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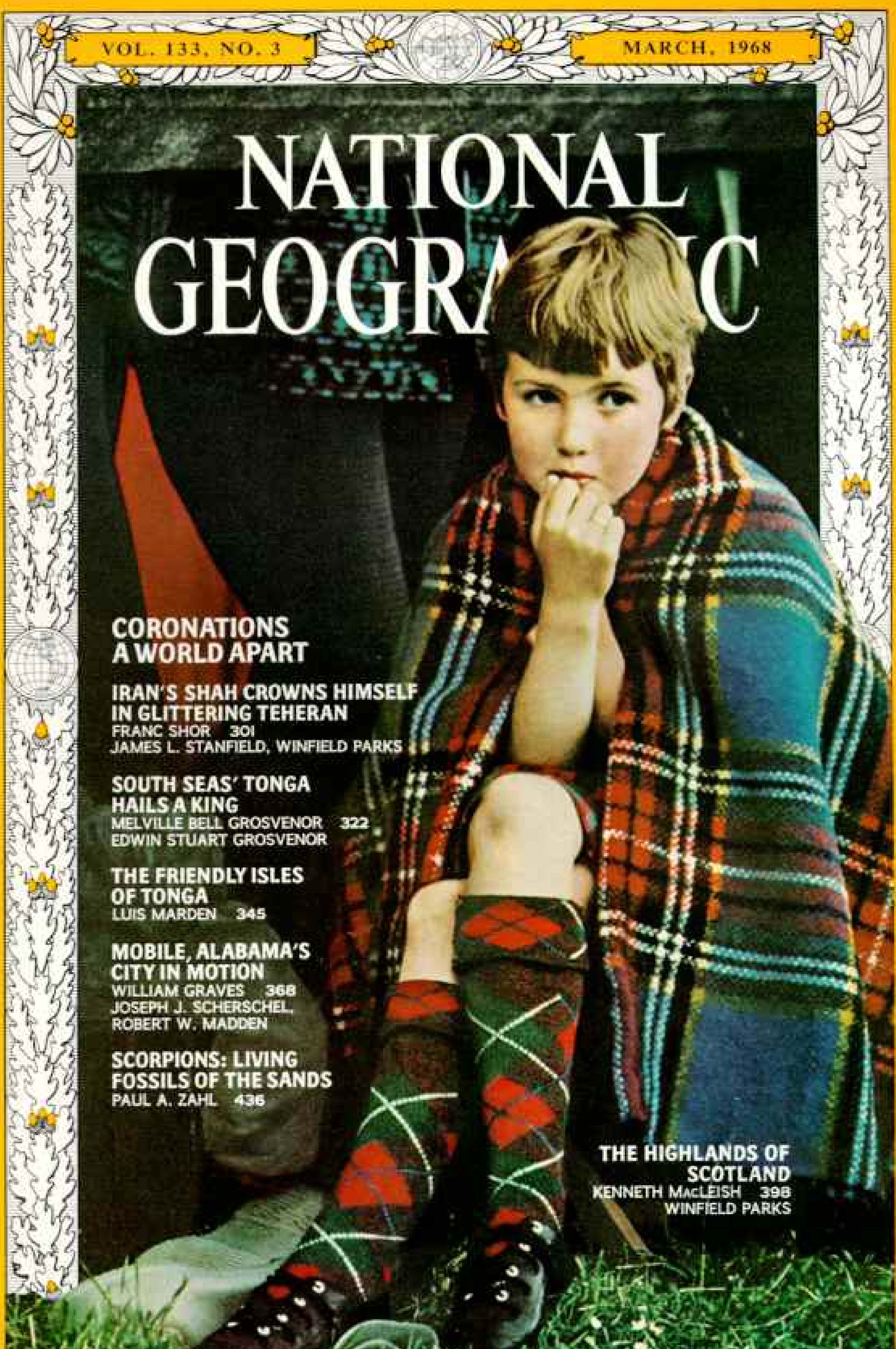

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OFFICIAL JOURNAL OF THE NATIONAL GEOGRAPHIC SOCIETY WASHINGTON, D. C.

NATIONAL GEOGRAPHIC SOCIETY

WASHINGTON, D. C.

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◀ **COVER:** Highland lassie keeps warm under a blanket of MacBeth tartan, named for the 11th-century king of Scotland immortalized by Shakespeare (page 398).

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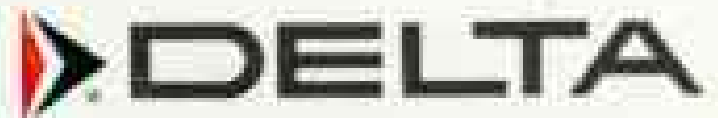


The one flight that matters is yours.

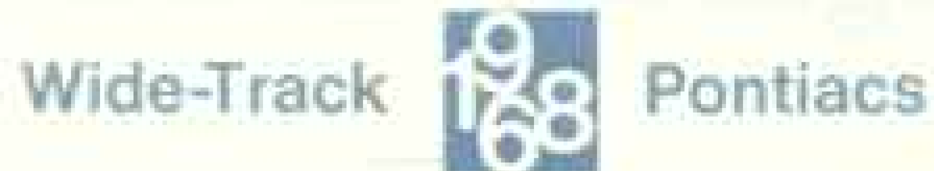
Anyone can build a luxury car. But only Pontiac builds one on Wide-Track.

This year, our resident geniuses in charge of creating Pontiacs have outdone themselves. For that lean-looking Bonneville captured below is more than just a luxury car. We admit it does offer interior selections that extend as far as genuine leather trim or exquisite pleated upholstery. And the generous swathes of simulated burl grained Carpathian elm that abound on doors and dash make you feel like chairman of the board. But the Bonneville is also Wide-Tracking. And that means you indulge in luxury-car comforts, without sacrificing the stimulation derived from a truly great road machine. If you've let the years slip by without experiencing Wide-Tracking in a Bonneville, see your Pontiac dealer. And see what you've missed.

GM

Other equally handsome practitioners of the art of Wide-Tracking: Grand Prix, Catalina, Brougham, Executive, Ventura, GTO, Le Mans, Tempest and the Five Firebirds.

Pontiac Motor Division.



Spotlight on salmon secrets

TRAVERSING TRACKLESS OCEAN, leaping waterfalls and dams, navigating by sensitive smell and possibly sun and star, salmon race homeward to spawn. Guided by unerring instinct, each amazingly seeks out the stream of its birth. Here a courting pair of sockeye salmon guard a nest, or redd, of rocks in the Adams River, British Columbia. Silver and blue in the sea, sockeyes turn crimson after entering fresh water.

Last fall the U. S. Bureau of Commercial Fisheries set the stage for a new look at spawning behavior by adapting a special observation tank at Lovers Cove, Alaska. Biologist William R. Heard, right, glues stones together to create an artificial redd. Beneath it, veteran NATIONAL GEOGRAPHIC cameraman Robert F. Sisson appears at a glass panel through which he later made dramatic photographs of fish in the act of spawning. Watch for his remarkable pictures in a comprehensive article on salmon by noted ichthyologist Dr. Clarence P. Idyll in a future issue of the GEOGRAPHIC.

Your window on nature's world opens wide as NATIONAL GEOGRAPHIC photographers provide an ever closer view of life in the wild kingdom. Unfold new vistas for your friends by nominating them for membership on the form below.

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Leverage

A brief explanation — and a word of caution

Don't let Wall Street terms like "leverage" bother you. (If you've ever jacked up a car in anger, you *know* what leverage means.)

In the market, a stock is called "high-leveraged" if the company is obligated to pay a large amount of bond interest (and/or preferred dividends) in relation to earnings.

Example: if a company earns $600,000, and must pay bond interest of $500,000, it has just $100,000 before taxes available for dividends to stockholders.

If the company has a good year, and earnings increase to $700,000, it *still* only owes $500,000 in bond interest, but has $200,000 before taxes available for dividends: *Double* the amount that was available before.

If the company has a *poor* year, and earnings drop to $500,000, *it still* owes $500,000 in bond interest. There's *nothing at all* left for dividends.

With a high-leveraged company, even a small rise or fall in pretax earnings may make a dramatic difference to the price of the stock. Up or down.

Some speculators have made fortunes in high-leveraged stocks. Some have *lost* fortunes.

Moral: don't play around with high-leveraged stocks—unless you can afford to lose as well as gain.

Price-Earnings Ratio

In line? Above the line? Or somewhere down the line?

To get the "P/E ratio" for the stock that interests you, check the *price* in your newspaper, and the annual *earnings-per-share* in the company's regular financial reports.

Example: your stock is selling at $30, and annual earnings are $2 per share. Price-earnings ratio: 15 to 1.

The P/E ratio of any stock is only meaningful when you compare it with the P/E ratios of other stocks in the same industry.

If other stocks in the same industry as yours have a higher average P/E ratio (30 to 1, for instance), there may be something about your company that requires further investigation.

One possibility: the *projected* earnings-per-share (those anticipated for the current year, or even for next year) may be lower than those in the company's latest report—and well-informed investors may be selling the stock. For our Research Department's earnings forecasts on more than 2,000 companies, stop by your nearest Merrill Lynch office.

News and Rumors

Plain or fancy, fact or fantasy?

It takes a bold man to say with certainty whether the market is going up or down. (Only your barber knows for sure.)

Merrill Lynch does not know for certain what the market will do. We spend millions of dollars analyzing the news, but the market makes up its own mind — every minute, every hour, every day.

The market reacts not only to *news*, but to *rumors*. Rumors about a company's earnings, its management, its newest product.

Sometimes these rumors turn out to be true. More often they are false. True or false, they cause some people to buy and sell. The result is that prices move up or down—because the price of every stock depends on supply and demand.

Suggestion for skeptics: If you'd like to check on what is behind the rumors, check with Merrill Lynch. Our analysts have a city editor's ear for hard news. We also have a network of 170 offices around the world and 310,000 miles of private wire. Result: we can get news to you *fast*.

Lynch: How many of these up or down during 1968?

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Profitability
Is the rate of return up, down or static?

A company's *rate of return on equity capital* may be a significant guide to its stock's possible future.

Example: the rate of return for one food company improved from 5.3% in 1957 to 12.4% in 1966. The price of the company's stock soared by over 500 percent.

To find the rate of return, investors and analysts check the company's balance sheet and income statement. Many companies save them working out the figure, by featuring it in the first few pages of their annual report.

Important: a stock's price can also be affected by *anticipated* rates of return. Such projections are generally the province of research specialists. Merrill Lynch suggests you ask for our Research Department's estimate of a company's *future* returns before making buy/sell decisions on the stock.

Management
Is it competent to compete?

Many analysts view a company's management *as the* dominating element in the evaluation of a stock.

However, sizing up management is also among the most complex tasks that analysts—and investors—have to face.

Here, as a guide, are *some* of the facets of management taken into account by Merrill Lynch analysts:

- age and experience
- adaptability to changing conditions
- willingness to invest in research and development
- aggressiveness
- ability to make effective use of manpower
- standing in the eyes of competitive managements

Forming judgments, as we do, on more than two thousand companies is a formidable undertaking. Fitting the management piece into the rest of the jigsaw puzzle is even more demanding. That's why we spend over $5 *million* a year on Research. Our findings are yours for the asking. No cost, no obligation.

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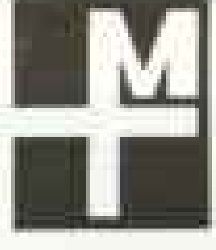

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Chevelle Malibu, front; Chevrolet Impala 3-seat Wagon, background.

CHEVELLE MALIBU

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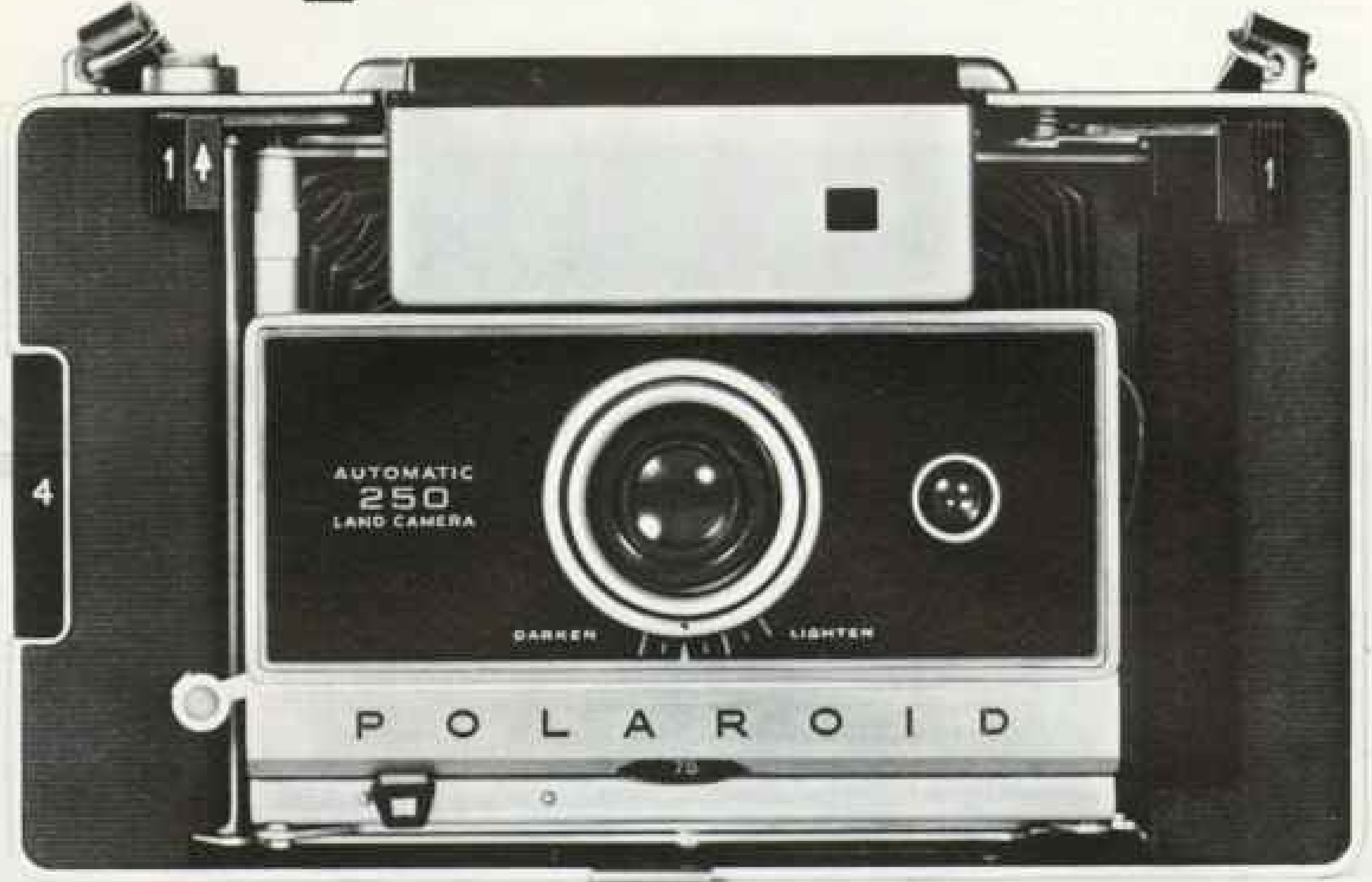

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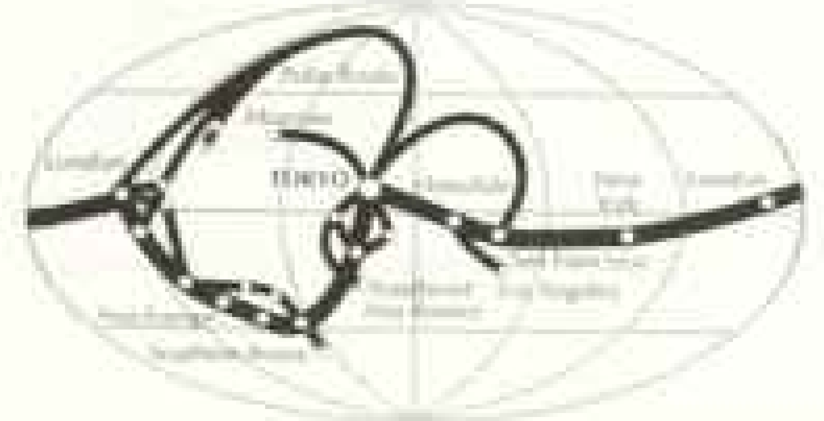

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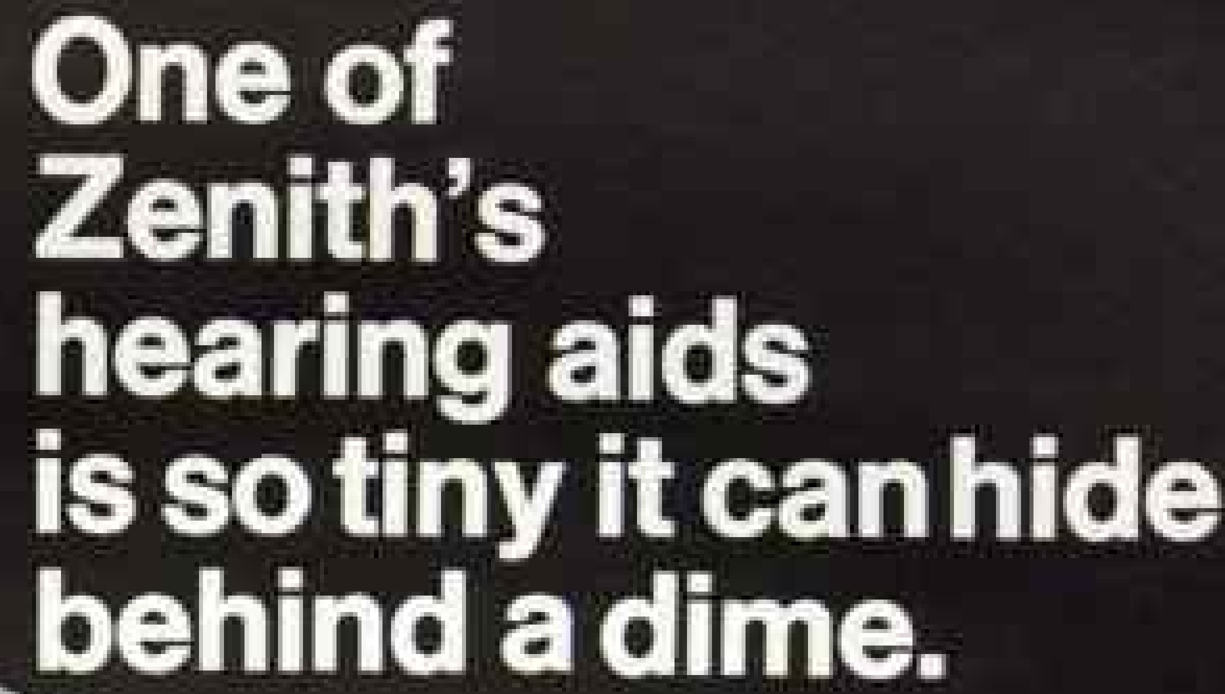

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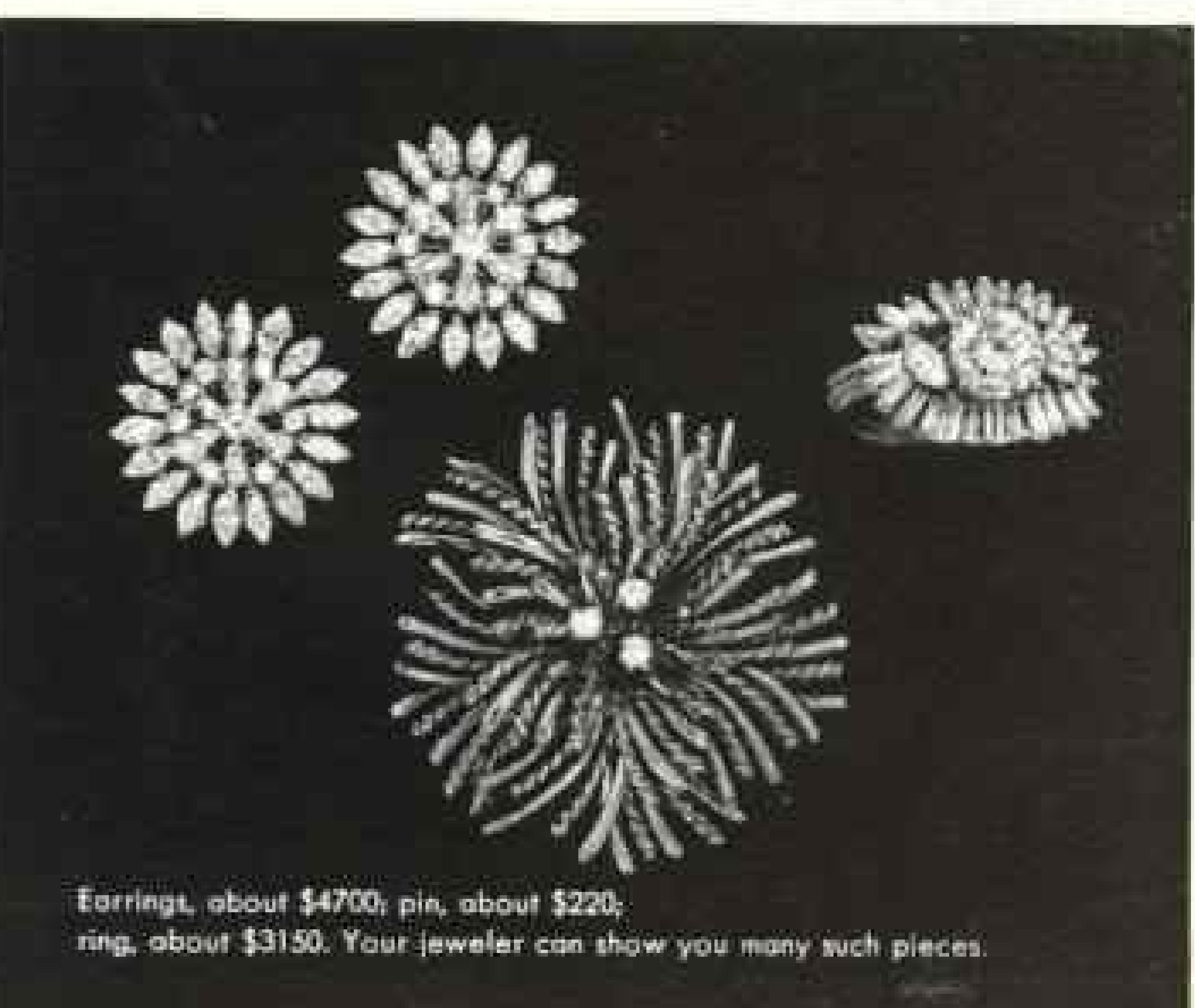

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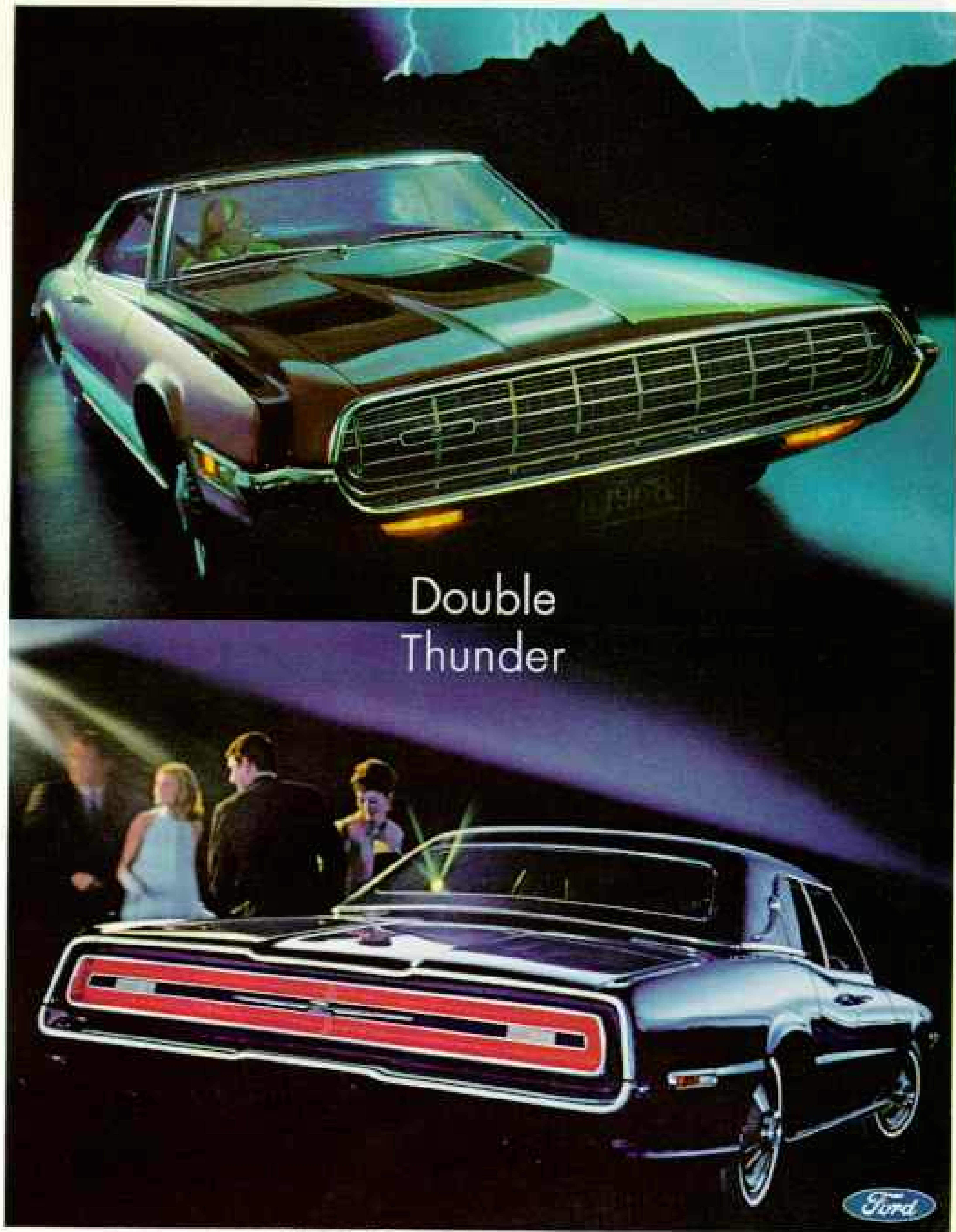

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Coronations a World Apart

TWO LANDS MORE UNLIKE would be hard to imagine—big, arid Iran and tiny Tonga, a cluster of verdant dots in the greatest of oceans. Yet both have one thing in common—the ancient institution of monarchy—and both crowned rulers in recent months, in ceremonies as different as desert from sea or Moslem from Methodist.

Tonga lies about as far from England as it would be possible to get on earth—almost on the Date Line, 180 degrees from Greenwich—but the little kingdom has been close to Great Britain in spirit ever since the 18th-century voyages of explorer James Cook. The sturdy cross on its red-and-white flag bears witness to the lasting efforts of British Wesleyan missionaries. Even the name of its former queens, Sālote, attests to Tonga's Anglophilia, for the first chief to unite the islands chose to call himself and his consort after the British monarch George III and his wife Queen Charlotte, and "Charlotte" in Tongan became "Sālote."

IRAN

TONGA

To this day Tonga looks to Britain for conduct of its foreign affairs, and its coronation service in a little wooden chapel under a bright Pacific sun followed Britain's Westminster Abbey ritual, but in the Tongan tongue. To that fascinating spot for its crowning occasion went the National Geographic Society's President and Editor, now Chairman of the Board and Editor-in-Chief, as an official delegate of the President of the United States. His eyewitness report on the coronation begins on page 322. Foreign Editorial Staff Chief Luis Marden, a long-time friend of the King of Tonga, follows on page 345 with an intimate account of these idyllic islands.

Long acquaintance, too, made possible Associate Editor Franc Shor's report on the coronation of Mohammad Reza Pahlavi as Shahanshah—King of Kings—of Iran, the Persia of ancient glory. Since Cyrus the Great welded the tribes of Persia into a single nation more than 2,500 years ago, that storied country has been ruled by some thirty dynasties. Among its kings have been such mighty leaders as Darius and Xerxes. But in their long and glamorous history Persians have never seen a coronation with such unusual features as this. The 48-year-old Shahanshah waited 26 years to don his crown—until he felt he had earned it. And he greatly advanced the cause of women, in the one-time realm of the veil and the harem, by firmly crowning his wife Empress. Franc Shor, who first visited His Majesty in 1949, reports on the ceremonies in the following pages.

And how many monarchies are left on earth? Though their ranks have dwindled in the present century, hereditary rulers today head 25 independent nations (9 of them in Europe, where there were 20 before World War I) and the total rises to about two-score when quasi-independent and semi-dependent states, sultanates, and sheikdoms are included. Rarely does the ancient, solemn, and ritualistic pageantry of coronation unfold twice in any year, or in two such strikingly contrasting geographic settings.—EDITOR.

Iran's Shah Crowns Himself and His Empress

By FRANC SHOR
Associate Editor

Photographs by National Geographic photographers
JAMES L. STANFIELD
and
WINFIELD PARKS

HIS IMPERIAL MAJESTY Mohammad Reza Pahlavi, King of Kings and Light of the Aryans, had borne his nation's burdens upon his shoulders for 26 years and worn its crown upon his head for 17 minutes when he began his coronation address.

"My sole aim in life is the constant improvement of the welfare of Iran and the Iranian nation," he avowed. "My deepest wish is to preserve the independence and sovereignty of the country, to bring the Iranian nation up to the level of the most progressive and prosperous societies of the world, and to renew the ancient grandeur of this historic land.

"In this task, as in the past, I will withhold nothing, not even my life."

He sat erect on his jewel-studded and gold-sheathed throne, the Pahlavi Crown on his head, his father's pearl-bordered cape over his shoulders, the gold royal scepter firmly clasped in his right hand (page 307). From my seat thirty feet away I watched—and watching, remembered.

I remembered a summer morning 18 years before when a young man still in his twenties, wearing riding boots and breeches and an open-necked shirt, had talked to me over a cup of tea in the Saadabad Palace on the outskirts of Teheran. We had just come from an hour in his stables, where His Majesty had shown me his magnificent Arabian horses and laughingly demonstrated his ability to vault into the saddle without touching the stirrup. Now our talk had turned to more serious things.

Why, I had asked him, had he not allowed himself to

Amid the pomp of old Persia, Shahanshah Mohammad Reza Pahlavi places a crown on the head of his wife Farah, the first Shahbanou, or Empress, formally crowned since Iran embraced Islam. Before an audience of diplomats and officials, the 2,500-year-old nation staged its double coronation last October 26.

EKTACHROME BY MARILYN SILVERSTONE, MAGNUM © N.G.S.

From Iran's capital, Teheran, excitement spread countrywide during a week-long holiday. In nearby mountains 48 bonfires commemorated the Shah's birthday. In remote villages, crowds followed events on transistor radios and celebrated with dances, feasts, and parades. The Shah freed thousands of prisoners, provided free weddings, and gave life insurance to newborn babies.

be formally crowned, even though he had already been Shahanshah for eight years.

"You have been all over Iran in the past few weeks," he answered. "You have seen the problems my people face. You have seen our poverty. We are working to change those conditions, but it will not be done overnight.

"I could not take pride in being crowned king of a nation such as we are today. But Iran will not stay like this. Our problems are big ones, but we have magnificent natural resources. And our greatest natural resource is the Persian people.

"Persians are artists. They are hard working. They can do anything if they have the proper equipment. We will give them the tools, and you will see miracles."

He relaxed in his chair, patting the head of a Saint Bernard that sprawled beside him. A half smile crossed his face.

"I inherited a crown," he mused. "Before I put it on, I want to earn it."

Jeweled Symbol of a Victory

Now, in the splendor of the Throne Room in Gulistan Palace, I had watched him place that crown, ablaze with diamonds, sapphires, and emeralds beyond price, on his own head. His hair was graying now, the lean face etched with care, but the trim athlete's figure was as it had been two decades before. Today was his forty-eighth birthday. He had put on the crown. How had he earned it?

Part of the answer lay within view of the windows of Gulistan Palace. Teheran, when I had first seen it shortly after World War II, was a sprawling city of one- and two-story buildings, where horse-drawn carts and donkeys clattered through ill-paved streets, and

EKTACHROME (BELOW) AND KODACHROME BY JAMES L. STANFIELD © N.G.S.

Like ropes of pearls, lights festoon Ferdowsi Avenue, a main street of Teheran. Millions of colored bulbs, plus miles of neon, turn the city into a jewel box.

When the Shah assumed power after his father's abdication in 1941, he decided to postpone the coronation until he had strengthened his country, improved the lives of his people, and fathered a male heir. Thus, after 26 years, Iranians hailed the coronation as a milestone in the nation's history.

Star-bright eyes watch in awe the fairyland of street decorations. Mother and child wear *chadors*, the long shawls of Iranian women. Their cab circles a park where outdoor games entertain some of the thousands who poured into the city.

the municipal water supply ran through open gutters. Now I had spent a week walking the neat streets of a modern city, looking into shop windows full of electric refrigerators, gas stoves, and television sets, and staring up at 16-story office buildings. And on the broad avenues where automobiles had been few, I had fretted through some of the most stupendous traffic jams the world has produced.

Not that Teheran had lost all its old flavor. Vendors still crowded the sidewalks. Fruit stands offering grapes, melons, figs, and pomegranates took advantage of the shade cast by a modern skyscraper. The odor of roasting kebab floated from a hundred small food shops, and corner vendors offered glasses of tart pomegranate juice—fresh from an electric blender.

And on my first night in Teheran on this trip, a week before the coronation last October 26, I was awakened at four in the morning by the vigorous crowing of a rooster. Scarcely had I regained a half doze when a donkey's raucous braying shattered the night. Old sounds, like old customs, die hard.

Changes in Teheran are important, but superficial. Iran is an agricultural country, and the real measure of progress is not in the height of its metropolitan skyscrapers but in the contents of its farmers' storehouses. There

Above rosettes of color, a high-rise office building on Hafez Avenue wears its own red crown. Before the coronation, Iranians showed their enthusiasm in a year-long burst of extra work, rushing to complete new apartment buildings, roads, stores, schools, and a concert hall.

To the bazaar for bargains: Coronation visitors shop for handbags, clothing, jewelry, and lanterns. Standing above the crowd, one sweater merchant cries his wares. A fellow vendor keeps cash in a plastic bag. Flags of Iran fill the only empty space—the ceiling.

EKTACHROME (LEFT) BY JAMES L. STANFIELD; KODACHROME BY WINFIELD PARKS © N.G.S.

has been a revolution in this country—the Shah likes to call it a "white revolution," because it has been bloodless—and its heart lies in the redistribution of Iran's land to the families that till it.

Iran is a big country, three times the size of France, but with a population density only one-seventh that of France.* There should be enough land for all. But when the Shah first turned his full attention to farming problems, shortly after my first visit with him in 1949, he found he had inherited, along with his throne, a fantastic situation.

"More than half the arable land of Iran belonged to private owners, of whom perhaps not more than thirty . . . [each] owned forty villages or more," he wrote recently. "These landowners almost never lived on their estates and naturally had little interest in improving the condition of their estates either by agricultural or social reforms. . . . The treatment of the peasants was in some cases inhuman and savage. . . ."

Determined to help his people, the Shah took

*See "Old-New Iran, Next Door to Russia," by Edward J. Linehan, NATIONAL GEOGRAPHIC, January, 1961.

