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JUNE, 1959

THE NATIONAL GEOGRAPHIC MAGAZINE

JUNE, 1959

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At the new United States Air Force Academy near Colorado Springs, Cadet John M. Melancon introduces its mascot and symbol, the prairie falcon Mach I, to Nathaniel T. Kenney, of the National Geographic's Senior Editorial Staff.

Later Mr. Kenney saw the bird in action. One of nature's finest flying machines, it drops on the falconer's lure like a feathered bomb.

As a U. S. Army intelligence major on the staff of General Dwight D. Eisenhower, Nat Kenney had his initial brush with the Space Age when he helped remove German V-2's from an underground factory near Nordhausen. Such captured V-2's later launched the first large-scale United States missile experiments.

"You don't realize how far and fast we are going," he reports, "until you see tomorrow's air leaders in the making. These fine youngsters—they were kindergarten kids when our war ended—take courses in such things as astronautics and use terms like 'angular misalignment of velocity vector' that are several hundred



miles over the heads of most of us ground-bound mortals." His vivid account of the Air Force Academy, "Where Falcons Wear Air-Force Blue," begins on page 844.

To get his facts firsthand, Nat Kenney spent weeks with the cadets and followed their activities by plane, automobile and—shakily—on skis.

Fellow contributors to this issue traveled by East-West Berlin subway, Hawaiian mule train, Staten Island Ferry, and boot-shod feet. In this one NATIONAL GEOGRAPHIC, members of The Society share journeys of 77,000 miles.

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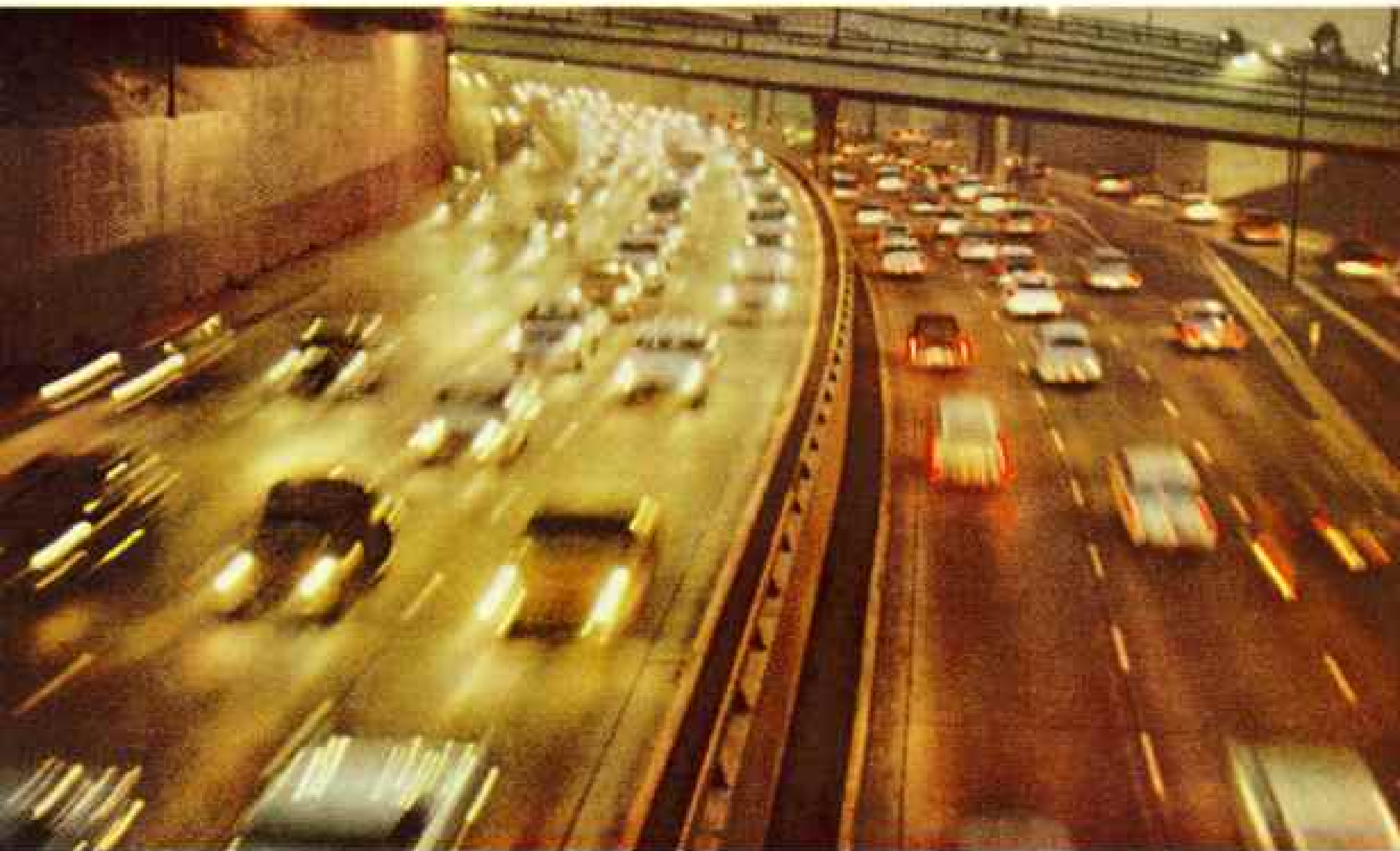
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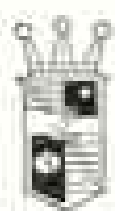
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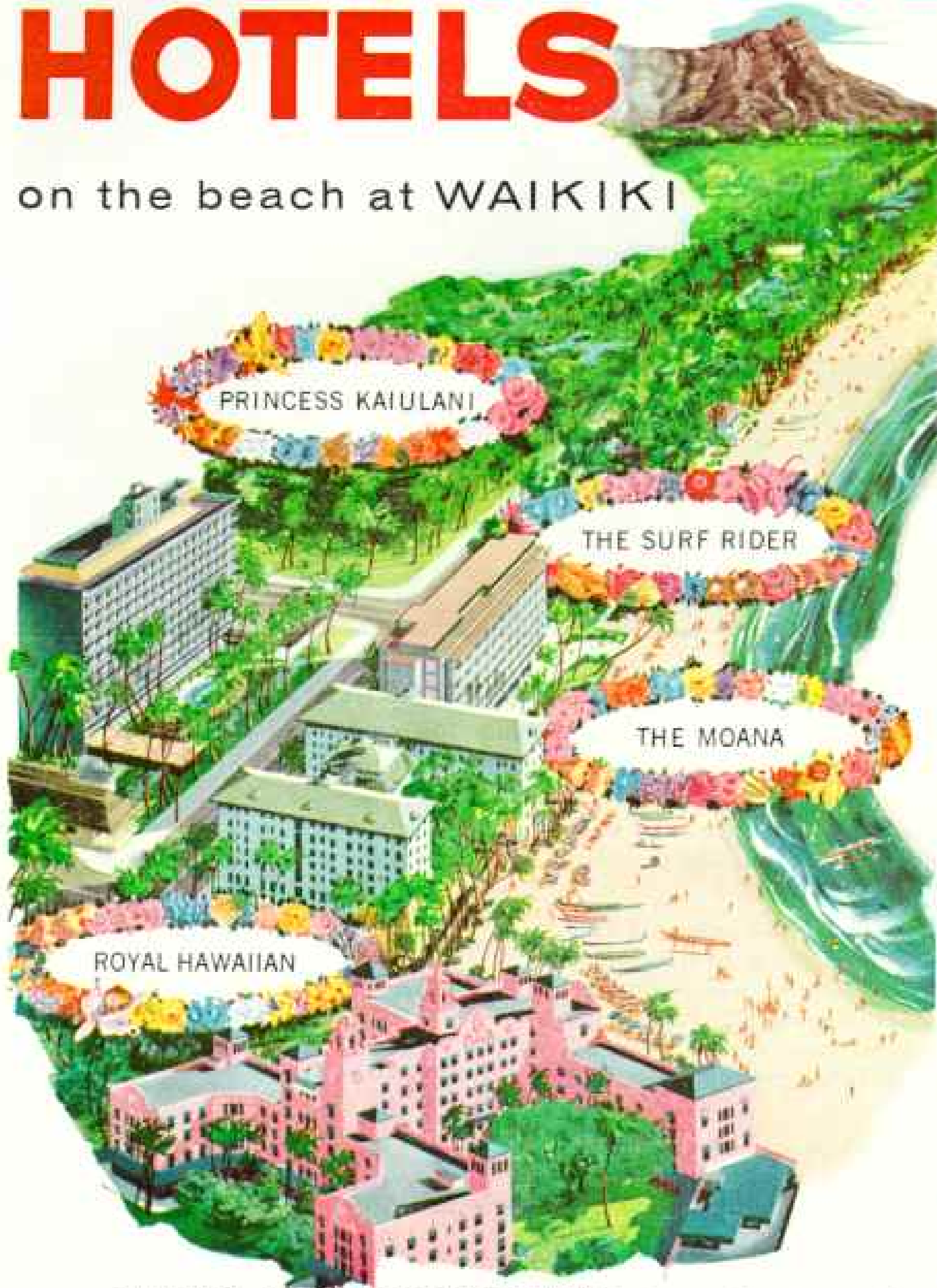
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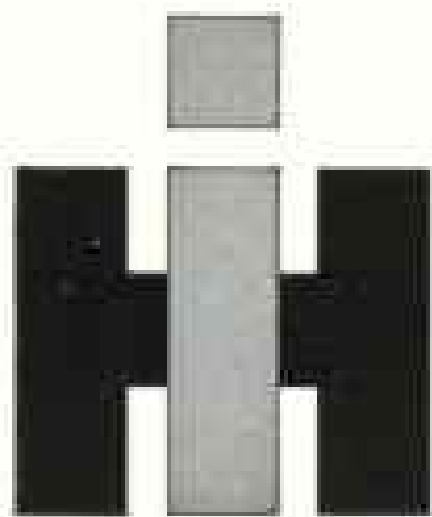
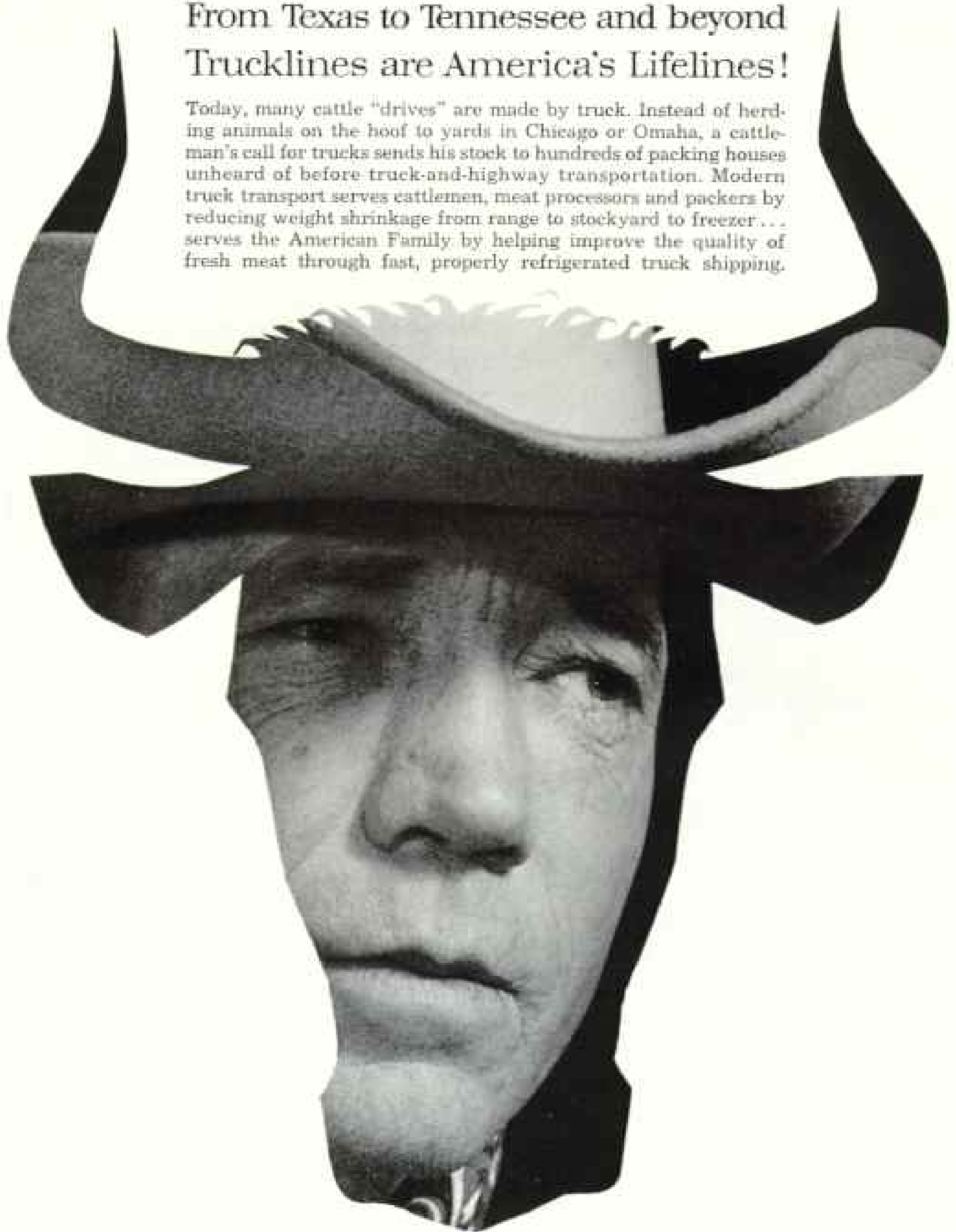
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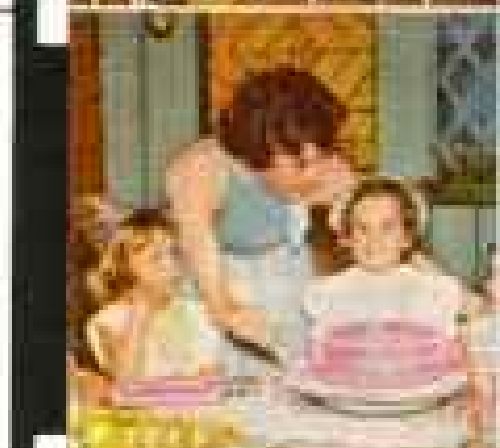
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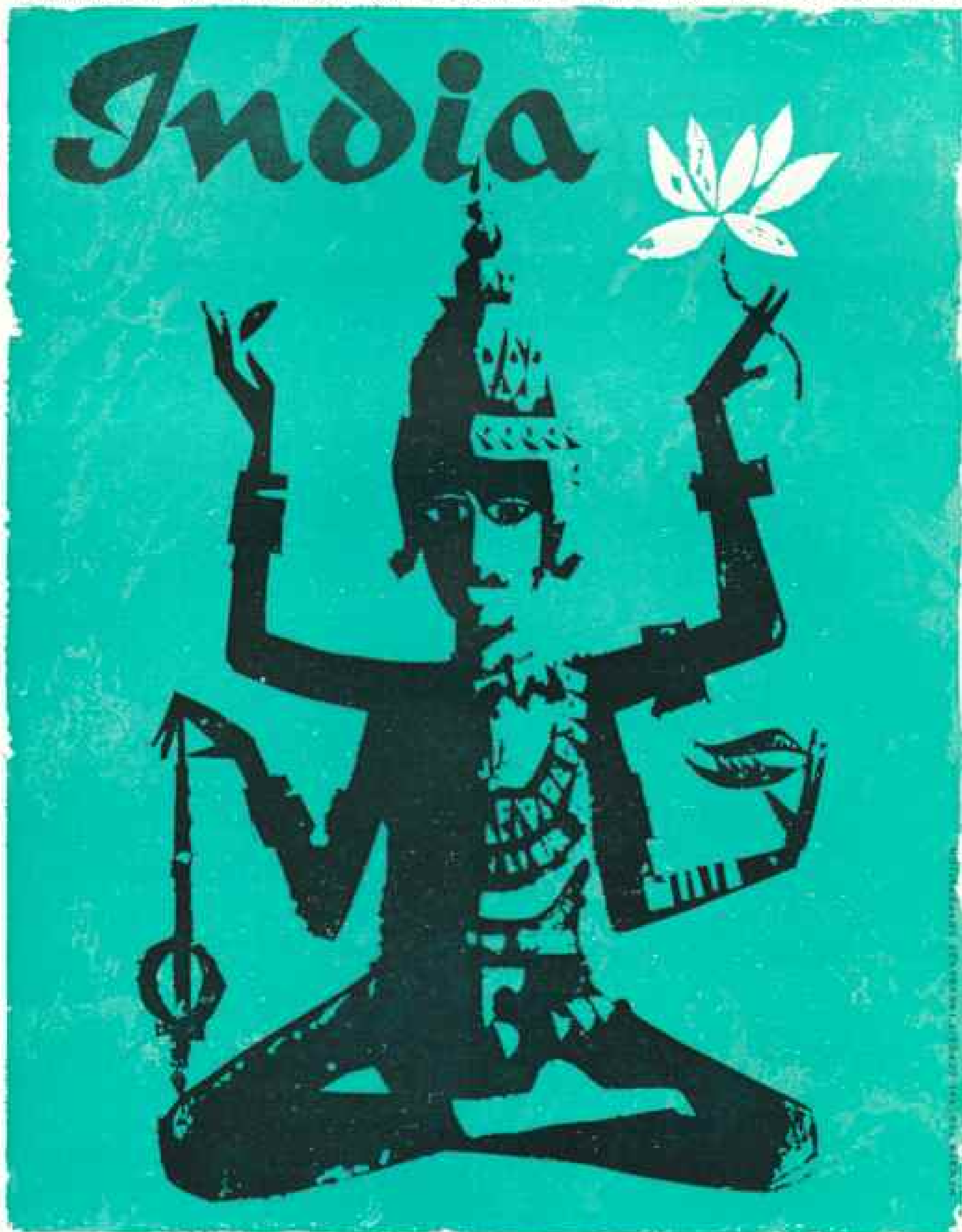
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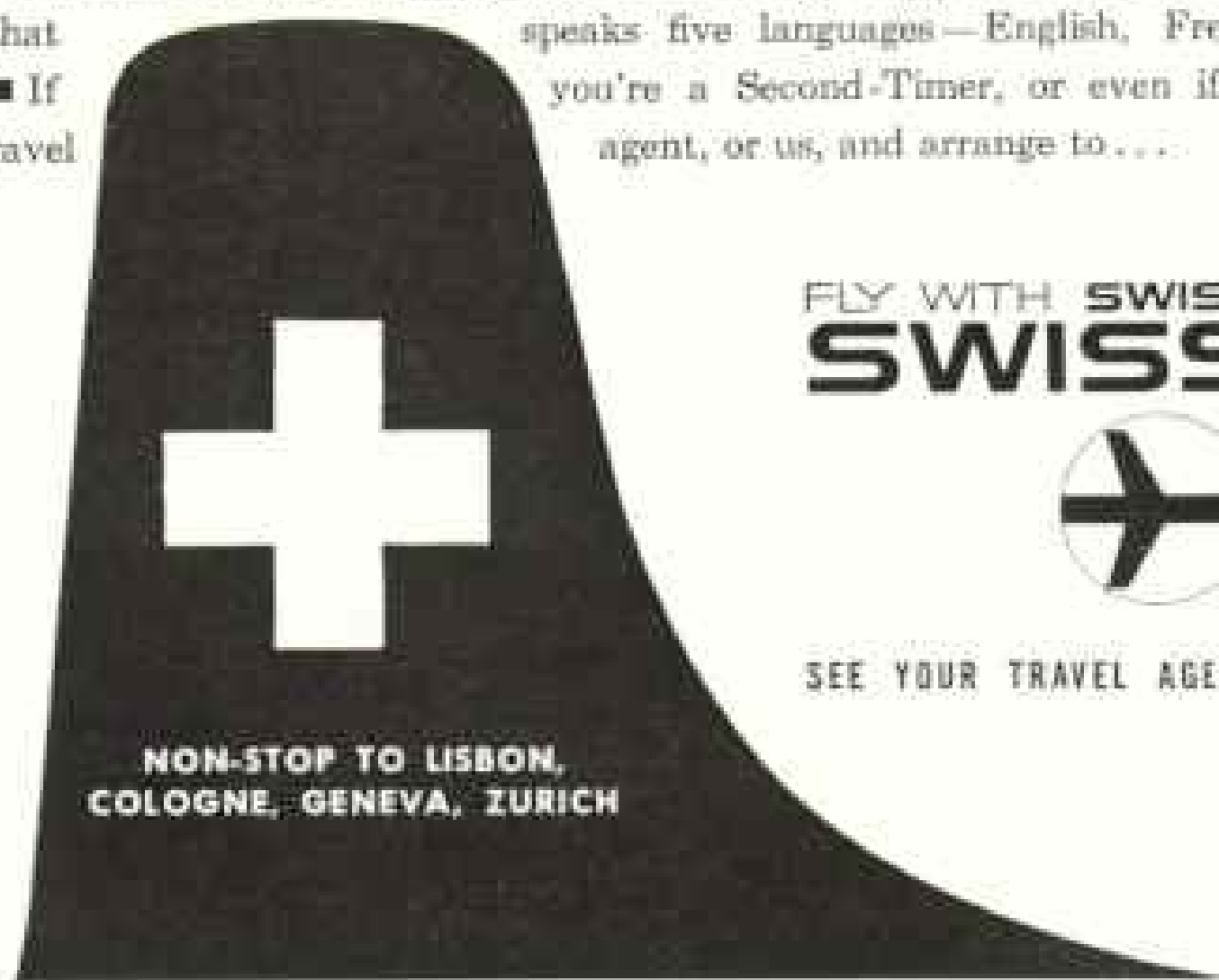
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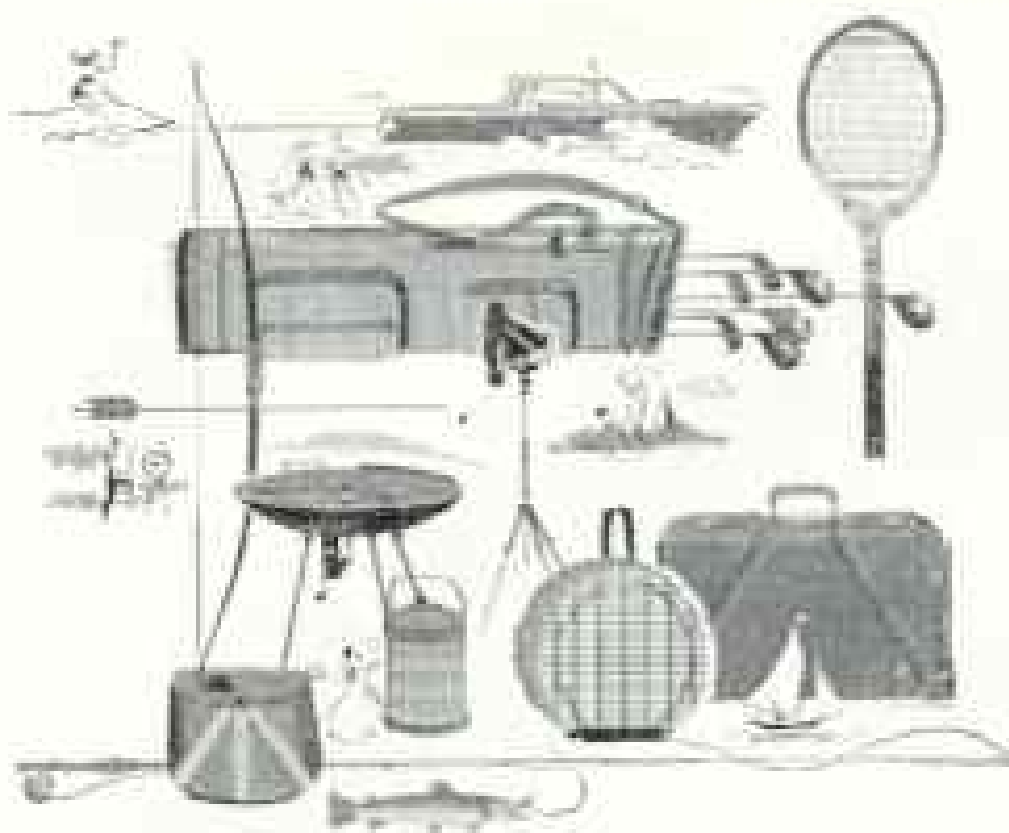
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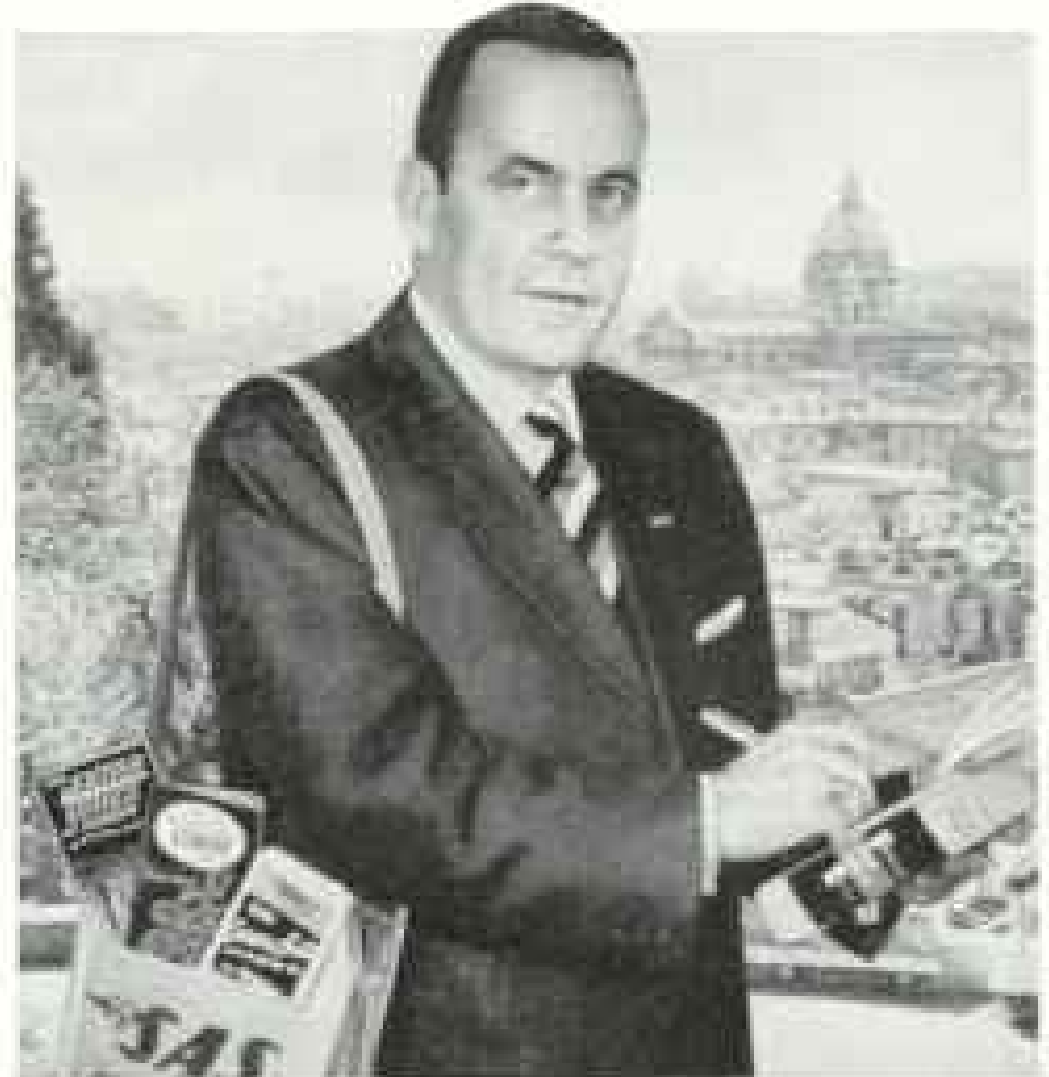
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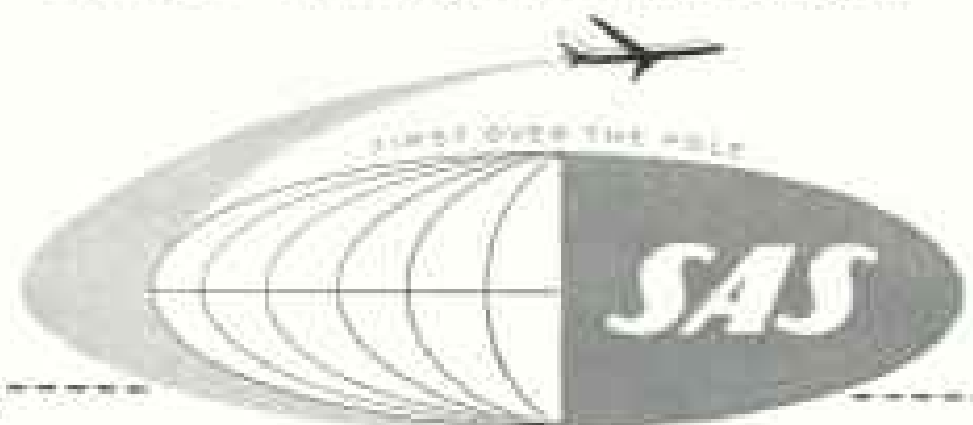
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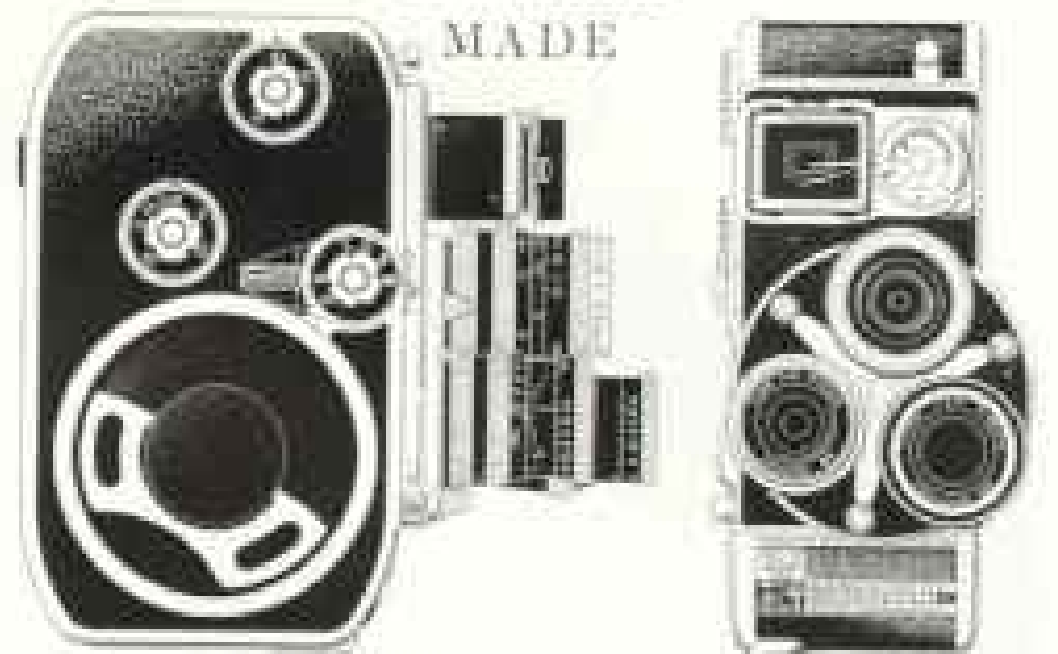
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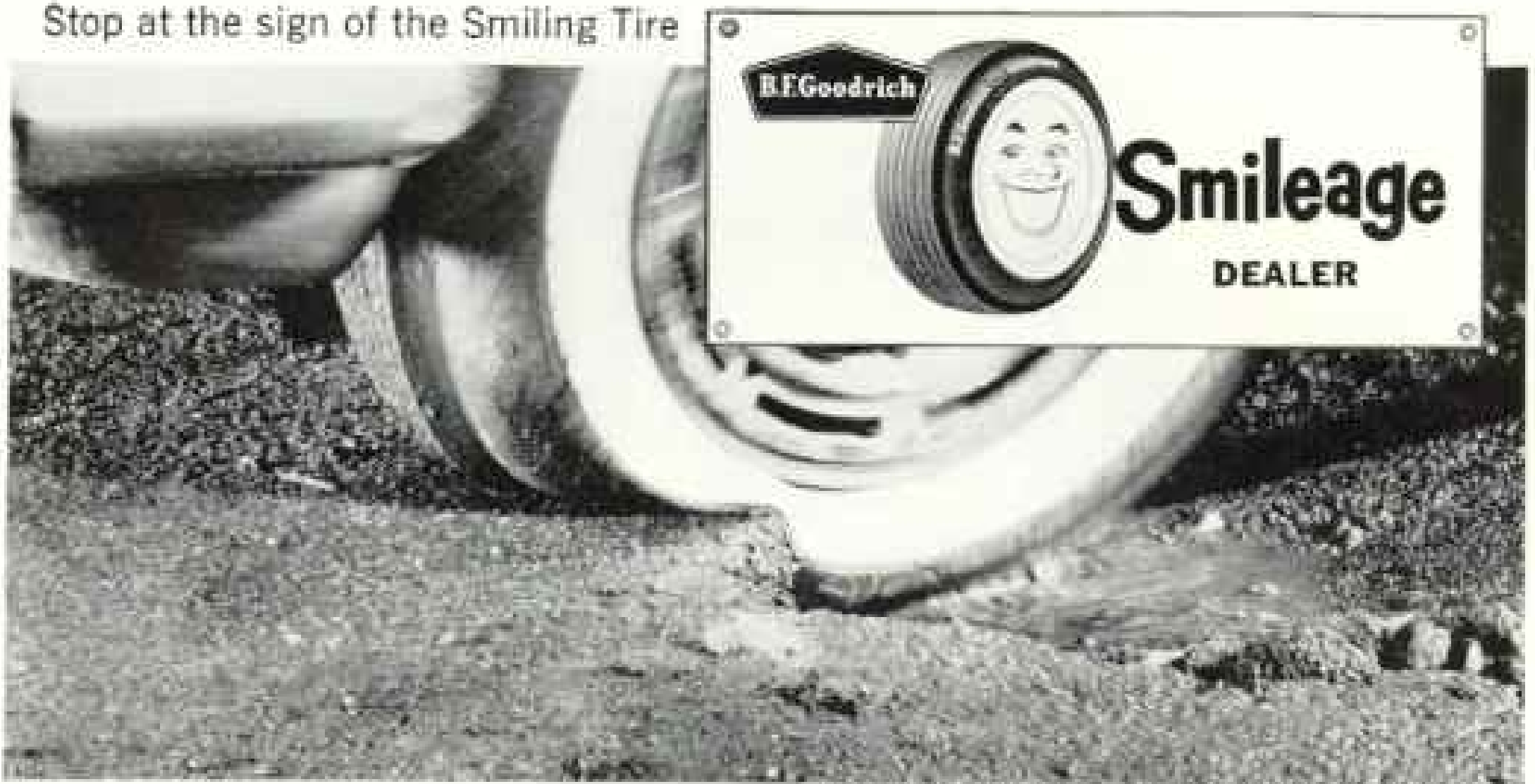
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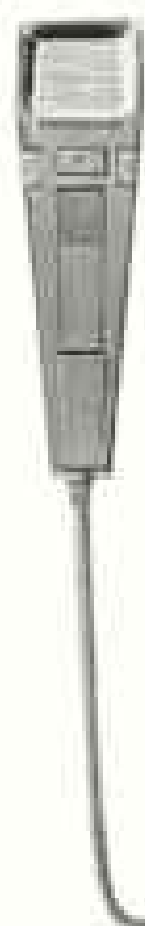
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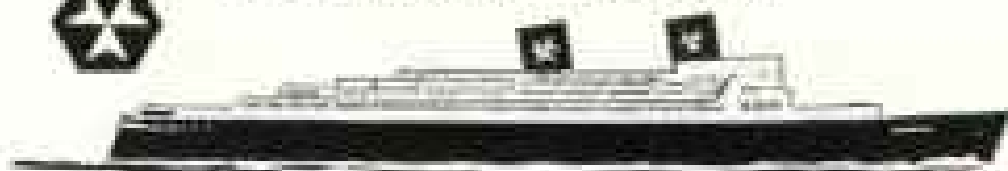
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YOU'D NEVER KNOW HE HAD A CORONARY . . .

Some facts and fallacies about **HEART ATTACKS**

- The chances of surviving a heart attack are now steadily increasing.

TRUE—Not long ago, most people felt that a heart attack or a "coronary" usually meant sudden or early death—or a life of invalidism.

Now we know that most victims of this disease—about 80 percent—recover from their first attack, and many of them recover fully enough to enjoy many useful years.

- After recovery, most coronary patients can go back to their work.

TRUE—Recent studies show that the patient who has made a good recovery is not handicapped when he works under proper conditions. Placed in a job which does not unduly tax his heart, and given proper medical supervision, he can engage in daily work without harm. Indeed, most doctors encourage their patients to return to work.

- Heart attacks are brought on by strenuous physical activity.

FALSE—Most heart specialists now believe that physical exertion has little, if anything, to do with a coronary attack. In fact, attacks often occur during sleep or rest.

Many factors—including age, sex, occupation and diet—are believed to play a part in the development of coronary disease.

- Recovered coronary patients should keep their weight down.

TRUE—Next to good medical care, nothing is more important for people who have had heart disease than to keep their weight at a desirable level.

It is just as much of a burden on the heart to carry around ten pounds of extra and unneeded weight all day as it would be to carry around a ten-pound bundle constantly.

- A person who has had one heart attack will certainly have another.

FALSE—The recovered patient should not live in fear that he will have another attack. He may—or he may not.

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*From the beautiful Bavarian Alps to the wind-swept heaths
along the North Sea, the young West German Republic
throbs and bustles with energy, prosperity—and problems*

By ROBERT LESLIE CONLY, Assistant Editor

Photographs by ERICH LESSING, Magnum

Modern Miracle

MADE IN GERMANY

THE SIGN SAID "U-Bahn," and the steps led down. Berlin was cold and rainy this November morning, and I hitched my coat collar around my neck as I entered the subway station and stepped aboard the most important train in Europe.

The passengers looked like subway riders everywhere. I faced, across the aisle, a middle-aged man reading a newspaper. Women sat with shopping bags in their laps; one held a small pig-tailed girl by the hand. Ordinary people, riding from stop to stop.

Yet some of them, I knew, were not so casual. For them this ride was the last dangerous leap in a desperate flight from the Communist world to freedom. The flight might have begun months earlier; it might have involved elaborate planning. It was surely arranged in fear and secrecy, for the penalty for trying to es-

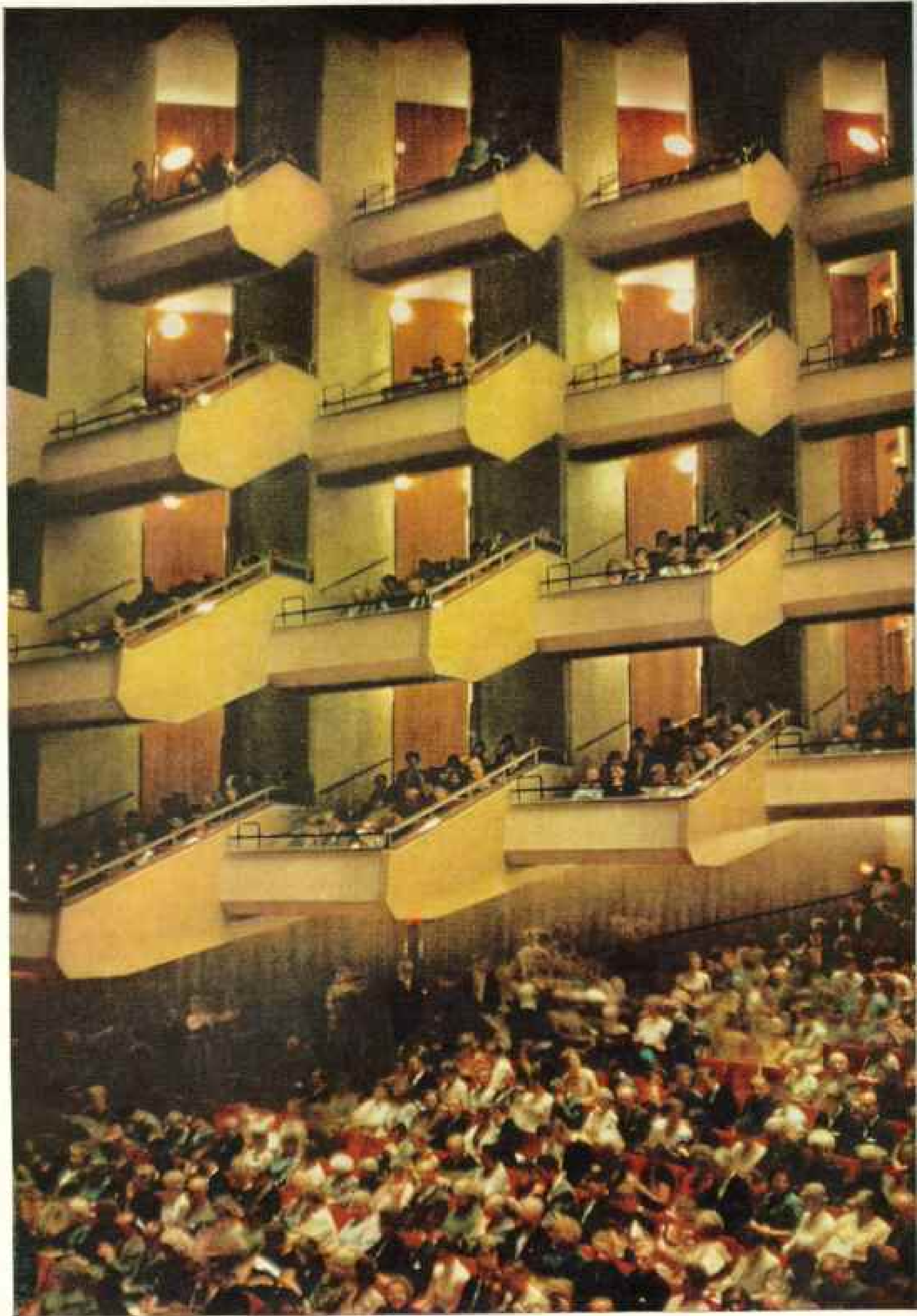
cape from East to West Germany was at least imprisonment, and it could be death.

