are these mysterious people, the Basques, whose presence keeps popping up in old chronicles and in remote corners of the world? Ethnically, they are neither French nor Spanish. The political division of their homeland between France and Spain accounts for much of the confusion. Despite that centuries-old partition, the Basques' self-imposed isolation of blood and language has enabled them to maintain their identity. It is a trait that has unified them in the face of invasion and threatened assimilation since the dawn of civilization.

It has been said that the Basques are easy to define geographically but impossible to account for historically. Their little homeland, once much larger in size, straddles the crest of the western Pyrenees between France and Spain. It is a land of deep oak forests, green mountain valleys, and the rugged seacoasts of the Bay of Biscay.

In size, it is barely a hundred miles across. In numbers, it claims some three million inhabitants, most of them living in what is now Spain. Politically, it is divided into seven provinces: Vizcaya, Guipúzcoa, Álava, and Navarre in Spain, and Labourd, Basse-Navarre, and Soule in France. Traditionally the Basques care little for the artificial boundary that divides them. Roman chroniclers called the members of one of their tribes Vascones, from which the popular name, Basques, seems to be derived. They call themselves Euskaldunak, their country Euskal-Herria, their language Euskara.

Where they came from, nobody knows. Evidently they wandered into the Pyrenees millennia ago, but more exact estimates of the time of their arrival vary widely. A few scholars, armed with archaeological evidence of continuous occupation of the region, are convinced they have been in situ in the Pyrenees for 70,000 years. Others trace them only as far back as the Cro-Magnon cave dwellers who produced the magnificent Paleolithic paintings found in caves throughout the area. Almost all would agree that they had inhabited the region by 5,000 years ago, or well before invasions by Indo-European tribes. Even this most conservative view would establish the Basques as the oldest identifiable ethnic group surviving in Western Europe.

BUT IT WAS in matters of language and blood type that scientists came to the conclusion that the Basques, although obviously Caucasian, were a distinct people totally unrelated to the Indo-Europeans who dominated the rest of Europe.

Philologists and linguists still searching for language links have come to dead ends in their attempts to find anything but tenuous connections with Celtic, Old Egyptian, Berber, the languages of the Caucasus, Japanese, and even Iroquois Indian. As of now,

the conclusion is that the Basque language is unrelated to any other tongue in the world.

When serology was perfected, scientists made another discovery. They found that type B blood is practically nonexistent among Basques and that they have one of the highest incidences of type O blood in Europe. More important, they have the highest Rh-negative factor of any of the world's peoples. By the end of the 19th century scientific and scholarly communities concluded that the Basques constituted a people distinct from any other now in existence.

The early Basques were hunters who evolved in mountain regions into a pastoral way of life, domesticating animals and practicing rudimentary farming. Those along the seacoasts became fishermen.

The Basques seem to have been made up of a loose confederacy of tribes that continually quarreled and raided each other until they were invaded by restless groups from the northeast. Then they banded together to form a united front against their common enemies, such as the Celts and other Indo-European tribes.

The Romans came into the Basque country around 200 B.C. Contrary to long-held theories, the Romans never sought to conquer the Basques. They exercised only token sovereignty over the Basque homeland, establishing a few romanized cities, such as Pamplona, named after Pompey. Its Basque name is Iruña. Some Basques even served as mercenaries for Roman legions, for which they won Roman citizenship.

Then came succeeding invasions and passages through the Basque country by the Suevians, Alans, Vandals, Visigoths, Franks, and Moors. They encountered ferocious resistance from warriors who waged guerrilla warfare on foot or mounted on shaggy ponies and then melted into the forests and high mountain passes.

The nation-state concept was not to emerge until the 16th century, or the Basques might well have formed their own out of this age of united fighting. At any rate, their chance never came again. Various portions of the Basque homeland fell under such political entities as the Duchy of Aquitaine, the Kingdoms of Navarre and Castile, and, eventually, France and Spain.

WITH THE AGE of whaling, the Basques moved into a larger sphere of influence. One tradition has it that Columbus first learned of land to the west from a Basque whaler. Juan de la Cosa, the owner and master of Columbus's flagship, the *Santa María*, may have been Basque himself; her boatswain and at least four other crewmen certainly were.

Juan Sebastián Elcano, master of the *Concepción* in Magellan's expedition from 1519 to 1521, took command of the *Victoria* after Magellan was killed in the Philippines. He became the first master mariner to circumnavigate the globe. Explorer Juan Vizcaíno charted South America's northern coast. Basque sea captains Urdaneta and Legazpi opened the first routes across the Pacific between Mexico and the Philippines.

Basque mercenaries fought for Cortés in his conquest of Mexico and accompanied Gonzalo Pizarro, half brother of Francisco, in his fruitless search for fabled El Dorado. Juan de Zumárraga was named bishop of Mexico, or Nueva España, in 1527. He imported Mexico's first printing press, publishing a catechism for the Indian children studying in schools he established. Cristóbal de Oñate and his brother Juan founded Guadalajara in 1528, and Juan de Tolosa discovered the rich silver deposits at Zacatecas.

Juan de Oñate, son of Cristóbal, journeyed north and penetrated what is today New Mexico with soldiers and colonists in 1598, founding the first permanent European settlement in the American Southwest. He also introduced sheep to the region. Far to the south, Juan de Garay founded Buenos Aires, and Miguel de Urrutia introduced sheep to an Argentina that would one day graze nearly a hundred million of them.

Religious conversion went hand in glove with conquest. St. Ignatius of Loyola, a Basque who founded the Society of Jesus, sent his Jesuit missionaries to spread their faith throughout the New World. St. Francis Xavier, who evangelized the Orient, was also Basque.

Recent investigation by my colleagues in the Basque Studies Program at the University of Nevada, Reno, records that four centuries of colonization in the New World were influenced by the Basques' capital and manpower. They were in the vanguard of the

INDIANS AND HARPOONED WHALES ADORN A PORTION OF PIERRE DESCELIERS'S 1546 WORLD MAP, WITH SOUTH AT THE TOP, INFLUENCED BY JACQUES CARTIER'S VOYAGES. 1894 REDRAWING COURTESY PUBLIC ARCHIVES OF CANADA, OTTAWA

development of Mexico, Cuba, Colombia, Venezuela, Chile, Peru, Uruguay, and Argentina. Their legacy continues today in the politics and commerce of the hemisphere. All these exploits were under the aegis of the Spanish crown, but loyalty was dubious. It is consistent that one of Basque descent, Simón Bolívar, was to become the liberator of northern South America when it threw off the Spanish yoke.

When the California gold rush in 1849 set in motion the great movement of humanity to the American West, the Basques were once again involved, coming from South America by sea and land. Finding gold in short supply, they typically turned their hand to raising sheep and cattle to feed the miners. Out of this was to be born a Basque presence in a dozen western states, forming the historic backbone for a long-lived sheep industry.

IN THEIR OLD WORLD homeland, the age-old autonomy of the Basque people came to an abrupt end. The French Revolution with its dreaded guillotine stripped the Basque provinces of France of their *fors*, or traditional rights and liberties. The Carlist Wars did almost the same for the *fueros* of Spain's Basque provinces. Whatever was left was abolished by dictator Francisco Franco as punishment for Basques' siding with Republicans in the Spanish Civil War of the 1930s.

For nearly 40 years Franco proscribed the Basque language and culture. A number of the old Basque rights were reinstated by the Spanish constitution of 1978, and autonomy was granted soon after. The new Basque government, its capital in Vitoria, has created a cultural and linguistic renaissance in the Basque provinces of Spain. Schools offer courses in Basque history and culture, and some 80,000 students are learning their ancient ancestral tongue.

For reasons of national sovereignty, the jurisdiction of the Basque government does not reach into France. While the economy of the French Basques remains largely agricultural and touristic, the Basque provinces of Spain are highly industrialized. Their aim has been to convert old industrial methods to high technology. Their Basque universities are turning out numerous engineers.

The phenomenon of change has been a constant in the Basques' history. So has their inherent dynamism, now being given free rein. The freighters produced in Basque shipyards today are but a natural progression from that olden time when whalers learned to build sturdy vessels that could brave the perils of unknown seas. □

Lighted round the clock *for work and play, Virginia's Elizabeth River flows past an oil tanker and a cargo ship under repair, along refurbished waterfronts of Portsmouth, left, and*

Hampton Roads, Where

Norfolk, right, to merge with the James River near the mouth of the Chesapeake Bay. This fortunate confluence, known as Hampton Roads, has spelled safe harbor since colonial times.

the Rivers End

By WILLIAM S. ELLIS
NATIONAL GEOGRAPHIC SENIOR WRITER

Photographs by
KARAN KASMAUSKI

THEY WERE supply and troop-transport vessels, dozens of them all in a line, sitting beamy and heavy in the water as they prepared to steam through Hampton Roads and on to the open sea.

It was in the early 1940s, and the convoys were assembling here one after another as this port in southeastern Virginia operated at a perpetual high tide of war effort. Tanks and heavy artillery swung in ignominious crane-borne transit from dock to ship, and so did crates stenciled with numbers (hardly ever a word, just the numbers). Destroyers and cruisers and battlewagons quilled with the Navy's largest guns came and went in a blur of gray occasionally accented by the glint of grease on steel.

Also here, where Hampton Roads separates the peninsula of Tidewater Virginia from the cities of Norfolk, Portsmouth, and Suffolk, were tens of thousands of infantrymen waiting for assignments to the pipe berths stacked four and five high, waiting for a voyage to war. But those serving in the Navy would be the ones to best remember Hampton Roads more than 40 years later. They would remember the bars of Norfolk's Main Street, and the women in the doorways who hummed "Anchors Aweigh" with heavy breath. Some of them would remember the iron grip of a shore patrolman's hands in the breakup of a brawl. A tattoo at midnight in an alley shop, a month's wages for a suit of tailor-made blues with cuffs that rolled up to reveal dragons embroidered in golden thread—those too would become lasting memories.

They shipped out, came back (most of them), and went home, taking with them an image of Hampton Roads, and especially Norfolk, that has continued to nag those who are striving, and succeeding, to make of this mid-Atlantic port a place of economic vibrancy and superior livability.

"The image problem is still with us," said Henry Clay Hofheimer II, a leading real estate developer in Norfolk. "We go to see a company about relocating here, and one of the officials will remember having been in Norfolk as a serviceman during the war. He doesn't want to come back because he thinks it's still the same."

The Navy's presence here is as pressing as ever, but no longer is it one of raucous exuberance. Rather, they now go about their business—the more than 98,000 sailors and marines stationed here—mostly in civilian clothes and with a clerkly mien. Sobriety reigns on Main Street, discrediting the notoriety of the strip. It has even come to pass, where once sailors were made to feel that their presence was not in the best interests of budding daughters and freshly seeded lawns, that the city of Norfolk now sponsors an annual Navy Appreciation Week.

It is not Norfolk alone that years ago lifted Hampton Roads past Baltimore to become the second largest port on the East Coast, after New York, in overall tonnage of cargo handled. Newport News is here, bound closer than ever to its tradition of building great ships, and there is the city of Hampton, 375 years old this year and throbbing with development. Virginia Beach, with the largest population of any city in the commonwealth, offers the sea and the most preferred of all waterside living in the area. And there are others, including Portsmouth, once among the drabbest of cities but now almost alluring.

HAMPTON ROADS is the name given to the water bridge connecting the James, Nansemond, and Elizabeth Rivers with the Chesapeake Bay. By maritime definition, "roads" means safe anchorage. Being ice free and surrounded by flat terrain, Hampton Roads is one of the finest natural ports in the world, and one of the largest. It is from here that more coal is shipped than from any other port in the nation. Grain comes here from the Midwest to be sent by sea to many foreign ports. Ships called here last year to load locomotives destined for China, a 42-day voyage. More than

Beautiful swimmers no more, *blue crabs await steaming at Graham and Rollins, Inc., in 375-year-old Hampton, the nation's oldest continuously occupied English community. Each basket, holding 400 pounds of crabs caught by local watermen, will yield 40 pounds of handpicked meat—one of Chesapeake Bay's delectables.*

two million tons of container cargo passed through the port last year, arriving and departing on vessels so vast they seem to eclipse the horizon.

Most of all, Hampton Roads is home port to 123 ships of the Navy's Atlantic Fleet, including guided-missile destroyers and frigates, and the behemoths of the seas, nuclear-powered aircraft carriers with crews of more than 5,000 each.

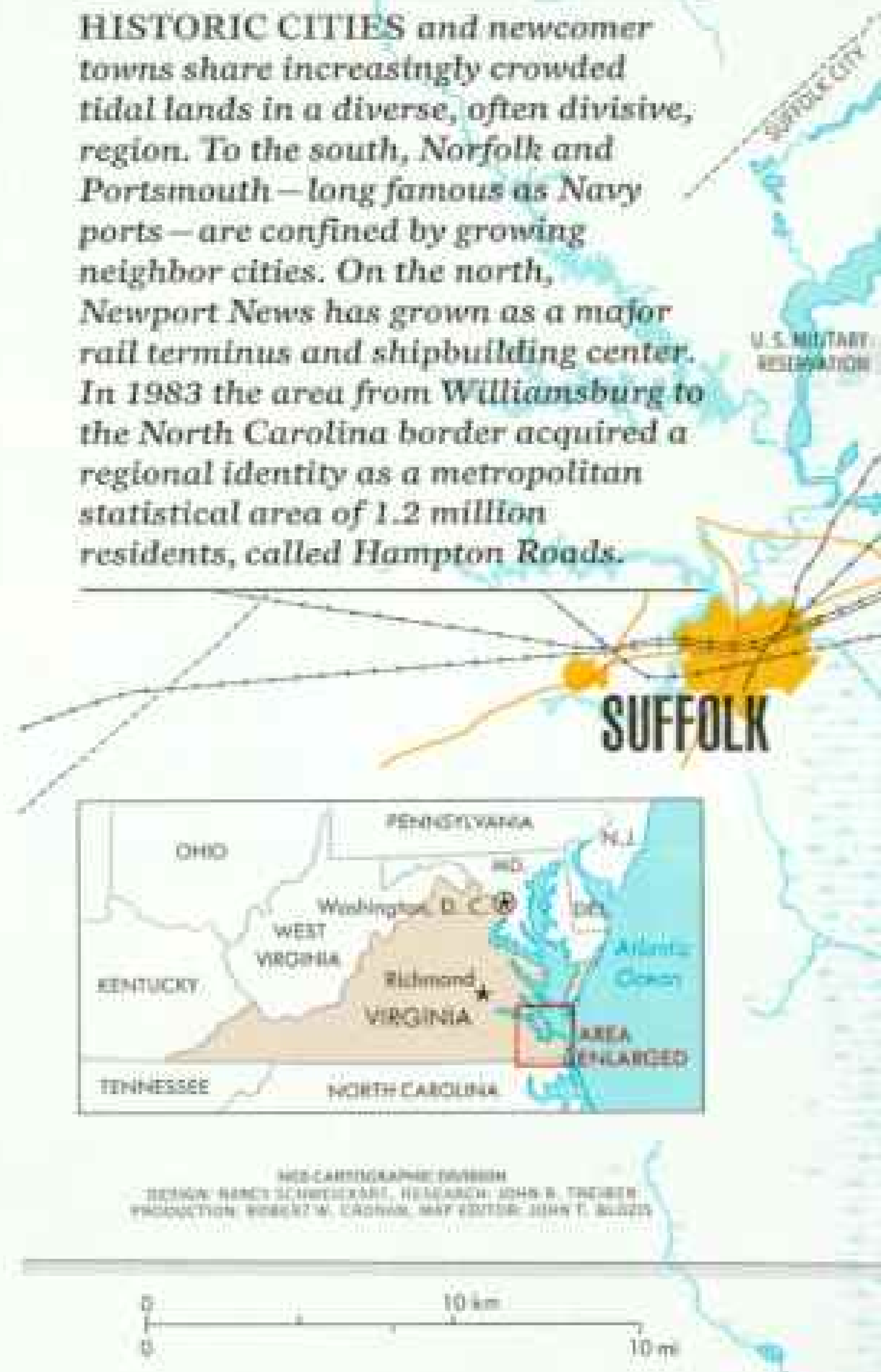
The military presence here is such that it is difficult to drive in the area for an hour without coming on at least one gate attended by members of the armed forces. On the peninsula are the Army Transportation Center at Fort Eustis, the Tactical Air Command headquarters at Langley Air Force Base, and Fort Monroe, where the Army bases its Training and Doctrine Command. Headquarters of the Fifth Coast Guard District is in Portsmouth. These facilities alone require 20,000 people in uniform.