Blessings of the Moslem faith go to the monarch during his coronation in Gulistan Palace. A leader of Iran's Shia sect, the Imam Juma of Teheran, Dr. Seyed Hassan Emami, recites from the Koran in classical Arabic. He prays for peace and friendship "among all the children of mankind." Then His Imperial Majesty kisses the holy book of Islam. The Deputy Commander of the Imperial Guards, Brig. Gen. A. Badrai Lorestani, stands at left.

EKTACHROMES BY JAMES L. STANFIELD © N.G.S.

Crowning himself, as his father did before him, His Majesty formalizes his reign as Aryamehr Shahanshah—Light of the Aryans, King of Kings. The Pahlavi Crown gleams with 3,380 diamonds, 368 pearls, 5 emeralds, and 2 sapphires. Designed for his father's enthronement in 1925, the crown resembles those of ancient Persia.

"**Long live the King**—*Javid Shah!*" The shout echoes across Iran as the monarch mounts the gem-encrusted throne. His symbols of royalty are beyond price: a pearl-embroidered silk cape, a gold girdle with an egg-size emerald buckle, the "all-conquering" sword jeweled with emeralds, diamonds, and rubies, and a gold scepter. Property of the state, the treasures ordinarily rest in the Central Bank of Iran, where they help back the country's currency.

a drastic step. In 1950 he issued a decree turning over to the farmers who lived on them more than 2,000 hamlets and villages that, as crown estates, were his personal property. The peasants were jubilant, but other large landowners fought the program. Not only did they refuse to yield their own extensive holdings, but they used their power in the Iranian Majlis, or parliament, to delay the distribution of crown lands.

The Shah fought back. By the end of 1958 more than half a million acres of land had been shared among 25,000 farmers. In the meantime, Mohammad Reza Pahlavi had turned his attention to the vast holdings of the government, separate from those personally owned by the crown.

"A law on the distribution of government land was enacted in 1955," he wrote, "and three years later it came into force. It fixed the maximum individual landholding at 25 acres of irrigated land and 37 acres of nonirrigated land. Government land was distributed to some 100,000 families."

With his land and that of the government in the hands of the people who farmed it, the Shah waited in vain for the great private landholders to get the message. Nothing

happened. In 1959 he sponsored a bill that would have required landowners to sell the bulk of their estates to the government, which would then pass it on to the small farmers on easy terms. The big landowners in the Majlis emasculated the measure.

Army Control Gives Shah Power

But the Mohammad Reza Pahlavi of 1959 was no longer the inexperienced youth who had gone, crown in hand, to the Majlis of 1950 asking for reforms. He had matured in political wisdom, as in years. With United States military aid he had built an Iranian Army able, if necessary, to enforce his decrees. And that army was intensely loyal to him.

In 1962 the Council of Ministers approved an amended land-reform law. Land ownership was limited to one village per person. Anything over that had to be sold to the government at a price fixed in relation to the declared taxable value of the property.

Landowners who had been paying taxes on ridiculous undervaluation of their property screamed in anguish, but some 600,000 farm families, totaling nearly three million people, became owners of their own land.

In 1963 the next stage was undertaken, after approval by the Iranian people through a nationwide referendum. Landlords who still owned the one village permitted by the 1962 law were required to lease or sell the soil to the resident farmers.

In the month of his coronation, in a speech opening the 22d Majlis, the Shah proudly announced that more than 14 million people had benefited by the land-reform laws.

The Shah's white revolution embraced more than land reform. Prodded, perhaps, by his aggressive twin sister, Princess Ashraf, and by Empress Farah, he issued a decree in 1963 giving women full voting rights.

Just how revolutionary a step that was can best be seen by reading Article 10 of the electoral law which it superseded:

"Those deprived of the right to vote shall consist of all females . . . fraudulent bankrupts, beggars . . . murderers, thieves and other criminals punishable under Islamic law. . . ."

It didn't take the women of Iran long to

Princesses of the realm, two sisters of the Shahanshah and his two daughters sit near the throne: from left, first row, Their Royal Highnesses Ashraf and Shams, and Their Imperial Highnesses Farahnaz and Shahnaz, daughter of the Shah's first wife, Princess Fawzia of Egypt. His second wife, Soraya, daughter of an Iranian tribal leader, had no children.

Small heir apparent walks alone. Crown Prince Reza, almost seven, solemnly marches from his chair beside his father's throne, flanked by officers with swords at salute. Decorations of the imperial family glitter on his cadet uniform. When the King was the same age, he too watched his father assume the crown here in the Throne Room.

Panoply of an Oriental potentate dazzles 5,000 guests in the gardens of Gulistan Palace. Surrounded by officers, the Shah, center page, acknowledges applause. The two coaches will carry the imperial family through streets thronged with well-wishers. In his coronation speech the Shah declared: "For me it is a source of great pride and pleasure that there exists today between my people and me an unbreakable bond, and that thus linked we are advancing together along the road that leads to the greatness, prosperity, and welfare of Iran."

take advantage of their new rights. Within a few days the first woman to hold the office of village supervisor was elected. In the parliamentary elections of 1963, six women were elected to the Majlis. Scores now hold prominent positions in government ministries.

The ancient Islamic custom of polygamy also fell to the revolution. Under the new laws an Iranian male, formerly permitted four wives, cannot take even a second without permission from local authorities, and, perhaps more difficult, permission from the first wife. Too, women may now sue for divorce.

Perhaps the best indication of woman's

new status in Iran is the fact that shortly before the coronation Empress Farah was named Regent for Crown Prince Reza. Should anything happen to His Majesty, the Empress would rule Iran until the Crown Prince was old enough to assume the throne.

Side by side with the emancipation of women came an all-out attack on illiteracy. In 1962 the Shah estimated that 80 percent of his people could neither read nor write. It was, he felt, a national disgrace in a nation which had traditionally prized learning so highly that the Prophet Mohammed had once exclaimed: "If knowledge were to be found only in heaven, the Persians would still strive to attain it."

To help them attain it this side of paradise, the Shah in 1962 created a Literacy Corps. Young men who graduate from secondary school have the option, when they reach the military conscription age of 21, of serving in the corps rather than the army.

Those who enlist are given four months' training and then are transferred to the Ministry of Education, which sends them to villages preferably near their own homes. There they teach for 20 months and then are eligible for discharge. Significantly, in the more than four years of the corps' existence, 30 percent of discharged corpsmen have volunteered to continue teaching.

When the corps began its work, Iran had 17,000 rural schools with some 675,000 pupils. Today more than 1,320,000 students are studying at 22,000 rural schools. By 1969, the Shah has predicted, 50 percent of his people will be able to read and write.

Industry, too, has benefited from the white revolution. Primed by $605,000,000 in U. S. aid since 1952, new dams have increased the supply of electrical power, scores of light industrial plants have been established, and the foundations have been laid for a petrochemical industry to utilize waste products from Iran's oil fields.

So successful has this U. S. aid program been that in November of 1967 it was terminated by mutual agreement.

Splendor Sets an Imperial Stage

True it is that the Shah waited a long time for his coronation, but when it happened it was certainly worth waiting for: a dazzling ceremony of Byzantine splendor, played out with the precision of a military exercise and the grace of a ballet. 312

KODACHROME BY WINFIELD PARKS © N.G.S.

Photo fans in formal dress, a diplomat's wife and military attachés from Great Britain (top) and West Germany snap the regal procession. No foreign dignitaries were officially invited, but guests included Teheran's diplomatic community.

Loyal subjects in native costume, Kurdish tribesmen pay their respects at the palace grounds. Farmers and nomads comprise 65 percent of Iran's 26 million people. Twenty-six years ago, the Shah inherited a nation of poor tenant farmers. Determined to help them, he distributed crown and government lands and forced wealthy landlords to sell excessively large holdings. Government loans assist in the drilling of water wells and the purchase of farm machinery.

Like a scene from *Scheherazade:* Empress Farah and her entourage create a memorable tableau as six maids of honor bear the 26-foot train of her velvet cloak, edged in white mink and richly embroidered by Iranian seamstresses. French jewelers set her crown with pearls and emeralds from Iran's treasury.

KODACHROMES BY JAMES L. STANFIELD © N.G.S.

KODACHROME (ABOVE) AND EKTACHROMES BY WINFIELD PARKS © N.G.S.

Old coins her jewels, Mrs. Soltan Vali-Ollahi wears the family wealth on her dress. Member of one of the many Lur tribes, she comes from the mountainous Nahavand district, southwest of Teheran, where seventh-century Arabs defeated the Persians and introduced Islam. Iran gave women the vote in 1963, and now eight women serve in Iran's parliament.

◀ THIS PAGE FOLDS OUT

I came into the great Throne Room a little before 8 o'clock and found my seat, some 10 yards to the left of the throne, directly opposite the area reserved for the Shah's brothers and sisters and other members of the royal family. I placed my credentials on my position, to make sure no one appropriated it, and went out to check with our photographers.

When I returned at 9, I found most of the seats occupied, and a bemedaled ambassador trying to sit in mine. Happily, the adjacent gentleman was vigorously defending my rights. I sat down, thanked him, and we introduced ourselves. He was the Baron Paul G. Kronacker, a Minister of State of Belgium.

"I saw the name of the magazine on your credentials," he said. "Since I am a member of the National Geographic Society, I didn't want anyone taking our magazine's place."

Family Leads the Royal Procession

At 10:25 all rose as the royal family entered. The Queen's mother came first, then two of the Shah's three sisters. Shahnaz, his grown daughter by his first wife, and little Princess Farahnaz, his daughter by the present Queen, preceded four of the Shah's five brothers.

Little Princess Farahnaz, four years old and absolutely adorable, had a tiny coronet around a little pug of hair on top of her head (right). When she sat down, her feet didn't reach the floor, and she let them swing.

At 10:48 a choir began to sing, and the aide-de-camp general, his chest a mass of medals, strode down the aisle with his sword upright in salute. Behind him two generals bore the Iranian flag and the Shah's imperial standard. Flanked by two more generals, they placed the two standards, one on each side of the throne, and stood stiffly at attention.

A minute later the master of ceremonies of the court entered. Behind him came the commander of the Imperial Guards.

Then in marched two generals with swords at their foreheads, and a few paces behind them walked the not-quite-seven-year-old Crown Prince Reza, in the uniform of an officer cadet. Two more generals followed him, and the little fellow marched smartly in the center of the box formed by the four tall generals, looking even tinier than he really is.

On the platform the Prince climbed into a chair to the left of the throne, and put his patent-leather boots firmly on a footstool.

Little Princess Farahnaz watched him with open-mouthed admiration, smiled at him, and tried to catch his eye. He was too well coached. Head erect, he looked straight ahead. Farahnaz smiled again, then gave up and yawned.

KODACHROME BY JAMES L. STANFIELD © N.G.S.

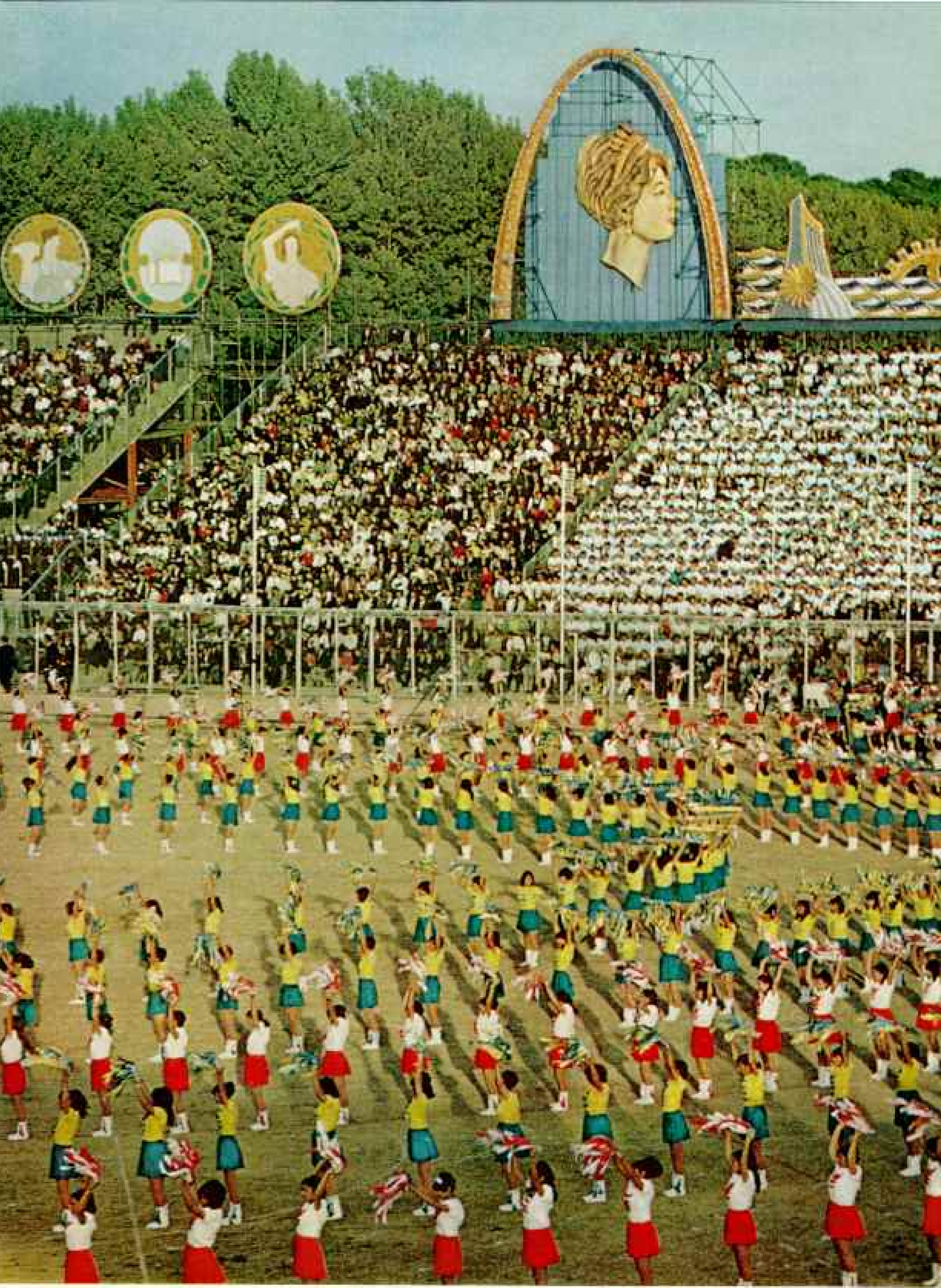
Littlest princess, Her Imperial Highness Farahnaz waves from a palace window. Her grandmother, Madame Farideh Diba, mother of Empress Farah, watches over the four-year-old child during the reception. Younger brother Ali Reza stayed home.

The Empress's chamberlain marched in, carrying a diamond-headed mace. Behind him were the vice-chief of the supreme commander's staff and two generals. Then came the Empress, or Shahbanou.

She carried herself with regal dignity, and she was beautiful. When she was seated to the right of the throne, six maids of honor dipped in unison, picked up the train of her gown, and draped it gracefully at her side.

At 11 o'clock the choir again burst into song, and the grand master of ceremonies to the Shah entered, carrying a mace with an emerald-encrusted head and spirals of diamonds and rubies. Behind marched the chief of staff and the commanders of the army, air force, and navy.

Then came the moment for which all Iran had waited for 26 years. Every eye in the



Waving paper streamers in unison, 1,000 schoolgirls circle Amjadieh Stadium in a postcoronation spectacle that featured marching bands and Boy Scouts, roaring motorcycle teams, precision gymnastics, and a torchlight tattoo by Imperial Guards.

KODACHROME BY JAMES L. STANFIELD © N.G.S.

Like a cheering section at a U. S. football game, students below the Shah's portrait created designs by holding up colored cards. The Empress, herself an athlete in her Teheran school days, works to improve sports, health, and educational opportunities.

KODACHROME BY WINFIELD PARKS © N.G.S.

Sharing royal duties, the imperial couple review a display of Iran's armed forces (opposite). Daughter of an army officer, the Empress studied architecture in Paris before her marriage eight years ago.

Throne Room was on the door. The Shah strode in, dressed in his uniform as supreme commander of the armed forces, his shoulders back and his head erect. Behind him came ten more general officers and a dozen other dignitaries. As I looked around at that hall full of generals, it occurred to me that, were the roof to fall, chances for promotion in the Iranian Army would be almost unlimited.

His Majesty marched straight to the throne, turned briskly, and seated himself. From outside the hall came a blast of trumpets. The Imam Juma of Teheran, a leader of the Shia faith in Iran, blessed the Shah and recited briefly from the Koran (page 306). The Shah kissed the holy book, then pressed it to his forehead. The Imam repeated the ritual.

Uniformed men marched down the aisle bearing the imperial regalia. As the Shah stood in front of his throne, the first presented the imperial golden belt, its buckle ablaze with a 175-carat emerald. The Shah unclasped his own girdle and buckled on the new belt.

Princess Farahnaz, her face now aglow, leaned forward to watch. The imperial sword, its gold scabbard solidly encrusted with gems, was brought on another pillow. The Shah snapped it onto his belt, and his little daughter almost fell out of her seat with excitement. She leaned forward, looking toward the other regalia bearers, for all the world like a child at Christmas wondering what new marvel would come from the next package under the tree.

Shah Dons the Pahlavi Crown

What came next was the royal cape, bordered with pearls. His Majesty placed it on his shoulders and stood erect.

The next bearer brought the magnificent Pahlavi Crown. The Shah took it in both hands, placed it firmly on his head with a no-nonsense air, gave it a quick twist to set it securely, and then took the royal scepter from the final bearer.

As he grasped it, a salute of 101 guns echoed across Teheran, and the audience shouted *"Javid Shah*—Long Live the King!" A band

Military parade: U. S.-made M47 tanks, an Imperial Guards band, and a smart-stepping army unit march past Their Imperial Majesties. A member of CENTO, a mutual defense pact with the United Kingdom, Turkey, and Pakistan, oil-rich Iran has built its forces to more than 165,000. Young men must serve two years, though high-school graduates may fulfill their military obligation by joining a Literacy Corps. They teach reading, writing, and community development to villagers. Six years ago 80 percent of all Iranians were illiterate. By next year, the Shah hopes the rate will have dropped to 50 percent.

KODACHROME (BOTTOM) BY JAMES L. STANFIELD, EKTACHROME (ABOVE) AND KODACHROME BY WINFIELD PARKS © N.G.S.

outside the palace struck up the national anthem, and the Shah sat again on the jeweled throne. A golden pillow was placed at his feet.

The Shahbanou rose and stepped in front of the throne. Down the aisle came her maids of honor, bearing a velvet cloak trimmed with white mink. She slipped it over her shoulders, then knelt on the golden pillow.

A general came forward with her crown. The Shah stepped down from the throne, took the crown, and placed it on her head (page 300). There was a brief problem. The crown caught for a moment on her hairdo, and would not go over it. The Shah hesitated, then pressed down firmly. The errant hair disappeared, and an Empress had been crowned.

The Shah gave her his hand and helped her rise. She stepped back and seated herself in her chair, while Princess Farahnaz tried vainly to catch her eye.

The Prime Minister delivered the nation's homage and congratulations. The Speaker of the Majlis and the President of the Senate spoke briefly. Then Dr. Lotfali Suratgar of Teheran University chanted the coronation ode he had composed in the classical Persian poetic style used since the 10th century.

"Yet Greater Cause for Pride"

Seated, the Shah delivered his four-minute coronation address. "I beseech Almighty God," he concluded, "that we ... will be able to pass on to our successors a country with yet greater cause for pride ... an even higher level of progress, and a society even more contented and prosperous."

The Shah's escort ranged itself in front of the throne. He descended, and they proceeded down the aisle. The audience bent their knees and bowed their heads as he passed. The Empress and the Crown Prince followed, and twice more knees flexed and heads bobbed in the Throne Room (page 309).

Then the royal family departed, Princess Farahnaz holding tightly to the hand of her half sister, Princess Shahnaz, who was crying.

I walked to a window and watched the procession make its measured way down hundreds of feet of red carpet to the waiting carriages (foldout, pages 310-12). If this was the twilight of monarchy, I mused, it had been a fantastic sunset.

The first United States Minister to the Court of Iran—then called Persia—was S. G. W. Benjamin, an Oriental scholar. In 1886, he wrote a book about his experiences. Speaking of another Shah, he said:

"For a sovereign to sit on the throne founded by Shah Jemsheed in prehistoric ages, strengthened by Cyrus and Darius, and made glorious in turn by Anurshirwan and Shah Abbass ... is of itself a rare and notable event. It is not less remarkable if it can be said of such a monarch that he is not unworthy of his great predecessors."

Nor is it less remarkable today.

THE END

Fountains of fire splash a midnight-black sky during a dazzling fireworks display for the Shah at the Royal Teheran Hilton on the city's outskirts. Later he opened an industrial fair, foreground, where some 150 Iranian firms showed off products ranging from light bulbs to trucks.

EKTACHROME BY JAMES L. STANFIELD © N.G.S.

Skins glistening with coconut oil, students dance a message of allegiance and joy at the

South Seas' Tonga Hails a King

By MELVILLE BELL GROSVENOR, LL.D., Sc.D.

Editor-in-Chief and Chairman of the Board, National Geographic Society

Photographs by EDWIN STUART GROSVENOR

KODACHROME BY EDWIN STUART GROSVENOR © N.G.S.

coronation of the King of Tonga, a tiny realm of palm isles and pounding surf in the Pacific.

"THE PRESIDENT HAS ASKED me to invite you on his behalf to be an official United States delegate on the occasion of the Coronation of King Taufa'ahau Tupou IV on Tuesday, July 4, 1967, in Tonga. Mrs. Grosvenor is also invited," read a telegram from the State Department last spring.

Thus began one of the most extraordinary experiences of our lives—a journey to a far Pacific island for the crowning of the King of the last Polynesian monarchy.

"King of Tonga!" exclaimed my wife Anne at the news. "Why, that's the giant Crown Prince we met at our dedication."

President Johnson had met him on that occasion, too, for the President had dedicated

In a ceremony of simple dignity, sovereigns kneel in Tonga's richly carved Chapel Royal on July 4, 1967, for the coronation. It was His Majesty King Taufa'ahau Tupou IV's 49th birthday. Seconds earlier the Royal Chaplain, the Reverend G. C. Harris, center, crowned the King, and the Reverend C. F. Gribble, President-General of the Methodist Church of Australasia, placed the coronet on Queen Halaevalu Mata'aho's head. Though most of the islanders speak fluent English, the ceremony was read and sung in Tongan, with Methodist hymns and prayers that reflect the work of missionaries of more than a century ago.

The making of a monarch: The Royal Chaplain gently lowers a massive gold crown onto King Taufa'ahau's head. Instantly, shouts proclaim, "Long may the King reign!" and ancient log drums relay the joyous cry across the island of Tongatapu.

the National Geographic Society's new headquarters building on January 18, 1964, and Prince Tungi of Tonga came as a guest of Luis Marden, Chief of the GEOGRAPHIC's Foreign Editorial Staff. Luis had known the Prince and his late mother Queen Sālote for many years, and had introduced him to the sport of Aqua-Lung diving on Tonga's reefs.

Anne and I both recalled how impressed the President had seemed to be with the quick mind and broad outlook of this Polynesian Prince, as well as with his vast dimensions.

My wife's next thought was practical and feminine: What to wear?

"The delegates must be attired formally," said the State Department's Protocol Office. "Morning dress with cutaway coat and gray or black topper for you, and long dark or white dress and white gloves for Mrs. Grosvenor—formal but simple so the ladies won't outshine the King and Queen."

Taking a top hat to the tropics made me feel like the Mad Hatter himself. And Anne had trouble finding a suitably sober dress in Washington in hot June weather.

But a more persistent problem was our son Edwin, 15. An enthusiastic photographer, he begged to be taken along.

"Or better still," he pleaded, "I could go ahead—and stay with Mr. Marden's friends. That way I could take more pictures."

We asked Luis Marden's opinion.

"Tonga isn't Tahiti," said Luis. "I don't see how Ed could get into trouble. Everyone on Tonga is devoutly religious; you can't go wrong on coconut milk."

So Ed set off by himself, loaded down with cameras and lights. We followed the next week, jet-hopping across the Pacific.

In Fiji we met Ratu (Chief) Edward Thakombau, who was also headed for the coronation. A tall, fine-looking man with a twinkle in his eye, this half brother of the late Queen Sālote wore a colonel's uniform and a kiltlike

Watching the ritual in an audience spangled with dignitaries, the Duke of Kent, cousin of Queen Elizabeth II, and the richly jeweled Duchess of Kent represent the United Kingdom. Beside them, in ceremonial *ta'ovala,* stand the King's brother and Premier, Prince Tu'ipelehake, and his wife, with the King's daughter, the Princess Pilolevu.

EKTACHROMES BY MELVILLE BELL GROSVENOR (ABOVE) AND LUIS MARDEN © N.G.S.

As if spent by their frenzy, dancers waving miniature Tongan flags prostrate themselves on a green beside the chapel and the Royal Palace, far left. In this strenuous precoronation performance, a troupe of 200 rhythmically bend lower and lower until they rest on the ground in a living depiction of the kingdom's state seal. Red-and-white apron worn by the leader (left) represents the Cross in the coat of arms.

The dancers perform in honor of nobles of Tonga and nearby Fiji and a delegation of New Zealand's Maori, who watch from the palace porch. In addition to invited notables, an estimated 35,000 Tongans—almost half the population—flocked to the coronation at Nuku'alofa, the capital on the main island of Tongatapu.

skirt with serrated edge. He had fought victoriously in the Malay Peninsula campaign against Communist guerrillas.

"Many people can't forget that the Fijis were called the Cannibal Islands," he said with a smile as we awaited our plane at Suva's airport. "Once I was on a ship bound for England when my dinner partner asked if I had ever eaten human flesh. 'Of course,' I said, 'much better than pork.'

"When the steward brought the menu, I said, 'Take it away! Bring me the passenger list!'

"The lady's eyes bulged, and there were no more questions about cannibals in the Fijis."

Our 466-mile hop to Tonga in an aged but refurbished DC-3 took us over the ethnic and cultural line between Melanesia, typified by the Fijians, and Polynesia, represented by the Tongans we were to visit (map, next page).

As we eased down onto the grassy runway of Tonga's Fua'amotu Airport, on the main island of Tongatapu, I saw a crowd of welcomers, an honor guard, and a band.

We were arriving ahead of the other U. S. delegates, led by John A. Burns, Governor of our own Polynesian state, Hawaii, and including former Governor Edmund G. (Pat) Brown of California. For a moment I thought the reception was for us. Dressed for tropical comfort in an open shirt, I looked at Anne in alarm and began struggling with tie and jacket.

Then I realized that the Tongans were honoring their Pacific neighbors from Fiji. As Ratu Edward and fellow Fijian chiefs disembarked, the band struck up ruffles and flourishes, then the British anthem, for Fiji is a British colony and Tonga's ties with Britain have long been close.

KODACHROMES BY ANNE REVIS GROSVENOR (UPPER LEFT) AND MELVILLE BELL GROSVENOR © N.G.S.

Capital Named "Abode of Love"

With great relief, Anne and I stepped quietly onto Tongan soil, unnoticed except for one busy photographer. It was Edwin, safely arrived and hard at work.

"Our friend Jack Riechelmann is here with a car," Ed said. A few days earlier, when Ed had dropped from the sky, Jack and his lovely Tongan wife Kato had taken him under their wing. Now Jack himself—friend and confidant of the King, editor of the Tongan weekly newspaper, diving expert, and disc jockey on Radio Tonga—had come to meet us, driving out 14 miles from the capital, Nuku'alofa. Its name means "the abode of love."

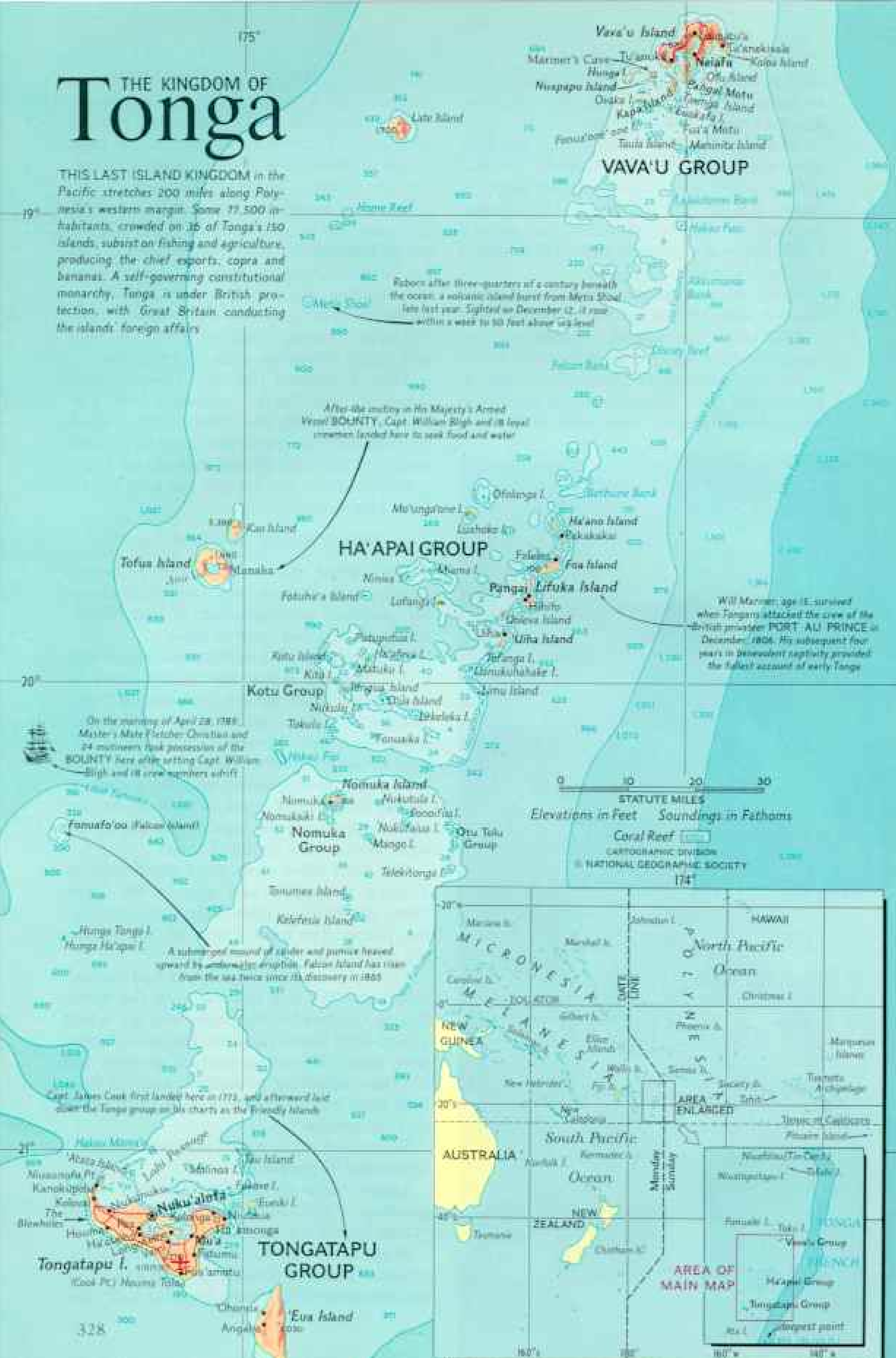
Our short drive was a good introduction to Tonga's geography and way of life. Taro, yams, and bananas grew under graceful coconut palms. The trees, I noticed, were either old and tall or young and short.

"Yes, coconuts are our bread and butter," said Jack. "We ship copra all over the world. But in the terrible hurricane of 1961 whole groves were leveled and the Tongan economy with them. Then, too, coconut growers had for years neglected to replant, and old trees bear little fruit. Now the King is pushing for more plantings."

We passed many a sign reading, "Coconut replanting in progress."

Larger signs arched the road with floral greetings: "Welcome to the Coronation" and "Long Live King Taufa'ahau Tupou IV."

Flags decorated our destination, the International Dateline Hotel. Less than a year old, this attractive three-story building had risen


THE KINGDOM OF
Tonga
THIS LAST ISLAND KINGDOM in the Pacific stretches 200 miles along Polynesia's western margin. Some 77,500 inhabitants, crowded on 36 of Tonga's 150 islands, subsist on fishing and agriculture, producing the chief exports, copra and bananas. A self-governing constitutional monarchy, Tonga is under British protection, with Great Britain conducting the islands' foreign affairs
Reborn after three-quarters of a century beneath the ocean, a volcanic island burst from Metis Shoal late last year. Sighted on December 12, it rose within a week to 50 feet above sea level
After the mutiny in His Majesty's Armed Vessel BOUNTY, Capt. William Bligh and 18 loyal crewmen landed here to seek food and water
Will Mariner, age 15, survived when Tongans attacked the crew of the British privateer PORT AU PRINCE in December, 1806. His subsequent four years in benevolent captivity provided the fullest account of early Tonga
On the morning of April 28, 1789, Master's Mate Fletcher Christian and 24 mutineers took possession of the BOUNTY here after setting Capt. William Bligh and 18 crew members adrift
A submerged mound of cinder and pumice heaved upward by undersea eruption, Falcon Island has risen from the sea twice since its discovery in 1865
Capt. James Cook first landed here in 1773, and afterward laid down the Tonga group on his charts as the Friendly Islands
VAVA'U GROUP
Vava'u Island
Neiafu
Mariner's Cave
Hunga I.
Nuapapu Island
Kapa Island
Late Island
Metis Shoal
Falcon Bank
HA'APAI GROUP
Tofua Island
Kao Island
Ha'ano Island
Foa Island
Pangai
Lifuka Island
Uiha Island
Kotu Group
Nomuka Island
Nomuka Group
Otu Tolu Group
Fonuafo'ou (Falcon Island)
Hunga Tonga I.
Hunga Ha'apai I.
Tongatapu I.
Nuku'alofa
TONGATAPU GROUP
'Eua Island
0 10 20 30
STATUTE MILES
Elevations in Feet
Soundings in Fathoms
Coral Reef
CARTOGRAPHIC DIVISION
NATIONAL GEOGRAPHIC SOCIETY
HAWAII
North Pacific Ocean
MICRONESIA
MELANESIA
NEW GUINEA
AUSTRALIA
South Pacific Ocean
NEW ZEALAND
AREA ENLARGED
AREA OF MAIN MAP
TONGA
Vava'u Group
Ha'apai Group
Tongatapu Group
Monday
Sunday

on the low foreshore beside a long pier (page 348). Most modern building for hundreds of miles, it boasts Tonga's only elevator.

When Captain Cook named these the Friendly Islands, he was absolutely right. The hotel was staffed with islanders who had spent all their lives picking coconuts, fishing, and digging taro roots; now they were suddenly waiters and maids in the European tradition. Some had just been added that week to care for coronation guests. They laughed at the strangeness of it all and greeted us as warmly as if they had been our personal hosts.

"Our housekeeper walked regally in and welcomed me with a warm hug and kiss," Mrs. Burns later recalled. "From then on I was right at home."

At dinner in the poolside dining room, Ed ordered for us in Tongan. *"Fakamolemole, mālō 'aupito,"* he said, to the great surprise of his parents.

When an off-islander tries their tongue, the Tongans are immensely flattered. Waiters laughed with delight and flocked to our table. One filled the water glasses. Another picked up my napkin before I knew I had dropped it.

"Taha, ua, tolu," Ed jabbered, and the waiters rushed out. Our superb dinners arrived exactly as ordered.

Not until much later did Ed reveal his secret; he had learned "please" and "thank you very much," and how to count. He had ordered our meal by number—"one, two, three"—while pointing to items on the menu.