Wherever the route had been plotted—in Rostock, Dresden, or Leipzig—it had ended with the Berlin subway, an underground railway in both senses of the word. The rest of the border between East and West Germany was closed tight, with barbed wire, machine-gun nests, watchtowers, and armed patrols. The *Untergrund-Bahn* was the escape hatch. A refugee could board the train in East Berlin; when it stopped under West Berlin, he had only to step out the door and he was free.*

He could not risk taking luggage. This would look suspicious to police, the *Volks-polizei*, who guarded the East Berlin stations. Nor could whole families flee together; they

* See "Berlin, Island in a Soviet Sea," by Frederick G. Vosburgh, NATIONAL GEOGRAPHIC, November, 1951.





Theater Lights Glow Once Again in a West Germany Rebuilt

An amazing economic rebirth has transformed a charred wasteland into a nation bright with new buildings, its people well fed and well dressed. Tiered boxes (above) overhang a spacious orchestra in Hamburg's new opera house. *Lohengrin* at Bayreuth's Richard Wagner Festival (opposite) once more attracts thousands of visitors.

must board the train, or sometimes separate trains, one or two at a time, and reunite on the other side.

Still they came, and in astonishing numbers. While I was in Germany last summer and fall, an average of more than 4,700 East German refugees slipped across the border each week.

Once in West Berlin, they found their way to Marienfelde, the busy refugee reception center near the edge of town. After a processing which took about two weeks, chartered planes flew them to West Germany for permanent resettlement.

"The Berlin refugee center," a German friend told me, "is known to every three-year-old child in East Germany. First they learn to say 'mother,' then 'father,' and then 'Marienfelde.'"

Future Bleak in East Germany

Why do they come? Why do they give up jobs, homes, friends, all their possessions, to steal away to a place already overcrowded and woefully short of housing?

Partly, of course, because life is grim under the Communist puppet government of East Germany. Because they are tired of secret police and dictators; because religious freedom is disappearing and political freedom has never appeared. But also, as more than one ex-East German told me, "Because there is no future; because you must work so hard to earn money, and when you get money, there is nothing to buy." The key words are "no future." After 14 years many East Germans are convinced that the Communists are there to stay.

But this is only the dark half of the picture. The other half glows so brightly that it can be seen all the way from Hamburg to East Prussia, 525 miles away. It is the picture of what has happened in West Germany since the end of World War II. (See the ten-color Atlas Map Germany, mailed with this issue of the National Geographic.)

It is a picture of one of the most incredible bootstrap operations the world has ever seen; of an industrious and energetic people dedicating themselves with methodical fanaticism

to rebuilding their country from a ruin. It is a success story, for West Germany, 14 years after nearly complete devastation, is today the most prosperous and productive country in western Europe.

Facing the Iron Curtain, the country is a show window for the Free World. And to the people across the eastern frontier, the wares in the window look good.

City Rubble Builds a Park

I began my tour in one of the shiniest parts of the show window, Munich, which celebrated its 800th anniversary last year with an almost overwhelming array of festivals, exhibits, operas, concerts, conventions, and speeches (pages 748-9). With the biggest university in West Germany, the first atomic reactor, a distinguished academy of music, and the country's most active colonies of painters and composers, Munich can claim with some justification that it is the intellectual and cultural center not just of Bavaria but of all Germany.

More than that, this happy city is an outstanding example of what has happened throughout West Germany in the past decade.

Shortly after I arrived, I stood with a Münchner friend on a hill on the outskirts of town. Not far away the Isar River—its name means "swift"—rushed past a white beach, and young Bavarians bathed and kicked bright-colored balls. The hill was a pleasant green park where children played and women wheeled baby carriages.

"A dozen years ago," my friend said, "there was no park here. In fact, there was no hill."

I looked around in astonishment, for the hill was solid underfoot and looked as if it had always been there.

"When World War II ended," my friend explained, "45 percent of Munich was in ruins. We had to get rid of the rubble before we could rebuild.

"So we built a railway through town. People dumped rubble in the cars as they went by. We emptied the cars here, and the hill grew.

"Later we threw on some topsoil, planted grass and trees, and made it into a park. Right

Volkswagen Factory Typifies West Germany's Rubble-to-riches Renaissance

At war's end Allied occupation authorities offered to sell the ruins of this Wolfsburg plant, but found no buyer. Even the Russians, eager to purchase any industrial machinery, declined. In 1949 the factory was handed over to a Federal German Government trust and within eight years produced its two-millionth car. When the author visited the plant, he saw a car roll off the assembly lines every 30 seconds. A fourth of Wolfsburg's residents help turn out the snub-nosed midgets.





Air Bridge Monument symbolizes the heroic spirit of the men who flew the West Berlin Airlift in 1948-49. To supply two million people cut off by Soviet blockade, a round-the-clock aerial convoy delivered 2,325,000 tons of supplies. The big planes descended at three-minute intervals; some dumped candy to children as they came in. The soaring concrete arch faces the West, source of the city's succor. Curving fingers represent the three air corridors that witnessed more than a quarter of a million flights. Names of 77 flyers and ground crewmen who lost their lives are inscribed on the base.

now you are standing on prewar Munich."

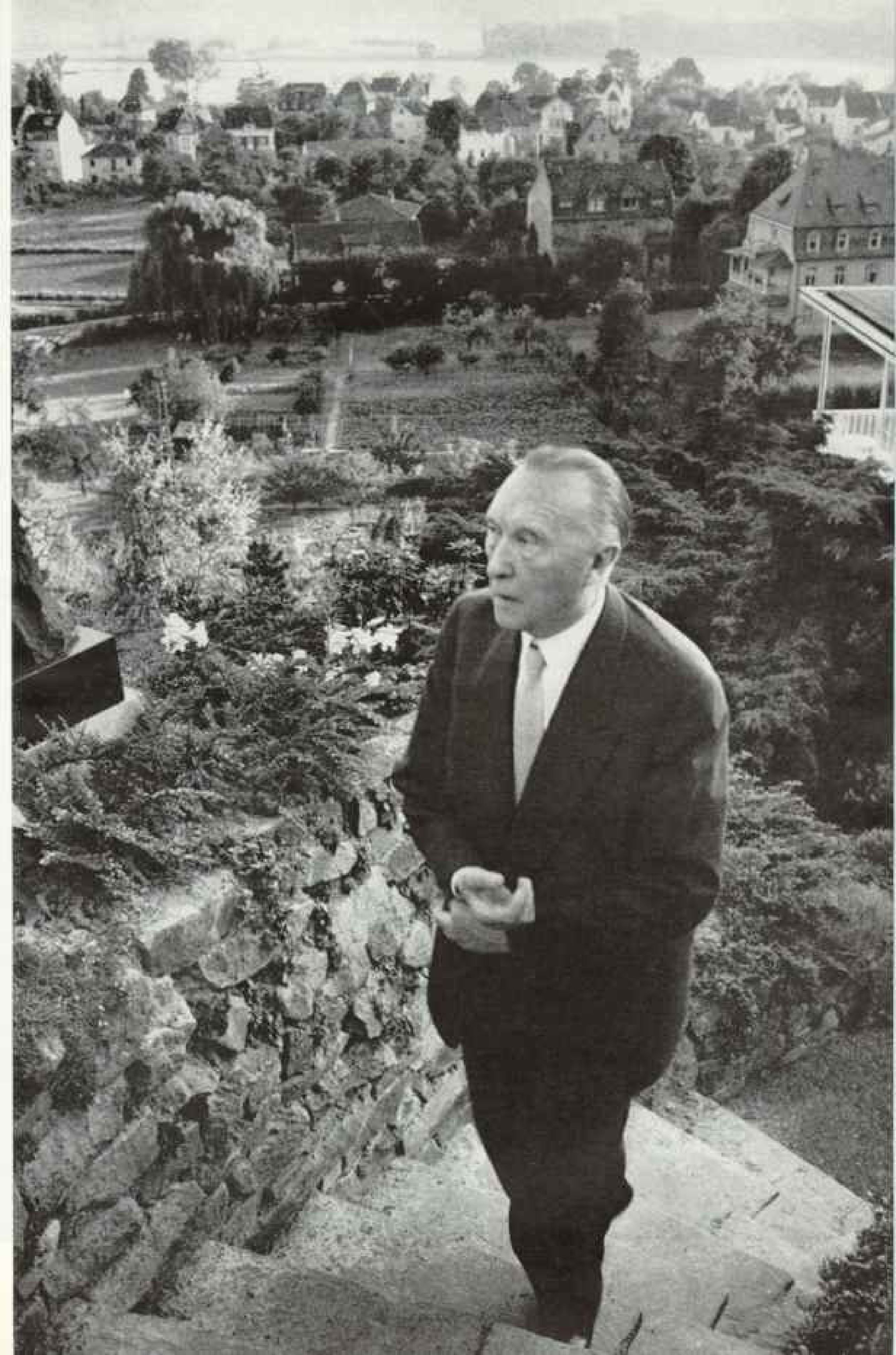
But walk through Munich today. True, you would know it had been bombed. There are still scarred walls and vacant lots, and some of the great public buildings await repair. But look along the complex of streets and squares leading to the Karlsplatz (page 742), along Theatinerstrasse and Maxburgstrasse, where tall new buildings of steel, aluminum, chrome, and glass have risen. Here are ultramodern offices and apartments, and glittering shop windows filled with fashionable clothing, furs, jewelry, television sets and refrigerators, shiny new cars and costly china and antiques.

To find out about Munich's reconstruction, I called at the big, echoey Rathaus (city hall), to talk with Thomas Wimmer, the Lord Mayor. Herr Wimmer is a famous man in Germany. He spent part of World War II in a Nazi concentration camp; when the Allies occupied Munich, they drafted him to help run the city government. He has since been elected to his present office three times.

Stocky and red-faced, he received me in shirt sleeves at a desk piled high with papers. I congratulated him on the appearance of his beautiful city. He thanked me a trifle wryly.

"It looks better than it did," he admitted. "We tried hard to get it presentable for our 800th anniversary celebration. But the job of rebuilding is still only about 60 percent done, and that's just part of the story.

Dr. Konrad Adenauer, Chancellor of the Federal Republic of Germany since 1949, strolls toward his rose garden in the Rhine village of Rhöndorf, across the river from Bonn, capital of the Republic. The dynamic 83-year-old statesman served as Lord Mayor of his native Cologne for 16 years, until the Nazis deposed him in 1933. Later they imprisoned him twice. After the war he emerged from obscurity to lead his nation out of despair and back to prosperity.





Traffic from a Dozen Arteries
Pours into the Karlsplatz in Munich

A television camera in the tower at right helps police unsnarl rush-hour jams at this square in the heart of the city. Twin copper-helmeted spires,



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most conspicuous landmarks of the Bavarian capital, crown the Cathedral of Our Lady.

Germany's third largest city (after Berlin and

Hamburg) is a cultural metropolis also renowned for its fairs and frolics. Last year the city celebrated its 800th birthday (pages 748-9).

"While we've been rebuilding, our population has been increasing. At the end of the war Munich had 480,000 people; now we have 1,031,000. So, in spite of all our work, we're still 50,000 apartments short—not to mention what we need in the way of new office space, streets, hospitals, and classrooms."

While making prodigious strides in new construction, Munich is also restoring with painful care some of its old landmarks—the castles, churches, theaters, galleries, and fountains that reflect the days when Bavaria was a kingdom and Munich its capital. Tradition-minded Bavarians want these rebuilt exactly as they were before the war. Such restoration is always more delicate, and often more expensive, than new construction.

Bavarian Bands Blare in the Platzl

Munich has worked hard to rebuild, and the results are impressive. But it would be misleading to imply that Münchners work all the time. Traditionally they are easygoing, and when the mood strikes, no city in the world can relax more thoroughly. And the mood strikes often.

In the middle of his morning's work, which may start at eight, the Munich businessman likes to knock off for *Bratzeit*—which means "bread time"—for a stein of beer, some pretzels, and possibly a plate of small white sausages called *Weisswurst*.

I was introduced to Weisswurst at a restaurant called Franziskaner, a favorite spot for the midmorning break. I went with a German friend, and when the waitress put in front of me a plate of what looked like pure white frankfurters, I picked up my knife and fork.

"No!" exclaimed my friend in horror. "Not that way! Watch." And he pointed to a near-by table where a Bavarian picked up a Weisswurst delicately in his fingers, opened the skin at one end, and sucked the meat like toothpaste from a tube.

"That's the proper way to eat Weisswurst."

Munich is the city of beer. Its seven large breweries and numerous smaller ones—Bavaria has, all told, 1,643 breweries!—pump out thousands of gallons a day. True, some is for export, but much of it never gets beyond the city limits.

Walk down any evening to the Platzl, a

small cobblestoned square, and crowd into one of the huge Bavarian beer halls that line it. Inside, the air is thick with smoke. The hall is as big as a large theater, and on a stage a noisy brass band blares out German drinking songs.

The audience joins in lustily, and as the evening wears on it is common for customers—who may have been total strangers when the evening began—to stand on their seats, link arms, and sway back and forth in rhythm to the music.

This is not to say that beer drinking is Munich's only entertainment, or beer its only drink. There are sophisticated Münchners who scorn the beer halls in favor of small, intimate night clubs in Schwabing, the artists' quarter, where trios and quartets play progressive American jazz, and hoarse-voiced chanteuses lean against artificial lampposts and sing plaintive Parisian ballads.

And there are luxurious restaurants which specialize in international cuisine and fine wines. One of them, Schwarzwälder, offers a choice of 467 vintages and serves no beer at all.

Yet, in the long run, beer is king; and the beeriest time of all is the annual *Oktoberfest*, which begins in late September and runs, or rather flows, for 16 days. It starts with a 12-cannon salute as the burgomaster knocks the bung out of the first keg of specially brewed, extra-strong Oktoberfest beer, and quaffs the first stein.

Celebrators Jam Huge Tents

I went to the Theresienwiese, a huge fair-ground, the first night of the affair as the guest of the mayor. About half of the meadow was taken up by carnival rides, sideshows, scores of stands selling sausages and roast chickens. The other half was filled by seven enormous beer tents, each capable of holding some 5,000 celebrators, and all jammed to the window frames (page 746).

When I had squeezed my way to a reserved table, a Munich publicity man began pumping statistics into my right ear.

"We expect more than 5,000,000 visitors to the Oktoberfest this year," he said. "They come from all over the world. Judging by past performance, they will drink about 3,000,000

Closed-circuit TV Beams Munich's Traffic Jams into Police Headquarters

A camera installed at the Karlsplatz (page 742) enables policemen a quarter mile away to regulate the flow into the square. Console controls the city's signal lights,



MÜNCHEN VERKEHRSSIGNALNETZ





Oom-pah! Oom-pah! booms out a Bavarian band at Munich's *Oktoberfest*. Actually held in September, the combination carnival and state fair attracts some five million visitors. Jamming into seven gigantic tents, each of which can seat 5,000, they down millions of quarts of beer.

Costumed revelers turn fun-loving Munich into a bedlam ballroom during *Fasching*, a pre-Lenten celebration that ranks among Europe's liveliest. This trio shares a goblet at the fete of the Foolish Knights, one of the 3,000 balls held from early January through Shrove Tuesday.

746



quarts of beer, consume more than a million sausages and about 229,000 roast chickens. They'll jam every hotel room in the city, not to mention the stores, restaurants, theaters, and taxicabs."

In a word, Munich was booming. Its citizens were working hard, living well, and rebuilding at a furious pace. And in all three ways they were typical of West Germany as a whole.

Word for a Postwar Wonder

I had not been in the country many hours before I began hearing a word that was new to me: *Wirtschaftswunder*.

"Since the *Wirtschaftswunder*," a housewife told me, "everybody has a refrigerator."

"Since the *Wirtschaftswunder*," I heard, "even the factory workers are buying cars. Before the war, that was unheard of in Germany."

Literally translated, "*Wirtschaftswunder*" means "economic miracle." It is probably not too strong a phrase to describe Germany's startling comeback.

Consider the ruin that was Germany in 1945, when the Allied occupation armies moved in. Hitler's disastrous drive to conquer the world had resulted in a country without a government, without mail or telephone or transportation, without currency, virtually without food or medicines. In the American zone of occupation only one factory in ten was functioning. The fabulous mines and mills of the Ruhr stood motionless.

Sunken barges and ships jammed German harbors, canals, and rivers; broken bridges blocked her railroads and highways. Most of her big cities were 60 to 90 percent destroyed.* Of the country's 10,600,000 houses and apartments, almost half were uninhabitable. During the first year after the war's end, the once-rich German diet fell below the minimum which scientists regard as necessary for bare subsistence. Germany was close to starvation.

And now consider the Federal Republic of Germany today. The factories and mines in the Ruhr produced more coal, more steel, more chemicals in 1958 than in any previous peacetime year. West Germany's over-all production is better than double what it was in 1936.

Last year Germany exported more cars and trucks than any other country; she was the second largest exporter of machinery. Her currency is one of the soundest in the world; unemployment is negligible. She has built

almost 5,000,000 new homes since 1949 and is building new ones at the rate of more than half a million a year. Stores are bulging with food, and average caloric intake is again more than 3,000 a day.

What is the explanation? How could Germany, who lost the war, surge back to prosperity faster than her neighbors, who won it?

Economists suggest a variety of causes: Nearly four billion dollars in U. S. aid started West Germany's wheels turning again and kept the people from starving while they picked up speed. A drastic currency reform in 1948 wiped out 90 percent of German cash savings, but established the new Deutsche Mark on a sound basis and stopped inflation. About the same time all price controls (except rent) were lifted almost overnight, giving Germany the least controlled economy of any European nation.

And so on. But the explanation that makes the most sense to me, after talking to hundreds of Germans, after seeing their factories and farms and forests, is a paragraph written by Theodore H. White in his excellent book on postwar Europe, *Fire in the Ashes*:

"The wreckage of Germany that so stupefied Germans and conquerors alike in 1945 was the wreckage of buildings and stone. But it was impossible to destroy the skills in the fingers of German workmen, the knowledge of German engineers, and the managerial know-how of German industrialists. . . . The social capital inherent in the accumulation of years of human experience is, economically, a vaster asset than all installations of pits, turning wheels and rails. . . . If all American industry were leveled to the ground, America would still be the greatest industrial power on earth because of her social capital. In Germany the social capital of skill and knowledge remained undamaged." †

Prosperity Crowds the Highways

To a visitor the most visible—and sometimes exasperating—evidence of German prosperity is the amount of traffic on her roads. West Germany has about 4,000,000 cars and trucks jammed into an area smaller than the State of Oregon.

Furthermore, despite the high price of gasoline (about 60 cents a gallon), Germans do a

* See "War's Wake in the Rhineland," by Thomas R. Henry, NATIONAL GEOGRAPHIC, July, 1945.

† Copyright © 1953 by Theodore H. White. Reprinted by permission of the publishers: William Sloane Associates, New York.



Tiny towheads laden with pennants slip under the ropes for a front-row view of a street procession last summer, when Munich marked its 800th anniversary.

Birthday Celebrants Swarm Munich's City Hall Square

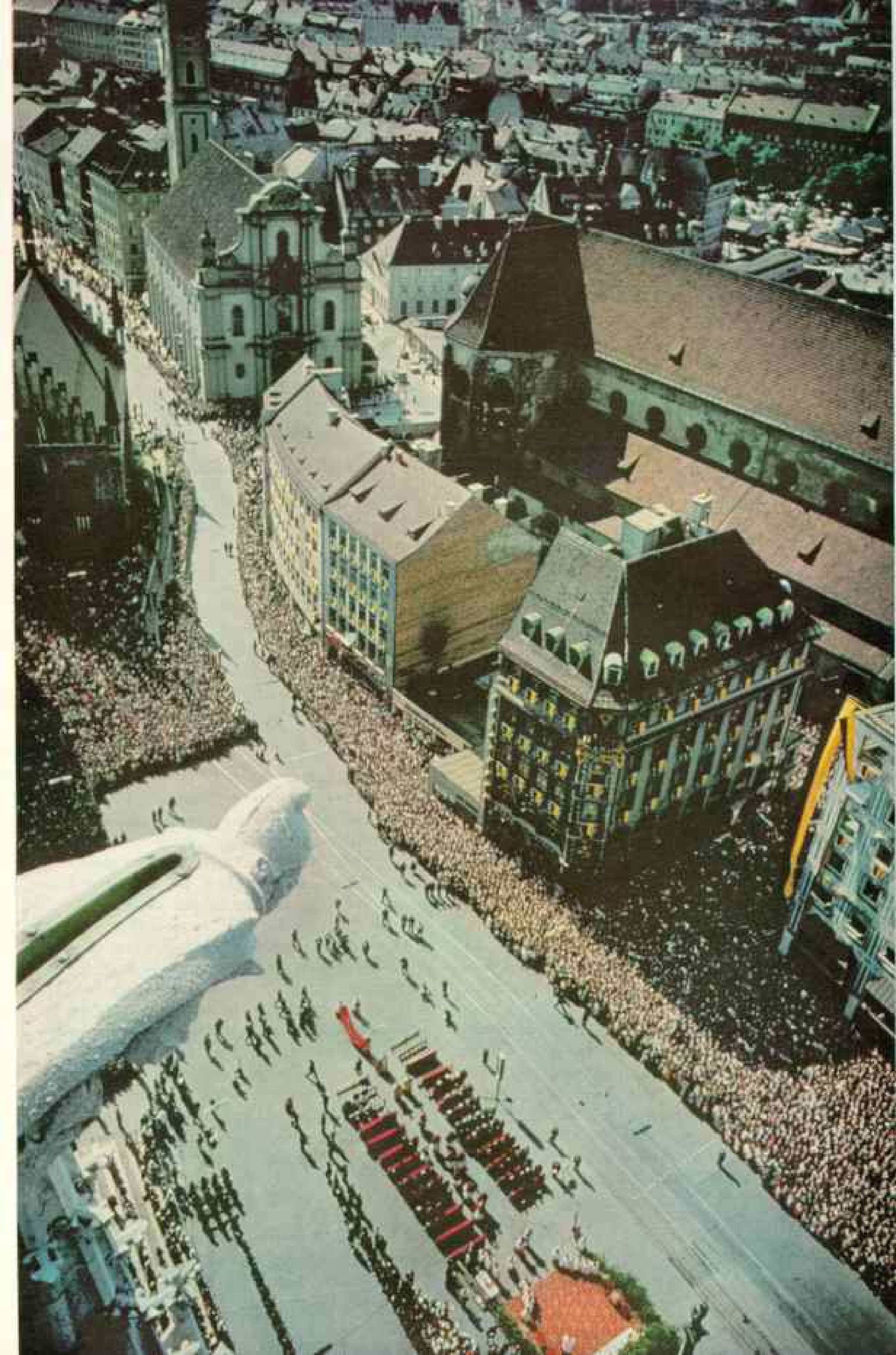
A solemn High Mass far below launches the 1958 celebration. The city's history began in 1158 when Duke Henry the Lion established a fortified crossing on the Isar River.

Here, in 1923, Hitler made his first bid for power. Fifteen years later the city became a symbol of appeasement when British and French statesmen meeting in Munich agreed to German annexation of Czechoslovakia's Sudetenland.

World War II air raids leveled half the city. Today Munich is largely rebuilt.

Surging throngs bend to the blessing of Joseph Cardinal Wendel, Archbishop of Munich and Freising, at the opening of the anniversary fete.





great deal of driving. I suspect that because the family car is still a novelty in Germany, they enjoy even more than Americans the custom of packing the wife and kids into it and hitting the road. Anyway, they do it, in large numbers and usually at a very brisk clip.

"To learn about Germany," I decided, "I will do as the Germans do." So I rented a dapper little black Mercedes-Benz and joined the weekend throng heading south from Munich for the Bavarian Alps. My goal was the town of Berchtesgaden, site of Adolf Hitler's famous retreat, the Eagle's Nest, a vacation house carved into a limestone mountaintop.

Although Berchtesgaden is an easy half a day's drive from Munich, I did not make it the first day, and thereby hangs a digression. One reason I had been eager to visit Germany was that I had acquired, in college, a fair reading knowledge of the German language. Spending a few months in the country, I hoped, would help me to speak it fluently.

Feminine Pen, Masculine Pencil

In some ways German is an easy language for Americans. Much of the basic vocabulary is similar. It is not hard to pick up a crude German that will get you by.

But to speak it properly is something else again. For the German language has one idiosyncrasy that drives Americans to distraction: its genders make no sense at all. In German a masculine noun is preceded by the article *der*, a feminine noun by *die*, and a neuter noun by *das*.

Well and good. But can any German explain to me why "the pen" should be feminine (*die Feder*), while "the pencil" is masculine (*der Bleistift*)? Or why a coat is masculine, a dress neuter, and trousers feminine? And why a German girl, who may look very feminine indeed, is always referred to in the neuter as *das Fräulein*?

In any case, I wanted to learn as much as I could; so I was disappointed to discover that in Munich, as in most big cities, it was almost impossible for me to converse in German at all: the Germans all preferred to practice their English. In my hotel, when I came down in the morning for breakfast, I would greet the headwaiter: "*Guten Morgen!*"

"Good morning, sir," he would reply in flawless English. "What would you like for breakfast?"

"*Ein Spiegelei mit Speck, bitte,*" I would say firmly.

"A fried egg with bacon. Yes, sir." It was quite hopeless, and when I complained to a German lady I knew in Munich, she agreed.

"But what you should do," she said, "is go to a smaller town. You won't hear so much English outside the big cities and the tourist resorts."

"Fine," I said. "Any suggestions?"

"Why not try Wasserburg am Inn," she said. "It's a lovely old town, and I doubt if anyone there speaks a word of English."

River Entwines a Medieval Town

Wasserburg lay on a side road between Munich and Berchtesgaden; so I decided to take a look.

I was glad I did. It was a cool, sunny autumn morning, and the road led through rolling farmland where women worked in the fields beside the men, and stocky brown milk cows grazed in bright-green meadows. Every few miles the winding road ran through a small Bavarian village of half-timbered houses, each with a second-story balcony crowded with bright flowers.

Then the road rounded a hillside, and Wasserburg lay below. Here the beautiful River Inn makes a loop rounder than a horseshoe; on the near-island of land it surrounds, a medieval village grew up eight or nine centuries ago. It has changed little since. The streets are curved and cobblestoned; the tall, narrow houses overhang the waterfront on one side and the street on the other (page 763). One of them was my hotel, the Meyer-Bräu. The proprietress told me—in German!—that the original structure was built in the 14th century, with a smithy on the ground floor front, a brewery in the rear, and sleeping rooms for itinerant salt traders overhead.

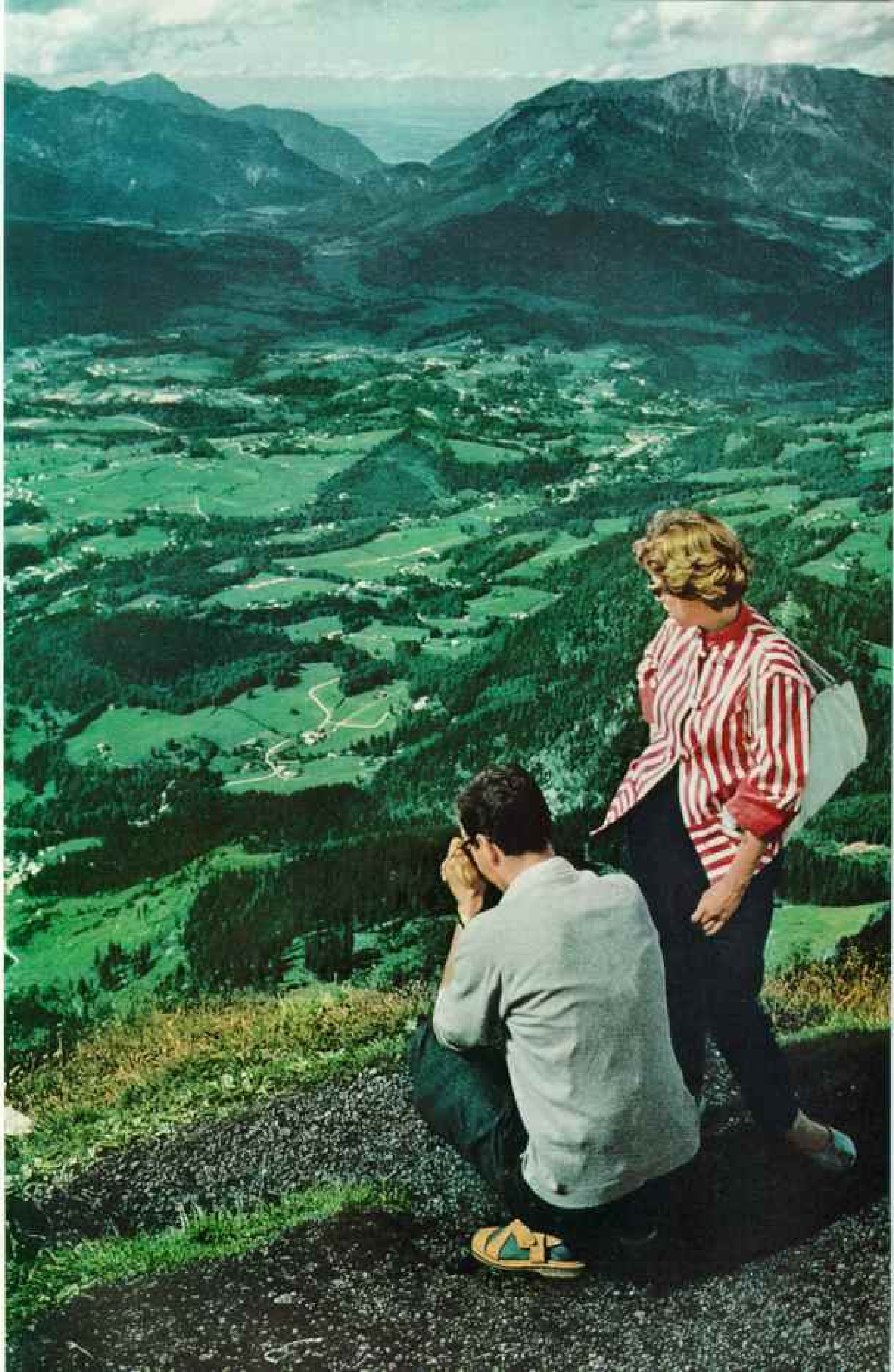
A walled convent perches on a hillside overlooking the river, and when I walked up to see it, I surprised a black-robed nun high in a tree, picking cherries.

It is not true that no one in Wasserburg

(Continued on page 759)

Pastures and Forests Checker a Valley in the Bavarian Alps

Scores of aerial cableways whisk sightseers to the peaks of Bavaria. "Floating up in open cars is not for the timid," reports the author, "but the vistas are magnificent."





Holiday Sailors Skimming the Blue Waters of Tegernsee Put in to the Resort Village



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of Rottach, a Cluster of Chalets Snuggled amid Spruce-clad Alpine Peaks.





Costumed Townfolk Parade the Square of Medieval Rothenburg

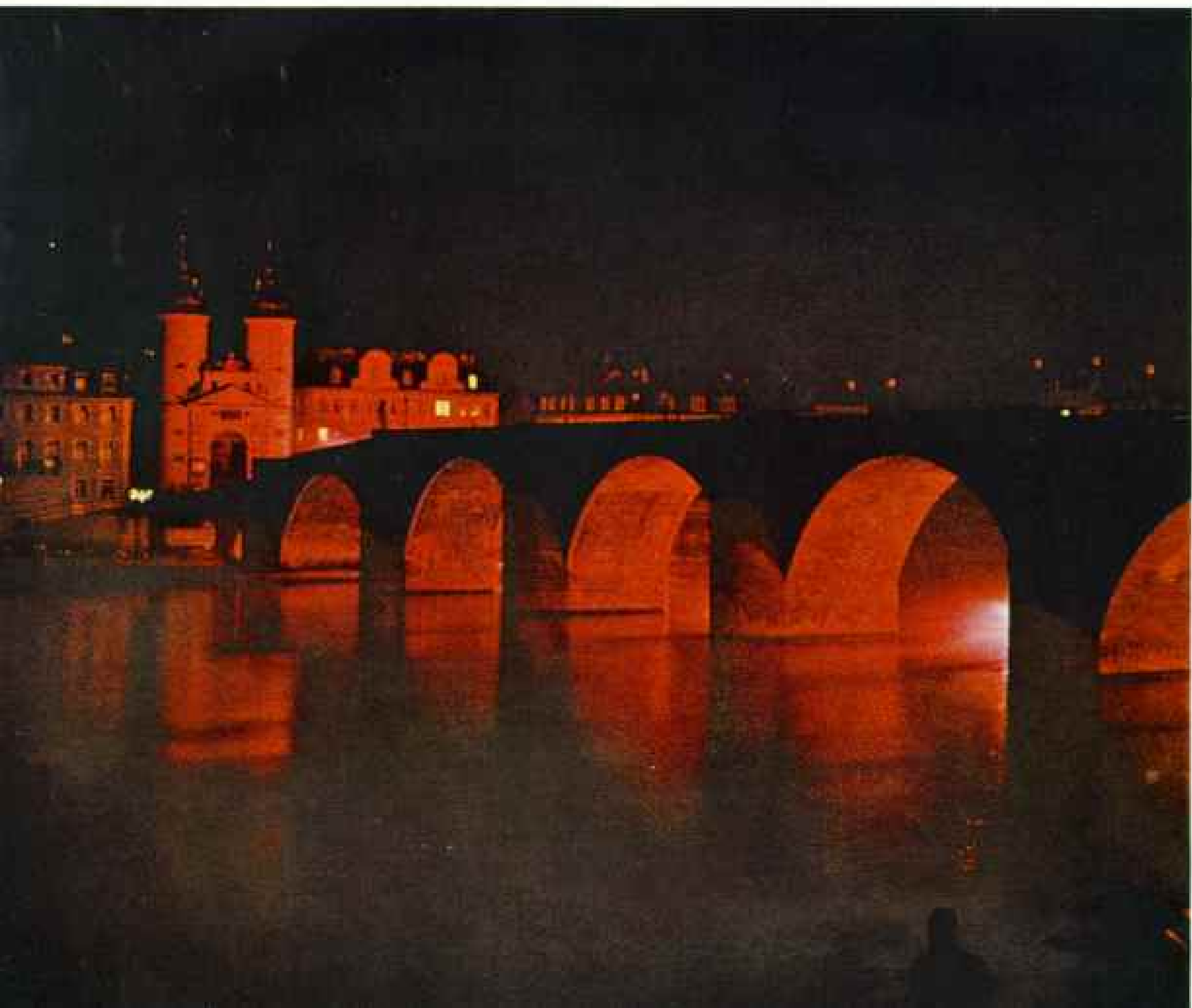
Pageantry honors the burgomaster of 1631 who, according to legend, downed three quarts of wine in one draught to save his councilors from hanging by a conquering general. In World War II an American admirer of Rothenburg, Assistant Secretary of War John J. McCloy, spared it from attack. The town later made him a patron.

Shepherds and shepherdesses dance in the market place following the pageant.



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ANODACHROMES BY ALFRED W. WHITE, DORP, AND (OPPOSITE) ERICH LESSING © NATIONAL GEOGRAPHIC SOCIETY



Flares and Bursting Rockets Light Heidelberg Castle

Heidelberg, tucked in the Odenwald hills beside the Neckar River, boasts Germany's oldest university, founded in 1386. The city gained world fame as a mecca for artists and writers in the 19th century. It became known as the Town of Romanticism; Mark Twain called it "the last possibility of the beautiful."

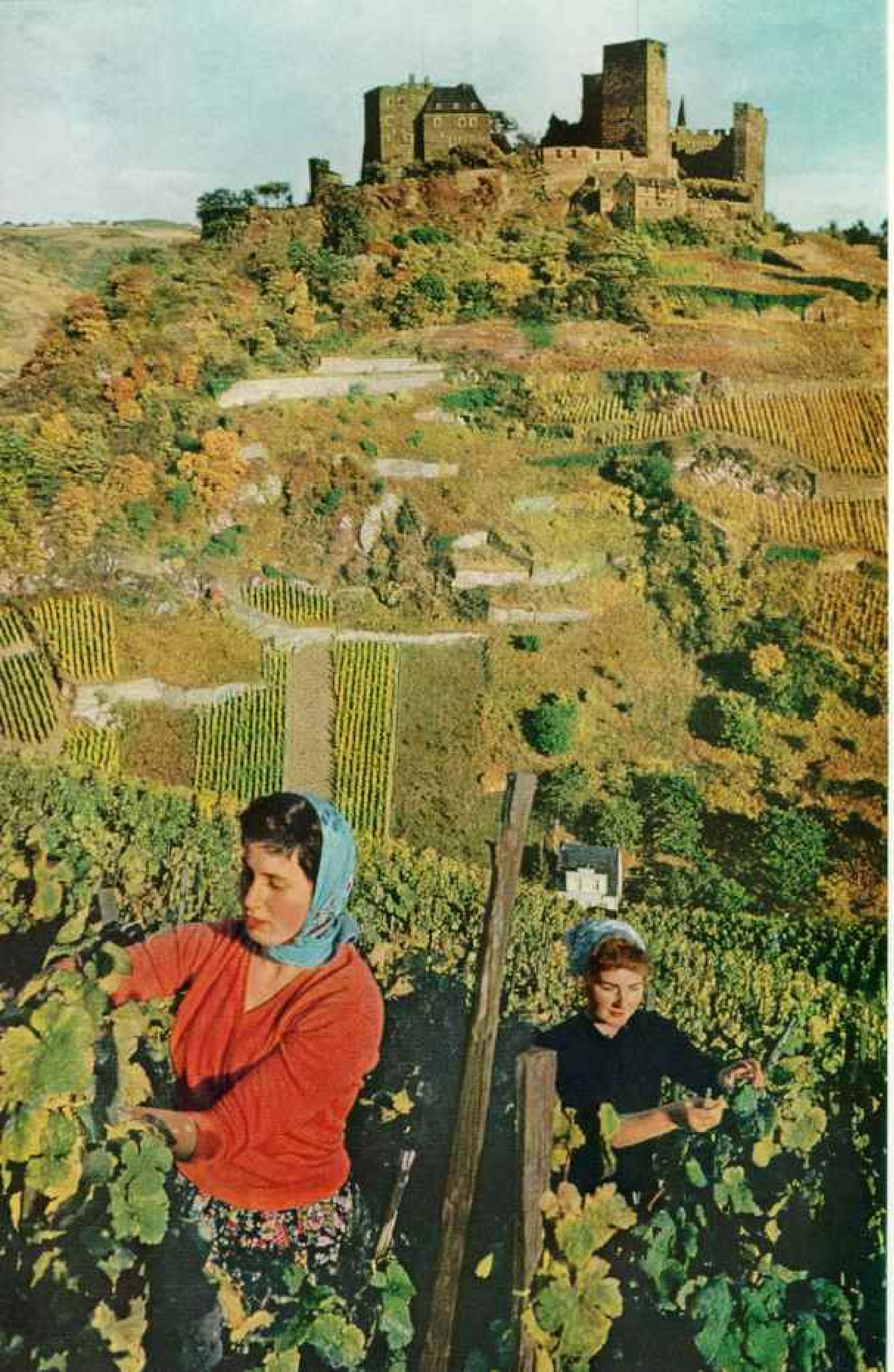
The red-sandstone castle, a masterpiece of German Renaissance architecture, was twice burned by the forces of Louis XIV and later was damaged by lightning, but the ruin still dominates the city.

Several times each summer residents dim their house lights while fireworks re-create the castle's flaming death.

Arches of the Old Bridge glow crimson from boatmen's flares during Heidelberg's pyrotechnic display. Dating from 1786, this Neckar River span for nearly a century was the city's only bridge link with the north.



In a seeming holocaust on the heights, torches illuminate Katz Castle above St. Goarshausen on the Rhine. The Cat Castle, onetime fortress home of the counts of Katzenellenbogen, looks toward the smaller Maus, or Mouse, Castle downstream.



speaks a word of English, however. When I had finished a dinner of *Kasseler Rippchen*, delicately smoked pork chops, in the Meyer-Bräu's pleasant dining room, I sat for a while over coffee. A stranger in Wasserburg is an object of curiosity, and several regular customers on the other side of the room looked at me intently. My accent had identified me as either American or English.

One man in particular stared long and thoughtfully. Then, dredging deep into his memories of high-school courses long forgotten, he came up with a line of English. He finished his stein of beer, stood up, and said, quite clearly:

"To be, or not to be: that is the question." He smiled triumphantly and walked out.

I drove on to Berchtesgaden the next morning. Leading south, the road rounded a bend, and suddenly the sky ahead of me was dark with mountains, a solid and impassable wall; I remember wondering how the car was ever going to get over them. Then, in another half hour, the sky darkened on either side as well. Now there were mountains to the left and right, and I realized that by some magic the road had found a pass through them.

Alpine Road Traps Motorists

This is the Deutsche Alpenstrasse, one of the most beautiful roads I have ever driven, but not one over which every driver can make fast progress. Its black-top is broad and smooth, and its grades are gradual enough, but as it climbs, the vistas off to the sides become increasingly breath-taking, and at each one the German highway department has thoughtfully provided parking space. The temptation to stop and look is irresistible.

Berchtesgaden itself lies in a valley awed to stillness by the enormous masses of limestone that loom over it. Near the town a green lake ripples in a rocky bed: the Königssee, walled in by cliffs so sheer and hard that in the lake's center a shout or yodel produces seven distinct echoes. Water from the lake spills over into a mountain stream stocked with trout.

I stayed in a charming flower-decked Alpine lodge, the Hotel Geiger; each afternoon the owner, Herr Rudolf Geiger, set out for this stream armed with hip boots and fly rod. In a couple of hours' fishing, he was usually able to catch enough trout to supply his hotel dining room.