IT IS IN NORFOLK, home of the largest naval base in the world, that the Navy's Atlantic Fleet is headquartered, along with the overall Atlantic Command and the Supreme Allied Command, only headquarters of the North Atlantic Treaty Organization in the United States. High-ranking officers abound on the ladder of authority here, but at the top of all three commands is a tall, craggy-faced four-star admiral.

As Supreme Commander in the Atlantic for NATO, Adm. Wesley L. McDonald's responsibility in the event of a war would be, quite simply, to lead the combined military forces of the 16 member nations to victory. As the ranking officer in the United States Atlantic Command, he directs joint operations of the armed forces of this country, not only in the North Atlantic but also in the Caribbean Sea, the waters around Central and South America, the Norwegian, Greenland, and Barents Seas, and the waters around Africa as far as the Cape of Good Hope.

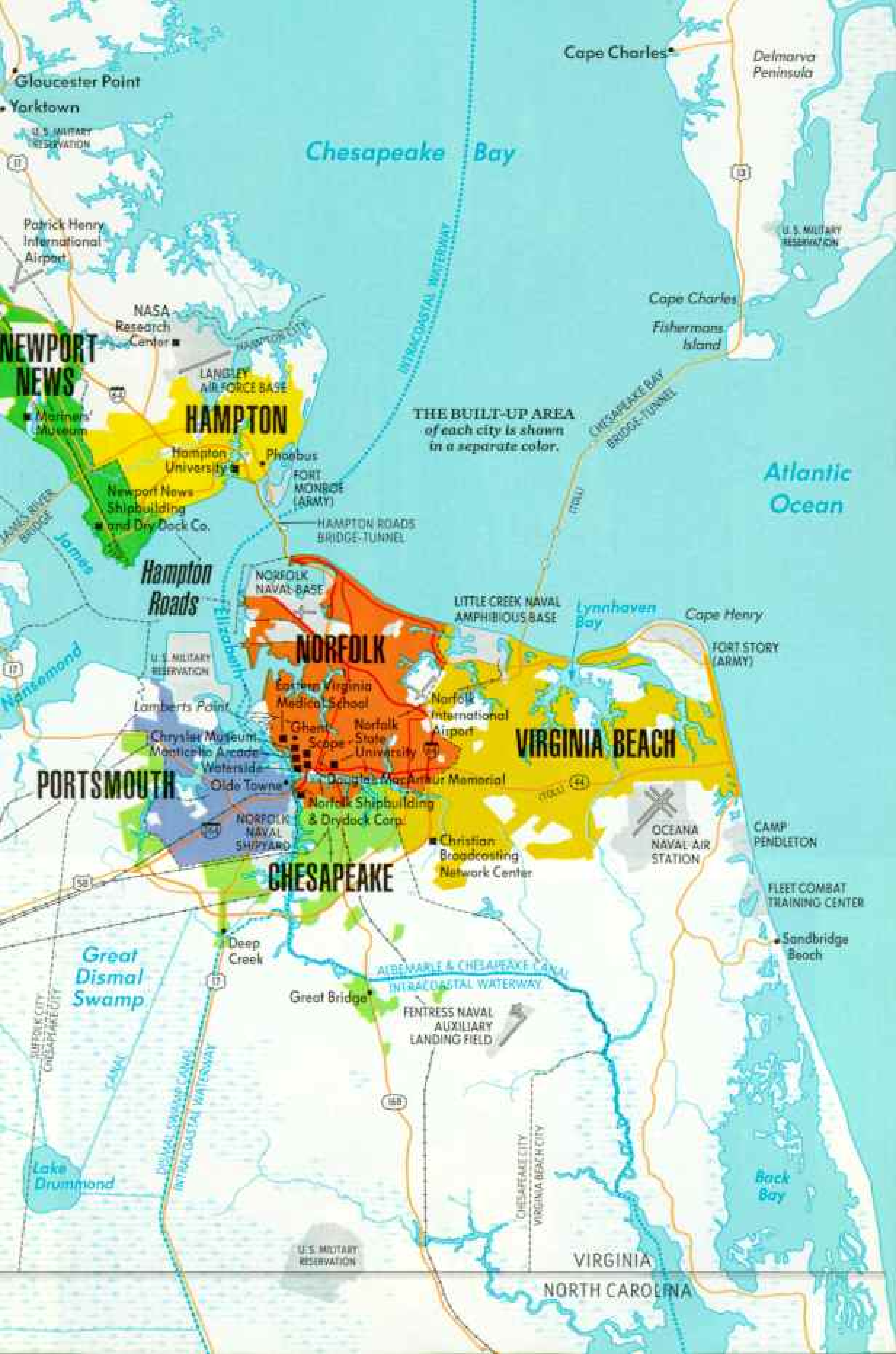
Finally, as Commander in Chief of the Atlantic Fleet, Admiral McDonald runs a shop with 250,000 personnel, 300 ships, and 2,070 aircraft.

He does all of that from an office near the naval base, in a building where yeomen spar with the Studebakers of typewriters. Although he has such worries on his mind



The 7 Cities of Hampton Roads

HISTORIC CITIES *and newcomer towns share increasingly crowded tidal lands in a diverse, often divisive, region. To the south, Norfolk and Portsmouth – long famous as Navy ports – are confined by growing neighbor cities. On the north, Newport News has grown as a major rail terminus and shipbuilding center. In 1983 the area from Williamsburg to the North Carolina border acquired a regional identity as a metropolitan statistical area of 1.2 million residents, called Hampton Roads.*



Cape Charles
Delmarva Peninsula
Gloucester Point
Yorktown
U.S. MILITARY RESERVATION
Chesapeake Bay
Patrick Henry International Airport
U.S. MILITARY RESERVATION
INTRACOASTAL WATERWAY
Cape Charles
Fishermans Island
NASA Research Center
NEWPORT NEWS
HAMPTON
LANGLEY AIR FORCE BASE
CHESAPEAKE BAY BRIDGE-TUNNEL
THE BUILT-UP AREA of each city is shown in a separate color.
Mariners' Museum
Hampton University
Phoebus
FORT MONROE (ARMY)
Atlantic Ocean
Newport News Shipbuilding and Dry Dock Co.
JAMES RIVER BRIDGE
James
HAMPTON ROADS BRIDGE-TUNNEL
Hampton Roads
NORFOLK NAVAL BASE
LITTLE CREEK NAVAL AMPHIBIOUS BASE
Lynnhaven Bay
Cape Henry
NORFOLK
FORT STORY (ARMY)
U.S. MILITARY RESERVATION
Elizabeth
Nansemond
Eastern Virginia Medical School
Lamberts Point
Norfolk International Airport
Chrysler Museum
Ghent
Norfolk State University
Scope
VIRGINIA BEACH
Monticello Arcade
Waterside
PORTSMOUTH
Douglas MacArthur Memorial
Olde Towne
Norfolk Shipbuilding & Drydock Corp.
NORFOLK NAVAL SHIPYARD
OCEANA NAVAL AIR STATION
CAMP PENDLETON
Christian Broadcasting Network Center
CHESAPEAKE
FLEET COMBAT TRAINING CENTER
Sandbridge Beach
Deep Creek
Great Dismal Swamp
ALBEMARLE & CHESAPEAKE CANAL
INTRACOASTAL WATERWAY
Great Bridge
FENTRESS NAVAL AUXILIARY LANDING FIELD
SUFFOLK CITY
CHESAPEAKE CITY
CANAL
DISMAL SWAMP CANAL
INTRACOASTAL WATERWAY
CHESAPEAKE CITY
VIRGINIA BEACH CITY
Lake Drummond
Back Bay
U.S. MILITARY RESERVATION
VIRGINIA
NORTH CAROLINA

Native son *and world traveler, Henry Clay Hofheimer II has helped the Navy work with Norfolk civilians "like ham and eggs." He now devotes his energies to the Future of Hampton Roads, Inc., a regional think tank that brings together some hundred area leaders. At home in the Ghent section of Norfolk, the real estate developer displays Worcester porcelain, his legacy to the renowned Chrysler Museum nearby.*

At the renovated Monticello Arcade **(left)**, *Norfolk's first Opera Ball last fall raised $5,000 for the internationally acclaimed Virginia Opera. Here Sheila Baumgardner completes her costume with the help of her husband, John, right, and Richard Bebee.*

as—and it is not a minor matter—how to deal with possible enemy invasion of Reykjavík, Iceland, he was relaxed as we talked, a man with the self-assurance of a combat pilot, which he once was.

"More than a third of all the personnel attached to the Atlantic Fleet are stationed in the Hampton Roads area," Admiral McDonald said. "We're not going to be able to absorb many more Navy people, and I wouldn't want to home-port another aircraft carrier here. As it stands now, there is a very good relationship between the Navy and the whole area. The leadership of Norfolk is so attuned to the economic advantages of our presence that they go out of their way to welcome the Navy. So the average sailor gets a good break. The city is in the process of rebuilding, and I'm very impressed with what I see."

What doesn't impress him favorably is the encroaching new development around bases and air spaces in Hampton Roads used by the Navy for squadrons of attack bombers and F-14 Tomcat fighter jets.

"Ten years ago these high-performance planes were operating out of bases that were in the woods here," he said. "No longer. Now safety and noise are serious problems. It's just dumb to build a major airfield out in the wilderness and then allow all the surrounding land to be heavily developed."

And so today jet contrails and the smoke from outdoor cookery hang together in the air here, the one a slash signature of military might and the other the barbecued breath of suburbia.

BEFORE JET PLANES, before suburban sprawl, residents of Newport News, along West Avenue bordering the James River, could look from their houses and see ships powered by steam moving to and from one of the world's greatest shipyards. Traffic is still heavy here, but now the vessels move with the hum of diesel or the eerie quiet of nuclear power.

The ones that were built at Newport News Shipbuilding and Dry Dock Company, those that slid into the James River with their bows still sticky with champagne, ah, they are the blue bloods of U. S. maritime history. One, the S.S. *United States*, launched in 1951, graced the sea like no

other passenger liner built in this country. She crossed the Atlantic on her maiden voyage in a record 3 days, 10 hours, and 40 minutes, averaging more than 35 knots, and still held plenty of her 240,000 horsepower in reserve. The record has never been broken.

Of all the nonmilitary vessels built at the yard, the *United States* remains the pride of Newport News. Designed by the late William Francis Gibbs, the ship cost 80 million dollars, and was built (for fire safety) with only two types of wooden items, butcher's blocks and pianos. Even that was too much for Gibbs. He tried, but failed, to have the pianos replaced with aluminum ones.

In 1969, with only 17 years of transatlantic service, the *United States* was laid up, a victim of labor problems, rising fuel costs, and the growing preference for air travel. The U. S. Maritime Administration bought the ship and berthed it at a pier in Norfolk, where it was sealed.

But the liner has been sold once again, for an embarrassing five million dollars, and its furnishings have been auctioned off. It will be refitted in West Germany, the owner says, and put back into service as a leisurely cruise ship. That's a pity, because the ship, with its double bottom and high-pressure engines, was meant to challenge nasty seas, to cushion the slap of swells with speed. It was meant to stand out to sea with its black-and-white hull slipping swiftly past Ambrose Channel Lightship, not a breakwater of coral.

Tom Paris helped set the keel for the *United States*. He also helped place running lights on the highest point of the radar mast.

Dropping in on friends, *George "Dutch" Hellman savors a moment at Fuller's in Phoebus, a former fishing village that is now part of Hampton. At the 84-year-old café, opened by the grandfather of proprietor Nelson Fuller, home cooking draws retirees, military men, and watermen under the memorable slogan: Eat Dirt Cheap.*

"You could say I covered her from top to bottom," he told me. "There has never been a more beautiful ship."

And when the great ship was ready for launching, Tom Paris was in control.

Now retired after 45 years with the shipyard, Paris helped launch more than 200 vessels. As launch master in his later years, Paris would be in the pit coordinating the tripping of the trigger that sends the ship on her way as some dignitary smashed the ceremonial bottle of champagne. "You've got to make sure the ship is right before you turn her loose," he said, "because when she's gone, you can't do anything to stop her."

No longer are large ships, such as aircraft carriers, sent sliding down the ways. They are built in dry docks, and when they're finished, the dock is flooded. Submarines, however, still take the grease, and Newport News is a major builder of nuclear attack submarines for the Navy (pages 106-7).

Tom Paris's first launch was a passenger liner, *President Monroe,* in 1940. His last was U.S.S. *Theodore Roosevelt,* a nuclear-powered aircraft carrier launched last October on a grand day for the ceremony. He had been planning for the launch for a year, and now, on this sunny Saturday, with the crowds pushing through the gates of the yard, with bands playing and with the carrier bedecked in bunting, like an elephant in the service of a raja, Paris made final checks of all the launch details. The balloons, 65,000 helium-filled colored balloons, were ready to be sent aloft at the breaking of the bottle. Workmen stood by to loosen the mooring lines when the 2.3-billion-dollar carrier made a symbolic movement, a stir of birth, in its flooded dock.

When it was over, the wonder of it all was not that *Theodore Roosevelt* had been christened, but that such a gigantic mobile structure could even be launched only three years after the keel was laid. The vessel is 1,092 feet long and displaces 91,000 tons. Power is provided by two nuclear reactors—enough power to maintain speeds in excess of 30 knots for 13 years without refueling.

With a work force of 30,000, Newport News Shipbuilding is the largest private employer in Virginia and the largest privately owned shipyard in the country. Opened in the late 19th century, the yard came to be identified with the credo of its founder, Collis Potter Huntington, a vow inscribed on a bronze tablet:

WE SHALL BUILD GOOD SHIPS HERE
AT A PROFIT—IF WE CAN—
AT A LOSS—IF WE MUST—
BUT ALWAYS GOOD SHIPS.

In 1968 the yard was sold to the 18-billion-dollar conglomerate called Tenneco, and the backlog of work for the Navy is heavy.

ONCE THE WORKERS were paid in silver dollars, and once, too, when they left the gates of the yard at the end of a work shift, the clothes of some were covered with asbestos. That fibrous mineral, once commonly used for insulation, is now viewed with extreme caution. Almost all of it has been removed from Navy ships and those of the U. S. maritime fleet.

The full extent of the health problem related to asbestos exposure in Hampton Roads shipyards is not known. Not only do some workers suffer lung cancer and other diseases—asbestosis and the dread, incurable mesothelioma—but so do members of their families.

"These asbestos-related diseases are latent for 15 or 20 years before enough damage is done to the lungs for symptoms to appear," said Robert Hatten, a Newport News attorney who represents hundreds of victims seeking damages. "The worker is usually in his 50s before he starts to notice that something is wrong. But then he figures it's old age or too many cigarettes. So the disease isn't usually diagnosed in its early stages."

In addition to suing asbestos manufacturers, the victim can turn to his employer for compensation under the state or federal law. But the wait is long, and death may come first. "In the case of the federal government, it takes two or three years just to get a decision," Hatten said. "It's an absolute disgrace to subject the family to such a long period."

Hatten in 1976 began filing actions against Johns-Manville Corporation and other asbestos producers. His first judgment was for $750,000, but his client settled for $275,000 while the case was under appeal.

Hatten later won $944,000 for four former shipyard workers, but that claim is under appeal. Hatten then settled 81 cases in a row

***Opening a picture window** on a working waterfront, Norfolk razed decaying piers and in 1983 welcomed blue-roofed Waterside, patterned by James Rouse on his*

without going to court. "We settled those on the courthouse steps," he said. Manville has since declared bankruptcy.

Of the people he has represented, more than 100 have died, and yet many retained a fierce loyalty to their shipyard. Once he urged a client to tell his story to a reporter, but the man refused, saying he did not want to embarrass the yard. Within two months the man was dead.

Starting with World War II, hundreds of thousands of workers have been employed by Hampton Roads shipyards. Estimates of the final toll of victims range from 2,000 to 10,000, and cigarette smoking is believed to play a heavy role in the tragedy. Meanwhile, ominous shadows continue to show up on chest X rays of those exposed to asbestos.