But if his Tongan was limited, his knowledge of geography had increased considerably. He had noted the difference between mountainous Fiji and the flat Tongatapu island group. "And the people—Fijians have darker skin than the Tongans and frizzy hair, and their language sounds more guttural and faster; Tongan is sort of flowing," he said. "I guess it's part of the difference between Melanesia and Polynesia."

To encourage Tonga's traditional crafts, the late Queen Sālote organized a women's cooperative that now maintains a handicraft shop in the new hotel. We found wall-size masterpieces of the beaten bark cloth called tapa (pages 353-55) and baskets so finely woven they looked as if they could hold water. But these did not interest Ed.

"People have already given me more baskets than I can carry," he said.

While taking pictures in the market, he had given Polaroid prints to his models. Delighted—and eminently courteous themselves—the Tongans rushed home to bring prized baskets and necklaces as presents for him.

"I couldn't refuse," he said, "I had to hire a cab to carry them all."

We found the same friendliness as we strolled the bougainvillea-decked streets of Nuku'alofa. Everywhere we saw children—round-faced jolly youngsters. We could appreciate the King's concern for the future in view of his kingdom's fast-growing population. Tonga lacks natural resources and its 77,500 people are mostly very young—36 percent under the age of 10.

KODACHROME BY MELVILLE BELL GROSVENOR © N.G.S.

Vision of the South Seas: Plumes and flag bedeck a dancer. Pandanus fruits drape her neck, and shells and beads gleam from her girdlelike *tisi*. A Tongan who now lives in Fiji, Paea Ta'aufo'ou returned for the coronation.

But if Tongans have future problems, they were certainly deferring all their worries. This was their first coronation in 49 years, and they were flocking in from the other islands. The whole capital was packed with people.

Our roving son was eager for us to explore the rural parts of the island. "You have to see the flying foxes," he said.

In a hired car, we drove over bumpy back roads to Kolovai, where these huge dark-brown fruit-eating bats abound. Hundreds of them clustered, like fruit themselves, in the spreading branches of casuarina trees. Some had a wingspread of three feet (pages 338-9).

They looked black against the blue sky, hanging upside down and chattering, with small ones clinging to their mothers' backs.

"Next, Dad, you have to see the blowholes on the southwest coast," Ed said.

For years I had heard of this spectacular sight, resulting from the ceaseless pounding of waves from the open sea. Trade winds sweeping unimpeded for a thousand miles build up great waves that come roaring in continuously. Hitting the steep sides of Tonga with a terrific crash, they undermine the coral limestone and wear holes in the reefs. The foaming water spouts up through these openings like geysers.

We parked the car under the coconuts near Houma and walked down a carpet of tropical green to the sea. Around a crescent of blue, spray was shooting skyward from hundreds of fountains. The earth shook under our feet from the impact of the thundering waves. In all my life around the sea, I have never seen anything more dramatic (pages 344-5).

Ed was mysterious about our next stop. Off we jounced on a dirt road, past coconut plantations and thatched villages. Families were cooking supper over outdoor fires, and fishermen were mending nets on the beaches. All smiled and waved as we passed.

Suddenly, near Kolonga, a curious coral limestone structure appeared, framed in a grove: two pillars with a mortised crosspiece weighing many tons. *Ha'amonga*, or "the burden carried on a carrying stick," Tongans aptly call it. The Ha'amonga was built by King Tu'itātui seven centuries ago, tradition says.

With European pageantry, the royal procession moves from the chapel along a pandanus-mat path, past seated Tongan women of high rank, to the palace. Princes in knee breeches and cocked hats bear the train of the King's robe—40 yards of French silk velvet trimmed with ermine.

Guests from GEOGRAPHIC: Foreign Editorial Staff Chief Luis Marden, an old friend of the new King, attends as a court photographer. With him stand Dr. and Mrs. Melville Bell Grosvenor. Editor-in-Chief of the NATIONAL GEOGRAPHIC, Dr. Grosvenor represented President Lyndon B. Johnson as an official U. S. delegate. From the porch, the King reviews 11,000 parading school children.

Pacific neighbors wait to be received by the King after the coronation. Governor John A. Burns of Hawaii, center, heads the U. S. Presidential delegation; Mrs. Burns sits in front. Former Governor of California Edmund G. (Pat) Brown, left, a delegate, still wears top hat and morning dress, as does H. Rex Lee, then Governor of American Samoa, with Mrs. Lee.

KODACOLOR (ABOVE) BY ROGER H. CORYELL; KODACHROMES BY EDWIN STUART GROSVENOR © N.G.S.

Homage of hands salutes the King. Students of Queen Sālote College, a girls' school named for the King's revered mother (page 350), use hand gestures to accompany their songs' changing cadences. The group performed in flawless unison for half an hour.

KODACHROMES BY LUIS MARDEN (LEFT) AND EDWIN STUART GROSVENOR © N.G.S.

Face filled with wonder, a junior subject sizes up her giant sovereign as he receives the acclaim of his people. Standing 6 feet 2 inches tall, he towers over most of his countrymen. Size and stateliness characterize members of Tonga's chiefly families.

Feasting and dancing on a regal scale: Wildly stamping and shouting, dancers wage a mock battle at the coronation feast, a mammoth luncheon for 2,500 guests. How to eat a whole pig without knife or fork puzzles the author, seated on pandanus matting between Mrs. Grosvenor and the Queen's mother, Heuifanga 'Ahome'e, right. His 15-year-old son Edwin came to the rescue

He supposedly erected it as a monument for his two sons, who he feared would quarrel after his death. The uprights represent the sons, the yoke brotherly love.

The stones of this trilithon had been cleared of vines, and beyond it an opening had been tunneled through the jungle like a telescope pointed to the horizon (page 365). We wondered why, and later were to learn the reason from the King himself.

From our hotel window that evening, we watched islanders pour ashore from canoes, sloops, and inter-island motor vessels, all bound for Nuku'alofa to pay homage to their King. Until late at night, lovely island girls in woven pandanus waist mats over dresses and long wrap-around skirts strolled along the promenade, singing and talking in the soft Tongan tongue; sightseers gaped at the palace; and Australian and British sailors from good-will ships dickered with drivers of three-wheeled motorcycle cabs or bargained for souvenirs. Long after we retired, we could hear the exotic musical sounds of this festive, crowded island.

Precoronation ceremonies began in earnest next day in the five-acre courtyard beside the Royal Palace and Chapel Royal. For two shillings, we put-putted in a three-wheeled cab to the grassy compound, where gaily clad troupes of dancers were gathering.

Hundreds of visitors crowded the lawn; some roosted in trees and on stepladders. As

after snapping this picture. The lad split the pig's skin with a karate chop, then expertly ran his fingers along the spine to peel off the filets—a technique he had earlier observed at a Tongan family feast. Attendants wait on the King and the Duchess of Kent (center). Governor Brown delights youngsters with Polaroid snapshots (above); few had seen themselves on film before.

KODACHROMES BY MELVILLE BELL GROSVENOR (ABOVE RIGHT) AND LUIS MARDEN (BELOW); EKTACHROMES BY EDWIN STUART GROSVENOR © N.G.S.

Like a volcanic eruption, torches blaze along five miles of Tongatapu's lagoon in an ancient tribute called *tūpakapakanava*, performed four times during the week-long celebration. As twilight nears, thousands of spectators filter down to the water. A hush falls; then a signal rocket streams aloft. Suddenly the shore bursts into flame with fires

guests of honor, chiefs from other Pacific islands—Maoris, Samoans, our Fijian friends—sat cross-legged on the palace veranda.

Dancing began, featuring the *lakalaka*, in which women tell a story by graceful gestures, and men leap athletically in accompaniment.

The climax was a rousing dance. While women danced and sang apart, the men shouted, grimaced, stamped, twisted, and charged as if to intimidate their partners.

As the dust flew, leafy costumes rustled, and drums beat out a heady rhythm, all felt a sense of growing excitement. Emotionally carried away by her team's performance, one of the spectators on the veranda, the wife of a chief, decided to join in. Perhaps she was a grandmother, but certainly she was beautiful to the islanders, who admire generous weight.

Slowly she rose, her body swaying to the beat; gently her feet and hands began to move in a most graceful way. Everyone was captivated. They recognized a great lady and famous dancer. She danced down to the grass, moving beautifully in solo. Thunderous applause greeted her performance.

That afternoon "The Spirit of Aloha," a Hawaii Air National Guard C-54, brought our fellow-delegates, Governor and Mrs. Burns, the Pat Browns, and H. Rex Lee, then Governor of fast-developing American Samoa, and his wife.

Luis Marden, as an old friend of the King, went to the Royal Palace that evening to pay his personal respects to His Majesty.

"A true Renaissance man!" Luis admiringly told me later. Luis asked the King about his latest educational project—using the abacus as a grade-school teaching device. These old friends conversed so long that Queen Mata'aho sent Luis a plaintive message: "Please remind the King not to stay up too late, since he has a busy day tomorrow."

"Tact itself," said Luis. "That 'busy day' meant his coronation."

Court Photographer Gets an Assistant

All of us had a busy day. We were awakened before dawn by a rural concert of crowing roosters, barking dogs, the clopping of hoofs, the grinding of cartwheels, and the choral music of rehearsing Tongans. We needed the early start to deck ourselves in formal dress before 9:30.

Joining the delegation, we wove our way by miniature bus to the Chapel Royal. There we found Luis Marden, in cutaway, ascot tie,

spaced every five feet. Fireworks flash from anchored British and Australian men-of-war, and cheers echo across the island. Ornamental electric lights snake up the trees.

EKTACHROMES BY LUIS MARDEN, NATIONAL GEOGRAPHIC STAFF © N.G.S.

Gnomes of the night, school children excitedly tend coconut-sheath torches. The youngsters vie to see who can keep a flame burning longest in tribute to the King.

and gray topper—distinguished as a duke.

"By special invitation of His Majesty," whispered Luis, "I am going to work with the court photographer. But I'll count on you for the most important picture of all—the actual moment of crowning."

"But I'm a member of the delegation," I protested.

"Has anyone told you *not* to take pictures? Then you owe it to history to do so," Luis pursued. "If you don't record this moment, no picture will exist!"

The Editor decided that the Chief of the Foreign Editorial Staff had a good point. With minor misgivings, I concealed a Leica inside my silk hat.

The Chapel Royal seats only 77 people. What this little Wesleyan house of worship lacks in size it offers in the charm of richly carved stained oak and an atmosphere of "Pacific Gothic." Sections were built and carved in New Zealand and assembled here in 1882. In the back of the throne is an inlaid star of *koka* wood, taken from an ancient tree traditionally used as a back rest at the investiture of Tongan chiefs (page 324).

Wesleyan missionaries in 1831 converted King George Tupou I, the powerful, 6-foot-6-inch chief who conquered and united these islands, led his people to Christianity, and established the present ruling dynasty. The Wesleyan Methodist Church became the state church of Tonga.

Thumbing through the Order of Service for the coronation, I saw that it would closely follow the British coronation ceremony, but with one exception: Although the liturgy was printed in English for the benefit of foreign guests, every word would be spoken in Tongan.

On the opposite side of the aisle sat an imposing Tongan noble. His sashlike *ta'ovala* was badly torn and frayed. Why didn't he turn the worn part under, I mused. Afterward Jack Riechelmann's wife Kato explained that the greater the age of the ta'ovala, the more it is treasured as an heirloom. Lucky owners show off their tatters proudly.

Anne and I were seated third row center, just behind a bewigged jurist. Cautiously, I raised my camera and checked the focus.

A stir went through the chapel as His Royal Highness the Duke of Kent and his Duchess, representing Queen Elizabeth II, were escorted to their seats by the Prime Minister. The Duchess was even more beautiful than the sparkling diamonds she wore.

KODACHROME BY LUIS MARDEN (LOWER RIGHT), EKTACHROME (ABOVE) AND KODACHROMES BY EDWIN STUART GROSVENOR © N.G.S.

Here was a setting worthy of a king. Magnificent costumes of the Polynesian and Melanesian ladies contrasted with the gowns of delegates' wives from Great Britain, Australia, and New Zealand. Exquisitely woven ta'ovala and tapa skirts vied with lovely Thai, Indian, Italian, and Hong Kong silks.

Two men, impeccable in their cutaways, now marched sedately down the aisle—the court photographer and his deputy, Luis Marden. They stopped in front, clicked their heels, raised their cameras, and click! a picture of the Duke and Duchess (page 325). Then, in step, they marched to the rear. From behind us, soft Tongan voices swelled out, singing a Psalm.

We stood. The royal family entered in stately procession and took their places in front. How impressive Polynesian royalty are! The King looked huge—and was. He stands 6 feet 2 inches and weighs 325 pounds. For the coronation—on his own 49th birthday—he wore a general's uniform and over it a robe and train made from 40 yards of scarlet French silk velvet trimmed with ermine.

"Sirs, I here present unto you," announced the Royal Chaplain in Tongan, "Taufa'ahau Tupou IV, your undoubted King. . . ."

And his subjects responded in the melodious Tongan tongue: "Long may Taufa'ahau Tupou IV reign!"

We sat as the King was administered his oath of office, then stood when he knelt at the Communion table, clasped the Bible, and said, "The Things which I have here before promised, I will perform and keep. So help me God."

Throughout the hour-long service, I was moved by the marvelous voices of the choir, singing without accompaniment. I have listened to famous choirs from Salt Lake City to St. Peter's, but never heard more beautiful singing than in that little chapel.

At last came the moment of crowning.

"Oh God," intoned the Royal Chaplain, "the Crown of the faithful: Bless we beseech Thee this Crown, and so sanctify Thy servant

"Flying fox," Tongans call the crow-size fruit bat *(Pteropus tonganus)*. Its big teeth can rip destructively into mangoes and papayas.

Wingspan matches arm span as a lad measures a fruit bat he nursed after it fell from a roost with a broken wing. In his village of Kolovai, the mammals festoon trees in daytime (left), hanging head down until evening departure to forage (below). Climbing a slippery roost to take the photograph at left, Edwin Grosvenor stopped at shrieks of *"Tapu!"*—taboo; villagers explained that Kolovai bats belong to Tongan royalty. Elsewhere, islanders often eat the animals. The appearance of an albino here, they believe, presages a royal death.

Taufa'ahau Tupou IV upon whose head this day Thou dost place it for a sign of royal majesty, that he may be filled by Thine abundant grace with all princely virtues. . . . Amen."

I raised my camera quietly and leaned past the great white judicial wig in front of me. The chaplain lifted the crown, and I snapped the shutter just as the heavy gold circlet descended upon the royal brow. That little click sounded to me like a shotgun blast; yet the judge never stirred. A unique moment had been recorded (page 325).

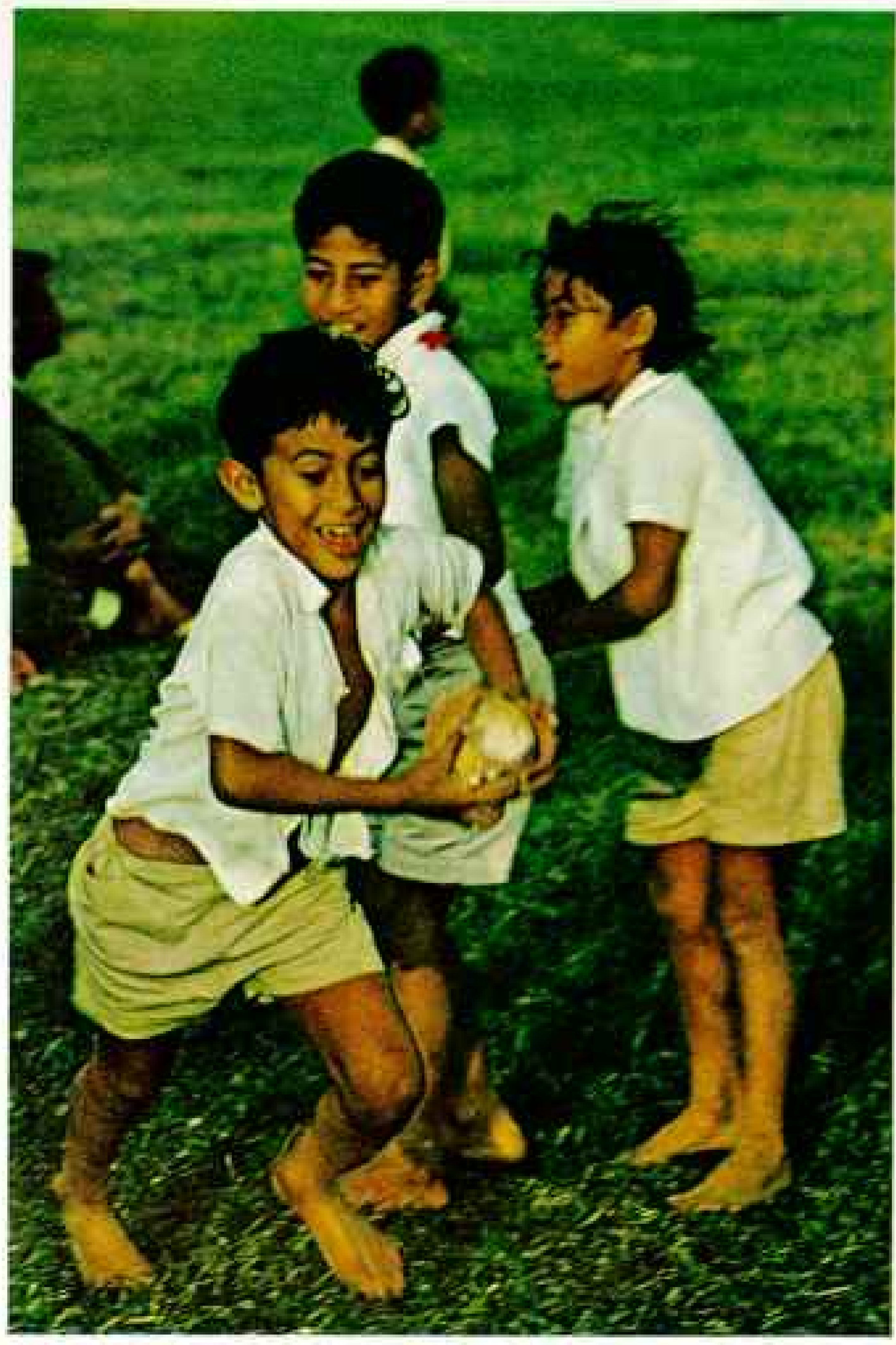
Then a smaller crown was gently lowered onto the dark hair of the Queen.

All of us were deeply moved. Mrs. Burns especially noticed the Queen—"I saw her weep softly and briefly. Such a gentle person."

When Their Majesties rose, we all stood for the Tongan national anthem, and outside boomed a 21-gun salute. As the royal procession moved out the east door, chapel bells pealed and answering bells and drums sounded across the Tongan isles.

In a frantic free-for-all, high-school Rugby players lunge for the ball; gap in one team member's teeth is a souvenir of an earlier battle. The King and his brother, Prince Tu'ipelehake, excelled at this fast and furious game, Tonga's favorite sport.

His ball a coconut, a half-pint player dashes for a score. Internationally renowned for their Rugby, Tongans starred on Hawaii's Church College team—unofficial 1967 U.S. collegiate champions.



Leading his procession along a broad pandanus mat, the King wore his gold crown, glinting in the sun—and dark glasses (pages 330-31). High ranking ladies sat along the edge, looking up admiringly. Then the King entered the palace, a Victorian structure in tropical style with a cupola and gingerbread.

When the King reappeared, he had changed from his crown to a more comfortable fore-and-aft hat. Now he reviewed a procession of loyal subjects, some 11,000 school children, and dancing groups (pages 332-3). To their songs and cheers, the King and his gentle Queen responded with waves and smiles.

In general, young Tongans are slender, but many grow quite buxom as they age. And everyone values great weight as part of the royal tradition of beauty and power.

I recall a story about the King's last visit to the U.S.A., when he was Crown Prince. An American doctor, concerned about the royal weight, wrote out a strict diet forbidding starches such as rice and potatoes.

"What about our South Sea vegetable taro?" asked the Tongan Prince.

"Vegetables are fine," said the doctor, not realizing that taro is a super-starch. So, on the reducing diet brought home from America,

EKTACHROME (ABOVE) AND KODACHROME BY EDWIN STUART GROSVENOR © N.G.S.

the King gained some 50 pounds—with the admiring approval of his people.

At the royal reception, His Majesty greeted us warmly and introduced us to the Queen. When I mentioned our visit to the Ha'amonga, the King's face lit up, and he told me of his recent studies and conjectures about the great limestone portal.

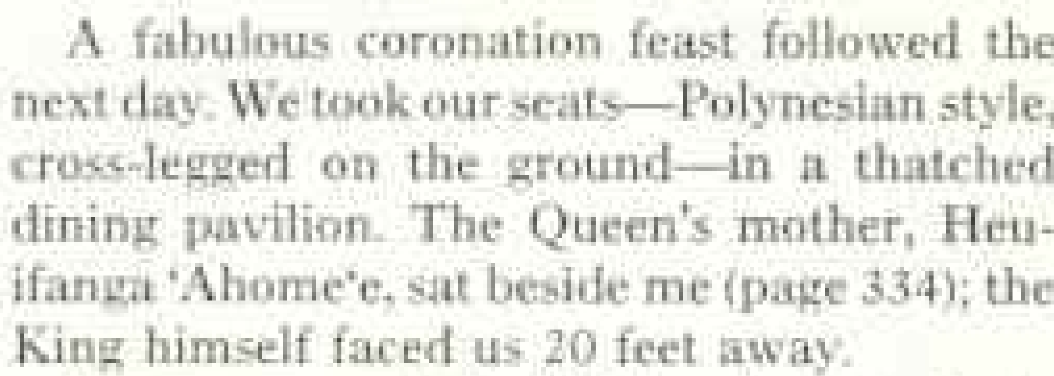
"The ancients worked out many ways of determining the solstices," said the King. "After seeing Stonehenge, and reading about Abu Simbel in the NATIONAL GEOGRAPHIC, I thought my ancestors may have used our Ha'amonga in the same way."

While the line lengthened behind us, the King enthusiastically told us how he had ordered the stone structure cleared of vines and found a small bowl-shaped depression on top. Grooves pointed toward the east—perhaps to the position of sunrise at the solstices.

"We cleared a path of vegetation in line with one of the grooves," the King continued. "And before sunrise on June 21 we went out to the Ha'amonga. Imagine my pleasure when the sun came up out of the sea exactly at the end of my palmy tunnel on the shortest day of the year" (in the Southern Hemisphere).

Commemorative stamp, shown actual size, depicts a special coronation coin bearing a likeness of the King. The Royal Treasury struck only 1,500 *hau* coins—worth about $100 each—minting them of rare palladium, a metal related to platinum. Collectors snap up Tongan stamps and coins, whose sale contributes up to five percent of the national income. The airmail issue above sells for 2 *pa'anga*—equivalent to $2.30.

Riding a king-size board, the 325-pound



A fabulous coronation feast followed the next day. We took our seats—Polynesian style, cross-legged on the ground—in a thatched dining pavilion. The Queen's mother, Heuifanga 'Ahome'e, sat beside me (page 334); the King himself faced us 20 feet away.

In awe we watched high-school students bring 8-foot trays, each to feed six guests. Yet, by Governor Burns's own count and official report, a single tray "bore four suckling pigs of about 18 pounds each; 12 chickens, 60 bananas, six large yams, 15 lobsters, eight bundles of tapioca pudding; six bundles of beef cooked with coconut milk; and two watermelons cut into quarters."

Squares of tapa served as napkins, but we had no knives, forks, or spoons. I was puzzling over how to eat suckling pig with my fingers when Edwin tapped me on the shoulder. "What's the matter, Dad? Having trouble?"

"It's easy—look," he said, cracking the crisp skin down the backbone with the side of his hand. Then, peeling the skin, he deftly scooped up two tiny filets with his fingers.

"*Faka-Tonga*—perfect Tongan!" exclaimed the Queen's mother. Ed had learned this art at a Tongan feast with the Riechelmanns.

After lunch, we watched more dances in the courtyard. One of the most graceful soloists was Their Majesties' daughter, her honey-colored skin shining with coconut oil. As this beautiful Princess swayed, the wives of visiting chiefs, crouching, brought forward lengths of gorgeous silk and tied them to her moving ankles in tribute.

When the dance was over, the Princess was immobilized. Maids of honor brought an umbrella to shade her, freed her feet, and carried away the silks.

After sunset we mingled with the crowd on the waterfront for the ancient torch-lighting called *tūpakapakanava*. All day, country people had brought bundles of dry coconut sheaths to the curved bay front. Then at dusk, when a signal rocket arched into the sky from H.M.S. *Sirius*, torches lit by 10,000 youngsters flared as if a switch had been thrown. Fire rimmed the lagoon (pages 336-7). All Tonga seemed

KODACHROME (ABOVE) BY LUIS MARDEN © N.G.S.

Taufa'ahau surfs in Pacific combers. The monarch also delights in fishing and scuba diving.

to cheer. Fireworks from Australian and British vessels added to the glitter.

Two days after the Christian coronation, the Tongan monarch sat down in a circle with his chiefs for the kava ceremony. Outsiders are not invited to this ancient rite in which the chiefs acknowledge him as King.

I sampled some kava, a slightly narcotic drink made from the kava root. Frankly, I prefer coconut milk. But the ceremonial drinking of kava formalizes Tongan announcements and titles.

Red Carpet, Polynesian Style

A highlight for all of us was driving out to the lawn party given by the King and Queen at their country place, Kauvai, near Longoteme.

"My most impressive memory," Mrs. Burns recalled, "was driving over a road completely covered with beautiful handmade tapa. The villagers were sitting cross-legged and laughing on the edge, just inches from the wheels!" None of us will ever forget that South Sea version of a red carpet.

Ed had his own special memory—of a Rugby game, or *'akapulu* as Tongans call it.

"A young fellow sits down next to me in the stadium while I'm taking pictures," Ed told us. "He asks about my cameras and long lenses, and I show him how they work. He explains Rugby to me, but I take no pictures of him. When the game is over and he is gone, Jack Riechelmann asks, 'What did the Crown Prince say to you?' "

Ed's easy meeting with the Crown Prince, a handsome young man on leave from his studies at Sandhurst, typifies this pleasant kingdom.

"I kept wondering," said Mrs. Burns, "whether these beautiful people were like the ancient Hawaiians before Captain Cook and the sailing ships changed their civilization."

Whatever changes may come to the last Polynesian monarchy, we hope that nothing may spoil the friendliness of these gentle Friendly Isles. Long may King Taufa'ahau Tupou IV reign over his island realm in the distant Pacific. THE END

The Friendly Isles of Tonga

Article and photographs by
LUIS MARDEN
Chief, National Geographic Foreign Editorial Staff

THE PEOPLE OF TONGA love their green islands and think anyone who lives elsewhere is unfortunate. Last July I met again in Tongatapu a woman I had known on a previous visit. She kissed me on the cheek and then held me at arm's length, looking at me earnestly and saying:

"Poor Lui, oh, poor Lui!"

"What is the matter, Ha'angata?"

"Oh, so long you not live in Tonga."

I had been away two years. Yet for an off-islander I have spent considerable time in Tonga. I had just seen the island at its most festive; the coronation, the event of a lifetime, had come and gone and had filled the capital with guests from all over the world. But I have stayed in Tonga on three different occasions during the past fourteen years, and have observed its ways and people in quieter times.

Like all Polynesians, Tongans are good humored, direct, and above all, friendly. Their smiling good nature is so marked that it gave their country its alternate name, "The Friendly Islands" (map, page 328).

Nuku'alofa, the capital, is a pretty, tranquil

Spouting like 1,000 whales, the sea crashes skyward against a setting sun on Tongatapu. Spectacular fountains play along five miles of coast where pounding waves spurt through blowholes in the coral, jetting water 50 to 100 feet into the air.

KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

town of white red-roofed wooden houses behind white picket fences and hibiscus hedges. Tall and graceful Tongans saunter along its peaceful ways, or whisk about on bicycles. There were more motorcars than on my first visit, and strange three-wheeled motorcycle taxis, called *ve'e-tolu*, careered around corners with staccato bursts of exhaust (page 349).

Nearly all the houses here are European-style wooden structures, but at the edge of town stand some *fale Tonga*—Tongan houses, single-room dwellings of bamboo or reed sides, thatched with coconut palm or pandanus.

When I walked there one day, a smiling man standing in the doorway of the first one I passed called to me to come in. He asked me, "What island you from?" When I told him, he said, "Oh, we have lots of Americans here during the war. They come to Tonga to rest and enjoy."

Like most Tongans, he spoke English fluently, as the language is taught in Tongan schools from the primary grades onward.

His house, standing under a breadfruit tree, was shadowed and cool. The sea breeze swept through two doors opposite each other in the middle of the bamboo walls. Pandanus matting covered the floor of crushed white coral, and curtains of tapa screened the round ends of the house where the family slept on springy beds of the same material (pages 353-5).

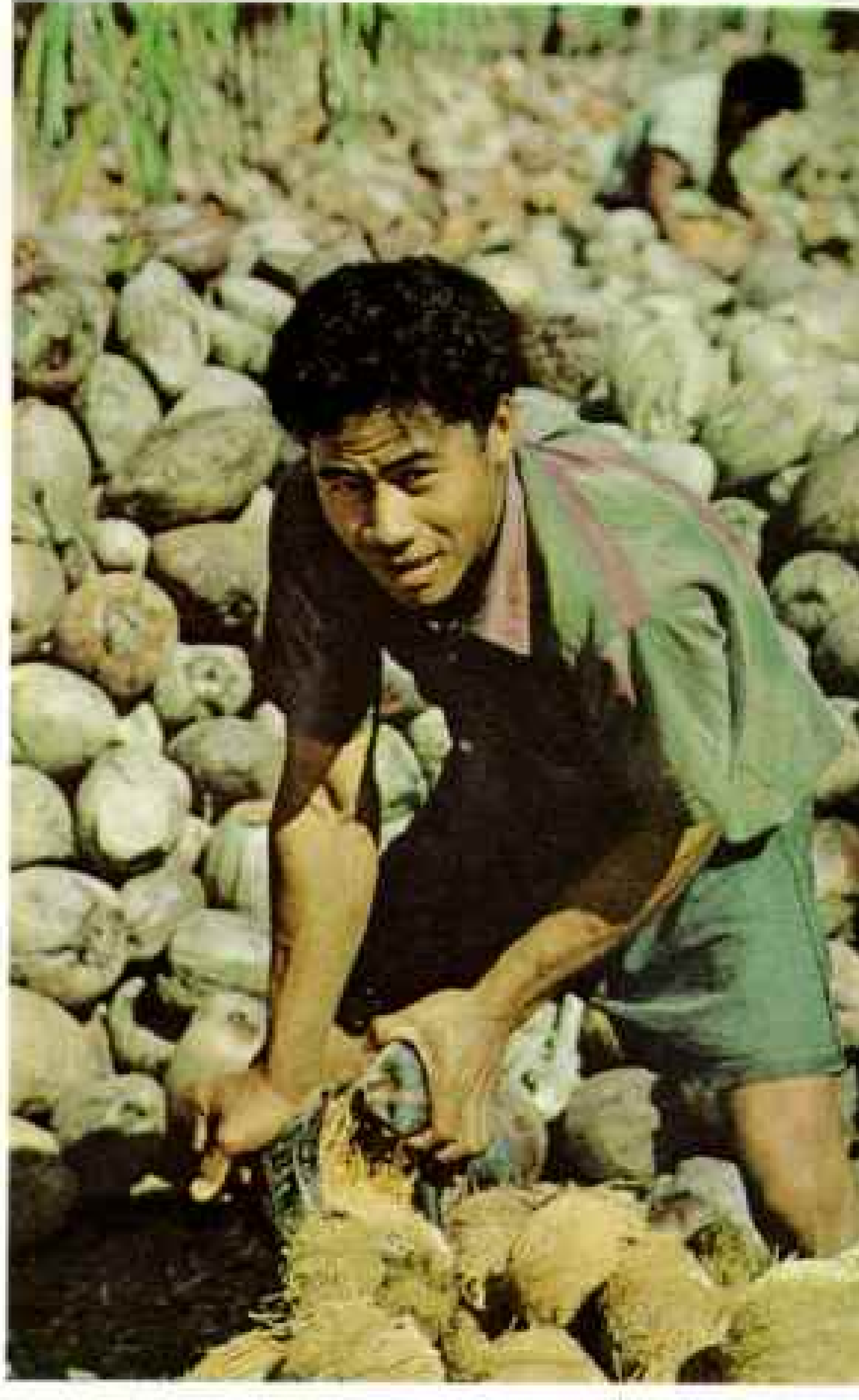
Although he asked many questions about America, my new friend had not much use for the rush and pressures of the Western World. His parting words, delivered with a strong handclasp, were:

"You come here live with us. I tell you the truth, you will be happy till the end of the world. If you too late, don't blame me."

Ancient Nose Flute Survives in Tonga

The southern islands of Tonga were discovered for the West by the Dutch navigator Abel Janszoon Tasman in 1643, but little was known about them in the European world until that great and good man, Capt. James Cook, visited them nearly a century and a half later. He bore instructions from his King, George III, to "observe the Genius, Temper, Disposition and Number of the Natives or Inhabitants, if there be any, & endeavour by all proper means to cultivate a Friendship and Alliance with them. . . ."

In the course of three great voyages Cook made such detailed studies that the Pacific would never again be the same, on the charts or in the minds of men. Because of "the friendly behaver of the Natives who seem'd to [vie] with each other in doing what they thought would give us pleasure," he laid down Tonga on his charts as the "Friendly Islands," a name they have borne ever since.



I had first visited Tonga at the time of Queen Elizabeth's royal visit to these islands in 1953. Now, at the palace, I met again my old friend the Honorable Ve'ehala, Keeper of the Palace Records, who has been justly described as a "Tongan Friar Tuck." He is a solidly built, portly man with a twinkling eye, who wears his hair brushed back and growing low on the sides in the ancient Tongan manner.

Ve'ehala is a traditionalist, a wit, a raconteur, a musician, and an appreciator of the good things of life. We talked of the time of the royal visit, when Queen Sālote Tupou III had given up her palace for a night to Queen Elizabeth and Prince Philip, and four nose-flute players had wakened the royal couple at dawn (page 351).

The literal meaning of the nose flute's Tongan name—*fangufangu*—is "to waken

Coconuts mean wealth on Tonga. Copra, dried coconut meat, brings the kingdom most of its income. Here an islander pries away a husk by impaling the nut on a sharpened stake. Then he will split it and lay the halves in the sun to dry. Striving to modernize, Tongans experiment with a machine that processes the coconut from tree to oil. Islanders also raise bananas for export, with Japan and New Zealand the major customers. For home consumption they harvest yams—prime staple of the South Pacific—taro, pineapples, and breadfruit.

Resourceful trio turns an abandoned hut, jokingly labeled "Private Hotel," into a playhouse. Children under 10 flood the islands like a spring tide, accounting for a third of the population of 77,500. Already, an average of 287 persons crowds each square mile. To check the explosion, the government established birth-control clinics in 1966.

The kingdom plans well for its youth. Boys and girls study at free schools from ages 6 to 14; English is a major subject. Scholarships at overseas universities go to promising students. A century ago a generous king decreed that every boy at 16 should receive an *'api*, a plot of 8¼ acres. The practice continues, though little empty land remains.

EKTACHROME (ABOVE) AND KODACHROMES BY EDWIN STUART GROSVENOR © N.G.S.

In a junior-size crash helmet, a lad can ride in safety behind his mother on her motorbike.