"It is hard work," he told me with a grin, "but nothing is too good for my guests."

Two-story Elevator Reaches Eagle's Nest

Towering over the Königssee the rugged peak of Kehlstein Mountain rises 6,017 feet. On the top the Nazi Party in 1937-38 built for the Führer the stone Eagle's Nest. The steep, winding road that leads up to it tunnels five times through solid rock. The whole thing cost almost \$3,500,000.

Today you can ride up to the Eagle's Nest in a tour bus for a few marks and goggle with other sightseers at the magnificent view once reserved for Hitler. Your vehicle deposits you at a parking lot below the peak, and you walk about 400 feet through an arched tunnel to a massive brass elevator that lifts you another 400 feet through limestone to the top. It's a two-story elevator; the top deck, comfortably furnished with leather seats, was for Hitler and his cronies; the lower deck for guards.

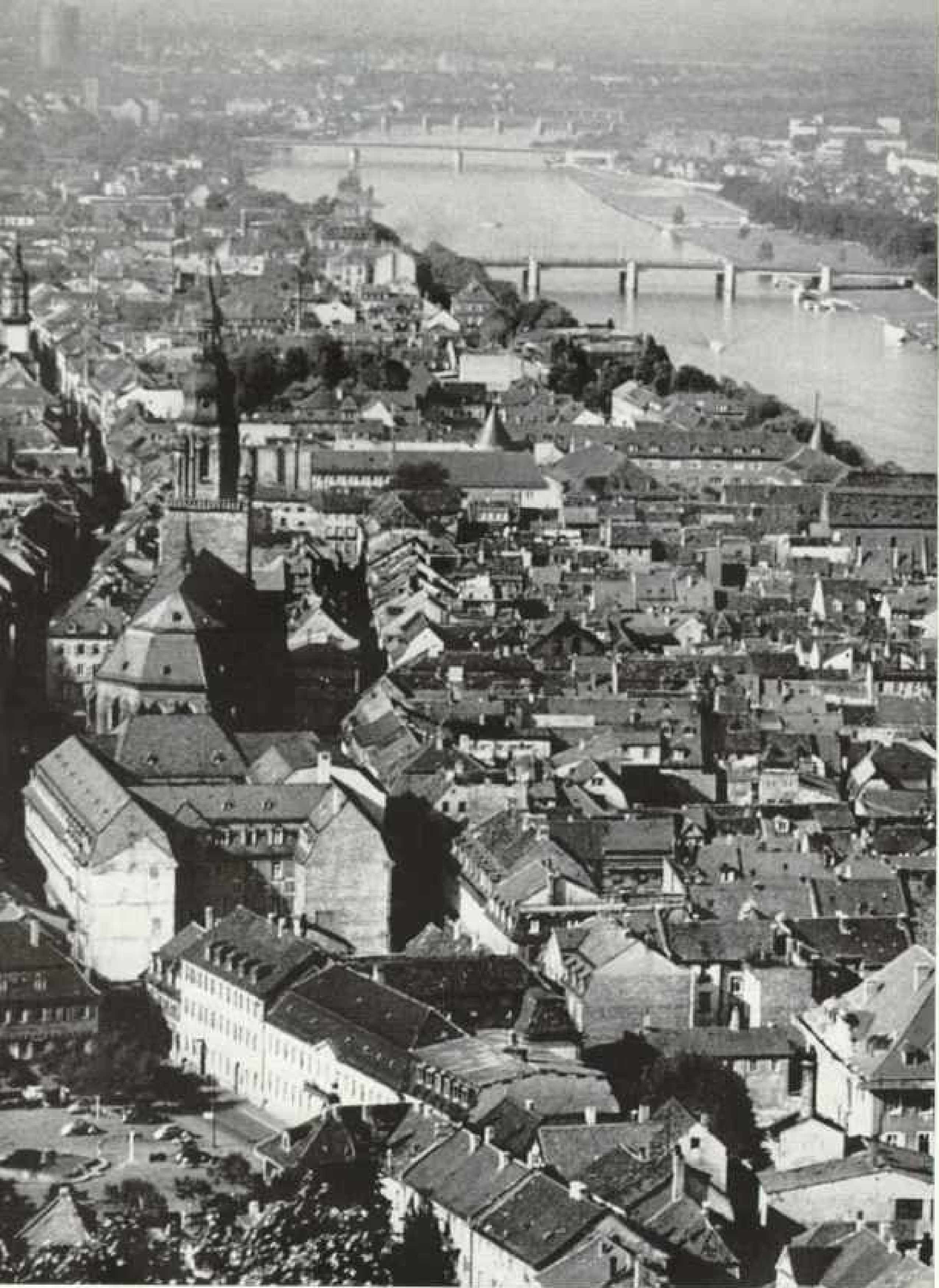
After all this, I found the Eagle's Nest itself relatively modest—no palace, but only a good-sized stone house surrounded by a broad terrace, covered now by tables and chairs and well filled with visitors, mostly Germans, ordering snacks. Hitler's hideaway, now owned by the German Alpine Club, has been converted into a restaurant.

The living room is big and paneled, with a curved wall of windows overlooking the lake and valley below, and a huge stone fireplace. It is easy to imagine the Führer and his lieutenants here, warming their feet before the fire as they dreamed of blitzkriegs to come.

From Berchtesgaden the Alps run west along the borders of Austria (page 751) and Switzerland to the Black Forest. This is Germany's playground, a land of swimming, sail-

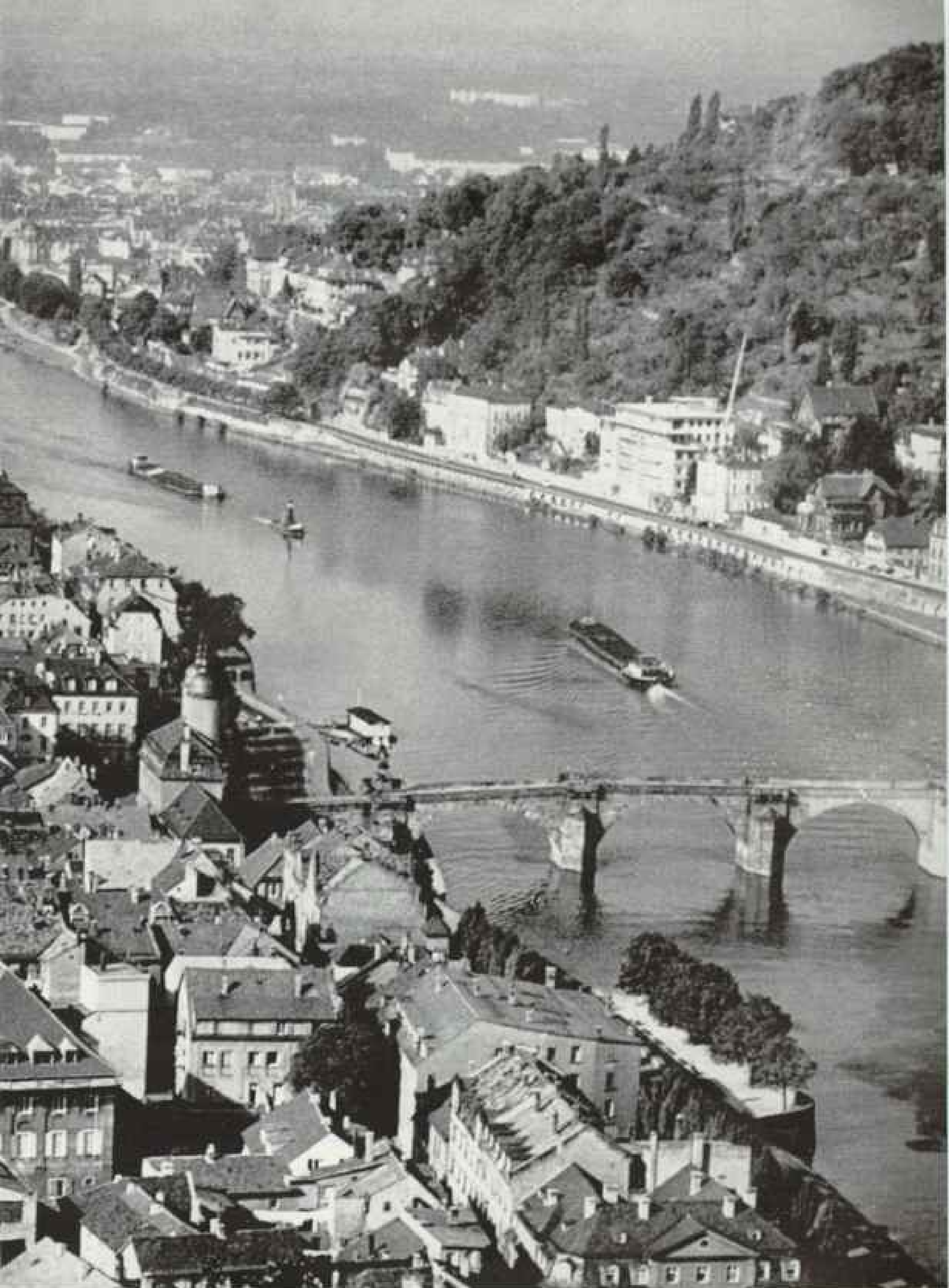
Vintagers Climb a Sun-washed Slope Below Storied Schönburg

The five-towered castle, whose name means "beautiful fortress," overlooks the walled village of Oberwesel on the Rhine. Part of the fortress dates back two thousand years. In 1886 a wealthy New Yorker named Rhinelandier bought and restored the ruin; later the town of Oberwesel acquired it. Today the castle houses both a small hotel and a youth hostel. "To live here is to live in the past," says the author. "There are no room phones, few bathrooms, and hot water is scarce, but the atmosphere more than compensates." These girls gather white grapes for Rhine wine.



760 Neckar River Bridges Link Heidelberg's "Old Town" with Its Modern Sector

Nave and tower of the Church of the Holy Ghost (left) rise above a sea of medieval rooftops. The 573-year-old university lies left of the church.



(NATIONAL GEOGRAPHIC PHOTOGRAPHER ARTHUR H. RAY)

Though the city has many new industries, it permits no factory chimneys in the old quarter, lest they mar its antique beauty. Zoological and bo-

tanical gardens, clinics, open-air baths, and apartments lie north of the river (right). Coal barges ripple the stream's calm face.

ing, fishing, and mountain climbing in summertime; of skiing, bobsledding, and skating in winter.

The lakes and streams here are too many to count or name; the inns, lodges, hostels, spas, and *Kurhotels* are nearly as numerous as the cars on the mountain highways. And all this, too, is a sign and source of the German miracle, for vacation and travel are a big business here. In 1958 the income just from foreign visitors in West Germany was \$450,000,000.

Herr Kilian Knows Everybody

I visited the town of Garmisch-Partenkirchen when it was crowded with summer visitors, but it is even more famous as a winter resort. In 1936 it was host to the Winter Olympic Games, and the big Olympic ice arena is still used for shows and competitions as well as pleasure skating. The area's ski slopes are renowned, and it has one of the fastest bobsled runs in the world.

It was in Garmisch-Partenkirchen that I ran into Hanns Kilian, a former bobsled champion and an energetic promoter of winter sports in general and his town in particular. He runs a pleasant hotel in Garmisch, the Parkhotel Alpenhof, and when he heard I was living there, he sought me out.

"You're going to write an article about Germany for your magazine?" he asked.

"I'm going to try," I said.

"Okay," he said. "Anything you want to know about Garmisch-Partenkirchen or the Bavarian Alps, ask me. Anybody you want to see, ask me. I'll fix it. I know everybody." (He does, too.)

So I should not have been startled when, at dinner that night, Herr Kilian walked up to me and announced:

"You're going to have a cup of coffee with Jesus Christ at ten tomorrow morning."

He was not being consciously sacrilegious; nor was he joking. Only a short drive from Garmisch is an Alpine village which every tenth year attracts visitors from all over the world. This is Oberammergau, site of the famous Passion Play which has been performed every decade, with a few exceptions, for more than 300 years.*

It is not uncommon for people in the Oberammergau area to refer to players in the *Passionsspiel* by their character names, especially when talking to strangers.

"Maybe you'd like to meet Judas," they say, or "Here comes St. Peter now."

The next performance would not be until 1960, but I had told Herr Kilian I wanted to talk to the man who had played the role of Christ in 1950 and who most probably would play it again in 1960.

He was Anton Preisinger, a gentle-eyed, brown-haired man of 46 who, with his short beard, looks very much like conventional portraits of Christ. I met him the next morning in the coffee room of the small inn he runs nine years out of ten, and we talked about what it's like to try to portray the character of Christ.

Actor Bears a Heavy Burden

"Of course," he said, "you understand I may not play that role in 1960. All parts are assigned by a committee, and the actors are not notified until eight months before the performances start in May. More than 1,200 people take part in the play—all from Oberammergau. It's possible they will choose me again, though first I must take a physical examination."

"A physical?" I said. "Why?"

"You must be in very good condition to play the Christus. Remember, the play lasts seven and a half hours each day, four days a week. In 1950 we gave 86 performances. If it rains, storms, thunders, lightnings, we go right ahead. The audience is under a roof, and so are the musicians, but the players are out in the open—we have to be, because we use no artificial lights.

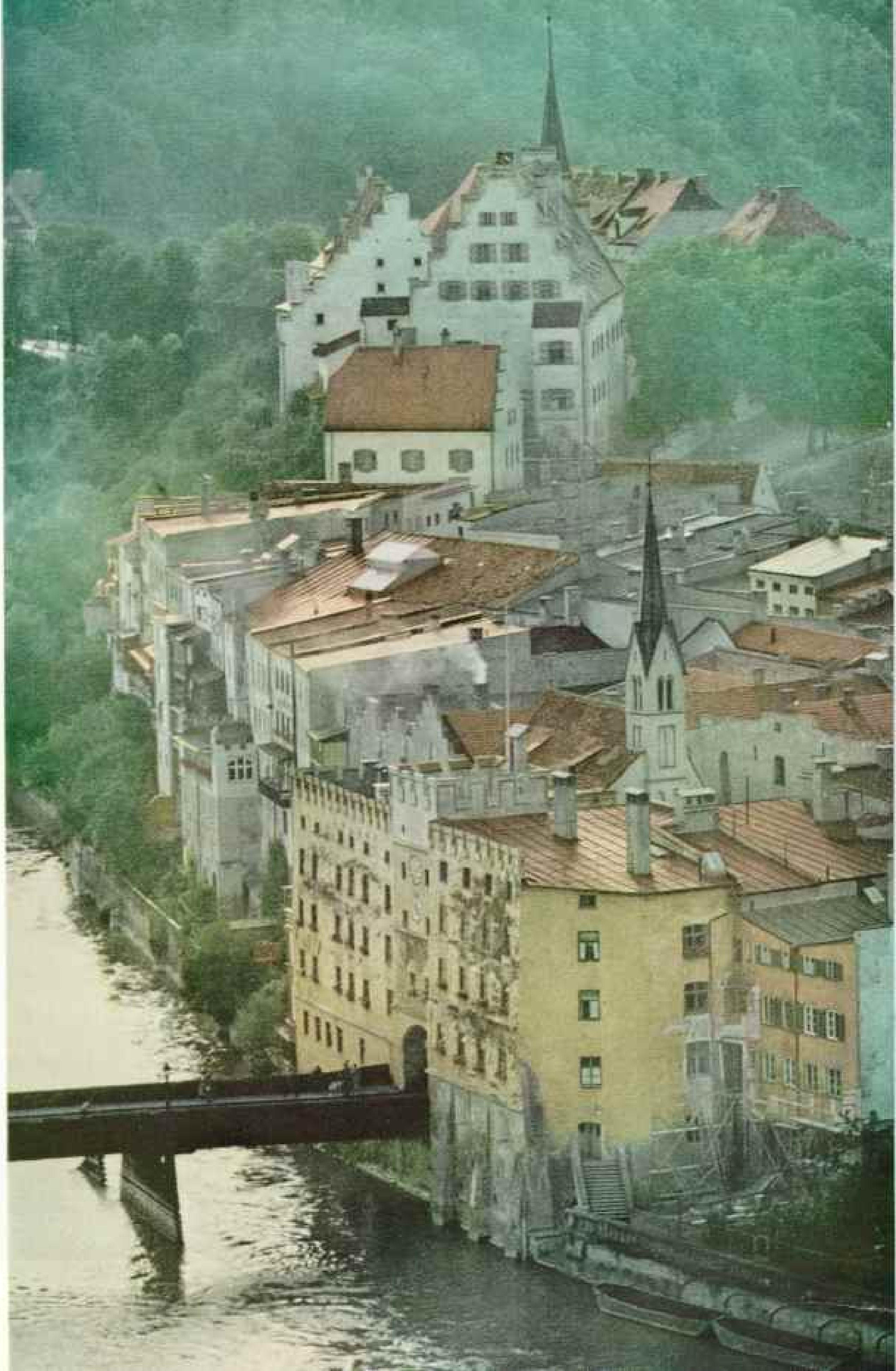
"The man who plays the Christus is on stage about four hours a day, standing most of the time. The play tells the final week of Christ's life, including the Crucifixion. So each day the actor must carry a cross for 20 minutes. We use a special cross made of hollow wood,

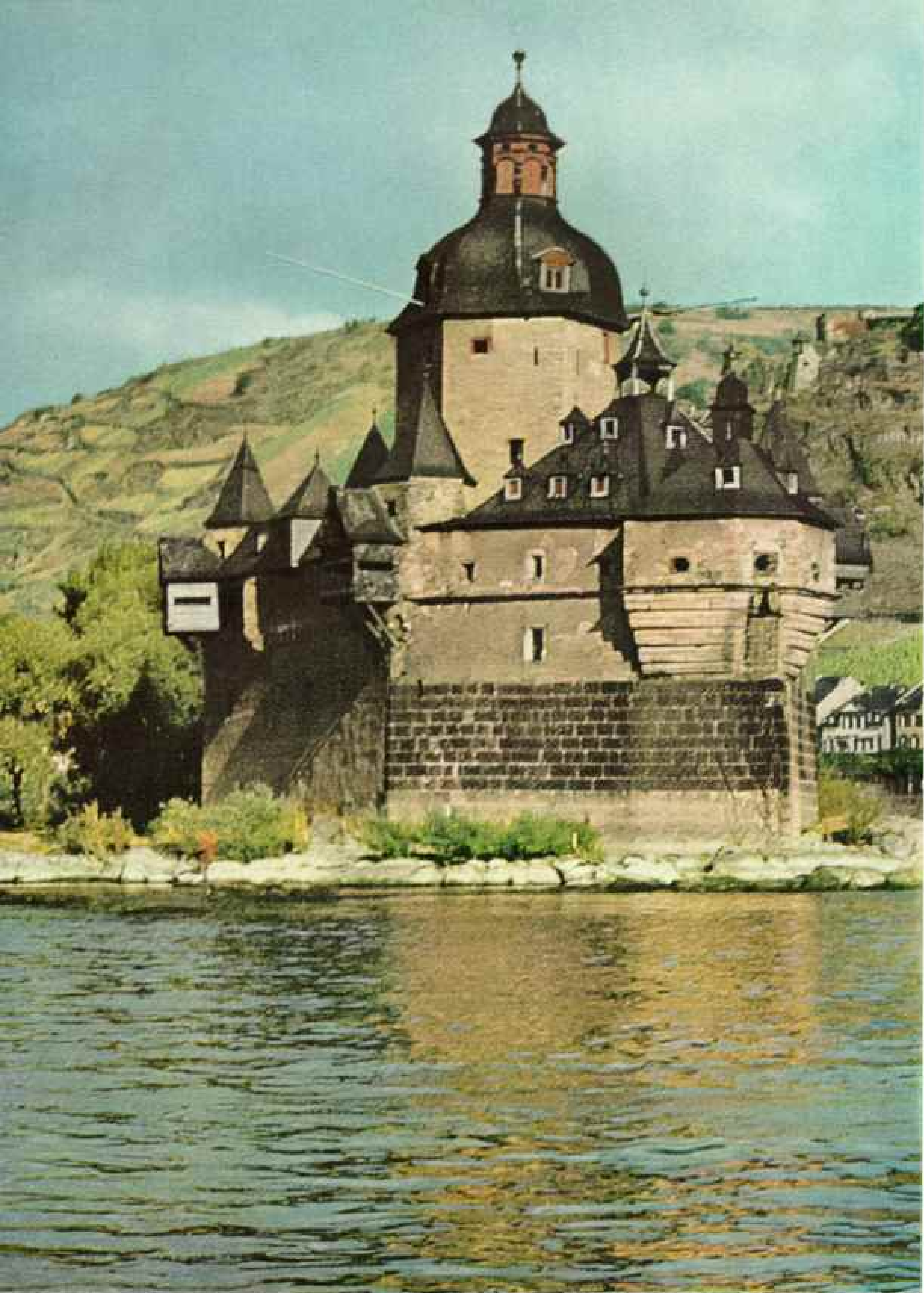
(Continued on page 771)

* See "Where Bible Characters Live Again," by Anton Lang, Jr., NATIONAL GEOGRAPHIC, December, 1935.

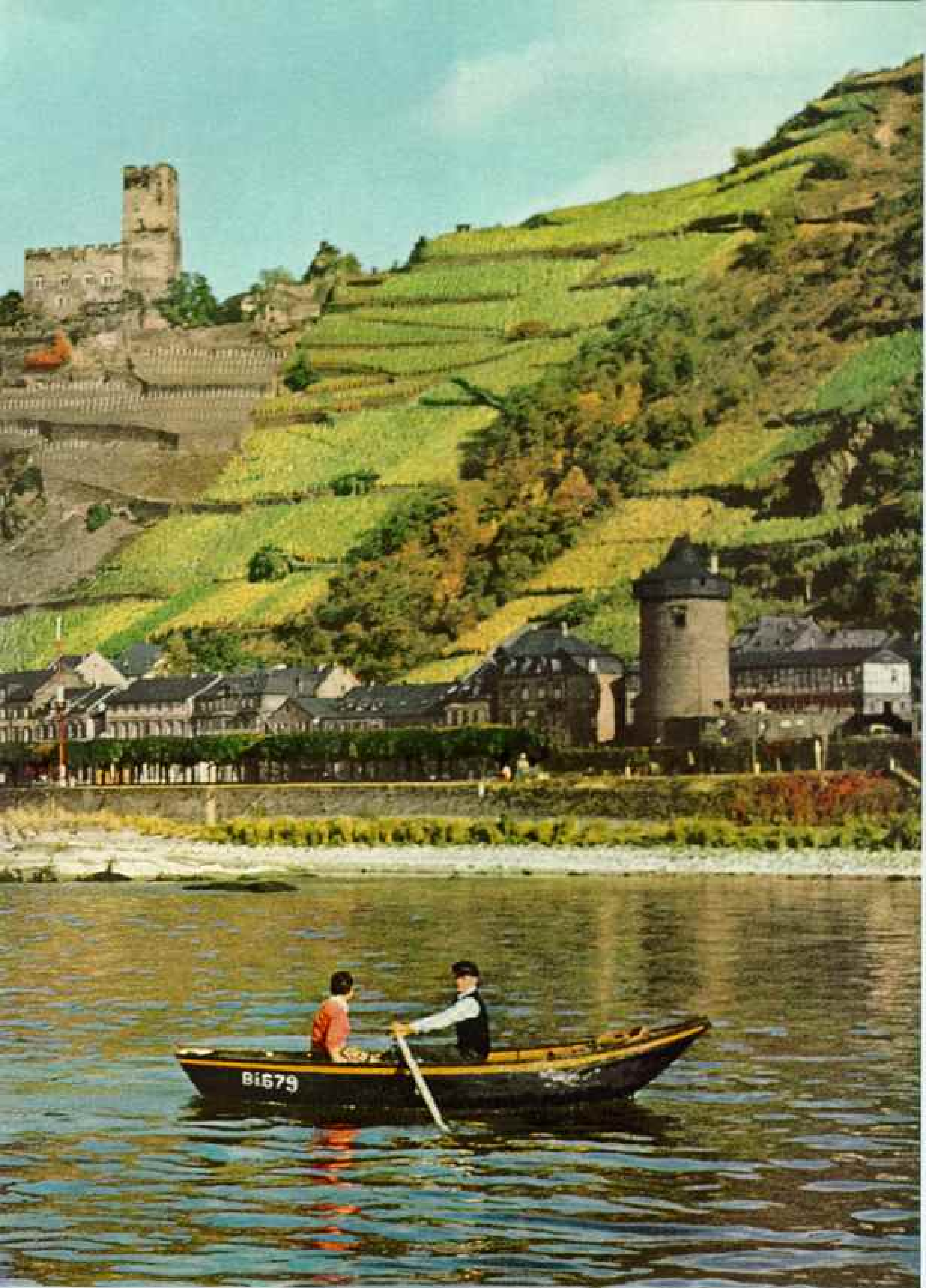
Wasserburg's Back Door, the River Inn, Lends a Touch of Venice

A hairpin loop in the river protects Wasserburg like a moat, but in floodtime drowns low-lying streets. Medieval traders driving horse-drawn barges made the town an overnight stop. Among its many riverside inns they found smiths to shoe their horses and brewers to quench their thirst. The town's name means "water fortress."





Pfalz Fortress, a Stone Ship on a Rhine Island, Served as a Tollhouse for Robber Barons



Who Waylaid River Traffic. Gutenfels Castle Crowns Vineyards Above the Town of Kaub

Wheelwrights fit a hot iron tire onto a wooden wheel near Waldkirch in the Black Forest. Then, by quenching it in the millstream (below), they shrink the metal so that it binds the felloes tighter.

New roads link once-isolated villages in the fabled Black Forest. Its craftsmen fashion cuckoo clocks, music boxes, and toys, but many of their small shops have given way to mass-production factories.



EDUCATED BY NATIONAL GEOGRAPHIC PHOTOGRAPHER VOLKMAR WENTZEL (ABOVE AND BELOW) AND ERICH LEYING © N. G. S.



Trim Farms Reflect a Devotion to the Soil

Typical of rural Germany, this village north of Bayreuth does not waste an acre of arable soil. Families build homes and barns in compact units, leaving fields free for crops and grazing.

Agrarian reformers, who contend that villagers waste too much time traveling to and from their scattered parcels of land, seek to change the landscape. They propose moving the family to the farm, in the American manner, and realigning its holdings.

Trailing a reaper across golden fields, women shock wheat in Bavaria.

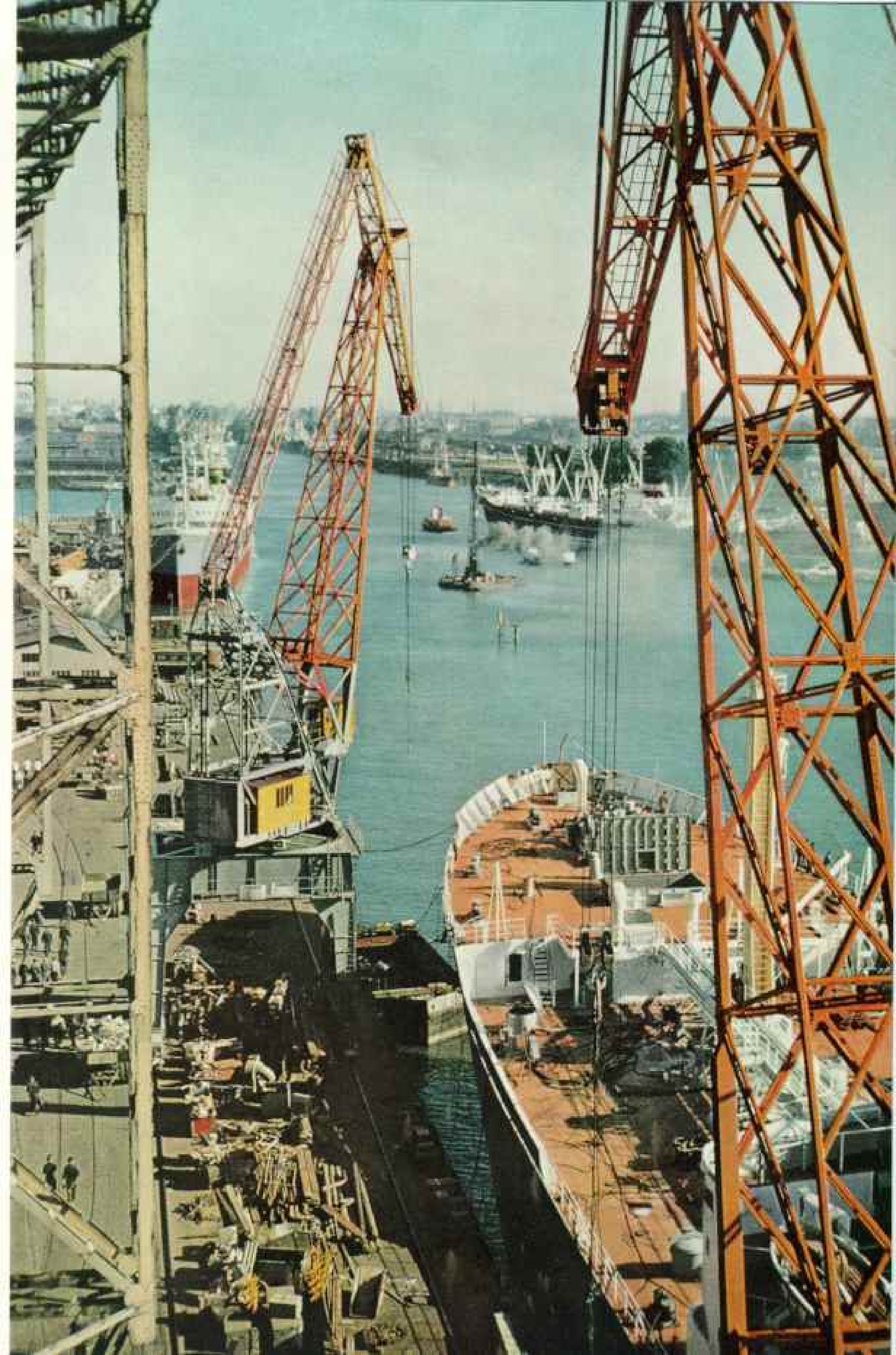




Krupp's Artists in Steel Forge Gears for a Rolling Mill in India

At war's end Alfried Krupp was jailed and his gigantic armament works dismantled. Today Essen's House of Krupp again ranks as a great steel producer. More than 100,000 employees make peacetime goods ranging from locomotives to stainless-steel dentures. Here an apprentice teams with a master craftsman for on-the-job training.

War-torn Bremen presents a miracle of reconstruction. Shipyards lining the Weser River throb with industry. Tugs guide a freighter past the piers.





but, even so, it weighs almost 80 pounds. And then, at the end, the hardest part of all, he actually hangs on the cross for 28 minutes. Of course, he's supported by hooks and straps, all invisible to the audience. But at the end of the 28 minutes, my arms were always completely numb—no feeling left at all.

"So you can see that the man who does it must be healthy. Especially, his heart must be good."

Bananas Grow on the Bodensee

Along Germany's southwest border, separating it from Switzerland, lies one of Europe's largest lakes, the Bodensee, known in English as Lake of Constance. It is 45 miles long, nine miles across, 827 feet deep, and its shores are lined with resort towns, luxury hotels, and fashionable beaches. Passenger and freight boats ply its surface, carrying on a busy international traffic with Switzerland and Austria, which touches the eastern end of the lake.

Although the Bodensee is high—1,296 feet—its climate is warm enough for swimming as early as June and as late as October. The warmest spot on the lake is the hilly little island of Mainau near the city of Constance, where I saw bananas, oranges, and lemons growing in the open air.

The lake's water is full of fish: trout, pike, perch, and a delicious whitefish the Germans call *Blaujochen*, which is shipped to restaurants all over Europe. Commercial fishing is an important business here. To see how it worked, I went out one morning with Herr Eugen Franz, at 69 one of the oldest fishermen on the Bodensee, and his pretty blond daughter, Frau Rosine Bartsch, in their sturdy steel-hulled fishing boat.

On a good day Herr Franz retrieves from his allotted 546 yards of nylon gill nets between 120 and 160 pounds of Felchen, plus an assortment of other edible fish. By eleven o'clock on the day I accompanied him, three large baskets on the deck were full, and Herr Franz headed back for shore and for lunch. On the way Frau Bartsch cleaned the fish with astonishing speed and skill, throwing the debris

to a squawking cloud of gulls that flapped astern.

After the fishing trip I went along to the packing plant where Herr Franz sells his catch. (He gets about 35 cents a pound for Felchen.) It was a small building filled with refrigerating equipment and cartons of chickens, game, and frozen fish ready for shipment. In one corner lay the carcasses of several deer. Venison is widely sold commercially in Germany and appears on the menu in most good restaurants.

Next to the plant, I noticed a very large four-story structure which hummed with the sound of big machines. When I met Dr. Eugen Kauffmann, the owner of the fish plant, I asked him what it was.

"Oh, that," he said. "That's my feather factory. Would you like to see it?"

Never having seen a feather factory, or dreamed that such a thing existed, I said I would. But why, I asked, should a feather factory be part of a meat-packing plant?

"The business was founded by my great-grandfather," Dr. Kauffmann explained, "as a farm to fatten poultry. When they cleaned the ducks and chickens, they also cleaned and sold the feathers as filling for pillows, quilts, and other things. Today feathers are 75 percent of the business. Our 260 employees process 800 to 900 tons of feathers a year. That's enough to fill 150 railroad cars."

Fine Feathers Make a Cloud

As he talked, Dr. Kauffmann led me to the door of the main building and into a cavernous room filled with huge machines.

"That's a washing machine," he said, pointing to an enormous vat. "The feathers are washed in detergent and cold water, then rinsed and dried. When they're completely clean and disinfected, we put them in a blower like that one there."

He pointed to a square glass-walled container as big as a room. Inside, a blizzard of feathers swirled and danced in an artificial wind.

"The light ones float to the top and are sucked out through a pipe. The heavier ones

Hamburg Rebuilds. Apartments Fill This Brick-and-concrete Honeycomb

World War II bombs flattened the Elbe River port, destroying half its homes and littering the harbor with wreckage. The city of 1,850,000 has staged a phenomenal recovery: shipping tonnage now exceeds prewar levels. Architect and city planner Ernst May, who has been called a German Frank Lloyd Wright, designed this structure. "Don't walk," cautions the red pedestrian in the signal. Says the author: "Picture signs regulate traffic everywhere, a boon to motorists who can't read German."

fall to the bottom. We end up with four main weights. The lightest are the most expensive."

We moved farther into the factory, where feathers lay packed in tremendous burlap bags. Dr. Kauffmann's plant is modern, but science can no more confine feathers than it can the wind. One way or another, they escape. Soon we were ankle deep in feathers. Dr. Kauffmann, who walked ahead of me, would sometimes almost disappear in a swirling cloud. Finally we came to a series of lofts where finished feathers were stored. Dr. Kauffmann entered one of them and emerged with his hands cupped as if holding a baseball.

"Watch this," he said, and opened a crack between his thumbs. Snowy white feathers popped out, emerging into a cloud bigger than a man's head. "That's the test," he said. "Only the finest down is elastic enough to do that."

At this point Dr. Kauffmann sneezed, and I noticed that his eyes were running with moisture. He took out a handkerchief and blew his nose vigorously. A horrid suspicion struck me, but before it could take root, Dr. Kauffmann spoke.

"It's this chilly weather," he apologized. "I have caught a slight cold." I felt reassured. It was unthinkable that the owner of one of Germany's largest feather factories could be allergic to feathers!

Black Forest Lives by Handicrafts

The next feathers I saw were in the Black Forest. Dyed brilliant red, green, yellow, and blue, they were piled on a worktable where a girl patiently glued them to a tiny mechanical bird.

This was in the little town of Triberg, where industry is quite different from the mighty shipyards and steel mills of the north. Factories in the Black Forest are more likely to employ five or ten workers than five or ten thousand.

This one, the Karl Griesbaum company, made music boxes, marvels of precise craftsmanship. You press a button on the side of a small, beautifully engraved case, and the bird, no bigger than a peanut, pops out, opens its bill, flutters its wings, and pipes in a sweet, shrill voice, turning as it sings. Then it pops back and the lid goes down. Such a factory turns out only a few hundred of these boxes a year, all handmade.

Similar workshops in the mountains of southern Germany produce cuckoo clocks, vi-

olins, recorders, and a variety of hand-carved wooden objects, from chessmen to crucifixes. Sad to say, these small shops are giving way to automated machines, plastic, and mass production.

Yet in the Black Forest they have a stronghold, for its people cling to old ideas and ways. Drive, as I did, from Triberg in a random loop around the countryside. Drive slowly, for the sake of your springs, over dirt tracks better suited to ox carts.

Danube River Links Eight Nations

Here the scenery is less rugged. Hills are softened by a thick carpet of firs, pines, spruces, beeches, and birches—and when you peer into the shadowy depths, you can see how the Black Forest got its name.

Then you come on a valley of farms and pastures, where pale-brown cows graze on steep hillsides. The houses, too, are softly rounded, their thatched roofs like inverted sugar bowls, with overhanging eaves that almost touch the ground.

Three or four miles southwest of Triberg you come to the little community of Martinskapelle, where you may park your car, walk across a field, and find a bubbling spring.

I translated the brass marker on a rock: "Here spring the headwaters of the Danube River . . . at 1,078 meters [3,537 feet] above sea level." The small brook leading from this spring would gather strength from tributaries, become, briefly, the River Breg, and join another river, the Brigach, to form the beautiful blue Danube at Donaueschingen. The water trickling past my feet would travel 1,725 miles across Europe, through eight countries, and lose itself, finally, in the Black Sea.

The Black Forest, which covers Germany's southwest corner, is only one of many heavily wooded areas. Surprisingly, considering her 54,000,000 people and her small area, more than 28 percent of the country is covered by forests. And this, too, is big business: receipts from timber in 1958 came to \$400,000,000. More than 17,000 foresters help care for German trees: her forestry schools are among the world's finest. And no wonder, for professional forestry, still relatively new in the United States, has been practiced in Germany since the 14th century.

More than a third of Germany's forests are publicly owned, chiefly by the *Länder*, or states, which use timber profits as state revenue. Bavaria's forestry department, for ex-



HANES BETZLER

A Munich Family Shares the Joy of Christmas with Two American Soldiers

No American serviceman need have been lonely in West Germany last Christmas Day; invitations from German homes far outnumbered soldiers. Here Sgt. Thomas Holiday of Martinsville, Virginia, and S/Sgt. Richard Wilson (right) of Peoria, Arizona, enjoy a violin solo by photographer Erich Lessing in the home of Hanes Betzler.

ample, has shown an annual profit in recent years of about \$25,000,000.

I saw one source of this wealth in the Spessart Forest, where grow 300-year-old oak trees that bring \$5,000 or more per tree. Since I burn oak by the cord in my fireplace at home, I wanted to see what these oak trees had that mine hadn't. In the city of Würzburg I met Bavarian-state foresters Alfred Betz and Wolfgang Fleder, and together we drove into the woods.

"For one thing," explained Forstmeister Betz, "these are a different kind of oak from the ones you burn. We call them *Traubeneiche*—grape oaks—because the acorns grow in clusters.

"For another, these oaks don't just grow. We control their growth every foot of the way." He stopped the car near a stand of trees about six feet high. "These were planted in 1949. You'll notice that around each oak we've planted several beech trees. The beeches

grow a little faster than the oaks and shade them, all except the crown. The result is an oak with a clear, straight bole—no branches except near the top. Their grain is so regular it's suitable for manufacturing the costliest veneer.

"Since veneer is cut in slices less than a twenty-fifth of an inch thick, a single big oak produces thousands of square yards. Fine veneer brings a fancy price; so you can see why our record tree, one we sold in 1956, brought more than \$5,700 at auction."

Yet I think the Germans' fondness for trees is based on more than money. German mythology, poetry, opera, songs, and fairy tales all have deep roots in the forests. Goethe, Wagner, and Beethoven wrote poetry and music about forests and the birds, animals, and noises that fill them. The stories of the Grimm brothers are peopled with woodcutters, with dwarfs and witches who live in the dark woods, with little children lost in the forest.



A German told me: "Forests are to us what the sea is to the English, or the Wild West to you Americans."

In the forest called Reinhardswald, near Kassel, I saw the turreted stone castle Sababurg, which is reputed to have inspired the story of "Sleeping Beauty." *Dornröschen*—Little Thorn Rose—as the Germans call her, slept for 100 years in the tower of a castle just like this.

The brothers Jacob and Wilhelm Grimm, who chronicled her story, lived in Kassel in the early 1800's. In libraries in Kassel and Marburg's Philipps University, where the Grimms studied law, I saw the small walnut secretary on which they wrote, and examined original handwritten versions of "Rumpelstiltskin," "Snow White," and other fairy tales.

If forests have deep roots in German hearts, there is something that runs still deeper, and

that is the River Rhine. Rising in Switzerland, the Rhine flows through the Bodensee and finds its way down the Alps into the rolling, vine-covered Rhineland. It looks up at countless castles along its banks, slides under dozens of rebuilt bridges, dives, holding its nose, into the sooty, industrial Ruhr, comes up for air in the Netherlands, and rolls on to the North Sea.

The Germans call it "Father Rhine." For centuries it was their bulwark against invading enemies from the west, whether armed with spears, arrows, swords, or tanks. One of their best known anthems, "Die Wacht am Rhein," runs reassuringly:

Dear Fatherland, rest peacefully,
Strong and true stands the watch on
the Rhine.

Long after other European nations had developed strong central governments, Germany



remained divided against itself into small, semiautonomous kingdoms, dukedoms, counties, bishoprics, and free cities. Along the Rhine, particularly, tiny political units fought one another, collected taxes, and extracted tolls on roads and rivers.

So grew the original castles on the Rhine—fortresses equipped with strong walls and moats to which the local ruler could retire when besieged. They still stand, in varying states of disrepair, on the tallest hilltops along the river (pages 757 and 764), and you can visit many of them for 25 cents or so, with a guide to show you through the dungeons and demonstrate instruments of torture left there since medieval times.

What I wanted, however, was not merely to see a castle on the Rhine, but to live in one. It is not difficult; again, "since the *Wirtschaftswunder*," enterprising Germans have

Shoppers Enjoy a Coffee Break in Frankfurt's Hauptwache Square

Germany's banking center, Frankfurt, serves as headquarters for several American military units in western Europe. Airliners from all parts of the world daily wing in and out of its huge International Airport.