AT THE SAME TIME, the celebration of revolutionary birth is occurring in Norfolk. It was in the city, at the Eastern Virginia Medical School, that the nation's first test-tube baby was conceived. That was in 1981, and since then, the number of so-called in vitro births here has risen to more than 100. The procedure, whereby an egg is removed from a woman's ovary, fertilized in a dish by her husband's sperm, and then implanted in her uterus, was pioneered in the United States by Howard Jones and his wife, Georgeanna, both physicians. Their Norfolk clinic, called the Howard and Georgeanna Jones Institute for Reproductive Medicine, is now the largest and most comprehensive fertility center in the nation.

pavilions in Baltimore and Boston. The annual June Harborfest draws thousands of visitors; the proposed Cousteau Ocean Center would be located nearby.

Brenda and Robert Ruloff live in Virginia Beach, in a fine, tall house painted yellow, with views of trees and the ocean. He is a lawyer, and she, a former schoolteacher, is now very much a full-time housewife and mother. They are the parents of the first set of in vitro twins born in Virginia.

"I have to watch them all the time, but I'm not complaining," Brenda Ruloff said, as her 21-month-old boys, Michael and Robert, destroyed a few fragile toys. "All I have to do is remember how the sky opened up when I was told I had an appointment with the Joneses at the clinic."

The marriage had entered its 14th year, and pregnancy seemed impossible. Brenda was 36, and her last hope, she knew, rested with the clinic. Two eggs were extracted from her, fertilized with her husband's sperm, and replaced.

"I lay on my stomach for four days," she said. "Except for trips to the bathroom I wouldn't dare move, because I wanted it to take. But I knew I was pregnant, I just knew it." A little more than a week later, the confirmation came through. "I cried. I cried all over the school."

Michael and Robert, one a redhead and the other with curly golden hair, are healthy and joyfully thrashing their way through the inquisitive world of the very young. Their mother is with them through the day, not wanting to miss a thing. "Without science," she told me, "they wouldn't be here. We couldn't have done it alone."

The Eastern Virginia Medical Authority,

of which the medical school is a part, was established in 1964. Since then more and more attention has been drawn to the important advances in medical research being made here. Medical people of world renown are moving to Norfolk to be close to these new frontiers.

There is a Microsurgical Research Center, for example. Its director, Dr. Julia K. Terzis, has pushed surgery to new limits of sophistication with reconstructions of nerve networks and muscular regions using high-powered microscopes and instruments that are the silicon chips of medicine.

At the Foundation of Specialized Surgery, surgeons led by Dr. Charles E. Horton are doing phallic construction. "Say there is a baby boy who loses his penis in an accident," Dr. Horton said. "Up until two years ago he had no hopes of ever having a sex life. But now we can restore the penis, and do it so that there is sensation in the organ. We have done this with adults who have gone on to marry and have normal sexual relations."

Plastic surgeons and urologists make up Dr. Horton's team. "Our goal," he said, "is

to have the finest center for plastic surgery ever established in the world." Here plastic surgery has taken on new meaning as a medical tool, not only to correct a deformity, but also to relieve the crushing emotional distress that is its frequent companion.

ONCE EACH YEAR a team of specialists from the United States, led by plastic surgeons from Norfolk, travel to the Philippines, where for ten days they operate on 30 to 40 people each day, mostly children, correcting deformities such as

"Come over *for some pickin' and grinnin'," says bass player Elizabeth "Bobby" Slagle in inviting friends for mountain music in Portsmouth. When she and her husband bought their 1820s home 22 years ago, "parts of Portsmouth were pretty dingy, and the city started to tear them down. A lot of us wouldn't leave. Now it's boomtown." Neighbor Fletcher Carson is renovating his century-old green Victorian house* **(left)** *in Olde Towne historical district.*

***Urban renewal** means displacement for some inner-city residents, like part-time barber Ivan Boyd (**above**). He recalls the 1960s, when Norfolk leveled run-down sections in Ghent for middle-class housing and an area downtown for Scope, a 12,000-seat convention center (**left**). Now on Church Street he awaits the bulldozers with some bitterness. Though his community joined in planning redevelopment that includes a regional post office and mall, some shoestring merchants are left out. "How can we pay the high rent and still give a $3.25 cut to kids like Bryson Smith?" Boyd asks.*

harelip. There is no charge for the service.

And while they are in the Philippines, a doctor here, a Filipino by birth, is donating his services to a free medical clinic for migrant workers on Virginia's Eastern Shore.

Juan M. Montero II lives in Chesapeake, a sprawling, faceless city abutting the southern boundaries of Norfolk and Portsmouth and running all the way to the North Carolina border. "I thought America has been good to us, so we should repay it in some way," Dr. Montero told me as he nibbled on chocolate chip cookies in his office. "So we—a group of Filipino doctors here—decided to provide medical services on the Eastern Shore." At first they maintained a mobile clinic, but now there is a permanent facility there.

Montero was born in a bamboo hut in a paddy field on Mindanao. He came to the United States in 1966. "Then there were four Filipino doctors in the Hampton Roads area," he said. "Now there are 70 or 80."

THE FILIPINO COMMUNITY here numbers close to 20,000. Many are retired from the U. S. Navy, for it was the policy of the federal government for many years to allow Filipino nationals to join the Navy as stewards or mess attendants. They remain the largest group of noncitizens allowed to serve in the Navy, but now they can hold ratings in many fields.

The large number of foreigners in Hampton Roads sets Norfolk and Newport News apart from other southern cities. It has always been that way. Both are too wedded to the sea to be provincial. Many who arrived on these shores from other lands never ventured farther. They stayed and raised families. Their youngsters had a window on the world; almost always they could see a vessel at a pier, a ship with rust on its hull where it drooled bilge water. Usually there would be a crewman on the deck aft, dark-eyed and auraed with mystery. Sometimes he would smile at the youngster as if to acknowledge the envy; *he* got to sail to wondrous, faraway places, while others had to go home and get at their schoolwork.

And when did ships begin to call here?

It is enough to go back to the birth of English-speaking America as a settled land, to 1607, when three vessels reached Virginia

under the command of Capt. Christopher Newport. (One story is that Newport "News" referred to word dispatched to England that the settlers had arrived safely.)

But reach back even earlier: Between 1585 and 1590, some members of Sir Walter Raleigh's colony on Roanoke Island, in what is now North Carolina, may have come north by boat to live with the Chesapeake Indians in the Lynnhaven Bay area of present-day Virginia Beach. Before that the Spanish were here, including a few Jesuits, who, in 1571, were slain by Indians.

It was with the Jamestown settlement that heavier traffic began. "Gentlemen" adventurers arrived in Newport's three ships, and later other settlers came in ships that returned with great casks of tobacco and an Indian or two to satisfy the curiosity of Londoners for the sight of a savage. The Chesapeake Bay and Hampton Roads, along with the rivers, formed the bloodstream of the new land.

They named this first permanent English settlement after their king, James I. In the early years there were great hardships to

MICROPOGONIAS UNDULATUS

endure, not excluding the dire effects of eating a bad clam. The site they chose was swampy and fever-ridden, but the land beyond promised forests of tall pines for ship masts and good soil for crops. The wide and beautiful James River, along which grand colonial mansions would be built, teemed with fish. There was no industrial poison in the James then, no fish with milky, cataractous eyes in the Elizabeth.

At Jamestown today there is a re-creation of that settlement. It is still possible to stop there and find a piece of high ground, and

In thriving docks** on the Elizabeth River* ***(left) *a cruise ship is overhauled, oil and grain await transport, and military vessels get refurbished at the Norfolk Naval Shipyard, right. At Lamberts Point* ***(top)****, the Norfolk Southern rail system hauls some of the 41.4 million tons of coal that helps make the region one of the nation's top exporters of bulk cargo. Competing with Baltimore for containerships, the area has lured away several cargo lines.*

Aquatic life suffers; this Atlantic croaker ***(above)*** *has cataracts, probably from creosote-derived chemicals in the water.*

from there, hidden in the trees, look out on the river as a Paspahegh Indian may have looked out to see a shallop under sail with fair-skinned men aboard.

EVENTUALLY JAMESTOWN fell into ruin, after the capital shifted to nearby Williamsburg. This leaves Hampton as the oldest continuous English-speaking community in America. It began in 1610 when a small group of the Jamestown settlers moved southeast to the shore of Hampton Roads. Special events throughout this year are commemorating the city's 375th birthday.

For all of its association with the water, Hampton is best known as the place where the groundwork was laid for this nation's first venture into space. Here, at the National Aeronautics and Space Administration Langley Research Center, the seven Project Mercury astronauts trained. Before that, Hampton was chosen as the site for the first research laboratory of the former National Advisory Committee for Aeronautics, from which NASA evolved in 1958.

Had not Lyndon B. Johnson become President, NASA's Mission Control might have been in Hampton rather than Texas. "This area supplied the nucleus for the Johnson Space Center in Houston," said Maurice Parker, a NASA spokesman in Hampton.

Two-thirds of the work now done at the facility is basic aeronautical research, and the rest is space related. Here, new designs for aircraft are taking shape, and planes are being deliberately crashed in a search for improvements in safety. "One of the big problems in aviation is getting a plane across that bridge between subsonic and supersonic speed," Parker said. "They were having trouble getting the F-105 fighter bomber to fly supersonic, so the researchers here reshaped the fuselage, giving it a Coca-Cola-bottle shape with the wings joining at the indentations. It flew supersonic then."

Hampton is also the home of a highly respected university. Once called Hampton Institute, but now Hampton University, it dates from 1868 when it was founded by Samuel Chapman Armstrong, a Union general in the Civil War, out of what he felt was a need to educate former slaves. Since that time, Hampton has maintained a standard of excellence generally regarded as a leader among predominantly black universities. It counts among its graduates Booker T. Washington, founder of Tuskegee Institute in Alabama.

Hampton University sits on 204 acres of waterfront, in a tranquil setting of magnolias and peach trees. Indeed, of all the scenic water views, none are so fine as those in Hampton. On Chesapeake Avenue

Pork-and-peanut belt *flanks Hampton Roads, where the legumes were introduced in colonial times; hogs may have arrived on vessels from England. Suffolk—home of a major Planters peanut factory—processes one-fifth of the nation's harvest. Nearby lie Smithfield companies, famous for hams that required peanut-fattened hogs. Now to bear the label, hams must simply age* **(left)** *for six months in the James River town.*

"I brought home a time bomb," *says Hayes Louis Whiddon, standing at center, for 31 years a pipe insulator at the Norfolk Naval Shipyard. In 1973 pulmonary asbestosis, a lung disease caused by asbestos, was diagnosed. His liability suit was settled out of court. Meanwhile, asbestosis was diagnosed in his wife, Wyolene, and their sons, Hayes Louis Jr., right, and James, caused by fibers carried home in clothing. Worker safety is a top priority for ship repairers like Norfolk Shipbuilding & Drydock Corporation, where a painter* **(left)**, *masked by a respirator, sprays a rust-damaged cargo vessel.*

ES 1

owners of old, spacious houses with wide porches have Hampton Roads as a front yard, and their skiffs are tied to poles, rocking in the water not far from where the *Monitor* and *Merrimack* fought to a draw in the Civil War.

Being tidal water, Hampton Roads shows its mud, and when it does, Chesapeake Avenue and a large part of the region are bathed in a smell worthy of a very dead and very vengeful flounder. There are those here, however, who say they enjoy the bracing odor; not only does it signal, like Kleenex changing color near the end of the box, that the tide is running low, but it also announces that Hampton is a waterman's place.

IT WAS LATE EVENING, after dark, when Pete Freeman's boat, *Colonel's Lady II*, made dock off Bridge Street in Hampton. The other boats were in, and the clams and crabs they brought had been sold on the spot, taken away in gunny sacks and bushel baskets.

Freeman is one of the 50 or 60 working watermen in the Hampton area. His father, at the age of 81, continues to hand-rake for clams during the summer. Two of his sons are watermen.

Colonel's Lady II came in with 20 bushels of crabs from Freeman's crab pots in Chesapeake Bay, and they sold on the dock for $21 a bushel. "Sometimes in the summer, when the moon is full, you'll pick up maybe 14 or 15 barrels of crabs [three bushels to a barrel]," Freeman said, "but in the winter it's between 20 and 30 bushels. Today's price of $21 is good. Tomorrow it may be $15."

There are 8,700 working watermen in Virginia, and of those 2,800 take only crabs from the water. They have an association of which Pete Freeman has been president for

Learning rules of the sea road, *officers take the helms of scaled-down supply and amphibious ships at the Navy's Little Creek Amphibious Base* **(left)**. *From nearby Fort Story, soldiers of the Army's 11th Transportation Battalion, which saw action in Grenada, hike in full gear past the hotel strip on Virginia Beach* **(above)**.

Saying "we love you" *long distance, wives and children of a Navy crew serving a six-month stint off Lebanon record a videotape "familygram" to be flown to the amphibious*

the past 14 years. "One of our big goals has been to stop Marylanders from working around the clock in Virginia waters," he said, after paying off the two hands on his boat. "Yesterday the General Assembly passed a bill in our favor. We don't mind them coming down here and crabbing, but we don't want them to deplete our stocks."

Feelings have been running high among watermen here because of theft from crab pots. "It's the watermen doing most of it," Freeman said. "The banning of around-the-clock crabbing should help stop it."

With his boat hosed down, Freeman was ready to drive home. Before six o'clock the next morning he would be out again, a tall man wearing a baseball cap in the cramped wheelhouse, nosing *Colonel's Lady II* out to the bay. He reflected on his work.

"Right now conditions for watermen are as bad as I've ever seen them," he told me. "There's pollution, restrictions, and so on.

ship Ponce. *These dependents, among the 99,000 kin of 98,500 Navy personnel stationed in Hampton Roads, picnic near the Chesapeake Bay Bridge-Tunnel.*

There are so many people in the business now—over 8,000 as compared to 2,000 when I started 30 years ago. When you have that many people working in the water, it thins it out for everyone. If I gross $50,000 in a year, I can only take home $18,000 after expenses. Take a crab pot. They used to cost $2.20 each. Now it's $15."

But, for all of that: "I have worked hard and learned a lot from the water. I don't have any money in the bank, but I raised my family, and I have my house and two boats worth $30,000 each. That's about all you're going to do in this business, but if it's in your blood, it's enough. Yes, it's enough."

IT'S HEARD over and over here, how the salt water gets in your blood. They will tell you that natives of this place go away and make a lot of money and wear fine clothes and live in buildings with uniformed doormen. When they come back, however,

***Surf's down,** and sun tanning takes over during a surfing contest sponsored by the Virginia Beach Jaycees as a summer fund-raiser. This restricted strand at the Army's Camp Pendleton adjoins the famous seven-mile public one that has drawn beach*

lovers for years. Virginia Beach incorporated all of Princess Anne County in 1963, "to keep it from Norfolk." With 258.7 square miles and 321,700 people, Virginia Beach has thus become, without a discernible downtown, the state's most populous city.

when they drive south from Richmond along the fast road with off-ramps to Providence Forge, Toano, and Lightfoot, then they start to feel the pull of the water. It happens at about the time they pass the Mariners' Museum in Newport News.

It is now more than half a century old. There is nothing quite like it anywhere else. The Mariners' Museum has gleaned the best from the history and culture of seafaring. For example, it has one of the most extensive and important collections of ship figureheads in the world, including what may be the largest figurehead ever carved, a golden eagle weighing 3,200 pounds and with a wingspread of more than 18 feet.

The strength and mystique of the sea are addressed here with artifacts and displays and photographs. And the miniature model ships carved by August Crabtree.

There are model-ship carvers and model-ship carvers, but August Crabtree added a new dimension to the craft. There are 16 of his works here, representing 28 years of work. They are scaled one-quarter inch to a foot, and they were built with hulls framed and planked and with operable rigging. They stand on their mounts in perfect construction, none more than 52 inches long.

August Crabtree is now 79 years old. He started carving when he was in his 20s, and for many years he carried his collection around in a truck. "To carve miniatures, it helps to have good eyesight. Mine was always unusually good. I once took an eye test, and I started to read the chart from the bottom line up. The examiner got mad as hell."