Warm embrace of ocean and lagoon encloses the Tongan capital, Nuku'alofa. A fringing reef of coral separates the island of Tongatapu from deep water, keeping large ships well offshore. H.M.S. *Sirius* docks at the end of Vuna Pier. At the foot of another pier stands the new Inter-

gently." The main function of the First Nose Flute in the household of great chiefs was to play softly outside the house of the chief each morning. "The idea," Ve'ehala said, "was to make sure the sovereign wakened in a good mood, because he had absolute power of life and death."

The bamboo nose flute still sounds in the land, although its notes are fading fast. Ve'ehala estimates that there are no more than 20 men left in all Tonga who can make or play one. It has all but vanished from the rest of Polynesia.

As we talked, a swelling diapason of choral voices drifted to us from the big Wesleyan church across the green. The choir was singing, in Tongan, the "Hallelujah Chorus" from Handel's *Messiah*.

Like all Polynesians, Tongans are natural singers, with an instinct for harmony. The early navigators all spoke of their sweet singing. When Tonga was Christianized, the people happily took to hymns, and later to the more sophisticated music of Bach and Handel.

Embarrassment Mars a Music Lesson

Ve'ehala told me that when Dr. J. E. Moulton, a late 19th-century Wesleyan missionary, tried to introduce the European system of sol-fa musical notation, he encountered an unexpected difficulty.

"The first time he sang the scale there was dead silence. The doctor started again, asking the students to sing after him; this time some pupils laughed aloud, some hid their faces in their hands, and others left the room. The poor man asked one student what was wrong.

" 'Oh, doctor,' said the confused youth, 'you

national Dateline Hotel, named for Tonga's proximity to the line where today first becomes tomorrow. Gingerbread cupola of the palace and steeples of the Chapel Royal peep through a screen of Norfolk pines on the foreshore, above. Royal Tombs show white against a spacious green.

KODACHROMES BY LUIS MARDEN (ABOVE) AND JACK FIELDS © N.G.S.

swear three times in Tongan.' To avoid the offending syllables, Dr. Moulton had to give new names to the notes."

The islands of Tonga were ruled by three chiefs until the appearance of Taufa'ahau, the first chief to unite all Tonga by conquest. He was born in Ha'apai, probably in 1797. This great-great-great-grandfather of the present King stood 6-feet-6 in height, and his military talents, as well as an unusual mind, quickly brought him to the top. In 1831 he became a Christian, taking the name of George, after George III of England. His wife was baptized Sālote (SAH-lo-tay), the Tongan version of Charlotte, after the English Queen.

King George Tupou I, as he was called after being formally named in 1845, ruled Tonga until his death in 1893 at the age of 96. In his lifetime he gave Tonga representative

Breeze-conditioned tri-cab races through Nuku'alofa, vying for the right of way with pedestrians, bicycles, motorbikes, and an increasing number of automobiles.

KODACHROME BY LUIS MARDEN © N.G.S.

Beloved monarch, the late Sālote Tupou III of Tonga came to the throne at 18 and guided the islands with wisdom and grace for 47 years until her death in 1965. The smiling sovereign charmed the world during Queen Elizabeth II's coronation when, to show her respect, she rode through the London rain and chill in an open carriage. Statuesque at 6 feet 2 inches, Queen Sālote posed for this portrait in her 54th year. Crowns on the tapa hanging represent the monarchy; stars, Tonga's three island clusters.

government, establishing a parliament and constitution, both on the British model.

Since 1900 Tonga has had a Treaty of Friendship with Great Britain, under which Britain looks after foreign affairs and undertakes to protect Tonga in case of invasion. Tonga is something unique—a protected state (not a protectorate) of Great Britain—and is completely autonomous.

In 1862, King George emancipated the people from the power of the chiefs, on whose estates they had lived in serfdom; then he named the high chiefs hereditary nobles. These titles still exist, and Parliament is made up of seven nobles who represent the 33 nobles of the realm, seven elected people's representatives, the ministers of the Crown, and the governors of Ha'apai and Vava'u.

Although no longer legally under the absolute power of the chiefs, the Tongans have never lost respect and deference for the ancient lines. They think it disrespectful to stand in the presence of chiefs, and they uncover their heads before superior rank.

The irony is that some of the foreign concepts of decorum have reversed the natural and ancient customs of the Tongans. Captain Cook noted that he was forbidden to approach their ceremonial ground until his shoulders, like theirs, were bared. Today no one, not even a male, may appear "without an upper garment on any public way within the boundaries of a town."

One sees almost no Europeans in the streets of Nuku'alofa. The Government of Tonga has for years followed a quiet, non-xenophobic policy of "Tonga for the Tongans," and each year fewer non-Polynesians remain in government posts or in business there. Only about 200 adult Europeans now live in all the kingdom. For little, remote, placid Tonga, like the rest of the world, is menaced by that colossal bugbear—overpopulation. The kingdom is among the most densely populated of South Pacific island groups. The number of Tongans, some 77,500, has increased by more than one third in the past decade, and they now crowd the land 287 to the square mile.

Tongans are beginning to realize that something must be done to curb the expanding

Soft as the breeze of dawn, the plaintive notes of Tongan nose flutes sound from the palace porch. Court musicians, led by the Honorable Ve'ehala, Keeper of the Palace Records, left, breathe gently through their right nostrils to play the four-note bamboo instruments. In this historic photograph, they waken Queen Elizabeth and Prince Philip, who visited the islands in 1953. Today, Tonga is one of the few places where the flutes survive; their music signs island radio programs on and off each day.

KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

population. In July, 1966, the government began an intensive campaign for birth control.

A system peculiar to Tonga makes the scarcity of land particularly acute. After emancipation in 1862, the newly enfranchised citizens were, technically, landless. King George I pondered this, and said to his ministers, "Let us draft a land act, so that every Tongan may have a chance to plant. Then if he starves it is his own fault."

Missionaries who advised the King spoke in acres. But King George exclaimed, "I do not understand your measurements!" and taking up a bundle of sennit (plaited coconut-fiber cord) he told them: "This is 100 *ofa* long; let us give each able-bodied man a piece of land this long on a side." The ofa was the span of a man's outstretched arms; a lot 100 ofa square worked out to eight and one-quarter acres.

The Tongan male, on reaching age 16, is entitled to this *'api*, or country plot; but where is it to come from? It cannot, unfortunately, be dredged up out of the sea. Therefore it is understandable that as the years pass, the government is less and less willing to grant long-term land leases to non-Tongans. As the old leases expire, few are being renewed.

My home in Tonga was Beach House, a rambling wooden boardinghouse facing the sea. I would sit on the veranda in the rose-tinted afterglow at day's end, and watch the sauntering youths call out to a passing beauty, *"Foi'atelolo, ta ō mu'a mata māhina hopo!"* (O fat liver full of oil, let us go and watch the moonrise!)

The liver of a baked pig is the choice morsel reserved for chiefs, and so fond are the Tongans of fat and oily food that any right-minded Tongan girl is enormously pleased at such flattery.

In front of Beach House the lagoon between the foreshore and the reef looks milky green when winter's prevailing winds whip it into whitecaps. Beyond the reef, against the startling cobalt of *moana*—the deep sea—the small islets that lie athwart the approaches to Nuku'alofa stand on the horizon, faint and feathery green with coconut palms.

From the shallows around these islands

comes a favorite food of the islanders. All Polynesians love food from the sea, and one of the delicacies Tongans prize most is the octopus. They have an unusual way of fishing him up, based on an old legend. Ve'ehala told it to me:

One day some land birds, sea birds, a hermit crab, and a rat put to sea in a canoe, but they left the kingfisher behind. The kingfisher flew out to sea and saw his companions sailing along; in his anger he dived and pecked a hole in the bottom of the canoe. When the canoe sank, the birds took wing and flew away, the crab crawled to the reef, but the rat was left floundering in the sea.

An octopus came swimming by, and seeing the rat's predicament, asked, "Would you like a ride to shore?" The rat climbed onto the octopus's head, and the octopus swam to land.

When they reached the beach, the rat jumped ashore and called out: "O octopus, feel of your head; see what I have left there."

The ungrateful rat, during his lifesaving ride to shore, had well and truly soiled the head of the octopus. This quite naturally infuriated the octopus, who from that day forward has felt an undying hatred for rats.

To take advantage of this enmity, Tongan fishermen fashion a lure in the shape of a rat —the *maka-feke*, octopus stone (page 359).

Off Fukave Island I watched a fisherman glide over the reef, paddling his outrigger canoe with one hand and dangling the maka-feke over the side, shaking it and chanting:

Octopus, descending fast,
Octopus, descending fast,
Spotted one come, spotted one come,
Come hither one, come hither two,
Come hither into the boat.

It worked. Octopuses dashed out from their rocky lairs and seized the lure, rippling all over in waves of silver, black, and brown. They held on so tenaciously the fishermen flipped them right into the boat.

With King Taufa'ahau, I believe that the octopus takes the lure for a crab, its favorite food, but—who knows? The point is, it works.

Perhaps the most remarkable achievements of a remarkable people were the ancient Polynesians' navigations in open canoes across wide expanses of the Pacific.

No one has yet been able to explain satisfactorily how these early navigators found their way from one dot of land to another, unseen below the horizon. Most students think the secret lay in keen observation of many things: winds, currents, waves, sea birds, clouds, and the stars.

Blind Navigator Shows the Way

In Tonga they tell a true tale of an astounding piece of pathfinding on the sea, performed by a blind man. When I heard that the father of Tupou Posesi Fanua, research assistant to Ve'ehala, was a direct descendant of the man who had performed the feat, I asked her to take me to him.

Tupou's father, Sione (John) Fe'iloakitau

Beating out tapa, women of Vaini pound water-soaked mulberry bark on a log until the narrow strips widen into 10-inch bands. The catchy rhythm of their ironwood mallets—*tonk-a-tonk, tonk-a-tonk*—sounded for weeks before the coronation, setting listeners to dancing. By gluing overlapped edges with manioc-root juice, the tapa makers fashion sheets of larger sizes. Traditional fabric of Polynesia, tapa serves as clothing, room dividers, bedding, and—on ceremonial occasions—as "red carpets."

KODACHROMES © NATIONAL GEOGRAPHIC SOCIETY

Holding a sapling with her toe, a villager strips bark from a paper mulberry. Discarding the gray outer coating, she will peel off the white inner layer for tapa.

Kaho, is a fine-looking man of 85, with an ironic eye and a sharp tongue. This is his story:

About the year 1820, Taufa'ahau, later King George I, journeyed to Samoa for the ritual tattooing which marked a young man's coming of age. Although the navigators of the three highest chiefs of Tonga accompanied Taufa'ahau, on the return voyage they lost their way.

Close to the King's flotilla there voyaged a small canoe that belonged to a little-known navigator of low rank, called Tuita Kaho Movailahi—Reed in the Big Water—who was so old he was completely blind. With him traveled his son Po'oi, who was his father's eyes. They passed close to the King's big canoes, and heard their captains conferring.

"What are they saying?" Tuita asked his son.

"The King's navigators say they are lost," replied the boy. The old man put his hand over the side, feeling and caressing the waves.

"Tell the King we are in Fijian waters," he said. The King's navigators said scornfully, "That is the old blind one!" But the King asked Tuita, "What should we do? Our food and water are almost finished."

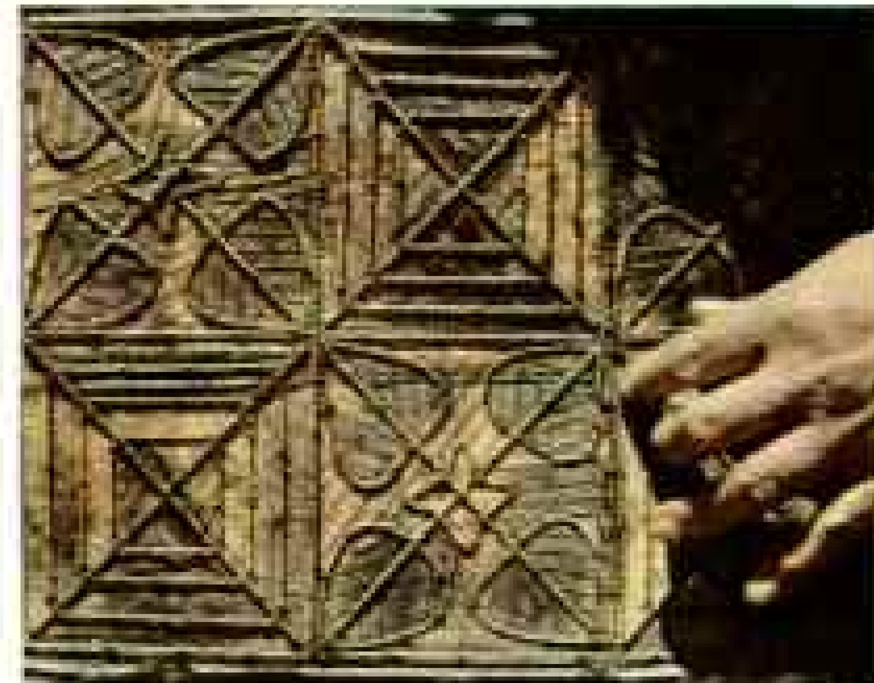
"Where is the sun?" asked Tuita. When his son told him, he said, "Tell the King that when the sun is in the middle of the sky he will see land."

Within a few hours they sighted land low on the horizon. It was Lakemba, one of the Lau Group of Fiji. For this feat Tuita was given a title of nobility and made chief navigator to Taufa'ahau. From then onward, he and his descendants were called Fāfākitahi—Feelers of the Sea.

When Kaho had finished talking, I sat there expectantly. "That is the end of the story," he said.

"But—how did your ancestor do this prodigious thing?" I asked him.

Kaho looked at me speculatively, then said suddenly, "I am going to tell you something

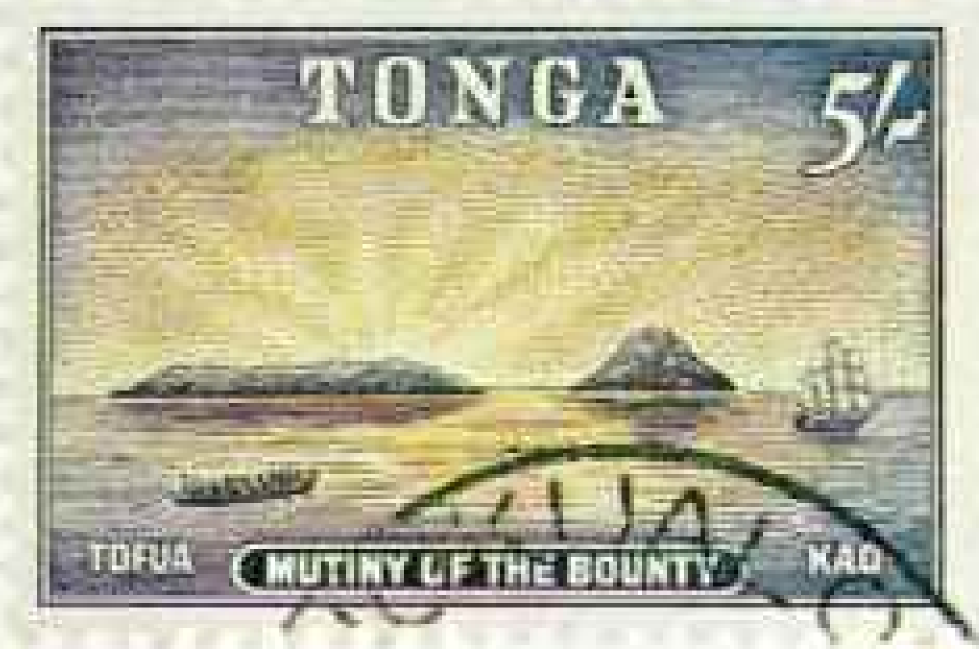


KODACHROMES © N.G.S.

"Printing plate" for tapa: Hibiscus bark and coconut fiber stitched to a pandanus-leaf base.

Quilting bee, Tonga-style: Women gather in the community house at Kolovai to hand-print tapa. They stretch the fabric on design plates curved over the long cylinder and rub the tapa with pandanus-fruit brushes dipped in dye. The stain colors the raised design. Sun-drying (opposite) darkens and sets the color.

Worthy of a bride's dowry, this giant sheet of tapa receives final decoration. Flying foxes flit across many panels. Women outline red areas with black coloring made by boiling rusty iron nails in a bark dye. For the coronation, the village of Longoteme covered its main street with a mile of tapa as a sign of respect, so that not even the guests' automobiles touched the bare ground.



History's most famous mutiny took place near the islands of Tofua and Kao on April 28, 1789. This westward view on a Tongan stamp places the event at sunset; actually Capt. William Bligh of the *Bounty* and his loyal crewmen were set adrift after dawn.

Green ring of a dozing volcano circles a crater lake on Tofua; plume of steam on left rim issues from a secondary cone. Beyond rises the 3,380-foot extinct volcano Kao, Tonga's highest point.

that I have never revealed to anyone before. Only the family know about this.

"When Tuita sailed in company with the King's canoes, he asked his son, 'Do you see a white bird?' 'Yes, only one.' 'Good,' said Tuita. He said no more, and after a few hours they sighted land.

"Now Tuita was cunning. He knew that the white bird, which we call *manuvākai*, the lookout bird, flies high to look for *'atu*, the tunny, swimming in the sea. He also knew that the manuvākai never flies very far from land. He knew they were sailing west toward Fiji, but the bird told him land was near."

"And the feeling of the sea?" I asked.

Kaho laughed. "Tongans of those days were superstitious. They thought when he felt the sea he must be half a god. And that is why we have kept it as a family secret; all the people feel there is something special about us."

"But why have you chosen to tell this to me?" I asked Kaho.

"Because I stand with one foot in the tomb, and I must tell the truth."

In Tonga, the cocks crow all night long, and sometimes during the day. I think I know why: The cocks are confused; they not only do not know what time it is, they are not even sure of the day.

First People in the World to Pray

King Taufa'ahau Tupou IV calls Tonga "the place where time begins." But *what* time?

The Tongan capital, Nuku'alofa, actually lies 20 minutes east of the Date Line—the 180th meridian. Tonga could have subtracted 20 minutes from local time and remained on the Date Line 12 hours east, or ahead, of the Prime Meridian at Greenwich, England. But the King preferred to ensure Tonga's title as the place where time begins.

The King, then Prince Tungī, therefore proposed to Parliament that they go ahead 40 minutes, thus making Tongan time 13 hours east of Greenwich—a seeming impossibility, since the time zones work out to 12 hours each way, east and west of Greenwich.

Some of the older and more conservative members from the outer islands objected: "If at midnight on December 31 we move ahead 40 minutes, as your Royal Highness wishes, what becomes of the 40 minutes we have lost?"

The Crown Prince, knowing his people, presented an unanswerable argument. "Remember that on the World Day of Prayer, you would be the first people on earth to say your prayers in the morning."

The Tongans, pious and ardent churchgoers, passed the law at once.

So much for the Tongan hour. But what of the date? The Tonga islands are in fact east of the Date Line. However, since the Date Line is a product of agreement among shipping lines and political administrations, deviations have been made in it at places to pass around inhabited islands, so as to bring their

EKTACHROME (BELOW LEFT) AND KODACHROME BY LUIS MARDEN © N.G.S.

Tangled jungle shrouds the lonely tomb of John Norton, quartermaster of the *Bounty*. Islanders clubbed him to death when Captain Bligh and 18 loyal crewmen landed on Tofua after the mutiny. All but Norton escaped and sailed in an open boat to Timor, a 3,618-mile odyssey.

calendar into accord with the nearest large centers. Thus Tonga lies inside an eastward deviation of the line to keep its date in harmony with Australia and New Zealand (inset map, page 328).

Tongans are scrupulous observers of the Wesleyan Sabbath, and it is possible to be arrested for fishing on Sunday. Even the Seventh-day Adventists, who elsewhere take Saturday as their Sabbath, here observe the Sabbath on Sunday. The local Adventist pastor explained his church's stand to me.

"When God made the world, He made the day go from east to west," he said. "On the map, the so-called Date Line actually makes a jog to the east here. We maintain that what is called Sunday in Tonga is actually Saturday, since we are really on the eastern side of the Date Line."

Did Bligh Leave Tongan Descendants?

Nearly a century before nations of the world agreed upon the sometimes-confusing Date Line, an event took place in Tongan waters which would be written indelibly in the annals of the sea.

For some years in the Pacific I have followed the track of Capt. William Bligh.* In Tonga I was on classic ground. For off one of its islands—Tofua—there occurred, on April 28, 1789, the mutiny in the *Bounty*.

One day in Nuku'alofa I met Afe Langi, a man who told a fantastic story: He claimed to be descended from Captain Bligh. Bligh, so far as history knows, left no offspring anywhere except at home in England.

When Bligh and 18 loyal men were cast adrift by the mutineers, they did try to find succor on Tofua. But Bligh was on Tofua for only two nights, in mortal fear for his life, sheltering in a crowded cave. The Tofuans attacked the party, and killed John Norton, quartermaster, so that the story of Bligh's having left any descendants on Tofua seemed, to say the least, unlikely.

Yet Tofua was the place where the celebrated mutiny began. I went there with Tili, an assistant medical practitioner who looked after the people on neighboring islands.

Tofua, almost exactly at the midpoint of the Tonga islands, is a circular crater with a lake at its bottom; from its northern rim rises a steaming parasitic cone (preceding pages). We approached the island from the eastern side. I could well see why Bligh had recorded in his journal that he had found landing difficult. Black and red lava cliffs, topped with dense greenery, rose sheer from the smashing surf. Our captain cautiously approached what undoubtedly was Bligh's landing place: a small rubble-strewn beach cut off at each end by lava spurs and backed by a thick growth of ironwood and coconut on the heights above.

Since 1854 there has been no permanent village on Tofua. So many eruptions down through the years had worked misery and death on the inhabitants that the King that year ordered everyone off the island. Transient colonies of young men live for three months at a time on the island to farm the fertile volcanic soil. Some of them came out for us in a small dugout canoe.

Near the rough beach, but separated from it by a tongue of lava, we found a small cave. Here, almost without doubt, was the spot mentioned in Bligh's journal:

"At the head of the Cove was a Cave about 150 Yards from the Water side. . . . I determined to remain on shore all the Night with a part of my people that the others might have more room to rest in the Boat. . . ."

Tulanga, one of the men living on the island, volunteered to guide us to the grave of John Norton, the quartermaster killed on the beach when Bligh made his escape.

Warrior Restrains White Man's Ghost

We walked in single file, with two men ahead hacking and slashing at the dense growth with bush knives. After about three-quarters of an hour of this hot work, climbing steeply uphill the while, we broke through into a small semi-clearing. A rough ellipse of black volcanic stones marked a traditional Tongan grave site (preceding page). I asked Tulanga why the site should be so big; too big, I thought, to bury a single man.

"You are right," he said. "This was the grave of Pa'ula Pola, a famous warrior of great strength and bravery. Our people were afraid that the *papālangi* [white man] Norton might come back to haunt them, so they buried him close to this famous fighter who could hold him in check."

From Norton's grave we continued our climb to the crater's edge, more than 1,000 feet above us. The trail was rough going with dense undergrowth and mud-covered, jagged,

*Mr. Marden told of his researches in "Tahiti, 'Finest Island in the World,'" NATIONAL GEOGRAPHIC, July, 1962; "Huzza for Otaheite!" April, 1962, and "I Found the Bones of the *Bounty*," December, 1957.

KODACHROMES © NATIONAL GEOGRAPHIC SOCIETY

Searching the silent sea for octopus, a fisherman dangles a *maka-feke*—a lure supposed to represent a rat. A Tongan tale relates that once an octopus saved a rat's life and was rewarded with an insult. Counting on the enmity of the octopus toward the rat, fishermen fashion such decoys as this from limestone, pieces of spotted cowrie shell, and coconut fronds and roots. And the lure works—either because it represents a rat or, more probably, because it resembles a crab, the octopus's favorite food.

Waves of silver, brown, and black ripple across an octopus clutching the maka-feke with two of its eight arms. It grips the lure so tenaciously that the fisherman can lift his catch into the canoe before the animal lets go.

Spread like a flying kite, an octopus dries to leather hardness. Tongans eat the flesh baked in cream squeezed from grated coconut.

Sunset fisherman stalks the shallows of Tongatapu; a flaring torch of coconut sheaths dazzles his prey on the reef. People of the sea, Tongans still hunt whales the old way, harpooning them by hand from open boats. They prize the flesh but discard the blubber for which whales are usually valued.

Roast pig goes to sea. Villagers of Nuapapu raft a feast toward the King's launch during an island-hopping tour. Earlier, they baked the pig in a pit lined with hot stones on a cliff above the sea. When the ruler's boat hove into view, sure-footed men bearing the pig on a float scrambled down a notched log and swam out with it. The pig's liver, a special delicacy reserved for chiefs and nobles, lies atop the carcass, skewered with the spine of a coconut frond. The multitude that attended the coronation ate roast pig and piglet that royal cooks had patiently turned on spits over open fires.

and shifting fragments of lava. Giant *tamanu* trees, a kind of hardwood that is prized for making dugout canoes, and the feathery branches of *toa*, the ironwood, shut out the light of a fast-clouding sky. The wind soughing through the trees made a rushing susurrus like a hundred waterfalls. At last we emerged onto a grassy slope and reached the rim of the main crater.

Clouds swirled about us. More than a thousand feet below glinted the lake, two and a half miles wide. To our right, high on the northern lip, a secondary cone vented a dense column of white steam that rose to merge with the low bank of gray cloud.

As we skidded and slid on the downward trail, a thin rain began to fall. We spent the night in a thatch hut, and shortly after dawn the captain, who had gone round to shelter in the lee of the island for the night, returned for us and we sailed to Lifuka.

About Bligh's alleged descendant: I leave it to some anthropologist with time and talent for questioning to resolve this curious point.

At the island of Lifuka 160 years ago there occurred an accident of history which has given us the fullest account of pre-European Tonga. On the first of December, 1806, the British privateer *Port-au-Prince* lay at anchor off Lifuka in the Ha'apai Group. On board

was Will Mariner, captain's clerk, aged 15. He was to begin that morning, by a series of strange and violent events, four years of life among the Tongans. His adventures were later recorded in one of the classic accounts of life in the early Pacific.

The *Port-au-Prince* arrived at a bad moment in Tongan history. Tonga's age of innocence had given way to warlike customs imported from Fiji.

Chiefs and warriors flocked aboard the ship, ostensibly to trade, but at a signal they clubbed to death everyone in sight. Will Mariner had been below; when he came on deck later, he was taken ashore to the high chief.

Finau Ulukalala, Lord of Ha'apai, was a fine figure of a man, six feet two in height, heavily muscled, with dark hair that fell nearly to his shoulders. He was guileful, crafty, persuasive, handsome—and ambitious. He wanted to conquer all Tonga, to make himself the first absolute ruler of all the Friendly Islands. For this he needed the white men's guns, muskets, gunpowder—and skill in their use.

Finau, who had lost a favorite son some years before, took a liking to Will Mariner and adopted him, giving him his son's name: Toki Ukamea, Iron Ax.

So began four years of benevolent captivity for Mariner, who became Finau's war counsellor and master of artillery. He took a prominent part in expeditions to Tongatapu and the Vava'u Group.

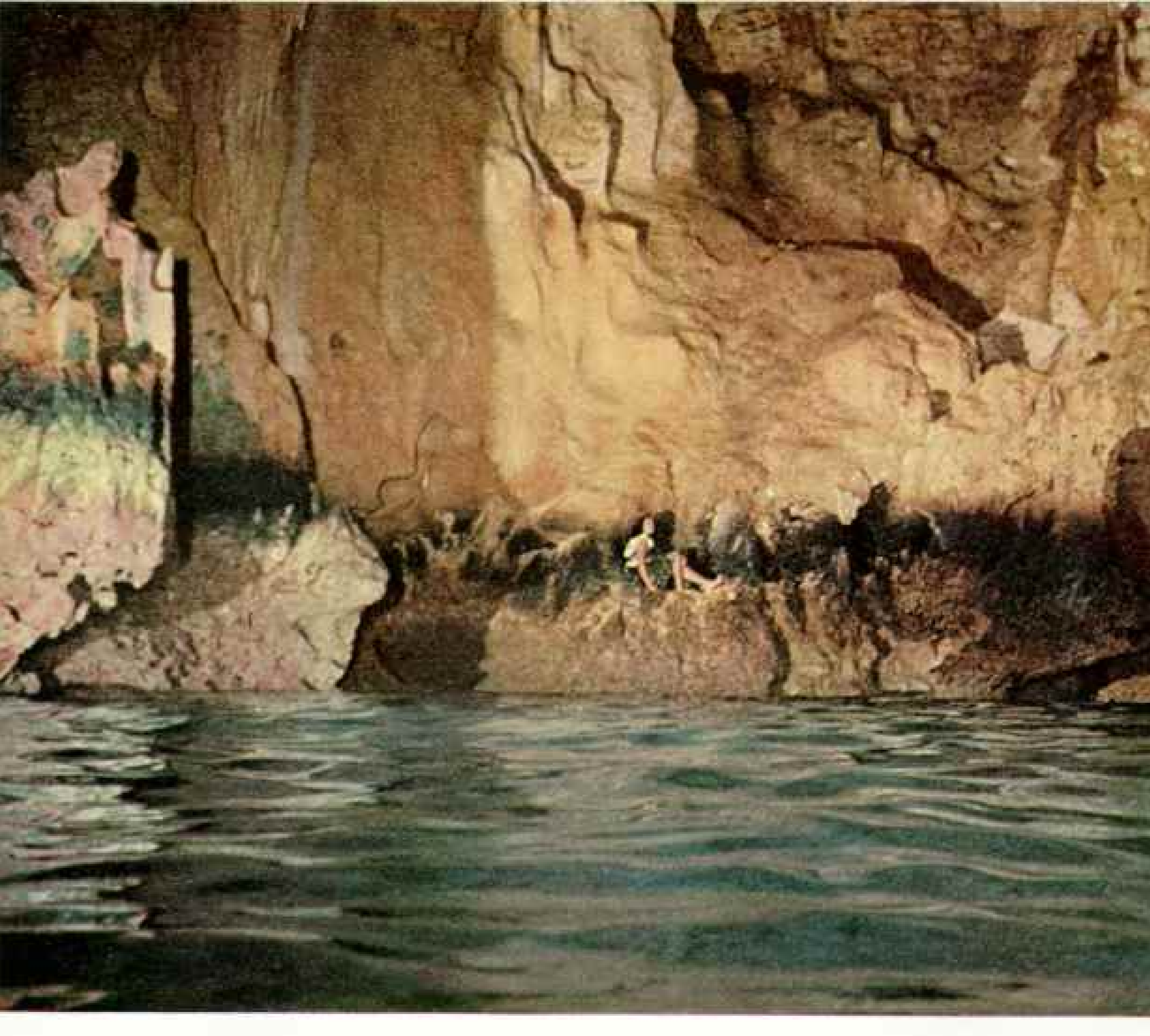
When the people of Vava'u concluded peace with Finau, Mariner stayed in that beautiful group of northern islands with his protector. While here he had one of the most curious experiences of his sojourn.

Chiefs Disappear in an Undersea Cave

At the island of Nuapapu, Mariner was with some young chiefs who were diving in the sea at the base of a cliff about 60 feet high. They disappeared and did not rise again. He stopped the last of the youths just as he was about to plunge in and asked what had become of the others.

"Follow me," said the chief, "and I will take you where you have never been before."

KODACHROMES © NATIONAL GEOGRAPHIC SOCIETY



Mariner dived after him and saw him disappear into a yawning black hole in the rock wall, eight feet below the surface. Guided by the flickers of light reflected from the soles of the chief's feet, Mariner swam through an underwater tunnel in the rock and emerged into a water-sealed cavern.

At first he could see nothing in the dimness. When his eyes adjusted to the deep-blue light, he saw his friends on a rock ledge at the far end of the cave, drinking kava.

Years before, I had explored Mariner's Cave with the King, then Crown Prince Tungī. His Majesty is an experienced diver, and together we had entered the blue-lit cavern of legend. Later I returned to Nuapapu in the company of Jack Riechelmann, Editor of the *Chronicle*, Tonga's weekly newspaper, and an old hand with self-contained diving equipment.

Against the steep northwestern face of the island the swell broke with a roar intensified by the concave overhang of the cliffs. We coasted along the cliff until a dark and ominous opening loomed through the green water.

When we floated face down on the rising and falling sea, we could see the yellow-brown face of the cliff continue downward at a sharp angle until it disappeared in a luminous blue-green haze. Round the black cave mouth small surgeon fish, dark brown slashed with vivid orange, flitted like darting swallows.

Fog Comes and Goes in Submarine Vault

The tide was full and the entrance was about eight feet below the surface, but we jackknifed to 15 feet because the rock ceiling of the tunnel bulges downward (upper right). We passed quickly from the bright blue of the sunlit sea into twilight. I rolled on my back to clear the jagged tunnel roof, and watched the expanding bubbles of escaping air spread into a shining pool of quicksilver trapped against the rocky ceiling.

We angled upward and our heads broke the surface in a cobalt dimness. Gradually our eyes grew accustomed to the light, and

Heart-shaped entrance frames divers hovering at the underwater mouth of Mariner's Cave on Nuapapu Island, in the northern Vava'u Group.

Legendary hideaway of young lovers: The drowned grotto offered refuge to a young chief and his beloved about two centuries ago, when feuds racked Tongan families. Tradition says the heroine, whose sweetheart guided her to the cavern, lived here for several weeks until her enemies gave up the search. Then the couple fled to Fiji. The story of the lovers became known to the outside world through the account of Will Mariner, survivor of a native attack on the British privateer *Port-au-Prince* in 1806. Mariner, for whom the cave is named, became the adopted son of a chief.

Like a physicist's cloud chamber, Mariner's cave alternately mists and clears. Pacific swells, surging through the entrance, compress air trapped in the cave. When the sea recedes every few seconds, moisture in the super-saturated air condenses into heavy fog.

KODACHROME (ABOVE RIGHT) AND EKTACHROMES BY LUIS MARDEN © N.G.S.

Once a tool of war, a cannon becomes a jungle gym for children on the village green at 'Uiha. Chief Finau Ulukalala II, an ancestor of the present King, captured it in 1806 from the British privateer *Port-au-Prince.*

Cherished heirloom, a decanter of Bohemian ruby glass once belonged to Chief Finau Ulukalala I. Tradition holds that Capt. James Cook, the first Englishman to visit Tonga, presented the decanter in 1777, during the last of his epic Pacific voyages.

KODACHROMES BY LUIS MARDEN © N.G.S.

I could see the vault of the cave arching some 40 feet overhead. Every cry and splash was amplified to a crashing roar.

Beneath us a fan-shaped cone of blue light streamed in from the tunnel. When we splashed on the surface, the drops glowed like cabochon sapphires. Fifty feet below, through water so clear we seemed suspended in air, gleamed the sands of the cave floor.

Suddenly, as I gazed above me, a thick white fog obscured everything; five seconds later, the air was clear again. All during our stay in that splashing dimness, instant fog smothered us every few seconds.

A few moments' observation explained the mystery. Each rising swell of the Pacific forced a surge of water like a piston through the submarine tunnel into the cave, compressing the moist air within. When a few seconds later the swell receded, the pressure dropped suddenly, and the water vapor, cooling as it expanded, condensed in a thick cloud.

Echoes Trace Island Beneath the Sea

I have visited a fair number of islands in my life, and I have looked for them through morning mist from a ship's masthead, strained my eyes at night for the faint wink of their lighthouses, and sought them from the air against the glare of the sun-bright sea. But I had to go to Tonga to search for an island with an underwater echo sounder.

In 1865 H.M.S. *Falcon* reported a shoal about 30 miles west of Nomuka Island. Twelve years later another ship observed steam rising from the sea at the same spot. In 1885 an island rose from the sea, spewed up by a submarine eruption. The Tongans

EKTACHROME BY EDWIN STUART GROSVENOR © N.G.S.

