VOLUME CX NUMBER FOUR

THE NATIONAL GEOGRAPHIC MAGAZINE

OCTOBER, 1956

Surprising Switzerland 427
With Map and 44 Illustrations
36 in Color JEAN and FRANC SHOR

Back to the Historic Black Hills 479
With Map and 23 Illustrations LELAND D. CASE
19 in Color BATES LITTLEHALES

Honey Eaters of Currumbin 510
With 9 Illustrations in Color PAUL A. ZAHL

Himalayan Pilgrimage 520
With Map and 13 Illustrations CHRISTOPHER RAND

A New Look at Kenya's "Treetops" 536
With 4 Illustrations
1 in Color QUENTIN KEYNES

Life 8,000 Years Ago Uncovered in an Alabama Cave 542
With 21 Illustrations CARL MILLER
10 in Color BROOKS HONEYCUTT

Shipworms, Saboteurs of the Sea 559
With 9 Illustrations F. G. WALTON SMITH
ROBERT F. SISSON

Sixty-four Pages of Illustrations in Color

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
WASHINGTON, D. C.

$7.00 A YEAR 75¢ THE COPY

NATIONAL GEOGRAPHIC SOCIETY

SIXTEENTH AND M STREETS NORTHWEST, WASHINGTON 6, D. C.

JOHN OLIVER LA GORCE, President
ROBERT V. FLEMING, Treasurer
HILLEARY F. HOSKINSON, Assistant Treasurer
WILLIAM H. McCAULEY, Assistant Treasurer
LYMAN J. BRIGGS, Chairman, Research Committee
ALEXANDER WETMORE, Vice-Chairman, Research Committee
MELVILLE BELL GROSVENOR, Vice-President
THOMAS W. McKNEW, Vice-President and Secretary
MELVIN M. PAYNE, Senior Assistant Secretary
VERNON H. BREWSTER, Assistant Secretary
ROBERT E. DOYLE, Assistant Secretary
LEON J. CANOVA, Assistant to the President
SIBYL PECK, Assistant to the Chairman of the Board

BOARD OF TRUSTEES

GILBERT GROSVENOR
Chairman of the Board, Formerly President, National Geographic Society, and Editor of its Magazine (1899-1954)

GEORGE C. MARSHALL
General of the Army
Formerly Secretary of Defense

CURTIS E. LEMAY
Commander in Chief
Strategic Air Command

MELVILLE BELL GROSVENOR
Vice-President and Associate Editor
National Geographic Magazine

LYMAN J. BRIGGS
Director Emeritus, National Bureau of Standards

BENJAMIN M. MCKELWAY
Editor, The Washington Star

HUGH L. DRYDEN
Director, National Advisory Committee for Aeronautics

ELISHA HANSON
Lawyer and Naturalist

LEROY A. LINCOLN
Chairman of the Board
Metropolitan Life Insurance Co.

JOHN OLIVER LA GORCE
Editor, National Geographic Magazine

ROBERT V. FLEMING
Chairman of the Board
Riggs National Bank

ALEXANDER WETMORE
Research Associate
Smithsonian Institution

THOMAS W. MCKNEW
Vice-President and Secretary
National Geographic Society

RICHARD E. BYRD
Rear Admiral, U. S. Navy, Retired

JUAN T. TRIPPE
President, Pan American World Airways

WILLIAM E. WRATHER
Director, U. S. Geological Survey, Retired

WILLIAM V. PRATT
Admiral, U. S. Navy, Retired

CHARLES F. KETTERING
Consultant and Director
General Motors Corporation

EARL WARREN
Chief Justice of the United States

LLOYD B. WILSON
Formerly Chairman of the Board
Chesapeake and Potomac Telephone Companies

L. O. COLBERT
Rear Admiral, U. S. Coast and Geodetic Survey, Retired

EMORY S. LAND
Vice Admiral, U. S. Navy, Retired
Formerly President
Air Transport Association

H. RANDOLPH MADDOX
Vice-President, American Telephone and Telegraph Company

ERNEST E. NORRIS
Retired President
Southern Railway System

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded sixty-eight years ago the National Geographic Society publishes this National Geographic Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material The Magazine uses, generous remuneration is made.

In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives. It has aided and encouraged exploration literally to the ends of the earth, having contributed to expeditions of Rear Admiral Robert E. Peary, discoverer of the North Pole, and Rear Admiral Richard E. Byrd, first man to fly over the North and South Poles.

National Geographic exploration and scientific study made known to the world the natural wonders now preserved as Katmai National Monument and Carlsbad Caverns National Park.

The Society's notable expeditions pushed back the historic horizons of the Southwest to a period nearly eight centuries before Columbus by dating the vast ruins of Pueblo Bonito.

In Mexico, The Society and the Smithsonian Institution, January 16, 1939, discovered the oldest dated work of man in the Americas. This stone is engraved, in Mayan characters, November 4, 291 B. C. (Spinden Correlation). It antedates by 200 years anything else dated in America and reveals a great center of early American culture, previously unknown.

On November 11, 1935, the stratosphere flight of the world's largest balloon, *Explorer II*, sponsored by The Society and the U. S. Army Air Corps, reached a world record altitude of 72,395 feet. Capts. Albert W. Stevens and Orvil A. Anderson took aloft a ton of scientific instruments and obtained results of extraordinary value.

A notable undertaking in astronomy was completed in 1956 by The Society and Palomar Observatory of the California Institute of Technology. This project photomapped vast areas of space, making available to observatories all over the world, at less than cost, the most extensive sky atlas yet achieved.

The Society and individual members contributed $100,000 to help preserve for the American people the finest of California's sequoias, the Giant Forest in Sequoia National Park.

One of the largest glacial systems outside the polar regions was discovered in Alaska and Yukon in 1938 by Dr. Bradford Washburn, exploring for The Society and Harvard University,

EXECUTIVE STAFF OF NATIONAL GEOGRAPHIC MAGAZINE

JOHN OLIVER LA GORCE, EDITOR
MELVILLE BELL GROSVENOR, ASSOCIATE EDITOR

Senior Assistant Editor
FREDERICK G. VOSBURGH
Assistant Editors
LEO A. BORAH
ROBERT LESLIE CONLY
GEORGE W. LONG
FRANC SHOR
MASON SUTHERLAND
Senior Editorial Staff
BEVERLEY M. BOWIE
ANDREW H. BROWN
ALLAN C. FISHER, JR.
Editorial Staff
JOHN R. HOOPES
JAY JOHNSTON
STUART E. JONES
NATHANIEL T. KENNEY
MATT C. MCDADE
CAROLYN B. PATTERSON
JOHN SCOFIELD
MERLE SEVERY
KENNETH F. WEAVER
ROSE T. MACBRYDE, Asst.
Executive Assistant
HERMAN J. A. C. ARENS
Editorial Research
INEZ B. RYAN, Chief
MARGARET G. BLEDSOE
Librarian
ESTHER ANN MANION
JULIA F. BANKS, Asst.
Geographic Research
GEORGE CROSSETTE, Chief
LOUISE F. ALTHOFF
NEWTON V. BLAKESLEE

Foreign Editorial Staff
W. ROBERT MOORE, Chief
DAVID S. BOYER
LUIS MARDEN
JEAN BOWIE SHOR
HOWELL WALKER

Secretary's Staff
Personnel Officer
HERBERT T. HENDERSON
Membership Administration
SHELDON CARY
Accounting
F. CHARLES BROWN, Chief Auditor
C. VERNON SANDERS, Auditor
Payroll Operations
ESTHER M. LOHRER
Statistical Control
EVERETT C. BROWN
Cashier
FRANK S. DELK
Cost Control
SARGENT C. ELLIOTT
Purchasing
JOHN P. M. JOHNSTON
Administration
WILLIAM T. BELL
CHARLES F. ALTHOFF
Membership Fulfillment
ROY J. KLOCKENBRINK
Supervisor of Accounts
DELLA M. HURT