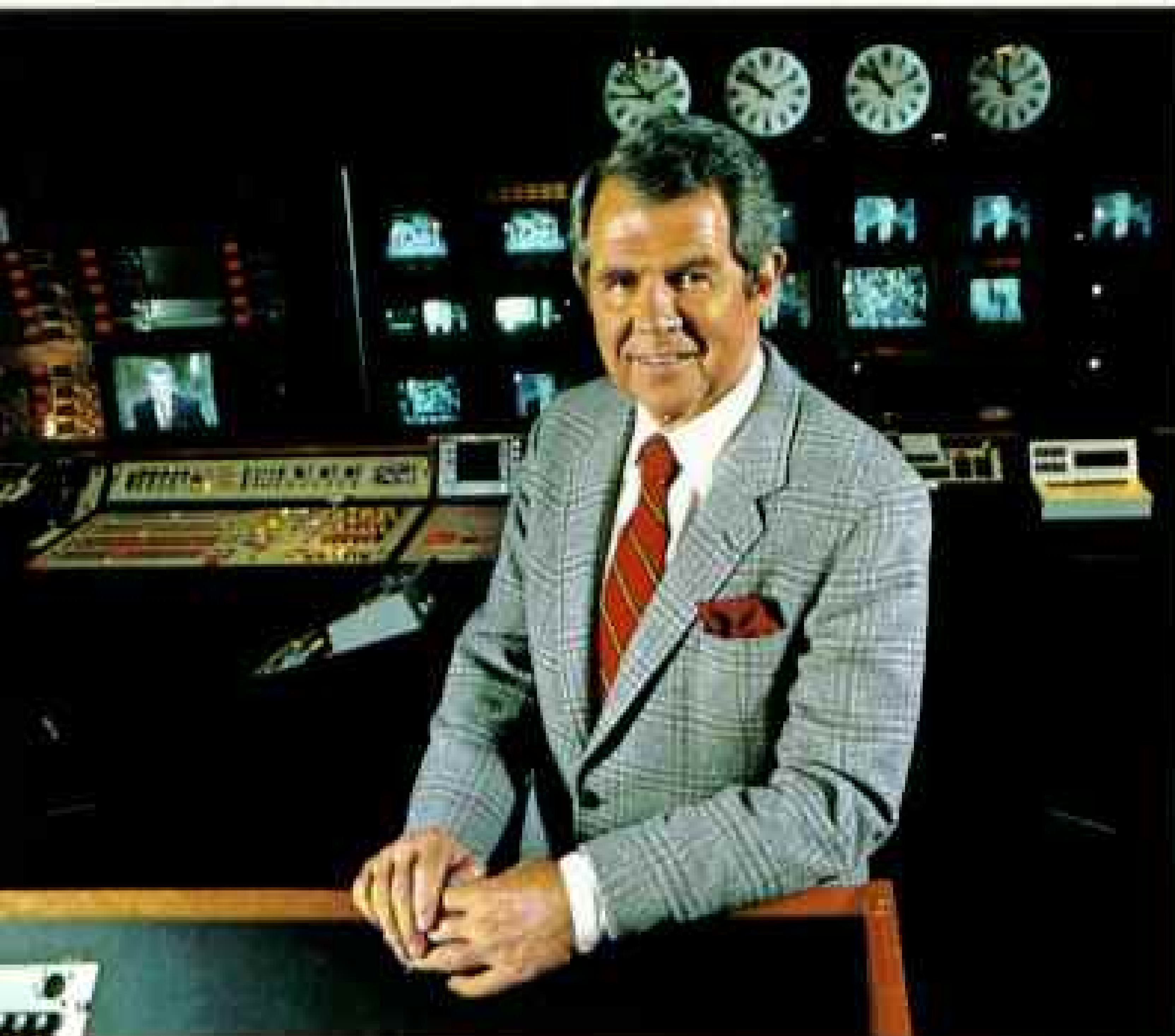
Crabtree carves models on commission,

"It's a roller-coaster program," *says Dr. Georgeanna Jones of the uncertainties faced by women trying to conceive through in vitro fertilization. At privately endowed Eastern Virginia Medical School in Norfolk, she and her husband, Howard, both gynecologists, pioneered the procedure to bypass blocked fallopian tubes. With a comforting word, Dr. Jones* **(upper left)** *sends a patient to surgery for removal of ova. Dr. Fred Weinstein* **(left)** *transfers fluid to a container for examination for eggs. Mature eggs will be united with sperm and inserted in the uterus.*

For Brenda and Robert Ruloff of Virginia Beach, their first try was a double success—twins in 1983. The weary father waits with Michael **(above)**, *while brother Robert gets a checkup at Children's Hospital of the King's Daughters.*

Two paths to Christianity *find expression in the area. Pat Robertson* (**below**) *founded the Christian Broadcasting Network in 1960 and now directs a national cable network, news bureaus in Washington, D. C., Jerusalem, and Beirut, and CBN University. As host of the 700 Club, he interviews guests "live from Virginia Beach."*

Preachers John and Anne Gimenez established nondenominational Rock Church, sponsor of this tent revival (**right**).



but his work does not come cheap. "A mathematician friend of mine figured out that I get three million dollars a pound," he said, smiling. Among his 16 pieces on display at the museum are an Egyptian seagoing vessel, a Roman merchant ship, and a Venetian galleass with three lateen sails and 359 carved figures. His masterpiece, he said, is a Dutch state yacht 19 inches long. "This is in my private collection," he said, "and probably will be until I kick the bucket."

The Mariners' Museum has, since its beginning, served as a symbol of the fast bond between Tidewater Virginia and the sea. Today, a man named Billy Moore is there to teach Newport News high-school students how to build a dead-rise boat, using no plans, only intuition and a reckoning called "rack of eye." Moore feels it is important that the tradition of building such vessels, made of loblolly pine, not be lost. Too much of it was lost to me in my years of growing up here. But I will remember forever the smell of crabs steaming, and the mounds of oyster and clam shells that rose as high as telephone poles around the processing plants. The fishing and fish I remember too: the croakers out of water, burping through their swan songs; the rockfish taking the sunlight in brilliant golden flashes.

There were boats, or boats abuilding, in the backyards of my neighborhood. And always there was the sight of a coal car riding high over Newport News, on an arc like a roller coaster, pausing only long enough to tumble over and dump its contents into a ship before righting and sliding down.

But that was all some years ago, and

many changes have since taken place. For one thing, the peninsula is now connected to Norfolk and the south side by a bridge-tunnel. That, more than anything else, has served to unify the Hampton Roads area. For statistical purposes, it is now classified as a single metropolitan area with a population of 1.2 million, the 29th largest in the nation. This consolidation also brings Hampton Roads within a link of joining the East Coast megalopolis, now stretching from Boston to northern Virginia.

Before the opening of the bridge-tunnel in 1957, Hampton Roads was crossed by ferry or the long James River Bridge. There was little interchange between the two sides. Peninsula residents crossed the water to go to Virginia Beach in the summer, and years ago high-school boys went across to see Rose La Rose on the stage of Norfolk's old Gaiety burlesque theater. Other than that, Norfolk and Newport News sniffed at one another and kept their distance.

Now the drive is on for even tighter unification of Hampton Roads. Some 25,000 workers cross the bridge-tunnel each day to reach their jobs. Still, on the peninsula especially, there is a reluctance to weld the identities of Newport News and Hampton with that of the south side, and a lot of it has to do with economics. The Newport News newspapers are not anxious for a circulation war with the Norfolk papers, and so the editorials counsel caution.

Nevertheless, bridge-tunnel traffic has increased each year since removal of the $1.25 toll in 1976. Advocates of a more unified greater Hampton Roads say the next

step is to eliminate long-distance telephone rates between the two sides.

Meanwhile, the cities of the whole region are moving ahead with redevelopment. The inner core of each is more or less a shambles, street after street left empty and ghostly in the wake of the flight of whites to suburbia. Once, Washington Avenue in Newport News was the artery around which the business and social life of the city revolved. The department stores and the restaurants were there, and the theaters, including the old Paramount where an organ the size of an army tank rose up out of the floor as the organist pounded out a thunderous rendition of "Tico-Tico." Now the street is like the Australian outback, with debris swirling in the wind around the shuttered buildings.

They have plans for Washington Avenue, plans to make it look like it never did before, with 17-story office buildings, a cultural center, open malls with trees, and much more. Thomas E. Ward, director of development for the city, has the model in his office, and he is optimistic. "We did not feel the recession of 1980-81 here, mainly because of the shipyard," Ward said. "With the administration's stated goal of having a 600-ship Navy, our employment situation remains, if you'll pardon the pun, on an even keel."

In Norfolk, too, there is decay, and there are plans to ream it from the core of the city. A good start has been made. Whites, mostly

***A new kind of boo** is given by the Hampton University band to rival musicians from Norfolk State at a football game (**right**); Hampton coach Charlie Brown (**above**) vents another brand of displeasure. The band publicizes the prestigious 117-year-old black school, which recently added programs for air-traffic control, banking, and marine science.*

young married couples, are moving back into the inner city, and an old section named Ghent is now a fashionable residential area.

Most of all, a development called Waterside, on the Elizabeth River, has contributed to the recent revitalization of downtown Norfolk. It is a festival marketplace, with shops and restaurants, surrounded by a waterfront park. A creation of James Rouse, who is also responsible for Baltimore's Harborplace, Waterside opened in 1983.

Of course, Norfolk is the financial center of the Hampton Roads area, and its cultural attractions outweigh those on the peninsula. Its museums include the Chrysler, counted among the top art collections in the nation. It has botanical gardens that come ablaze each year with flowering azaleas, and a convention and cultural center called Scope, capable of holding 12,000 in its hall. Jacques Cousteau has announced that he would like to open a 24-million-dollar marine research and exhibition center in Norfolk, but that is still in the design stage.

The city has the Douglas MacArthur Memorial, where the body of the late five-star general lies at rest surrounded by 11 galleries of exhibits tracing his colorful, and often controversial, career. The MacArthur Memorial is housed in Norfolk's former city hall, a neoclassic gem by the noted architect Thomas U. Walter, designer of the famous dome of the nation's Capitol.

In Virginia Beach there is no downtown

Newport News Shipbuilding
CHICAGO
SSN 721
Launching - October 13, 1984
NEWPORT
NEWS

***Launch!** The fast-attack submarine U.S.S. Chicago slides down greased ways into the James River, becoming the 38th nuclear-powered sub from one of the nation's leading shipbuilders, in an area long tied to the sea.*

to rehabilitate. The resort and bedroom city is like a cookie without a raisin in the middle. One of the more impressive sights in Virginia Beach is the large complex of buildings belonging to the Christian Broadcasting Network, Inc. Founded in 1960 by M. G. (Pat) Robertson, CBN now includes a university and one of the nation's largest cable television networks. The programming reaches 28 million households, offering such fare as a soap opera with a Christian theme, wherein Scripture substitutes for scandal.

IN THE END the visitor to Hampton Roads always returns to the water, and in the end, too, many ships come here to die. There are 155 vessels lying at anchor in the James River just off Fort Eustis. They are part of the reserve fleet maintained by the U. S. Maritime Administration. In truth, many will never sail again.

There are Victory ships, and Navy auxiliary ships, and, of course, the homely Liberty ships, the workhorses of World War II.

And sitting off alone in quarantine is the *Sturgis*, a vessel containing a nuclear reactor built to supply electrical power to isolated military installations. It has been in the reserve fleet for seven years and must remain there another 43 to ensure that the now emptied and sealed reactor presents no danger.

On a cold morning in January, ice on the James pushed against the hulls of the ships, against the hull of the *Sanctuary*, the last hospital ship to serve in the Navy, and against the *El Paso Columbia*, a huge tanker that ran onto rocks and tore its bottom while being towed to Europe for conversion to a bulk carrier. They all lay there, side by side, in groups of five and six, bow to stern.

Some will be sold for scrap to shipbreakers' yards in Spain. They will be put in tow and moved downriver to Hampton Roads, like bodies on gurneys, and when they get to where the river ends, they will go to sea for the last time. □

Iran Under the Ayatollah

Text and photographs by MICHAEL COYNE

THE IMAGE BANK

For three months recently, Australian photojournalist Michael Coyne was permitted to travel extensively in Iran and document aspects of life seldom seen by outsiders. His unique photo essay reveals the fervency of fundamentalist Islam under the mullahs and the brutal impact of the debilitating five-year war with Iraq.

Before hotels and public buildings in Tehran, Coyne photographed Iranians "walking on their enemies"—flags of Israel, the United States, and the Soviet Union. The U. S. field of stars is interspersed with Stars of David and the hammer and sickle in probably the only country where these symbols represent the common enemy. —THE EDITOR

FROM THE MOMENT I landed in Tehran, I was struck by larger-than-life images proclaiming the messages of Ayatollah Ruhollah Khomeini, the supreme authority who has injected religion into all aspects of Iranian life.

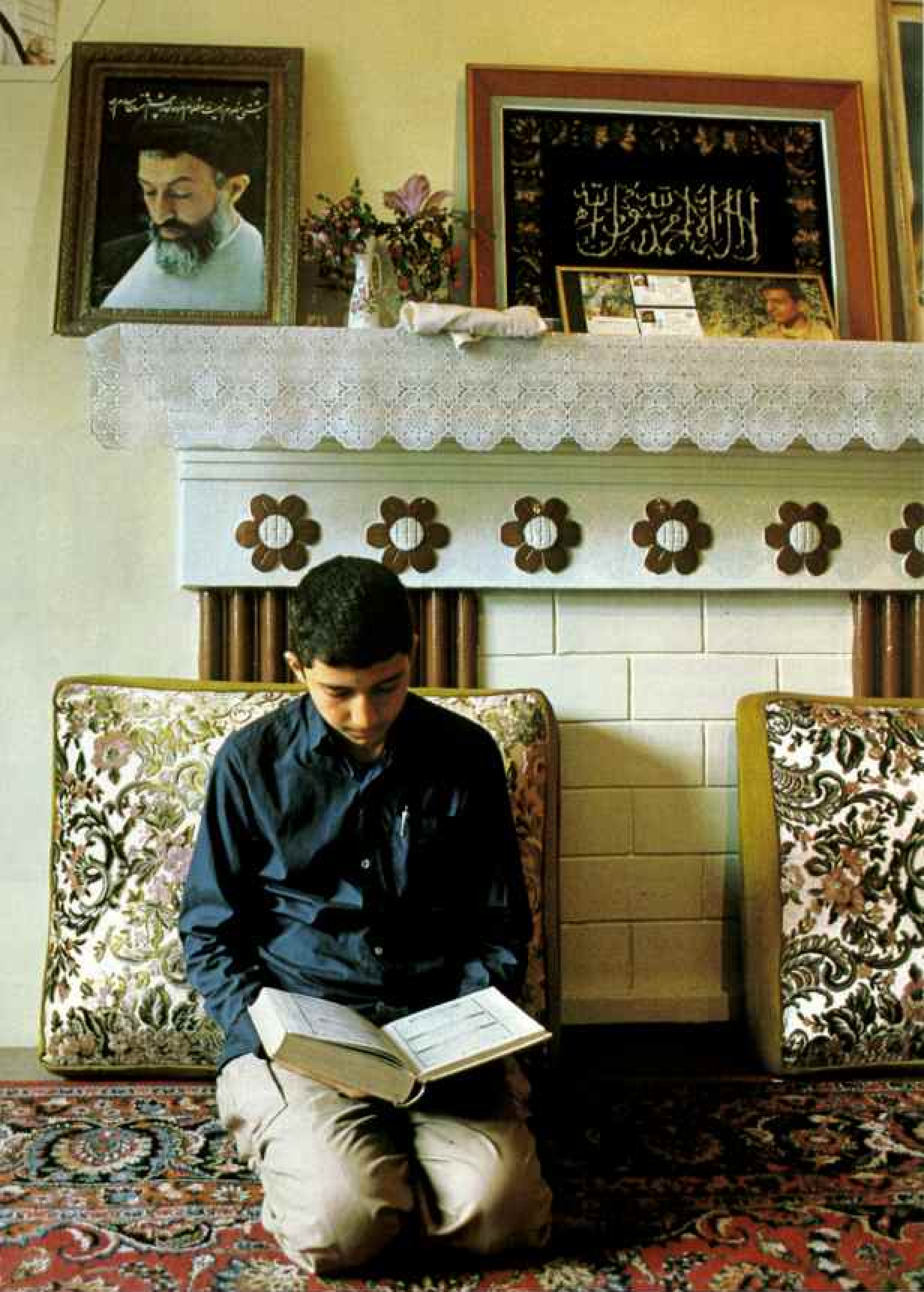
Wall posters and billboards show raised fists, blood-dripping rifles, and warriors striding into heaven—all in support of the five-year holy war against Iraq and its president, Saddam Hussein. This mural (***left***) of a child mourning a dead soldier reveals how emotions are kept high. Iran's mullahs, Shiite Muslim clerics, extol martyrdom, promising direct entry into paradise to all the fallen. Almost every home and shop I entered had a picture of a martyr.