Stonehenge of the South Seas: Long a mystery to islanders, Tonga's ponderous 700-year-old Ha'amonga trilithon may have surrendered its secret to King Taufa'ahau Tupou IV when he discovered a design cut atop the stone lintel. He surmises that it served as an astronomical device to mark the seasons. A nearby sign reads: "On June 21st 1967 at dawn [the winter solstice in the Southern Hemisphere] His Majesty was present at this place and it was a thrilling moment when the sun rose at the exact point indicated by his interpretation of the lines etched on the great stone. . . . it is now clear how it was used to determine the season in ancient times."

called it Fonuafo'ou—New Land. Falcon Island—its English name—emerged again in 1927, and eventually reached a height of more than 400 feet. Each time the ceaseless attrition of the sea eroded away the loose material until the island disappeared again.

I wanted to see for myself the present status of this curious non-island. The government vessel *Hifofua* deviated from her course on her way back from Vava'u so we could look for the elusive shoal.

We had left Vava'u in the afternoon, so as to be in the area at daybreak. At dusk we forged southward through an oily black sea. Low on the western horizon, a dead volcanic cone, Kao, was a remote black triangle against the salmon afterglow (page 356). The planet Venus, greenish and brilliant against the orange sky, traced a sinuous track of light on the darkening water. On our port hand, Mars shone like a newly minted copper coin; below it, on a sea like black glass, its reflection, a faint line of red, wavered like the tremulous trace on an oscilloscope.

Boiling birth cloud steams from Tonga's Metis Shoal as a new island surfaces north of Tofua. In this photograph from an aircraft chartered by King Taufa'ahau Tupou IV, the volcano's cauliflower cloud rains ash and rock into water discolored by suspended matter. The island was first reported in 1858 but vanished by 1898. On the night of December 12, 1967, crewmen of an interisland ship witnessed its rebirth, announced by a pulsing glow on the horizon.

KODACHROME BY J. C. RIECHELMANN © N.G.S.

F. POOLE (UPPER); EKTACHROME BY LUIS MARDEN © N.G.S.

Submarine jack-in-the-box, volcanic Falcon Island rose out of the sea in 1927 for its second appearance in a century (upper). Seen here a year later, the island smokes as it builds. By 1930 it stood more than 400 feet high. Whittled away by water, it disappeared again in 1949. To plant the Tongan flag in 1965, the author and his friend Manu Mapuaho dived 60 feet down; Manu clings to a hillock on the drowned island in turbulent ocean currents (lower).

Shortly after dawn our captain pointed to a spot on the sea about a hundred yards off our beam, where ever and again a glassy swell heaped up and broke in a white smother. "Less than three fathom when it does that."

Keeping well off the shoal, he stopped in 60 feet of water. A Tongan diver joined me. We strapped on compressed-air tanks and climbed over the steel bulwarks, helped by a dozen anxious-looking deck passengers. When I struck the water on my back, I turned quickly and put my mask under the surface. Beneath us lay the lunar landscape of Falcon Island, a flat expanse of black clinkers and heaps of gray volcanic debris stretching into the luminous blue haze of underwater infinity. We were in the open Pacific, and the water was gin clear.

We kicked our way to the bottom and knelt on the bed of coarse black grains. Almost immediately three small sharks in echelon appeared, burnished like steel, swimming in circles around us. Lower over the clinkers, smaller fish swam in compact schools of hundreds. No reef fish here; these were all the swift, voracious swimmers of the open sea.

Flag Waves on Submerged Mound

My companion, Manu Mapuaho, carried the flag of Tonga rolled on a steel rod. He unfurled the flag and thrust the rod deep into a hillock of gray volcanic stones. The red-and-white banner waved and snapped in the current as if blown by a stiff breeze (left). The restless nervous hunters of the deep sea sheered off and then swam back again to stare.

We surfaced, but the swells were so high we could see nothing of the ship. Manu brought the flag to the surface and held it high above his head.

The sea lifted us on its shoulder and we saw the *Hifofua*, to our dismay half a mile off. At the same instant a shout made us turn our heads. Captain Walter had sent the ship's boat after us, and the sailors pulled first our tanks and then us from the water.

When we reached the ship and I saw the line of relieved and smiling faces looking down on us, I felt at one with James Cook, who wrote:

"... this groupe I have named the Friendly Archipelago as a lasting friendship seems to subsist among the Inhabitants and their Courtesy to Strangers intitles them to that Name."

At the end of my sojourn in Tonga, I could say with the good captain: "Thus we took leave of the *Friendly Islands* and their Inhabitants after a stay of between two and three Months, during which time we lived together in the most cordial friendship. . . ." THE END

Oyster tongers working sun-burnished Mobile Bay find the prized mollusks plentiful in shallows off Dauphin Island.

KODACHROMES BY JOSEPH J. SCHERSCHEL © N.G.S.

Up go a ship's hatches as stevedores unload grain at the Alabama State Docks. Mobile is the Nation's 15th busiest port.

Pride of Mobile, the new domed Municipal Auditorium and adjacent Municipal Theater stand within a few blocks of the city's waterfront.

MOBILE
Alabama's City in Motion

KODACHROME BY ROBERT W. MADDEN © N.G.S.

Pink beauty in a languid lagoon, flamingos parade past a Japanese teahouse in famed Bellingrath Gardens.

EKTACHROME BY ALBERT MOLDVAY, NATIONAL GEOGRAPHIC STAFF © N.G.S.

Tide of revelry engulfs Mobile at Mardi Gras time. Masked merrymakers atop a float toss candy and trinkets.

By WILLIAM GRAVES
National Geographic Senior Staff

Illustrations by
National Geographic photographer
JOSEPH J. SCHERSCHEL
and ROBERT W. MADDEN

LIKE MANY A YANKEE whose ancestors hailed from the Deep South, I have often longed, in a sense, to return home. I have conjured up visions of a hauntingly beautiful land, where the sun shines endlessly on a gay and delightful people, where every door is open to strangers, and where azalea blossoms are as plentiful as dandelions.

Inevitably, when I finally did travel south, I sought reality to match the vision. In Mobile, Alabama, I found it. For in that intensely southern city, the landscape is

often haunting, the sun shines regularly, if not quite endlessly, people welcome strangers, and azaleas seem to border every pathway.

But, to my surprise, I found that there is a second side to Mobile, one that lives up to the city's energetic name—despite the fact that the name itself was originally borrowed from an American Indian tribe, the Mabila.

In the avalanche of change that has overwhelmed the South in recent years, attention has focused largely on a handful of giant cities—Atlanta, New Orleans, Miami, Houston.* Yet along with the giants are equally vital communities, no less important for their slightly smaller size. Such a city is Mobile, a distinctive blend of historic charm and the growing power of the new South in trade and industry.

Quiet Beauty Cloaks an Energetic City

First of all, there is the haunting beauty. It is a slumbering land, flat in the southern sun and laced with the brown veins of unhurried rivers. Between the veins, stretching northward, run the great forests of loblolly and slash pine, pungent with their own sachet. Southward lies the Gulf of Mexico, an immense crucible of molten silver set to cool in the shadow of a continent.

Between the forests and the sea stands Mobile, a postcard image of a prosperous southern city. A growing skyline overshadows quiet avenues arched with live oaks, somber caverns festooned with stalactites of Spanish moss. Beside the avenues, half-screened by banks of dogwood and azalea, sit comfortable old homes of white frame or shingle, like rows of plump dowagers along a veranda.

The air of quiet charm is deceptive, for Mobile is no drowsy monument to a vanished age. Among other things, Alabama's oldest city is the fifteenth busiest port in the United States, with an annual volume of cargo exceeding 22,000,000 tons. Mobile, in short, is a vital go-between for world markets and exploding southern industry.

The explosion has long since enveloped Mobile itself: The city is a major producer of such items as pulp and paper, chemicals, ocean-going ships, processed aluminum ore, and—to one Yankee, at least—the world's finest sea food.

In addition, Mobile holds title to liquid treasure, in the form of enormous reserves of fresh water. In an average year, the Mobile River system, which includes the Alabama, the Coosa, the Tombigbee, the Black Warrior, and the Tensaw, pours 14 *trillion* gallons of fresh water into Mobile Bay—an amount greater than that consumed annually by the entire population of the United States.

"You don't need a crystal ball to see what that means," one Mobilian told me. "With the explosion of world population and with vast new demands for water, people and industry of the future are going to gravitate to the major sources, such as this one.

"Add to the equation a superb southeastern climate and hundreds of miles of magnificent coastline along the Gulf of Mexico, and what do you have? A future megalopolis."

Less tangible assets of the city beside Mobile Bay are its warm hospitality, its gift for laughter, its deep pride.

Well, but you ask, why the deep pride, and who wants to live in Mobile, anyway? The answer is: nearly a quarter of a million people. Bill Sturgeon is a good example.

Mobile Delta: Treasury of Wildlife

Like me, Bill is a Yankee, although it no longer shows, for he has lived in Mobile more than twenty years. After World War II, he moved there from New York to become the publisher of an engineering magazine. My first morning in Mobile, Bill took me on an aerial tour of the bay region in a light plane.

We began with the delta, a vast labyrinth of marsh and bayou formed by the rivers emptying into Mobile Bay (map, page 379). In size, Mobile's delta ranks among the largest in the United States. In variety of wildlife, it has few equals.

As we swept low over broad reaches of mangrove and saw grass, the plane stirred a

*See "Houston, Prairie Dynamo," by Stuart E. Jones, NATIONAL GEOGRAPHIC, September, 1967.

Like a yellow rose abloom in picture hat and crinoline gown, Azalea Trail Maid Debbie Copeland enhances the half-time pageant at the Senior Bowl Game. Each January top-ranked graduating college football players compete at Ladd Memorial Stadium, named for civic leader Ernest F. Ladd. The Trail Queen and her court welcome visitors on a 35-mile tour of Mobile in late winter, when the city's azaleas reach their peak.

KODACHROME BY [illegible] © N.G.S.

living tornado of waterfowl—canvasback, mallard, pintail, and shoveler—that eddied and swirled in dark clouds behind us. Farther on, we flushed a deer at the edge of a bayou, its white tail flickering away across the marsh like a feather duster come to life.

"That's only a fraction of what the delta has to offer," Bill said over the sound of the engine. "By boat on a lucky day, you might see black bear, otter, wild turkey, woodcock, quail, raccoon, opossum, nutria, and half a dozen other kinds of animals.

"Night's the time for alligators—in a spotlight their eyes glow like coals. Friends of mine have seen them so thick at the edge of a bayou they looked like the lights of a city along a coast."

We swung south, following the Tensaw River, and 25 years suddenly vanished in an instant. Below us stretched a vast convoy of Victory and Liberty ships, the famous merchantmen that carried Allied armies to every corner of the earth during World War II. The convoy, in this case, was stationary.

"They're the Mobile Reserve Fleet," Bill explained, "laid up and mothballed after the war. A good thing, too, it turns out. We've had as many as 350 ships at a time here, but

EKTACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JOSEPH J. SCHERSCHEL © N.G.S.

As the sun deserts the sky, stars begin to twinkle—not fall—on Alabama. The folk tale that a meteor shower long ago changed the state's destiny inspired both a book and a song entitled *Stars Fell on Alabama.*

Mobile's prized possession, the battleship U.S.S. *Alabama* lights up for the night in her permanent berth on the Tensaw River. The battlewagon participated in every major Pacific action in World War II. When the Navy planned to scrap her in 1962, Alabamians raised more than a million dollars to tow the ship 6,450 miles from Bremerton, Washington, and enshrine her in this memorial park.

quite a number have put to sea again—first for Korea, and now for Viet Nam."

Opposite the busy port of Mobile, I spotted another World War II veteran, home from the sea forever. In a shallow basin beside the main channel the retired battleship *Alabama* (above), now a museum, welcomes visitors.

A more peaceful fleet, callers from distant ports of the world, plied the roadstead with cargoes for growing southern industry. Mobile's volume of traffic may one day swell to giant proportions, if the so-called Tennessee-Tombigbee Waterway takes shape. The project involves a 253-mile channel and canal to link the Tennessee and Tombigbee Rivers in northeastern Mississippi (map, page 377).

Such a system, Bill explained, could alter the pattern of much of the water traffic between the industrial giants of the Tennessee and Ohio Valleys and world markets.

"Take Pittsburgh for example," he said. "By way of the Ohio and Mississippi Rivers, the distance from Pittsburgh to the port of New Orleans is 1,847 miles. But from Pittsburgh to Mobile, via the proposed Tennessee-Tombigbee route, it would be only 1,620—a saving of 227 miles.

"But that's not all. If the shipper's cargo were bound for Europe, he'd save another 50 miles by going through Mobile, because we're that much closer to the Atlantic Ocean."

Discovery Creates Historic Rivals

Our flight took us south once more, down the widening 30-mile-long funnel of Mobile Bay to the realm of early Gulf Coast history. Where bay meets gulf, the funnel abruptly narrows to a thin passage between the offshore resort of Dauphin Island and a low peninsula. Here in 1702 the French explorer Jean Baptiste Le Moyne, Sieur de Bienville, drove his ship through the narrows and founded a colony north of the great bay. The settlement became known as Fort Louis de la Mobile, in joint honor of Louis XIV of France and of Alabama's friendly Indians, the Mabila.

Mobilians are fond of pointing out that during the previous months, Bienville had searched vainly for a suitable spot to colonize in the area now known as New Orleans.

"Mobile and New Orleans have been rivals ever since," Bill remarked, as we followed a chain of slender islands. "In reply, New Orleans likes to quote another Frenchman, Antoine de la Mothe Cadillac, founder of Detroit, who succeeded Bienville as royal governor of Mobile. Cadillac took one look at Mobile

EKTACHROME BY ALBERT MOLDVAY © N.G.S.

Mardi Gras! Mere mention of the carnival, even the thought of it, excites Mobilians. Resplendent in satin, Mattie L. Jones arrives at the coronation ball of the Colored Carnival Association. Its members choose their own festival rulers and appoint a "mayor," who presents the Negro sovereign with a key to the city on his arrival by royal barge.

"Let revelry be unrestrained, and laughter be the language of the day," decreed King Felix III, monarch of the 1967 Mardi Gras. For weeks before Ash Wednesday, beginning of Lent, secret societies stage gala balls, and many put on their own parades. The Municipal Auditorium converts to a dazzling ballroom (below) as the Order of Myths celebrates its 100th anniversary.

and declared, 'The entire colony is sand, fit only for hourglasses.'" Bill chuckled.

"But then Cadillac was hardly the world's greatest prophet. He once predicted that the Mississippi River would never be worth navigating, even by canoe."

Whatever the relative merits of Mobile and New Orleans, there is no denying their common French heritage. Several days after my flight with Bill, I joined Mobile in celebrating the cherished Gallic tradition of Mardi Gras.

To the chagrin of Mobilians, many Americans think of Mardi Gras as the exclusive property of New Orleans.* Yet, as knowledgeable New Orleanians themselves will admit, their city's famous custom of organized street parades was borrowed more than a century ago from Mobile.

Mardi Gras is no longer the simple one-day affair that its French title, "Fat Tuesday," implies. In both Mobile and New Orleans, revels extend over a period of several weeks preceding Lent. Fat Tuesday is merely the last in a series of joyous explosions.

The explosions turn downtown Mobile into a great caldron of light, bubbling over with glittering street parades, side-show carnivals,

*See "Mardi Gras in New Orleans," by Carolyn Bennett Patterson, NATIONAL GEOGRAPHIC, November, 1960.

Reign of merriment begins as 1967 Mardi Gras Queen-to-be Laura Lee Peebles advances toward her throne in coronation ceremonies at the Municipal Auditorium. Later she wrote a romantic footnote to the pageant when she married John Schley Rutherford—King Felix III. It marked Mobile's first wedding between carnival rulers.

Each year from this same stage another queen is crowned: "America's Junior Miss." High-school seniors from all parts of the country compete for the title on the basis of charm, scholarship, and activities in their home communities.

EKTACHROMES BY JOSEPH J. SCHERSCHEL (ABOVE) AND ALBERT MOLDVAY © N.G.S.

and costume balls (pages 369 and 374-5). Viewed at night from the top of a building, the city seems perched on a live volcano, its floodlit avenues veining the dark earth like glowing fissures.

Mobile spares neither pains nor talent when it comes to revelry; the city's Mardi Gras parades have all the exuberance of coronation processions. As I watched one Negro parade, all but engulfed by wildly cheering bystanders, I envisioned equally moving scenes that took place more than a century ago along Mobile's Dauphin Street.

In days before the Civil War, Dauphin Street was the pride of Mobile, a prosperous downtown commercial district. During the postwar era, many of the city's former slaves took to promenading along Dauphin Street as a gesture of new-found freedom.

Gradually, the gesture gave way to plain enjoyment, and a phrase grew up in Mobile that still survives. Among whites and Negroes both, any occasion that is a proud or happy one is "like walking down Dauphin Street."

Traditionally, Mobile's white and Negro communities each elect a King and Queen of Misrule. One of the heroes of the white festival is a gentleman in his mid-30's who goes by the title of Folly. Only a handful of Mobilians know his real name.

Folly is a member of the OOM, or Order of Myths, the city's oldest secret parading society. Year after year, Folly is the star attraction of the OOM parade, which comes on the final night of Mardi Gras.

For the occasion, Folly dons a golden mask, a jester's doublet and tights, and rides the leading float to stage a continuous wrestling match

Five proud flags—those of France, Great Britain, Spain, the Confederacy, and the United States—have flown over Mobile since its founding in 1702. Development of river channels and a new canal in northeastern Mississippi may someday link the city with the Ohio Valley and the Great Lakes.

Dominating Mobile's skyline, the new 33-story First National Bank Building lends a metropolitan look. A freighter gliding down the Mobile River passes some of the 33 cargo berths on the port's 2½-mile-long waterfront. The ship churns above Bankhead Tunnel, which carries automobile traffic between downtown Mobile and the eastern bay shore. This year construction begins on two additional river tubes to serve future Interstate Highway 10, the broad, unpaved swath cutting through the city at extreme right.

KODACHROME BY ROBERT W. MADDEN © N.G.S.

with a figure dressed as Death. All Mobile gathers to watch, for the tournament decides who will rule Mardi Gras at last, Death or his merry opponent.

For my first and only Mardi Gras, Folly performed true to tradition: He triumphed at the end of the parade, banishing Death for another year. Later, at the OOM costume ball marking the order's 100th anniversary, I asked Folly how long he had been filling the role of champion. Seven years was the answer, and Folly added that he was considering turning the job over to a younger man.

"It's a two-hour battle," he said wearily from behind the gold mask, "and Death and I always try to put on a good show. Of course, I'm supposed to win, but Death sometimes forgets, and he's a good five years younger than I am."

I asked if Death had ever won by mistake, and Folly shook his head.

"But one year he came close. Right in the middle of the parade, the elastic in my tights broke. They started slipping, so I bent over to pull them up—and that rascal nearly kicked me into Mobile Bay!"

Cotton Fosters an Age of Elegance

French is only one of the varied strains in Mobile's pedigree; the city is something of a human bouillabaisse. During two and a half centuries it has paid allegiance to five different flags, one of them—that of the United States of America—twice.

A high point in Mobile's glory came early in its existence, when the small outpost served as the colonial capital of French Louisiana. Mobile's domain was immense, stretching from Canada to the Gulf of Mexico, and from the Appalachians westward to the Rockies. In 1720, to the sorrow of Mobilians, the capital was moved to Biloxi, in what is now Mississippi, and two years later to New Orleans.

With the ebb and flow of New World empire, Mobile changed hands several times. In 1763 the British marched in; in 1780, the Spaniards. Finally, in 1813, U. S. troops seized Mobile from the Spanish garrison and annexed the city, plus parts of western Florida, to deny the region to the British.

Commercial ties were more stable than political ones; Mobile built a thriving cotton trade with Great Britain during the first half of the 19th century. As the money rolled in, the mansions went up. Several beautiful homes of the era still survive as elegant reminders—Fort Condé-Charlotte House, Palmetto Hall, and Oakleigh (pages 384-5).

"The British trade was so brisk," Caldwell Delaney, a widely respected Mobile historian, told me, "that among cotton brokers, St. Michael Street down by the waterfront was known as the 'English Channel.'

"In those days," he added, "Mobile Bay was often more white than brown, thanks to a floating blanket of cotton lint."

Affluence had its occasional price. One British visitor in 1828 warned his countrymen that among Mobilians "no individual thought to visit a tavern or retire to rest without being certain that his pistols and dirk were ready for use at a moment's notice."

Three decades later, dirk and pistol gave way to saber and rifle as Mobile joined Alabama in secession from the Union. Defeat after four years brought ruin to the South, ended Mobile's age of elegance, and toppled the cotton empire.

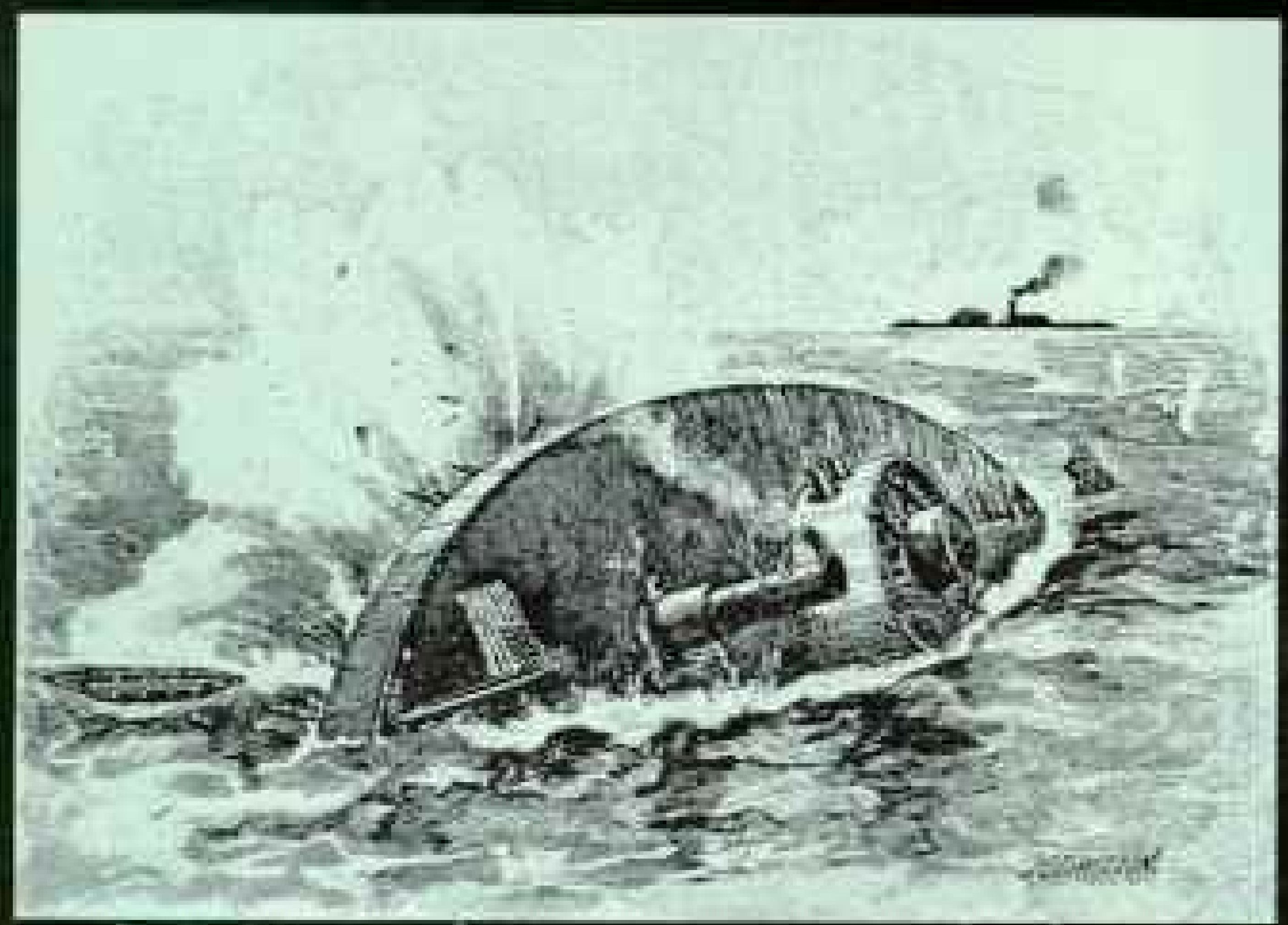
Ironically, Mobile's most famous monument to the Civil War is a tomb for her former enemies. The monument is U.S.S. *Tecumseh*, a Union ironclad, once part of Rear Adm. David Glasgow Farragut's fleet, and the first casualty in the Battle of Mobile Bay.

KODACHROME BY JOSEPH J. SCHERSCHEL © N.G.S.

Green tie and vest flashing, City Commissioner Joseph N. Langan joins the St. Patrick's Day parade. Mobile's three commissioners alternate the mayoralty.

Dilemma for face-lifters: How to renovate Mobile yet retain her venerable charm. Marion M. Barnett, director of city planning, points out historic buildings being restored near Municipal Auditorium; from left, planning consultant Arch Winter, Mayor Arthur R. Outlaw, and Commissioner Lambert C. Mims.

Alabama's bayou metropolis has doubled in population in 20 years to 233,000. Consulates of 24 foreign nations help speed the city's import-export traffic.



UNION IRONCLAD, ***the*** **Tecumseh,** ***hits a mine and sinks during the Battle of Mobile Bay. Her captain and 92 men perished.***

CORRODED ANCHOR ***of the*** **Tecumseh** ***comes up after a century's immersion. The warship was located last year by experts of the Smithsonian Institution, which hopes to raise it for exhibition on the Potomac River near Washington, D. C.***

CLIMBING THE SHROUDS ***of his flagship*** **Hartford,** ***locked in battle with the Confederate ironclad*** **Tennessee,** ***Rear Adm. David G. Farragut directs the Federal fleet in Mobile Bay on August 5, 1864. Earlier, tradition says, he had ordered "Damn the torpedoes! Full speed ahead!" after losing*** **Tecumseh** ***to a "torpedo," as mines were then called.***

CULVER PICTURES, INC. (TOP); PAINTING COURTESY WADSWORTH ATHENEUM, HARTFORD, CONNECTICUT

Americans, as a rule, recall that Civil War naval engagement in terms of Farragut's famous command: "Damn the torpedoes! Full speed ahead!"

In fact, no one knows whether Farragut actually spoke the words, for they were not attributed to him until many years after the battle. His intention, however, was clear, and concerned naval mines—the "torpedoes" of Civil War days—not underwater projectiles. The mines themselves have figured in a bitter century-old argument recently settled by the Smithsonian Institution.

Last spring the Smithsonian began the delicate task of salvaging *Tecumseh,* as part of a plan to establish an Armed Forces museum and park on the Potomac River just south of the Nation's Capital. With Lt. Col. Robert Calland, a Smithsonian military adviser, I joined the initial search.

FRED WARD, BLACK STAR

We set out in a launch from Fort Morgan, the old Confederate bastion that had shelled Farragut's fleet as it entered Mobile Bay in the summer of 1864 to close one of the South's last remaining ports.

Colonel Calland explained that although skin divers were rumored to have seen the submerged wreck in recent years, no one knew its exact location. Nor could historians agree on the cause of *Tecumseh*'s death.

"Even J. O. Davidson's famous engraving," he said, "shows the ship sinking to starboard [opposite, top]. Actually, she sank on her port side—that much we know from the 21 survivors of her 114-man crew.

"Most of us believe *Tecumseh* hit a Confederate mine," Colonel Calland continued, "one of those that menaced the Union fleet. *Tecumseh*, you see, led the battle line, and went down after a fearful explosion.

"For a moment, the ships behind her simply came to a halt, and that's when Farragut made his crucial decision. The Union fleet surged ahead, passing through the mine field without any more casualties—although the crews below deck actually heard the dreadful sound of mines now and then bumping gently against the hulls. Once through the mine field, Farragut went on to defeat the Confederate ironclad *Tennessee*" (page 380).

I asked where the argument had arisen. Colonel Calland waved toward Fort Morgan behind us.

"From the Confederate gunners ashore," he answered. "Some of the men in the batteries reported that *Tecumseh* carried an explosive charge attached to the bow on a long boom—in effect, a fixed torpedo for ramming enemy ships. The Fort Morgan gunners claimed that one of their shots broke the boom, and that *Tecumseh* ran over her own torpedo. But the U. S. Navy says she never carried a torpedo. Once we find *Tecumseh*, we'll be able to settle the argument."

With old U. S. Navy charts and battle accounts as guides, the Smithsonian team dragged an area northwest of Fort Morgan, using a long chain slung between our launch and a companion boat. Steering parallel courses several hundred yards apart, the launches towed the chain in a wide U across the floor of the bay, 30 feet below us, in an effort to snag the wreck. But neither that day of dragging, nor a second, brought results.

Ruptured Seams Provide an Answer

Plainly, *Tecumseh* was buried too deep in mud for ordinary search methods. Several weeks later, Colonel Calland returned with underwater metal-detecting instruments and found the wreck without difficulty. Divers went down to clear away mud and inspect, and found the ship's seams ruptured 60 feet aft of the bow, but no evidence that she had carried a forward boom.

Colonel Calland, elated at having learned the truth at last, reported: A Confederate torpedo, not her own, killed *Tecumseh*.

Back in the city, I turned from war to lighter subjects, among them Mobile's superb civic opera (below).

"This city is unbelievable," Jeannine Crader told me one evening backstage, after singing the lead role in Puccini's *Turandot* in the theater of the vast new Mobile Municipal Auditorium (pages 368-9). A recognized star in Europe and the United States, the Missouri-born soprano had recently appeared with the New York City Opera Company in its debut at the New York State Theater.

"Opera requires people, a great many of them," Miss Crader continued, "not as a source of talent alone, but also of audiences and funds. What you saw here tonight generally requires the resources of a much bigger city. But size isn't everything, if you have taste and determination. Mobile has both, and as a result it has outstanding opera."

Mobile has often surprised northern visitors in another field, that of racial harmony. Not that the city is any cradle of civil liberty —Mobilians themselves make no such claim. Yet against the long backdrop of history and of recurring racial bitterness elsewhere, Mobile's quiet record has been impressive.

One northern industrialist who moved to Mobile after World War II takes pride in the city's early steps toward racial equality.

"I think of Spring Hill College, the great Jesuit school here," he told me, "which desegregated classes some 20 years ago—not because of any law, but just on principle.

"The same applies to the first Negro probation officer Mobile appointed, in 1920," he added, "and to the Negro deputy sheriff who followed soon afterward. Those were early milestones. Fifteen years ago, Mobile seemed to wake up in earnest to the fact that a third of its people were Negro, and began hiring Negroes on the police force."

I started to interrupt, but he raised a hand.

"I know. You're going to say it was high time, too, and I won't argue. But a lot of other southern cities didn't take the step when they could have, and I think they paid a heavy price for it later.

Comic counselors, Ping, Pang, and Pong, enliven Puccini's opera *Turandot* before a capacity audience in the Municipal Theater. Local men sing these parts; guest artists from New York take the leading roles. For a quarter of a century the city's widely acclaimed Opera Guild has brought in the best professional talent for its two presentations a year. Patrons underwrite the cost of student tickets to foster appreciation of classical music in young Mobilians.

EKTACHROMES BY JOSEPH J. SCHERSCHEL © N.G.S.

"**Check my coolie hat.** Is my mandarin coat all right?" With 24 local youngsters playing Chinese children, backstage becomes a babel before the curtain goes up on *Turandot*. Mme. Rose Palmai-Tenser, founder and artistic director of the Opera Guild, congratulates the group on their Oriental look. Hungarian-born "Madame Rose," as she is affectionately known in Mobile, has sung opera on two continents.

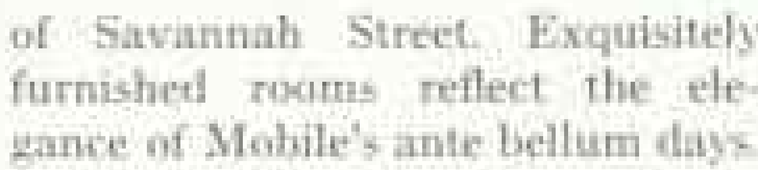
Gracious plantation era lives on at Oakleigh, headquarters of the Historic Mobile Preservation Society. Azalea Trail Maids welcome a member of the Old South Antique Auto Club in a 1920 Marmon to the 135-year-old mansion at the head

"What makes Mobile different?" He shook his head. "It's hard to say, but several things certainly play a part—international influence by way of the port, historic ties with other countries, and of course the influx of northern industry. There's a lot of that here now, and it's got a big stake in Mobile's future. It's determined to help make it a peaceful one."

For a different view of Mobile's racial climate, I turned to an impressive new institution in Mobile, the University of South Alabama (opposite). With grounds and buildings valued at more than $25,000,000, the school—chartered by the state in 1963—combines academic atmosphere with distinctive modern architecture.

South Alabama's enrollment reflects a growing reputation for scholarship throughout the southeastern United States. Four years ago the student body numbered less than 1,000; today it exceeds 3,500. Estimates for 1976 run to nearly 10,000 graduate and undergraduate students.

From the beginning, classes and dormi-



of Savannah Street. Exquisitely furnished rooms reflect the elegance of Mobile's ante bellum days.

KODACHROMES BY JOSEPH J. SCHERSCHEL (LEFT) AND ROBERT W. MADDEN © N.G.S.

Gas lamps light the campus of the University of South Alabama, a new institution enrolling 3,500 students. Mobile College and Spring Hill College also offer higher education.

tories at South Alabama have been integrated. Through friends on the faculty I came to know George Stiell, an outstanding third-year political-science major and one of the first Negroes to enroll at the university. I asked George about his early days there.

"They were what you might expect when you come up against tradition," he answered, thoughtfully. "Not that anyone ever bothered me. In fact, a few did the exact opposite: To them, I was just—well, invisible.

"But I've been invisible before," he added, "and in time the reaction wore off. Today I have as many white friends here as I do Negro ones. Through me and other Negro students, they know a lot more about the basic problems—poor neighborhoods amounting to ghettos, and narrow job opportunities. After graduation, those friends are going to be a big help in solving such problems."

He smiled. "There's more to a university education than just books."