Chief Cartographer
JAMES M. DARLEY
Cartographic Staff
NEWMAN BUMSTEAD, Asst. Chief
IRVIN E. ALLEMAN
JOHN J. BREHM
WELLMAN CHAMBERLIN
RICHARD DARLEY
ATHOS D. GRAZZINI
APPHIA HOLDSTOCK
RALPH E. MCALEER
WALTER K. MORRISON
Typographer
C. E. RIDDIFORD
Cartographic Artist
WILLIAM PALMSTROM
School Service
RALPH GRAY, Chief
WILLIAM C. BAUGHMAN
ENRIQUE C. CANOVA
EDWARDS PARK
News Service
WINDSOR P. BOOTH, Chief
LONNELLE AIKMAN
SAMUEL W. MATTHEWS
EVELYN PETERSON
Advertising
GILBERT G. LA GORCE, Director
JOHN F. CONNERY, Manager
Printing Production
DEE JAMES ANDELLA
JOE M. BARLETT

Illustrations Editor
WALTER MEAYERS EDWARDS
Assistant Illustrations Editors
KIP ROSS
ANDREW POGGENPOHL
HERBERT S. WILBURN, JR.
Illustrations Staff
CHARLES ALLMON
ROBERT L. BREEDEN
WILBUR E. GARRETT
LEONARD J. GRANT
GIFFORD D. HAMPSHIRE
GERALDINE LINDER
CARO STILLWELL, Librarian
Staff Artist and Naturalist
WALTER A. WEBER
Staff Photographers
B. ANTHONY STEWART, Chief
WILLARD R. CULVER
JOHN E. FLETCHER
BATES LITTLEHALES
DONALD MCBAIN
KATHLEEN REVIS
J. BAYLOR ROBERTS
ROBERT F. SISSON
VOLKMAR WENTZEL
Photographic Laboratory
EDWIN L. WISHERD, Chief
RICHARD H. STEWART, Asst. Chief
Film Editor
JOSEPH M. RIDEOUT

Copyright © 1956 by National Geographic Society, Washington, D. C. International Copyright secured. All rights reserved. Quedan reservados todos los derechos. Printed in U. S. A. Entered at the Post Office at Washington, D. C., as Second Class Mail Matter. Acceptance for mailing at special rate of postage provided for in Sec. 1103, Act of October 3, 1917, authorized July 1, 1918. Cover design and names registered in United States Patent Office. Marcas Registradas.

Be in fashion and on time, too, with a Hamilton Five-Feature watch!

No longer do you have to indulge the girls their charming disregard for time! With the Five-Feature concept, Hamilton has proved that purely feminine watches can be *reliable*. And there are handsome new Five-Feature styles to keep the men on time, too.

Beautifully styled as these newest Hamiltons are, each contains the five *basics* of time-telling dependability. Each has 22 jewels and a guaranteed Dynavar lifetime mainspring. Each is shock-resistant, anti-magnetic and *fully adjusted* for temperature, isochronism and positions.

Let your Hamilton jeweler show you a new Five-Feature watch and you'll know why Hamilton is the finest watch you can give or get, $39.50 to $10,000.

HAMILTON WATCH COMPANY, LANCASTER, PENNSYLVANIA

And here are the Five Features:

22 jewels · Fully adjusted · Shock-resistant · Anti-magnetic · Guaranteed Dynavar lifetime mainspring

A. Bluebird, $79.50

B. Harlequin, $110

C. Heather, $65

D. Trent, $75

HAMILTON

THE WATCH JEWELERS RECOMMEND MORE OFTEN THAN ANY OTHER

Tunnel to Outer Space

World's most powerful wind tunnel, lashing tomorrow's spacecraft with winds many times the speed of sound . . .

World's largest outdoor turbine, producing electricity for Atomic Energy Works at Paducah, Kentucky . . .

World's most completely automated plant, manufacturing automobile engines . . .

First successful diamond-making machine, with pressures up to 1,500,000 pounds per square inch . . .

These new challenges to man's lubrication know-how all have this one thing in common, SOCONY MOBIL's *master touch in oil*. It guards one of every six industrial wheels turning in the Free World, including more than half of all the big turbines (5,000 kilowatts and over).

Good reason! Men who depend on machinery depend on SOCONY MOBIL as a partner in its protection.

* * *

Wherever there's progress in motion—in your car, your plane, your farm, your factory, your boat, your home—*you, too, can look to the leader for lubrication.*

SOCONY MOBIL OIL COMPANY, INC.

LEADER IN LUBRICATION FOR 90 YEARS

Most valued symbol of your devotion

A diamond, most valued of gems, steadfastly suggests the measure of your devotion.

Its matchless excellence demonstrates, as no other gift can, the quality of your thoughtful discernment.

In a diamond, the soundness of your judgment is proven: for regardless of size or price, it has enduring value.

Most welcomed, most cherished of gifts, a diamond testifies to your achievement.

This year, let a diamond make memorable that special anniversary, or important birthday, a debut, the birth of a child, or any significant event.

½ carat	1 carat	2 carats	3 carats
$280 to $500	$580 to $1155	$1265 to $3320	$2725 to $6450

Color, cutting and clarity, as well as carat weight, contribute to a diamond's value. A trusted jeweler is your best adviser. Prices shown cover the range of quotations in July, 1956, by representative jewelers for their top-quality unmounted diamonds. (Federal tax extra.) Prices vary with the qualities offered. Exceptionally fine stones are higher.

De Beers Consolidated Mines, Ltd.

"The thing to do with life

Westward or Eastward—Hawaii, the paradise of the Pacific, is on Pan American's skyway to adventure 'round the world.

Half the fun of eating native dishes is <u>not</u> using a knife and fork. In Japan, you'll use *hashi*.

Temple of the Emerald Buddha in Bangkok is a surviving testament to a half-forgotten kingdom.

is *Live it!*"

And one of the nicest ways to Live it
begins with a call to Pan Am. Then leave home for anywhere
—over 600 offices to smooth your way all over the world.

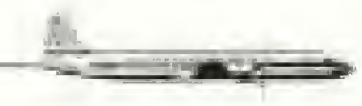
Join the Pan American parade down the main street of the world. One wonderful experience follows on the heels of another.

See the frolicking tumble of the Hawaiian surf. The moment of wonder as Fujiyama rises from a silver mist. Smell the exotic scents of hibiscus, frangipani and spice shops of the faraway Pacific islands. Watch the Middle East step out of storybooks. Hear the hurdy-gurdy tinkling Neapolitan folk songs. Stand before the haunting Colosseum. Soon Paris will be flirting boldly with your heart.

All the world's ready to greet you. Now you're really living life—and loving it!

What are you waiting for? Why not meet the world halfway? Get your Travel Agent or Pan Am on the telephone right now. Start planning your next vacation on Pan American—the *only* airline that can fly you all the way 'round the world and to most places in between.

WORLD'S MOST EXPERIENCED AIRLINE

PAN AMERICAN 

The world is smaller by hours
on the SAS DC-7C Global Express

SAS TRANSPOLAR
LOS ANGELES
NEW YORK
SAS TRANSATLANTIC
TO ALL EUROPE, NEAR EAST, ASIA, AFRICA

In 11 different models from $115 F.T.I.

All SAS *flights are precision-timed by*
UNIVERSAL GENEVE
*POLAROUTER**
Global Protected Watch

On SAS routes to Europe, Near East, Asia, Africa, these fastest, finest of world airliners save two hours transatlantic, four hours on the magnificent SAS polar route. And on *all* routes, SAS pilots precision-time their flights with the POLAROUTER AUTOMATIC WATCH.