A crossroads of trade since earliest times, Frankfurt is famed for its commercial fairs, which date back to 1240. The war virtually wiped out its Old World section, but City Hall and Goethe House, birthplace of poet-dramatist Johann Wolfgang von Goethe, have been painstakingly reconstructed.

Principal shopping streets converge on Hauptwache Square. Billboard at left cautions: "Atomic weapons give no security. Atomic weapons can only destroy." The views are those of a pressure group that wants to outlaw nuclear weapons.

bought up historic castles, modernized them, and converted them into hotels. For a few dollars a day you can rent a room and live, literally, like a prince. Or possibly somewhat better, for the prince had no running water.

I chose castle Schönburg, which overlooks the little walled village of Oberwesel on the Rhine. It stands on the most romantic section of the river. Part of the fortress is two thousand years old, and, most important, it looks exactly the way I thought a medieval castle ought to look (page 758).

I arrived at the castle late at night. In pitch darkness I crawled in low gear up the steep, winding road from Oberwesel, and jammed on the brakes at the brink of a deep chasm. I got out of the car. Perhaps a hundred yards ahead, and still quite high above me, loomed the black bulk of Schönburg. The chasm formed a natural moat, and now I could see that a narrow bridge led across it. Big enough for a car? Maybe, but I decided not to try.

I walked across the bridge and stumbled up a stony path to the castle wall. A gate stood open, and set in the stone beside it I could dimly perceive four push buttons. I pushed one, then another, and finally all four at once. A light came on above, and a few minutes later a man in a tweed sport jacket appeared, carrying a flashlight.

"Welcome to Schönburg," he said in German. "I am Hans Hüttl, the innkeeper."

We carried my suitcases to the castle, and into a charming, low-ceilinged chamber with a narrow casement window cut through a wall that looked five feet thick.



Pleasure Palaces Blaze a Neon Trail
Along Hamburg's "Great White Way"

A holiday city of spenders, Hamburg boasts so many and such varied after-dark attractions that visitors class its night life with that of Paris and



Copenhagen. Cafes, cabarets, theaters, and dance halls line both sides of the Reeperbahn, the medieval street of the ropemakers, who used to pro-

duce cordage for ships. A dozen or more languages are commonly heard in this cosmopolitan pleasure area near the city's famous waterfront.

Schönburg is not a luxury hotel, but rather a comfortable rustic inn. What it lacks in hot water and room telephones, it more than makes up in atmosphere. When I woke up the next morning, I looked out at a cobbled court surrounded by crenelated stone walls with massive stone towers at the corners. Along the top of the wall I could almost see men-at-arms pacing sentry duty, armed with swords and crossbows. On a tower ravens warmed themselves in the morning sun. A church bell chimed in the village below, and I half expected to see the Graf and his Gräfin, in medieval hats, set out to attend Mass.

But it was a very modern young lady, dressed in a smart gray suit, who walked up to me after breakfast and introduced herself.

"Good morning," she said in English. "I'm Frau Doris Pieper. Herr Hüttl telephoned me that you are here to write about our castle. He thought perhaps I should show you through it. You see, my grandfather was once manager of the castle. I spent my holidays here when I was a little girl."

We walked across the sunlit court to a seven-sided stone tower, its walls partially crumbled.

"This is the oldest structure on the hilltop," she said. "It was built by Celtic tribes in pre-Christian times. The first actual residence was begun by a Graf von Schönburg about 950 A.D. There's nothing left of that now; it was destroyed by the French in the Thirty Years' War."

We approached another tower, and on a brass plaque I read that it was called the *Gefängnisturm*—prison tower—and that in 1148 Pfalzgraf Otto von Stahleck had imprisoned here a rival Graf, Otto the Younger. It was a grim-looking dungeon, about 35 feet tall and not a window all the way.

Romantic Rocks on the River Rhine

"The only opening was at the top," said Frau Pieper. "They lowered prisoners through it with a rope, and the only way out was to be pulled back up by a rope. I don't think they pulled many prisoners out, because when a hole was cut in the base of the tower years ago, they found 16 skeletons inside. Poor Otto the Younger! They couldn't even tell which bones were his."

Later, in Frau Pieper's pleasant company, I boarded a spacious white river boat, the *Beethoven*, and sailed down the storied section of the Rhine that flows beneath castle

Schönburg. We bought tickets at Bacharach, and soon after the boat swung into the current, I noticed a light flashing in a stone tower on the left bank ahead.

"That's a signal for the pilot," explained Frau Pieper. "The river takes a sharp bend here; the light warns him when boats are coming upstream." Around the bend we approached another hazard, a tall crag of stone looming gray-white in the morning light: the Lorelei.

As we approached it, with all cameras aboard clicking furiously, the *Beethoven's* loud-speaker system played a rather scratchy record of Heinrich Heine's famous song which describes the beautiful girl who sat on the bluff, jewels flashing, and combed her golden hair. As she combed, she sang a melody so moving that river captains were enchanted, and crashed their boats on the rocks below. I was glad our own pilot stuck strictly to business. He skirted the rocks with precise skill, and a little later we debarked safely at Braubach.

River Fleet Has 11,000 Vessels

You may go to the Rhine to savor its romance, to sail, on a summer night, in gay excursion boats and sing and dance with young German couples to boisterous German bands, to photograph the green vineyards that climb its steep banks, or to sample the delicate white wines they produce. But for whatever reason you come, you will stay to marvel, as I did, at the almost incredible bustle of commercial traffic that crowds the river's surface.

Sitting one sunny day on a riverside terrace in Bonn, West Germany's new capital, I counted 46 large freight boats passing in a single 15-minute period—more than three a minute.

The Rhine is, in fact, Germany's most important single artery of trade: 150,000,000 tons of goods move up and down it each year. It is an international waterway, for its fleet of more than 11,000 vessels includes 6,430 Dutch boats, 3,312 German, and 1,583 Belgian; hundreds more fly French and Swiss flags.

Linked with an intricate system of canals, the river's traffic eventually reaches every corner of Europe. It is navigable for boats up to 1,350 tons all the way from its mouth at Rotterdam to Basel, Switzerland, and so swift is its current that a boat which travels six days upstream can make the return journey in two.

Yet the Rhine's busy traffic is only sympto-



PHOTOGRAPH BY NATIONAL GEOGRAPHIC SOCIETY

Grimy with Coal Dust, the Ruhr Miner Welcomes a Shower at Day's End

In the coal-rich Ruhr, miners dig nearly half a million tons a day. This redhead, removing shoes and armorlike leg guard, will hang his gear on one of the clothes trees that lift to the ceiling.

GERMAN EMPIRE, 1871



GERMANY, 1920



AUGUST, 1939



1959 BOUNDARIES



matic of Germany as a whole, and in Bonn you soon realize that the river is, if anything, somewhat less crowded than the capital itself. Prewar Bonn was a quiet university town of some 100,000, built around a green-lawned park and a cobblestoned market place. Its chief claim to fame was as the birthplace, in 1770, of Ludwig van Beethoven, and burial place, in 1856, of Robert Schumann.

You can visit the house where Beethoven was born, and see a collection of his original manuscripts, including the "Moonlight" Sonata and the Pastoral Symphony. There is also a rather pathetic collection of hearing aids, symbolizing Beethoven's losing fight against deafness. They are cumbersome, horn-shaped devices, some designed to clamp to his head so that his hands were free to play or to conduct. Eventually his deafness became total, and his most majestic work, the Ninth (Choral) Symphony, he never heard at all.

In 1949 Bonn, to its surprise, became the capital of Germany. "The only reason they chose Bonn," one German told me jokingly, "was that Konrad Adenauer lived near it, and he refused to move." Today the city is bulging with a population of 140,700, and the government ministries occupy old barracks and remodeled houses scattered from Bad Godesberg, five miles south, to Duisdorf, four miles west. Germany's legislature meets in the Bundeshaus, a former college building enlarged by ultramodern glass-walled wings.

From Bonn the Rhine flows north under the shadow of the twin-spired Cologne Cathedral, Germany's biggest, to its busiest point of all, the smoky harbor of Duisburg. A boat ride through Duisburg harbor is a good introduction to the whole incredibly complicated industrial region known as the Ruhr. For much of what the Ruhr buys, makes, mines, or

Germany's Oft-changing Face Reflects a Turbulent Past

Modern Germany was forged into a single nation by the fires of the Franco-Prussian War. The empire lasted until World War I, which brought defeat, the Treaty of Versailles, and shrunken boundaries for the short-lived Weimar Republic. By 1939 an expanding Nazi Germany felt ready for the invasion of Poland and for World War II; a second defeat resulted in Allied occupation.

Today's Germany lives under a precarious division. Striped areas of East Prussia and the German territories east of the Oder-Neisse Rivers are shown provisionally under the administrations of Poland and the U.S.S.R.

sells passes through Duisburg harbor, Europe's busiest inland port.

I spent half a day seeing the harbor from a small boat, admiring my pilot as he dodged expertly among tugs, barges, cargo ships, and floating derricks. And half a day affords only a glimpse, for Duisburg's port has 28 miles of quays, 27 basins, and 10,000,000 square yards of water area. It handles small ships only—but 58,000 of these turn around here each year, moving some 30,000,000 tons of cargo.

Ruhr Refinery Produces Gold and Silver

The city of Duisburg itself is West Germany's largest producer of iron and steel. I was surprised to learn, however, that it also produces gold and silver. Gold mines in the Ruhr? No, these metals and a dozen or so more, including copper, zinc, lead, cobalt, and cadmium, come from the Duisburger Kupferhütte, an enormous, sprawling chemical plant that takes up a mile of Rhine River frontage.

The Kupferhütte shows, in capsule form, the complexity of Ruhr industry. It also demonstrates German ingenuity and efficiency. For it lives entirely on the waste products of other factories—chiefly two dozen chemical plants—and in turn sells its own waste to the steel industry at a profit.

It buys pyrite cinders, left over from the manufacture of sulphuric acid, at the rate of 1,800,000 tons a year. From these it extracts each year, among other things, 20,000 tons of copper, 35,000 tons of zinc, 50 tons of pure silver, and 134 pounds of solid gold.

The residue is 1,500,000 tons of iron ore. The Kupferhütte converts part of this into pig iron, and sells the rest to steelmakers. So in the end, the only real waste product is what comes out the tall smokestacks to blow through the air, to grit on teeth and tabletops, and turn the Ruhr sky gray.

I saw big industry in the Ruhr from a pleasant vantage point. Through friends I was introduced to a family who live in Mülheim-Speldorf, on the edge of Duisburg. Graciously, they invited me to spend a night or two with them. I ended up staying a week.

Dr. Wolfgang Vollrath took his doctor's degree in history at the University of Münster but now runs a civil engineering business in Duisburg; he and Frau Vollrath have five children, a comfortable house in the suburbs, two cars, and a dog named Rino.

When I was there, three of the Vollrath

children—Linda, 11, Fritz, 10, and Lutz, 8, were attending school. The other two children, Hannes, 4, and Goetz, 11 months, stayed at home, and I got quite used to seeing Frau Vollrath, like any American housewife, holding the baby in one arm and stirring the soup with the other.

I went grocery shopping one day with Frau Vollrath. She bought her meat at a butcher shop, her bread at a bakery, her coffee at a coffee store, her fruit, vegetables, and eggs from vendors in a wonderful, crowded, noisy open market place in Duisburg. I asked her why Germans don't have supermarkets.

"We do," she said, "but only a few. They haven't really caught on here. Personally, I like to buy in smaller shops where I know the people I'm dealing with. I especially like to go to the market place. Many of the stands are run by farmers who sell their own produce. And I often go when my friends are there, so we can talk while we shop."

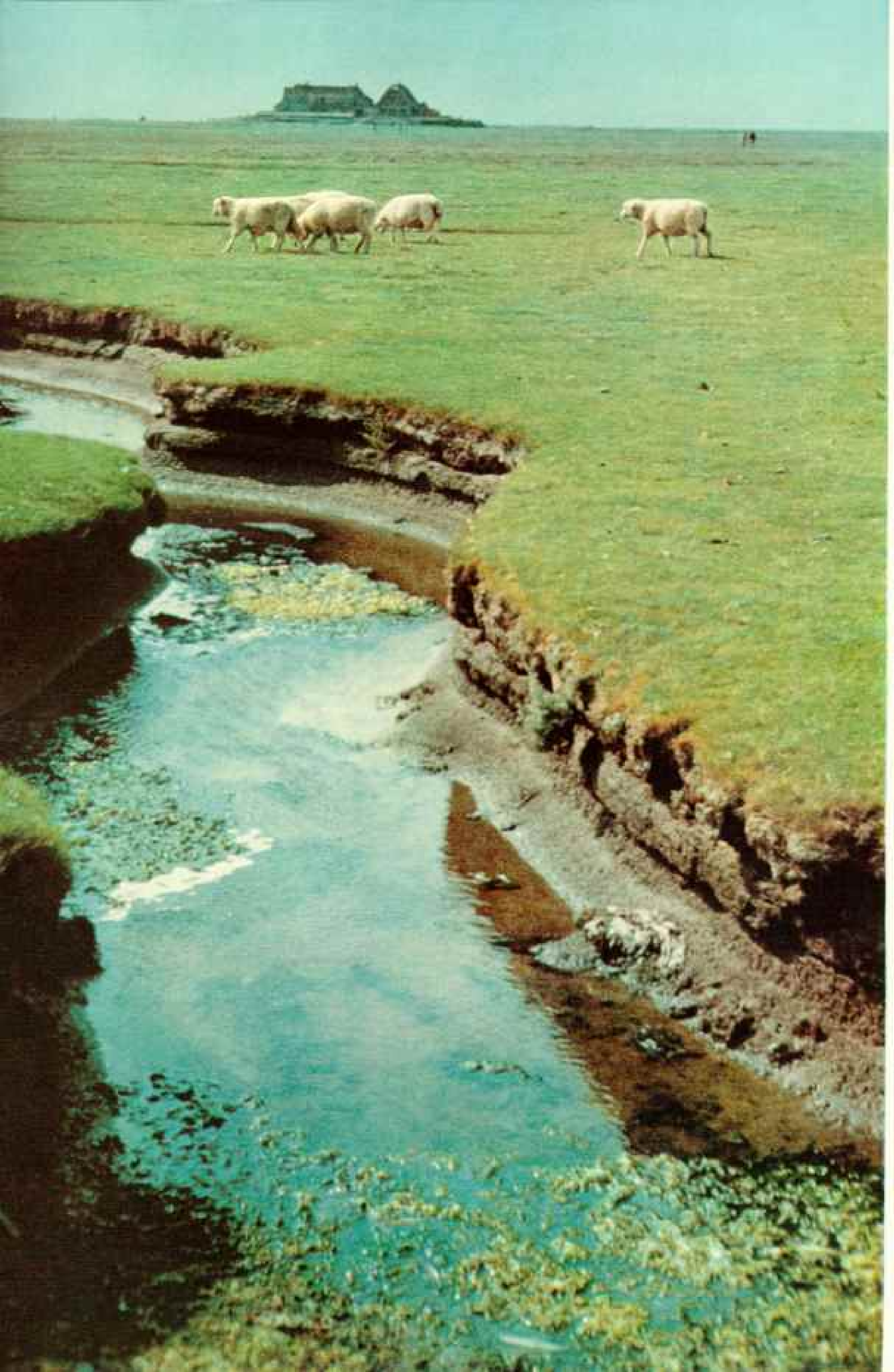
Inefficient, perhaps. Yet the German housewives seem to find time for it, and the real test was in the eating. The vegetables were fresh, the meat tender, the sausage spicy, the ham smoky, the coffee strong and aromatic. And the bread was the best I have ever eaten—crisp-cruste'd, firm, with enough body and flavor so that I quickly accepted the German custom of eating it plain, though butter was always available if I wanted it.

Noble Redskins Interest Germans

The older Vollrath children, like many Germans, are fascinated by American Indians. They wear feather headdresses, play in a teepee in their back yard, and read stories by Karl May, a sort of German James Fenimore Cooper who wrote romantic novels about America's noble savages. In one of Dr. Vollrath's bookcases I also noticed a well-thumbed copy of the National Geographic book *Indians of the Americas*.

Dr. Vollrath himself likes to retire after dinner to his study, a tiny book-lined room with a desk and an easy chair, and listen to music on his high-fidelity phonograph. His large record collection specializes in opera, but also includes such American selections as *My Fair Lady* and the folksongs of Burl Ives.

The Ruhr is the beating, roaring heart of the Wirtschaftswunder. I saw its coal mines and steel mills and walked through the great Rheinhausen works of the Friedrich Krupp company, the giant industrial complex which





Sail-powered handcar rides a causeway linking the German mainland with one of the Halligen, 11 small islands in the North Sea. Should the wind die, the woman pilot gets out and pushes. Sail advertises a soap powder.

Grassy Süderoog Island Often Lies Under Sea Water

Violent storms that swept the North Sea in the 17th century submerged a wide swath of the north German coast. Subsiding waves left only a string of desolate islands—the Halligen.

Hardy folk stayed on to wage a never-ending battle with the sea. They rebuilt their homes atop artificial knolls, as in the distance. Today, when floods wash the islands, only the mounds escape, and sometimes waters force inhabitants to the rooftops. Salt-resistant grasses thrive on a mixture of sea water and rain.

Carving from a Spanish bark that foundered off the Halligen in 1870 adorns the only house on Süderoog. A letter displayed inside expresses the captain's thanks for saving his crew.





UNITED PRESS INTERNATIONAL

Sled Dogs Whisk a Fisherman of Cuxhaven Across the Tidal Flats

Where the Elbe River flows into the North Sea, fishermen trap their catch in baskets anchored on the beach. Fish riding the tide are stranded in them when waters recede. Twice each day—at ebb tide—this crude sledge makes a collecting run.

once supplied arms to the Kaiser and Adolf Hitler. Heavily bombed in World War II, Krupp is vigorous again as Germany's biggest steel producer (page 768). In Düsseldorf, the financial center of the Ruhr, I walked down the beautiful street called Königsallee—the Avenue of Kings—where you can easily spend \$10 for a lunch or \$10,000 for a fur coat.

But there was another burgeoning factory in Germany I wanted to see, one which has acquired a special interest for some 350,000 U. S. car owners in the past decade. It is in Wolfsburg, 150 miles northeast of the Ruhr, almost on the barbed-wire frontier that divides East and West Germany. Wolfsburg, only a hamlet 21 years ago, now has 54,000 people and is famous around the world as the home of the Volkswagen.

The huge red-brick Volkswagen plant dominates the town, stretching for a mile along the Mittelland Canal. Two-thirds of Wolfsburg's

wage earners work there, plus thousands more from neighboring towns.

The original plan to produce a Volkswagen—a "people's car"—was first announced by Hitler in 1934 amid tremendous blasts of propaganda. Wolfsburg was chosen as the site, and a planned community of barrackslike apartments grew up near the new plant.

Only a few prototype cars emerged from the factory under the Nazis, however; during World War II it turned to making army jeeps and was accordingly blasted to bits by Allied bombs. Not until the plant was rebuilt after the war did it begin to turn out in quantity—2,000,000 by the end of 1957—the rugged little car that is now familiar on streets all over the world.

Today the Volkswagen plant roars and strains to keep up with demand, and never quite succeeds. The clatter of its presses is deafening as they turn out the 10,000 parts

a minute needed to produce one car every 30 seconds (page 739). It runs on a two-shift basis, 17 hours a day; auxiliary factories have been built in Hannover, Braunschweig, and Kassel. Yet in Germany you still must wait 12 months for delivery of a new Volkswagen.

"We're turning out 1,960 cars a day this month," a plant official told me. "Next month it will be 1,980 a day, and the month after that 2,000 a day—each month 20 more."

The end products emerge, bright steel eggs from a clanking iron chicken, at the rear of the factory, where a conveyer rolls Volkswagens one at a time into a 25½-acre parking lot. Across the lot a private railway station admits trains of double-decked flatcars, and the drivers who load the little cars onto the trains move with almost frenzied haste.

"Our drivers work in teams of eight," explained my guide as we walked into the station, "and they're always under pressure to keep up with production." I jumped aside as a Volkswagen roared past me, followed by another, and another. Without pausing, they shot up a runway onto the train, driving over the steel connecting ramp from flatcar to flatcar at frightening speed. No sooner did a car stop than its driver leaped out and raced to a waiting bus. When all the drivers were inside, the bus thundered off so that the drivers could pick up another load of cars.

Checkup Completes a Volkswagen

Volkswagen engines are put together on an oval assembly line that looks rather like a cluttered race track. I followed one motor around the course; finished, it weighed only 187 pounds.

"Where now?" I asked.

"To the inspection room," said my VW guide. We followed the engine around a corner, where an inspector clamped it with competent hands into a testing stand. For some 20 minutes I watched while he tuned and adjusted it, raced it, idled it, checked its compression, timing, spark plugs, took its temperature and its pulse, and finally pronounced it O.K. Finished and ready to drive, it acquired a serial number.

So, if you're considering buying a Volkswagen, I suggest that you look for the one with an engine bearing the serial number 2624518. I know it is a good one; I personally watched it made and supervised its inspection.

North of Wolfsburg the German countryside

flattens out; the Alps and the central hills, the Mittelgebirge, are far behind, and the smells of heather and sea salt blow on the wind. I pointed the nose of my Mercedes toward Denmark; the road led due north with scarcely a bend to Lüneburg, on the edge of Germany's biggest heath, the Lüneburger Heide.

To see its heather blooms and dark juniper trees, I changed vehicles, for part of the heath is a wildlife preserve, and automobiles are *verboten*. Visitors may rent a horse and carriage, or buy tickets on an old-fashioned stagecoach that makes regular crossings.

Night Falls Early in German North

From the heath I drove on, making a wide loop around the neck of the Jutland Peninsula, Germany's farthest north. Here, although the climate is still mild, the latitude is that of Labrador, and the sun sets early. By 3:30 on this rainy afternoon it had grown so dark I had to turn on my car lights.

I crossed the Kiel Canal by ferry at a town called Brunshüttelkoog (which, as nearly as I can translate it, means "brown bailiff's bog"), near the mouth of the Elbe River and skirted the coast of the North Sea. This is the state of Schleswig-Holstein, a land of windmills, canals, and trees that slant eastward under the steady west wind. Cattle grazed in damp green fields along the roadside, and I noticed that not only the horses but some of the cows as well wore blankets.

At Husum I headed inland, aiming for Flensburg, the northernmost city in Germany. As I turned off the coast road, I saw a forlorn young man standing on the corner, coatless and dripping in the rain. He was hitchhiking in the way Germans do it, not with the thumb but by waving one arm up and down like a semaphore. I stopped the car and called to him:

"*Möchten Sie nach Flensburg fahren?*"—"Do you want to ride to Flensburg?" He nodded and climbed in, oozing water over the seat and floor. By this time my German had progressed to the point where I could converse fairly easily on simple topics, so to pass the time I asked:

"*Wohnen Sie in Flensburg?*"—"Do you live in Flensburg?"

The young man answered volubly with four or five paragraphs of—to me—pure gibberish. It *sounded* like German, but not a word could I understand. I tried another question or two with the same result, and then gave up.



Later I mentioned the incident to a friend in Flensburg, and he laughed.

"The young man must have been speaking *Plattdeutsch*," he said. "It's a dialect, a kind of 'low German' used in this part of the country. You know, if you should put a Bavarian farmer, who speaks in a southern dialect, in the same room with a farmer from Schleswig-Holstein, they could scarcely converse at all."

Flensburg is a seafaring town. The men on its streets wear the visored blue caps of merchant sailors, and in one of its suburbs the German Navy runs its own Annapolis, the Mürwik Naval Academy, with 360 midshipmen. A merchant marine training school overlooks the harbor, which lies in a sheltered fiord 20 miles from the Baltic Sea. Even the local drink has a nautical flavor—*ein Grog*, made with rum, hot water, and sugar.

A main street in Flensburg is the so-called "European Highway," one of a series of connected routes which lead from Italy all the way to Denmark. I drove north on it until the language on the road signs changed from German to Danish; then I turned and headed south again, to wind up my trip in Hamburg, Germany's second largest city.

Hamburg Lives by the Sea

Although it lies 55 miles inland, Hamburg regards itself as a seacoast town, and well it might, for it is Germany's largest port and has made its living from the sea for a thousand years. In the Middle Ages it was a leading member of the Hanseatic League, a mercantile association of north German towns which eventually grew so strong that it controlled a substantial part of world trade, waged wars, and even ran its own school system, primarily to teach arithmetic and accounting to the people in ports along its trade routes.

Hamburg straddles the Elbe River, which from here to the North Sea is deep and wide enough to accommodate big seagoing ships. Another river, the Alster, flows through the city to join the Elbe, and on its way forms two large lakes—the Aussen Alster and the Binnen Alster, bordered by parks, fashionable houses, and hotels. Numerous canals criss-cross the town, so that nowhere in Hamburg

can you drive very far without crossing water.

Hamburg is a free port; that is, goods may enter a portion of the city's harbor for storage, transshipment, or even processing, without paying duty. Ships from all parts of the world call here—50 or 60 of them in an average day—and hundreds of large industrial firms and shippers of many nations maintain offices, warehouses, and factories.

Free Port Offers Glittering Nights

As a result, Hamburg has an international flavor unmatched by any other German city; driving along her waterfront, I saw streets with names like Amerikastrasse, Afrikastrasse, and Asiastrasse. Her night life is equally cosmopolitan. In the glittering Sankt Pauli district near the waterfront, and especially along the Reeperbahn (street of the ropemakers), French follies, lady wrestlers, and Dixieland bands compete for the sailor's pay and the visiting shipper's expense account (page 776).

Across the river from the Reeperbahn the rivet guns rumble in Hamburg's six big shipyards, and the blue glare of arc-welding machines flickers late into the night. Last year the city's yards launched 76 ships, with a capacity of 376,000 tons.

Yet Hamburg has troubles. Its harbor facilities, 80 percent destroyed during World War II, have been rebuilt and modernized at a cost of more than \$125,000,000. Ultra-modern wharves with streamlined equipment make this one of the world's fastest ports for loading, unloading, and turnaround. But business is not all it should be, for the city lies unfortunately close to the Communist world, and much of its natural trading area is cut off.

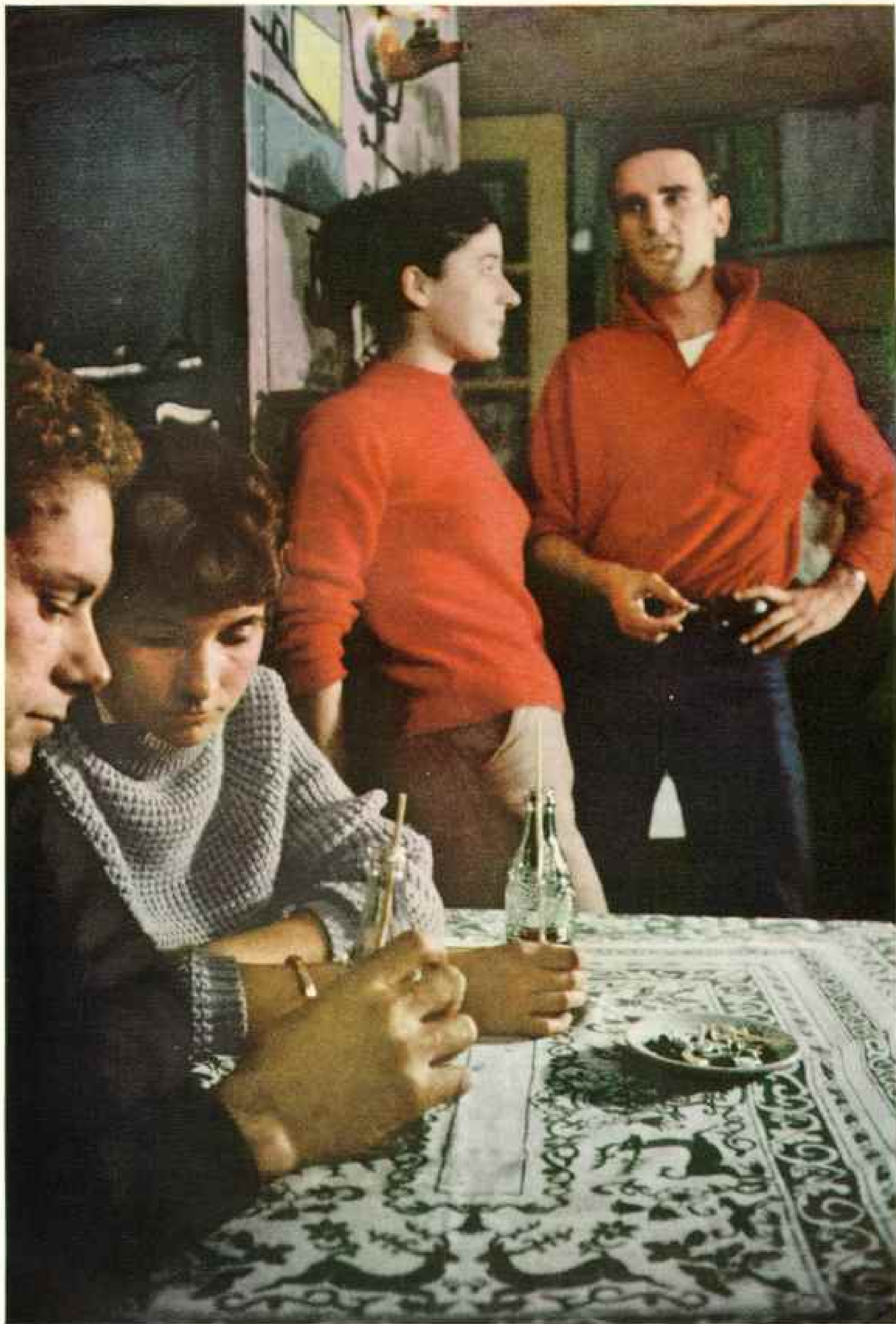
The city's commerce with East Germany, for instance, is only 24 percent of prewar, and though the port's over-all traffic is about 20 percent above 1936, world trade as a whole has increased 75 percent in the same period.

Hamburg also has a housing shortage, aggravated by a vast influx of refugees. Her population at the end of World War II was less than 1,100,000; now it is 1,850,000, and more are coming every day.

While they wait for permanent housing,

West Berlin's Clean Cobblestones Meet East Germany's Weeds in Midstreet

Slabs spaced at intervals mark an invisible iron curtain. Traffic sweeps the western lane clear; rank growth clogs the neglected eastern zone. A rustic fence on the left faces a barbed-wire barricade behind the trees that seals off the citizens of East Germany. Free Berlin remains an island in a Communist sea.



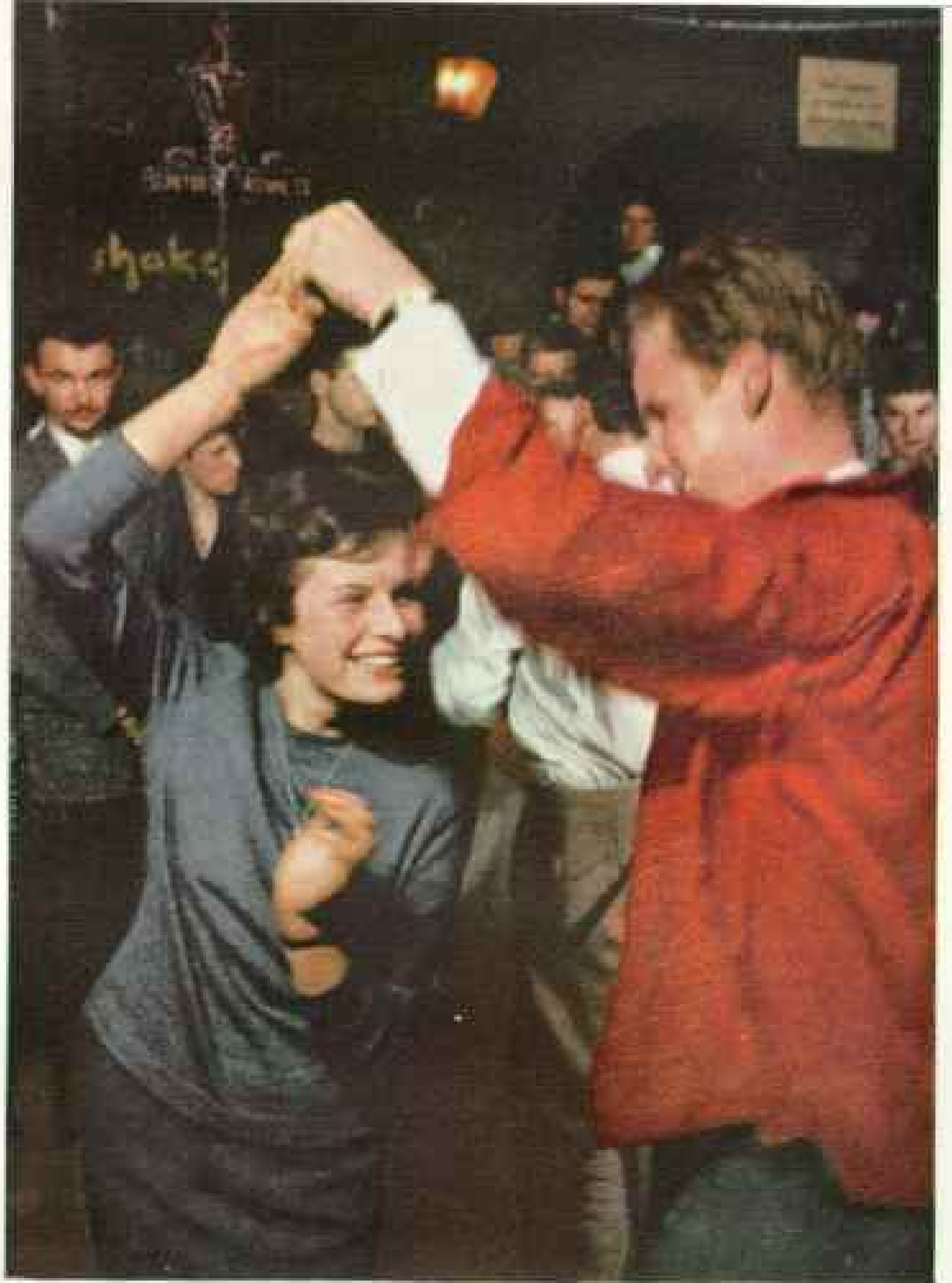
Berlin Night Spot Caters to Teen-agers

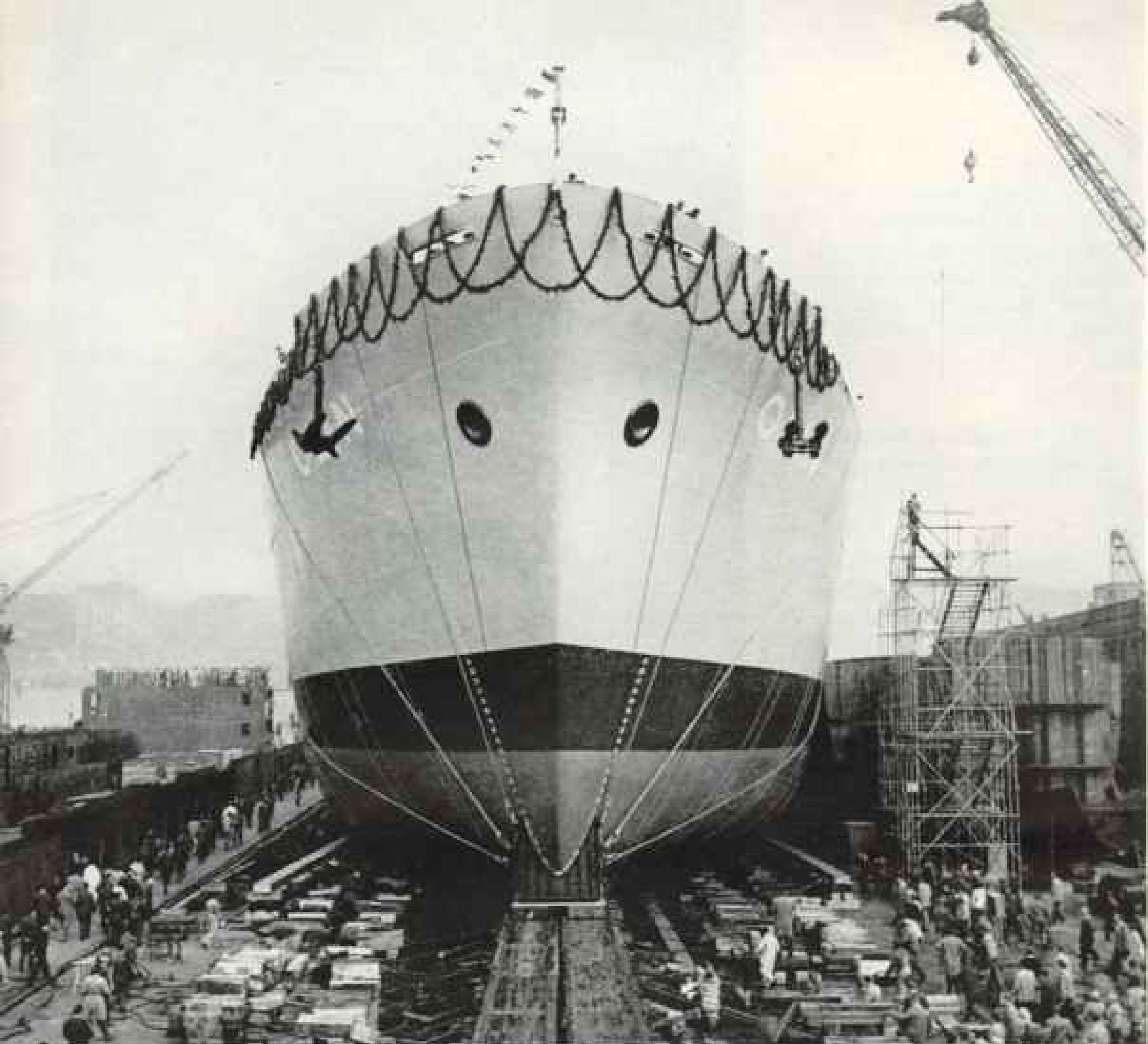
Sweatered and blue-jeaned fitterbugs jam the Eggshell club. They thin out at 10 p.m.—curfew for those under 18.

U. S. dance styles catch on with young Germans.

Jazz fans from the Free University of Berlin gather for a Sunday afternoon session. A guitarist joins in the taped music.

"German college students can talk more knowledgeably about American jazz artists than most Americans," reports the author, "but they aren't alone in their love of jazz. A leading industrialist I interviewed boasted of meeting Louis Armstrong. One of his prized possessions was a complete collection of Armstrong records."





Olin, a 22,600-ton Ore Carrier, Slips Down the Ways at Hamburg

A ship with an international flavor, the *Olin* was built in a German yard, carries an Italian crew, and flies the Liberian flag while hauling bauxite from Surinam to Louisiana for a U. S. corporation. The wife of Hamburg's mayor christened the vessel at the launching last September. Two sister ships are scheduled for delivery this year.

many refugees live in camps in and around the city (some stay in private homes). There are 27 such camps in the Hamburg area. On a rainy morning I drove out to visit one at Finkenwerder, where 1,900 men, women, and children lived in what were once barracks for a submarine base. They spent their days in dreary squalor, crowded as many as 10 to a room. In one building a small kitchen with 14 gas burners served 120 people, and bathroom facilities were even more primitive.

Yet when I knocked on the door of one of the rooms, I met a most cheerful family, whom I will call Schmidt. There were seven of them—father, mother, and five children from 4 to 19 years old.

The walls of their single room were lined with double-decked bunks. A curtain strung from the ceiling provided a measure of privacy, and though the room was incredibly crowded, it was neat and clean.

Children Ride Subway to Freedom

"We have lived here almost three years," Frau Schmidt, a plump, blond woman in a red sweater, told me. "But it has not been so bad, because we knew it was only temporary. Now it is almost over. Next month we move into a new four-room flat in Hamburg."

They had fled from a city in Mecklenburg, she told me, sending the three oldest children

ahead through the Berlin subway to stay with relatives in West Berlin. The rest of the family followed a few days later.

Why had they left East Germany?

"Almost everyone *wants* to leave," Herr Schmidt explained. "Working conditions there are very bad, and if you don't work hard enough they accuse you of sabotage. There are men called 'activists'—Communist Party agents—who have jobs in the factories and claim impossible production records. Then you're supposed to match those records. You can't. But if you could, it would do no good, because when you take your pay to the stores, they have nothing you want to buy.

"Even so, it's hard to make up your mind to leave. But I helped arrange for a friend to get away—I worked on a railroad—and then another friend warned me that the police were suspicious of me. That made up my mind. I decided to get out while I still could.

"At first, you see, everyone thought that these conditions were just temporary, that in a few years Germany would be reunified. Now they don't believe it any more.

"You might say," he added with a suggestion of a smile, "that I got tired of waiting, so I reunified myself."

Energy Generates a German Problem

Herr Schmidt has made his choice. Word has gone out across eastern Europe that the Fatherland is rebuilding in the west, and Herr Schmidt, like millions of other German refugees, wanted to be part of it. Yet though he has crossed the frontier, he has not left it very far behind, and its proximity will affect almost every facet of his future.

For the same factors that make West Germany a showcase also make it Europe's most explosive political problem. Precisely because the German people are so fantastically energetic and because they live along the fringe of the Communist world, their country is the biggest source of friction in the cold war.

For more than a decade, U. S. and British troops have stood guard along the 825 miles of frontier that separates West Germany from its eastern neighbors. I remember squatting one afternoon in a trench on this border, where four American soldiers manned a loaded machine gun and a radio transmitter. A few hundred yards away, across a valley, East German soldiers manned a similar post, with a machine gun aimed at us.

But now a change is taking place. The

frontier north of Bad Hersfeld is patrolled in part by West German border police. By 1961 the new West German Army, the *Bundeswehr*, will probably be the biggest standing in western Europe. And as this is written, the Bonn government of the Federal Republic of Germany is approving a contract to acquire 296 supersonic jet fighter planes. Ninety-six will be purchased from the Lockheed Aircraft Corporation in California. But the other 200 will be built, under license from Lockheed and General Electric, in West Germany. Thus for the first time since World War II, German airplane factories, including one named Messerschmitt, will be making fighters again.