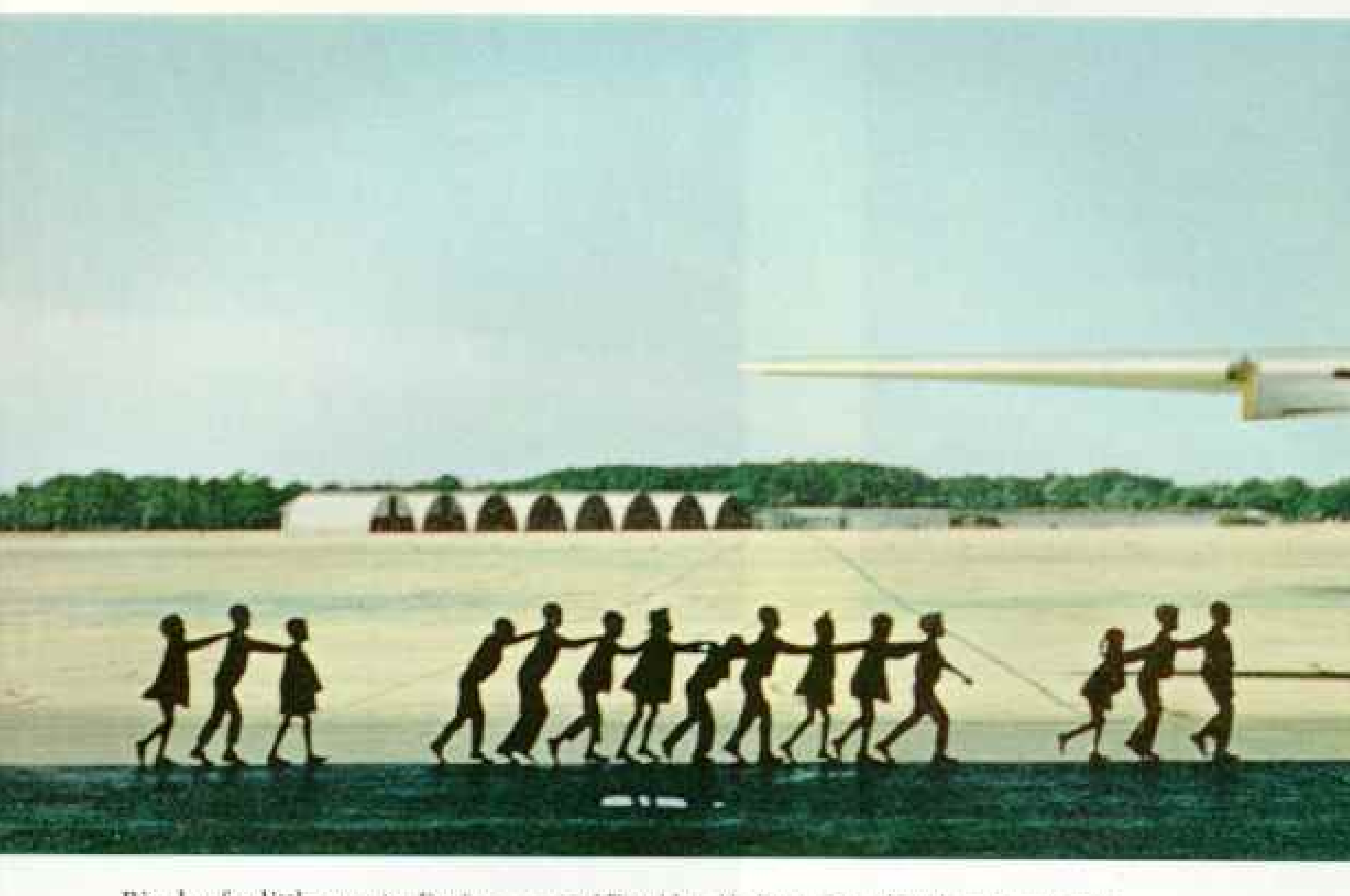
One of the problems that have united all Mobilians is the problem of human disability.

KODACHROME (LEFT) BY JOSEPH J. SCHERSCHEL, EKTACHROME BY ROBERT W. MADDEN © N.G.S.

Ship castings take shape in the Mobile Pulley and Machine Works, one of the South's largest foundries. A city long wed to the sea, Mobile welcomed early-19th-century sailing ships from Europe and New England, come to carry cotton home to the textile mills. In both World Wars I and II, her shipyards hummed around the clock to build and repair U. S. merchantmen and fighting vessels.

Wood gets a wet-down at the International Paper Company's huge plant on the edge of the city. Spraying the pine and hardwoods prevents fibers from drying out before machines convert the 20,000-cord stockpile into bags, wrappings, other kraft products, and newsprint.

Modern Mobile's varied industries present a striking contrast to the one-enterprise era between 1820 and 1860. Cotton was king, and river paddle-wheelers churning south from the "Black Belt," named for its dark clay soil, brought bales with a total value as high as $20,000,000 in a single year. But the Civil War shattered the city's prosperity, and a Federal blockade threatened its citizens with starvation. During lean Reconstruction times the port lapsed into obscurity, but now, a century later, it booms again.



Big day for little guests: During a tour of Brookley Air Force Base, Headstart youngsters from St. Vincent's School file through a hangar and climb aboard a C-119 troop carrier. A major maintenance center for the Nation's air arm in World War II, Brookley is now being deactivated and its facilities leased to private industries.

Keys to open the gates of silence: Preschool deaf children practice consonant exercises at the Rotary Rehabilitation Center. When four-year-old Sam Feibelman makes the sound "b," his breath flutters the paper strip held by teacher Janet Horton. Both Sam and classmate Brian Wiggins wear aids to supplement a vestige of hearing.

The city's Rotary Rehabilitation Center is a model of its kind (opposite) and has drawn patients from as far away as Australia.

I walked one morning through the center's long bright corridors with Myrna Ely, the program director. Along the way we visited diagnostic laboratories, handicraft centers, and gymnasiums with white and Negro patients hard at work with athletic equipment, strengthening damaged muscles. As Mrs. Ely passed, there was an occasional lift of a head or a quick smile, but rarely a greeting: Breath was for more serious business.

Later, Mrs. Ely introduced me to one of the center's 200 patients, a strikingly pretty Negro girl of about 16, who was exercising a badly wasted leg with a bean bag strapped to her ankle. I asked her how many of her fellow patients were Negro, and how many white.

"Well, now," she answered, smiling, "I couldn't really tell you, but I guess it comes out about even. Around here, nobody pays any mind to your outsides. Only thing counts is what's wrong underneath."

To help support such farsighted public services as the rehabilitation center, Mobile looks to its major industries. One morning I toured International Paper Company's giant mill on the city's northern edge with Ion Walker, a company official. The mill and others like it scattered within a 200-mile radius of Mobile represent the world's largest concentration of paper production.

Giant Jackstraws Feed Paper Mill

Our tour of International began in the wood-storage yard, with its mountain range of logs piled jackstraw-fashion and constantly showered by a score of huge sprinklers (preceding pages).

"Water helps preserve the wood and makes it easier to remove the bark," Ion said.

KODACHROMES BY ROBERT W. MADDEN (ABOVE) AND JOSEPH J. SCHERSCHEL © N.G.S.

Sails seeking every zephyr, racing sloops swing downwind during the annual 18-hour Round-the-Bay contest. Striped spinnakers billow above crews in their cockpits; yacht at right still carries her genoa, but will shortly strike it. Leaving Fairhope Yacht

KODACHROME BY ROBERT W. MADDEN © N.G.S.

Club in late afternoon, the racers follow a triangular 60-mile course. When sun-silvered seas turn dark, skippers navigate by compass and lighted buoys. Winds usually slacken during the night, but on Mobile Bay a calm is almost as rare as a snowy day.

"We pile it at random like that to allow the water to seep down through the pile quickly. Only the outer support wall of logs is stacked carefully. The wood goes through here pretty fast, you know—on an average of 1,600 cords a day."

We followed a thundering procession of logs destined for newsprint and for various grades of industrial paper. Huge conveyor belts trundled the raw material through a number of stages—further soaking, removal of bark, and finally, in the case of industrial grades, "chipping," in which a machine like an enormous kitchen blender quickly reduced logs as thick as telephone poles to little more than shavings.

From here the fragments disappeared into cavernous cookers, washers, and bleaching tanks. Finally the finished product emerged at high speed in an endless ribbon. Still other machines wound the ribbon into cylinders weighing roughly a ton apiece.

Most of the mill's production comes together at last in one hangar-size warehouse, where I saw rolls of paper stacked in columns up to 20 feet in height, suggesting some giant version of a candle shop.

Ships Cut Apart for "Jumboing"

While International produces immense quantities of standard types of paper, it is constantly searching for new uses of that age-old substance. One of the company's major goals is the development of a container for carbonated beverages.

"It's no trick to produce a waterproof carton," explained Joseph Ferguson, chief of International's southern research division. "The problem in this case is internal pressure. Some of our early experimental containers held up for a time, and then gradually started looking like giant marshmallows. But give us a while longer. It's possible one day you might even be drinking champagne out of a magnum from International."

Such a thing would never do in Radcliff Maumenee's business, for Rad likes his champagne bottles to burst. Of course, he wouldn't think of breaking them himself—only a lady can christen a ship.

I walked one morning with Rad through the huge yards of Alabama Dry Dock and Shipbuilding Company, of which he is president. To an anvil chorus of pneumatic hammers, the rolling thunder of mobile cranes, and the sharp sputter of welding torches, we toured half a dozen crowded slips and drydocks. Some cradled vast ocean-going tankers and bulk carriers, brought in for repair or for "jumboing"—elongation by the addition of midship sections. Other ways held the skeletons of river barges, and one slip sprouted what looked like a city block on stilts.

"That's an oil-drilling rig," Rad said. "With the growth of offshore drilling, construction of rigs may become a mainstay for Gulf Coast yards. Things have changed a lot in 25 years, since the days of those Victories and Liberties moored back up in the Tensaw River.

"Of course, we still get the mothball jobs to refit and to scrap, but a good yard depends today on versatility. Recently, we've built, or had a hand in, an oceanographic research craft, an atomic-powered electric-generating barge, two prototype undersea rescue vessels, and one fantastic job, the conversion of a standard cargo ship into what amounts to a seagoing deep-freeze.

"That ship's job is to carry natural gas in liquified form at minus 260° Fahrenheit, for reasons of safety and condensed payload. To make it possible, cargo tanks of aluminum had to be built and installed with a one-foot-thick insulating jacket of balsa around them, with an outer jacket of steel."

While Rad Maumenee's draftsmen explore tomorrow's nautical designs, others who depend on the sea for a living cling to traditional ways. Early one morning I joined Capt. Lawrence Nelson at the small port of Bon Secour, east of Mobile Bay, for a spell of oystering out on the reefs.

Fog lay cotton-wool thick along the waterfront, blurring the outline of Bon Secour's fishing fleet beneath towering live oaks with their mournful draperies of Spanish moss. Captain Nelson slipped a pair of long-handled oyster tongs aboard his slender 24-foot, outboard-powered skiff, and we set off down Bon Secour River for the open bay.

Roughly translated from the French, Bon Secour means "good refuge," giving historic

Man wrestles marlin on the deck of the *Ramona*, after Mickey O'Brien reeled in the fighting fish during Mobile's annual Deep Sea Fishing Rodeo in the Gulf of Mexico. His companion, Tommy Taul, boats the catch. *Ramona*'s three anglers, among 1,500 competing for $15,000 in prizes, landed a marlin apiece.

KODACHROME BY BILL GARRETT © N.G.S.

testimony to the Gulf Coast storms that drove many an early vessel into the shelter of Mobile Bay.

"It gets a bit airish even on the bay," Captain Nelson remarked. "Bay squalls come up sudden, and I've known times out oystering when the only thing seemed above water was my briar pipe here, sticking up like the periscope on a submarine.

"Bay squall's not the worst, though," he added. "Hurricane's the thing. When a hurricane's tempting, a wise man has the fear in."

Neither squalls nor hurricanes "tempted" that morning; the water was oil-smooth in the gathering light. Soon the fog burned off, and Mobile Bay began to simmer in the sun like some vast tureen of sea-food gumbo.

The bay sometimes does boil over with sea food, in what Mobilians call a "Jubilee." For reasons still baffling to science, shoals of crab, shrimp, and a variety of fish surge ashore and lie helplessly in the shallows. Then the cry "Jubilee!" rings along the shore, and every wash-basin, bucket, and clothes hamper in sight is put to work harvesting the mysterious bonanza.

Face as furrowed as the sea he harvests, a snapper fisherman comes ashore at Bayou La Batre, south of Mobile. To help supply its six major sea-food companies, he daily sails down "Main Street," a 9-foot-deep channel twisting two and a half miles to Gulf waters.

"**God bless your going out** and your coming in.... May He fill your nets," goes the annual benediction of the shrimp fleet in Bayou La Batre. Visitors jam the fishing village on the last Sunday in July to watch the gaily decorated trawlers gather for the blessing. Later, in a pine-shaded meadow, residents play host at a mammoth picnic, with trays of shrimp, crab, flounder, hush puppies, and watermelon.

KODACHROME (BELOW) BY KATHRYN E. ERROUD

EKTACHROME BY JOSEPH J. SCHERSCHEL © N.G.S.

"Jubilee never brings oysters in, though," Captain Nelson said. "Not that old man oyster is the world's brightest gentleman; he's not. Take the business of sun and fog.

"You bring an oyster up off the bottom on a sunny day, and right away he knows he's left home and he shuts up tight. But fog'll fool him; he thinks he's still under water, and pretty soon he'll start 'smiling' to himself, opening his shell a little. Before you know it, he's bled to death—lost all his juice—and you've got a ruined oyster.

"Sounds queer, but on foggy days you have to keep oysters dry with a canvast."

We worked Bayou Coura Reef—or "reeve," as baymen call an oyster bed—in Bon Secour Bay, an eastern arm of Mobile Bay. Standing amidships, Captain Nelson thrust the tongs overside and worked the handles, called "stales," back and forth in the manner of a giant hedge clipper (page 368).

Eight feet below, the rakelike teeth of the tongs clawed through a mixture of mud, dead shell, and live oysters until Captain Nelson sensed a proper haul. Lifting the tongs, he dumped the contents on deck and quickly culled eight fat oysters from the mud and debris.

Later I tried my hand, but after groping for five minutes, I collected nothing more than a pair of empty shells.

"It's all in the way a big old oyster talks to you," Captain Nelson said sympathetically, accepting the tongs again.

"With me, seems that gentleman just telephones up the stales and hollers, 'You win, Cap'n—haul me up!' "

Flowers Enchant a Visiting "Devil"

From oysters I turned to another Mobile specialty, azaleas, with my friend George Downing for company. One April morning we strolled through Bellingrath Gardens, a world-famous botanical preserve of 755 acres just west of Mobile Bay. Since the death of the original owner, Mr. Walter Bellingrath, in 1955, George has directed the foundation charged with maintaining the gardens.

Bellingrath Gardens remind me of my original view of the romantic South—a sort of vast outdoor stage set for *Gone With the Wind*. The atmosphere is one of majestic live oaks, of Spanish moss, azaleas, camellias, and magnolias, with the addition now and then of graceful southern belles in hoop skirts (next page). The latter, known as Azalea Trail Maids, appear for special occasions, such as pageants or the visits of prominent guests.

Many of Bellingrath's visitors react to the gardens' beauty in stunned silence; others are moved to eloquence. The late gifted actor Charles Laughton spent hours at the gardens during his visit to Mobile with a theatrical group performing George Bernard Shaw's *Don Juan in Hell*. Asked to sign the Bellingrath guest book, Mr. Laughton wrote: "I don't know how I will be able to play the Devil tonight, after being in Heaven this afternoon."

Spring had swept the gardens almost overnight as George and I walked the fragrant pathways. In passing, the season had set the earth ablaze with a forest fire of azalea blossoms —crimson, lavender, salmon, and white—that flickered and swirled beneath the dark canopy of oaks. Here and there bright tongues of flame even brushed the canopy itself,

Moss-garnished live oaks in Bellingrath Gardens bower Azalea Trail Maids and their guests, contestants for the title of America's Junior Miss. This show place on the banks of the Isle-aux-Oies River, 20 miles south of Mobile, boasts beauty in all seasons. Late winter's spectacular azaleas yield to Easter lilies and hydrangeas; roses of summer give way to autumn's chrysanthemums and the poinsettias of Christmastide. In the camellia arboretum, 2,500 plants bloom during nine months of the year.

EKTACHROME (ABOVE) BY ROBERT W. MADDEN; KODACHROME BY JOSEPH J. SCHERSCHEL © N.G.S.

Trickling from a bamboo tube, spring water fills an urn in the Oriental-American Garden, Bellingrath's newest addition. With its serene setting and precision planting, this corner of the gardens combines the best of East and West. A wooden bridge crosses a pond paved with lily pads. Steppingstones in the water lead to a miniature teahouse (page 369). Flamingos prance down green-velvet knolls to terraced waterfalls. Some 200 species of birds live on the estate or touch down on its acres during migrations.

for many of Bellingrath's azalea bushes are a century old and tower 20 feet in the air.

"Azaleas are almost a religion with Mobile," George said, as we reached the gates once more. "Each spring in the city we hold an official opening of the Azalea Trail, a 35-mile tour of the finest gardens. We try to guess when the flowers will be at their peak, usually in late March, but azaleas sometimes have minds of their own.

"I remember one opening ceremony at the football stadium when the azaleas let us down completely—there wasn't a blossom to be seen in the city." He smiled.

"Well, we had to have at least *one* azalea for the ceremony, so we borrowed a hothouse plant from Bellingrath Gardens and delivered it to the stadium in an armored car."

Grits for Breakfast, Like 'Em or Not

Mobilians are like that, quick to see humor in their own customs. One favorite story they tell on themselves concerns a Yankee visitor who spent several days at a downtown hotel.

The first morning the waitress brought a dish of what looked like white porridge.

"What's this?" demanded the Yankee, suspiciously.

"Why, honey, that's grits," answered the waitress. "Hominy meal—it's a real ol' southern specialty."

"I don't eat it," said the Yankee. "Please take it away."

The second morning the grits arrived again, and once more the Yankee refused it. Finally, on the third morning, he lost patience.

"Miss," he said to the waitress, "I've told you I don't like grits. Why do you keep serving it when I ask you not to?"

The waitress glanced cautiously around the room, then leaned down. "Honey," she whispered, "I think it's the law."

Summer crowded close on Mobile as I said goodbye. There was much I would not see. July and August lure Mobilians far out into the Gulf, under billowing canopies of sail or under power in search of the elusive marlin and sailfish (page 393).

In time, autumn would brush the delta's rich green to gold, and flights of migrating ducks would darken the northern sky, like smoke bursts carried on the wind. In the crisp evening, beach fires would wink from Dauphin Island like cheerful blinker signals to ships standing south toward the Gulf and open sea, or to others inbound for Mobile Bay.

In either case, they would mark a friendly door.

THE END

The Highlands, Stronghold

By KENNETH MacLEISH, Assistant Editor

IN THE DAYS before writing was, when the Highland Gaels made music with spoken words, a tale of travel began with a lilting cadence of prose poetry that sought to catch the ear and stir the heart. Translated, it might have had such a sound as this:

There was a stranger before now, northbound across the land, making his way from low ground to high ground, through cold rain and kind sun, by heather hills and stone mountains, with the morning on his right hand and the evening on his left.

On a day of days, and he traveling, he came at the edge of evening to the rim of the Great

Where loch and land intertwine, Eilean Donan Castle proclaims the Highland spirit, an

# of Scottish Gaeldom

Photographs by WINFIELD PARKS, National Geographic Staff

Glen. A gray crow of the country flew to him, resting her wings on the wind.

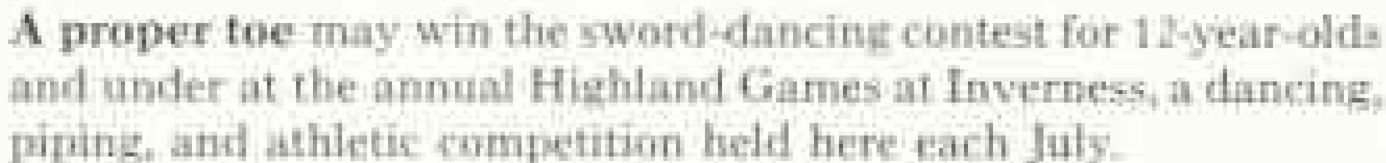
"Have you got where you were going?" she asked.

"I have not," said the stranger. "I'm bound for the top of the kingdom, and the two sides of it. If I go up by the crags, I'll come down by the valleys. If I follow the rivers, I'll walk by the sea. If the moorland is above me, the lochs will lie below. I'll go wherever wind blows and water flows, until I see the sight of all Gaeldom."

"You'd best take up your travels, then," she said, "for they stretch far before you."

independence born of solitude. Golden broom brightens spring in a land often gray with clouds.

KODACHROME © NATIONAL GEOGRAPHIC SOCIETY



A proper toe may win the sword-dancing contest for 12-year-olds and under at the annual Highland Games at Inverness, a dancing, piping, and athletic competition held here each July.

Resplendent in Royal Stewart tartan, a piper plays at Inverness. The stirring skirl that once led

And if she'd been with him before then, she was not, after.

So might my own story have started, told in the old way. Then, let it start so.

I SAT ON THE WARM HOOD of my Land-Rover and watched the gray crow glide away. Her call came back to me, a sardonic croak no longer in the language of legend. Then there was only silence.

To my left, Loch Ness reached away southwestward down the dead-straight, 60-mile cleft of the Great Glen (pages 410-11 and map, page 408). Below was Inverness, perfectly placed at the juncture of sweet water and salt, of gaunt snow-streaked mountains and low-lying fields going green in the mild spring. Here, where Macbeth once reigned, even the air was curiously compounded of ocean and upland scents.

Inverness claims the proud title "Capital of the Highlands," and deserves it. Its population of 30,000 makes it by far the biggest Highland town. It is a marketplace and cul-

clan against clan has inspired British troops in every corner of the world.

KODACHROMES BY PATRICK THURSTON © N.G.S.

Spectator gets an unexpected lift from a pipe band at the Inverness games. Contestants prize gold medals won here, at the Argyll Gathering in Oban, and in other Highland competitions.

tural center. Its environs contain most of the region's small share of private industry, much of its rare rich farmland, and some of its grimmest reminders of past tragedies.

A chill breeze rustled the bracken, and sleet stung my face. I eased the Land-Rover back onto the Great North Road and came down from the high moorland, dropping 700 feet in four miles with the car in low gear.

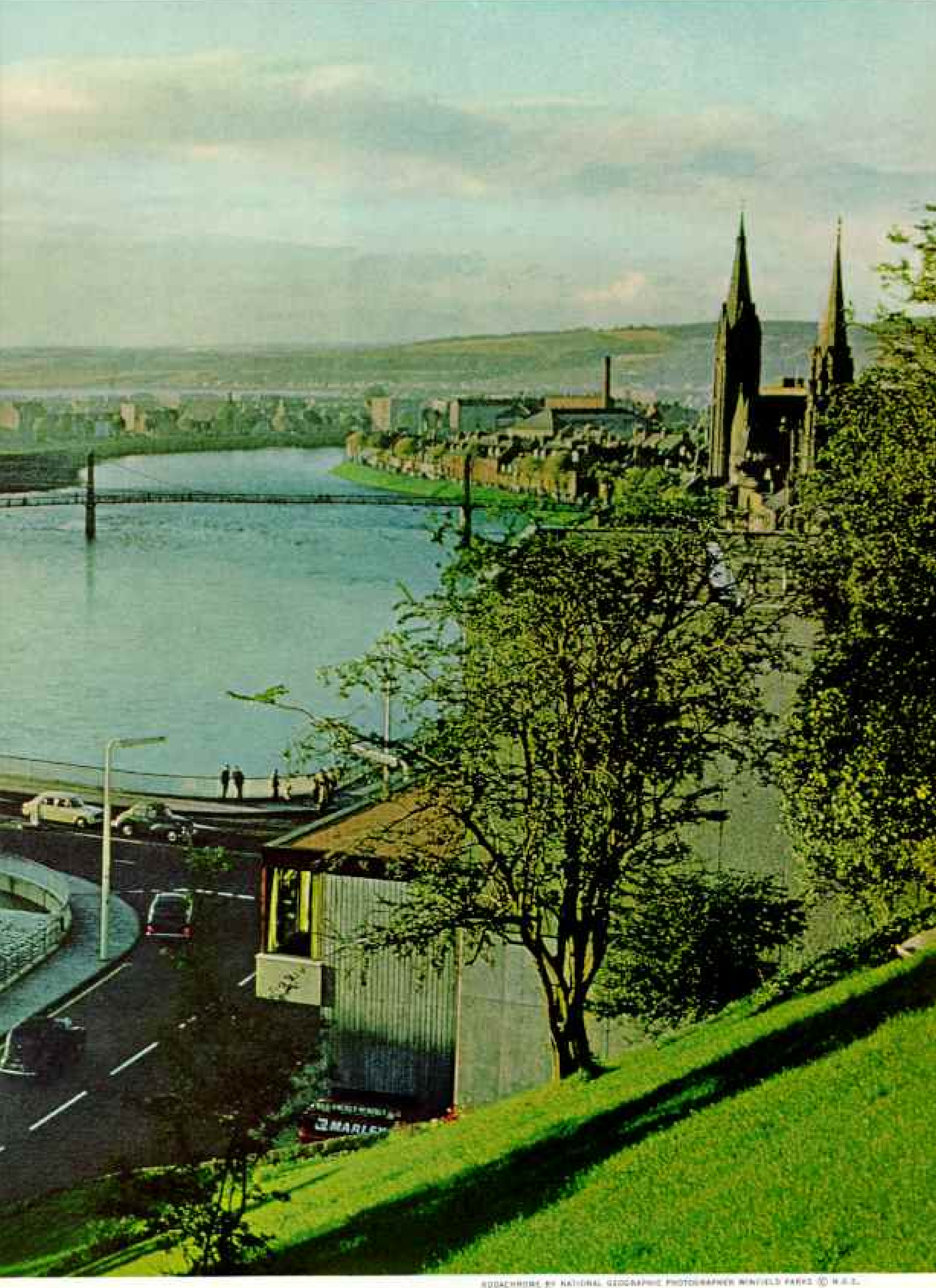
I checked into the stone Station Hotel and wandered off for a look around. A cabbie, studying football scores behind the wheel of his spotless Austin, looked up and gave me a greeting. He did not throw open his door or solicit my custom. That would have been forward, something a Highlander is not.

"Where would I go for a good look at this place?" I asked.

"Well, ye've only got to find the High Street," he pointed, "and ramble down to the bridge. It's a grand view from the bridge. Aye. Especially at sundown." He glanced at his watch. "Ye've plenty of time. It's no but nine-thairty."

I thanked him and turned away. "Cheerio,

Soft light of evening bathes Inverness, "Capital of the Highlands." The amber River Ness, turned blue by reflection, curves toward the Moray Firth and North Sea, lying beyond the gentle hills. Built up and torn down through successive conflicts for the



KODACHROME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER WINFIELD PARKS © N.G.S.

dominance of Scotland, Inverness today wears a 19th-century façade. Gaunt mountains, haunting glens, and serene lochs of its Highland domain produce a people proud of their heritage, fiercely independent, and joyful in their love of music and poetry.

just now," he called, and went back to his football news. He did not suggest that I hire him for the trip.

The northern dusk softened the texture of the city's sturdy stone walls, giving them a spurious air of antiquity. For the Inverness of today is not old. Though the original Inverness dates back most of a millennium, human destructiveness here has kept pace with human creativity. The result is a Victorian town. Even the castle is modern, rebuilt a scant century ago upon the ruins of earlier keeps.

The words "Highland" and "problem" have been coupled for many years. But I saw no sign of a Highland problem in Inverness. Shops were many and the tourist trade was brisk. People strolling on the High Street were well-dressed and almost startlingly friendly looking. It was as if they felt that a pleasant expression was as much a part of being presentable as combed hair and clean clothing.

Scraps of speech reached me in passing, a clear, uncluttered English carrying neither the "accents of the Ascendancy" (as acerbic Highlanders sometimes describe Oxonian tones) nor the glottal stops of Lowlands Scots. This Lowland dialect is so widely caricatured that most foreigners think it is the natural speech of Scotland and are amazed to find no trace of it in the Highlands.

Yet Highlanders are Gaels, and the native tongue of the Gael was—and sometimes still is—Gaelic, a Celtic language related to Irish, Welsh, and Breton.

The cabbie was right about the bridge (pages 402-3). Here the peat-tinted River Ness came coursing through the town, clear and golden as the cairngorm—the

EKTACHROME © NATIONAL GEOGRAPHIC SOCIETY

Ewe loses her fleece at Glen Affric as Scottish lassies watch. Sheep took over the Highlands in the 18th century, replacing cattle as the farmers' mainstay. Wool and mutton provide an important source of income for crofters, but the animals' close grazing damages Highland pastures.

topaz quartz that is the Highlanders' favorite gemstone. In how many cities could you look down from a bridge and count pebbles on the bottom of the streambed? Near both banks wading fishermen worked the pools and riffles with long salmon rods, dreaming of a 30-pound bright-sided fish just in from the sea.

IF DARKNESS COMES LATE to the Highlands by midspring, dawn comes as early. At seven the sun has been up so long that conscience rousts a man from his bed and launches him into a new 16-hour day. But I rose readily enough, for I had planned a hunt for a rare quarry: the Highland bagpipe.

I had played for a few years with a Scottish band in the States. Now was my chance to replace my worn and dried-out set of pipes with a fine new one and, at the same time, survey one of the liveliest legacies of Gaelic culture. For despite the heavy-handed repression of the Protestant Reformation, which condemned popular pleasures in general and "the black sticks of the devil" in particular, the pipes still sound out, dauntless as ever.

Pipes are hard to come by anywhere, Scotland included. They are expensive and usually made to order. But I prowled the streets, questioning passers-by as I went, until I came upon a music shop called The Music Shop, Capt. N. D. S. Henderson, Prop.

There hung in the window of this establishment a magnificent set of pipes, heavy with engraved silver, to which was pinned a card bearing a simple, straightforward declaration: "The finest set of

Blending colors, workers at Pringle's Holm Mills in Inverness combine precise amounts of white with blue- and black-dyed wool to be spun into variegated yarn. Scotland initiated this practice of mixing dyed wool before the spinning and weaving of her world-famous woolens.

EKTACHROME © NATIONAL GEOGRAPHIC SOCIETY

solid-silver-mounted master pipes in the world today." I went in.

Captain Henderson wandered out from the back of the shop, a big graying man with pensive blue eyes that seemed somehow to focus upon distant things.

"You admire my pipes?" he asked, or rather, stated. "So you should. You'll not find their like." He described them lovingly, and soon he was telling me of his life in the Hebrides—of times when the winds and tides were perfectly attuned, so that his long lines came in heavy with whitefish and his small boat could hardly contain the catch.

"The pipes . . ." I said.

"They cost a hundred and fifty guineas. Now if we were only home in the islands, I could show you fishing you'd not soon forget."

I must have paled at the mention of the price, $440 at the time, for Captain Henderson returned from the sea. "Well, ye've not got to buy this set," he reminded me kindly. "You might find a good plain set. But here, take them in the back and have a blow at them. So you can say you've played the finest."

Short of wind and stiff of finger, I launched into "Ghillie Callum," the Sword Dance. He did me the honor of recognizing it.

"I'm just thinking," he said. "That old pipe major by Beauly—MacLennan that is, he was with the Camerons—he has a good set he's blowing in for me. You might take a look at them. Now, there's a sea loch far from here where the trout. . . ."

It appeared that Pipe Major D. W. MacLennan of Beauly was my best hope. I sought him out.

Intent eye on the bidding, a Scot watches a sheep auction at Oban (right). He wears a kilt of the MacNicol tartan, a familiar sight in Argyll. Rubber boots are normal footwear for those who tread the often rain-soaked soil.

Like a circus ringmaster, the auctioneer at the Oban market displays Blackface sheep for buyers. Each month, boats from the Hebrides bring stock to market.

The Highlands raise two breeds of sheep, the whiteface Cheviot and the shaggy Blackface. Cheviot wool is particularly valued for blending (preceding page), since its fibers maintain their brilliance when mixed.

He was an old man, half blind, and he played beautifully. He had already "blown in" my pipes (as they soon were), and he took them up to demonstrate them. As he played he prowled, bent-kneed, around the room, followed by a three-year-old grandson who prowled, bent-kneed, behind him. The boy blew with red-faced resolution into a little practice pipe which made small squeaking sounds. A miniature cairn puppy about the size and shape of a potato completed the procession, making loud squeaking sounds and untying everybody's shoelaces.

Mr. MacLennan "belonged" to Harris on the Isle of Lewis, he told me, but he had been away in the wars. In World War I he had lost his pipes. Afterwards his colonel, Chief of Clan Cameron, gave him an ancient set that had been played in 1746 at Culloden, near Inverness, where the Highlanders lost their last battle against the English.

In all Highland history there is no more poignant date, or any past event so clear in Highland memory. The Culloden pipes were MacLennan's proudest possession.

EKTACHROME © NATIONAL GEOGRAPHIC SOCIETY

I took my leave of the man who can still raise the living voice of Culloden, and went in search of the site of that gallant catastrophe.

I MIGHT HAVE MISSED IT had I not been watching closely. There is nothing remarkable about Culloden Moor except that Bonnie Prince Charlie should have chosen it for the Highlands' hopeless battle for independence. His clansmen stood no chance against King George II's far larger force in so unprotected a spot.

The old moorland was broken now by fields vivid with the first sprouts of spring and by patches of neatly planted forest. A small stone house, thatched in the old manner, looked as it had on April 16, 1746, when the savage fighters of the glens died and their way of life died with them. A stone cairn stood nearby, a modest memorial to valor, if not to wisdom. And there were the graves, long low mounds still bulging above the buried bodies. The Highlanders lay by clans, each in its own trench, and the English in a field nearby.

The place seemed deserted on this gray morning in May. Then, at the far end of the clearing, I saw a fair-haired girl in a kilt-skirt and sweater bend quickly over a grave marker, then mount her bike and pedal away.

As I walked toward the spot, a spark of color glistened beneath the rough headstone, on which I could make out the words "Clan Stewart of Appin." A single daffodil lay on the sheep-cropped turf, as fresh and bright as the memory that put it there.

The flower fluttered under a spatter of raindrops. I hurried away to my Land-Rover, out of the persistent past into the haunted present.

Scottish Highlands
STATUTE MILES
Elevations in feet
Roads followed by author
Other roads
Railroads
Area of crofting Gaels on Scottish mainland highlighted with yellow tint
ISLE OF LEWIS
North Minch
North Sea
Cape Wrath Lighthouse
Kyle of Durness
Durness
Dounreay
Thurso
Melvich
Reay
Bettyhill
Halkirk
Tongue
CAITHNESS
Wick
Scourie
Forsinard
Stoer Head Lighthouse
Kylestrome
Lybster
SUTHERLAND
Morven
Lochinvar
Helmsdale
Elphin
Lairg
Brora
Golspie
Scoraig
Ullapool
Invershin
ROSS AND CROMARTY
Melvaig
Aultbea
Inverasdale
Naust
Poolewe
Gardens of Inverewe
Dornoch
Dornoch Firth
Tain
Gairloch
Badachro
Wester Ross
Alness
Invergordon
Lossiemouth
Kinlochewe
Cromarty
Buckie
Uig
Garve
Elgin
Beinn Eighe
Achnasheen
Dingwall
Forres
Fochabers
The Storr
Shieldaig
Nairn
START
ISLAND OF SKYE
Portree
Beauly
Culloden Moor
Battle of Culloden 1746
MORAY
Keith
Applecross
Lochcarron
Inverness
NAIRN
RAASAY
Loch Carron
Plockton
Cannich
Moy
BANFF
SCALPAY
Kyle of Lochalsh
Kyleakin
Dornie
Eilean Donan Castle
Urquhart Castle
Grantown-on-Spey
Broadford
Kintail
Kylerhea
Glenelg
Invermoriston
Glen Mor
Loch Ness
INVERNESS
Fort Augustus
ABERDEEN
Ardvasar
Cairngorm
RHUM
Invergarry
Kingussie
Newtonmore
Ben Macdhui
Mountains
Mallaig
Loch Lochy
Grampian Mountains
Balmoral Castle
EIGG
Arisaig
Loch Morar
Morar
Spean Bridge
Badenoch
Lochnagar
Glenfinnan
Great Glen
Dalwhinnie
Fort William
Ben Nevis
Loch Ericht
Corran
Onich
Kinlochleven
Glencoe
Pitlochry
ANGUS
Tobermory
Buachaille Etive Mor
Morvern
ISLAND OF MULL
Salen
Lochaline
Appin
Rattray
Forfar
Ben Lawers
Loch Etive
Loch Tay
Connel
PERTH
Dundee
Oban
Tyndrum
Kilbride
Dalmally
Crianlarich
Lochearnhead
Perth
Fionnphort
Kilninver
Ben More
ARGYLL
Crieff
Firth of Lorn
Cupar
Inveraray
Auchterarder
Callander
Tarbet
FIFE
Strachur
Kinross
Doune
COLONSAY
Kilmartin
CLACKMANNAN
Buckhaven
Loch Lomond
Stirling
Alloa
Kilmichael
Lochgilphead
Ardlussa
Kirkcaldy
DUNBARTON
STIRLING
Dunfermline
JURA
Helensburgh
Alexandria
Falkirk
Firth of Forth
Dunoon
Greenock
Dumbarton
Linlithgow
Sound of Jura
WEST LOTHIAN
Port Askaig
Feolin Ferry
Tarbert
Clydebank
RENFREW
Glasgow
Edinburgh
Rothesay
I. OF BUTE
Airdrie
Coatbridge
ISLAY
KINTYRE
Largs
Paisley
MIDLOTHIAN
Motherwell
Wishaw
AYR
Hamilton
LANARK

Land of lonely grandeur, the Highlands extend across northwest Scotland. Place names strange to the Anglo-Saxon tongue evoke visions of clansmen, staunch in loyalty to their chief, following a proud piper to battle. Today their descendants have dwindled, and only those whose love for the land outweighs their desire for prosperity stay to till the harsh soil. At harvest time in Scoraig, the entire family must lend a hand (below).