For the supreme thrill of Timekeeping
Write for Booklet of watches and name of nearest dealer to Universal Genève, 587 Fifth Ave., New York 17, N.Y.

SEE YOUR JEWELER

For the supreme thrill of Travel,
take a fabulous SAS Round the World tour, or unforgettable Grand Viking Tour with transatlantic and transpolar flights! For descriptive brochure — and folder on Extra City travel bargains — write SAS, Scandinavian Airlines System, 638 Fifth Ave., New York 20, N.Y.

SEE YOUR TRAVEL AGENT

*TRADE MARK

You can save a lot of calories by sweetening with Sucaryl

and you can't taste the difference

Weight-Watchers' Cherry Cobbler

- 1 cup sifted flour
- 1½ teaspoons baking powder
- ¼ teaspoon salt
- 3 tablespoons shortening
- 3 tablespoons skim milk
- 3 teaspoons Sucaryl solution or 24 tablets, crushed
- 1 egg, beaten
- 3 cups water-packed sour cherries (with juice)
- 3 tablespoons quick-cooking tapioca

Combine flour, baking powder and salt in large mixing bowl. Cut in shortening until consistency of cornmeal. Combine milk, 1 teaspoon Sucaryl (or 8 tablets) and the beaten egg. Add to the dry ingredients, stirring only until dampened.

Meanwhile, sweeten cherries with remaining Sucaryl. Place in a 1-quart casserole and sprinkle with tapioca. Spoon batter over cherries. Bake in a moderate oven (350°F.) 30 to 40 minutes, or until top is golden brown. Makes 8 servings.

Sucaryl is for weight-watchers. It gives you all sugar's sweetness without bitterness or aftertaste—with no calories at all.

Use Sucaryl to sweeten your drinks, your cereal, your fruit. Cook with it—boiling and baking don't affect it at all. You can even use it in freezing. The fact is, you can use Sucaryl practically anywhere you would sugar, and you simply can't taste the difference.

Naturally, Sucaryl is for dieters and diabetics. If you have any question about dieting, ask your doctor. Get Sucaryl in tablets or solution; Sucaryl Calcium for low-salt diets. Abbott Laboratories, North Chicago, Ill. and Montreal. Abbott

Sucaryl®

Non-Caloric Sweetener • No Bitter Aftertaste

AT DRUG STORES EVERYWHERE

What's fencing got to do with your business?

Just this . . . fencing more than any other sport, calls for MOTION-ECONOMY . . . and that's exactly what today's business procedures call for—*accomplishing the most with the least waste of movement and effort.* Remington Rand pioneered this trend and today is delivering MOTION-ECONOMY built into the most advanced business machines of every type. For example, the four electrically-powered records-handling machines shown below.

Greater productivity results because walking and standing are eliminated. All records FLOW into position at the same level, directly in front of the operator who is comfortably seated. Eye and body fatigue are reduced . . . unnecessary physical labor and drudgery eliminated.

Why not get full particulars *now* on how these records-handling machines can be applied to your business? Simply write Room 2003, 315 Fourth Avenue, N. Y. 10, and ask for the booklets listed.

Remington Rand

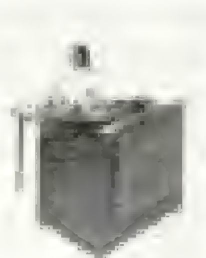
DIVISION OF SPERRY RAND CORPORATION

*Trademark

Robot Kardex* . . . saves up to 39% on posting time . . . up to 59% on space. 4,000 sets of visible records. Ask for KD505.

Convé-Filer* . . . saves up to 30% on clerical cost for users of large card records . . . 200,000 cards. Ask for LBV166.

Roto-Kard* Up to 6,000 record cards in less than 3.6 square feet . . . electric or manual operation! Ask for KD770.



Kard-Veyer* . . . electrically powered . . . 16,000 to 80,000 vertically-filed cards (including punched cards). Ask for LBV700.

Anyone on your list will enjoy a Gift of

Cheese

Here are some of the many delicious varieties America's cheesemakers are packaging now for your Holiday gift giving—

CAMEMBERT

Soft, delicate Camembert is a classic dessert and tray cheese. Served at room temperature it has a rich, full but mild flavor. It's yellow and creamy in texture, with a thin, natural crust. The Italian version, Bel Paese, is similar in character, but more firm and mild. Camembert was created by Marie Harel in 1791. It was Napoleon's favorite, and was named by him in honor of the French village where it was first produced. Try it on slices of pears or apples, or crackers!

PROVOLONE

Smoky, masculine and of Italian origin, Provolone is light in color and firm. Provolone bears distinctive "rope" marks from the sling in which it is suspended while aging. Serve it in finger slices with beverages, holiday turkey plates. Good with fruit, too.

BLUE

Blue comes from a famous cheese family dating back to 1070. Blue is a semi-soft, crumbly white cheese veined throughout with blue mold. Its flavor is sharp, piquant and distinctively pleasing. Add Blue to salad dressing, crumble it over salad greens, or serve Blue with toasted crackers for dessert. And connoisseurs know—it's a perfect foil for the flavor of turkey.

BRICK AND GOUDA

Clad in holiday red, oval Gouda or round Edam make holiday cheese boxes look the part. Their red-bordered slices brighten trays.

Brick is as socially acceptable as Cheddar, but with a bit of added zip to make life interesting. Brick cheese combines the pleasure of Cheddar and Limburger. Smooth, easy slicing, this cheese stars during the holidays for snacks, nibbles . . . and with beverages.

SWISS

Swiss is called the "King of Cheeses." You know it by its distinctive holes and light yellow color. Gruyere, a variety of Swiss, has smaller holes and added body. The mild, nut-like flavor of Swiss makes it one of America's favorite cheeses. Primarily thought of as a sandwich or snack cheese, Swiss has a wide variety of cooking uses—and makes an always welcome gift.

CHEDDAR (or American)

Cheddar, by far the most popular of all cheeses, ranges in flavor from mild to very sharp and in color from creamy white to yellow orange. Popularly known as American, Cheddar gets its name from an English village. Cheddar comes in wedges for easy slicing, club style for smooth spreading, and in packages for utmost convenience.

* * * * *

This year give your friends (and yourself) a Gift of Cheese. Cheese Gift boxes come in a wide range of prices. Use coupon below for information on Holiday Gifts of Cheese.

American Dairy Association
20 North Wacker Drive
Chicago 6, Illinois

The dairy farmers across the nation want you to know—You live better in every way with foods made from milk.

Gift of Cheese
Post Office Box 8409, Dept. N
Chicago 80, Illinois

Send me information on 1956 Holiday Gifts of Cheese.

Name ______________________

Address ______________________

City ____________ Zone ______ State ______

Reliability

Another Reason More and More Americans Fly Air France

A world leader flying the most modern planes on clockwork flight schedules. Europe's *first* airline in equipment, in passenger and cargo miles flown, and choice of worldwide destinations. *First, too, in the judgment of more and more Americans!* Daily non-stop flights from New York offering every accommodation to Paris and to Mexico. Regular service from Boston, Chicago, Montreal. The utmost in luxury, a famed cuisine aboard giant Super "G" Constellations. You pay no more!

AIR FRANCE

THE WORLD'S LARGEST AIRLINE WITH 177,740 UNDUPLICATED ROUTE MILES TO 236 CITIES IN 73 COUNTRIES

SEE YOUR TRAVEL AGENT, OR AIR FRANCE

New York • Atlanta • Boston • Chicago • Cleveland
Dallas • Detroit • Los Angeles • Miami • Philadelphia
Pittsburgh • San Francisco • Washington, D. C.
Mexico City • Montreal • Toronto • Vancouver
Havana • Puerto Rico • Fort de France • Pointe a Pitre
Panama • Caracas • Bogota

TELESETS · HI-FI · RADIOS

Recognized as the Height of Quality

SEDGWICK
24" overall diagonal,
332 sq.-in. viewable area.
Mahogany Grain or
Limed Oak Grain finish.