A martyrs' fountain in the center of Mashhad bubbles with red-dyed water (***right***) that looks so much like blood I thought splash marks on my clothes would be permanent stains. Behind this fountain, photographs of local martyrs form a shrine.

On the streets I found no music or laughter, just the roar of traffic and the anonymous dark shadows that are Iran's women today, well covered from head to foot. They need not veil their faces but may not speak casually to men other than relatives. Clearly Iran has undergone a transformation.

I had come to this historic land with an Australian film crew headed by producer Robert Plasto, who was invited by the Iranian government to make a film about life since the 1979 revolution. Because we wanted to stay three months to observe, to hear, and to feel, we were given more freedom than most foreign correspondents. Though an official from the Ministry of Islamic Guidance accompanied me on trips outside the capital, everywhere Iranians were eager to receive me. Out of hearing of officials, they were amazingly frank. And yet almost everyone seemed pleased that the revolution had occurred and the shah was gone.

For 37 years Shah Mohammad Reza Pahlavi had tried to westernize Iran and bring it into the 20th century. He broke up large estates, gave women the vote, spread literacy, won high prices for Iranian oil in world markets, and allied his nation with the West, especially the United States and France. Yet he ruled like an ancient Persian king, despite the fact that his own father was of modest origins, a Persian Cossack officer who staged a coup in 1921 that led to the Pahlavi "dynasty." The shah's autocratic ways alienated many people including the mullahs, whose revered Ayatollah Khomeini had been exiled in 1963 for opposing reforms that he believed conflicted with Islamic law and morality. He went first to Turkey, then spent 13 years in Iraq. Opposition to the shah grew so strong that he was forced to give up his throne in January 1979. Perhaps a million Iranians—military leaders, professionals, and officials—eventually fled as well. But at least 37 million Iranians remained, and at first "we were ecstatic with the new freedom," one Iranian remembers. But Khomeini had returned from Paris, his last place of exile, and gradually the mullahs gained power, executing or exiling rivals. Khomeini declared Iran an Islamic republic on April 1, 1979. Then, in September 1980, Iraq invaded.



An only son goes to war

YOUNG MEN AND OLD alike are implored by the mullahs in the neighborhood mosques to volunteer for an irregular force to fight against Iraq. I asked to meet a volunteer, or *basij*, and my guide introduced me to 17-year-old Mohammed Reza Farajzadeh (***left***) and his family in southern Tehran. A gentle boy, he had briefly returned from the front to take school exams he had earlier failed. His room, where he was reading the Koran, was decorated with a snapshot of a friend killed in action, center, and pictures of Ayatollah Khomeini, right, and Ayatollah Mohammed Beheshti, a leader of the dominant Islamic Republican Party, who with more than 70 key politicians died in a 1981 bombing of party headquarters.

In a customary Muslim gesture at leave-taking, Mohammed kissed the Koran held by his father and passed under it three times (***below***). His father, Ali, his mother, Zahra, and two sisters spoke of their pride in sending their only son and brother to possible martyrdom.

Often in our five days together Mohammed told me he was fighting for Islam and for the revolution, and "if I become a martyr, that's Allah's will; if I come back victorious, that's all the better."

CHANTING "Down with America, with Israel, with the U.S.S.R.," Mohammed (second row, with headband) and other basij gather downtown. A dark banner proclaims "Allah Is Great"; Iran's green-white-and-red flag bears the word Allah in place of the royal lion. A sheep (***left***) is ritually slaughtered in the hope that its blood may substitute for that of the basij. Departing from the former U. S. Embassy, Mohammed bids friends good-bye (***right***).

IN THE WAR ZONE at small Spartan camps near Ahvaz, I was impressed by the sheer determination of the young boys preparing for combat under the Revolutionary Guards, a force of Shiite loyalists. Mohammed and his companions kneel for noonday prayers (***left***). Receiving minimal instruction, he listens intently (***below,*** sixth from right) as his commander describes land mines, such as this Italian-made antipersonnel mine, planted by Iraqis in front of their emplacements. Then the boy dons a headband with a phrase in Farsi invoking the blood of an imam (***right***); his socks proclaim "Death to Israel" (***lower right***).

When battle comes, basij are asked to volunteer as a human wave ahead of the regular army to disorient the enemy and clear the way of mines. The basij saw no action while I was present, and I have since been unable to learn the fate of my friend Mohammed.

The ayatollah speaks...

AND MEN LISTEN, go to the front, and earn martyrdom—or return, many with horrible wounds from mines or shrapnel. Rehabilitation centers are well stocked with braces and artificial limbs (*left*). This center was a mansion of one of the shah's generals, whose paintings were torn from frames and replaced, here with Khomeini and a poem by a Shiite mystic urging dedication to Allah. Men exercising new legs told me they wanted to return to the front, an impossible dream with their injuries.

The government also equips hospitals for maimed basij, encourages women to marry them, and provides pensions. I met two plastic surgeons from Australia invited for ten days to help rebuild bodies. They planned to repair the mouth of 14-year-old blind Kurdish shepherd Saleh Edin Fathi (**below**), who had stepped on an Iranian mine. His father, who sold most of his property to bring his son to Tehran, offered his eyes, but the boy was too badly injured for a transplant.

WAILS OF ANGUISH rise unceasingly (***left***) from the martyrs' cemetery, a growing section of Tehran's immense Behesht-e-Zahra Cemetery. Every Friday, the Muslim holy day, families visit the graves (***right***), each decorated with a flag, small shrine, and likeness of the deceased. On the cemetery's periphery, men dug more graves as war deaths mounted; Iran's toll has been estimated at 150,000 to 200,000.

Men usually mourn separately, many

beating their chests in an age-old Shiite rite. Several asked me to photograph their mourning party and send pictures to them. Of course I agreed.

At the grave of a naval officer (***left***), women heap offerings of fruit and flowers. Elsewhere a mother (***above***) throws herself into a fresh pit prepared for her son, her fingers clutching her chador, but immediately friends leap in to pull her out. Another woman cries, "Majid, you were your mother's hope for life."

As I walk about this soul-searing place, the wailing echoes from every side; death is everywhere. It seems like Armageddon.

AN INSTITUTION TRANSFORMED, Tehran University reopened after the revolution with segregated classes, and the Friday prayer service became a political platform. This day Hojjatoleslam Hashemi Rafsanjani, one of Iran's most powerful men, denounced foreign correspondents for

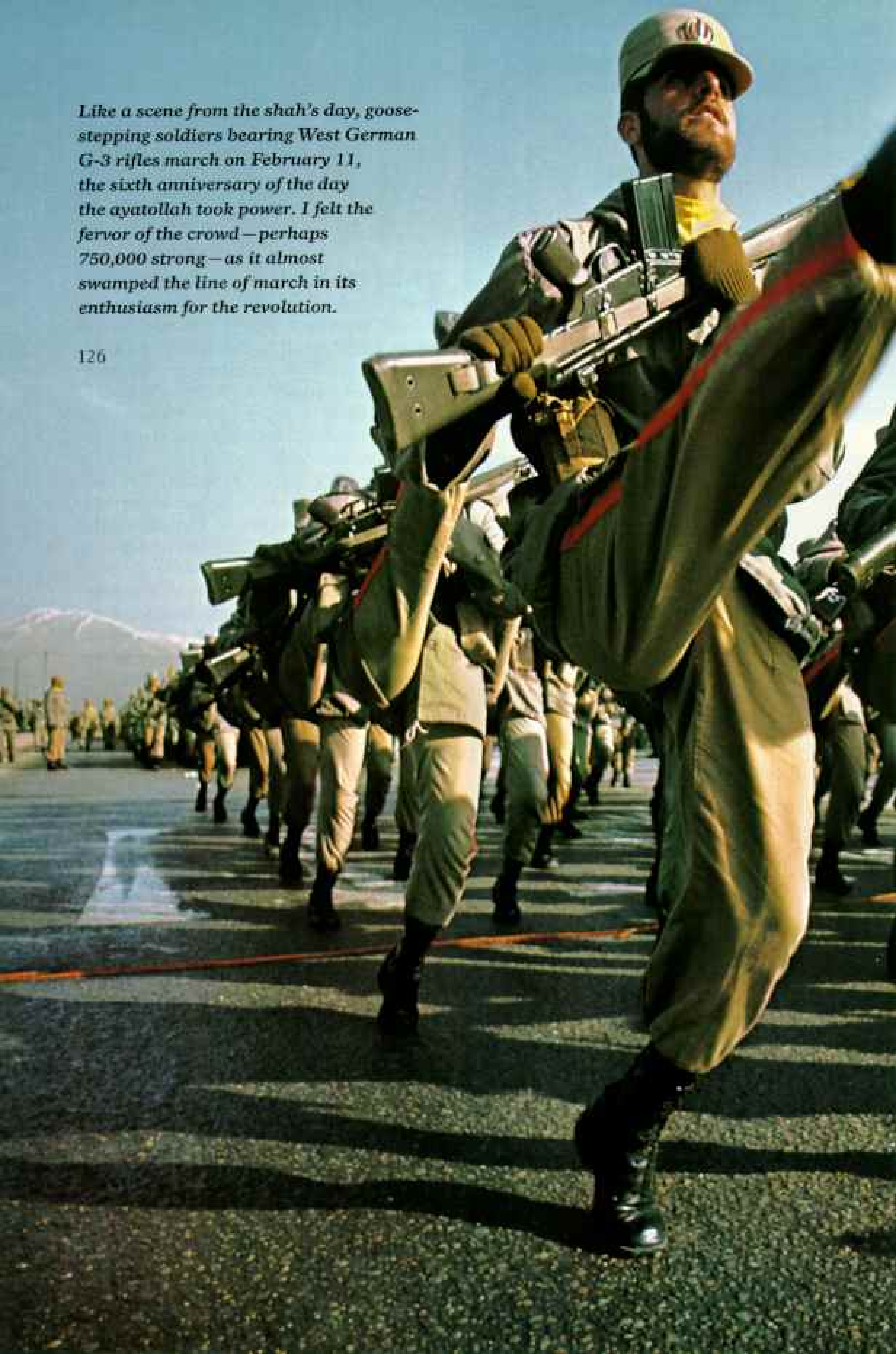
presenting a false picture. Some 30,000 men gathered under framework for foul-weather canvas; women listened in the streets. Worshipers were asked to donate blood for the war effort. A few weeks after I attended, a dissident rigged with explosives killed himself and several others here.

THE FORMER U. S. EMBASSY serves as a somber reminder of the 444-day hostage crisis that seared both the United States and Iran. On November 4, 1979, fundamentalist students stormed the compound, taking captives in an attempt to pressure the U. S. to return the shah to stand trial. The students refused to negotiate with moderate revolutionary leaders, then in power, leading to their downfall. The mullahs, gaining in power, agreed to the hostages' release when the U. S. freed frozen assets Iran needed for the war with Iraq.

After repeated requests, I was permitted to visit the embassy, still controlled by revolutionary students. The rear courtyard is a gathering place for basij going to the front (***above***). Offices serve as classrooms for training young Revolutionary Guards.

In a small ground-floor room I was shown bags of shredded documents (***left***), some of the embassy papers destroyed by Americans during the takeover. With the patience of Persian-rug weavers, revolutionaries were still untangling shreds and rearranging them until messages were legible. More than 50 volumes of documents, reconstructed or found intact, have been published so far in English and Farsi; the books include such commentary as "America, the great Satan, is manipulating Third World leaders to use those countries' riches and resources for its own gain," and "the U.S.S.R. manipulates Afghanistan for its own ends."

On the second floor I saw the conference room where staff meetings were held inside a heavy Plexiglas enclosure (***above, far left***) designed to foil bugging. Embassy personnel called it the Bubble; students said it was "the heart of Satan's power."



Like a scene from the shah's day, goose-stepping soldiers bearing West German G-3 rifles march on February 11, the sixth anniversary of the day the ayatollah took power. I felt the fervor of the crowd—perhaps 750,000 strong—as it almost swamped the line of march in its enthusiasm for the revolution.

CONSTRUCTION came to a halt when the revolution occurred, and some cranes in Tehran still sit idle (***left***) at projects started by the shah but stalled by the flight of finances and expertise.

I lived in a middle-class suburb of northern Tehran (***lower left***), where sometimes in the early morning, before automobile pollution filled the sky, the view of the Elburz Mountains was magical. Smart shops in my neighborhood carried fine imported clothing and gold jewelry, although soon after I left, the government closed 150 boutiques to curtail Western influence. Old Persian carpets were offered at reasonable prices, but a small one that I purchased was confiscated as I cleared customs.

Many Iranians were very hospitable, inviting me to family gatherings and telling me their views. Some, calling themselves true believers, rigorously adhere to the ayatollah's injunctions against alcohol, Western music, exposure of women, drugs, and criticism of the ruling party. Others, insisting that they are true Muslims too, said the ayatollah interprets the Koran in ways they do not believe, and they do not follow all his instructions in their private lives. In such homes I attended fashionable dinner parties that might have been set in my home city of Melbourne, or in Washington, D. C., or in London. But at night on the empty streets, roadblocks stopped cars for searches by Revolutionary Guards, who would confiscate alcohol and tapes of Western music.

Outside the capital I was fascinated by stunning scenery and the monuments of old Persia. As a non-Muslim I could not enter the Shrine of Imam Reza, the goal of Shiite pilgrimages to Mashhad, but I was allowed into its labyrinth precinct for a glimpse of the gilded dome (***right***) over the tomb of the martyr, the only imam buried in Iran.

WHEELS OF JUSTICE grind on in Branch 139 of the penal court in Tehran. I attended a murder trial there in January chaired by a mullah, Hojjatoleslam Javad Hojjati, assisted by his civil counterpart, Judge Nazari (***top,*** background); formerly such cases were heard only by civil judges. A butcher, Mostafa Masumian, was charged with "causing fear and terror in the southern districts of Tehran, involving a knife stabbing resulting in death" to his business partner, Hassan Salehi, in 1982. The accused (***lower***) denied everything, asking, "Where are the witnesses?" Shortly two men came forward to describe how Masumian assaulted his partner and slit his throat with a knife. Masumian refused to testify further, saying, "Talk to my lawyer."

The victim's wife, Monireh Salehi

(**above**), who brought the suit, asked the court why her family had to wait so long for justice. "I have two small children. . . . I demand *ghassas* [an eye for an eye]. . . . Mostafa was a menace to society . . . I will pull the rope to hang him myself."

I later learned the accused had a long criminal record and had been in jail until revolutionaries emptied the prisons after taking power. He was, the judges said, "a thorn in the flower garden" of society. After deliberation, they recommended death by hanging. Under Islamic code a victim's family can consent to forgive, and the accused is released. But Monireh Salehi had refused Masumian's offer of $60,000 as restitution.

She told me, "Things are better under the Islamic Republic. No more addicted teenage girls on the streets, or husbands drunk and carousing with other women."

SHOPPERS in an open-air market outside the bazaar in Esfahan consider dresses they would wear under their chadors or at home. At a ski resort on Mount Dizin (*left*), once frequented by the shah, men and women now ski on separate slopes with separate lifts. I was surprised to see this woman being taught by a man, probably her husband. If challenged, such couples must produce a marriage certificate, or face arrest. In their homes many women spoke against the new restrictions. Some expressed dissent in public by wearing a bright scarf or letting a lock of hair show. But nonconformity is risky. The Revolutionary Guards, who rove in patrol cars, arrest and lecture first offenders, who sometimes are sentenced to religious classes; repeaters are whipped or jailed. I wondered about the fate of the woman I saw arrested, wearing a fur coat.

Fresh fish and lamb overflowed this Tehran butcher shop (***right***) near my apartment; I saw no food lines or empty shelves, but inflation straps consumers.

THE MAJLIS, Iran's national assembly, elected for a four-year term, meets in a sumptuous hall built by the shah (***left***). From the balcony it looked like a religious service, there were so many turbaned mullahs. The first row is reserved for high government officials. As in any parliament during long-winded speeches, members walked around conferring with one another (***lower left***). With the film crew, I was permitted five minutes on the floor, a first for foreigners since the revolution, according to my guide.