In the Highlands, the two are never very far apart. Not far enough, I was soon to discover, in the minds of progressive Highlanders. I drove a dozen miles to Moy, to meet with such a man.

"TARTAN TWILIGHT!" said The Mackintosh of Mackintosh. "Too many people think the Highland sun set at Culloden, and they look backwards, hypnotized by nostalgia, into the fading colors of its afterglow. I mean, pride of race and culture is well and good, and I share it, but emotionalism can obscure the real issues of today."

Lachlan Mackintosh, present Chief of Clan Mackintosh and Laird of Moy Hall, is as directly related to the events of Culloden and "the '45" (the uprising of 1745) as any man alive. He gestured toward a painting of a lovely lady on horseback.

"My ancestress, Lady Anne. Keen supporter of Prince Charles and the Stuart cause. She was jailed after Culloden. Now, her husband was on the other side. He was a regular officer, which meant he had to serve the king, whoever the king might be.

"Here was a family split over the issues of the '45," said The Mackintosh. "So were the Highlands. Not everyone felt the revolt was necessary. Perhaps it was the hideous rape of the country afterwards that makes Highlanders look back upon Culloden as the end of everything. Charles stopped the clock on April 16, 1746, and for some it hasn't moved since. But you mustn't stop clocks. Time goes on without you, if you do."

He stared thoughtfully at the painting. "We've got to realize now, even if some Highlanders didn't then, that the clan system had pretty well had it even before Culloden. The clans were tribes, you know, blood-related, living in their own territories, growing and making what they needed, and raiding each other for fun and profit. Clansmen didn't need jobs or gold or anything but bare essentials, so the hills and glens became overpopulated.

"Then they began to realize that there were other ways of life—easier ways, with more amenities. But these were based on money. To get it, the Highlanders had to leave the glens.

"That was a sad thing, but perhaps—in the end—not entirely a bad thing. Every summer I see Rolls-Royces roll up to my door carrying Americans of Highland descent. Are they not better off than they would be if their ancestors had stayed in the hills?"

I pondered the point as I drove back toward Inverness in an icy rain streaked with snow.

Along the way I overtook a young woman walking head up and heedless of the wild weather. She made no signal, but climbed in gratefully when I stopped for her, brushing the water from her brown hair and red cheeks.

"Do you live near here?" I asked, searching the dark heather-covered hills for the sight of a house.

"Aye, near enough."

"Is it a croft you have, then?"

"No, we rent 20 acres. It's a proper farm."

"Forgive me, but just what is a croft, if not a small farm?"

She laughed. "A croft is a wee bit of land entirely surrounded by rules and regulations. But that doesn't help you, does it? You might say that crofting is a way of life, while farming is a way of making a living.

"There's nothing like a croft in your country. It's a little plot of arable land, maybe three or four acres, on a big estate. It's controlled by the laird and the Crofters' Commission, and the Department of Agriculture and the Land Bank. It's not worth much. But the rent is small, only a few pounds per year. If a man wants to take a croft and work it, it's his forever and his children's after him, so long as he pays that little rent.

"A crofter has security, you see, and a home, but he can't make money. Crofting is a way of staying on the land. For some, that's enough."

She paused, watching the wet road's winding. "They say that the Highlands' greatest export is Highlanders. More have left the hill crofts and farms in the last century than live here now. But if we should all go, there'd be no one left to welcome the tourists, would there be?"

She smiled a little sadly. "Just drop me at the garridge here, and I'll be most obliged to you."

Before leaving the Inverness region, I had two more tasks to accomplish: one, to find out just where the Highlands were, and two, to talk to the dedicated gentleman most crucially concerned with their future.

As if cleft by a claymore, the double-edged sword of Highland warriors, the Great Glen slices across Scotland. Farmland and sky-blue lochs fill the 60-mile-long, 300-million-year-old fracture in the earth's crust. Here larch and pine line a section of the Caledonian Canal, the connecting link between Loch Ness, lying on the horizon at upper left, Loch Oich, left center, and Lochs Lochy and Linnhe (map, page 408).

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By some definitions, the Highlands extend almost as far south as Glasgow and Edinburgh (map, page 408); by others, they include everything north of a certain geologic fault line, despite the fact that the east coast is not truly Highland in character. Experts in Inverness advised me to let anthropology influence my definition more than geology.

Since crofting remains the closest approximation of the original land use, I would take it as one of the denominators of the Highlands. Another is the distribution of Gaels, the true and original Highlanders, for the *Gaidhealtachd*—Gaeldom—and the Highlands were once synonymous. Thus, for me, the Highlands would be the region of the crofting Gaels on the mainland of Scotland.

This is a workable definition, and it has become the official one, used by the newly formed Highlands and Islands Development Board and its chairman, Professor Robert Grieve. It is the heavy responsibility of Professor Grieve and his board to determine, by intuition as much as by expert knowledge, what may be done to help the Highlands.

His is not the only office concerned with their sad situation. The Forestry Commission is replacing the ravaged forests of an area hardly fit for anything else; the Department of Agriculture urges economical practices and speeds their acceptance with bonuses and subsidies; the Hydro-Electric Board fills the glens with water and concrete; the Crofters' Commission firmly defends the smallholders' rights and safeguards their precious tenure.

But Grieve's organization is not parochial. It must balance sentiment against pragmatism, the desirable against the achievable, he told me.

"We have had, in the Gaelic Highlands, a steady population drain for a century and more. The brightest and best of the young leave in dreadful numbers every year. The Highlands cannot afford this loss.

"We are here to do something about it. And with one-fifth of Britain's land area but only

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Relics of indomitable spirit fill Clan Macpherson House and Museum in Newtonmore. Flying Officer Eóin Macpherson, the curator, holds the shattered fiddle of Jamie Macpherson, hanged for cattle theft in 1700. With the rope around his neck, the doomed clansman shouted, "No one else shall play Jamie Macpherson's fiddle," and, cracking it across his knee, sprang to his death.

The museum also preserves the Macphersons' green banner and the Black Chanter, the finger pipe of a set of bagpipes, said to have fallen from heaven during a clan combat on the North Inch of Perth in 1396, ensuring the Macphersons' victory.

Relaxing at day's end, men of Dornie lift a glass in the hotel pub. Bowing to the strict keeping of the Sabbath in Scotland, pubs served only travelers on Sunday until a change of law in 1962.

one-fifth of 1 percent of its population, we feel we have space enough to do it.

"Industry is the first, the most obvious thing. We have hardly any, yet we have marvelous natural advantages. More industry would give people a better chance to earn a decent living.

"Tourism is important—though it is only seasonal—and forestry, too. We're planting more trees now, and can plant a lot more. Agriculture is the biggest employer of labor at the moment, but the more efficient it becomes, the fewer people it will employ.

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"Crofts don't provide a decent living by themselves. A crofter has to have at least one other string to his bow, and the hard fact is that very many youngsters just don't want to go on working on the croft. They want a better living, better opportunities—now.

"We must keep the youngsters by giving them the opportunities they leave home to seek. They have the initiative and drive that this area really needs."

FROM EAST COAST INVERNESS, where the Highlands' future is being shaped, I headed for west coast Dalriada, where the Highlands' history began. You will not find Dalriada on any modern map. It was an ancient kingdom, founded in the early sixth century in what is now southern Argyll by a group of Irish invaders called Scots.

On a rare bright morning, with an unveiled sun warming the new lambs bouncing limber-legged on the tawny hillside, I drove up out of the Great Glen onto the rolling plateau of the Grampian Mountains. Here heather-clad hills rose two to three thousand feet, treeless except where plantations of dark pine or pale-green larch lay in unnatural tidiness upon the land that once supported the great Caledonian forest.

Yet even stripped of its cover, this gnarled country is handsome. Ahead, the highest peaks of the Cairngorms—just over 4,000 feet—still bore patches of snow. During the past few years the biggest tourist boom in

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Beam from heaven, a shaft of sunlight strikes the churchyard at Kilmartin in Argyll where an artist pauses to sketch the centuries-old mossy stones. Markers dating from the 14th century fill the cemetery beside the broad Valley of the Kings, coronation site for the Kingdom of Dalriada. Here, about A.D. 500, came the Scots from Ireland to conquer a new territory. They warred with the Picts until 843, when Kenneth MacAlpin united both peoples and became King of Alba, today's Scotland.

Scotland has developed there, based on that long-lasting snow. Cairngorm skiing now competes with that of the Continent.

The road to Argyll follows the Strathspey (Spey Valley) into the land of Badenoch. Badenoch is Macpherson country, and thus of personal interest to me, since MacLeishes belong to that clan. Old loyalties aglow, I came home to Badenoch and its principal village, Kingussie (kin-youssie, if you please).

Gaelic place names like this one are often a geographer's delight. If they begin with *inver* or *aber*, the place so named is at the mouth of a stream. If they start with *strath*, they are in a valley. *Bad* places them in a grove (usually vanished), and *kin*, or *ceann*—which mean "head"—at the upper end of whatever it may be. Kingussie is obviously, therefore, at the head of something, but nobody seems to know quite what.

It is a pleasant little town, built of gray stone and sturdy slate, with the river mumbling along nearby (map, page 408). I found lodgings in the Duke of Gordon Hotel, and although I was far too late for dinner, I was given dinner anyway. No Highland hotelier would let a guest go hungry to bed.

Breakfast was served me by a bright-looking yellow-haired lad, who stood by and watched me eat with friendly fascination. Robert Macpherson his name was, and just in from Gairloch in Wester Ross. Since Gairloch had been recommended to me as a fair sample of the Highlands in microcosm, I was planning to make it the focus of my coverage. Robert gave me the names of his friends there, as one man of good will to another.

I was reminded again of the traditionally classless quality of Highland society. Under the old clan system, crofters might owe service and produce to the laird, but the laird was their blood relative and chief, and the land he controlled was theirs too. So it was in the Highlands until after the '45, when the English and Lowlanders seized clan lands and sold them as personal property to lairds of their choosing. But this unnatural and un-Gaelic situation did not last long. The Highlander still thinks himself as good as the next man, and he's usually right.

There is in Kingussie an excellent museum of Highland folkways, managed by a wise old gentleman of heroic proportions who refuses to be identified, on the grounds that his exhibits are of greater interest than himself. Five buildings house furnishings, weapons, clothing, tools, and implements of the 17th and 18th centuries.

I asked the modest manager what people did in Kingussie for a living in these modern times. "Take in each other's washings," said he with a bland blue glance. "There's also a bit of farming and tourist trade."

Other relics of the Highlands' yesterday lie a little way down the road at Newtonmore, where the Clan Macpherson House contains a small but touching collection of clan treasures. Among these was a broken fiddle which once belonged to a freebooting ancestor, one Jamie Macpherson, who played at his own hanging, then smashed the instrument over his knee and jumped from the scaffold to his death.

I made for a pub across the way, to dedicate a pint to poor Jamie, and resumed my westward way restored in mind and body.

I STOPPED OFF at Fort William, on the floor of the Great Glen, for a look at the British Aluminium Company's installation there. The big plant huddles under the side of Ben Nevis, at 4,406 feet Britain's highest mountain, down whose side the company's gargantuan water pipes descend.

Water power brought this industry to the west Highlands, which contain no others of any size except for a pulp mill, also at Fort William, where the first fruits of reforestation are being harvested. In the long smoking sheds, electric furnaces produce aluminum from alumina powder, made in Fife on the Firth of Forth from bauxite mined in Ghana.

Some 10 miles south of Fort William lies a region of such aching silence and solitude, such dark grandeur, that even an ignorant passer-by must sense that it is haunted by the memory of murder. Every Scottish child knows Glencoe almost as well as Culloden. Its past thus becomes part of the present.

The Glencoe Massacre of February 13, 1692, was not, like Culloden, a turning point in Scottish history. It is remembered as infamy rather than catastrophe—first, because the MacDonalds of Glencoe were butchered by fellow Highlanders, the Campbells; second, because the Campbell soldiers lived with the MacDonalds as guests before suddenly turning upon them as they slept.

The ostensible reason for the attack was that old MacIan, Chief of the Glencoe MacDonalds, had not signed an oath of allegiance to William of Orange, the Dutch King of England. In truth, MacIan had been late in

his signing, but he had signed. Whether the sadistic Secretary of State, Sir John Dalrymple, knew this is uncertain. In any case, he deliberately ordered that the soldiers take no prisoners. And indeed they took none.

The upper glen is almost deserted now. Its floor and lower slopes, scoured by vanished glaciers, stretch away, dun as a stag's hide, below crests of naked rain-rotted rock (right). I stopped near Buachaille Etive Mor, the Great Shepherd of Etive, to watch ribbons of white water cascade down his flanks. The peaty soil was soft under foot, and I walked for a while under a tarnished sky, in thought as deep as a dream. A grouse roused me, breaking out of cover at my feet. I returned to the security of the Land-Rover and sped out of the haunted glen, bound for bustling seaside Oban, and for Dalriada.

Oban is a cheery, cozy little town, set in a curving bay. It faces misty Mull and other offshore islands, and the clean sea is its mirror. I did not tarry long in this gentle place, where calendars replace clocks, but went south to the scenes of Scotland's beginnings.

THE OLD KINGDOM of Dalriada lay on the long peninsula of Kintyre, which reaches down to within 12 miles of Ireland (map, page 409). Throughout history and before it, men of the Irish shore crossed over into the northern land. One such wave, about A.D. 500, brought the Christian Scots from Scotia, as the Romans called Ireland.

There were other races on the mainland then: Celtic Picts in the Highlands, Celtic Britons in the western part of the Lowlands, Germanic Angles in the eastern part. The Celts spoke dissimilar dialects. As for the Angles, they spoke Angle-ish (English), a totally foreign tongue.

The Romans, arriving in A.D. 80, had managed to subdue the Lowland Britons, but never the Highland tribes. By the time the Irish Scots came, Rome had fallen and her armies had withdrawn. Picts, Britons, Angles, and the newly arrived Scots were left to fight for supremacy. But first the Scots created their new kingdom of Dalriada.

Lush green of summer drapes Glencoe, where shaggy Highland cattle wander in search of fodder. Here in Scotland's most notorious massacre, the Campbells, soldiers of the king housed by the MacDonalds, rose up on the night of February 13, 1692, to murder their hosts.

KODACHROME BY WINFIELD PARKS © NATIONAL GEOGRAPHIC SOCIETY

It must have been a fine land then, for it is now. It is pretty—a word that finds no application in the superb sweep of the northern reaches. Dalriada's hills are not high. Valleys have good earth in them. Small soft-flowing burns take the place of crashing torrents, and birch and hazel line their docile banks.

The Picts valued this land, and for a time Celt fought Celt. Then, in 563, the slaughter was slowed by the coming of St. Columba out of Ireland, and other great saints after him. The Picts became Christian. As Norse attacks on the northern islands and shores weakened them, they turned more and more to their Scots kin and co-religionists. In 843 Kenneth MacAlpin, half Scot and half Pict, merged the Celtic moieties and became the first King of Gaelic Alba (for Scotland was not yet Scotland in name).

THE VERY NAMES of villages here echoed an earlier age—Kilbride, Kilninver, Kilmichael—(*kil* refers to a monk's cell of medieval times). When I came to Kilmartin I stopped. Its graveyard, covered with turf as thick and soft as green fur, contained burial slabs of the 14th to 18th centuries (page 414). Beyond, a flat-floored valley stretched away toward Ireland.

"They call it the Valley of the Kings," said the Reverend Alexander Walker, who had come out of the manse to show me the treasures of his parish. He pointed to an emerald meadow where ewes and lambs cropped fragrant grass. "See the cairn down there, the great pile of stones? It's a cist with a tomb in it. It goes back nearly four thousand years. Farther down there are standing stones set up in a circle for some ancient rite; and there's Dun Add, the little hill where King Kenneth MacAlpin was crowned."

I saw these things, then turned away north toward the far mountains that contain the Gaeldom of today.

There is perhaps no more corrugated country on earth than that beyond the Great Glen. Its ridges, rivers, and lochs lie parallel, east and west, as though some many-pronged cosmic harrow had been dragged across the land. The long probing fingers of the sea reach far inland into drowned valleys, cut and reamed out by glaciers in the Ice Age, then flooded as the land sank.

The rocks that underlie this furrowed wilderness are among the oldest on our planet, and much worn by weather. They make a sparse, ungenerous soil. But they are beautifully fashioned, in the manner of old hills. They rise steeply from the sea, displaying all their altitude in a single splendid slope. Their sides are sculptured rather than splintered.

Doubled in the glaze of Loch Carron, whitewashed cottages of Plockton wear a look of prosperity. The crofting and fishing village has become an artists' colony and tourist haven, and pleasure sailboats now outnumber fishing craft on the loch.

The lower landscape is deployed in curves unknown to any region of raw and recent rock. There is no prettiness in the western glens, only grandeur.

A road cuts westward from the Great Glen to end at Mallaig, on the Sound of Sleat. It ends because it has nowhere to go, and the only way back is the way it came. It is a classic product of ridge-and-fjord geography.

As I drove westward, Loch Eil appeared below me on the left, slender as a stream, still as a pond. A little farther on, Loch Shiel came in sight, and at its head Glenfinnan, where Bonnie Prince Charlie unfurled his standard on the nineteenth of August, 1745.

At Morar the road heads straight for the sea, where Rhum and Eigg rise from the restless water, before it veers up-coast to Mallaig.

I got there in time for dinner. Afterward, in a gray evening of wind-driven rain, I walked down to the harbor and its fleet of double-ended purse seiners, painted in brave colors and bearing names like *Girl Jane, Fair Dawn, Angus Rose, Star of Hope,* and anticlimactically, *Accumulator.*

Sailors were leaving the boats. I hailed one.

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"Where are you from, yourself?" I asked.

"From over by Aberdeen."

"And the rest of the men?"

"Och, they almost all belong to the east coast, where the big ports are, and work the boats of east-coast companies. See them buses yonder? They'll be taking us home once we've had a drop to warrum the blood." He winked happily, blowing a raindrop off the end of his nose.

RATHER THAN RETRACE my tracks to the Great Glen (as I would have had to do to find a road that would take me farther north), I took the big island-cruising car-and-passenger ship to Skye, drove 25 miles over its open moorland to Kylerhea, and took a microscopic four-car ferry back to the mainland at Glenelg. It is a narrow strait, no more than two or three hundred yards across, tide-ripped and wind-blown.

"What ye've got to do," said the long-faced, red-haired ferryman, "is to figure the current and figure the wind and come in fast. You pray that the wind won't die at the last moment, or ye'll go halfway through the pier, and it's stone."

We came in like a duck to its nest.

My road along the coast threaded its way through dark, lovely glens and endless loch shores where clear water lapped at clean rocks. Another ferry got me to Lochcarron, a cheery village of whitewashed cottages laid out in a single file facing the splendid sea loch.

I had trouble with my car—my windshield wiper wouldn't work, which is serious in the Highlands—so I sought a garage and there engaged in a formal north-country ritual:

"I've got a bit of trouble. . . ."

"It's sorry I am, I'm here alone, I'm far behind in my work. . . ."

"If you could just have a look. . . ." I raised the hood invitingly. He leaned inside.

"Perhaps I could fix it myself. . . ."

"No, no, man, ye'd best leave that kind of work to expairts. Here, just hold this. . . ."

And the job was done. The charge? None.

It was well that I could see again, for I left Lochcarron and the highway to tackle one of the wildest stretches of country in the west—the remote peninsula of Applecross. Until recently no road reached the village on its far shore, only a track known as the Bealach nam Bo, the Pass of the Cattle. The new road follows the old track. This sporty thoroughfare climbs 2,000 feet in five miles, with switchbacks that can't be got round in one go. It is a stirring trip. But the village at the end is a fitting reward.

The Gaelic name for Applecross is A' Chomraich—the Sanctuary, and so it was in

Money trees lure guide Murdo MacKenzie to Eilean Maree. The island in Loch Maree once saw bullocks sacrificed in religious ceremonial; today visitors hammer pennies into an oak to bring good luck. Though this tree long ago died of copper poisoning, its coins remain—guarded by the tradition that whoever steals them will die within a year.

A laird in his castle, J. D. H. MacRae joins wife and daughter in the banquet hall of Eilean Donan Castle (pages 398-9), on a sea loch opposite the Isle of Skye. Since 1520 the MacRaes have been constables of the castle for Clan MacKenzie. For their valor as allies of the clan, they won the sobriquet "MacKenzie's Shirt of Mail."

the seventh century when the Irish monk Maelrubha founded a church there. The big level glen of Applecross makes up the home farm of an English gentleman, Maj. J. L. Wills, a cigarette manufacturer who also owns 84,000 acres of surrounding land, including that on which the village is built.

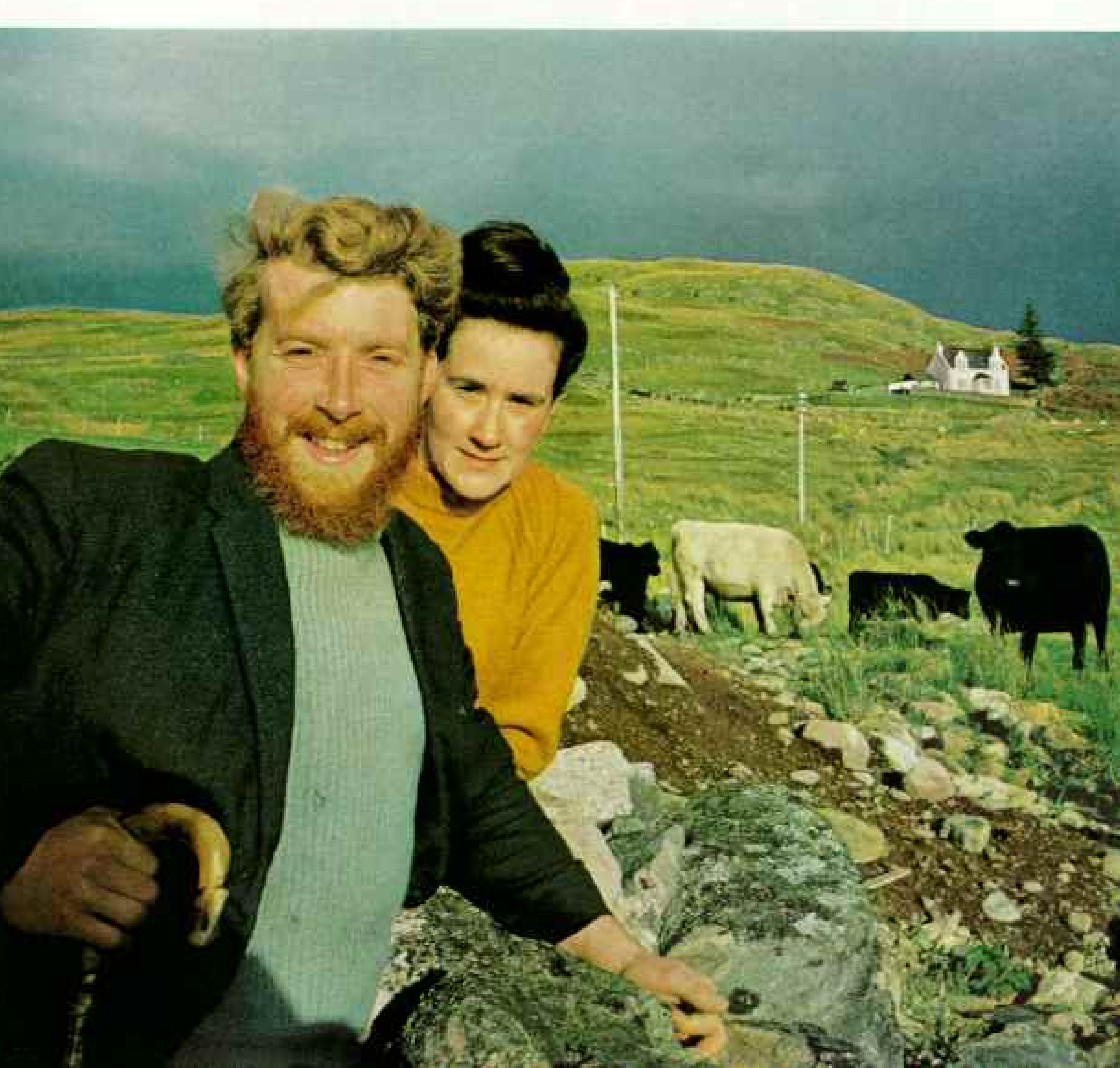
Applecross is arrayed along the shingle, its little stone houses looking out across the Inner Sound to Raasay and Rona and, beyond, the north end of Skye. Where the village stops, crofts begin, and in one of these I found a tall blue-eyed man whose face wore an expression of permanent pleasure.

"It's a free and easy life," said he, stretching and smiling in the peace of evening. "I can shoot a deer if it comes on the croft, and I can fish in the sea. If I need extra money, I go to the commercial fishing or to roadwork. The government gives agricultural subsidies [sub-

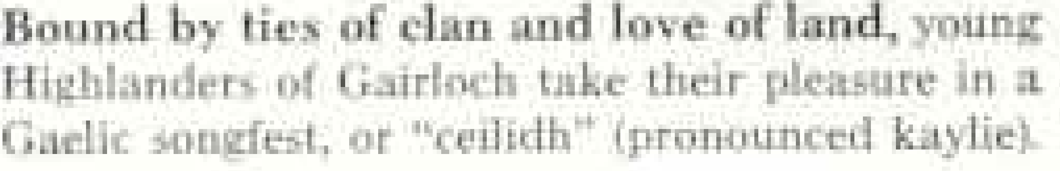
SY-dies, he called them] which help with the farming. I haven't got to hustle and hurry to make my living."

Here was a man who shared the old Gaelic view that "When God made time, He made plenty of it." It struck me that this amiable person was the natural product of a society in which no man need defer to another. Free from the emotional indigestion caused by the swallowing of too much pride, he could turn a friendly face to everyone.

IN THE MORNING I set off back up the pass and, near the top, climbed straight into the bottom of a cloud. If the trip in had been challenging, the return was unnerving, for the half-hidden road was scarcely wider than the car. The fairy folk—demons, hags, water horses, gnomes, and devil dogs—with which the west Highlands are peopled (if one

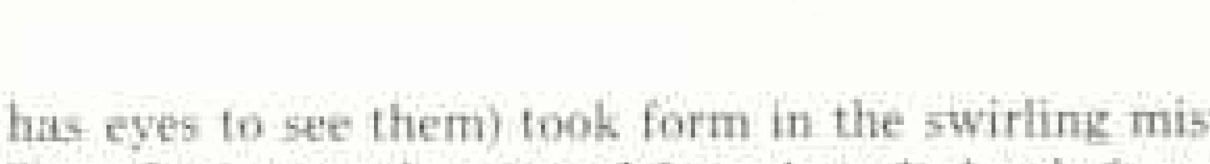


KODACHROMES © N.G.S.



Bound by ties of clan and love of land, young Highlanders of Gairloch take their pleasure in a Gaelic songfest, or "ceilidh" (pronounced kaylie).

Faces bright with hope, crofters turn their backs on a gathering storm near Gairloch. Accepting the challenge of the Highlands, Kenneth MacKenzie and his wife Isabel have accumulated seven crofts, small parcels of rented land, with the right to run sheep on a common grazing ground. To augment income, Kenny works at night in the local hotel and Isabel clerks at MacKenzie Bros. grocery.



has eyes to see them) took form in the swirling mist. Then I was over the top and down into the land of men.

The sense of wilderness grows stronger north of Applecross. But as the land grows harsher, it grows also more magnificent. The strange bulk of Beinn Eighe rises on the left, its pale summit shimmering with quartzite scree. Its slopes and surroundings form the oldest nature reserve in Britain.

Edging the Beinn Eighe Reserve and pointing straight to my destination, the Gairloch peninsula, was 12-mile-long Loch Maree, one of the loveliest stretches of fresh water in the Highlands. It contains many islands, each with its own legend. One, Eilean Maree, is reputed to have been the home of St. Maelrubha, the same who founded the Church of Applecross and now lies buried in its yard. The saint, in fact, gave Loch Maree its name, which is a corruption of his own.

Despite the Christian influence of this holy man, bulls were sacrificed on Eilean Maree until 1678, in a continuation of pagan rites. Even more recently a sacred well on the island was credited with curing insanity. Cures continued, says local legend, until someone tried the treatment on a mad dog, and the well dried up in disgust.

Faithful light flashes unceasingly in the lingering dusk of a northern summer night. The time—11:15 p.m. Stoer Head Lighthouse stands atop a 150-foot cliff on the North Minch, the blustery passage between mainland and the Isle of Lewis.

In search of an easy dinner, a herring gull scouts docked fishing boats at Mallaig. Some crofters earn extra money by fishing, but most of the local catch goes to boats from the big east-coast ports, whose crews often travel back and forth by bus.

KODACHROMES BY WINFIELD PARKS (ABOVE) AND KENNETH MACLEISH © N.G.S.

Moist moss covers the fallen stones of the saint's enclosure. Oak and holly give it green shade. There are graves spanning centuries. And there is the well, or the remains of it. A leaf-filled depression now, it is surrounded by dead and dying trees which have been literally poisoned by pennies. Thousands of coins have been pounded edgewise into their trunks (page 420). These coppers are the successors to the butchered bulls, small sacrifices to superstition. Queen Victoria left a coin there. So did I.

Patches of forest still edge the loch, though they are a regrowth of the splendid timber that covered its sides before a 17th-century iron smelter bought the trees from the local laird and cut them down to make charcoal for his ironworks.

Beyond Loch Maree I came upon a broad bay, opening upon North Minch and distant Lewis, and rimmed with glowing pink sand. This, I knew, was Gairloch—"the short loch"—even before I spotted its century-old hotel. In the fire-warmed lounge of the big stone building, genteel English ladies and gentlemen were taking high tea, as they have done in Scotland's hostelries since Queen Victoria made Highland sojourning fashionable.

ONE of the few generalizations that can be made about the Highlands is that one cannot make generalizations about the Highlands. Differences between the east coast and western Highlands are greater, racially and ethnically, than between certain independent nations. Even in the west, local conditions vary from glen to glen. But a few broad themes apply. Gairloch is a good place to observe them.

Gairloch's history is a succession of violences in which tribal loyalty, courage, and love of land appear as constant elements in a rapidly changing picture. There were Stone Age people who left tools and weapons as proof of their presence, but little else. Following them, or descending from them, were the Celtic Picts. Christianity came quietly and took deep root. Viking Norsemen came violently and were as violently driven out, leaving only place names (Longa Island, Thorisdale, Naust) and Norse-Pictish descendants—the MacBeaths and the MacLeods—as their memorials.

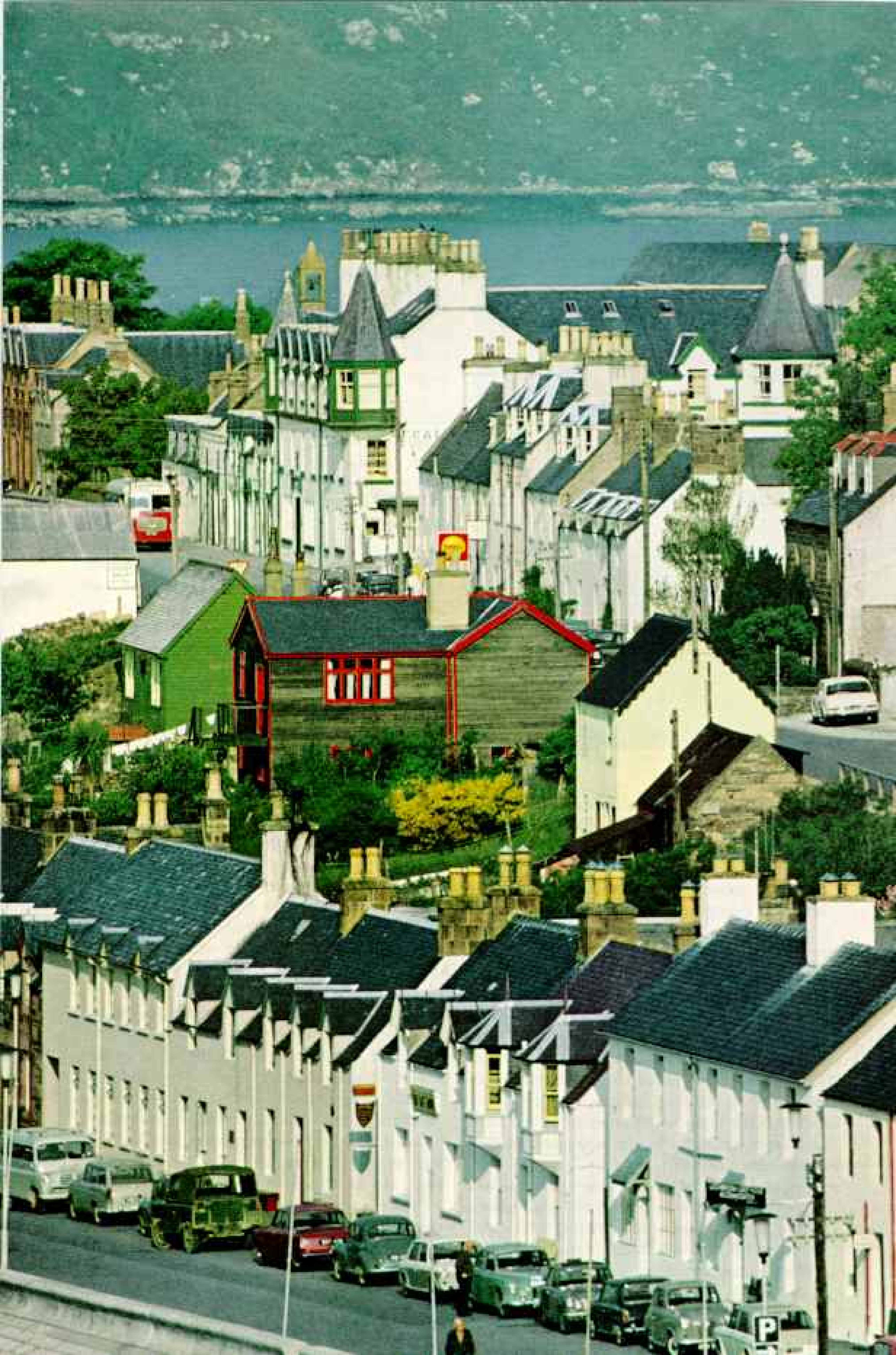
Both these mixed-blooded clans claimed Gairloch and fought for it. But the MacDonalds, whose clan had taken the whole of the Hebrides from the retreating Norse, put them down. They in turn lost Gairloch to Clan MacKenzie of Kintail. And the MacKenzies are still there.