You pay no more for Du Mont than for ordinary television! And you know you own the best. Reserve power is built in, for effortless performance and long life under all conditions.

For free illustrated Du Mont Buying Guide, write Allen B. Du Mont Laboratories, Inc., Dept. NG-11, Receiver Division, 35 Market St., East Paterson, N. J. Manufactured and Distributed in Canada by Canadian Aviation Electronics, Ltd.

Unlocking the secrets of the universe

AMAZING TEXTILE FIBERS spun out of natural gas . . . wonder drugs squeezed from a lump of coal . . . shining stainless steel forged from drab, brownish earth.

These man-made marvels—and nearly everything else that is vital to modern living—were born in the minds and hands of research scientists in their search for a better understanding of our world.

Never satisfied with things as they are, the research scientist takes apart the raw materials of nature to capture the basic "building blocks" of the universe. Then he rearranges and combines the pieces into new and better things that help improve our lives.

Hundreds of useful products have been created from such basic substances as oil, natural gas, ores, air, and water. And the wonders yet to come, the exciting things of tomorrow, are being sought and found in the research laboratories of today.

Research is a living thing to the people of Union Carbide—for it is the foundation upon which their work is built. The elements of the earth are a constant challenge to their insatiable curiosity and technical skills.

FREE: *Learn how Union Carbide products and research help satisfy basic human needs. Write for "Products and Processes" booklet H.*

UNION CARBIDE

AND CARBON CORPORATION

30 EAST 42ND STREET UCC NEW YORK 17, N. Y.

In Canada: UNION CARBIDE CANADA LIMITED, Toronto

UCC's Trade-marked Products include

SYNTHETIC ORGANIC CHEMICALS PRESTONE Anti-Freeze EVEREADY Flashlights & Batteries PREST-O-LITE Acetylene
Dynel Textile Fibers ELECTROMET Alloys and Metals HAYNES STELLITE Alloys UNION Carbide LINDE Oxygen
UNION CARBIDE Silicones BAKELITE, VINYLITE, and KRENE Plastics NATIONAL Carbons CRAG Agricultural Chemicals PYROFAX Gas

"Our life would be an idyll if we had an electric laundry."

Always scheming, these modern women. Is there no limit to the luxuries they demand? Yes, fortunately, there is. Reasonable women are willing to throw in the sponge once they have a Hotpoint electric laundry.

With a Hotpoint laundry, there's nothing much for a woman to do on washday but enjoy herself. The washer washes almost *anything*; pillows, for example. Not to be outdone, the dryer *dries* almost anything: heavy shag rugs and chenille robes. And they're both fully automatic, every work-free step of the way. Naturally, superior laundry equipment like this is available in a comforting choice of Colortones. Even pink.

Your life can be an idyll. Ask your Hotpoint dealer. *He'll* show you how. Hotpoint Co. (A Division of General Electric Company), Chicago 44.

electric laundries and kitchens by

Hotpoint

NEW

Constellation

GRAFLEX SLIDE PROJECTOR

Only Automatic 500 Watt Projector Under $100!

Perfect companion for the Graphic 35, or any other 35mm camera, the automatic Constellation offers 500 watt brilliance at little more cost than 300 watt slide projectors. Smartly styled, its streamlined cast aluminum body has built-in automatic slide changer using popular Airequipt magazines with 36-slide capacity. Automatic remote control model permits push-button slide changing up to 15 feet away. Has highly efficient optical system coupled with 4" f/3.3 coated anastigmat lens for oversize, brilliant projected pictures, filling a 40" screen at only 10 feet. Silent blower and heat absorbing glass keep projector cool, protect your valuable slides.

Constellation with automatic changer and remote control.......................$89.75
Constellation with automatic changer.....$67.75

As little as 10% Down

Graphic® 35

EXCLUSIVE PUSH-BUTTON FOCUSING

The only camera in the world with PUSH-BUTTON FOCUSING and SPECTRAMATIC FLASH SETTINGS makes it easy for even beginners to take beautiful color transparencies. Just squeeze the push-buttons for precise focusing and direct reading flash settings, eliminates usual guide number arithmetic. Double exposure prevention, built-in self-timer, rugged precision cast all-metal body, built-in flash synchronization at all shutter speeds, speeds up to 1/300 second. The most popular camera in its price class.

Graphic 35 with f/3.5 lens..............$77.50
Graphic 35 with f/2.8 lens..............$87.50

Write Dept. NG-106, GRAFLEX, INC., Rochester 8, N. Y.

Graflex Dealers are in the 'Yellow Pages'

GRAFLEX

Prize-Winning Cameras

Prices include federal tax where applicable and are subject to change without notice. Prices are slightly higher in Canada.

More days of fun! (She's got The Hertz Idea)

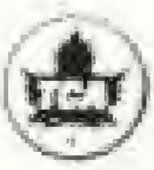
Nice, huh? Sure, she makes every vacation day count. She goes by fast train or plane, and has a Hertz car meet her there.

That's The Hertz Idea! Vacationing with it saves you days on the way. Days you can spend on nothing but fun in a new Powerglide Chevrolet Bel Air or other fine car. Just show your driver's license and proper identification. And all you pay on a national average rate is only $37.50 a week plus 8 cents a mile (lower daily rates, too). All gasoline, oil—even proper insurance included.

You can reserve a Hertz car for as long as you want it just about *anywhere*. Hertz has over 1,000 offices in more than 700 cities around the world. So if your vacation calls for a car, be sure to call Hertz. We're listed under "H" in your phone book. Hertz Rent A Car, 218 South Wabash Avenue, Chicago 4, Ill.

Hertz has new Powerglide Chevrolet Bel Airs (or other fine cars)—just like your own!

Fly TCA Viscount to Canada for a thrilling glimpse of *tomorrow's* air travel . . . swift, quiet, amazingly vibration-free. Viscount service to Toronto, Montreal and Ottawa from New York, Chicago, Detroit-Windsor . . . other services soon. In Canada, Viscount service westward to Vancouver. Other TCA services from Boston, Cleveland, Seattle-Tacoma, Tampa-St. Petersburg.



TRANS-CANADA AIR LINES

TCA Offices in Boston, New York, Cleveland, Detroit/Windsor, Chicago, Seattle/Tacoma, Tampa/St. Petersburg, Los Angeles

Something old . . .
something new!

For 257 years* Americans have enjoyed this Mississippi Gulf Coast, fast becoming Dixie's most popular resort. Old World charm, fascinating history, for sure. But much is new: a 28-mile white sand beach, a new 4-lane beach highway, smart new Gulf-side hotels, motels, fine regional restaurants. Fall is beautiful, the beach is uncrowded, fishing and golf are at their best.

*Pierre le Moyne, Sieur d'Iberville landed in 1699.

NG 10-56

Write to the Chamber of Commerce in any of the cities listed above.
A POSTCARD WILL DO.

Name ______________________

Address ______________________

City ______________ Zone ____ State ______________

Boys' Club Member at Hoover Dam, Nevada-Arizona

Two monuments to a nation's greatness...

A boy and Hoover Dam . . . Together, they stand for conservation – and each, in a particular way, helps to explain the greatness of America.

A massive monument to the conservation of natural resources, the dam tames the waters of the mighty Colorado to provide power, irrigation, flood control and one of the Southwest's most exciting tourist attractions, Lake Mead.

Unforgettably blue and 115 miles long, Lake Mead is the greatest man-made reservoir in the world. It offers swimming, fishing, boating, picnicking and camping in a highly scenic vacationland.