New Army Lacks Old Glamour

The new German Army is different from Hitler's or the Kaiser's. Its uniforms are drab and businesslike; hobnailed boots are gone, and so is much of the old glamour. Like the U. S. Army, it is run by a civilian defense minister, an arm of an elected democratic government. Under NATO command, it is not the potent political force that German armies have been in the past.

Yet there are straws blowing the other way. The famous student dueling clubs, symbols of German militarism, are coming back to the universities. Their members are aristocratic young men who believe that scars on the skin prove mettle and manhood. The clubs are still so unpopular with most of the students that they remain secretive, holding their duels in strictest privacy and even, one student member told me, trying to confine their saber scars to their scalps where, with the hair properly combed, they do not show.

I asked serious questions of a number of Germans: Do you think West Germany will keep her democratic government? Or will a new Führer arise? Will she stay at peace with her neighbors? Will East and West Germany ever be reunited? What will become of Berlin?

Most often, the answer I got was something like this: "Why ask us? Our future is not in our own hands. All these questions are really up to you and the Russians."

Well, yes. At least for the past decade, and perhaps for the next half decade. But at the rate they are going, it will not be long before the future of Germany and, to a degree, of her neighbors, will again rest largely in the hands of the Germans. It will be interesting to see what they make of it this time.





HAWAII NATIONAL PARK

Volcanic Fires of the 50th State

By PAUL A. ZAHL, Ph.D.

National Geographic
Senior Editorial Staff
(Natural Sciences)

LURCHING AND BUCKING, our jeep made its way upward through a two-color world of blue sky and black lava. Soon we would get out and hike to a point near the 13,680-foot summit. Still on foot, we would cross the crater of this active volcano.

"Just when is the next eruption due?" I asked our driver, geophysicist Jerry P. Eaton.

"Well, on the average, one comes along every three and a half years," said Jerry, dodging a bump. "The last one was eight years ago. But Mauna Loa can wait awhile longer."

These scorched slopes were part of Hawaii National Park. Here on the large island of Hawaii, and across 30 miles of Pacific on Maui, the Park Service has set aside 362 square miles of unpredictable, lava-built scenery.

Behind us, at park headquarters, my family was sampling quieter vistas. Like 500,000 other annual visitors,

Roaring like a jet plane, a glowing fountain spurts incandescent rock 400 feet into the air during the 1955 eruption of Kilauea on the island of Hawaii. The column of lava lasted 12 days and fed a molten river three miles long and 15 to 20 feet thick just outside Hawaii National Park. A shift in wind could have showered geophysicist Jerry Eaton with washtub-size clots of hot pumice.

we had come—my wife and I, our daughter Eda, 10, and our son Paul, 7—to explore this immensely varied park (map, page 796). Since the park straddles salt water between the islands of Hawaii and Maui, we were prepared to be mobile. But braving the crater of an active volcano, I felt, was not exactly a family exploit. With their mother, the youngsters were reluctantly staying behind, for the moment putting aside their earnest wish for "a real eruption."

Climbing a Lofty Spitfire

Measured from the floor of the ocean to the top of its blunt, shieldlike dome, Mauna Loa thrusts upward for more than 30,000 feet, exceeding Mount Everest's over-all stature by a thousand feet. Thus its underwater size accounts for the claim that this Hawaiian peak is "taller" than the world's highest mountain. From an oval crater three miles long, and from its rift zones, Mauna Loa—literally, "long mountain"—often sears the countryside.

When would the heavens again redden to the glow of molten lava? We did not know, but our journey might help provide an answer. Jerry Eaton and geologist George D. Fraser wanted to install a tiltmeter on the summit of Mauna Loa. We would prepare three small concrete piers for this simple, sensitive instrument. Its water level would indicate any warping of the earth's surface; to volcanologists, such movement can reveal a change in subterranean pressures—and possibly a coming eruption.

"See where she burst out in 1935?" asked Jerry Eaton. He pointed to a cinder cone on the mountain's north flank. From it lava had bled down into the saddle which separates Mauna Loa from the extinct volcano Mauna Kea. From the saddle the lava had turned directly for the port city of Hilo. When the lava was only 15 miles from the city, U. S. Army bombers dropped high explosives at strategic spots, apparently checking the advance of the flow. A similar bombing took place in 1942 when Hilo again seemed under threat.

At length Eaton parked the jeep and we at-

tacked the mountain on foot. No Bureau of Standards test could have punished our hiking shoes with the severity of Mauna Loa's lava wastes. The loose, clinkery variety of lava was aa (pronounced ah-ah), while the billowy, smoother form was pahoehoe (pa-hoay-hoay). These odd Hawaiian names have become well entrenched in the literature of volcanology. During an eruption, aa creeps overland, a spectacle of grinding—sometimes glowing—clinkers. Pahoehoe flows with quieter ease; its surface crusts over, and the molten mass runs through a tube of its own making. Highly fluid Hawaiian lava moves at frightening speeds: up to 35 miles an hour.

We entered the 13,000-foot zone late in the afternoon; the thin air grew cold, and the sky deepened into a spaceman's blue. When at last we spied the summit shelter, I was too tired to give out with anything but a quiet inward cheer. Only a stone's throw away, perpendicular cliffs fell off several hundred feet into Mauna Loa's primary crater.

An hour later, as night overwhelmed our volcano top, we sat around a crackling wood stove to watch Dr. George C. Rühle, chief park naturalist, assume chef duties with a steak.

"Eat up strong," he was saying. "Going into the crater tomorrow will take a lot of energy. And remember to wrap your blankets tight," he added. "July or not, the temperature drops below freezing at night."

Loose Lava Conceals Treacherous Pits

Early next morning Eaton and Fraser dipped water from an ice-capped pool in a near-by crevasse and mixed concrete. Not far from the crater's brink they affixed wooden forms to a solid mass of lava and poured their mix. The tiltmeter mechanism would be installed on another trip.

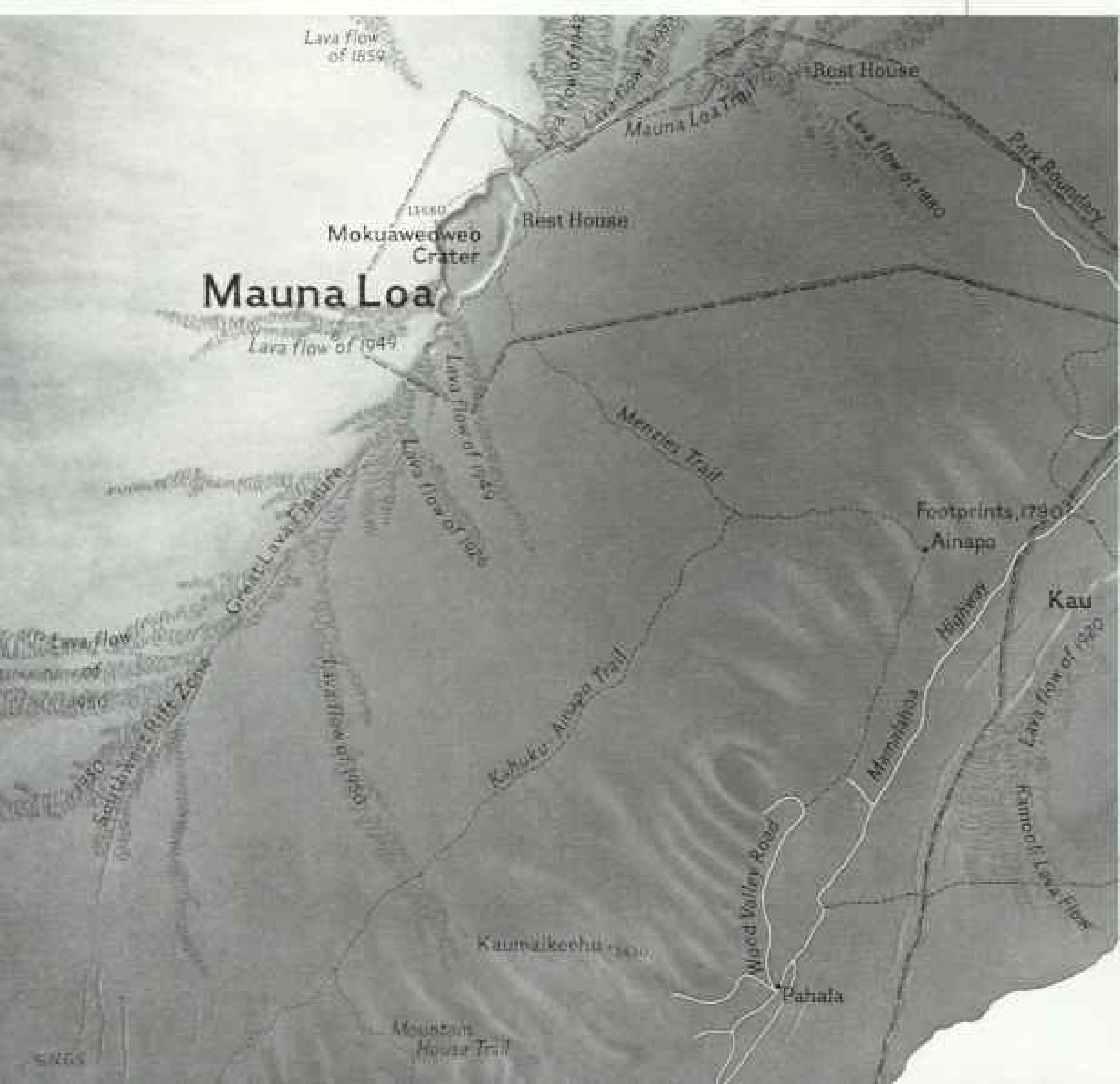
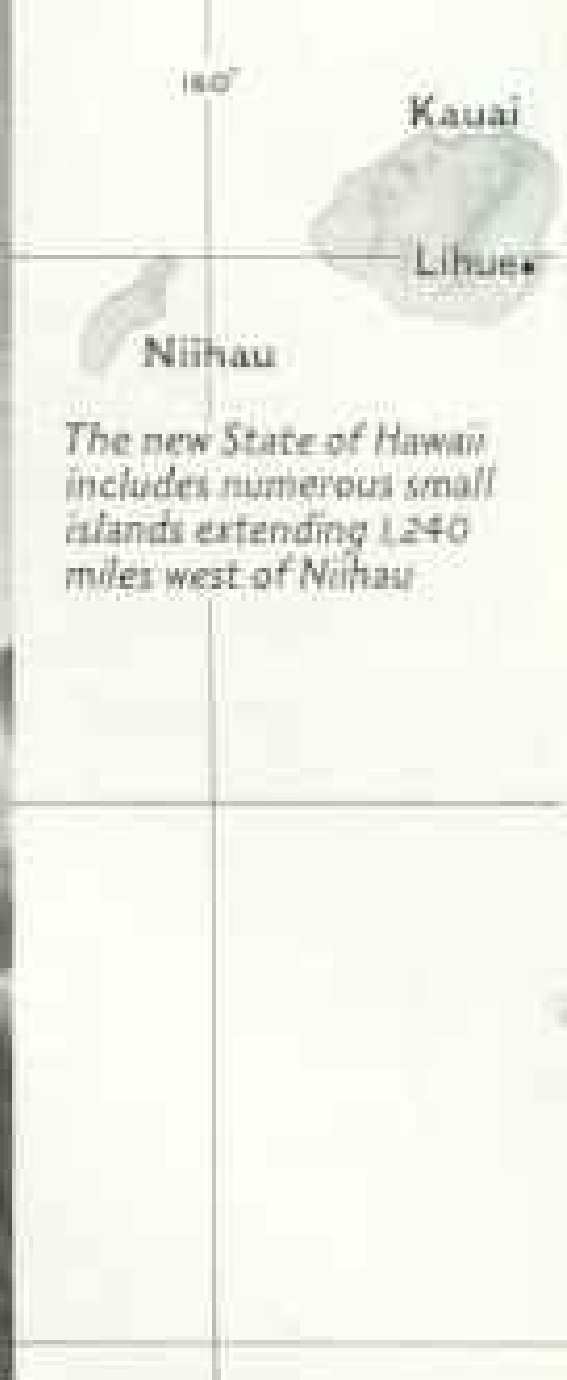
By eight a.m. we were on the move again. Southward we picked our way along the crater edge for a mile or so; there the going changed from hard lava to loose pumice. This golden-brown gravelly material was easy to negotiate in places, but treacherous where it concealed

(Continued on page 800)

White Water Embroiders Black Sand on the Beach at Kaimu

Ages ago hot lava rushed into the cold sea; some of it exploded in a rain of fragmented basalt which waves smoothed to sand. Fifty miles away lava containing olivine built a green beach. The author's children, 10-year-old Eda and Paul, 7, play just beyond tongues of powerful surf. "Speckled with sand, they looked like refugees from a coal bin," said their mother, "but black sand is as clean as white and leaves no smudges."





HAWAIIAN ISLANDS

Pacific Ocean

Oahu

Haleiwa

Honolulu

Molokai

Passenger-carrying freighters connect Hilo and Kahului with Honolulu and the mainland



Maui

Several flights daily link Honolulu with Maui and Hawaii. Limousines take park visitors to Maui's crater and across Hawaii

Lanai

Lanai City

Kahoolawe

HAWAII NATIONAL PARK

Hawaii

0 100
STATUTE MILES

Automobile roads reach the rims of Haleakala and Kilauea. Foot trails face the park. Mauna Loa may be climbed by a steep, shattering trail not recommended for average visitors. Horses, available near Silverwood Inn, may also be used on Haleakala trails

Mountain View
Hilo, 33 miles

Kailua

Kilauea Iki
City of Refuge

Mauna Kea
13794

Hilo

Mauna Loa
13678

PEÑA

Kilauea
10800

Pahoehoe

Lava erupted from the lower slope of Kilauea in 1955

Kilauea Crater

Observatory

1954 Lava

Halemaumau Crater

Great Crack Trail

Steaming Bluff
Sulphur Banks

Park Headquarters

Vulcano House

Twin Craters, connected by Thurston Lava Tube

Fern Jungle

Fern Forest

Napau Crater

Makaopuhi Crater

Kaimu

Desert

Kahana Trail

Kalapana

Poliokeawe Pali

Puna Trail

Hilina Pali Trail

Apua Point

Pacific Ocean

HAWAII NATIONAL PARK

ISLAND OF HAWAII

0 10 20 30 40 50
STATUTE MILES





An Advancing Tide of Fiery Lava Barricades a Road Near Pahoa

Fountaining out of the vent (page 792), the monstrous wave oozed through a forest of ohia trees on Hawaii. Burned off at the base, 100 footers toppled like matchsticks. As the mass crossed the road, it sent this tentacle down the straightaway at 300 feet an hour. Clinkers rode the crest until they tumbled off the front edge and then, like the treads of a caterpillar tractor, paved a way for the hot, mobile core.

"At this point," writes photographer Eaton, "we could hear the dull roar of the fountain half a mile away, the crackling brush burning at the edge of the flow, the glassy tinkle and clatter of clinkers rolling down the front. The odor was smoke; the sensation, heat; the emotion, awe."

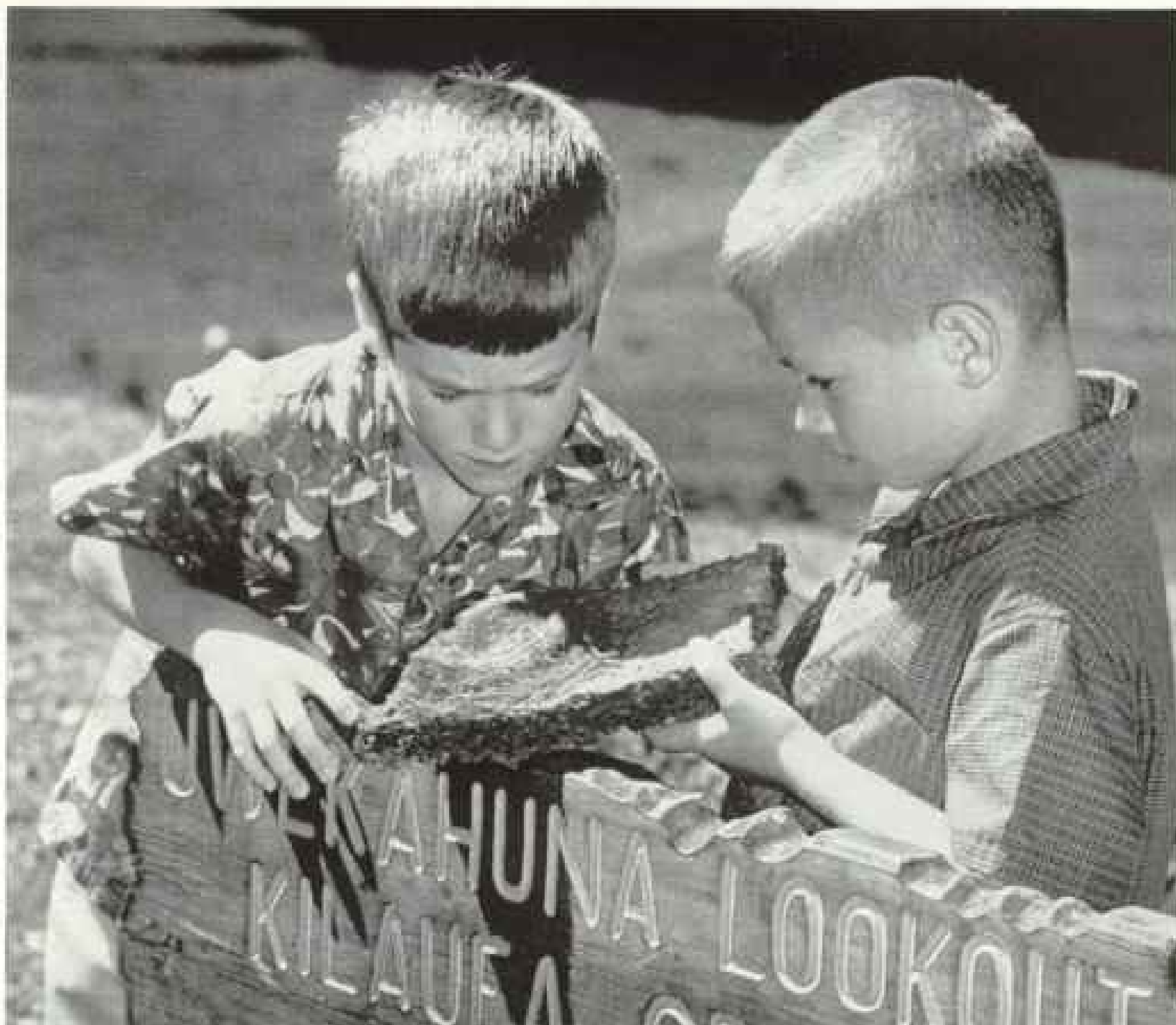
Clearing its throat, a 15-foot-high spatter cone ejects blobs of red-hot lava.

Islands of sugar cane dot a black river of cooled lava. Abrasive, treacherous, the clinkers threaten the Zahl family with shredded shoes, slashed trousers, and torn skin.

799

PHOTOGRAPHER: J. P. EATON, U.S. GEOLOGICAL SURVEY; AND (BELOW)
PAUL A. ZHIL, NATIONAL GEOGRAPHIC STAFF © 1962





A Bird's Nest of Pele's Hair—Spun Volcanic Glass—Intrigues Park Visitors

Squirted into the air, droplets of lava often string out as filaments and solidify into long threads. At least three birds of unknown species have used the material for construction. The builder of this glass house, discovered in 1954, gathered thousands of glassy fibers to shape the cup. Other nests turned up in 1881 and 1943.

pits and rock crevices. Finally we stood on the solid surface of a lava stream which only nine years before had flowed hot and incandescent. It was half a mile wide. Our aim was to cross this now blackened river; then we would ascend a red pumice cone to the southwest on the easiest route to the crater floor.

Crater Resembles a Lunar World

The cone, a good 250 feet higher than the crater rim, suggested a dizzying descent from its steep slope. Bailing off the edge of these pumice heights was a mixture of fun and fright. In a cloud of cinder dust, we half ran and half slid 600 feet. The slope, slanting nearly 45 degrees, funneled us into the utterly grotesque world of the crater floor. Meeting a Martian spaceship here would have surprised me not at all.

We dusted cinders from our clothes and hair

and stopped for a lunch of cheese and crackers. I turned toward our geologist, George Fraser. In one hand I held an abrasive chunk of aa, in the other a slab of pahoehoe, both from the terrain where we sat. "What makes some lava rough and clinkery, some smooth and ropy?" I asked.

"Chemically, these two pieces are identical," said Mr. Fraser, "so we must look for a mechanical difference. The rough aa continued to move after solidification—it had to pull apart and break into pieces. The smooth pahoehoe stopped moving while it was still fluid, so that it was stretched and folded but not broken."

Jerry Eaton added more information: "Hawaiian lavas are very fluid when they come out of the vent. Perhaps for this reason, our volcanoes are less violent than most others."

He went on to explain that Hawaii had

experienced "a pretty good eruption" in 1790 and another in 1924. But these could not compare to the destruction wrought by the East Indies volcano of Krakatau in 1883. That explosion was heard 3,000 miles away; its volcanic dust showered the whole planet and blotted out the sun for hundreds of miles. The island of Krakatau—18 square miles in area—literally disintegrated.

Hawaii Offers Volcano Laboratory

"We don't have eruptions like that," said Jerry. "Gases dissolved in fluid Hawaiian lavas escape readily. They don't build up the pressures needed for violent explosions."

"And for that, we're all grateful," said park ranger Albert Ayers. "One Krakatau explosion here, and goodbye Hawaii National Park."

"But this way," said Jerry, "we have probably the best place in the world for studying volcanoes."

Regirding ourselves with knapsacks, we set our course directly northward, past a series of sulphur vents. Some hours before, from the east brink, we had viewed the bluish emanations of those vents.

With the volcanologists and ranger Ayers vigorously in the lead, Dr. Ruhle and I slowed down to photograph some of the fantastic crevasses, spatter cones, and rainbow incrustations along the way. Spatter cones are so called because during activity their vents throw out wads of molten lava which, splashing down and congealing, build hollow, open-topped "anthills" of stone (page 798). The brilliant red-and-orange lips of some of the now dead cones glowed almost as intensely as they must have done when hot.

"And those cones were *really* hot," said Ruhle. "Fluid lava can have a temperature anywhere from 1,600 to 2,000 degrees Fahrenheit. Right here where we are walking, the crater floor opened in 1949 and lava fountains shot up as high as 800 feet—more than five times the height of Yellowstone's Old Faithful."

Much of this crater floor was lava flooded on that occasion, and fiery rivers overflowed the south end. A year later, in 1950, Mauna Loa erupted again, but this time from the mountain's southwest flank instead of the crater. A billion tons of lava cascaded down the slopes, some eventually pouring into the sea. "You probably saw newsreel shots of those fireworks," said Dr. Ruhle.

Cautiously we climbed over great jagged aa

heaps, around yawning holes and vents, between monstrous folds of pahoehoe (page 810). It took an effort of the imagination to see this cold, harsh, petrified surface as the boiling inferno it had been a few years before. What utter desolation! Except for our small party, the crater was utterly devoid of life or sound.

An hour later we caught up with our companions. "Stick to the windward side," Ruhle warned as we approached more sulphur vents. "The fumes are awful." The geologists collected mineral samples. Then we spent the remainder of the afternoon feeling our way across the crater toward a gentle slope on the north and a reasonably simple exit.

On the brink again, I looked back, finding it hard to believe that we had traversed the entire trackless length of Mauna Loa's crater. The eruption—the "real one" that my youngsters wanted—had remained overdue for two more days.

"Eda and Paul settled for another look at the volcano movies," my wife reported on our return. These color films, projected daily in an auditorium next to the park museum, were taken during past eruptions of Mauna Loa and Kilauea. Seeing them, the visitor gets a vivid impression of Hawaii's own beginnings.

Islands Boil Out of the Sea

All islands of the Hawaiian group rose from the mid-Pacific sea floor by a slow piling up of periodically released lava. For each volcano standing above the sea as a craterous tropical island or as an eroded coral-capped reef, many a smaller volcanic mountain remains invisible on the ocean floor.

Legend has it that the Polynesian demigod Maui fished the Hawaiian Islands from the sea—Niibau, Kauai, Oahu, Molokai, Lanai, Kahoolawe, Maui, and Hawaii. Together these islands, with smaller, coral-capped components of the new State of Hawaii, comprise an area of 6,436 square miles. The island of Hawaii, twice the size of Delaware, accounts for two-thirds of the land; to local folk it is "the big island."

"The volcanoes are quiet now," a resident told us when we established quarters in the National Park, "but you'll still see Madame Pele's handiwork."

This was not the last time we heard reference to Pele. In Polynesian folklore this goddess of volcanoes is depicted as either a ravishing beauty or an ugly hag. Pele's vol-



WOODCARVING BY PAUL A. ZANK, NATIONAL GEOGRAPHIC STAFF © N. G. S.

Lovers Flee Pele's Burning Wrath: a Wood Carving at Volcano House

Hilaka, beautiful young sister of Pele, and her bridegroom Lohiau wade through lava sent by her jealous relative. Being mortal, Lohiau turned to stone, but was later miraculously restored to life and the arms of his wife.

This famed hotel on the brink of Kilauea uses natural steam, piped directly from lava fissures, for its steam baths. One-hundred-year-old George Lycurgus, retired manager of the hotel, and his son Nick show the Zahl children chunks of colored lava. Edi wears the voluminous muumuu, a Mother Hubbard introduced into Hawaii by missionaries. Scarlet anthuriums brighten the hearthside.

canic mementos are strewn everywhere on the big island: ethereal waterfalls pencil down great lava cliffs; seas pound against dark lava promontories or lap on beaches of black sand; porous substrata of volcanic origin nourish vast tracts of sugar cane.

In 1916 the Federal Government set aside 250 square miles of the island of Hawaii and 25 on the neighboring island of Maui as the twelfth U. S. national park. Since then, a tract connecting the mountains of Mauna Loa and Kilauea has been added to park areas, together with a section of the grotesque Kau Desert.

Neighboring areas are no less fascinating: the beautiful black-sand shore at Kaimu (page 795), ethnologically interesting ruins in the eastern Puna district, and the ancient City of Refuge on the Kona coast—a holy place where, during the old monarchy, taboo-breakers and even murderers could take inviolable sanctuary.

Though Mauna Loa's lava-spewing escapades have made international news since the days of Captain Cook, it is far from being the only pyrotechnic attraction. Its restless neighbor to the east, Kilauea, erupts only sporadically these days, but in years past Kilauea was almost continuously active. One early witness described the inferno with simple horror: "I've seen hell."

Modern pilgrims to Kilauea bring back a different impression. In the near-by Puna district, the mellowed fires of this volcano now heat the waters of Warm Springs, creating the very dream of a tropical pool. Here visitors may swim or admire bright blossoms in a lush, idyllic setting.

Lava-built Mountains Capture Rain

Even so, Kilauea still has keepsakes of its violent past. From its summit, near tons of boulders tossed from Kilauea's depths in 1924, a great fissure in the earth runs for more than 10 miles down the mountain's arid side. This terrifying trench—90 feet deep and in places 60 feet across—is thought to be the work of earthquakes hundreds of years ago.

The sharp contrast of lush tropics and arid desert is another result of volcanic activity. The lava-built mountains intercept moisture from trade winds—more than 100 inches of rainfall a year—leaving dry "rain shadows" on the leeward mountainsides.*

Our own first day on the island of Hawaii gave us a luxuriant sampling of the rain traps. From the gentle tropics of the coast at Hilo,

we motored up through rolling sugar-cane fields into country that grew ever more deeply choked with lush greenery. We felt the air cool steadily. From time to time I snapped on the windshield wiper, as our car carried us through fitful rains and swirling mists. We passed Mountain View, a floral and cane community 1,500 feet up the eastern slopes of Mauna Loa.

"Annual rainfall exceeds 180 inches," my wife read aloud to the children. "That explains the giant ferns here on the highway," she said. Soon we passed a sign at the roadside: we had entered Hawaii National Park. We had also climbed 4,000 feet in the course of driving 30 miles.

Patriarch Visits Pele's Altar

That evening we joined a group of lei-adorned tourists gathered around a blazing log fire in the lounge of Volcano House, a hotel perched on the very brink of Kilauea Crater. Operating under franchise from the U. S. Department of the Interior, this establishment boasts a colorful proprietor, 100-year-old "Uncle George" Lycurgus (opposite). Uncle George was playing cribbage with a guest in one corner, and a young Hawaiian tour guide was dreamily strumming a ukulele in another. In this enchanted setting we had found Hawaii's essence.

Early next morning I was taking photographs on the strip of lawn that separates Volcano House from the sharp 330-foot cliff of Kilauea caldera, as such great volcanic depressions are technically called. Two miles away across blackened lava, I could make out a row of low, jagged irregularities—vents and cones of a past eruption. Beyond these was the gaping mouth of what seemed to be an enormous hole.

This was Pele's legendary abode, once called Ka-lua-Pele, or Pele's Pit. Today's visitors know it as Halemaumau, or Fern House, perhaps because of a fern-frond shelter maintained on its brink in olden days for the use of Pele-worshiping pilgrims.

Nearer, from the brim of Kilauea's north wall, great plumes of steam swept out over the caldera, sharply angled by the ever-blowing trades. Similar tufts, although smaller, rose from dozens of invisible vents in the 2,600-acre caldera floor. This steam was not the signal of a coming eruption; rather, it was

* See "Because It Rains on Hawaii," by Frederick Simpich, Jr., NATIONAL GEOGRAPHIC, November, 1949.



**Halemaumau Conjures an Inferno;
Fountains Spewing Fire Fill a Lake**

Here, at dawn on May 31, 1954, pyrotechnic geysers rear incandescent columns as high as 50-story buildings. At intervals 15-foot breakers



EDUCATIONAL BY A. P. ESTER, U. S. GEOLOGICAL SURVEY © NATIONAL GEOGRAPHIC SOCIETY

roll across the lake and splash against the pit walls. Between waves a thin crust of thickening lava veils the glowing face of the pool, which

covers 140 acres to a depth of 30 feet. Sulphurous fumes swirl around the thundering jets. Today steam vents crease the congealed floor.

caused by rain and ground water seeping down onto subterranean beds of hot rock hundreds or thousands of feet below the surface.

Steam vents of this sort are commonplace in other parts of the park. Along the Chain of Craters Road steam so reduces visibility at certain times that, for safety, engineers have divided the highway into widely separated one-way lanes.

I pulled up the collar of my raincoat and watched gray mist blow in from the east. It enveloped the caldera, then gradually cleared. The dark lava slopes showed changing shades of gray, blue, and pink.

Demigoddess Gets Strong Drink

A voice startled me: "Lovely sight, isn't it?"

I turned to find Uncle George Lycurgus greeting me, his clear speech and erect carriage belying his years.

"It certainly is," I replied. "But can you tell me, sir, when Madame Pele will stir up a little activity out there?"

The alert eyes sparkled. "Bah! She's totally unreliable," he exclaimed. "Once Pele listened to me; now her heart has turned to stone."

He referred to a story I had already heard, how Uncle George had once been party to a strange bit of pagan occultism. The tale goes that in 1934, following a lean period of Kilauea inactivity, and an inn quite empty of guests, Lycurgus faced a worrisome financial pinch.

In desperation, he and a friend prepared a lei of ohelo berries, the fruit sacred to Pele (page 809). This they tossed into Kilauea's lifeless fire pit, the while imploring Pele to manifest herself. For good measure, the supplicants flung over a bottle of gin, for it is legend that the demigoddess has a powerful hankering for strong drink.

Their oblations completed, Lycurgus and his henchman hurried home, lest Pele answer them too suddenly.

As recorded by a onetime assistant superintendent of Hawaii National Park, within hours of that weird half-mock, half-serious ceremony, smoke and steam began rising from the pit. The stone bed flooded with fiery

lava. The news quickly got to Honolulu, and before long Volcano House was filled with paying guests.

To find out what science has to say of Pele's whims, I visited the Hawaiian Volcano Observatory, high on Kilauea's west rim. The director was young Dr. Jerry Eaton, who had piloted our jeep on the Mauna Loa climb.

"These instruments are truly sensitive," Jerry was saying, as he pointed to three slowly rotating seismographic drums, each about the size of a standard nail keg. "They record even tiny disturbances produced by wind—or by waves on the shore down there—or even by distant storms at sea."

I noticed that the seismograph pens were constantly moving on the drums' sooted paper, recording the minute vibrations called microseisms. Those are the movements which imperceptibly shake the ground beneath everyone, everywhere.

Eaton explained how electrical signals are produced by three pendulum mechanisms in three different field pickup units. "The signals are then transmitted here for recording," said Eaton. "We can tell at once if there is movement—or any other rearrangement deep in the earth. A fault movement stands out above these microseismic wiggles like a peal of thunder above the noise of a city."

The volcanologists know the location of the three pickups. They know the speed of tremor waves passing through the earth and can measure the time those waves arrive at each seismograph. With that information the experts can carefully calculate the time and place of any disturbance.

Guesses Grow More Educated

In addition to the three seismographs represented by the drums we were watching, the observatory also has seismographs at eight other stations on Hawaii and one in the Haleakala region on Maui.

"When are you going to be able to forecast eruptions—or control them?" I asked.

Eaton smiled regretfully. "Someday we may be able to forecast. Right now we can't. We've got to dig more deeply into basic

(Continued on page 815)

Scarlet Pompons of the Ohia Lehua Brighten Every Corner of Hawaii

A relative of the myrtle, the ohia opens plum-size blossoms from seashore to mountaintop. In rain forests it appears as a towering tree 100 feet or more in height; on deserts it ekes out its living as a bush (page 808). This enlargement shows full and developing blooms, seed pods (upper left), and buds (lower).



Eda Zahl Peers Cautiously into the "Eye of the Eel,"
the Rock-paved, Forest-grown Makaopuhi Crater

Once a lake of lava spread across the crater's flat upper level. The rock hardened, then fell into a subterranean cavity, forming the deeper abyss in the foreground and sheering off the cliff at center. In 1922 a fresh flow cascaded from a vent in the wall of the younger crater (left), building up the floor to its present level of 980 feet below the lookout.

Hawaii National Park's seven-mile Chain of Craters Road in Kilauea's east rift zone threads 10 of these pit craters. The island's most recently active one, Halemaumau, with its neighboring lava flows (below), lies near by.

ALL PHOTOGRAPHS BY PAUL A. ZAHL, NATIONAL GEOGRAPHIC STAFF © N. G. S.



Plant pioneers settle on a 35-year-old volcanic desert near Halemaumau. Hawaiian snow, a shaggy white lichen known scientifically as *Stereocaulon*, arrived first and covered the barren rocks like a sheet.

In time, red-blooming ohia (left), red-berried ohelo (foreground), and heatherlike pu-keawe sprang out of cracks in the lava. Eventually they will reclaim the wilderness.

Author and daughter here examine a lichen encrustation.



Meager fare supports the ohelo bush and berry. Pele claimed the plant because it thrives on volcanic ash and cinder. Worshipers at her Halemaumau shrine tossed the sacred berries into the crater with the incantation: "Pele, here are thy ohelo. I offer some to thee; some I also eat." After the rite they might partake of the fruit without angering the goddess. A relative of the cranberry, the ohelo berry lacks distinctive flavor.







Rocks hot enough to fry an egg pile up around fumaroles at Kilauea's Sulphur Banks. Swirling out of the earth, vapors at 200° F. condense in the air and paint the stones with colorful minerals (right). In rain, the area resembles a steam bath.

A Swirling Black Wave of Lava Stands Frozen in Its Track

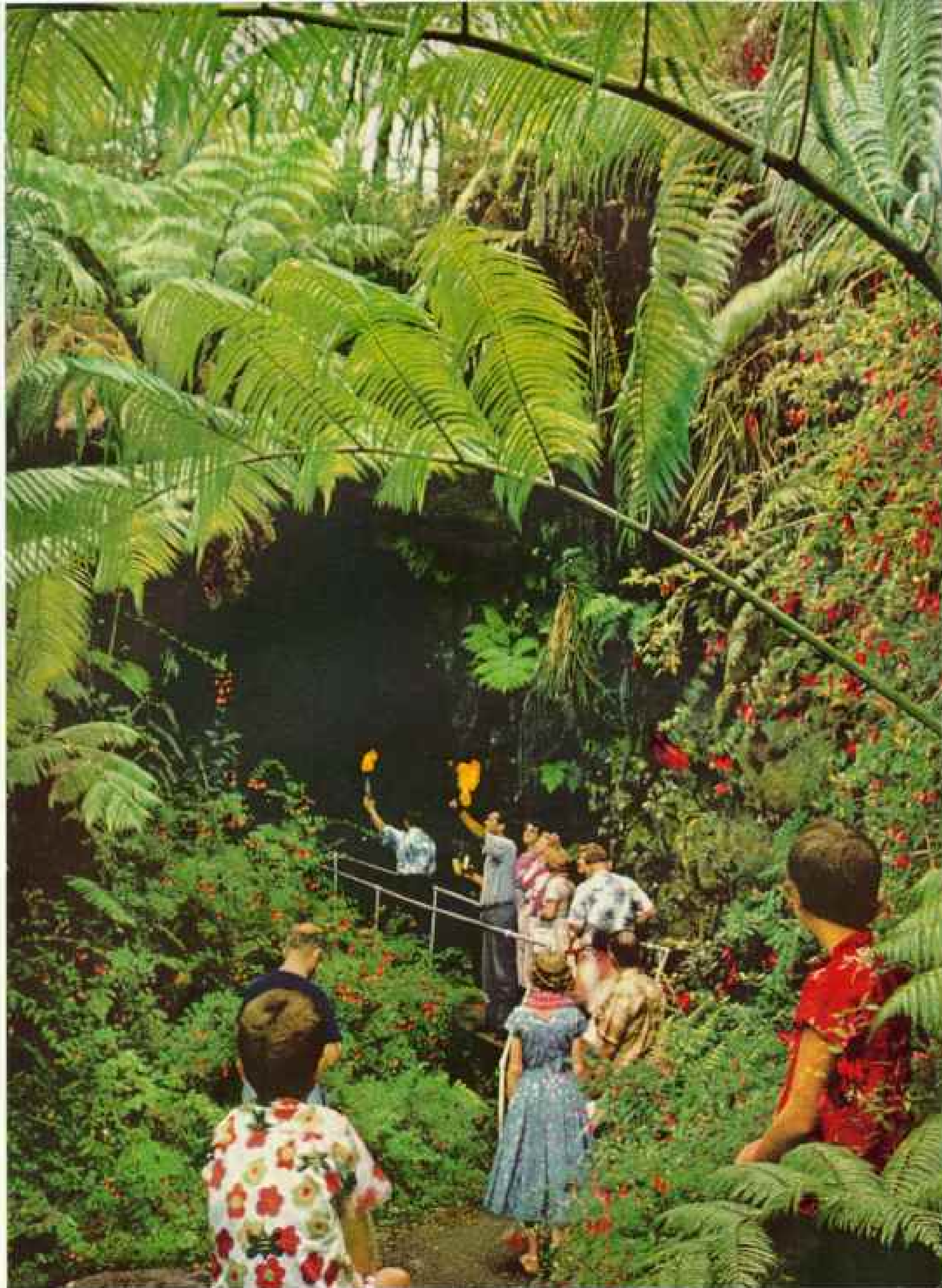
In 1949 the distant cone at the summit of Mauna Loa rose and belched globs of pasty red lava, which welded together in the foreground. The sirupy black basalt known as pahoehoe then covered the upper slope.

Thick and tarlike in appearance, this pahoehoe actually resembles thin bubble-filled glass. A man walking on it could easily crack the shell and tumble into an empty tube.

Dr. George C. Ruble, park naturalist, follows a fissure in the bank of solid spatter. Gloves protect his hands from jagged rock.

Fragile as ash, sulphur crystals (magnified 4 times) look like snow-laden pines.