Outside in the corridor, legislators sat on the carpeted floor consulting with concerned constituents, an old Middle East custom.

Some legislators are neither clerics nor members of the majority party, but they must be loyal to the revolution. The mullahs themselves divide along liberal and conservative lines over such issues as land reform. Many of the activists were educated in Faizieh Theological School (***upper left***) in the holy city of Qom, where Ayatollah Khomeini studied and had his political base.

In the world of Islam, with 850 million adherents, the Shiite branch is a minority, but it is an angry minority. Militant groups are increasingly active in Lebanon, Iraq, and the Persian Gulf States. Traveling in Iran was seeing militant Shiite rule in action, with every activity justified by religion, all "in the name of Allah." Leaving the country, I fully realized the meaning of a slogan seen on billboards everywhere: "We are neither East nor West, but Islam." □

Saving the World's Largest Flower

By WILLEM MEIJER

Photographs by EDWARD S. ROSS
CALIFORNIA ACADEMY OF SCIENCES

"THE MOST important discovery . . . was a gigantic flower, of which I can hardly attempt to give anything like a just description. It is perhaps the largest and most magnificent flower in the world . . . its dimensions will astonish you—it measured across from the extremity of the petals rather more than a yard . . . and the weight of the whole flower fifteen pounds."

With this letter Sir Thomas Stamford Raffles—British explorer, statesman, and founder of Singapore—reported the finding on May 20, 1818, of a wondrous flower in southwestern Sumatra. His companion, surgeon-naturalist Dr. Joseph Arnold, judged it to be the "greatest prodigy of the vegetable world." Named *Rafflesia arnoldii* in their honor, it is not only the largest flower but also one of the rarest and most mysterious.

A jungle parasite, *Rafflesia arnoldii* has no roots or green photosynthetic tissues. It emerges from the roots of wild vines of the grape family hidden in rain-forest litter, or sometimes from the lower stems of these climbing host plants. Growing from minute seeds no bigger than those of the poppy, it swells through the bark into buds resembling large heads of cabbage.

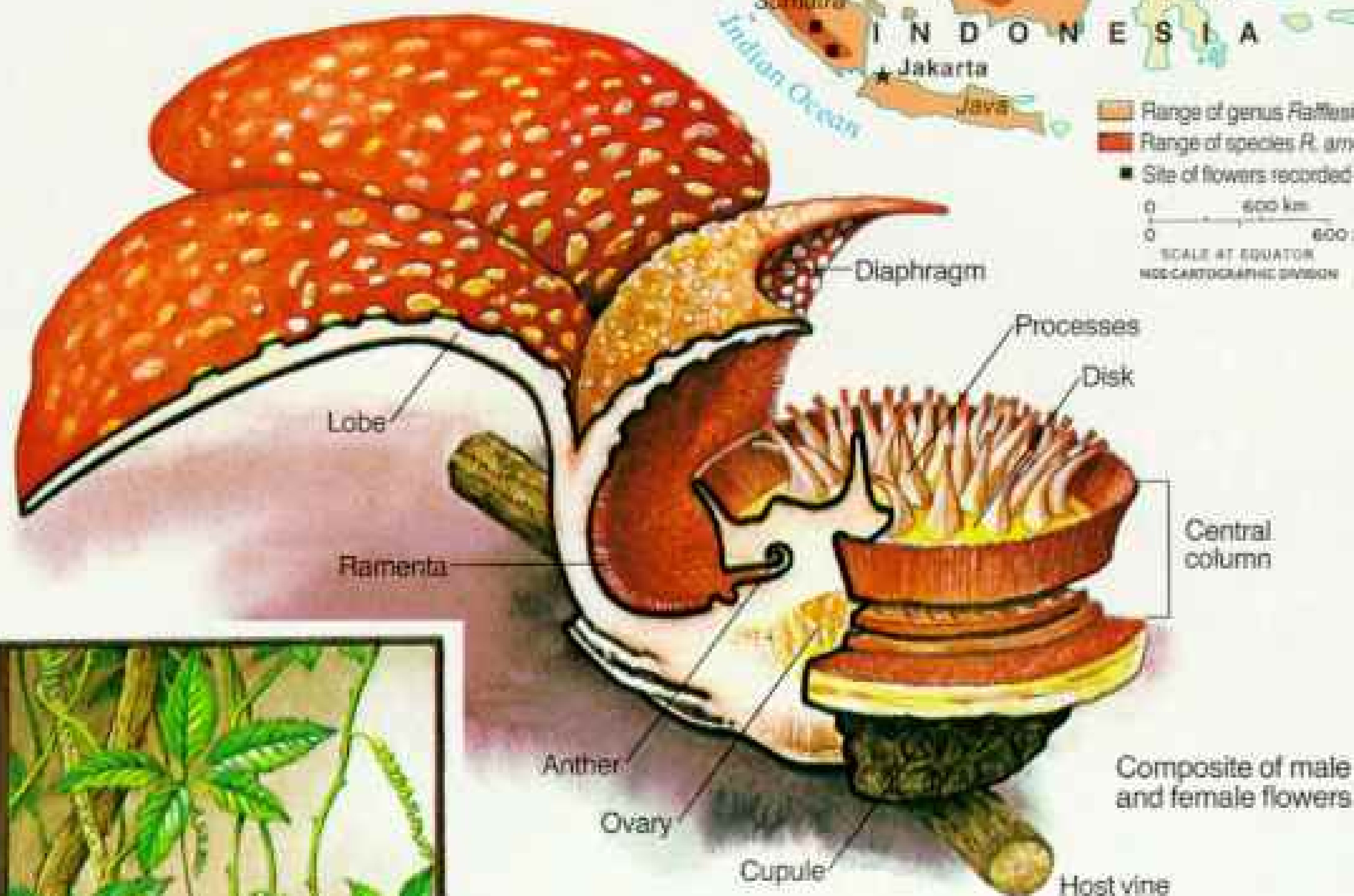
YVES LAUMONIER (LEFT)

Taking months to reach maturity, the flower blossoms (***above***) and then wilts within four days. Carrion flies are apparently the chief pollinators, lured by its smell—that of rotting flesh.

Rafflesia arnoldii blooms in a handful of localities on the islands of Sumatra and Borneo. Probably never abundant, its long-term survival is now seriously in question as rain forests fall to timbering, plantations, and settlements. As a professor of botany at the University of Kentucky, I have joined scientists and government officials in Indonesia to locate and protect viable *Rafflesia* populations. My work has centered on a hundred-mile radius of Padang, capital of West Sumatra. The reward of one long day's search was a newly blossomed flower and adjacent bud (***above left***) in a patch of jungle only a stone's throw from a cultivated field. Stretching 27.5 inches across, it was of average size. But I have measured a *Rafflesia* bloom as wide as 36 inches, and the unofficial record is 42 inches—about the height of a five-year-old child.

A research project supported in part by your Society

Into the heart of a blooming colossus



PAINTINGS BY MANABU SAITO

LIFELINE for a giant, the wild vine called *Tetrastigma lanceolarium* (**insert above**) is the most common host of *Rafflesia arnoldii*. But the nature of this relationship is just one of the many questions as yet unanswered about the flower.

In full bloom, *Rafflesia arnoldii* seems the figment of a flamboyant imagination. Pale patches, some raised like warts, cover the five leathery, petal-like lobes and extend to the underside of the gaping diaphragm. Rigid spikes known as processes cover the central disk that protects the ovary or anthers, depending on the flower's sex. Like many other plants, *Rafflesia arnoldii* occurs as male and female specimens that cannot be distinguished without dissection of the flowers.

Twelve other species of *Rafflesia*, some as showy as *Rafflesia arnoldii* but generally smaller, are native to Indonesia, Malaysia, Brunei, Thailand, and the Philippines. Two species have not been seen since World War II and may be extinct. Even on the ten nature reserves that hold these flowers their future is unpromising: Most sites are small, and flowers are few.

Attempts to cultivate *Rafflesia arnoldii* under monitored conditions began in 1981 when the Singapore Botanic Gardens started growing *Tetrastigma*. Recently seeds gathered on Sumatra were sown in the vine bark. Such an experiment was tried once before in 1854, when it

proved successful.

How this planting occurs in the wild is debated. Some botanists think that seeds from the mushy fruit of a pollinated female flower are picked up on the hooves of deer and pigs and then trampled into breaks on the host vine. But I propose that the more probable agents are common ground squirrels that feast on the fruits and very likely plant the seeds as they gnaw on the bark and roots of the host vine, searching for food. Sticky pulp and small nubs on the seeds may also attract ants and termites, and perhaps these insects help disperse the seeds.

How the seeds start to grow is not known, but slowly filaments of *Rafflesia* tissue spread inside the vine, apparently without harming the host. About a year and a half will pass before a bud bulges through the surface. At two inches wide, this newly emerged bud (***top***) will grow for nine more months before flowering. The woody cup of vine tissue, known as the cupule, is joined to its base and acts as a pedestal.

Blossoming over a period of four days, the flower quickly draws pollinating flies with its fetid odor. Squirrels, too, reportedly seek the nutritious pollen, nibbling through a bud to eat the anthers. Such was the fate of this flower (***center***). Its severed lobe fell to the ground upon opening.

Its lobes quickly curling and darkening, *Rafflesia arnoldii* dissolves within a few weeks into a slimy shadow (***bottom***). If the flower is female and pollinated, the central column with the ovary remains and within seven months grows into a half-rotten fruit chock-full of thousands of seeds.

YVES LAUMONIER (ABOVE AND BELOW)

FLY'S-EYE VIEW: Two of some forty anthers of a male *Rafflesia arnoldii* ooze sticky yellow pollen (**left**). Bristles surrounding the sex organs may guide one of the pollinating agents, *Chrysomyia megacephala* (**below**), to perches below the pollen. The flower's powerful fly-attracting scent may be produced by the shaggy, dark red structures, called ramenta (***bottom left***), that carpet the inside of the flower below the diaphragm.

Local tradition attributes special virtues to *Rafflesia*, most of them sexually related. The swelling buds remind people of human pregnancy. A Malay midwife told me that bud extract is still prescribed for women after childbirth to shrink the womb and restore the figure.

The most frequently used local name of *Rafflesia* is *bunga patma:* bunga meaning "flower" and patma from a Sanskrit word for "lotus"—a symbol of fertility. Some reports on the flower have sensationalized its name to "corpse flower" or "stinking corpse lily," but either one misses the point. In my 30 years' experience with *Rafflesia arnoldii*, I have found that people fortunate enough to see this fleeting spectacle are overwhelmed not by its scent but by its beauty. □

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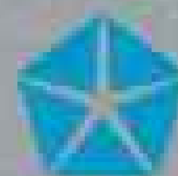

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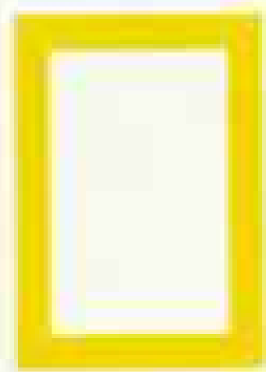

Canadians and Americans will continue the pressure

OUR SOCIETY has nearly as many Canadian members in relation to population as it has U. S. members. So when acid rain was on the agenda of the so-called Shamrock Summit in the city of Quebec this past St. Patrick's Day, between Canadian Prime Minister Brian Mulroney and U. S. President Ronald Reagan, it meant something to many people we consider important friends.

Acid rain not only is a physical phenomenon, but it also involves a long series of tough problems with as yet uncertain solutions in international economics and politics. It is estimated that 50 to 70 percent of the acid rain that falls on Canada has its origins in the United States, and that 10 to 20 percent of the U. S. total comes from Canada.

It's easy to dwell on differences between neighboring but very different nations, but I recall one incident of cooperation that is a useful symbol. It was at Baddeck, Nova Scotia, in February 1909 that four men, two Canadians and two Americans, launched *Silver Dart*, the first powered aircraft flown in Canada. The pilot was a Nova Scotian, J.A.D. McCurdy, the other Canadian a young engineer, F. W. "Casey" Baldwin; the Americans were motorcycle builder Glenn H. Curtiss and my great-grandfather Alexander Graham Bell. But the team was bound by mutual interest in flight, not divided by nationality. They were there *to get something done*. And there was another member, Bell's wife, Mabel Hubbard Bell. She had put up the money for *Silver Dart* and was, in effect, a one-woman foundation for the encouragement of aviation in Canada.

GARGOYLE ON CANADA'S PARLIAMENT BUILDINGS IN OTTAWA CORRODED BY AIR POLLUTION. PHOTOGRAPH BY TED SPIEGEL, BLACK STAR

Interest in Canada still runs deep in my family. I serve as a trustee of the William H. Donner Foundation in the United States. (The Donner Canadian Foundation is among that nation's largest.) An Indiana-born industrialist, Donner was committed to Canada, and the foundation today fosters the advancement of U. S.-Canadian relations, including better management of both ocean and inland water resources, reduction of acid rain, and other mutual concerns.

It has funded studies of joint U. S.-Canadian use of the Great Lakes, of the future of the Niagara River and its falls with respect to hazardous waste, and of how to strengthen each nation's environmental statutes to promote "more decisive bilateral problem-solving on acid rain and other transboundary air pollution problems."

Many threads of my life are woven across the long border that provides no defense against acid rain. Concerns about the rain's killing effects have worked their way up from the grass roots on both sides of that border, up through scientific studies, up through citizens groups and foundations, and up through elected officials. Prime Minister Mulroney and President Reagan made a grand start in cooperation at the chief-of-state level. Experience suggests that ultimately Canadians and Americans at the grass roots will continue the pressure until solutions are found, and that they will cooperate in paying the price *to get something done*.

Gilbert M. Grosvenor

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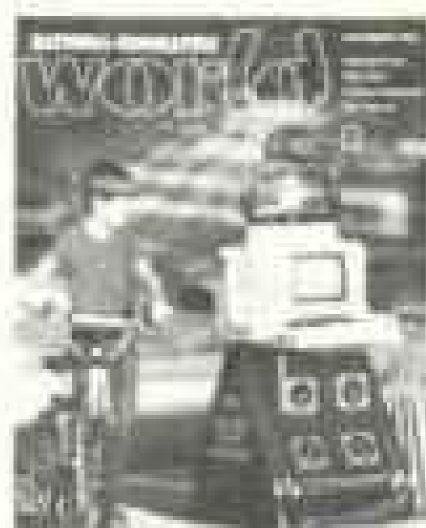

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Members Forum

Hazardous Waste

"Storing Up Trouble . . . Hazardous Waste" (March 1985) was the most informative, enlightening article I have read on the subject in years. Everyone wants to get rid of toxic waste properly, but the same people have the NIMBY complex—"Not In My Backyard!"

Thomas A. Spithaler
Evans City, Pennsylvania

I was appalled by your picture of the Ben K. Kazarian (BKK) toxic-waste dump in West Covina. Our family has suffered physically, emotionally, and financially from this dump. Nothing was mentioned about the 19 families who were evacuated because of the explosively high levels of methane and high levels of vinyl chloride, benzene, and other cancer-causing chemicals.

Geraldine Gilman
Brea, California

Potential explosion from high methane levels caused the evacuation of 21 families. Inspectors later detected vinyl chloride and benzene.

It was impossible to go into detail about all the waste sites. Those we cited, with accounts of the tribulations of the local inhabitants, seemed representative of our chemical graveyards.

As a public-health sanitarian, I have had civic-minded citizens call for help in disposing of hazardous waste legally and appropriately. I am run through a myriad of buck-passing: State Pesticide Branch, State Health, Dept. of Ecology, EPA, all saying, "Not me." It's no wonder hazardous wastes get dumped into septic systems, landfills, ponds, and the roadside ditch.

John R. Templar
Lacey, Washington

I was amazed that you did not even mention the most hazardous waste of all: nuclear waste.

Althea Reustle
Cerrillos, New Mexico

We limited our coverage to toxic chemical waste, a subject of broad ramifications. The problem of nuclear waste was discussed in our April 1979 article "The Promise and Peril of Nuclear Energy."

The cover picture was ironic in that several hazardous wastes probably were produced to manufacture the person's protective clothing—from the hard hat to the boots. And the clothing itself probably will be considered hazardous waste once it is discarded.