The boy, as a member of a Boys' Club, stands as a monument, too – to the conservation of *human* resources. His club is part of Boys' Clubs of America which this year celebrates its 50th Anniversary. Described by J. Edgar Hoover, a member of the National Board of Directors, as "a vital institution in the life of our nation," the Boys' Club movement helps more than 400,000 boys to better citizenship through worthwhile activities.

Two monuments to conservation: one, over 700 feet high – the other, less than 5. The men who built the dam can stand back and look at it with pride and satisfaction. But the Boys' Club men who are building tomorrow's citizens can be prouder still – for their handiwork is the hope of America.

FREE Tour Information

If you would like to visit Lake Mead National Recreational Area, or drive anywhere in the U. S. A., let us help plan your motor trip. Write: Tour Bureau, Sinclair Oil Corporation, 600 Fifth Avenue, New York 20, N. Y. – ask for our colorful National Parks Map.

SINCLAIR SALUTES THE BOYS' CLUBS OF AMERICA for their work in building character and developing well-adjusted citizens for tomorrow's world. Under the guidance of National Board Chairman Herbert Hoover, the dedicated adult leaders of these 437 clubs have shown their faith in the quality of youth, in the belief *that a man never stands so tall as when he bends to help a boy.*

Let yourself GO

on the INDEPENDENCE or CONSTITUTION

TO SPAIN ★ FRANCE ★ ITALY

THE DELIGHTFUL *Sunlane* to Europe is your express gateway to the heart of Spain! Every voyage of the *Independence* and *Constitution* is now met at Algeciras by the specially-scheduled train, "The Castilian," for immediate departure for Madrid. Same superb service for your return.

Sail from New York non-stop to Algeciras. You can tour Spain . . . 5 to 8 days . . . and return on the same cruise ship . . . a total trip of only 20 days!

★ *Join the Constitution February 1 for the De Luxe Cruise of 1957 to the entire Mediterranean. 39 glorious days . . . 21 ports . . . 13 exotic countries. From $1575.*

THREE WEEK VACATIONS!

Have you heard about Fall *Sunlane Cruises to Europe?* As little as $520 round trip Cabin Class or $670 First Class on the *Independence* or *Constitution!* Time ashore at 3 to 7 Mediterranean ports. 9 different cruises September through December!

SEE YOUR TRAVEL AGENT OR

AMERICAN EXPORT LINES

39 BROADWAY, NEW YORK 6, N. Y.

Now **ZENITH** *presents*

Two dramatic new advances in hearing ease and convenience

1. THE NEW "DIPLOMAT"

A practical miniature aid, slender, tinted, contoured to fit snugly right at the ear!

This is all you wear . . . no dangling cords!

2. THE NEW "CREST"

A versatile, full-powered eyeglass hearing aid* you can wear 10 different ways!

Can even be worn as a jeweled brooch!

Now! Dramatic new proof of the electronic leadership and quality that have made Zenith the largest-selling hearing aid in the world! And these are just two of *seven* superb new full-powered 4- and 5-transistor models, engineered to Zenith's highest standards of quality for every correctable hearing loss!

Try these amazingly tiny, light, *yet full-powered* aids to better hearing! Learn why Zenith is the choice of so many outstanding world leaders . . . people who could afford to pay *several times* the low Zenith price.

Ten-day money-back guarantee! You must be satisfied or your money will be refunded promptly. Zenith aids sell for as low as $50, including One-Year Warranty and Five-Year Service Plan. Easy time payments.

See your nearby Zenith Hearing Aid Dealer today. You'll find his name in your classified phone book. Or mail the coupon for free literature and local dealer list.

• • • •

FREE! *One-year subscription to "Better Hearing" – new illustrated magazine, filled with articles of interest to all those with hearing problems. Written by leading authorities. Introductory 1-year subscription free. Send coupon below.*

ZENITH®

QUALITY HEARING AIDS

By the Makers of World-Famous Zenith TV and Radio Sets

**Lenses and professional services in connection with the eyeglass feature available only through your ophthalmologist, optometrist, or optician.*

Zenith Radio Corporation, Hearing Aid Division
5801 Dickens Avenue, Dept. 4X, Chicago 39, Illinois

Please mail facts on new Zenith Hearing Aids. Also free subscription to "Better Hearing."

Name ____________________

Address ____________________

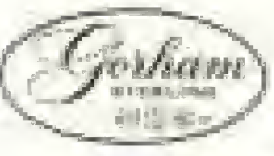
City ____________ Zone ______ State ______

A PERFECT MATCH...

Chantilly

STERLING BY GORHAM

Chantilly is the most popular of all sterling silver patterns, regardless of make. If you own Chantilly flatware, you'll surely want these matching Duchess Chantilly accessories that complement it so beautifully. Even if you own other flatware, an occasional piece of Duchess Chantilly makes a stunning addition to your table. Ask to see them today!



Look for the famous Gorham Seal on the underside of all sterling holloware. The seal is your assurance of authentic design, distinctive quality and traditionally superior craftsmanship.

America's Leading Silversmiths Since 1831
125th Anniversary

Enjoy uncrowded

Canada

...land of "Vacations Unlimited" all year 'round!

MORE THAN 1,000,000 LAKES
29,000 SQUARE MILES OF NATIONAL PARKS
OVER 59,000 MILES OF SCENIC COASTS
A SUPERB WINTER PLAYGROUND

Send for the

CANADIAN VACATION PACKAGE

free information, containing:

1. "Canada Vacations Unlimited"—with full-colour pictures describing its holiday attractions.
2. A new Highway Map of Canada and northern U.S.A.
3. "How To Enter Canada" — helpful information on border-crossing.
4. Tourist Enquiry Form — for your convenience in obtaining more detailed information.

Just stick this coupon on any postcard — (or use an envelope)

PLEASE P-R-I-N-T

01-1-13-56-07

CANADIAN GOVERNMENT TRAVEL BUREAU
OTTAWA CANADA

Name ______________________

Address ______________________

Town ______________________

State ______________________

Rear Admiral Richard E. Byrd, USN (Ret.), the world's foremost living explorer, was the first man to fly over the North Pole (1926), over the South Pole (1929), the first to make a non-stop flight across the Atlantic in a multi-engined aircraft (1927). Today he is Officer in Charge of the entire U. S. Antarctic Program.

COMPETITION PAYS OFF AT 60° BELOW ZERO

BY REAR ADMIRAL RICHARD E. BYRD, USN (Ret.)

"In America, where men are free to compete, industries as well as individuals have continually improved on performances that were already remarkable. There is, for example, the story of the fuels and lubricants that took me over both Poles and the Atlantic in the early days of flying.

"Through these experiences my comrades and I developed a special respect for U. S. fuels and lubricants. In fact, with no possibility of rescue, we literally staked our lives on them.

"I'll never forget the 42 gruelling hours of our transatlantic flight in June, 1927. Despite continuous storms, a fuel tank leak and impenetrable fog over France, our engines and fuel never quit. We made it, and the road was open for non-stop Atlantic flights by multi-engined aircraft.

"Since that time I have noted consistent dramatic improvements in our fuels and lubricants, until now they have become so cold-resistant that machinery can be operated efficiently at temperatures of 50 and 60 degrees below zero.

"Never-ending competition is the key to this never-ending progress! I know that all of America's many oil companies keep searching for new ways to make petroleum perform its miracles. Once they've found it, their rivals must improve on that miracle. And they've always managed to do just that. No wonder we get the world's finest oil products.

"I strongly believe that the great strength of America is that our society is essentially competitive. To assure our future progress, we must see that it stays that way."

Richard E. Byrd

This page is presented for your information by the **AMERICAN PETROLEUM INSTITUTE**, 50 W. 50th St., N. Y. 20, N. Y.