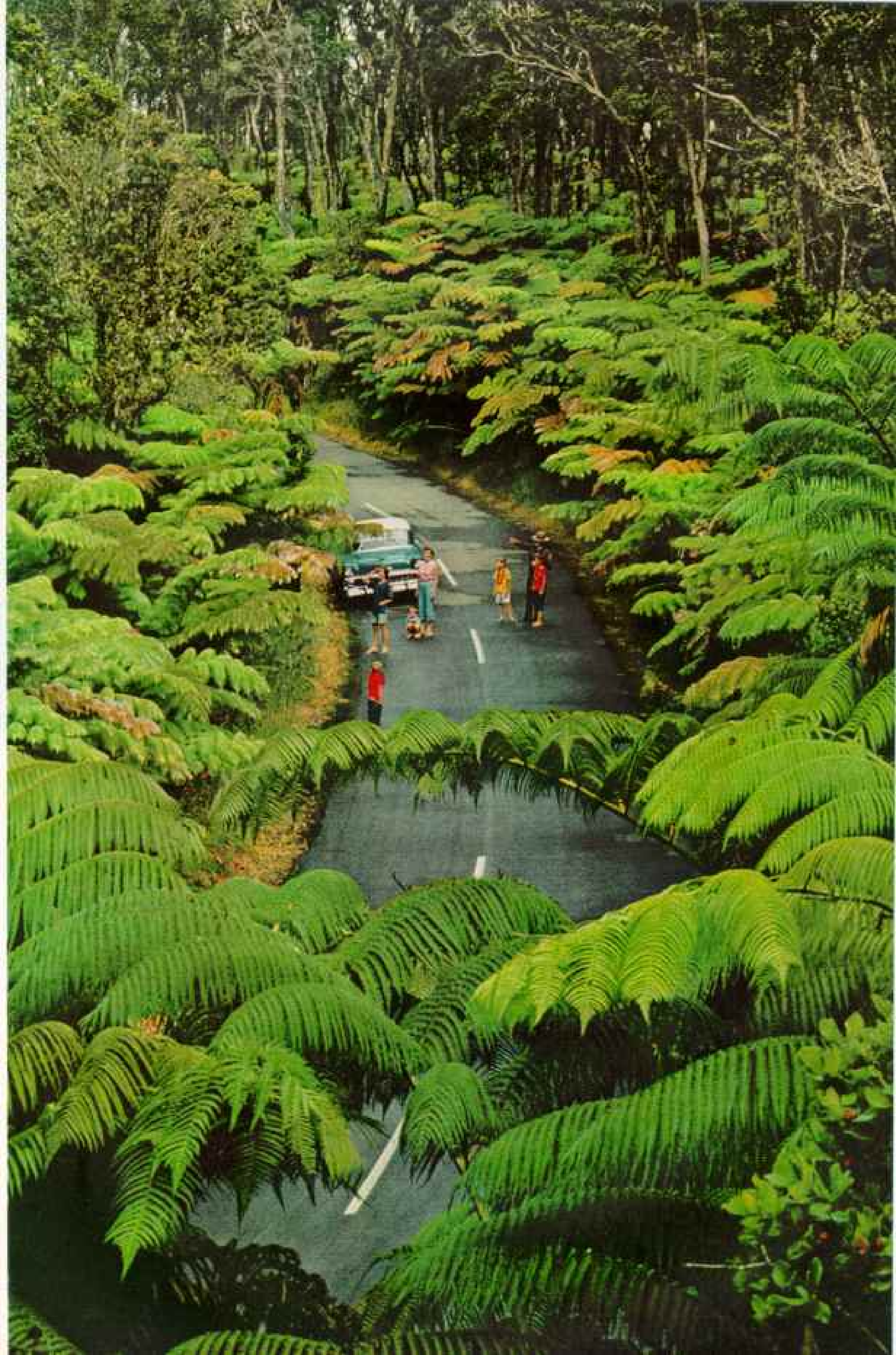


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Torches Light the Way to Stygian Gloom in the Thurston Lava Tube

This hard outer casing of a once-molten flood attracts sightseers at the Twin Craters. They walk only 400 feet of the tube's 1,200-foot length, emerging through a hole in the roof. Tree ferns and blossomy fuchsia, growing on lava, frame the entrance.

Lacy tree ferns overhang a road on Kilauea. Taller ohia's shade the luxuriant undergrowth, where trade winds dump some 100 inches of rain a year. In former days Hawaiians cooked the fern's starchy pith in steam crevices and fed it to their pigs.





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Brush-and-broom Brigade Files Out to Uncover History

Coughing up fluid basalt, Hawaiian volcanoes rarely explode. Frequently they even give polite notice of coming activity. But in 1790 Kilauea unexpectedly blew its top, trapping a band of warriors on a march across the near-by Kau Desert. Bombarded with mud and pumice, the men fell in anguish. Legend says they left a pitiful trail of footprints in the cooling clay. Members of the author's family and their friends set out to find the scene of the disaster.

Sweeping dust away, Eda unearths footprints, presumably those of a doomed man.



physics, chemistry, and geology. Of course, we can make some educated guesses."

Preceding a major eruption, he explained, fluid lava quietly wells up from beneath the earth's crust; it accumulates for a time in great sheets of liquid rock lying within a few miles of the surface. As these temporary reservoirs expand, the rocks around them are shoved upward and aside. The surface of the earth bulges slightly, like a weal beginning to swell on a man's back.

The observatory's tiltmeters, located at various strategic areas, reveal even the most minute warping of the earth's surface: a tilt of only a fraction of an inch per mile suggests pressure below. Thus, the volcanologist knows that lava, or magma, as lava is called when still in the earth, is accumulating.

Another clue is a change in the earth's magnetic field caused by underground magma movement. Information like this gives the volcanologist some basis for a forecast.

"As for controlling eruptions," Eaton laughed, "I refer you to the devotees of Pele."

As we chatted before the laboratory's picture window, a party of a dozen tourists arrived on an overlook platform outside. The freshness of their plumeria and orchid leis showed that they were new arrivals. The long limousine of a private tour company waited to carry them along the island's popular rim drive. The visitors had lunched at Volcano House and had then visited Steaming Bluff. Presently they would continue toward Halemaumau Overlook and then make at least one more stop at the Thurston Lava Tube in the lush Fern Jungle.

Lava Fountain Surges 600 Feet

"I think I'll do some nontechnical sight-seeing," I told Jerry as we finished the laboratory tour. When the tourists reboarded their limousine, I got into my own car to follow.

A couple of miles down the road, our two-car cavalcade pulled into a parking area near the awesome Halemaumau pit.

"The pit is 430 feet deep and half a mile across," I heard the guide tell his group.

Such a gigantic pock in the caldera of a volcano is probably the result of a gaseous lava reservoir's deflating like a tire with a slow leak. The brittle crust above this reservoir gives way, settling into the area where magma once moved. These pit craters are often of great size. Later flows may turn the depressions into lava lakes.

Far below us was such a lake, but one of cold, congealed gray stone; veined patches on the surface indicated areas of former turbulence. What a different aspect it must have presented in the early hours of May 31, 1954, when the pit was last active. At 4:10 a.m. of that day a long fissure suddenly opened across the pit floor. From this crack fountains of incandescent lava surged up as high as 600 feet (page 804).

The fissure continued its crackling course; another crack opened across the Kilauea floor. Finally it produced a great curtain of fire half a mile long and as much as 100 feet high—a display of infernal grandeur.

After only a few hours the fountains abated; within four days all the lava flow from the fissures ceased entirely. But during that brief period of intense volcanic activity, some 1.5 million cubic yards of lava had inundated 139 acres of the Kilauea caldera outside Halemaumau.

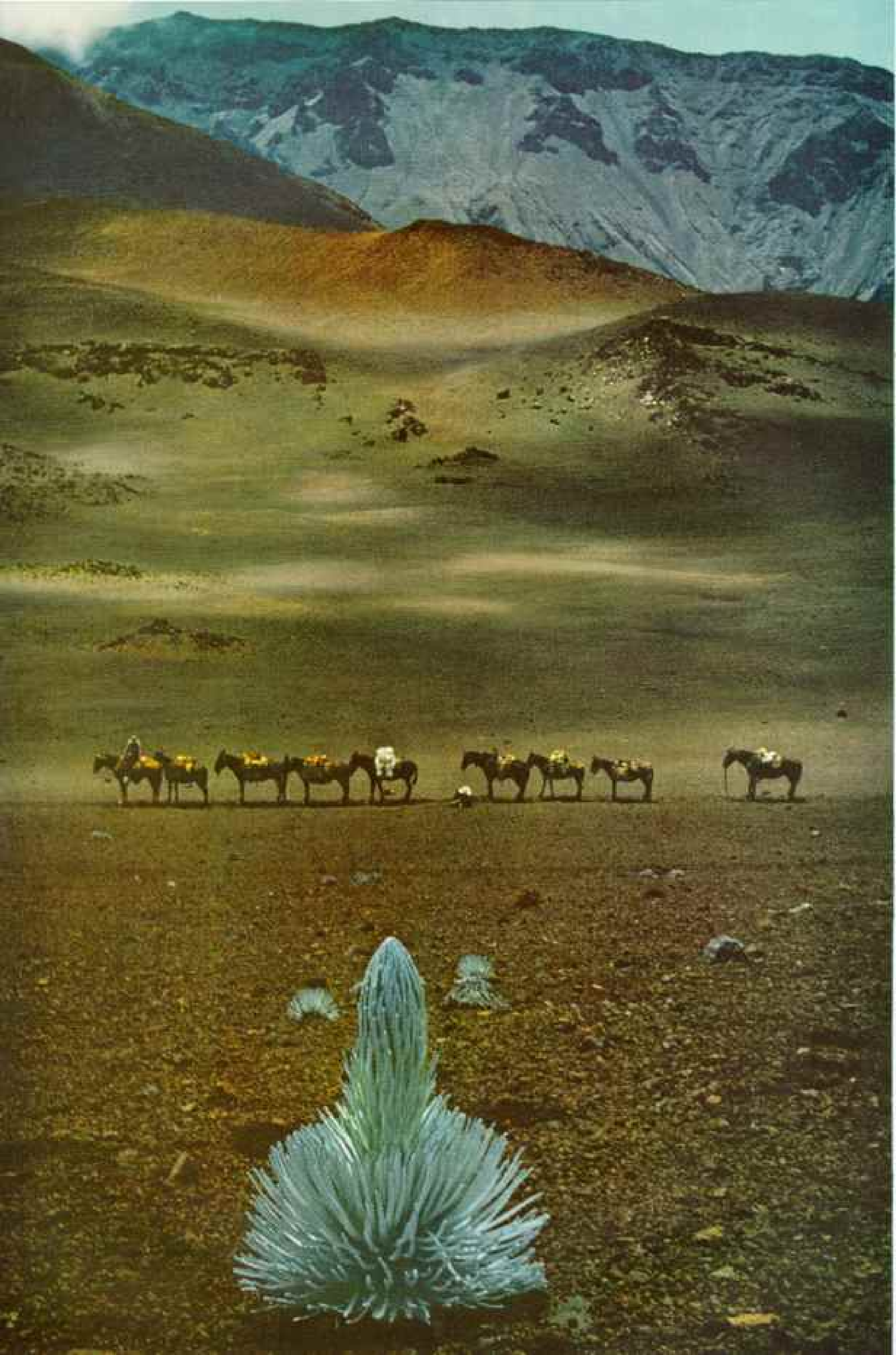
Crater Birds Commute to Fire Pit

One member of our tourist group was adjusting the telephoto lens of his movie camera on some large white birds winging low in the pit. These were *kou'e*, better known in their more normal marine environment as *bo'n* or tropic birds (*Phaethon lepturus*). Feeding far out at sea on fish or squid, "crater birds" commute to the lava walls of inactive volcano pits for nesting. During eruptions men have seen them perish from the heat and fumes rather than abandon their eggs or young.

Our guide was telling a fascinating story which I later found supported by numerous historical accounts. The persuasion of early Christian missionaries was being felt by the Hawaiians in the 1820's. Nevertheless, ancient taboos were still strong and Pele worship was widespread. In 1824, after the tribal leader Kapiolani was converted to Christianity, she decided once and for all to challenge the fearful might of Pele.

From her home near Kealakekua Bay, where Capt. James Cook had earlier died at the hands of the natives, Kapiolani set out by foot on a 100-mile journey from the Kona coast. She struggled across nearly impassable lava fields to the crater, in those days a cauldron of boiling lava.

A Pele priestess who maintained a shrine near the pit tried but failed to dissuade Kapiolani. With the conviction of an inspired saint, Kapiolani made her way to the brink.



There she proceeded to break a powerful taboo by eating ohelo berries without first throwing some into the pit as an appeasement offering to Pele. As her fearful followers watched, Kapiolani then raised her voice above the hiss and roar of the fire pit:

"Jehovah is my God. He kindled these fires. I fear not Pele. . . . All the gods of Hawaii are vain."

There was no retaliatory eruption, and Kapiolani safely completed her historic pilgrimage. This brave act dealt paganism a staggering blow in the Hawaiian Islands.

Giant Ferns and Little Folk

Every park visitor I encountered was caught by the special spell of the fern forest on Kilauea's eastern slopes. Hawaiian legend has it that "little folk," the *menehunes*, peek out from behind each lacy frond. One can almost believe it.

Some of the giant tree ferns here rise 35 feet, to create a landscape suggesting Carboniferous times (page 813). These giants belong to the genus *Cibotium*. A smaller fern, but no less striking, is *Sadleria*, with glorious hues of reds, yellows, browns, and greens; it is among the first plants to appear on new lava.

Towering above every fern glen, and sheltering the ferns from harsh sunlight, are trees which Hawaiians call ohia. These hardwoods (*Metrosideros*), the park's most common native trees, thrive from sea-level altitudes to 9,000 feet. The ohia bloom, commonly called the lehua, ranges in color from pink to scarlet, and sometimes even yellow; it has become the big island's official flower (page 807).

Now and then a shadow or a flutter reminds the visitor to the rain forest that birds are present. They are especially conspicuous in the park's kipukas—forested oases created where lava flows have split to leave islandlike areas isolated and undisturbed (page 799).

Generally speaking, we found wildlife inconspicuous in the park; fauna has come mostly from introduced parentage. Pigs, whose diggings in the fern forest are almost the only sign of their existence, were probably brought from the South Sea Islands by early

Polynesian migrants. So, too, were dogs and probably rats and mice. Rats perform a curious service. They feed on the floral parts of the climbing ieie plant; in the process, pollen rubs off on the rat's fur and—in the manner of a bee—the little rodent pollinates the next ieie flower that it visits.

Hawaii's mongooses are descendants of those brought from the West Indies in 1883 to exterminate cane-field rats. Goats, so abundant on the cliffs of Hilina Pali and Haleakala as to be a nuisance, are from stock introduced by traders since the 18th century.

Touring visitors are sooner or later directed to an ominous cavern a hundred yards or so off the highway, two miles southeast of park headquarters. There they find the Thurston Lava Tube, named for one of the park's early sponsors (page 812). In unknown times past, the tube served as an artery for the underground flow of white-hot molten lava. Now it is empty, silent, and Stygian.

Equipped with a flashlight or a kerosene torch, the visitor may with relative ease penetrate some 400 feet of this weird Pelean underworld. There are no stalagmites or stalactites; only walls of smooth black or discolored lava. Yet, here, especially at the tube's fern-bearded entrance, perhaps more camera film is exposed than at any other single park feature, excepting, of course, at the site of an actual eruption.*

Footprints in the Rock of Time

Intriguing as these park attractions were, my family and I wanted to make some discoveries on our own. But before exploring, we had to delve a bit into Hawaiian history.

In the year 1790 a Hawaiian chieftain named Keoua was leading a troop of native warriors across the Kau Desert of Kilauea's southwest slopes in a campaign against Kamehameha I, the ultimately victorious first king of the Hawaiian Islands.

Although accounts differ, it seems that when the troops were about six miles from the crater,

* See "Photographing a Volcano in Action," by Thomas J. Hargrave, NATIONAL GEOGRAPHIC, October, 1935.

Only the Silversword Glows in the Cloud-dappled "House of the Sun"

The immense crater on the island of Maui owes its Hawaiian name, Haleakala, to legend. Because the sun wheeled across the heavens too fast to dry his mother's tapa cloth, demigod Maui captured its morning rays and tied them to a tree. Begging for release, the sun promised to shine here longer.

The author's pack train pauses among Haleakala silverswords (page 821), found nowhere on earth except on Maui.



Clouds Wreath Hulekahu's Mighty Wall;
Manhattan Could Almost Fit in Its Bowl

Like mountains on the moon, cinder cones up to 900 feet high pock the crater floor, a dizzying half-mile beneath the visitors. Eighty air miles



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away, across the Pacific, Mauna Kea (left) and its neighbor, Mauna Loa (right), a park landmark, thrust their domes into a sea of clouds.

When winds push such clouds into Haleakala, a man on this western rim in late afternoon can see his shadow floating on the fleecy bank.

the volcano loosed a sudden eruption of hot mud, ash, pumice, and noxious gases. One band of warriors was trapped, and everyone in it died in his tracks.

The presumed site of this disaster, with tell-tale footprints still preserved in hard volcanic clay, was discovered in 1920. I had hiked once into the desert trying to rediscover these footprints. But the only tracks that I had found were those—about half a dozen—protected under glass in a park field shelter.

"Of course you couldn't find them," said Cynthia Fraser, wife of my geologist friend George Fraser. "Imagine all the dust that's blown over those tracks during the years! To find them you need a broom!"

Accordingly, a curious expedition set out on a desert safari. Our equipment included a tall house broom and two hand whisks, together with several lunch boxes and photographic gear. Indian file among lava heaps, through and around patches of flowering ohia and fruitful ohelo, my company followed me: Eda and Paul, Judy and Cindy Fraser, ages 13 and 9, with my wife and Mrs. Fraser bringing up the rear.

Wherever we saw signs of clay strata breaking through an overlay of pumice or dust, we vigorously applied broom and whisk.

"Look—toes! And a heel, too," my wife suddenly shouted. She had uncovered a perfect footprint from the 18th century.

The rest of us swept with new enthusiasm. And in the next hour we were rewarded with more discoveries. Some tracks showed toe marks pressed in a manner that suggested frantic movement by the victim (page 814).

A Living Rarity: the Silversword

Not only do Hawaiian volcanoes preserve the footprints of dying men; they also provide privacy for living rarities. The isolation of these islands in the mid-Pacific, their walls of craters and canyons, and their abundant sun and rain have produced in Hawaii one of the world's greatest collections of plant endemics—species found nowhere else.

We wanted to photograph the most spectacular of these plants; so we chose the Haleakala silversword. Scientists call it *Argyroxiphium macrocephalum*. To find it, we air-hopped 30 miles of sea to Maui.

"Not so far as it seems," observed my wife, as we stood on the 10,000-foot brink of Maui's Haleakala Crater. "We can still see Mauna Loa." And so we could.

We could also see—at our feet—one of the earth's largest craters. The floor of the abyss was half a mile down; its width was two miles, its length seven. This colossal sky-scooping bowl could very nearly have held Manhattan Island (page 818).

"Those things look like anthills," said Paul. He was pointing toward a dozen truncated cinder cones on the crater floor. Diminished by distance, some were actually 500 to 900 feet high.

Cowboy Hats for a Botanic Roundup

Stopping at an inn near the entrance of the park, we awaited the arrival of a local guide and horse wrangler. With him we would descend into the dormant crater on our hunt for silverswords. Any doubts I might have had about taking the children on a pack trip vanished when I met Frank Freitas, a powerful 57-year-old Mauian of Portuguese extraction. In a voice like a jet engine, he instructed young Eda and Paul in saddle posture and rein usage. Indeed, that midsummer morning, as we plodded down the cindery surface of Sliding Sands Trail, I felt a stir of parental pride. The children, resplendent in new cowboy hats, sat as if born to the saddle.

No vegetation was visible in the expanse yawning below us. We accepted on faith the fact that somewhere on the slopes of those gigantic cones we would find Hawaii's rarest and purportedly most beautiful endemic. Our route lay over a bare, dry terrain of cinder and lava (page 816). This Haleakala Crater, the "House of the Sun," was so named by ancient Hawaiians who believed that the demigod Maui had here kidnaped the sun and won a ransom of extra sunshine.

"You are lucky, mister," our hearty guide was saying. "In three hours you will be in a garden of flowering 'swords.'" He went on proudly to tell that in all his 1,008 descents over a period of 39 years—ours was his 1,009th—the silverswords were most abundant this season. In the 1920's they dwindled almost to extinction; but since the Park Service started taking precautions against wild goats and human predators, these aristocrats of Haleakala have slowly returned.

Leaving the area known as Pele's Paint Pot, our trail wove through a long flat stretch of rough gray lava. At length we came to a gulch where, on a bare and clinkery slope, clung dozens of glittering spheres.

"Here you are," said Freitas proudly. We



Silverswords Rear Golden Candles; After Flowering, They Die

A century ago these plants grew so abundantly they made hillsides appear bathed in moonlight.

Early visitors to Haleakala uprooted silverswords just to watch them snow-ball down a slope. Numbers of the spheres were dried and shipped to the Orient for ornaments. By the mid-1920's barely a hundred remained on Maui.

Today, vigorously protected by the Park Service, silverswords are staging a comeback, as this cinder garden reveals.

Silvery hairs cover the saberlike leaves and bar all but flying insects from the store of nectar in the flowers. No one knows how long it takes a plant to grow from golf-ball to bushel-basket size. At the climax, the silversword produces a flowering stalk, which with its base can attain the height of a man.



dismounted and hurried over to examine the botanic quarry we had traveled so far to find.

A majority of the spheres were bloomless gatherings of curved sabers. Their bright metallic surfaces glistened in the sun. Very young plants were no bigger than golf balls; others outmeasured bushel baskets. Gleaming shafts of narrow, tightly packed silvery leaves rose up like rocket heads through the center of several of the larger plants; in a conspicuous few this structure had grown several feet high and opened into a fountain of small purple flowers.

Like century plants, silverswords bloom once, then die. I asked Freitas whether he knew the age of these blossoming rarities.

"No one knows," he replied. "Some say seven, some say nine years. I myself think they are even older."

Tap Roots Seek Out Moisture

I set up my camera tripod close to one of the flowering stalks. From its fleshy trunk branched hundreds of little stems; each one ended in a half-dollar-sized platter of seeds encircled by a fringe of delicate purple petals. The bloom resembled a sunflower in miniature; one would need little knowledge of botany to recognize these "sunflowers" as members of the widespread *Compositae* family. Blooms low on the stalk had already wilted; higher ones were fresh, sweetly fragrant, and swarming with tiny insects.

My wife was on her hands and knees carefully inspecting a patch of about twenty very small silverswords; their minute swordlike leaves seemed identical in form to those of the adults. "However do the little things grow out of this dry cinder?" she asked. "Do they have tap roots?"

"Yes," I said. "They must find moisture deep in the cinder—certainly minerals."

An ominous bank of mist was rolling toward us across the crater floor from ever-beclouded Koolau Gap in the north.

"Hard to get lost here, even in a mist," said Freitas, "but with children along, guess we'd better head for shelter."

Back on the trail, we passed a deep lava cavity. Here, said Freitas, early Hawaiians made barefoot trips to hide the umbilical

cords of their newborn as a precaution against bad fortune. Judging from the terrain, their bare feet suffered the real misfortune.

Near the base of the crater's looming 3,000-foot west wall, in a belt where Koolau Gap admits enough moisture to provide pasturage, Holua Cabin came within sight. This is one of three neat shelters maintained by the Park Service here for hikers and riders.

That evening, as shadows lengthened, the expedition settled for the night. "The children have earned a hot meal," Freitas boomed, as he loaded the stove with kindling.

"Silverswords? Yes, they are rare," Freitas chatted, "but this," and he held aloft a stick of firewood, "is the rarest plant of all!"

As though to confirm Freitas's words, we heard at that moment the sound of hoofs and pack leather; this was a six-mule train delivering wood cut outside the park, miles away. Through the window, I saw a young ranger dismount.

"How about supper?" Freitas asked.

"Thanks," said ranger Ted Lamoreaux. Then, as darkness fell, the youngsters sat enthralled by the bunkhouse conversation. Ted told us about unexplored jungle on Haleakala's eastern slopes, about a near-by cave, and about a pack mule that some months before had slipped off the very pali, or cliff, that we would scale on our way back.

Surviving a Trial by Trail

Next morning we recalled his words. Well up the side of precipitous Leleiwi Pali on the Halemauu Trail, we thrilled to the breathtaking scenery and dizzying heights. We reached the top before noon, followed closely by ranger Lamoreaux and his mule train. I heard him call to 7-year-old Paul:

"Anyone who climbs this crater wall the way you did, sonny, has earned membership in a very special club. Come to park headquarters tomorrow for your scroll."

Paul did, and now in his New York bedroom hangs a certificate stating that he, "having visited Haleakala, House of the Sun . . . and made offering acceptable to Maui . . . is entitled to full, active life membership in the Hui Ahinahina, a Society of the Silversword . . . By Order of the Demigod Maui."

Aged Basalt Looks as Gray and Wrinkled as Elephant Hide

Unlike flows of thin-shelled pahoehoe (page 810), this century-old outpouring does not threaten children at play. Turned to stone in its lazy course, the lava is massively solid, with few man-trapping holes. It lies off the road to Hilina Pali on Hawaii.





*Elizabeth II does not visit
Ottawa; she is "in residence"*

Queen OF CANADA

By PHYLLIS WILSON
Staff Writer, the *Ottawa Citizen*

*Illustrations by National Geographic
Photographer KATHLEEN REVIS*



"WHERE is my Prime Minister?" asked the Queen. Anyone who heard the query might have thought Elizabeth II was referring to Harold Macmillan, Prime Minister of Great Britain. But no—the man who responded was John G. Diefenbaker, Prime Minister of Canada.

The incident occurred at the British Embassy during the Queen's 1957 state visit to Washington, D. C., from Ottawa. It served to illuminate a truth often overlooked by our American friends—that Canada is a kingdom.

Elizabeth II is officially "...by the grace of God of the United Kingdom, Canada, and her other realms and territories Queen, Head of the Commonwealth, Defender of the Faith."

When Elizabeth comes again this June to help dedicate the St. Lawrence Seaway, it will be the Queen of Canada coming home, not the Queen of England paying a call. When

she is here she is not visiting; she is "in residence" at Government House.

Whether the Queen is in Ottawa, London, or Canberra, she is an integral part of Canadian life. Her official birthday is a statutory holiday. A dozen Canadian regiments and corps boast that the Queen is their Colonel-in-Chief. People haled into court are prosecuted by the "Crown attorney" before the "Queen's justice," or swear to evidence given "between Our Sovereign Lady the Queen and the prisoner at the bar." All faiths pray for her, and her annual broadcast has become part of many Canadian families' Christmas observance.

On two earlier occasions we have seen two Elizabeths. In 1951 Canadians, momentarily startled by her diminutiveness, took a second look and saw a shy, tense princess who slowly relaxed with the dawning realization of the certainty of her welcome. In 1957 it was a

Brave with Flags, Ottawa Welcomes Elizabeth II to Canada

When Her Majesty joins in dedicating the St. Lawrence Seaway this month, she will be in Canada for the third time. Here (left) in October, 1957, crowds gather before the city's Peace Tower to await her arrival for the opening of Parliament.

Later (above) Elizabeth broke ground for the Queensway, a link of the Trans-Canada Highway. Ottawa's Mayor G. H. Nelms, his wife, and Prince Philip accompany her.





ESCHENBACH BY NATIONAL GEOGRAPHIC PHOTOGRAPHER BARBARA BEVILL © N. G. S.

Framed in Gothic splendor, the Queen and her husband take the Royal Salute. Canada's coat of arms overhangs this arch in the Peace Tower, which honors Canada's part in World War I.

Stiff as starch, handsmen and troops of the Canadian Guards stand at attention. The Queen rides past in an open landau, followed by a scarlet-clad guard of Royal Canadian Mounted Police.

Queen who stepped from her airplane at Up-lands on the outskirts of Ottawa. A new poise and assurance were apparent. Some observers were heard to wonder if the Queen had not actually grown taller.

The word for Her Majesty is radiant. When she was with us two years ago, Canadian Press writers in Ottawa fined each other every time the adjective appeared in copy—not because they disputed its aptness but for fear that it would disintegrate from overwork.

Of course the Queen and her husband are carefully briefed for every occasion, but the ability to apply their knowledge to the right individual among hundreds in a receiving line often smacks of magic. At a press conference, for example, Prince Philip, with an almost straight face, voiced the polite hope to an Ottawa city editor that his newspaper had come out on time that day. It so happened that because of a mechanical difficulty thousands of the previous day's "royal edition" had been shredded to bits. The Prince had been in Ottawa just over three hours.

The Queen's greatest ordeal in Canada was her first live telecast. During the rehearsal, make-up was discussed and the Queen agreed to use a professional make-up artist. When she appeared the producer exclaimed, "You

look wonderful!"—which shocked her staff but delighted her.

Since their sovereign is a woman, Canadians sometimes wonder which comes first, the queen or the woman. Both appeared to speak as one in an incident during her last Ottawa stay. Officials fidgeted as the starting time for the ceremonial drive to Parliament Hill neared and there was no sign of the Queen. Messengers were sent repeatedly to inquire, until finally her maid appeared and announced: "Her Majesty will be down when she is ready." The Queen was on time.

No one who saw Her Majesty ride forth that day to open Canada's 23d Parliament can ever forget the gleaming white figure in the landau drawn by coal-black horses, the 44-member escort of Royal Canadian Mounted Police in scarlet tunics with white-and-red pennants fluttering from their lances, the throngs of people, the peal of church bells mingling with band music. Pacing the length of the red-and-gold Senate Chamber, the Queen must have won the admiration of even the ardent republicans occasionally found lurking in letters-to-the-editor columns.

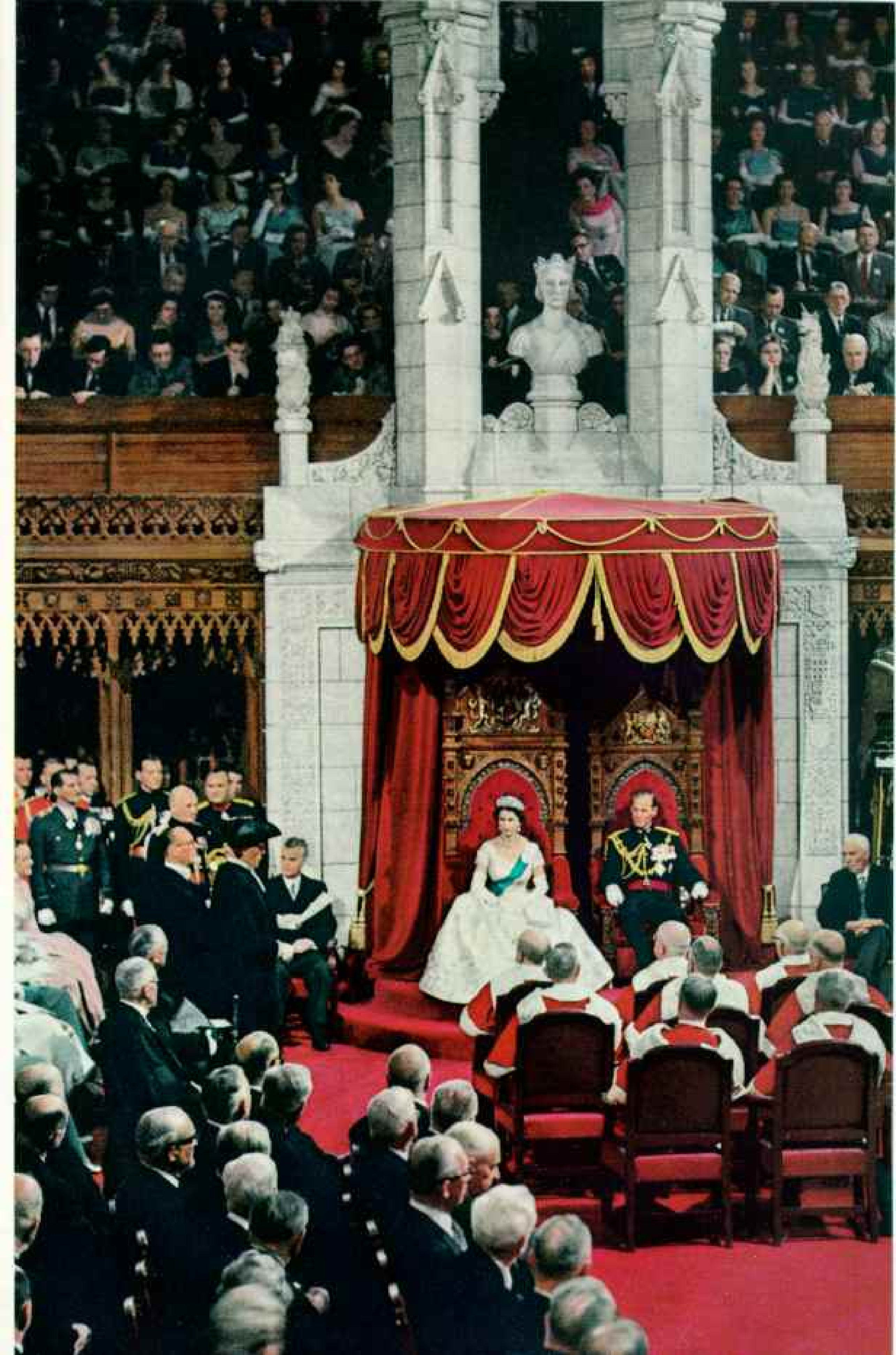
Canadians who listened to the grave voice reading the Speech from the Throne were suddenly reminded that they were inheritors of an unbroken tradition that dates from Magna Carta, that the slight figure who so easily dominated the scene was indeed the symbol of parliamentary freedom, hard won in the past and to be cherished in the future.

"I Greet You as Your Queen. Together We Constitute the Parliament of Canada."

With these words Elizabeth II opened her Speech from the Throne in the oak-paneled Senate Chamber of Canada's Parliament. Here, in 300-year-old ceremonies based on those of Britain's Parliament, the Speaker (in tricorne) directs the Gentleman Usher of the Black Rod (extreme right) to command the attendance of the House of Commons. Red-robed Justices of the Supreme Court sit in front of the monarch; Prime Minister John Diefenbaker (seated, left) and Prince Philip flank her. The Queen wears her white satin coronation gown with pearl-and-diamond-embroidered Commonwealth emblems. Her husband wears the uniform of Colonel-in-Chief of the Royal Canadian Regiment. A bust of Queen Victoria occupies a niche above the couple.

A young subject rests before the Queen's coat of arms; a Royal Canadian Mountie stands guard.







Magazine Photographer of the Year: Thomas J. Abercrombie wears a souvenir of Antarctica.

FROM SUNNY Lebanon to the South Pole, and from atomic furnaces to beneath the ice of a winter-locked lake—such were a single year's assignments for NATIONAL GEOGRAPHIC photographer-writer Thomas J. Abercrombie (left).

For his camera artistry on all these travels, 28-year-old Tom Abercrombie of The Society's Foreign Editorial Staff this spring was named "Magazine Photographer of the Year."

Five other awards as well came to members of the Magazine staff in the first national competition in which GEOGRAPHIC photographs have ever been entered.

Mr. Abercrombie's portfolio of both color and black-and-white was adjudged best in the largest contest of its kind in the United States, conducted jointly by the National Press Photographers Association, the *Encyclopaedia Britannica*, and the University of Missouri School of Journalism. Selection of the Photographer of the Year is based on versatility, originality, and technical excellence.

The winning entry represented Abercrombie's work in four articles: "Man's First Winter at the South Pole" and "Young-old Lebanon Lives by Trade," both in the GEOGRAPHIC of April, 1958; "You and the Obedient Atom," September, 1958; and "Ice Fishing's Frigid Charms," December, 1958.

His ice fishing photographs, in addition, won first place among magazine feature picture stories, and his scenes of a Lebanon village, third place. Nearly 600 photographers participated in the nation-wide contest.

Mr. Abercrombie is a native of Stillwater, Minnesota, and a graduate of Macalester Col-

National Geographic Photographers Win Top Magazine Awards

From Abercrombie's prize-winning folio: frozen Minnesota walleyes stand on their heads





Airborne on a canvas kite, this water skier appears in a series that won a first place for Wilbur E. Garrett.

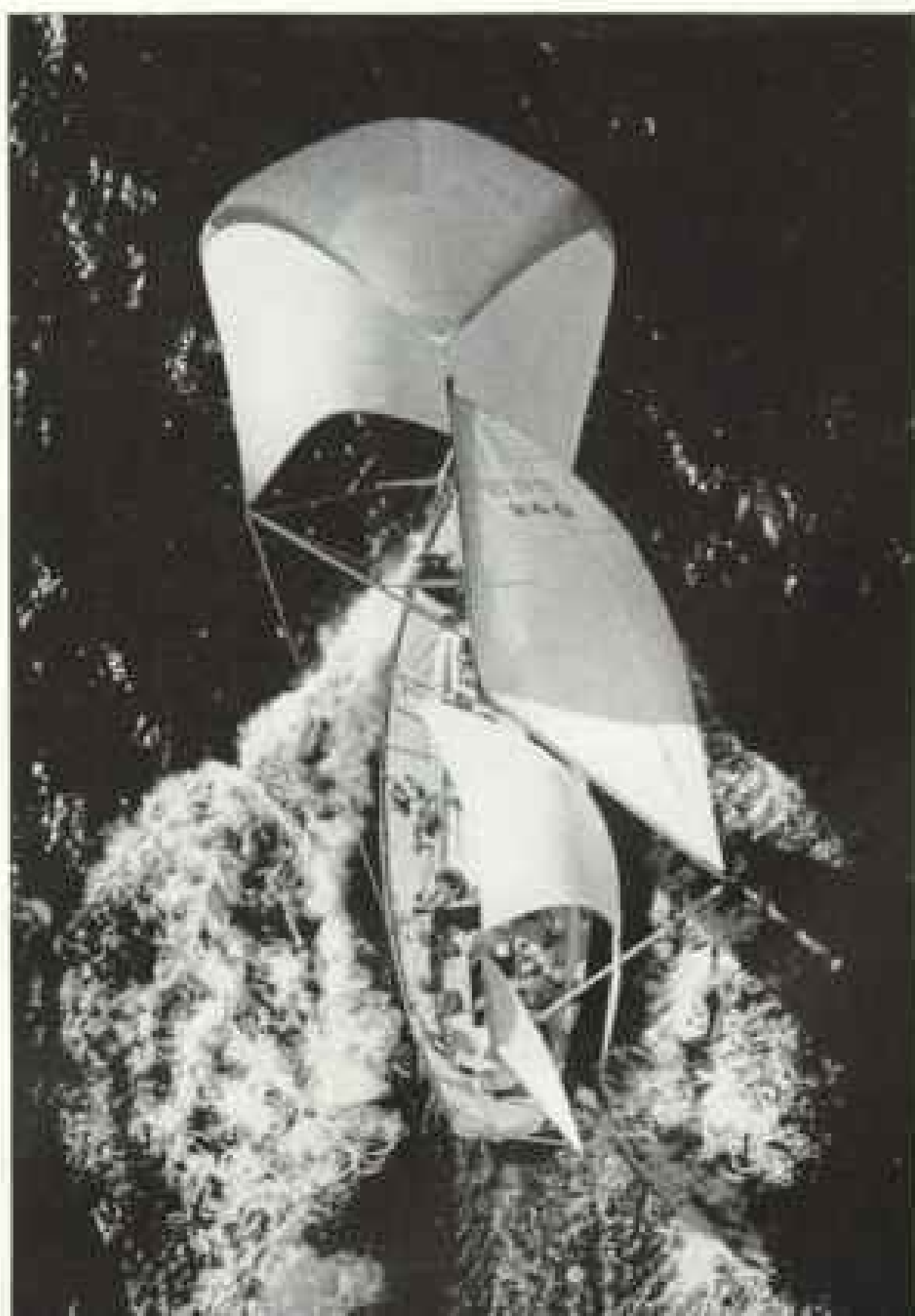
lege at St. Paul. He joined the Magazine staff in 1956. In 1954, while with the *Milwaukee Journal*, he was named "Newspaper Photographer of the Year." Abercrombie is the first to win both these top awards.

In the same contest, Wilbur E. Garrett, Assistant Illustrations Editor of the NATIONAL GEOGRAPHIC, won first place for sports picture stories with "The Booming Sport of Water Skiing," in the November, 1958, issue. It included the spectacular shot above, first published double-page in color.

Chief Photographer B. Anthony Stewart took second prize for national magazine color with his picture of the yacht *Finisterre* (right), published as a full-page Kodachrome with the article "To Europe with a Racing Start," in June, 1958. Staff photographer Thomas Nebbia took a third place with a newspaper sports picture published in the *Columbia, South Carolina, Record*, before he joined the GEOGRAPHIC last summer.

Earlier this year, in the annual competition of the White House News Photographers Association in the Nation's Capital, an entry by staff photographer John E. Fletcher and two by Joseph Baylor Roberts won, respectively, first, second, and third places for color photography.

Finisterre's patterns of sail and foam, photographed from a blimp, earned honors for B. Anthony Stewart.





By JOHN T. CUNNINGHAM

and JAY JOHNSTON

National Geographic Staff

*Illustrations by National Geographic
photographer W. D. VAUGHN*

STATEN ISLAND FERRY

New York's Seagoing Bus

One of the few rides that can still be bought for a nickel, the Staten Island Ferry gives its passengers a front-row bench for the daily drama of the Nation's busiest harbor.

PROPELLERS CHURNING, *Miss New York* plows toward Staten Island on her five-mile, 25-minute run across New York Harbor. With a thousand passengers topside and two dozen vehicles in her crew, the big barn-red queen pulses at a steady 14 knots through Anchorage Channel. Off her broad bow the spires of lower Manhattan grow ever dimmer in the haze of a midsummer afternoon.

Staten Island ferryboats never turn around on their eternal shuttle: their bows always point toward the Battery. With a rudder, a propeller, and a pilothouse at each end, *Miss New York* travels equally well in either direction. Bow and stern appear almost identical, but the single black stack is a trifle nearer the bow, as in most vessels.

As she beats her way across the Upper Bay, traffic swarms about her flanks: tankers and warships, scavenger scows and sleek yachts;



muscular tugs nudging bargeloads of coal, scrap iron, and freight cars; sightseeing boats circling Manhattan or heading for the Statue of Liberty. Shrill whistles mingle with the melodious clang of bell buoys and the cries of winging gulls.

Operating around the clock—only ten minutes apart during rush hours—ten ferryboats serve the 40,000-odd Staten Islanders who commute to and from jobs in Manhattan. Last year the boats carried nearly 24,000,000 passengers, logging a total of 319,370 miles.

Staten Island, officially the Borough of Richmond, is the least populous of New York City's five boroughs and the only one without direct bridge and tunnel connections to Manhattan. But most residents don't object. They cherish the island's isolation, its bucolic air, its skyscraperless towns. And they look upon the ferryboats with the same affection San Franciscans hold for their cable cars.





Excitement lights the face of a youthful voyager as a ferryboat whisks her across the harbor. Shoulder-high perch guarantees she will miss none of the port's wondrous sights and sounds. Father, sharing her enthusiasm, sees the old and familiar take on a fresh look when glimpsed through the eyes of youth.

Big-city Girls on a Holiday Cruise Turn a Ferryboat's Deck into a Game Room

To escape summer's sweltering sidewalks, hordes of Manhattanites journey to the beaches and meadows of near-by Staten Island. Sprawled on the deck, the salt wind tangling their hair, these day campers ride the southbound *Mary Murray* on an early-morning run. Old hands at ferryboat travel, they concentrate on their game, giving not even a glance to the passing excursion boat *City of Keanburg*.

Minutes later the *Mary Murray* will sail past Robbins Reef Light and the hills of Staten Island will loom near. Crowding forward, the carefree youngsters will watch the vessel wiggle into the St. George slip. Then, ever in a hurry, they'll race off as if the trustworthy old boat were sinking.



New York Greets the *United States* as She Sails into Home Port for the First Time

FERRYBOATS provide perhaps the best of all vantage points for the harbor's big shows. From their decks riders have watched history parade in review.