Nick Russian
Central City, Pennsylvania

Susquehanna River

Snaking its way through three states, the Susquehanna (March 1985) ought to remind us of the undeserved gifts we've received from waterways as they etch abidingly across our national landscape. Oh, that men could be as forgiving of intolerable insults as rivers have been of hazardous waste.

A. Wayne Adam, Jr.
Ottawa, Ontario

A very good portrayal of the river and its environs. Pages 382-3 picture a fisherman knee-deep in the stream, a shotgun secured to his waist "in case a duck wings by." Where do his fellow fishermen go for cover when the man with the gun slips on the algae-slick bottom as he takes aim?

Walter T. Assur
Falls Church, Virginia

Talk about unsafe logging practices. The faller shown on page 364 wouldn't be allowed in the woods here on Vancouver Island. No hard hat, no earmuffs, no safety visor, no visible safety whistle, too loose upper clothing, too tight pants, no faller's pants or chaps, and the straight back cut on that tree probably didn't have an undercut to direct its falling. Your photographer is very lucky the tree didn't tilt sideways toward him.

Dick Yates
Nanaimo, British Columbia

Viking Trail

I'm writing to thank Robert Paul Jordan, Jim Brandenburg, Michael A. Hampshire, and the Society for the magnificent article "Viking Trail East" (March 1985). I've never been so captivated by a GEOGRAPHIC story as I was with this one!

John R. White
Owensboro, Kentucky

The claim that the name "Slav" is derived from the Latin or Greek word for slave is disputable. In my native Ukraine I was taught that the name derived from *slovo*, which means "word." The name could also have been derived from the Slavic word *slava*, meaning "glory."

Leo Wysochansky
Westwood, Massachusetts

As many readers have pointed out, we put the cart before the horse. The Latin Sclavus *and Greek* Sklabos *originally meant "Slav," borrowed from the Slavs' word for themselves, "Slovene." The secondary meaning was "slave," probably arising from the many Slavs who were captives.*

The minarets of the splendid Hagia Sophia in the painting (pages 286-7) belong to a different historical era, the Muslim conquest of Constantinople on April 11, 1453.

Carla Sansom
Westlake Village, California

The towers in the painting are not minarets but columns—topped by figures—honoring Constantine, Justinian, and a war against the Goths. Long ago destroyed, the pillars reportedly rose 100 to 120 feet and acted as beacons to mariners approaching Constantinople.

Being of Latvian descent, I was particularly pleased about your fascinating article "Viking Trail East." In it you mentioned an antinuclear youth festival in Riga, Latvia. When I was in Riga, several of my student friends told me participation was absolutely obligatory. The banners were supplied by the officials. The students with whom I talked said they didn't want the West to disarm unilaterally. They wanted Russian missiles out of Latvia, and they supported a nuclear-free zone around the whole Baltic Sea, including the Soviet side.

Maija V. Hinkle
Ithaca, New York

Miniature Horses

In reading "Miniature Horses" (March 1985), it brought to mind a conversation between my two sons several years ago. Stephen, then 13, mentioned that he was surprised to learn that at one time horses had only been about a foot tall and through evolution had grown so large. Jonathan, then three, looking up at his brother, said in all seriousness, "Gee, Stephen, how big were the cowboys?"

Jean Dreher
Butler, Pennsylvania

On page 392 the author refers to "siliceous grass." What is "siliceous grass"? My dictionary defines "siliceous" as: containing, resembling, pertaining to, or consisting of silica. Silica (or sand) is found, I believe, in glass, but not grass. Anyway, what's the difference between forest and plains grass other than that the latter is more dried out by sun and wind?

Ron Klingbeil
Chicago, Illinois

Blades of grass do indeed contain silica from the soil, making a coarser diet for the early horse as it moved onto the plains from the forest, where it lived off the soft leaves of trees and bushes.

The smallest breed of horse is the Falabella, bred by Julio Falabella and developed over a period of 45 years by crossing and recrossing a group of undersized English Thoroughbreds with Shetland ponies. Ironically, Julio Falabella also bred the

tallest horse, Firpon, which stood 21.2 hands (7 feet 1 inch) and weighed 2,976 lbs.

Lesley Duston
Branson, Missouri

Falabellas (along with other miniatures) are not a separate, registered breed, nor are they smaller on the average. However, Señor Falabella reported the smallest he raised stood 15 inches.

Mongolia

I enjoyed your article on Mongolia (February 1985). However, on reading the statement implying that the Communists overthrew the tsar, I saw red. History tells us there were actually two revolutions. The first was in March 1917, when the tsar was overthrown and a provisional democratic government established. The Bolshevik party took no part in this. The provisional government headed by Kerensky was overthrown by the Communists.

Henry A. Shave
Peach Bottom, Pennsylvania

Northern Approaches Map

On your supplement to the February 1985 magazine, you state "King Philip's War of 1675-76 was one of a number. . . ." Of which realm was this monarch the king? At this date King Charles II was on the English throne, Louis XIV on that of France, and the imbecile Charles II on the Spanish throne.

Joan C. Darwall
Malmesbury, Wiltshire, U.K.

King Philip was an Abenaki Indian chief who led an attack on the English in reprisal for an incident he considered a violation of a truce.

Members Forum and Manatees

The letter in your January 1985 issue on manatees in Lake Kariba is totally false. Manatees have never been introduced. The vegetation problem, I think, refers to *Salvinia molesta,* more commonly known as Kariba weed, a species of water fern. Fluctuating water levels reduced the weed cover, and the introduction of a weed-eating grasshopper *(Paulinia acuminata)* was felt to be a factor in controlling the growth.

Mrs. Robin H. Gardner
Lake Kariba, Zimbabwe

Letters from our readers often contribute information. Unfortunately, it is not always possible to verify all the statements in a short time frame.

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.*

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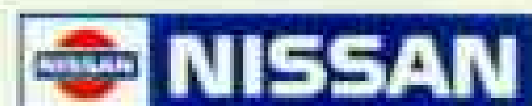

PEOPLE
THE Z CAR AND
CAR REVOLUTION.

On Assignment

"I NEVER TURN AWAY from my subject. I might miss something," says National Geographic photographer ***James L. Stanfield.*** "You have to keep watching. The more time you spend with people, the better off you are." Jim practices what he preaches as he photographs Jews at the Western Wall in Jerusalem (***right***) for our Israel story (pages 2-39)—his 36th photographic byline in the magazine.

Getting close to his subjects for other stories, Stanfield has lived with Bedouin in tents, with the monks of Mount Athos, Greece, with a Mongolian family in a yurt, and with a hermit on a Potomac River island. For a memorable coverage of rats, he stayed up all night in a Bombay grain warehouse to photograph rodent depredations.

Writing member of the Israel team, ***Priit J. Vesilind*** (***below***) interviews a Jewish woman who moved with her family to Hebron on the West Bank, where many people think the Patriarch Abraham is buried. Here in 1929 Arabs massacred 67 of the town's Jews. This woman is part of the Gush Emunim—"bloc of the faithful"—who say they have a God-given right to reestablish a Jewish presence in ancient Jewish lands.

"I think I can understand how Jews feel when they come back to Israel," says Vesilind, who revisited his roots in 1980 for a story on his native Estonia. He had fled with his family as a youngster when the Soviets occupied the country in 1944. "I felt I was among my own people," he remembers. "There were lots of Priits there. It was the first time in my life I didn't have a funny name."

BY THOMAS R. SMITH, NATIONAL GEOGRAPHIC STAFF (ABOVE) AND JAMES L. STANFIELD

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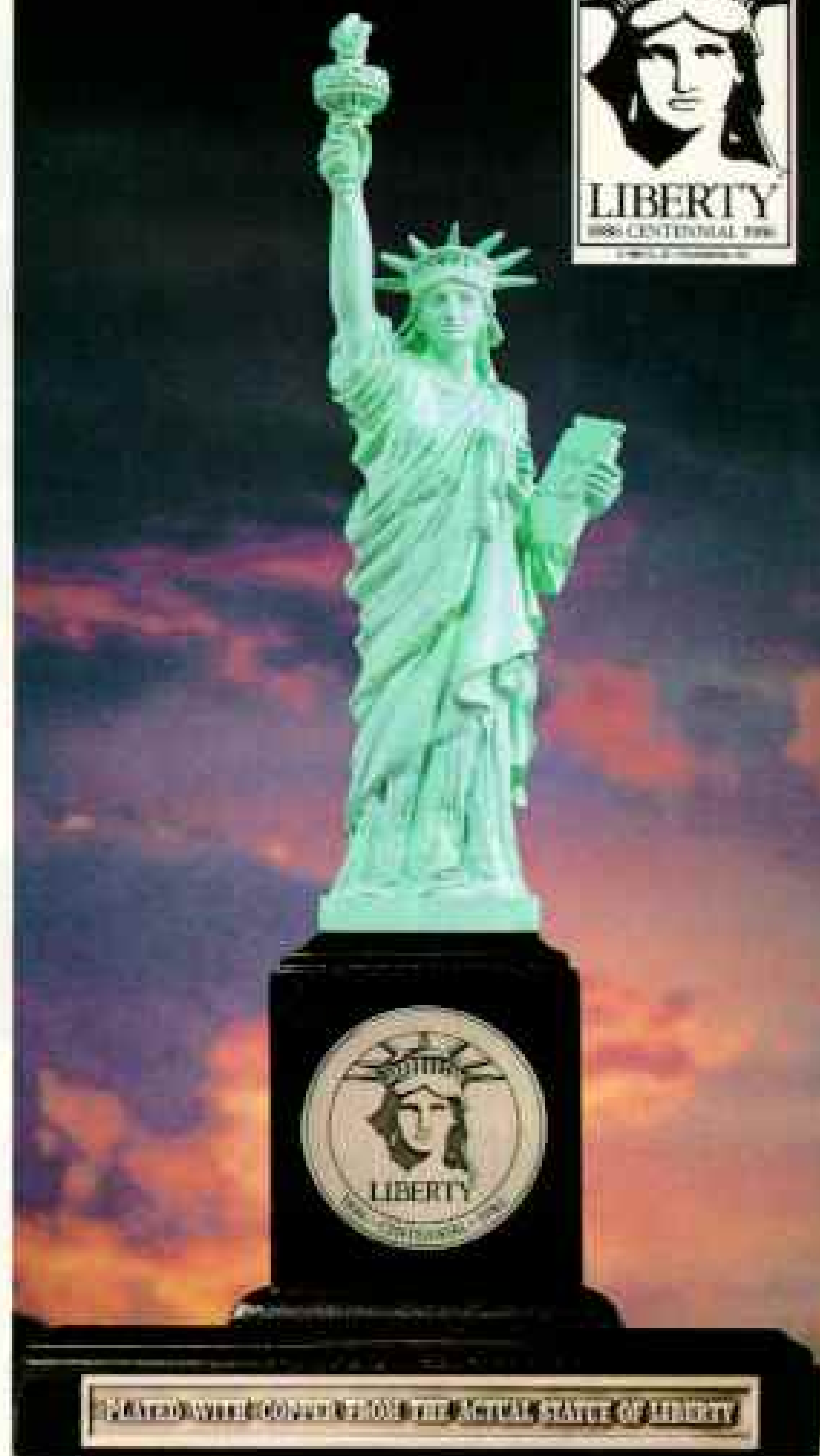

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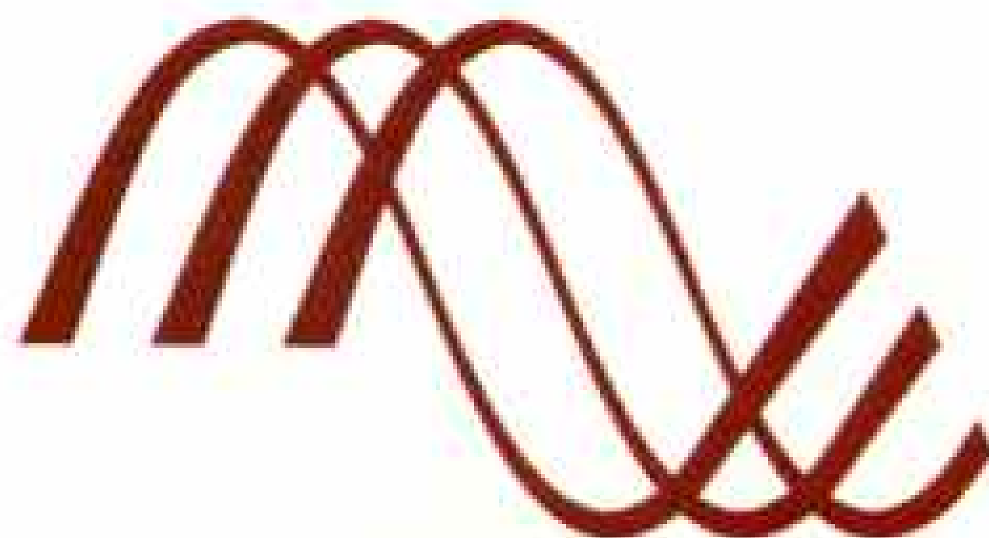

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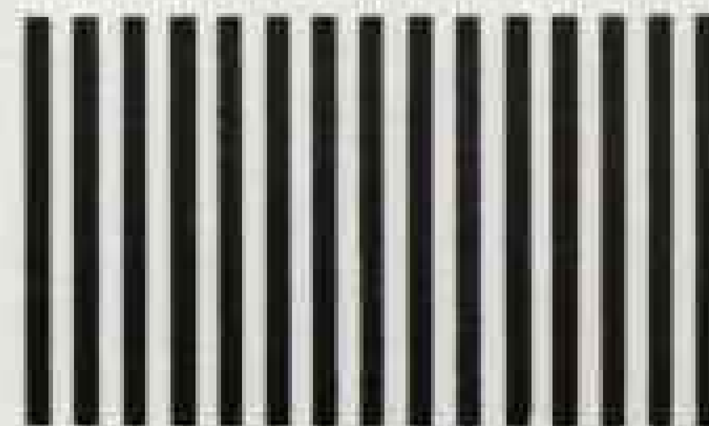

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1. Are you now or have you ever worked in a noisy place? ☐Yes ☐No
2. Do you hear people speaking, but have difficulty understanding the words? ☐Yes ☐No
3. Do you have difficulty understanding on the phone? ☐Yes ☐No
4. Do you have to turn the radio or television up louder than normal? ☐Yes ☐No
5. Can you hear car horns, sirens, or other warning signals when they occur? ☐Yes ☐No
6. I am now wearing: ☐Cord Type ☐Behind-the-Ear-Type ☐In-the-Ear-Type ☐Eyeglass Type ☐No Aid

Please tell me more about Miracle Ear, the custom-made canal aid without cords, tubes, or wires.

Name (Please Print) ____ Telephone ( ) ____

Address ____

City ____ State ____ Zip ____

NG-140

Miracle Ear

— TAPE OR STAPLE HERE —

The last time she saw England.

The newlyweds were off to live in America. She had put off saying good-bye until the very last moment.

As always, he had something for her: an antique cameo brooch. "It was your mother's," he said. "I know she'd want you to have it." Then she tried to put her feelings into words.

But how do you begin to tell the person who single-handedly raised you how much you love him?

Call England. Ten minutes can average just 76¢ a minute.*

Saying good-bye is never easy—but saying hello is, with AT&T. A ten-minute phone call to England can average as little as 76¢ a minute.

Just dial the call yourself any night from 6 pm until 7 am.

If you don't have International Dialing in your area, you'll still get the same low rate as long as special operator assistance is not required.

AT&T International Long Distance Service.

England		
Rate Level	Average Cost Per Minute For a 10-Minute Call**	Hours
Economy	.76	6pm–7am
Discount	.95	1pm–6pm
Standard	$1.28	7am–1pm

Average cost per minute varies depending on length of call. First minute costs more; additional minutes cost less. All rates are for calls dialed direct from continental U.S. during hours listed. Add 3% Federal Excise Tax. For further information, call our International Information Service toll free **1 800 874-4000.

*During Economy time periods.

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AT&T

The right choice.

© 1985 Toyota Motor Sales, U.S.A., Inc.

Fun is taking the all-new MR2 out to play. So much fun and so well thought-out, this mid-engine two-seater has won *Motor Trend's* Import Car of the Year Award.

Slide in and prepare to blast-off. Punch the accelerator and the tach snaps to the 7,500 rpm red-line while the Twin Cam, 4-valve-per-cylinder, TC-16 Electronically Fuel-Injected engine builds a sweet resonance behind you.