WHAT CAREER WILL BE BEST FOR YOUR CHILD?

Send for New York Life's FREE BOOKLETS containing facts on 20 rewarding careers!

When your boy or girl is trying to decide on a career, will you be able to help answer the questions that may come up?

Here are 20 thought-provoking booklets—reprints of New York Life's popular series of career advertisements currently appearing in national magazines. Prepared by leading authorities, one or more of these booklets may well help you guide your child in planning his future. Mail the coupon for your FREE booklets now. There's no obligation!

Check the booklets you want
MAIL TODAY!

New York Life Insurance Company
Career Dept. NG-7, 51 Madison Ave., New York 10, N.Y.

What would your child like to be?

- ☐ Doctor
- ☐ Lawyer
- ☐ Chemist
- ☐ Newspaperman
- ☐ Accountant
- ☐ Public Servant
- ☐ Aeronautical Engineer
- ☐ Salesman
- ☐ Home Economist
- ☐ Printer
- ☐ Pharmacist
- ☐ Dentist
- ☐ Architect
- ☐ Nurse
- ☐ Teacher
- ☐ Farmer
- ☐ Owner of His Own Business
- ☐ Electronic Engineer
- ☐ Banker
- ☐ Mineral Engineer
- ☐ We will also send you a booklet on "The Cost of Four Years of College"
- ☐ Personnel

A MUTUAL COMPANY nylic FOUNDED IN 1845

Name ____________

Address ____________

City ________ Zone ____ State ____

KONICA III

THE NEW LUXURY 35MM CAMERA that costs you no more than any ordinary "35"!

Compare its features today—at your dealer, or write for the complete Konica story.

$119.75 plus case

KONICA CAMERA CO., 76 W. Chelten Ave., Phila. 44, Pa.
In Canada: McQueen Sales Co., 1648 W. 4th Ave., Vancouver 9, B. C.
In Venezuela: Seijiro Yazawa, Apartado 3179, Caracas, Venezuela

Now RADIANT presents a great new

★★★★SCREEN

with features found only in high-priced screens

THE NEW RADIANT

picturemaster

America's Greatest Screen Value . . . only $16.95

For 30" x 40" size

Now everyone who projects motion pictures or slides can enjoy the thrill of brilliant clarity, vivid contrast and warm, living color. Radiant, the world's largest screen maker, makes superb quality projection features of costly screens available at a popular low price. These features include: superior "HY-FLECT" million mirror glass beaded screen fabric, "velvet glide" Tear-Drop screen case, automatic instant opening and closing legs, screen leveller that keeps screen level on uneven floors—plus *many other* construction and convenience features.

No other screen at this price offers all these features!

Ask your dealer to demonstrate the Radiant PICTUREMASTER to you—be sure to insist on RADIANT!

AVAILABLE IN
30" x 40"
40" x 40"
37" x 50"
50" x 50"

A touch of the toe and tripod legs open. Close easily, too.

New Molded streamlined handle—permits easy, quick height adjustment.

Exclusive Radiant tear-drop screen case permits screen fabric to glide in and out smoothly, effortlessly.

RADIANT

Radiant Manufacturing Corporation
1214 So. Talman Ave., Chicago, Ill.

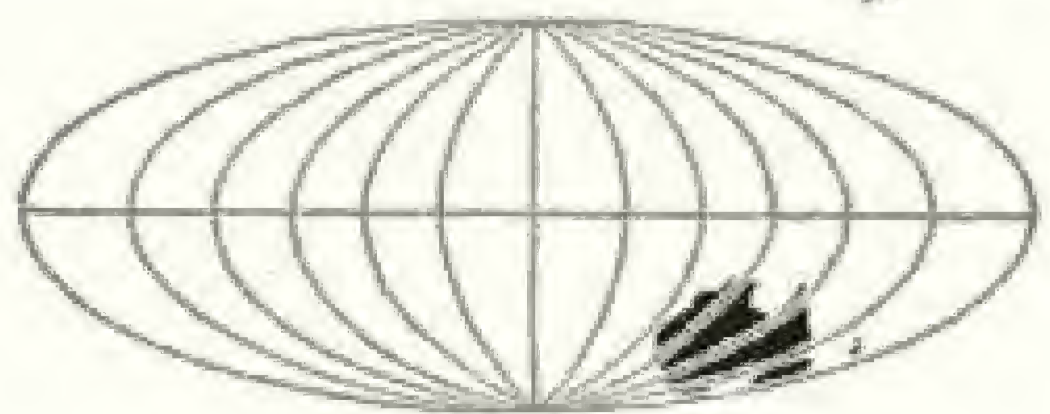
Please send me FREE COPY of your new booklet—"How to Shop for a Projection Screen". Also circular describing "PICTUREMASTER"

Name ____________
Address ____________
City ____________ Zone ____ State ____________

ORIENT LINE

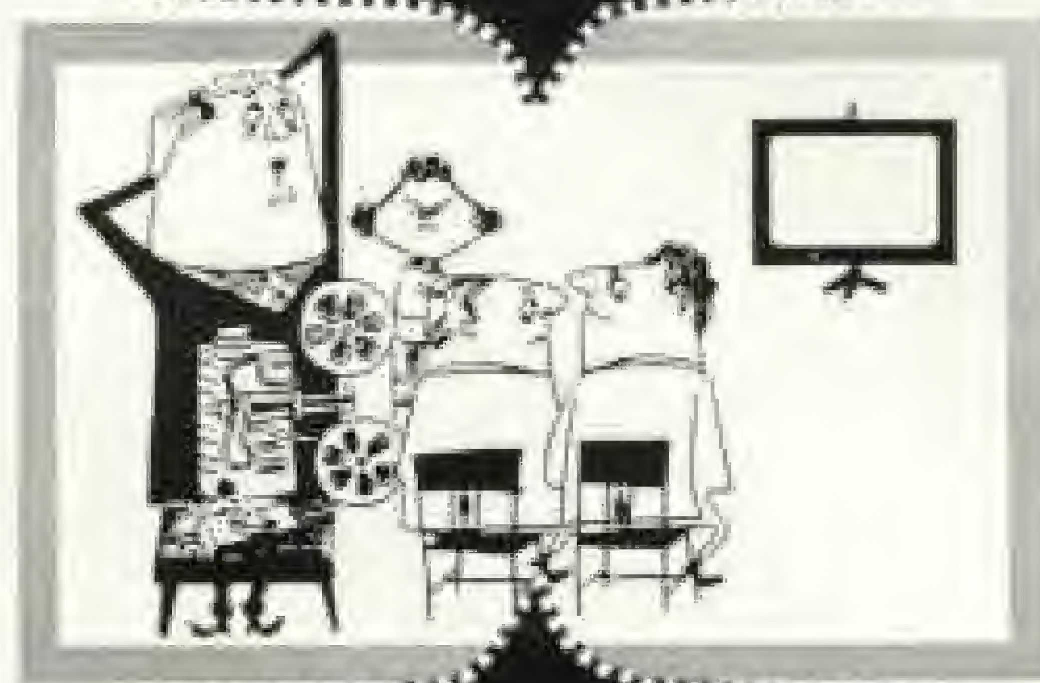
ORSOVA • ORONSAY • ORCADES • ORION

Enjoy three glorious weeks of fun and relaxation, congenial shipmates and fine food—*plus* unsurpassed British service. Big O is the way to go! Regular cruise-like voyages from Vancouver and San Francisco via Honolulu and Fiji. Around the world too . . . connections from Australia to Europe, and return trans-Atlantic by Cunard.



Your local travel agent is the man to see.
CUNARD LINE—GENERAL PASSENGER AGENTS IN THE U.S.A. AND CANADA

BULB BLOW? SPOILED SHOW?



BUY A PAIR! HAVE A SPARE!