In an entrance befitting a new queen of the seas, New York gave the *United States* a spectacular welcome seven years ago. Thousands lined the shore. Thousands more showered ticker tape from skyscraper windows.

Tug flotillas swarmed about the black hull like Lilliputians around Gulliver. Fireboats sprayed white draperies against the gray skies. Sweep-

ing by the Statue of Liberty, the newcomer paid homage with a deep-throated blast.

Here, her trim bow cleaving the water, the liner moves past Ellis Island (upper right). Heading for her berth up the Hudson, she cruises within a few hundred feet of the Staten Island ferryboat, its rails lined with spectators.

In World War II warships clogged the wide bay, moving in and out at all hours of day and night. Victory saw troopships streaming home to brass-band receptions on the docks.

Mayflower II called at the port following an



A. GOSWAMI, INC.

A Staten Island Ferryboat, Whistle Tied Down and White Plume Spurting, Screams a Salute

epic Atlantic crossing in 1957. On an Indian summer day that year a ferry carried Queen Elizabeth and Prince Philip across the harbor.

Last February ferryboat passengers looked on with awe as the supercarrier *U.S.S. Independence*, tall as a 17-story building, put to sea for the first time from New York Naval Shipyard in Brooklyn.

For the ferryboat captain, high in his paneled pilothouse, such moments stand out in memory. But each day brings forth new challenges, new excitements. Fog and snow, tricky tides, and adverse currents keep him ever alert. Sometimes a

passenger gives birth or suffers a heart attack. Occasionally a would-be suicide slips overboard into the murky wash. Or an anchored freighter breaks its moorings and drifts out into the channel. Yet Staten Island skippers pride themselves that in more than 30 years the line has not had a major accident.

New York City's Department of Marine and Aviation, which runs the line, readily admits that it is a money loser. But the fleet ranks high as a tourist attraction: an estimated four million persons each year go just for the ride.





Skirting Battery Park with its open-air diners, *Miss New York* veers close to Governors Island (background). Sitting squarely in the mouth of the East River, the island owes its name to colonial days when it housed the King's governor. Today the United States First Army makes its headquarters there.

Rush-hour Commuters, Homeward Bound, Swarm Spacious Whitehall Terminal

In late afternoon subways and buses disgorge hordes of ferryboat riders at Peter Minuit Plaza, which shows through the glass wall. The crowds pour up the stairs and escalators, through the turnstiles, and into the concourse.

Heart of New York's harbor stretches seven miles from Battery to Narrows and thrusts long fingers up the Hudson and East Rivers. It boasts hundreds of miles of shoreline and utilizes virtually every foot. Ceaseless traffic moves via ships and bridges on the surface and through tunnels deep beneath the floor. A soaring suspension bridge, still in the blueprint stage, would link Staten Island with Brooklyn at the Narrows.



Wooden Racks Creak and Groan as a Three-decker Glides into Port and a Two-decker Eases Out

To dock a skittering 2,350-ton ferryboat in a narrow U-shaped slip is never easy, and the crosscurrents that meet in front of Manhattan's Whitehall Terminal make the task even more difficult. Here the 290-foot *Cornelius G. Kalf* (left) coasts the last few yards to the dock. Seconds earlier, when the captain reversed propellers, the big vessel shuddered and slowed, then hit the pilings with a resounding thump. Oak staves bent so far they seemed certain to snap. But the elastic fence contained the boat and pushed her back. Now she grates along the timbers until her bow touches the pier's concave rim and she is made fast.

From an adjoining slip *Miss New York* moves seaward, her propeller churning the water into a foamy whirlpool. One of these giant screws—called "wheels" in the language of ferrymen—attaches to each end of a 200-foot-long shaft. The forward propeller pulls the boat; the rear one pushes.

Directly beneath these slips run the Lexington Avenue subway tubes to Brooklyn. When engineers sank the piles, they sent technicians into the tubes with sensitive listening devices to guard against disastrous break-throughs.

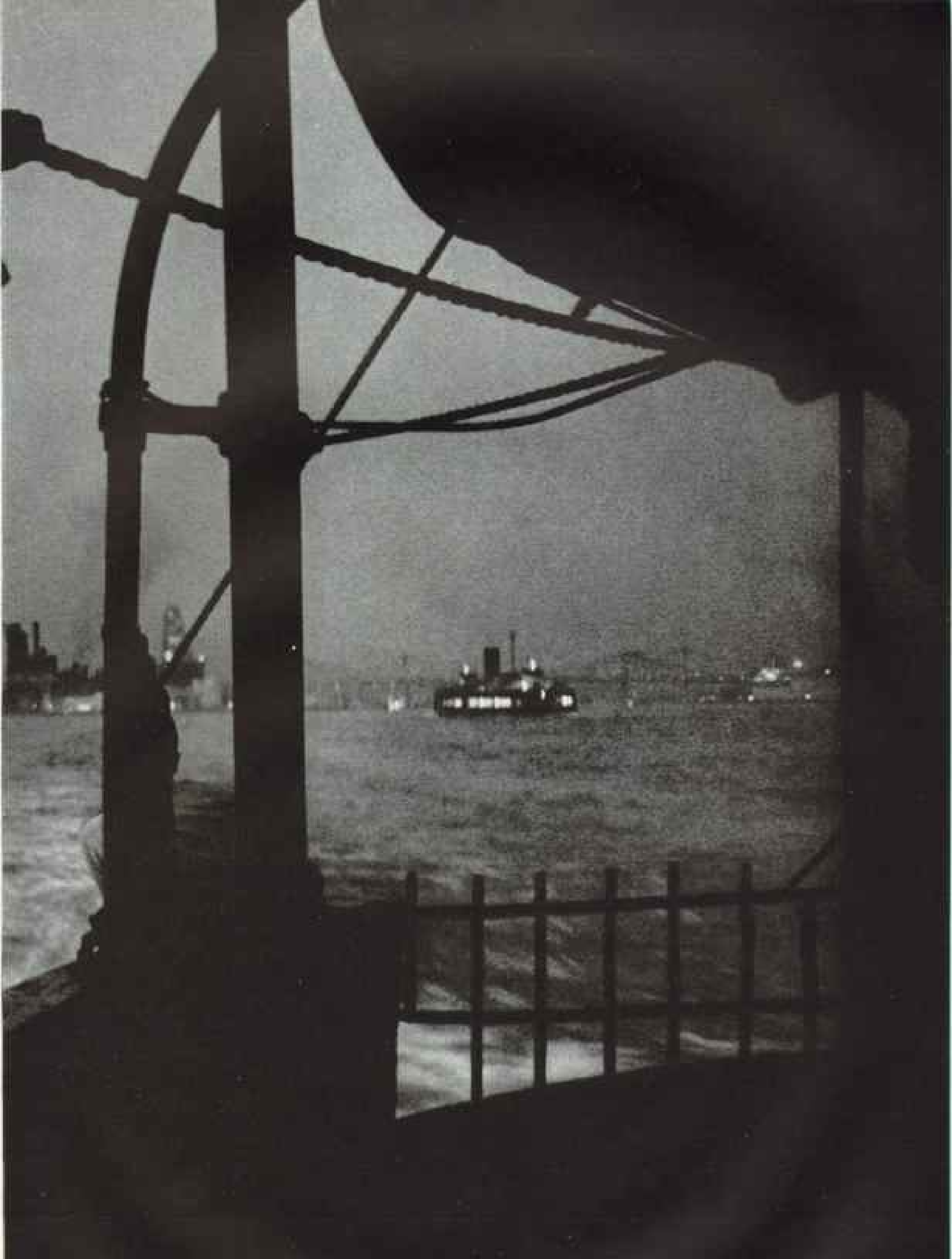


Puzzle: Find the commuter who forgot his paper. Ferryboat riders seated back-to-back on pewlike benches scorn sun and sea to catch up on their reading. "They really suffered during the newspaper strike last year," recalls a deck hand, "but the magazine business never had it so good." This reading room is the bridge deck of the *Verrazzano*, named for the Florentine navigator who discovered these waters in 1524.

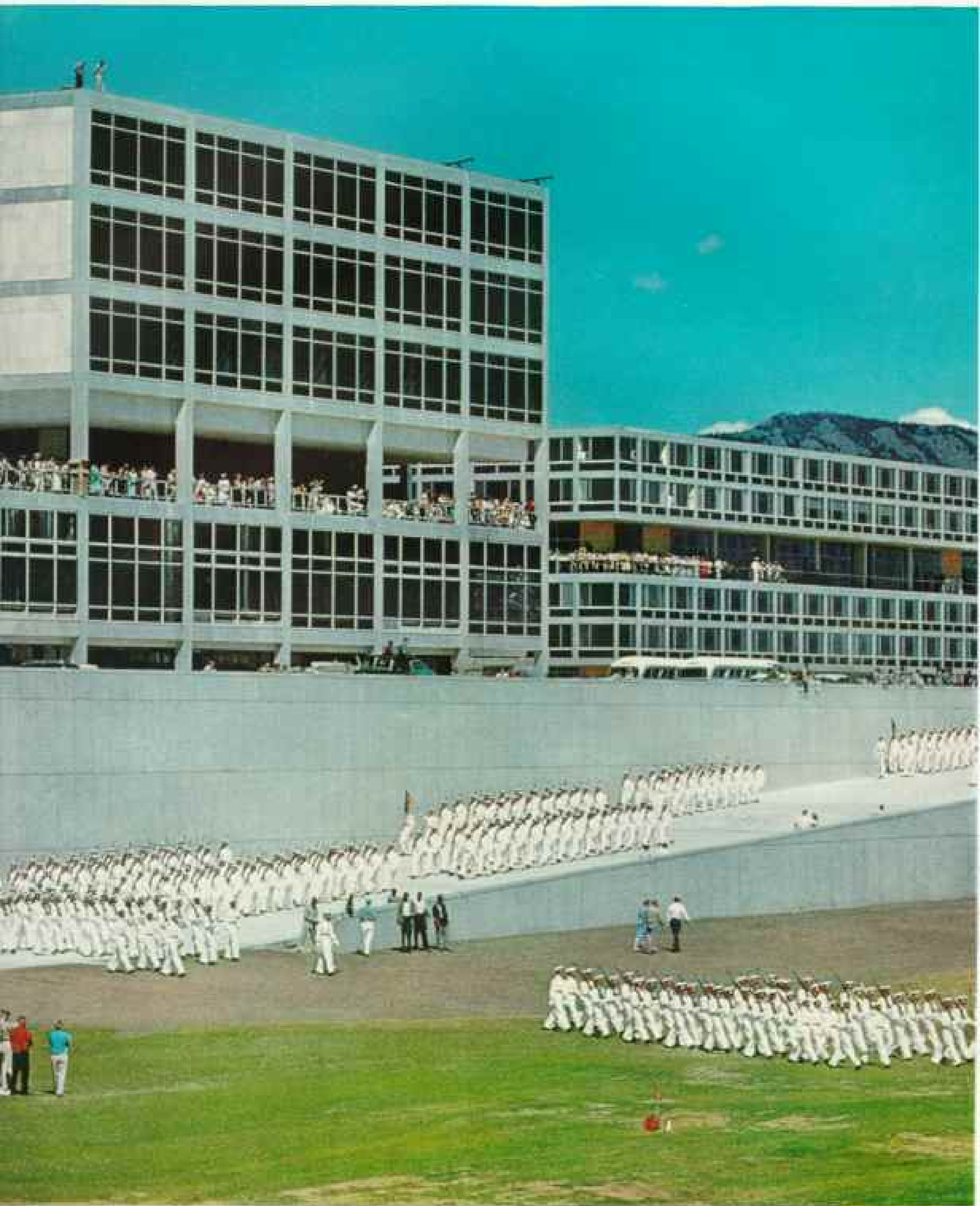








*A solitary rider leans on the rail and watches
the towers of Manhattan light up in the lowering dusk*



Cadets in flawless formation swing down a ramp to the parade ground at the newly built United States Air Force Academy near Colorado Springs, Colorado. Bare of ivy and venerable tradition, this counterpart of West Point and Annapolis faces a Space Age future with 20th-century architecture. Spectators at the 1,100-man Cadet Wing's dress parade line the open floors of classrooms and dormitories. Behind them looms a part of the Rockies, the aptly named Rampart Range.

UNITED STATES

AIR FORCE ACADEMY

Where Falcons Wear Air Force Blue

By NATHANIEL T. KENNEY

National Geographic Senior Staff

Photographs by WILLIAM BELKNAP, JR.

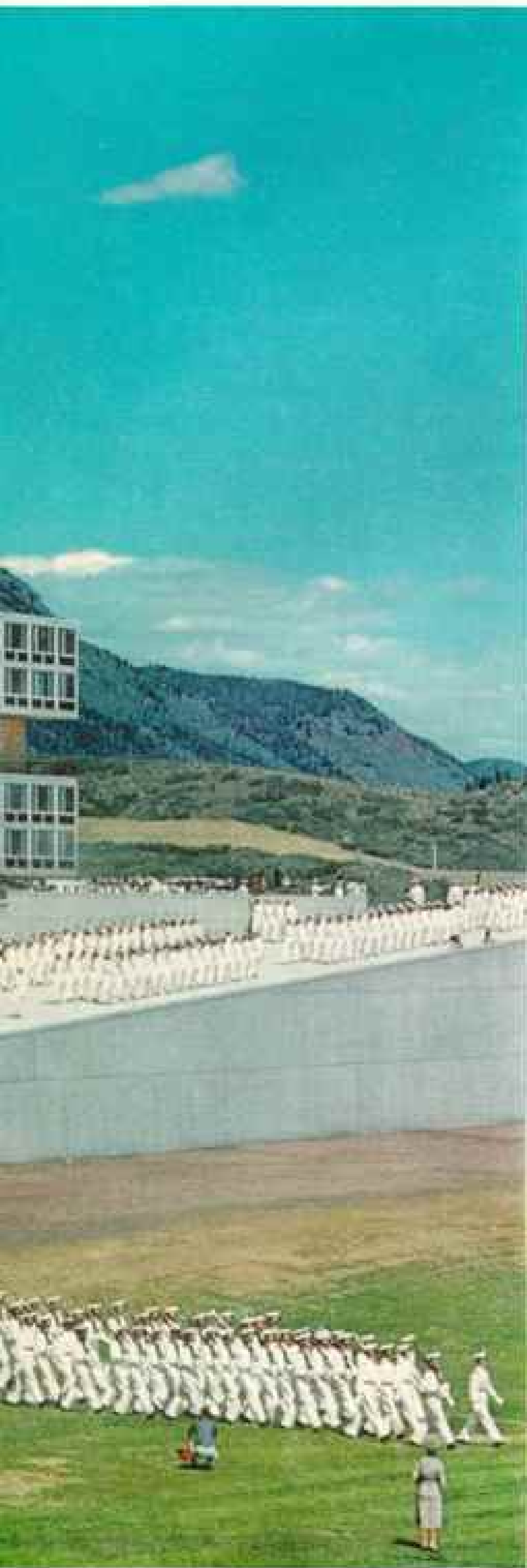
IN THE thin, keen air on our side of the snowy peaks, a winged thing circled fast. Abruptly it zoomed, hung a split second at the top of its climb, then plunged like a bomb into the afternoon sun. Half blinded by the light, I turned my back.

"Here he comes again!" Mr. Melancon shouted. "Bring him down this time!"

Across the field a young man in blue uniform, whistling like someone calling a dog, stepped up the speed of a misshapen apparatus he whirled at the end of a string. Tension flexed his knees as he stared into the sun. Suddenly he let the whirling object fly out ahead of him.

I felt a rush of air and heard a tinkling sound, as of tiny bells. Something whooshed past my ear and struck the object on the end of the

845



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Academy symbol perches on the hand of cadet falconer John F. Hutchinson. Handlers fly the birds during half time at football games. Cadets call their falcons Mach, a term relating to the speed of sound.



string with a thump. Prey and attacker tumbled to the ground. Above them a single brown feather floated gently to earth.

That is how I met the United States Air Force Academy's symbol and mascot, the falcon, in action beneath the Colorado sky, careering down the west wind at almost 200 miles an hour. I watched the lovely bird, its mission complete, shake its plumage of brown and white, glance once at the leather-and-feather lure it had smashed to earth with its half-closed fist, and spring to the gauntleted hand of its master, the cadet in Air Force Academy blue.

Alma Mater for the Space Age

Here, I thought, was the best college mascot I ever saw, the perfect totem for a Space Age alma mater training young men to command satellites or lead rocket squadrons to the brink of forever. In this fit bird were all the basic qualities the newest and most fabulous of the service academies seeks to develop in its cadets: courage, intelligence, love of the wild sky, ferocity in attack, but gentleness and dignity in repose.

And discipline. The good falcon, well schooled, turns its back on precious freedom to return to its handler; the cadet with strength of character fused into steel by discipline becomes the airman who completes his mission alone in the blue, where none would know should he shirk.

The Class of 1959, first to graduate from the four-year-old Academy, chose the mascot in its entering year. One of the reasons for the choice, a class member told me, was the falcon's private life.

"He leads a right clean life for a bird of prey," the cadet said. "He sticks pretty close to our honor code, which says 'we will not lie, cheat, or steal, nor tolerate among us those who do.'"

"People always want to know certain things about our falcons," said First Classman John M. Melancon of Pineville, Louisiana, the Academy's chief falconer.

"How many we have, for example. Well, we try to keep half a dozen, each with its separate stall in the mews. We've had a fine white gyrfalcon and good peregrines, but we prefer the medium-sized prairie falcon, like the one we just flew, for demonstrations.

"We name them all with a word related to the speed of sound—Mach I, Mach II, III, and so on," continued young Mr. Melancon. (Not even the Academy superintendent omits the "mister" when he speaks to a cadet.) "Our friend here is Mach I. He's famous. Millions saw him on TV last football season, flying over the Cotton Bowl at Dallas between halves.

"No, bands and crowds don't worry them. But when they swoop low over the upper tiers, they sometimes scare girls.

"They don't chase off after stadium pigeons. We teach them to come to us for food; we reward them with raw meat when they strike the lure. If we want them to make another flight around the stadium, we pull the lure away as they stoop.

"Yes, you *did* hear a bell. Trained falcons traditionally wear a tiny bell on one foot.

"Falcons aren't cruel or vicious. A wild one will give you a bad working over with his claws—he never fights with his beak—but only because he is afraid. We've never had one we couldn't quickly tame with kindness."

Academy Rises from a Mesa

Spell "falcon" with a capital "F" and you mean an Air Force Academy cadet, as any sportswriter knows. The aerie of the Falcons, the quadrangular main complex of Academy buildings, is so new that there are still almost as many construction workers on campus as students.

It tops a mesa some ten miles north of Colorado Springs. The rugged Rampart Range shadows it on the west (page 868); beyond the superhighway to Denver on the east stretch the plains, where antelope and coyote still thrive.

Nearly 18,000 acres of grassy valleys and

Cadet Wing Commander and His Staff Ascend a Glittering Staircase

To give the impression of flight, architects designed the Nation's newest service academy with soaring staircases and long, open corridors. This stairway contains Italian mosaics, the only imported material in the \$137,000,000 project.

Cadet Col. Robert D. Beckel (left) wears the four broad stripes of the Wing's senior officer, a position rotated each semester. Shoulder boards of the other cadets proclaim a lieutenant colonel (center) and two majors. These officers carry swords and wear winged-propeller insignia on the collars of their summer khakis.



evergreen-studded foothills, one of the biggest college campuses in the country, surround the aerie. Five years ago, before the construction crews came, fine Hereford and Aberdeen Angus cattle lived here, disturbed occasionally by the bears and mountain lions that still take short cuts across the site to the mountains.

Now smooth modern roads sweep in through the hills. Housing for an eventual campus population of 1,200 staff and faculty families mushrooms in two valleys. There are a fine community center and an officers' club. Hand-planted trees and uncropped grasses begin to hide the cattle trails on the slopes.

Glass Walls Merge with Mountains

And in the majestic setting stand the mesatop buildings, marvels of functionalism in steel, aluminum, white marble, and so much glass that crystal doors merge with picture windows almost to form picture walls. They are spectacular above all at night, when the lights within are on and the rectilinear forms glow with soft incandescence against their backdrop of dark mountains.

The Academy's four most essential build-

ings flank a 4-acre quadrangle destined, when landscaping is completed, to be a magnificent "Air Garden." The cadet dormitory bounding the quadrangle's north side is six stories tall and a quarter-mile long; it houses the entire Wing. Almost as big are the administration and academic buildings and the cadet dining hall (page 851).

I visited the Academy in January, only four months after the Wing had moved in from Lowry Air Force Base, Denver. There it had occupied temporary quarters for the first three years of its existence.

The cadet newspaper *Dodo* irreverently described the new quarters as "glass battleships afloat in a sea of mud." The Wing, it said, would be issued brown shoes so the mud wouldn't show, and fourth classmen would double time only when the muck was less than two feet deep.

These structures look their size only when one is near them: the Ramparts diminish them, and the architects broke their bulk with unwallied or "open" floors girdling them in balcony fashion (page 844). Panels of mosaic tile in blazing red, blue, or yellow relieve



the starkness of what solid walls there are.

Behind the picture walls, the ultramodern look extends to every room and facility. Classrooms have blackboards of dark glass and steel and are wired for closed-circuit television. Every cadet dormitory room has a picture window; in the corridors outside, colored lights flash on panels to indicate the uniform of the day.

Stars Juggled to Order

Fantastic machinery in the "heavy laboratory" building outside the quadrangle positively terrified me. There was, for example, a trisonic wind tunnel in which air could scream through a pipe the size of my waist at 2,100 miles an hour. Steel-and-concrete test chambers for jet engines had viewing ports of bullet-proof glass. Exhaust gases lost their noise in muffling systems that culminated in great story-high steel stacks outside the building.

The planetarium, invaluable teaching aid in a school which strongly stresses aerial navigation training, placed a somewhat lighter burden upon my understanding. Maj. F. C.

Ethridge, planetarium officer, told me that his remarkable projector could reproduce the heavens at any point in time.

"I can run it backwards to the night Christ was born," he said. "It takes 18 hours, but we'll probably do it for a special show next Christmas Eve.

"Or I can single out the Big Dipper and in a matter of seconds rearrange its stars into the pattern they will form 50,000 years from now. I'm sorry I can't put up a satellite yet. The gadget for that is still on order."

Knowing the building had received its final coat of paint only the day before, I forgave him. He invited me to class that night.

"It ought to be a ball," he said. "This will be the first group of cadets to see the planetarium. They have no idea what's in store for them."

At the appointed time I went inside with 200 third classmen, or sophomores. Quickly and quietly we filled the room's circular tiers of soft benches. Shocked cadets discovered that the backs of these benches were head-rests; the proper position for stargazing is an unmilitary slump.



Grim Faces Mirror the Strain of Life for the New Cadet

To newcomers, life at the Academy seems an endless ordeal of roll calls, drills, lectures, and formations. One harried cadet wrote home: "You learn it's possible to live 30 hours in one day."

First classmen take charge of new cadets for two months, thus getting a refresher course in basic training and experience in leading men. Academy officers grade instructors as well as students.

These fourth classmen, attending a lecture on escape and evasion, display the newcomer's cropped haircuts and name plates. Those who survive the grueling first year usually go on to graduate.

Hangar-size Dining Hall Feeds the Wing at a Sitting

Filling an entire building, the hall will hold 3,000 men, several hundred more than the Wing's planned strength of 2,528. Glass paneling and lack of inside supports add to the feeling of spaciousness. Here the cadets receive orders for the day over a public-address system.

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Brass chimney and log fire brighten the First Class Lounge, a leisure room equipped with television and a snack kitchen. Fourth classmen have a separate lounge, their only sanctuary from upperclassmen.

Fourth classmen brace for senior cadets, whose bathrobe ornaments and bogus medals commemorate punishment tours or "good-bye forever" letters from girl friends. Robes of different colors distinguish classes in the dormitories.





U. S. AIR FORCE

A superb stereophonic hi-fi system played Tchaikovsky's *Romeo and Juliet* overture. The "sunlight" slowly faded below the artificial horizon. The music thundered to its climax. It was night, and the stars shone with perfect realism.

For a moment there was stunned silence. Then amazement overcame discipline briefly, and the cadets showed their appreciation with applause and howls of glee. Characteristically, they restored order themselves. "Let's knock it off!" one of them shouted, and the noise ended instantly.

Sky Whirls from Pole to Equator

But from time to time, voices out of the anonymous darkness proved that Academy discipline and bubbling spirits are compatible. The sky whirled dizzily as Capt. W. H. Gibson, lecturing on the navigator's stars, switched the heavens from North Pole to the Equator. A sound indicating gastric distress came from the audience.

"Pass the gentleman an airsick pill," said Captain Gibson, and went on talking.

"Sir, may we escort to weekend shows?" called another voice; to "escort" is to date, in Academy language.

"Certainly," said the captain. "But we'll be checking the house from time to time. Like this." And he switched on every light in the room.

I made some friends among the cadets that night. I met others by wandering into their classrooms, joining their dormitory discussion sessions, and sharing their meals. In the dining hall I received an education in the Academy's air jargon.

Cadets know the table as the "ramp" and the kitchen as the "hangar." Empty platters "flame out" and return "cross-country" to the hangar for refills. Fourth classmen who perform the table chores (civilian waiters bring in the food) hold such titles as "copilot," who serves cold beverages, and "hot pilot," who handles coffee.

My presence at meals appeared to overjoy my table mates of the fourth class. I basked in their smiles until the ramp commander, First Classman David J. Phillips of Burbank,

California, a football tackle, inadvertently deflated my ego.

"Fourth classmen eat at rigid attention and may not speak unless spoken to," he said during an exposition of freshman customs. "But when we have a guest, we relax the rules."

Anyway, I made cadet friends one way or another, and I think I came to see them as neither the rebels of the darkened planetarium nor the automatons of Saturday dress parades, but the normal, if exceptionally intelligent and dedicated, young Americans they are.

A Cadet Squares His Corners

The average Air Force cadet comes to the fourth, or freshman, class as an unmarried 17- to 22-year old. A searching physical examination has proven his fitness and competitive examinations his intelligence.

Experience thus far indicates that if he has been a member of the Civil Air Patrol or an Eagle Scout, he stands an especially good chance of succeeding at the Academy. Usually he has a Congressional appointment, although

there are several other categories of eligibles, including sons of Congressional Medal of Honor winners.

He reports in June, is shorn of all but half an inch of his top hair, and draws a Garand M-1 rifle. Upperclassmen bound him mercilessly but impersonally, teaching him to salute, to say "sir," to square his corners, to stand straight, to offer no excuses for his inevitable mistakes.

In late summer he moves out into the field and then to an Air Force base. Here he learns the basic arts of field soldiering—camping, marching, shooting, and caring for his rifle. He services and arms real planes and talks with real pilots (page 866).

He rides with them in jets. Best of all, he gets to fly one himself, a T-33 trainer, or "T-bird," with one of the pilots at the forward controls.

It surprises most people to learn that he will not become a qualified pilot until after he graduates and pins on his second lieutenant's bars. The Academy, however, will have

Architect's aerial drawing shows an early version of the Academy. The final design bears little resemblance to this working plan, explained by the late Lt. Gen. Hubert R. Harmon, the Academy's first Superintendent.

By his request, General Harmon lies at the site, the first person to be buried in the Academy cemetery.

Superintendent Briggs Examines a Cadet Sword

Cadet Wing Colonel Beckel chats after Saturday parade with Maj. Gen. James E. Briggs (left), Academy Superintendent, and Brig. Gen. Henry R. Sullivan, Jr., Commandant of Cadets.

Broad sleeve stripe on Beckel's parade dress whites marks the cadet. Three narrow stripes identify a first classman. Sword and sash, issued by the Academy, may be worn only by cadet officers.





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Model of a Titan missile absorbs students in astronautics, a new course for first classmen only. Trainees design a complete missile from rocket motors to nose cone. Col. Benjamin P. Blasingame, head of the Department of Astronautics, holds the replica's second stage.

Huge plastic globe becomes a plotting board for tomorrow's flights. Academy graduates, though receiving a Bachelor of Science degree, spend as much class time on liberal arts as on basic and applied science and engineering. These fourth classmen wear winter duty blue.

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given him considerable pilot instruction and a thorough course in navigation.

Future classes will be pledged to go on to one of the Air Force flying schools and become pilots if they are physically fit at graduation time. Although unpledged, many of '59 elected to take flying training.

Some cadets learn to fly in their free time, at their own expense. I was told that the Academy would like to cut down on the navigation courses and substitute enough training in light planes to make solo pilots of the whole Wing. The cadets would be pleased.

"The way it is now, people tease us a lot," one of them told me.

Spanking Uniforms for a Stern Life

When autumn approaches, the field-hardened class goes back to the mesa. The new cadet gets his uniforms, and this is a big day. A committee of experts headed by the late Cecil B. deMille designed the glittering wardrobe, from trim blue winter duty dress to striking parade dress whites.

But when the novelty of the uniform wears off, the winter regime seems starker than ever. The fourth classman trades his tent under the stars for a severe two-man room he must keep in apple-pie order (page 857).

Before the dorm I saw a dozen cadets, rifles on their shoulders, marching back and forth for no apparent reason.

"Punishment," explained a cadet companion. "The man nearest the wall is my roommate. At yesterday's inspection they found shaving soap in his wash basin."

Studies begin. Upperclassmen back from summer leave triple the ranks of the beginner's stern summer mentors. He and his classmates will be the only cadets at the Academy for Christmas.

Suddenly he notices a few familiar faces are missing. Friends have quietly resigned; their desire for an Air Force career, they discovered under pressure, was not as strong as they had thought. Most cadets who stay on after the first year graduate; academic failure above the fourth class is satisfactorily low.

Life relaxes considerably for upperclassmen. Having deliberately cut the cadet's home ties and shaped him into a military pattern, the Academy now lets his individuality return. Increasing seniority brings him more weekend and summer leave. He assumes added responsibility, both for the fourth classmen and for Wing affairs in general.

He still doesn't get to come and go as he pleases. Clean-shaven and in proper uniform, he turns out on the quadrangle at 6:15 o'clock each school morning, ready to march in formation to breakfast.

I have seen the Wing barely able to hold ranks intact in a howling gale from the Ramparts. "Forward, mush!" I heard one cadet officer command as he stepped off into the driving snow.

Classes fill the day from 7:30 a.m. until 3 p.m. A cadet studies or takes part in prescribed athletics until time to dress for dinner—and again the mealtime formation. He has 45 minutes to himself after dinner. Then he studies until bedtime, which is 10 o'clock unless he wangles permission for another hour with his books.

How a cadet finds time and energy to do more than follow the routine is beyond me, but he does. He devotes considerable effort, for instance, to assaults upon the regulations. He undertakes his forays, he explains, without malice.

"It's a sort of game we can't resist playing," said Cadet Aaron D. Thrush, '60, of Saint Johns, Ohio, who helps put out the student magazine *Talon*. "We try to beat a rule, the officers try to catch us—and they aren't playing games! If we lose, we take our punishment without hollering.

"I've never seen a mean or vicious trick. The cadets would take care of anything like that without leaving it to the officers."

"Radio Free Cadet" Harasses Instructors

Most jousts against the rules are peccadilloes like hiding a forbidden can of coffee in a room without hiding places, or rigging a cadet officer's quarters with alarm clocks set to go off an hour apart. But some are feats of ingenuity and skill.

"Once the cadets crammed an airplane wing tank into a room not much larger than the tank," Brig. Gen. Henry R. Sullivan, Jr., Commandant of Cadets (page 853) told me. "We had a time getting it out; they'd filled it with a ton of water!

"Another time we woke up to find a squadron guidon nailed to the top of a flagpole I'd have sworn couldn't be climbed.

"Then there was 'Radio Free Cadet.' Some genius tapped the dormitory loud-speaker system one April Fool's Day and kept ordering ridiculous changes in the uniform.

"No, we never caught all the culprits, and





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Glass walls and zigzag staircases pattern the dormitory in cubist style. Many rooms stand vacant, awaiting an increase in the Cadet Wing. The first full class enters this summer.

Roommates share a joke in their spotless quarters. They divide the cleaning detail, each man alternately taking responsibility at inspections. The typewriter is standard equipment.



I'll have to admit we're not unhappy over our failure. Those lads showed a lot of ingenuity. They also reminded some of us of our own days as cadets."

Noteworthy escapades, mellowed by the years, become legends. Legend joins long-established practices, time-hallowed objects, and old singable songs to form college tradition. The new Air Force Academy lacks tradition, although it has borrowed from other service academies for a beginning.

Future Flyers Take a Bus

Last year's Falcon team may have established a football tradition. Nearly everyone knows the story. It is the classic one of the team that starts without apparent chance for success and winds up in a blaze of headlines. Captained by First Classman Brock T. Strom of Ironwood, Michigan, who was to become an All-American tackle, the unknown Falcons won all their games but two, which they tied.

Mr. Strom divides the credit between Ben Martin, the new coach, and the entire Cadet Wing.

"The Wing pulled us through the Iowa game, first of the ties," he said. "We were in Iowa City all alone, waiting to play one of the country's best teams. Nothing could

convince us we stood a chance. Some of us were happy the Wing was back at the Academy, where it couldn't see the slaughter.

"But the cadets held a mass meeting back there, we found later, and told the superintendent and commandant they would pay their own way, if the trip were authorized. The generals just couldn't say no. More than 800 cadets paid \$25 each to hire buses.

"For some whose buses broke down, the trip took more than 20 hours, and they didn't arrive until half time. But the Wing was there, outhollering the whole Iowa cheering section, and old Mach I sat up on Mr. Melancon's wrist so puffed up and full of pride he looked big as an eagle.

"They could have put a team of tigers in Iowa uniforms that day and they wouldn't have beaten us. All of us would rather have died than let the Wing down."

The Falcons' reward was a bid to the Cotton Bowl, where they tied Texas Christian University, another "better" team.

Rattlesnakes Rout Romance

There appears to have been at least one attempt to manufacture a bit of tradition. It ran into an unexpected snag. The word went around that Cathedral Rock, a wind-



sculptured natural formation out on the campus by itself, should become the Falcons' Lovers' Lane.

"So I went out there with a couple of cadets and their girls," said Bill Belknap, who made the photographs on these pages. "First thing we saw was a big rattlesnake! That ended the photography—girls can't think about romance and snakes at the same time. Looks like the Academy will either have to stage a rattler hunt or find a new trysting place."

Better luck attended the borrowing of traditional West Point and Annapolis cadet customs and rules of behavior. They came to Colorado with young graduates of these older academies who served the first Air Force cadets as synthetic upperclassmen.

These "air training officers," as they were called, did their job well. I found little difference between the Falcons and their opposite numbers of the land and sea academies, at least until their final year.

But the years will certainly bring changes. Already some of the borrowed procedures, particularly certain of the fourth-class customs such as double time in the dining hall, are under fire. Running to table, it may be decided, is bad manners.

Wall-to-wall Slide Rule Solves a Problem in Fourth Class Math

Basic mathematics introduces cadets to such formidable subjects as spherical trigonometry and calculus. Fourth classmen early learn the value of the "slipstick," or slide rule, described by a student handbook as "that magic piece of wood on which you can find anything but money, leave orders, and answers."

Instructor and cadets watch a student demonstrate on the huge classroom model.

"Being new has its advantages," said Maj. Gen. James E. Briggs, Academy Superintendent (page 853), who, like many of his teaching and administrative staff, is a West Pointer. "Nothing binds us to the past.

"That goes for customs that may have outlived their usefulness, and it certainly goes for teaching methods and curriculum."

To find out about the curriculum, I called on the Dean of Faculty, Col. Robert F. McDermott.

"Half our courses are in the social sciences and humanities," the colonel said. "It may appear surprising that a service considered highly technical does not give more emphasis to science and engineering courses.

"But we're not producing engineers. The cadet here receives a broad liberal education and a good knowledge of the sciences applicable to his service, which means aeronautics, astronautics, nuclear physics, and electronics."

Object: To Use the Mind

For its technical specialties the Air Force relies largely upon postgraduate schools. These schools look to the Academy for good human material—young men taught to think and to express themselves and in whom intellectual curiosity has been aroused.

"We think our graduate's cultural attainments will command respect, not only for himself, but for the Air Force and the country," said Colonel McDermott. "Most important of all, his judgment should be tempered by an understanding of humanity—this is the sort of judgment the world demands of one entrusted with the means for its destruction."

I sat in on some of the nontechnical courses. I found the cadets reading Hemingway and Faulkner, who were a bit advanced for my college English professors. The cadets knew the history of Communism and World War II, and they understood the effects of defense spending on the Nation's budget.

I found, naturally enough, an orientation toward Air Force special needs. The Depart-

ment of Geography stressed cartography; an airman must understand maps (page 854). Law classes taught international conventions governing a country's airspace rights.

For my initial look at the technical side of the curriculum, I attended a class in astronautics. A dozen students were engaged in spirited discussion as I sat down at the back of the room; for better instruction, the Academy keeps classes small.

Even the words these cadets used were new to me. I looked at the blackboard. It contained complicated mathematical formulas I could not understand. I asked the cadet in front of me to tell me the subject under discussion, and I wrote his whispered answer in my notebook. Here it is: "Range error as a function of angular misalignment of velocity vector at burn-out."

After class I looked up Capt. Norbert D. LaVally, the instructor.

"What in the name of the Milky Way does

that mean?" I asked, showing him the book.

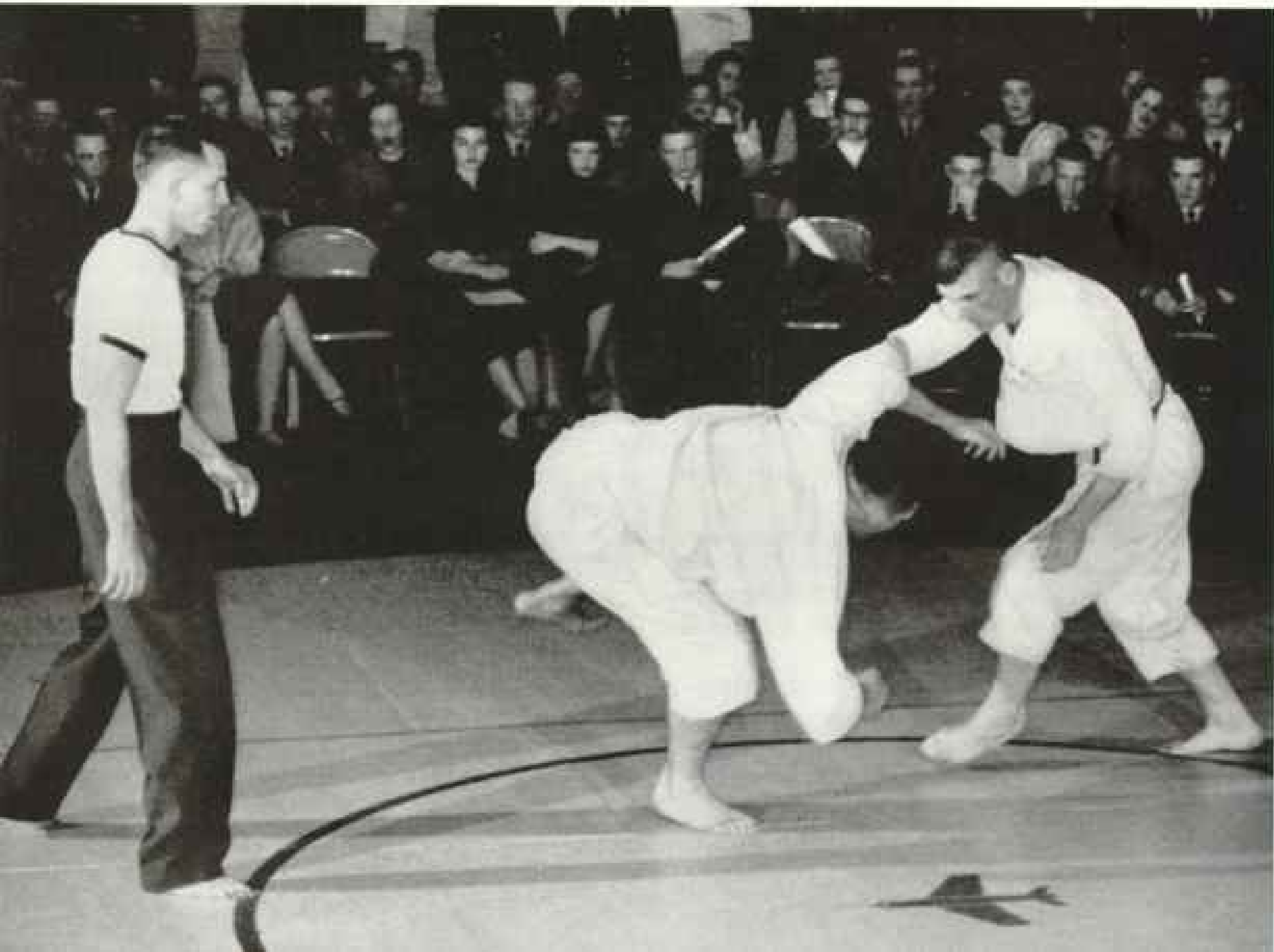
"Well," he said, "don't go shooting off any ballistic missiles until you study up. You might drop one in the wrong place."

I had wandered, it seems, into the Academy's very newest subject, the fundamental physics of space technology, or the things you must know before you fire intercontinental ballistic missiles and artificial satellites.

Astronautics joined the curriculum only last year and is exclusively for first classmen. It does not even have textbooks. Col. Benjamin P. Blasingame, the department head, is writing them as he goes along. He is well qualified to do so: he served as top Air Force officer on the Titan missile project.

"This course teaches mostly basic things," the youthful-looking colonel told me. "We don't attempt to keep up with every new development. But the cadets do design a complete, workable missile system before they're through."

Judo wrestlers grapple for a hold in the intramural championships. Training includes disarming opponents who wield real knives with blunted points and dulled edges. Every cadet must learn this fighting technique, a modified form of jujitsu. Cadets and their dates watch a finals match refereed by a first classman.