Fire lightning-fast through the 5 gears. Rush from 0-60 in 8 seconds flat. Reel in the road and get ready for love at first corner.

The 45%/55% front/rear weight distribution created by the MR2's mid-engine design gives you superior balance for excellent road-holding ability. And four-wheel independent suspension, stabilizer bars front and rear, gas shocks with rack-and-pinion steering and light alloy wheels with performance radials give you cornering confidence.

MR2's interior adds to the experience by creating comfort and efficiency that puts nothing in fun's way. A 7-way adjustable driver's Sport Seat offers snug support. Full instrumentation is unobstructed. And special options include a moon roof and a startling AM stereo/FM/MPX stereo receiver with an auto reverse cassette.

MR2. Affordable and reliable because it's a Toyota. A winner for the same reason.

Take it out to play and just try to stop shouting, "the fun is back."

OH WHAT A FEELING!
TOYOTA

BUCKLE UP—IT'S A GOOD FEELING!

TOYOTA'S 16-VALVE, MID-ENGINE 2-SEATER WINS MOTOR TREND'S "IMPORT CAR OF THE YEAR." THE FUN IS BACK!

MR2

OMNI

TRANSMISSIONS. NO EXTRA CHARGE.

With Dodge's two great Transmission Discount Packages on Omni and Charger.

CHARGER

Dodge Omni and Dodge Charger have always been economical. And together they've proven their value over 38 billion front-wheel-drive miles.

Now we've made Omni and Charger even more economical... with a choice of two option packages, and discounts of up to $447*

Purchase the spirited 2.2 liter engine, power steering and other popular options in Dodge's Automatic Transmission Discount Package, and you'll get the automatic shift at no extra charge—a $439 discount*

Or purchase the options in the Manual Transmission Discount Package, and the 2.2 liter engine, 5-speed and AM/FM stereo radio are yours at no extra charge—a $447 discount.

You can get a Dodge Omni with the Automatic Transmission Discount Package, for just $6877† Or choose a Charger with the Manual Transmission Discount Package, for just $6879† The choice is yours. Whether you buy or lease** you pick the car, you pick the package. And remember that both Omni and Charger are backed by our standard 5-year/50,000 mile Protection Plan.**

See your Dodge dealer for all the details on these two special packages.

AN AMERICAN REVOLUTION

*Discounts based on sticker prices of package items if purchased separately. Ask for details. †Sticker prices exclude tax and destination charges. **Whichever comes first. Limited warranty on outer body rust-through, engine and powertrain. Deductible applies. Excludes leases. Ask for details. BUCKLE UP FOR SAFETY

YOU CAN GIVE EYES TO THE BLIND.

We breed, raise and train these loyal and intelligent dogs to become the "eyes" for the blind. And we train the blind to work with these dogs and thus become independent, active, productive and happy human beings. All this at no cost to them. Contributions from concerned and caring people make it all possible. Please help give eyes to the blind. Send your tax-deductible contributions to...

Guide Dog Foundation For The Blind, Inc.

A non-profit organization. Dept A-84, 371 East Jericho Turnpike, Smithtown, L.I., N.Y. 11787

38¢ a Mile.

MS NOORDAM

HOLLAND AMERICA CRUISES

CARIBBEAN & MEXICO

It doesn't take a lot of money to go a long way on a Holland America cruise. Consider all you get.

For 7 or 14 days aboard the Noordam, the Nieuw Amsterdam or the Rotterdam, you'll have magnificent accommodations and gourmet cuisine. Onboard activities ranging from tennis and golf to a casino and a theatre. Plus Holland America's exclusive Ocean Liner Service℠, and the expert attention of our experienced Dutch officers and world-renowned crew every mile of the way.

And those miles lead to some of the most exotic ports of call in the world. Places like St. Thomas, Montego Bay and Grand Cayman in the Caribbean. Puerto Vallarta, Zihuatanejo/Ixtapa, and Acapulco along the Mexican Riviera.

Our 7- and 14-day cruises include free air* from most major gateways. And on Holland America ships, unlike any other luxury cruise, *no tipping is required.*

So on your next trip, remember, you can have it all on a Holland America cruise. For 38¢ a mile, it's the most luxurious vacation value on land or sea.

See your travel agent today.

*Does not include Christmas cruises to the Caribbean. Ships' registry: Netherlands Antilles.

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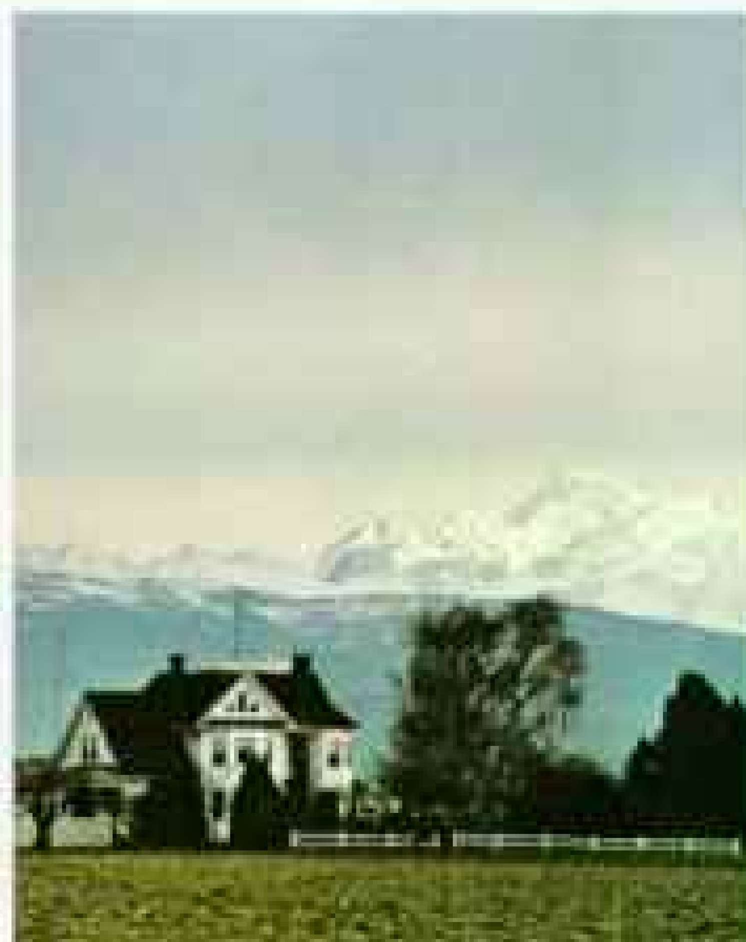

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Only AT&T has over 35,000 operators to give you any help you may need.

Guaranteed discounts off AT&T's Day Rate.

Only AT&T offers calling to over 250 countries and faraway locations worldwide.

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AT&T makes sure you have all the long distance services you need.

Our long distance operators are there for you to call upon 24 hours a day. To help with collect or person-to-person calls, and to give immediate credit for wrong numbers.

Because AT&T has over 100 years of experience providing quality long distance service, you know your calls will sound as close as next door.

And that's not all. You get savings along with all these services. Dial direct state-to-state Sunday-Friday from 5pm-11pm, and you save 40% off AT&T's Day Rate.

All weekend till 5pm Sunday and every night from 11pm till 8am, save 60%. (Different discounts apply to Alaska.)

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Who says you can't have it all?

Reach out and touch someone.®

AT&T

The right choice.

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Sundays on Nickelodeon Cable TV: National Geographic

BELOW ARE ONLY A FEW HIGHLIGHTS; TURN PAGE FOR FULL PROGRAM LISTING

July 7
Iceland Breakthrough

A daring team of 12 men run a wild Icelandic river, the Jökulsá a Fjöllum, from its hot-springs source deep within the Vatnajökull glacier to its mouth on the Arctic Ocean. For this first-time-ever expedition, they use kayaks, inflatable rafts, and ultralight aircraft equipped with detachable floats, wheels, and skis for landing on water, tundra, or snow. Attempting to cross the glacier, the adventurers endure snow storms and violent gales. Coursing the river's 128 miles, they survive life-threatening mishaps as they brave dangerous rapids and major waterfalls.

July 14
Thoroughbred

Swift and spirited, slim-bodied and long-legged, the Thoroughbred is respected worldwide as the aristocrat of race-horses. Descended from a pure line of Arab stallions, Thoroughbreds such as Nijinsky and Secretariat can be worth millions to their owners. From the stunning Bluegrass country of Kentucky, to the forests in France, to the rolling grasslands of Ireland and New Zealand, explore the breeding, training, racing, and trading of Thoroughbreds. Owners and trainers show how computers are used to help achieve every breeder's goal: creating a champion.

July 21
The Brendan Voyage

A small boat made of wood and leather is thrashed by force 9 gales as her intrepid five-man crew braves the North Atlantic Ocean in pursuit of a legend. The boat is a replica of a sixth-century vessel. According to the story, an Irish seafaring monk, St. Brendan, sailed in such a vessel all the way from Ireland to the "Promised Land," arriving in America 900 years before Columbus. Fourteen centuries later Timothy Severin and his crew embark from Ireland's Brandon Creek on a 4,000-mile journey to Newfoundland, determined to show that the legend could be true.

July 28
Pantanal

In southwestern Brazil lies the Pantanal, a marshy prairie whose spectacular landscape changes dramatically during the year. In the parched, dry season, the ancient tapir, using its sensitive prehensile snout, grazes the waterways, and the five-foot jabiru stork returns to its huge nest. October brings torrential rains; swollen rivers overflow, and myriad pools attract anacondas and apple snails. Marsh deer move swiftly through the water on webbed feet, pursued by the agile jaguar. In April, the floods recede, and the Pantanal once again faces a scorching drought.

WATCH National Geographic EXPLORER, the exciting weekly television magazine that covers the earth.

Tune in EXPLORER every Sunday from 5 to 8 p.m. (check local cable listings for times in your area) on the Nickelodeon cable TV channel. To the left are only a few highlights from our July programming.

For three hours, in five or more shows, EXPLORER offers some of the most entertaining and fascinating films from around the world, exploring everything from adventure to archaeology to science, wildlife, and travel.

Another EXPLORER feature, "On Assignment," will bring you the work of scientists and adventurers as they travel and study the world.

Discover the real wonders of the world on National Geographic EXPLORER.

TEAR OUT AND SAVE THIS PAGE AS A HANDY GUIDE

Three hours every Sunday: Your July guide to EXPLORER

Sunday, July 7

5:00 ON ASSIGNMENT
In Ontario, Canada, join Kate and Larry McKeever, who have dedicated the past ten years of their lives to the care and rehabilitation of injured owls.

5:15 AMATEUR NATURALIST: JAM JAR JUNGLE
Gerald and Lee Durrell unveil a seething world—including water spiders and bitterlings—in a tranquil pond in Kent, England.

5:45 SPECIAL FEATURE: ICELAND BREAKTHROUGH
(See front of guide.)

6:45 ELUSIVE DEPTHS OF MEXICO
In search of the world's deepest caves, a team of international spelunkers descends limestone shafts in Chiapas, Mexico. Residents provide vital information about cave entrances often hidden by brush or boulders.

7:45 ON ASSIGNMENT
Dive through a forest of soft coral trees with photographer David Doubilet as he captures rare and beautiful images of marine life in Japan's Izu Oceanic Park.

Sunday, July 14

5:00 ON ASSIGNMENT
A veritable paradise for bird-watchers, India is permanently indebted to 87-year-old Dr. Salim Ali, who is here profiled as the "grand old man of Indian ornithology."

5:15 BITE FOR SURVIVAL
The justly maligned mosquito is responsible for more human deaths than any other creature. Its fascinating life cycle is illustrated with unusual footage.

5:45 SPECIAL FEATURE: THOROUGHBRED
(See front of guide.)

6:45 DOLPHIN TOUCH
In Shark Bay, along Australia's remote western coast, a pod of wild dolphins makes direct contact with local inhabitants. A series of beguiling encounters shows the dolphins actively seeking out human companionship and affection.

7:45 ON ASSIGNMENT
At a sacred waterfall in Haiti, pilgrims purify themselves in the cascading waters during an annual ritual that combines Roman Catholic and voodoo beliefs.

Sunday, July 21

5:00 ON ASSIGNMENT
Ancient Bedouin traditions are honored in modern Saudi Arabia as 2,500 camels hurtle through the desert sand in a 19-kilometer race to win first prize from the king.

5:15 GARDEN OF EDEN
In three decades an alarming 15 to 20 percent of the earth's wild plants and animals may be extinct if steps are not taken to preserve their natural environment.

5:45 SPECIAL FEATURE: THE BRENDAN VOYAGE
(See front of guide.)

6:45 ETHIOPIA: THE HIDDEN EMPIRE
Ethiopia 15 years ago: This classic National Geographic Special surveys the African land once known as Abyssinia, from monasteries to castles, from deserts to fertile highlands, from the rituals of tribal wars to modern music.

7:45 ON ASSIGNMENT
Their drumming is exhilarating, their performances captivating: They are Kodo, a Japanese group of communal-living musicians and dancers.

Sunday, July 28

5:00 ON ASSIGNMENT
A rare close-up of the Alaskan grizzly bear. See a fierce confrontation between two males, and watch a female with her playful cubs fishing for salmon.

5:15 OVER SAND
Stunning sand formations in Algeria form the backdrop to breathtaking scenes of rock-climbing.

5:30 SPECIAL FEATURE: PANTANAL
(See front of guide.)

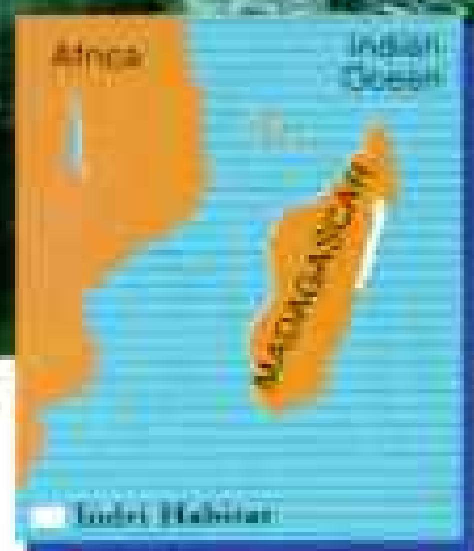
6:25 AMATEUR NATURALIST: CREATURES OF THE SUN
In Arizona's beautiful Sonoran Desert, the Durrells examine how indigenous creatures have adapted to the severe heat.

7:00 CONQUEST
From visions of space colonies to the realities of Sputnik and Explorer 1, the Soviet Union and the United States jockey for predominance in the conquest of space.

7:45 ON ASSIGNMENT
In treacherous waters, intrepid Coast Guard trainees maneuver 44-foot boats as they learn to save lives at the National Motor Lifeboat School in Washington State.

Enjoy National Geographic EXPLORER every Sunday on the Nickelodeon cable TV channel. Air times may vary between Eastern, Central, Rocky Mountain, and Pacific time zones. For program times in your area, consult your local cable listings or call your cable television operator. Each week EXPLORER offers an exciting three-hour selection of films from around the world. Themes range from adventure and exploration to natural history, high technology, and anthropology. Discover the wonders of the world on National Geographic EXPLORER.

Photographed by Russell A. Mittermeier ***Indri:*** ***Genus:*** *Indri* ***Species:*** *indri* ***Adult size:*** *Length of head and body, 61cm; tail, 6cm* ***Adult weight:*** *6kg* ***Habitat:*** *Rain forests on eastern Madagascar* ***Surviving number:*** *Unknown*



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

The largest of all lemurs now existing on Madagascar, indris are barely visible in the thick forest when sitting quietly or clinging to a tree trunk. At dawn, however, their silence is broken when indri pairs proclaim their territorial rights with songs that reverberate throughout the forest. Revered locally because of native beliefs, indris have been somewhat spared from hunting. But like all lemurs, these gentle creatures are threatened today by the loss of habitat.

Nothing could bring the indri back should it vanish completely. And while photography can record it for posterity, more importantly photography can help save it and the rest of wildlife.

Madagascar's forests, which are the indri's last refuge, have been reduced to a few remaining patches. Indris and all lemurs require continued protection. Photography can help promote a greater awareness and understanding of how important nature conservation is for the survival of the indri and other animals.

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

Canon

Images for all time