G-E PROJECTION LAMPS

for all slide and movie projectors

GENERAL ELECTRIC

2¼ x 2¼

HASSELBLAD

Single Lens Reflex

On the home front or on a safari, the HASSELBLAD gives everybody a fair and square chance at better pictures. Interchangeable lenses, interchangeable roll film magazines, automatic foolproof shutter with speeds to 1/1000th make HASSELBLAD preferred the world over. HASSELBLAD 1000F with Zeiss f/2.8 Tessar lens, $379.50.

squares away for better pictures

At Your Camera Store, or Write
HASSELBLAD DIVISION, 110 W. 32nd St.
New York 1, N. Y., Dept. NG-3.

FIRE

THEFT

LIABILITY

Why buy <u>three</u> policies when you can get Hartford's 1-Policy Package?

Once you had to pay three premiums. For the only way you could get broad insurance protection was to buy *separate* policies.

You bought *fire*. You bought *theft*. You bought *personal liability*.

It's different now. Hartford's "1-Policy Package" combines the fire, theft, liability and other insurance you need for your home. Gives you—*in ONE policy*—all the vital protection shown in the panel at the right.

You can see how much more *convenient* this is. Just one policy to keep track of. Just one to pay for. And, if you want, installments arranged to fit your budget.

Another important consideration: Hartford's "1-Policy Package" may be easier on your pocketbook than the policies you have. For it can save you as much as 20% of what you would have to pay for separate policies giving you the same broad and dependable protection.

What about your present policies? You don't have to wait for them to expire. Your Hartford Fire Group Agent can arrange to give you credit for policies now in force. So you can begin enjoying the advantages of a modern Hartford home protection policy any time you choose.

So don't delay. Whether you own your home or whether you rent, you owe it to yourself to find out about Hartford's "1-Policy Package" *before you pay another premium!* Mail the coupon. Get the full story. Then decide.

FOR THE HOMEOWNER ... FOR THE TENANT ...
ALL THIS DEPENDABLE PROTECTION!

Our 1-Policy Package insures you against . . .

Fire	Liability
Windstorm	Theft
Falling Objects	Hail
Glass Breakage	Collapse
Aircraft Damage	Explosion
Vehicle Damage	Additional Living Expense
Vandalism	
Smoke	

. . . and other hazards, too, at home and away from home —all subject to policy conditions.

Year in and year out you'll do well with the

Hartford

Hartford Fire Insurance Company
Hartford Accident and Indemnity Company
Hartford Live Stock Insurance Company
Citizens Insurance Company of New Jersey
Hartford 15, Connecticut

New York Underwriters Insurance Company
New York 38, New York

Northwestern Fire & Marine Insurance Company
Twin City Fire Insurance Company
Minneapolis 2, Minnesota

—SEND FOR FREE FOLDER—

Hartford Fire Insurance Company
Dept. G10, Hartford 15, Conn.

I'd like to know more about Hartford's "1-Policy Package." Please send your free folder.

Name ____________________

Address ____________________

City __________ Zone ____ State __________

The Kalart Editor-Viewer Eight for 8mm film — color or black and white only $39.50

Get a bigger kick out of your movies . . . Edit your films this easy way!

It's easy to be your own movie editor — easy to be sure of films that are good from start to finish, films you'll be proud to show!

The Kalart Editor-Viewer Eight makes you an expert! You can trim out over- and under-exposed shots, false starts, fogged ends and useless leaders . . . and quickly splice all your best scenes into one interesting, enjoyable show! You can join old and new film, and insert titles wherever you like!

Viewing is wonderfully clear on the Kalart Editor-Viewer Eight screen — it enlarges picture 12 times! The 30-watt convection-cooled lamp lets you look at single frames indefinitely without overheating film or straining your eyes. The custom built-in splicer welds splices swiftly and permanently in seconds. Takes up to 400' reels.

Optical elements are precision-ground and polished. Smooth, single-handle drive provides forward and reverse projection. Folds flat in a 10" by 14" by 4" handy-carry carton; weighs only 6 pounds. See your camera dealer now for full details about the Editor-Viewer Eight.

The **KALART** Company, Inc.

Plainville, Connecticut

Producers of Precision Photographic Products since 1930: Speed Flash Synchronizers, Synchronized Rangefinders, KALART and CRAIG Movie Editing Equipment

YOURS FOR ONLY 10¢

. . . this easy-to-read, fully illustrated book shows you how to get professional results — covers film cutting, splicing, story-telling, sequence development; how to get humor, action, etc. Regularly 50¢.

The Kalart Company, Inc., Dept. NG-10
Plainville, Connecticut

Enclosed is 10¢ for your book "Editing for Better Movies."

Name__________

Address__________

City__________ Zone____ State__________

Help that counts...

when disaster strikes!

Claims advice is communicated to all

Emergency claims offices are thrown open.

When windstorms, explosions or conflagrations cause widespread destruction, the carefully worked out CATASTROPHE PLAN of capital stock insurance companies is operating in a matter of hours.

Urgently needed information and comforting advice on what to do about claims are communicated by radio and newspapers to dazed and troubled people.

Claims offices manned by experienced insurance men are hurriedly opened in the stricken areas.

Trained adjusters from near and far move in to speed recovery.

Local agents work night and day processing claims.

Settlement checks start leaving major companies promptly —increasing in numbers daily to match mounting claims.

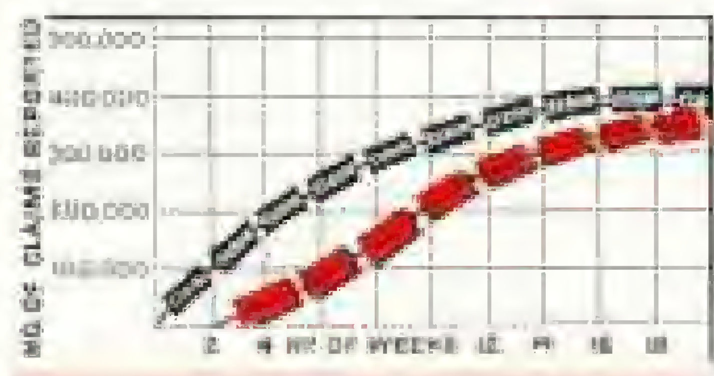
Thus through planning and foresight the capital stock insurance companies and their agents go into action immediately in the wake of destruction —to bring peace of mind and the ability to build anew.

For the name of a nearby America Fore Agent call Western Union by number and ask for Operator 25.

Adjusters move in from far and near.

★ The Continental Insurance Company ★ Fidelity-Phenix Fire Insurance Company
★ Niagara Fire Insurance Company ★ The Fidelity and Casualty Company of New York