U. S. AIR FORCE PHOTOGRAPHIC AND CHARTING SERVICE (MATE)

Hong Kong Holiday Gives a Cadet a Taste of Foreign Relations

Last summer a third of the Class of 1959 traded home leaves to tour U. S. bases and countries in the Far East. This man explores the British Crown Colony by ricksha.

"Don't let's alarm the Academy's neighbors, however. Be sure and say the cadet 'birds' never leave the drawing boards!"

I tried some classes in nuclear physics, electronics, and aerodynamics, after which I went back to see Colonel McDermott.

"I'm worried," I said. "This difficult stuff, I've been told, is the sort of thing we must know to survive as a nation. With all due respect, these cadets were children only yesterday. Do they truly learn these things?"

"You can stop worrying," the dean smiled. "They learn and ask for more."

"We have something here you might not

expect to find in a service academy. We call it an 'enrichment' program. Part of it consists of a group of optional courses considerably more advanced than those in the prescribed curriculum.

"After a cadet's first year, if his marks are extra good, we let him take an 'overload.' Mind you, we don't pressure him; we just offer him an opportunity to get more out of his stay here.

"We didn't look for any rush to take us up, but to our complete astonishment we've wound up with nearly half the first three classes on voluntary overloads."

Also through the enrichment program, Air Force cadets who come in with previous knowledge in a prescribed course may pass validating examinations in that subject and then take a substitute. The dean said more than a tenth of the student body passed validating exams.

Through the enrichment program a cadet may major in a chosen subject. The standard military academy degree is a Bachelor of Science without a major.

Airmanship Takes Cadets Far Afield

A group of officers responsible to the commandant of cadets rather than to the dean teaches the purely military specialties—basic weaponry, courtesies, and drilling; Air Force doctrine; flying and navigation. The catalog calls this curriculum "airmanship studies."

Although I cannot think of a better one, I found the term inadequate. Its importance goes far beyond the teaching of mere facts and skills. It is a major character builder and prime source of cadet career motivation. The Academy officially terms it as essential as the academic curriculum to the production of an air officer.

The cadet, I am sure, rates it even higher. His studies he is inclined to look upon as necessary evils superimposed upon the Wing life for which he came to a military rather than to a civilian college. He considers airmanship, on the other hand, an integral part of cadet life, and mostly fun.

"It takes you places," said one man. "Last year we flew down to Eglin Air Force Base in Florida for a fire-power demonstration. Best show I ever saw—and now I know what the weapons I've been studying in books can do."

"Next year when I'm a first classman," said another, "I'll watch missiles being built in the Martin plant near Denver, and then maybe see them ready for testing in Florida or California."

Second classmen in the room had spent two weeks last spring tasting the lives of real officers.

"I went to a base in the East with the rank of 'third lieutenant,'" said one of them. "The colonel gave me a regular headquarters job and even assigned me a tour as officer of the day."

From their wallets several lads produced snapshots of themselves lolling on beaches in France and Spain, surrounded by girls.

"Airmanship at its best," they grinned.

The two upper classes can trade summer leave for tours of United States and allied military installations overseas (page 861). The tours come under the category of special airmanship activities.

"Special activities is right," I said, riffling through the pictures again. "Does the Academy go for this?"

"Certainly," the cadets said. "They tell us to mix with the people of other countries and learn their customs. Can we help it if some of them turn out to be girls?"

Thirty-nine cadets spent last summer's leave in the Army's parachute school at Fort Benning, Georgia.

"We all passed the course," said Cadet Anthony W. Seizys, '59, of Philadelphia, who was the honor jump student. "If we can make the insurance people see it our way, we'll organize an Academy Sky Divers Club."

Airmanship includes the athletic program, which makes it no less attractive to the cadets. Physical training and sports are compulsory; every cadet plays on an intercollegiate or an intramural team.

I have a bit of advice: speak softly to Air Force Academy graduates. Their alma mater has taught them judo! Watching classes in this Oriental art of rough-and-tumble, I marveled that half the Wing was not in hospital (page 860).

A lieutenant instructor taught his group to disarm opponents armed with knives. The knives, although blunted, were real.

"You don't teach good judo with rubber ones," said the lieutenant. "You need a weapon that will give a man a bruise if he doesn't dodge it."

Commonwealth Lends Instructors

From judo instructor to academic department head, the Academy faculty forms an elite corps. Unlike some military organizations, the Academy can decline to accept an officer assigned to it. Most instructors wear the Air Force uniform, but some are on loan—the title is liaison officer—from the United States Army, Navy, Marine Corps, British Royal Air Force, Royal Canadian Air Force, and Royal Australian Air Force.

A few men hold permanent assignments. One day, if General Briggs realizes a goal, 30 percent or more of the faculty will be doctors of philosophy. There are no civilian profes-

(Continued on page 871)



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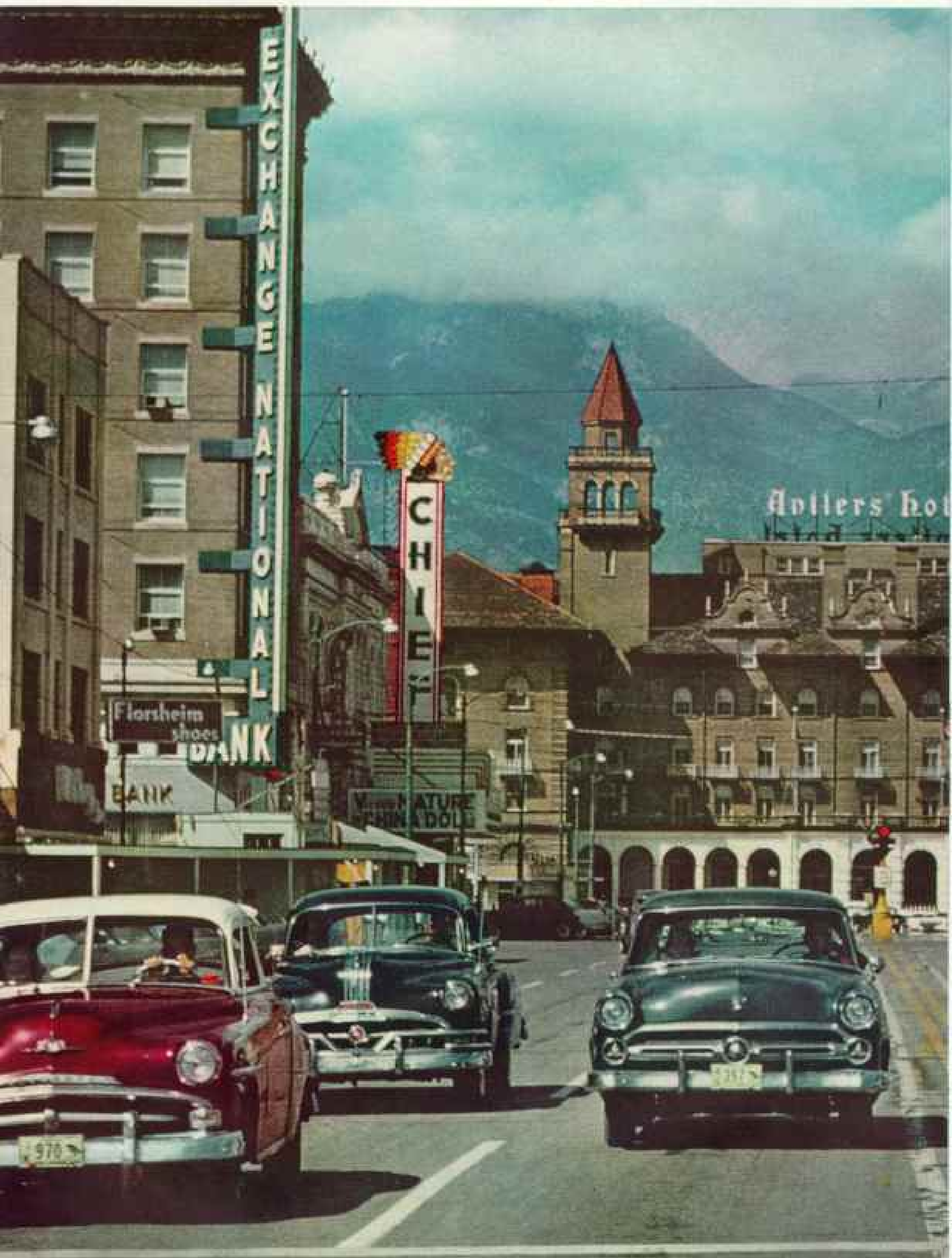
Dress uniforms and evening gowns enlivened this Christmas ball at Lowry Air Force Base, Colorado, the Academy's home during construction of its permanent quarters. Cadets told the author they take dancing lessons "with real girls!"

Academy insignia, a gift of the Air Research and Development Command, adorns an alcove. An official seal will replace this design, now kept in the Academy's museum together with gift seals from West Point and Annapolis.



Off-duty Cadets Enjoy a Glimpse of
Civilian Life in Colorado Springs

Weekend leave, a prized privilege, depends upon seniority. First classmen get one overnight a month, second classmen three a year, and third



classmen one a year. Fourth classmen, subject to tighter discipline, seldom set foot off the campus. These cadets cross Pikes Peak Avenue,

the city's main street. The peak itself, 14,110 feet high, looms into the clouds directly behind the turreted Antlers Hotel.

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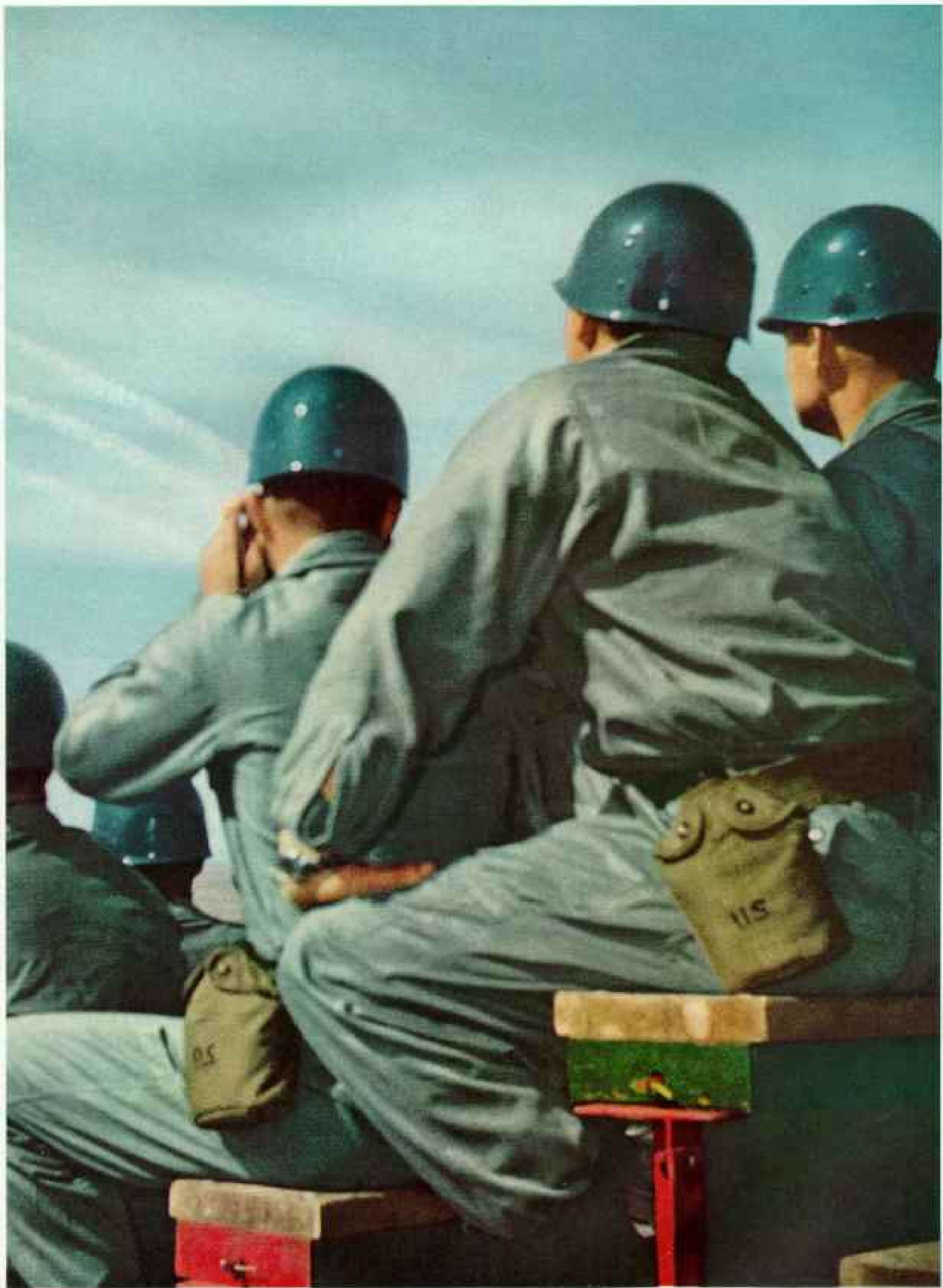


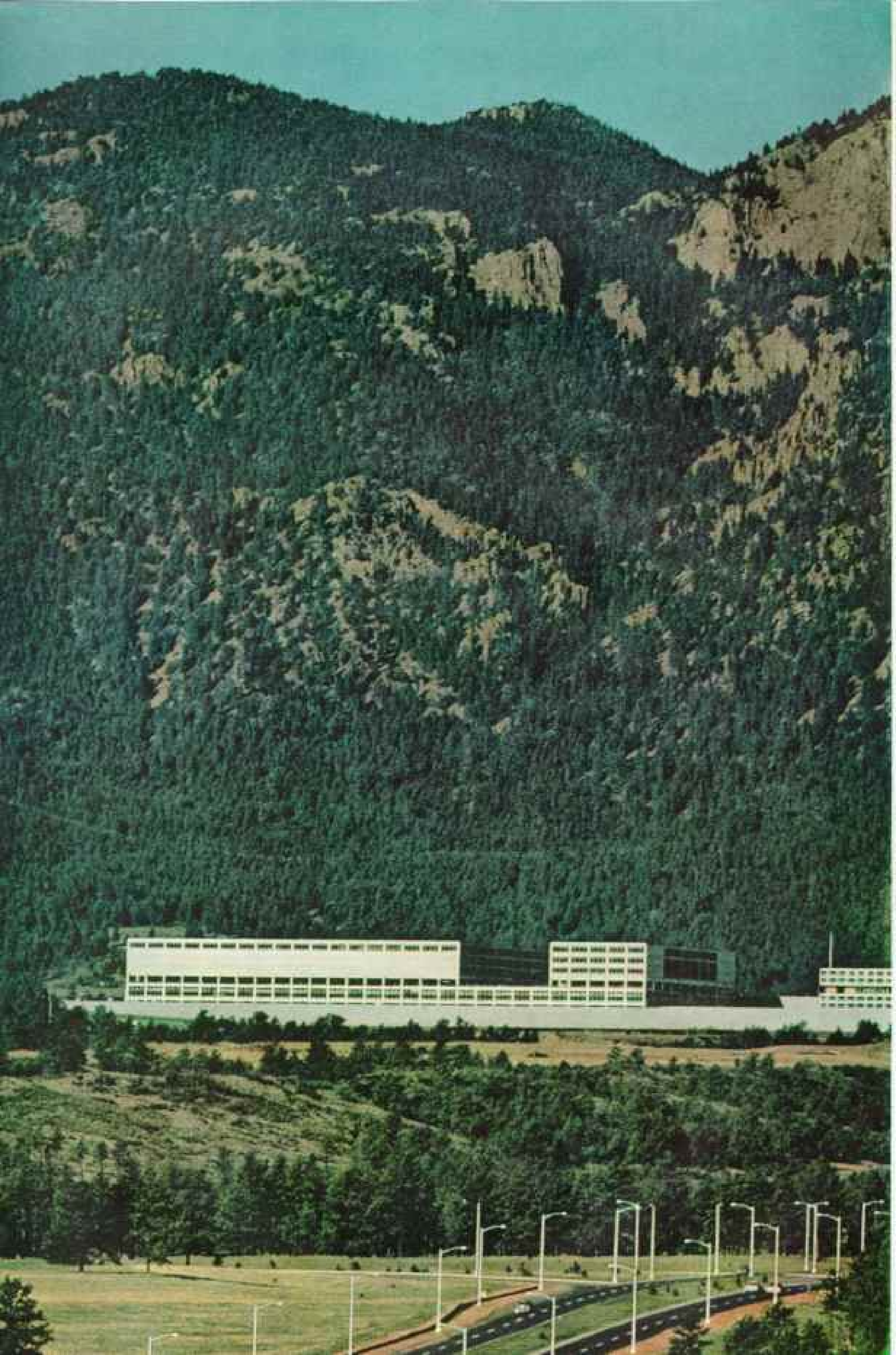
Lesson in air tactics prepares a cadet for his first ride in a jet. Fourth-class students devote part of their first summer to handling weapons, servicing aircraft, and watching aerial demonstrations (right).

Pilot adjusts a cadet's oxygen mask before take-off. The instructor, a member of an air squadron at Lowry Base, flies full time for the Academy.

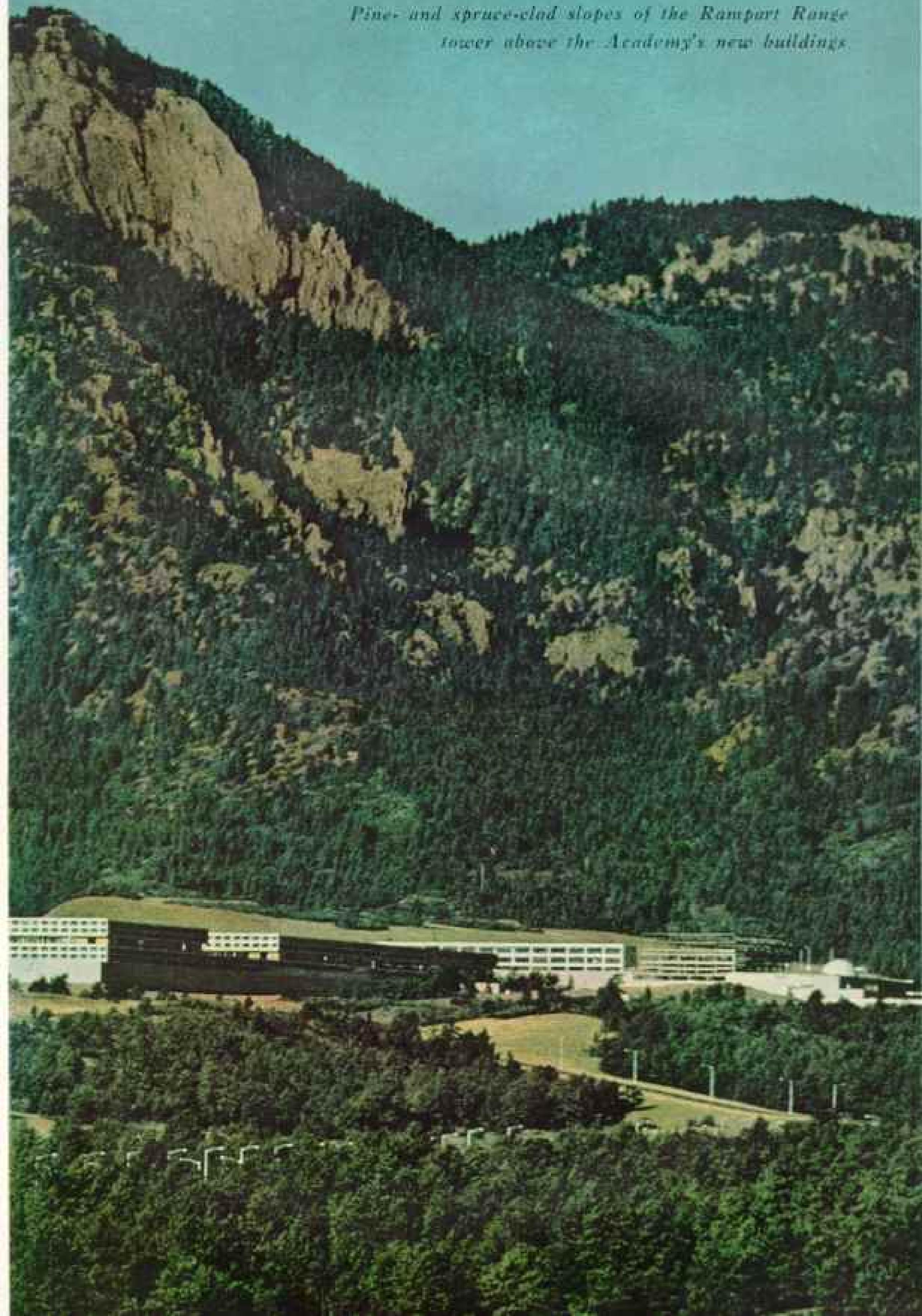


Dartlike F-100 Super Sabres





Pine- and spruce-clad slopes of the Rampart Range tower above the Academy's new buildings.





Cadets at Lowry Base Turn Weekend Teachers

During the Academy's first year at Lowry, cadets took over Sunday school classes for children of base personnel. More than 100 men volunteered, making it, in the words of one chaplain, "the only Sunday school with more teachers than pupils."

A cadet puts books aside to supervise picture coloring.

STEPHEN HYSCOCK/PHOTOS © NATIONAL GEOGRAPHIC SOCIETY

sors, although the Academy expects occasionally to invite eminent outsiders to lecture.

A small group of "AOC's"—air officers commanding—directly commands the Cadet Wing. Some members of the academic staff confess to envy of the AOC's.

"No courses and lectures to prepare, no papers to correct," said one of them. "Living the military life with these wonderful cadets, helping them grow into men, getting to know them as friends—they have the best jobs in the Air Force."

It is not that good, of course. The AOC has his long hours and his problems. More even than the chaplains, he shares the grief of the cadet who flunks out—or, worst of all, the heartbreak of the lad who, under the honor code, must report a comrade for cheating.

The Wing is organized into three groups of four squadrons each. An AOC commands each group and squadron. The AOC's report to General Sullivan.

A hierarchy of cadet officers, who are mostly first classmen from lowest noncom to colonel, assists the AOC's by handling routine fourth-class discipline and Wing administration. Visiting parents always marvel at the efficiency of the cadet-operated "security flight," which produces a student on five minutes' notice or gives his whereabouts if duties detain him.

The commandant of cadets appoints the student officers upon recommendation of the AOC's. The commissioned authorities, however, have no voice in the election of the cadet board that supervises the honor code.

Shooting a Bear Is No Excuse

I spent a pleasant afternoon learning about cadet life from the 4th Squadron's AOC, Capt. Todd Mallett, an Army officer. He told me a story, part legend and part fact, that well illustrates the firm, yet feeling way in which the Academy administers discipline.

A cadet, said Captain Mallett, went bear hunting in the Ramparts. He had a hunting license, but he did not have permission to miss supper formation.

Not until late in the day did he shoot a bear. Too good a woodsman to leave it for the coyotes, he dressed it out and cached it in a tree, which made him late for supper.

I doubt if he offered an explanation, but his AOC learned the details.

"Meet me at crack of dawn," the officer told the cadet, "and we'll bring your bear down."

Next day the pair laboriously packed the animal in.

"And now," said the AOC, painfully straightening his back, "consider yourself charged with a Class III violation, late for formation. Next time shoot your bear earlier in the day."

Flyers at Home on Skis

One day I saw an upperclassman whose manners and bearing so favorably impressed me that I remarked about it to the Academy officer accompanying me.

"A fine cadet," the officer said. "And yet, but for the wisdom and decency of Academy discipline, he might have been sent back to his home town in disgrace.

"He cut a wide swath in Colorado Springs one weekend. His AOC brought him back here. Instead of bouncing him summarily, the commandant and the superintendent took the trouble to look beyond the escapade for the underlying cause.

"They found it, and they cured it, as you can see. Part of the cure was nine months' restriction, a record for the Academy, which this kid took like the man he is. Some other kind of discipline would have produced not a man but a sure delinquent."

Later, in near-by civilian communities, I inquired of people what they thought of their cadet neighbors. I need quote only the answer of a hotel man in Colorado Springs:

"We had 400 of them here for a dance. We played host that night to 400 gentlemen."

Captain Mallett doubles as coach of an Academy athletic team. Only after accepting an invitation to watch it practice did I learn it was the ski team, and that it worked out in the Arapaho National Forest 70 miles to the northwest!

I rented some skis and showed up on the appointed morning in Loveland Basin, two miles above sea level. The thermometer read four above zero. Searching for the cadets, I rode a chair lift above tall trees and sickening canyons nearly to the top of a near-by Rocky Mountain.

The team wasn't there. A small boy stopped beside me. "Mister," he said, "how did you do those somersaults getting out of the chair lift without breaking your leg?"

"That'll be enough," I said. "You just aim me for the bottom and give me a shove."

Later I met one of Loveland's slender, bronzed instructresses.

Starved for Oxygen, a Groggy Cadet Fumbles a Test in the Altitude Chamber

Head sagging, eyes resisting focus, hands seemingly detached, the volunteer experiences flight conditions without an oxygen mask at 55,000 feet. Fellow cadets, masks in place, watch their listless classmate fail a simple problem of inserting numbered pegs into proper holes. The airman at right stands ready to replace the mask before the trainee blacks out.

Surprisingly, the Academy produces no full-fledged pilots. "We have only four years to train future air commanders," an officer told the author. "Judgment, character, and a sound education come first. There's time enough to learn flying later."

"If you're writing a ski story," she said, "you missed the most spectacular show we've had in weeks. The ski patrol told me they tailed a novice who fell 23 times, hit two snow fences, and reached the bottom of the mile-and-a-quarter slope alive. I wonder if he'd ever been on skis before."

"You can quit wondering," I said. "He hadn't."

Then I set out afloat and found the Academy team whizzing magnificently down a far steeper slope than the one I had come down. I tried to write down the names they gave me for the maneuvers they were performing, but my pen was frozen. I stood in their midst to have my picture taken, but my camera was frozen. I gave somebody my ski lift ticket and went back to Colorado Springs.

Wing Marches as One Man

The ski interlude took place on a Saturday. I slept 14 hours that night and consequently failed to make chapel the next morning. Otherwise I missed very few cadet activities.

I learned about cadet clubs—devoted to things like fishing, debating, and mountaineering. There are clubs in geography and skeet. A lacrosse club turned up so many players that the Academy may authorize an intercollegiate team in this sport.

On the windy parade ground I watched the Wing march thrillingly behind its band (page 844). A thousand gloved hands slapped a thousand rifles in metallic unison as the cadets presented arms.

"Bill wrote me just where he'd be in the formation," wailed the mother of a fourth classman making her first visit to the Academy, "but they all look so much alike in those uniforms I can't find him!"

I could have told her she was due for an-



other shock when she did meet her son: Bill's greeting would be distinctly decorous. "PDA"—public display of affection—is a fairly serious cadet offense.

I saw workmen hurrying to finish the social center, Academy counterpart of a civilian university's student union building, in time for graduation festivities. I inspected the sites of the gymnasium, stadium, and golf course. I heard the hope expressed that Congress someday would authorize an airfield.

I visited the library, which takes up three floors in a wing of the academic building. In the huge periodical room I saw newspapers and magazines I never dreamed existed. One of them, I learned after a cadet translated its title, was the official publication of the Russian Air Force!



APR. 1942 PAGE 873

The sound of steel blades on ice led me to one of the dormitory courtyards. I found a blazing hockey game in progress.

"The rink was our own idea, O.K.'d by the commandant," one of the players told me. "It's natural ice. All we had to do was turn on a spigot, and let the cold nights do the rest. There'll be a lawn here next year, but maybe by then we'll have a regular rink."

I stopped by the cemetery, a place of simple beauty where the mule deer like to stand quietly at eventide. Two men rest here, two soldiers of the air whose ages and ranks differed, but whose devotion to the Academy was the same.

One, 1st Lt. Richard H. Boyce, served in the early days at Lowry as one of the commissioned "upperclassmen." His mission com-

plete, he went on to other duties in Alaska and died in a plane crash.

The other, Lt. Gen. Hubert R. Harmon, was the Academy's first Superintendent (page 852); with Generals Billy Mitchell and "Hap" Arnold and other early airmen of the same brilliant stamp, he had long advocated an academy of its own for the Air Force. In the end he could not bear to leave the dream he had molded into reality; he asked that his ashes be interred on the campus.

I had a plane to catch for home. I started the car. A large bird leaped into the sky from the top of a pine and winged swiftly back toward the mesatop.

For a moment I thought I heard the sound of a tiny bell; but the car engine was running, and I could not be sure.

New Atlas Map Charts a Germany Divided

FIVE precarious lifelines connect West Berlin to the Free World. Today, as international attention focuses on this most controversial part of Europe, a National Geographic Society map makes it easy to trace these vital links.

The new map, the tenth issued thus far in the Atlas Series,* portrays Germany on a scale of 24 miles to the inch, larger than any previous Geographic map of the country. The lifelines to Berlin include three air corridors and two ground routes; freedom of access on all is guaranteed by agreements between Russia and the Western Allies.

The air corridors, each 20 miles wide, lead from the airport cities of Frankfurt, Hannover, and Hamburg. An orange line on the map marks the railway leading east from Helmstedt; another traces the *Autobahn* to Berlin, particularly vulnerable to blockade because it must cross dozens of bridges on its 110-mile course from the border of West Germany.

The ten-color map shows shrunken modern Germany reaching from the Danish border in Jutland on the north to Switzerland and Austria in the south. Her southwest border is enlarged by the addition (following an agreement with France in 1956) of the coal-rich Saarland, but her eastern border awaits a final German peace treaty.

"Inhuman Frontier" Severs Germany

The most striking feature of the new map is the jagged green streak through its heart. The Germans call it "*die unmenschliche Grenze*"—"the inhuman frontier"—for it bars neighbor from neighbor and parent from child.

The barrier between East and West Germany is made of barbed wire and plowed earth, a strip 30 feet wide replowed frequently so that Communist patrols can watch for new footprints and guard more closely the areas where crossings are made.

The border cuts through villages, farms, and sometimes individual houses, so that back or front doors must be sealed off. At one point, near Helmstedt, it divides a salt mine in two; a wall keeps Red miners on their own side.

The present division of Germany gives the Federal Republic 95,910 square miles of territory, with a population of 54,000,000; the Eastern Zone has 41,646 square miles and

17,700,000 people. Since World War II about 13 million displaced Germans have moved into West Germany from the east.

The influx of refugees and expellees has swelled the population of West German cities and has added at least one new name to the map. This is the town of Neugablonz (New Gablonz), near Kaufbeuren in southwestern Bavaria. Here some 10,000 former Sudeten Germans from Gablonz (Jablonec), now in Czechoslovakia, have settled en bloc, and brought with them a \$33,000,000-a-year industry for which they were famous in prewar days: the manufacture of costume jewelry and glassware.

Another group of "outsiders" who have settled into German life are five divisions of U. S. Seventh Army troops and more than a score of U. S. Air Force units, part of NATO's armed force for the defense of Western Europe.

Seventh Army headquarters is in the historic city of Stuttgart; Wiesbaden, 100 miles northwest, is the nerve center of all U. S. Air Force operations in Europe.

Canals Supplement Roads and Rails

Parallel red lines crisscross the map to show in detail the famous complex of autobahns, the high-speed divided highways. Ticked blue lines show the canals of Germany's intricate inland-waterway system, which carries more than a fourth of her commercial traffic. Near the top of the map the Nord-Ostsee, or Kiel, Canal, badly bombed in World War II, is open again.

Another, the Mittelland Canal system, runs from Duisburg and provides a water link between Berlin and the Rhine, 300 miles away.

An inset in the upper left corner of the map enlarges the 341 square miles of Berlin. Tinted boundaries demarcate the American, British, French, and Soviet sectors, and a small square locates the military headquarters of each occupying power.

* A convenient Folio to hold Atlas Maps is available for \$4.85; a packet of the seven maps issued in 1958 for \$3; individual maps for 50¢. Write to National Geographic Society, Dept. 15, Washington 6, D. C.

This map is Atlas Folio Plate No. 35. Plates previously issued: Northeastern United States (No. 6), Southeastern United States (8), North Central United States (9), U. S.-Canadian National Parks (13), Southern South America (28), British Isles (31), Poland and Czechoslovakia (38), Greece and the Aegean (40), and Lands of the Eastern Mediterranean (47).

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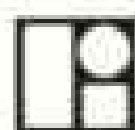
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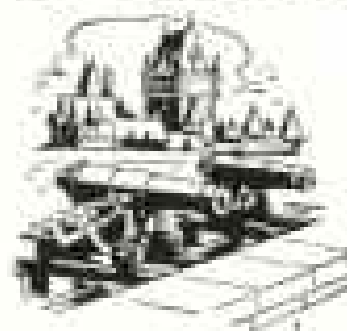


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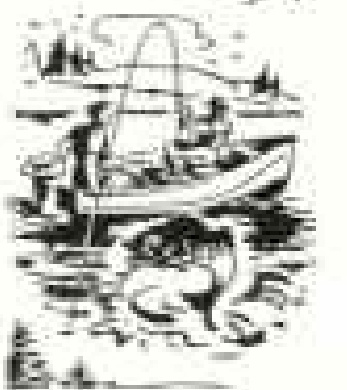
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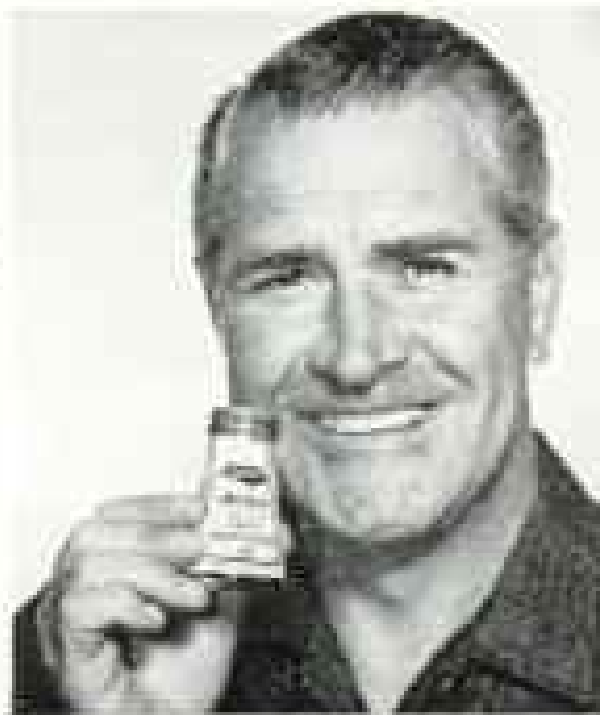
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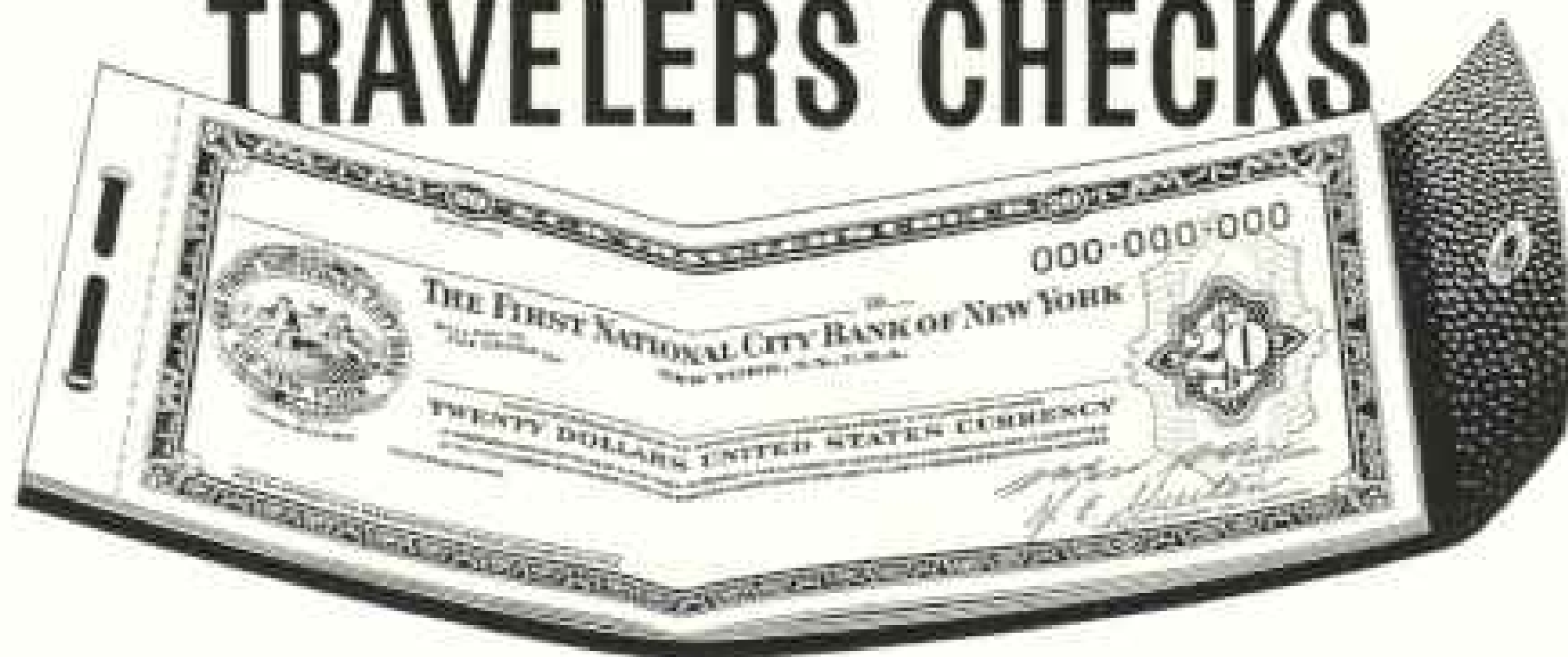
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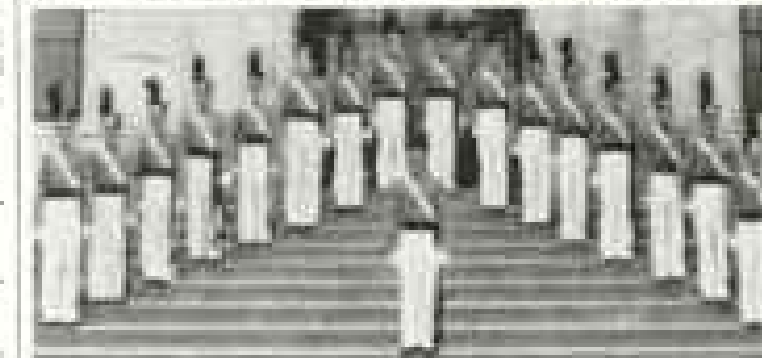
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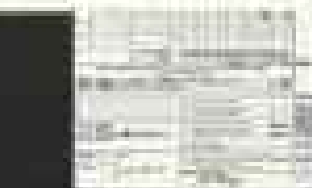
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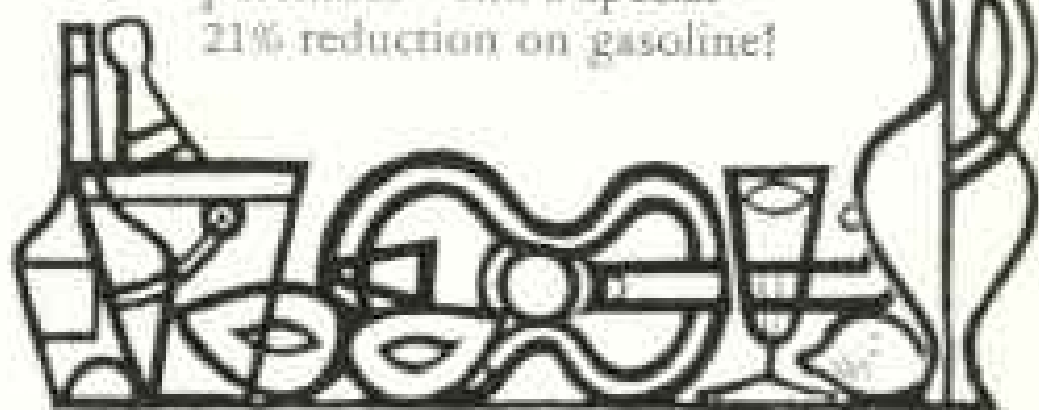
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Bausch & Lomb Optical Co., Rochester, New York.

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Ray-Ban[®]
SUN GLASSES



19 frame styles, 46 colors, variety of lens types, for men and women—\$5.95 to \$24.95.

Mention the National Geographic—It identifies you.



A *Bedtime Story* FOR BUSY MOTHERS

Once there was a beautiful young mother who had two active, attractive children and an extension phone beside her bed.

Thanks to the phone, she could read or romp with the youngsters and run her household at the same time.

When she had to take or make a call, she saved steps and stairs and time.

When she wanted to plan a birthday party or order a Christmas present, she could talk with complete privacy.

And all through the night she slept more peacefully, knowing that doctor, police, fire-

men and friends were as close as the phone by her bed.

As a result, life was easier, her family happier, and she looked younger than her years forever after.

* * *

You, too, can share the fun and get things done with the help of a bedroom phone. It comes in a choice of lovely colors, with a built-in night light if you like.

Other handy phones around the house—wherever people work or play or sleep—add so much to your comfort, so little to your budget. Just call our local business office.

BELL TELEPHONE SYSTEM



*Gives your
handwriting
true character—
instantly!*



*Fills
this exclusive
"no-dunk" way—
instantly!*

SNORKEL®

FOUNTAIN PENS BY

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(above) Snorkel Pen with
your Dad's personal signature
or initials on 14K gold
band, \$25. Others from \$10.
Matching Finesse Pencils from
\$6. Sets from \$16. Snorkel
Desk Sets from \$12.50.

Your thoughtfulness will be remembered for years to come when you give a Sheaffer Snorkel Pen. It's the ideal gift for Father's Day and Graduation, for the "best man" or that important June birthday. You will be proud to give the world's finest fountain pen and pencil set!

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Reach for Coca-Cola...and be really refreshed! Only Coke gives you the cheerful lift that's bright and lively...the cold crisp taste that deeply satisfies! Pause often...and always drink Coke!



SIGN OF GOOD TASTE