The five-century MacKenzie succession is a story in itself, full of resounding names like Kenneth of the Nose, Black Murdo of the Cave, Alexander the Upright, and Ewan, Son of the Goat. No one should mention the medieval MacKenzies without saluting their supporters, the Clan MacRae, known as MacKenzie's Shirt of Mail. A tale is told of one of them, Big Duncan of the Ax, which gives the flavor of the breed:

During a battle between the MacKenzies and the MacDonalds, a MacKenzie chief, Red Hector, noticed a big MacRae youth sulking on the sidelines. He was offended, it seemed, because his MacRae kinsmen had not thought him worthy of good weapons. He had only a rusty old ax which he had picked up.

"I shall not do a man's work," he told his chief, "unless I get a man's esteem."

Hector promised him that. Big Duncan immediately killed a MacDonald, dragged him aside, and sat on him. "I have killed my man,"



said he. Hector persuaded him to take a less arithmetical view of clan combat. The boy then mowed MacDonalds like grass.

With such henchmen, the MacKenzies fared well enough, and the prudence of Sir Alexander MacKenzie in staying out of the '45 rebellion prevented forfeiture of the Gairloch estate to the Crown—though many MacKenzies personally "went out" for the prince.

During the troubled years following the '45, clansmen were driven out of their glens and forced westward. Later, clearances of hill land for sheep pushed crofting families to the coast. Smallpox vaccine and the end of clan warfare cut the normal death rate. The introduction of the potato allowed more people to live on less land. There were only about 2,000 people in Gairloch in 1755, but in 1861, its peak year, there were 5,500.

Then came crop failure and famine. The exodus began, and it continues still. There are some 1,700 people in Gairloch today.

For a look at the land as it has become, I went up the peninsula to Melvaig, an old crofting community in Gairloch parish. It appeared to be half abandoned. Yet the facts of Melvaig life, taken in historical perspective, are not quite so discouraging as its present appearance. For what I saw in Melvaig was not a community reduced to half its normal and natural number, but one which had been unnaturally overpopulated and, perforce, subsequently depopulated.

KODACHROMES BY WINFIELD PARKS © N.G.S.

Half a man high, an Atlantic salmon brings a smile to a fisherman at Gairloch. Lairds lease commercial fishing rights along the seacoast to professionals, who net the running salmon. Sportsmen pay a fee to cast a line on loch or river.

Built to order by the British Fishery Society in 1788, Ullapool serves as center for the herring fleet from October to March. During squalls, the curved seawall, lower left, tosses the frothing waves back to the loch.

I APPROACHED a particularly fine croft house, made in the old way with whitewashed stone walls and a smooth thatch of rushes protected from the wind by a net weighted with heavy stones. The crofter, a lean man in his sixties, made me welcome without asking my business.

His name was Kenneth MacKenzie, and he held two crofts, each with four acres of arable, or "inbye," land. His "souming"—the number of sheep he had a right to put on the common hill grazing—was 200, but he had only 60.

"If I had 200 sheep I'd do fine," he explained. "I'm too old for cultivating." He said it cheerfully, looking out to sea, or perhaps back into another time. Then suddenly in a loud, harsh voice, "I love sheep! Yess. Yess. When I wass a lad, I knowed every part of the hill. I wass with the sheep alone in the night and the day. But an old man can't make hiss way on the hill."

He pointed up the slope: "I mind when that wee inbye made 24 stooks of corn [shocks of oats]. My cousin had it, that's gone to America, or wass it London? Yon place beside iss after going to ruin too; but that there iss a good croft still. But come in now, and warm yourself."

So thick-walled was the old man's house that the inside was almost a miniature dwelling, yet bright and clean, painted and papered. A peat fire smoldered in the little hearth, and in honor of my presence he nursed it into cheerful flame. He sat quietly before the fire, content, dreaming perhaps of 200 Cheviots on the hill and himself the boy behind the sheep.

Only the voice of the wind answers a man in the empty expanse of Sutherland County. A lone house clings tenaciously to fields turned green by frequent rains. Crofters' snug homes once filled the land. But in the early 19th century, the prospect of greater gain from sheep-

KODACHROME BY WINFIELD PARKS © NATIONAL GEOGRAPHIC SOCIETY

raising caused wholesale eviction of the population by the landowners. Houses were burned about tenants' heads. Displaced crofters were forced to eke a living along the rocky shore. Today, Sutherland County averages only six people per square mile.

Since most Gairloch folk are MacKenzies, and many of them Kenneths, I had some difficulty in locating a certain other Kenneth MacKenzie, wed to the daughter of still another Kenneth MacKenzie. This particular Kenneth, I'd been told, was the most ambitious crofter in the region. I found him at last, a lithe and lively young man with a red beard (page 422), living in a new croft house with electricity and plumbing. His dark-eyed wife Isabel had an electric stove. They had a radio, new furniture, and coal (not peat) for their fireplace. Both had jobs in Gairloch.

But Kenny also worked seven crofts of four acres each, and ran some 260 head of sheep.

"There's abandoned land here," he said, "and I'm asking to take over more of it. Extra crofts would get me extra soumings so that I might get 600 sheep on the hill. Then I'd have a fairly good living."

In the old days Gairloch men supplemented crofting with fishing. Most have now given up the sea, but I found one Gairloch lad who

Awash with purple, a field near Loch Maree wears its fall garment of heather in bloom. The heath is not only beautiful to look at, but its nectar is transformed by bees into a distinctive honey.

Wall of rich brown peat means winter warmth for a Sutherland crofter. Men cut "peats" in the spring and the women stack them to dry. In the fall the fuel is carried to the homestead. Families take pride in having a large, neatly stacked supply in their yards.

EKTACHROMES © NATIONAL GEOGRAPHIC SOCIETY

had not. His approach to the sea was like Kenny's to the land, and his success was similar. He, too, was a MacKenzie, but his first name was Billy, not Kenneth. Kenneth was his father's name.

"There're only three Gairloch boats now," he said. "There're no but a few lads knows how to handle a boat and to work lines and pots. People used to fish to eat, not to make money. It was easy work, lovely. Folks had little enough, but they were content. No electricity to pay for, or things to buy. But we can't go back to that. So we have got to fish for profit now."

IF GAIRLOCH'S sea fishing has been abandoned by all but a stalwart few, its loch and river fishing is as sought after as ever. Fresh waters are the domain of lairds and their friends, of hotels and their guests. The fees paid for a go at the trout and salmon bring in far more than a sea fisherman could earn.

In search of a sporting stream, I made my way to Poolewe, where the three-mile-long River Ewe carries the runoff of Loch Maree to the sea. There, for an hour or two, I worked dark, promising pools without result. But though the Ewe provided me no sport that day, it did lead me to one of the most surprising scenes in the Highlands.

Hard by the river mouth lie the marvelous gardens of Inverewe. They are a horticultural expression of the western Highlands' geographical paradox: mildness and moisture at the latitude of Siberia. They were started in 1864 by Osgood MacKenzie, of the Gairloch family, who transformed barren coastland into a subtropical grove of eucalyptus, bamboo, azalea, and many more exotic species by virtue of a shelter belt of Scotch pine. With

the wind in check, the moist climate brought forth plants worth any visitor's attention. Even to me, an ignoramus where flowers are concerned, rhododendrons the size of forest trees with their open blooms as big as hats are objects of awe.

Despite the floral treasure-trove at the end of the Ewe, I still longed for the feel of a fish at the end of my line. I decided on a loch for my second attempt.

One of the most remote and isolated areas in all Britain lies east of Gairloch, and in the middle of it is Fionn Loch. The Fionn Loch country was MacKenzie land for generations, but is now inhabited only by a learned gentleman named George Anderson, formerly of the Colonial Agricultural Service.

Mr. Anderson lent me a rod and led me to the loch. On the way, this dedicated newcomer to the Highlands discussed the problems of the native crofters.

"So many are old, that's the thing. No incentive. No initiative. A new population is needed, people who've chosen the Highlands and are willing to work hard for the privilege of living in them.

"I'm here because I choose to be. I have no other ambition than to live in this place. If I die poor, well and good. I'll have had a grand old age here in what agronomists call a devastated land."

It would be hard to find a more enthusiastic supporter of Gairloch than Mr. Anderson. Yet, because he is an outsider (albeit a Scot), I wanted to supplement his views with those of an active Gael of Gairloch. Therefore I left Fionn Loch, fishless as usual, to find the soul I sought in the person of Miss Katrine Matheson, schoolteacher, Gaelic speaker, expert in local crafts, and an amateur of Gaelic music and legends.

"We need no new population here," she told me. "Our old ways and old language are coming alive again to give our native people new pride in their race and region, and new vigor. We used to be punished for speaking

EKTACHROME © NATIONAL GEOGRAPHIC SOCIETY

Cap of flaming hair matches the coat of Avril Gordon's five-month-old pet fox.

the Gaelic, a generation ago. We were told it made us inferior. Now we teach it.

"It was the English who tried to kill the Gaelic language, but it was Calvinism that tried to kill Gaelic culture. The reformed church was puritanical—it wanted to ban music and storytelling and dancing—and that among a people with some of the finest literary and musical traditions in the world, even if they weren't written down.

"But the church is growing a bit more tolerant. There are still fine songs to be heard, and pipers too. There is a mod—a Gaelic musical competition—at Aultbea tonight. Come and hear our children sing."

I left Gairloch in the morning, with a head full of haunting music to hum on the lonely road north.

THE HIGHLAND HILLS grow lower in the northern reaches at the west coast, and lie farther from the sea. Ullapool, the largest village in the west, stands on this unprecipitous shore, as tidily arranged as only a planned settlement can be (page 426). Despite its Norse name (Ulla's Home), it was built in 1788 by the British Fishery Society.

I drove on to Lochinver and took a room in its handsome hotel. I counted myself lucky; it was Saturday, and there are many Highlanders who will not take money on the Sabbath. A Gairloch friend had warned me of this:

"Watch out for the Wee Frees [members of the Free Church] when you take a room on Saturday. You may find it will be Monday before you can pay your bill and leave."

And indeed the Sabbath did immobilize Lochinver like an anesthetic. I went at midmorning to visit two families whose names had been given me, following the directions of the hall porter, who watched my departure with a grin. There were signs of life at both places, but my knock brought forth only a silence that rang with reproof.

"Perhaps they are after going off somewhere," said the hall porter comfortingly upon my return.

"They're not," I told him, "and you know it."

"Aye," he said, shoulders shaking, "aye."

I was now in Sutherland, the most desolate and emptiest county in Britain. The name is Norse, and means "southern land." Odd as its appellation may seem for an area at the extreme north of Scotland, Sutherland was in fact a southern land to the Norse who colonized its shores during the ninth century.

The county's time of tragedy came with the infamous Sutherland Clearances of 1811 to 1820. The clearing of the glens for sheep occurred throughout the Highlands, but nowhere was the eviction of crofters managed more brutally than by the factors of the Duke of Sutherland.

A sardonic anecdote of that time tells of a crofter, threatened with eviction, who went to his minister for advice. The parson told him to pray. A fortnight later the crofter was back. Happily he told the minister, "Ah, the Lord's the boy!"

"Why do you say that?"

"The factor's dead!"

My main goal in Sutherland was Cape Wrath, the northwest tip of Britain. The Cape Wrath ferry, a dory which operates only when wind and tide permit, brought me across the Kyle of Durness to the only road that reaches the remote headland. The one private vehicle on the cape carried me 11 miles to the lighthouse. There the driver sought shelter, and I crept out to the raw, pink granite cliffs which mark, with an unnecessary emphasis, the end of land. Plunging well over 500 feet, they are among the highest on the British mainland.

Here, where no offshore islands give protection, the precipice stands in a restless surge from the open Atlantic Ocean, a reminder that between Wrath and the North Pole lie only the unquiet water and ice of the northern world.

The wind sang eerily around the awful rocks, gusting and shifting. I watched fulmars, those slim-winged gliders, soar under the cliff edge where nesting gulls laughed and shrieked. Orange-billed oystercatchers shrilled crossly, annoyed by my presence. On the rocks below, snake-necked cormorants stood in a driving sea spray, and a mottled seal lay resting.

My driver got me back to the dory-ferry before the falling tide could leave the little boat stranded, and I headed east across the top of the country.

The northwest corner of Scotland is in the Highlands; the northeast corner is not. The former is wild and rugged, poor in soil; its few inhabitants are Gaels. The latter is flat and smooth, fruitful and unexciting; many of its inhabitants are of Norse blood. The Highland boundary lies between the two, uncharted but perhaps falling near Reay, not far from a marvelous monument placed as if to mark it.

Rock-bound aerie, a low-roofed cottage hugs a Sutherland hilltop; solitary gull brings a touch of life. Though many people have left the Highlands, those who remain find hope in the coming of new small industries and an increase in tourism.

"Monster watch": Simon Legg, one of 150 volunteers of the Loch Ness Phenomena Investigation Bureau, scans Loch Ness for its elusive inhabitants—long-necked creatures often seen, sometimes photographed, but not generally accepted by scientists. The volunteers hope to prove once and for all that monsters exist. A camera with telephoto lens stands ready should a "Nessie" appear. Reports of the creatures date from the sixth century, when St. Columba, making the sign of the cross, saved a swimmer from a monster.

It is the Dounreay atomic-energy plant, one of the most advanced nuclear-power producers in the world.

To me, Dounreay's 135-foot steel sphere announces and epitomizes the sensible, forward-looking Anglo-Saxon world of modernity, efficiency, and creativity. That world extends southward from here down Scotland's east coast to the Lowlands and England. Dounreay itself is a high spot in anybody's world, as experimental centers are apt to be. But I had left the subject of my study, the Highlands, as completely as if I had crossed a

KODACHROMES BY WINFIELD PARKS © N.G.S.

frontier into a different country—which, as a matter of cultural if not geographic fact, I had done. So I turned westward again and re-entered Gaeldom.

I TRAVELED DOWN across the empty inland glens to Inverness and the start of my journey home. I found a place on the night train to Glasgow and stared out the window as we rolled southward.

Even at midnight the long Highland evening still repulsed the darkness. And indeed there would be no darkness, for the first light of morning would soon silver the sky.

"Tartan twilight," The Mackintosh of Mackintosh had said, speaking regretfully of the Gael's nostalgic inclination to live in the soft afterglow of antiquity rather than face the harsh light of the modern world. Yet the Highlander, for all that he has one boot planted in the past, is feeling with the other for a foothold in the present. He will soon find it. Then, perhaps, Gaeldom's transition to tomorrow can be as gentle as the undark Highland night, in which the old day does not die but is reborn in the new. THE END

Scorpions
Living Fossils of the Sands

Article and photographs by PAUL A. ZAHL, Ph.D.
Senior Natural Scientist, National Geographic Staff

"HOLD IT!" Lorin whispered, and one step behind him I froze. Slowly he bent and lifted a piece of bark that hung loose from the trunk of a fallen tree. Foot-long chrome tweezers flashed in the sun, then darted down like the beak of a hungry heron. Before my eyes could blink twice, a creature shorter than my little finger was squirming inside one of our plastic bags.

"Centruroides sculpturatus," announced its captor, as if Latin were his native tongue. "The most dangerous scorpion in the Southwest."

We were on the Salt River flats, east of Phoenix, Arizona—a no man's land of dry sand and gravel, where heaps of dead mesquite and cottonwood lay strewn by recent high water. This is promising territory for a scorpion hunter, and Lorin Honetschlager knows how to find scorpions. With him, it is a business.

Tiny Creature Packs a Powerful Punch

It was hard to believe that the frail, segmented, straw-colored creature, now separated from us only by a thinness of clear plastic, could be dangerous. But I recalled an earlier discussion with Professor Herbert L. Stahnke, Director of the Poisonous Animals Research Laboratory at Arizona State University in Tempe. He had shown me a species of desert scorpion much larger and fiercer-looking than the one in Lorin's bag—a three-inch-long monster stalking menacingly about the floor of its pen.

Noting my instinctive withdrawal, Dr. Stahnke tried to put me at ease: "I'd rather be stung by ten of those than by one *sculpturatus*. By test, the venom of this big ugly fellow is only 1/150th as potent."

Generally speaking, the professor explained, there are two types of scorpion venom. One causes only local swelling and inflammation, no worse than the effects of a wasp or bee sting. But the other rapidly

Death in the desert: Hairy scorpion ravenously eats a banded gecko. Although one of the largest of North America's 50-odd scorpion species, *Hadrurus arizonensis*, here three times life-size, possesses a poison much less potent than that of its lethal little cousin at right. When necessary to subdue its prey, the scorpion injects venom with a lightning-swift forward snap of its stinger.

KODACHROMES © N.G.S.

Midget killer, *Centruroides sculpturatus*, and a related species once claimed as many as seven lives in one year in Arizona before antivenins, public education, and extermination techniques reduced the threat.

Wary eye on his quarry, Lorin Honetschlager, an Arizona collector, holds a *sculpturatus* in his tweezers. He will place the squirming scorpion in a plastic bag held by his wife.

Milking a hairy scorpion for studies of its poison, Mr. Honetschlager grips the tail with electrified forceps. A mild shock makes venom glands contract and eject venom into the pipette. A drop spills down the forceps.

KODACHROMES © NATIONAL GEOGRAPHIC SOCIETY

diffuses into body tissues, acting violently on the nerves and often producing convulsions, respiratory and cardiac difficulties, and sometimes—in the case of small children or susceptible adults—death.

"Fortunately, with certain antivenins available, along with public awareness and the use of the newer residual insecticides, the scorpion problem here in the Southwest is no longer serious," Dr. Stahnke said. "During the 15 years from 1935 through 1949 there were 54 deaths from scorpion stings recorded in Arizona. From 1950 through 1964 there were eight; only one has been recorded since then."

With these statistics comfortingly in mind, I followed Lorin farther into the tangle of brush and flood residue. Nevertheless, I kept my gloves on and watched my step—perhaps more carefully than necessary, for during daylight hours scorpions stay under bark and rocks, in sand and debris. Only at night do they venture forth to prey on crickets, spiders, cockroaches, moths, caterpillars, tiny lizards—anything small that crawls.

Scorpions Predate the Age of Dinosaurs

While on the prowl, the scorpion thrusts its pincers forward and wide open, lobster-fashion. The stinger-tipped "tail" arches forward over the body, ready to apply the coup de grace, if necessary, to any prey caught by the pincers (page 436).

Although their heads are studded with anywhere from 2 to 12 eyes, depending on the species, scorpions, as far as is known, perceive only light and dark; they rely chiefly on senses other than vision. Delicate hairs on the pincers, for example, respond to the least movement of air or nearby objects. The scorpion uses comblike appendages on its underside to feel its way and probably to detect odors as well.

Mainly because of their eight legs, scorpions are classified as arachnids, although they are not spiders. Nor are they insects, and the expression "stinging lizards," used colloquially in some parts of the country, is clearly erroneous. The belief that scorpions will sting themselves to death when surrounded by fire or hot coals is equally wrong.

Theirs is an ancient history, extending back perhaps 400,000,000 years. Yet during this period—one that saw the rise and fall of dinosaurs and the coming and going of myriad other life forms—scorpions have undergone little change. To be sure, color, size, and structural detail vary somewhat among the world's 700-odd species of scorpions that have been

identified to date, but basically all are similar.

By midafternoon we had about 25 of the little tan scorpions in our collecting bags. "Not much of a haul," was Lorin's comment as we returned to our parked car near the flats. "I need more like a hundred."

The need for scorpions is a most unusual one, but so is Lorin's part-time business: He sells their venom. His regular work is as chief curator of the Animal Resource Center at Arizona State University.

At the time of my visit his "milking herd" numbered about 700, set out in plastic containers arranged in neat rows behind the locked door of a backyard shed. Lorin gets a dollar a milligram from biomedical laboratories which use the fluffy, white freeze-dried venom for studies of its properties and characteristics and for antivenin research.

Electric Forceps Milks Deadly "Herd"

I watched the once-a-week milking (opposite)—a tedious and somewhat hazardous job. Protectively gloved, Lorin nipped up a *sculpturatus* between the prongs of an eight-inch forceps that had been wired to produce electric shocks. Then, as if threading a needle, he deftly fitted the stinger into the end of a glass pipette no thicker than an ordinary fever thermometer. He steadied the tail with the forceps and pressed a connecting foot treadle. As a slight shock coursed through the scorpion's body, the venom glands contracted and expelled droplets of opalescent fluid that ran down the pipette into a glass bulb for storage.

The scorpion was tossed back into its pen and Lorin went on to the next. This milking of the herd yielded about a teaspoonful of liquid venom—a mere pinch when dried, about 100 milligrams of powder.

"A scorpion is good for only about four milkings," Lorin told me. "Then production falls off." Also, a scorpion molts periodically and loses its protective covering, becoming easy prey for its companions in captivity. Thus Lorin must constantly replenish his herd.

"During winter this species tends to congregate," he explained. "Then you can find as many as 200 or 300 specimens under a single rock or sheet of bark. But now they're dispersed, and I have to use a special trick of the trade."

He disclosed the "trick"—a technique now used by most scorpion collectors—a few nights later at an empty cattle stockade a few miles southeast of Phoenix. We carried with us a portable "black light," not much larger than an ordinary flashlight, of the sort used by

Cannibalizing a cousin, a *sculpturatus* devours a molting scorpion beside its cast-off skin. Lacking armor, molters usually seek cover.

In a courtship minuet, a male and a female with a maturing litter already on her back "hold hands" and scuttle to and fro. During the mating ritual he deposits sperm on the ground. She induces fertilization by brushing over it.

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rock hounds and mineralogists. In the darkness it cast an invisible beam. Suddenly I saw a small moving object, then another, glowing an eerie greenish-blue. Curiously, for reasons not definitely known, *sculpturatus* and other scorpions fluoresce under ultraviolet light (opposite, lower).*

Lorin pointed the light along the edge of a cattle feeding bin, revealing several more of the ghostly crawling creatures. He went to work with his tweezers; in half an hour we had collected more than 50. "Some nights I can catch as many as 500 this way," he said.

Fortunately for us, there are scorpion collectors other than Lorin Honetschlager. The elf owl, for example, which nests high in holes in the saguaro cactus, helps hold the desert's scorpion population in check (right). This remarkable bird has learned not only how to swoop down through the darkness on the night-foraging scorpion, but also how to nip off its tail without being stung. Roadrunners, too, know how to handle scorpions; so do some snakes, and, in Africa, baboons.

One-gallon Traps Aid in Desert Census

Early one morning, under a sky still black and starry, I went on a hunt with another scorpion specialist, Stan Williams, a graduate student in zoology at Arizona State University. We parked our car ten miles south of Phoenix, where jagged mountains thrust up from the desert and multiarmed saguaros stand like warning semaphores.

As part of his doctoral studies, Stan had embedded scores of one-gallon cans in the

*See the author's "Fluorescent Gems From Davy Jones's Locker," in the August, 1963, NATIONAL GEOGRAPHIC.

Beady-eyed scorpion killer, an elf owl peers from its nest in a saguaro cactus, dinner dangling from its beak. The night hunter swoops down on the prowling scorpions and deftly pecks off their stingers. The crunchy bodies constitute much of the diet of elf owl young.

Giving birth, a *Vejovis spinigerus*, here magnified four times, ejects a newcomer from her abdomen into a cradle made with her forelegs. Born in filmy "delivery sacks," groggy babies soon rip free and clamber onto the mother's back. After subsisting on their own body nutrients for about two weeks, they molt and dismount to strike off independently.

ANSCOCHROME BY LEWIS WAYNE WALKER (ABOVE);
KODACHROMES BY STANLEY C. WILLIAMS (LEFT) AND PAUL A. ZAHL © N.G.S.

Luminous prowler of the desert, a hairy scorpion glows in the invisible beam of an ultraviolet lamp. Taking advantage of scorpion fluorescence, collectors armed with such "black-light" torches may catch hundreds in a night. Captives flourish on a diet of roaches, though they can survive nine months without food. The hairy scorpion's venom inflicts pain and swelling; *sculpturatus*'s more powerful poison attacks the nervous system and may bring convulsions or even death.

desert floor, flush with the ground, so that scorpions and other small nocturnal wanderers might fall in. To keep people and larger animals from stepping into his traps, he had partially covered them with large flat rocks. By counting and identifying the contents of the cans every morning throughout the year, he hoped to correlate the movement and abundance of scorpions with changes in season, weather, and temperature. As he began his circuit, I followed, careful to avoid wickedly needled cholla cactus and heavily thorned ocotillo.

Stan's flashlight swept the stony ground and glinted on one of the traps. We knelt and examined the metal interior. Nothing. The light cast about until it caught the next can, 20 yards away. This one held a spider.

The next trap yielded a small *Uta*, or side blotch lizard, and the next a *sculpturatus*. Another held a big, fearsome-looking *Hadrurus arizonensis* (page 436), scrabbling futilely against the smooth metal wall.

At the end of the "trapline," we tallied our catch: four lizards, half a dozen scorpions, twenty spiders—not a great deal, but all scientific grist for Stan's mill.

All around us were weird rustlings in the dark, and an occasional unidentifiable low cry. The vibrancy of a desert night is almost tangible, when scorpions, snakes, lizards, spiders, kangaroo rats, Gila monsters, coyotes, and other creatures, usually hidden during the day, move in single-minded search of food—plainly a matter of life or death to those involved.

In this austere setting, the savagery of scorpions seemed appropriate, for here their pincers, stingers, and venom—no less than the sharp beak of the elf owl or the ripping teeth of the coyote—are weighed in the balance for what they are, necessary weapons in the normal struggle for survival.

Scorpion country: From the desert's stony floor, author Zahl plucks a *Hadrurus* in his tweezers. Beside him bristle two species of cholla cactus; many-armed saguaros punctuate the arid landscape. Here, when night falls, the cooling earth crawls with scorpions, spiders, lizards, and other creatures in a nocturnal drama of eat and be eaten.

KODACHROME BY PAUL A. ZAHL © N.G.S.

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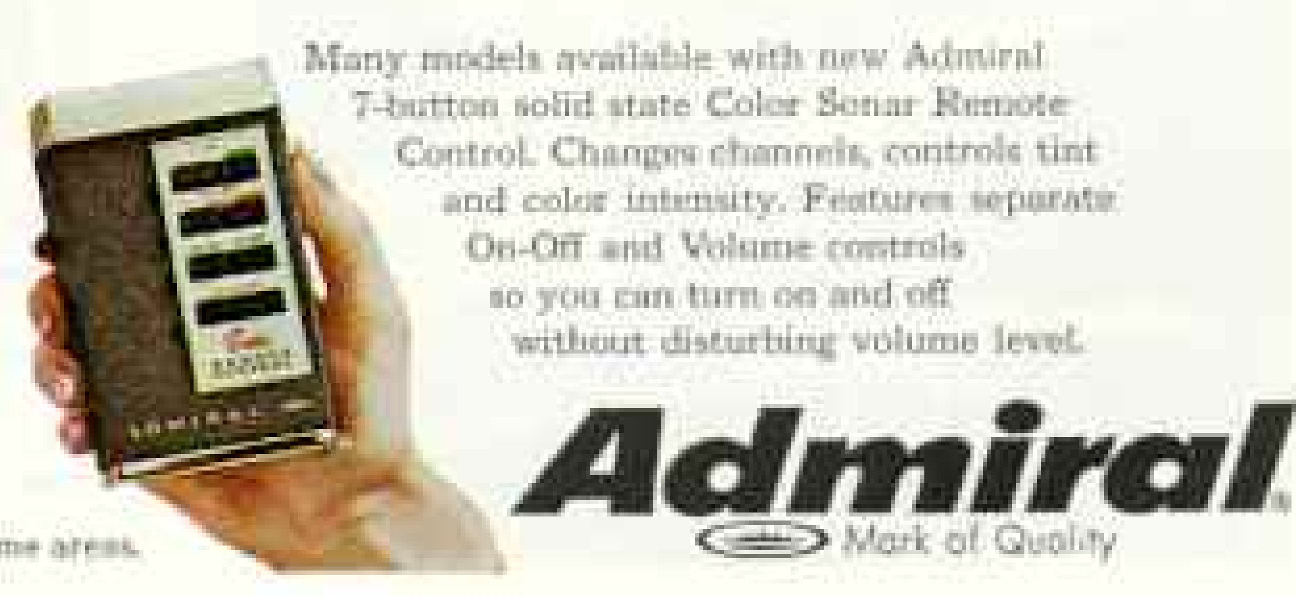

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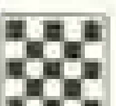
CHECKER MOTORS CORPORATION 
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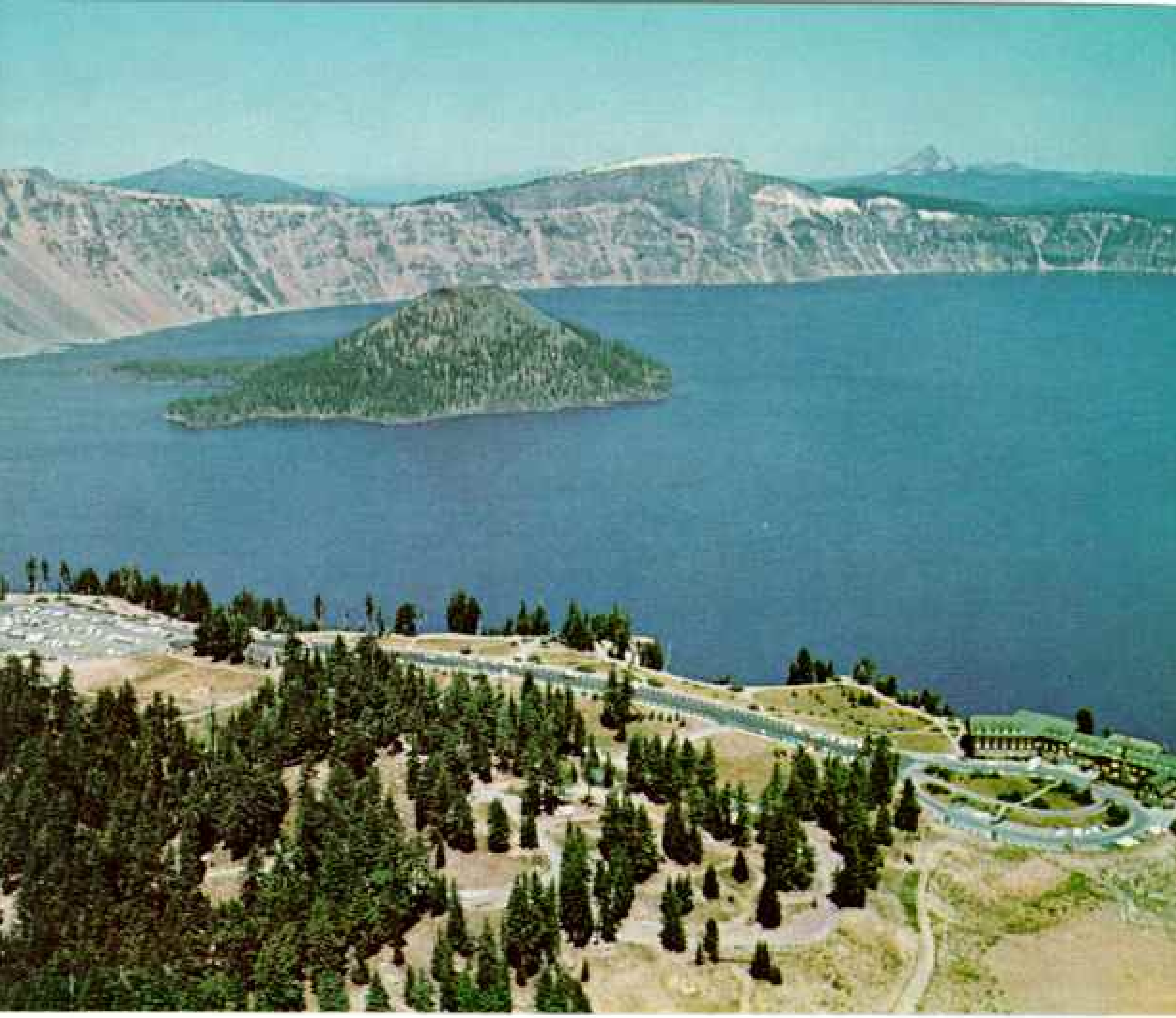

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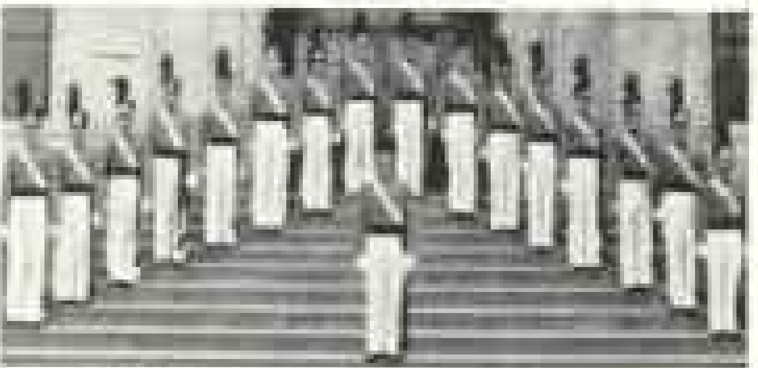

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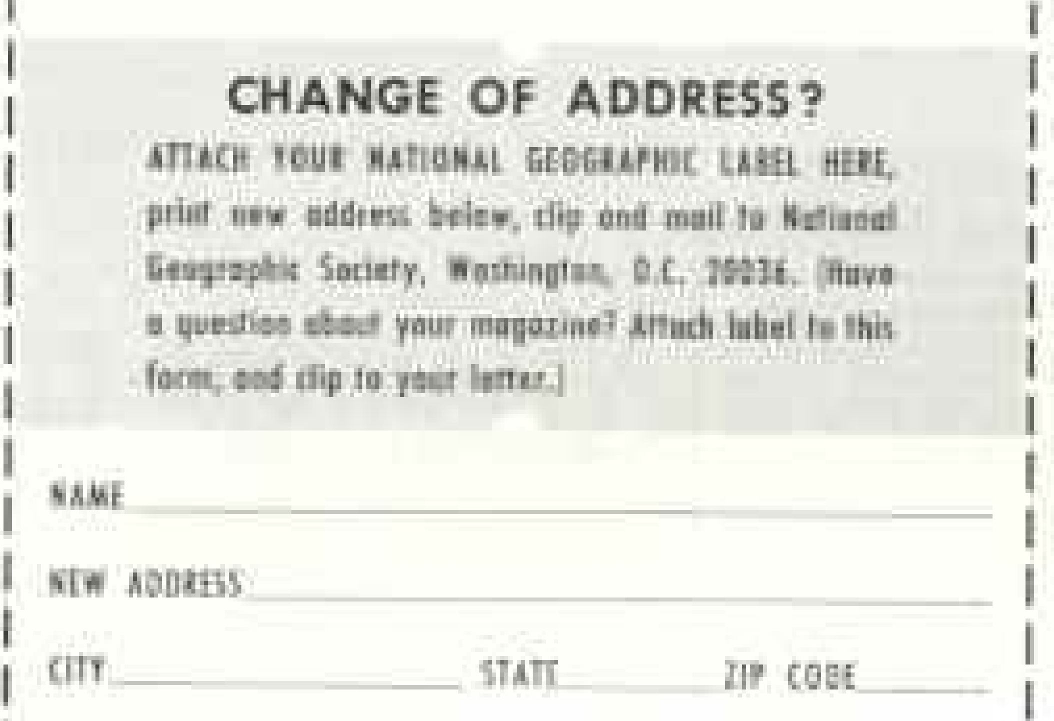

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