Local agents work night and day



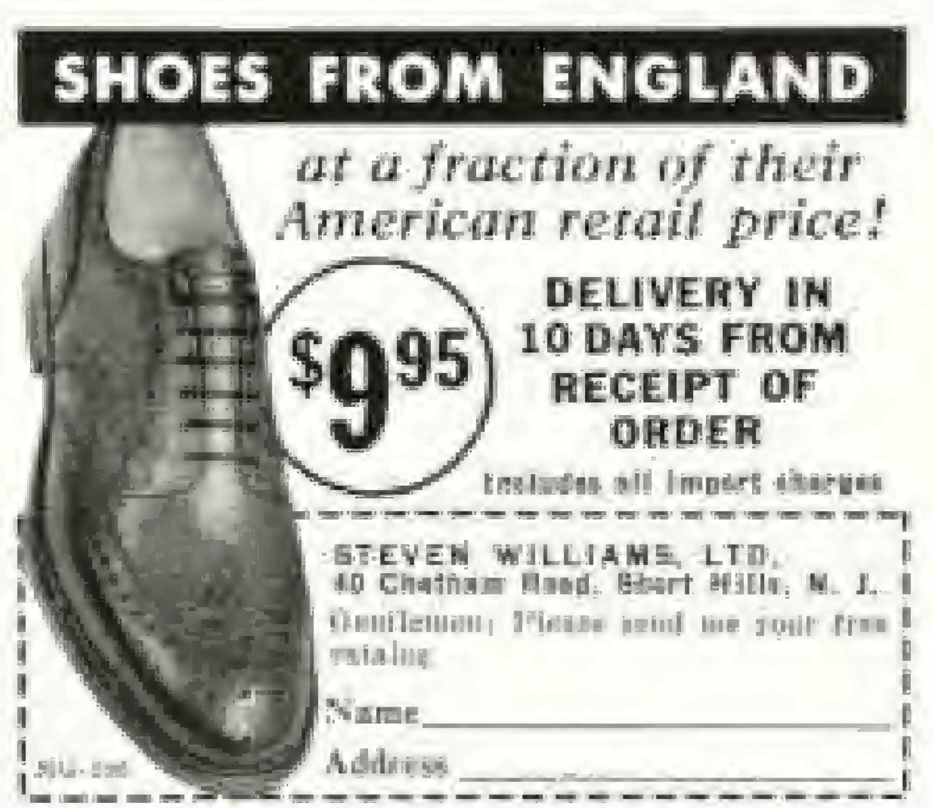
Claims mount— payments quickly follow.

Insurance helps to build anew.

for picture discoveries
there's nothing like a LEICA
The LEICA M-3 encourages you to discover pictures —wherever you are. That's because its automatic features perform for you with an ease beyond comparison. Ask your dealer to show you this precision instrument—the world's most advanced camera.
NEW Leica M-3
lifetime investment in perfect photography

there's nothing
under the sun
like Tucson's
Hospitality
Folks out here are as friendly as the winter weather is warm
GO TO
Tucson
IN FRIENDLY ARIZONA
Relax in an atmosphere of gracious informality — where the charm of the old West lives happily with the comfort of the New
For color Booklet and complete information, WRITE: Tucson Sunshine Climate Club 5604-B Pueblo, Tucson, Arizona
western gateway to Mexico

NEW and FRESH for 1957
Here are mobile homes at their best. Modern styling blends beauty with practical arrangements for home-like livability. American quality assures top value and long service. 5 sizes—32' to 45'. Write for literature.
American COACH CO.
Cassopolis, Mich. Newton, Kan.



SHOES FROM ENGLAND
at a fraction of their American retail price!
$9.95
DELIVERY IN 10 DAYS FROM RECEIPT OF ORDER
Includes all import charges
STEVEN WILLIAMS, LTD.
Name
Address

The "City of Portland" Domeliner skirting the Columbia River Gorge

Miles and Miles of this...

Green forests coming down to meet the majestic Columbia River, waterfalls lacing high rugged rock. Your eyes drink in the ever-changing panorama through wide windows of Union Pacific Domeliners on your way to or from the Pacific Coast.

You can dine in the Astra Dome Dining Car, enjoy the luxurious Astra Dome Lounge, or relax in the restful Astra Dome Coach. All the extra pleasure at no extra cost.

Whenever you travel through the West, ask for reservations on *Union Pacific Domeliners* and *Streamliners* . . . between Chicago and Los Angeles, San Francisco, Portland and Seattle, as well as many other western cities and National Parks.

UNION PACIFIC HONORS RAIL TRAVEL CREDIT CARDS

UNION PACIFIC *Domeliners*

"CITY OF PORTLAND"
"CITY OF LOS ANGELES"
"The CHALLENGER"

Between Chicago and the Pacific Coast

UNION PACIFIC RAILROAD

Room 753, Omaha 2, Nebraska

I am interested in a Domeliner trip to California ☐
To Pacific Northwest ☐ Send descriptive booklet.

Name____________________

Address____________________

City__________ Zone____ State______

Phone No.____________________

SELF-CONTAINED!

NEW, TRUE AUTOMATIC

Revere "888-D"

DELUXE 2x2 SLIDE PROJECTOR

Accepts 35MM, Bantam and New 1½"x1½" Transparencies

Built-in Automatic Preconditioning Slide Chamber

Super-coated Anastigmat Lens and Superb Optical System

NO ACCESSORIES TO ATTACH!

Newest of Revere famous *self-contained* automatic slide projectors! Everything built-in! All the controls for truly automatic slide projection in one self-contained unit. No dangling attachments. Just insert the magazine, set the switch, press the button and sit back and enjoy your slide show from anywhere in the room. Extra Condenser Lens for projecting large 1½" x 1½" slides. Built-in pointer. Special stereo slot; fade lever; 500 watt lamp; WOLLENSAK F/3.5 lens and a host of other Revere advantages. Complete with self-contained carrying case in handsome Irish linen, viewing screen, cord and 7 Revere magazine trays. **$159.50**

"888" FULLY AUTOMATIC 35MM SLIDE PROJECTOR

Just set it . . . forget it! Revere "888" shows 36 slides of all type mounts as slow or as fast as you like—without your touching a finger to it! Operates completely by itself, shows clearest, sharpest pictures without effort. 500 watts with picture brilliance control. WOLLENSAK 5-inch F/3.5 lens. With compact, self-contained linen-covered case and viewing screen . . . **$144.50***

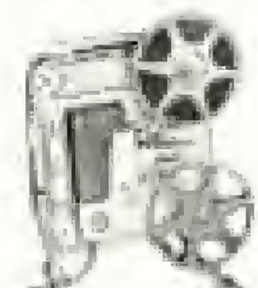
*All Revere Slide Projectors equipped with 7 Revere Magazine Trays

NEW!

"101"—16MM Spool Load Camera. Uses 100' reels, objective view-finder, automatic threading; WOLLENSAK f/2.5 coated lens. Inc. tax $139.50

NEW!

"103"—16MM Turret Spool Load Camera. Divergent turret head; corresponding objective view finder. WOLLENSAK f/2.5 coated lens, inc. tax . . . $169.50



NEW!

"777" 8MM Projector. Forward-Reverse Controls; fast ¾" wide angle f/1.6 lens; 500 watt lamp — 750 watts optional; 2—400' reels; self-contained case . . . $127.50

REVERE CAMERA CO • CHICAGO 16, ILL.

NOW—in PITTSBURGH

The WILLIAM PENN becomes the

PENN-SHERATON

You'll now find Sheraton warmth of service at the best address in Pittsburgh. For reservations call the Sheraton nearest you.

SHERATON *the proudest name in* HOTELS

COAST TO COAST IN THE U. S. A. AND IN CANADA

Overlooking beautiful Waikiki Beach in Honolulu, Hawaii. In the background is Diamond Head, the famous extinct volcano

Wherever you are, at home or abroad...

IT'S EASY TO KEEP IN TOUCH BY OVERSEAS TELEPHONE SERVICE

There's nothing quite so satisfying and thrilling as a telephone call to someone overseas.

From your home or office, you can talk with friends visiting Hawaii . . . relatives living in Germany . . . prospects and customers in Japan.

The telephone gives you the advantage of *personal* contact. You can talk things over as if you were face to face.

It's easy and economical. Just tell the operator the country you want to call.

Note to travelers: When you're abroad, keep in touch with family and friends at home by telephone.

OVERSEAS TELEPHONE RATES ARE LOW

Here are some examples:

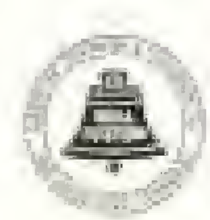
New York to Hawaii . . $9

From anywhere in the United States to:

Germany or Japan . . $12

These are the rates for the first three minutes, not including the 10% federal excise tax. To many countries, lower rates apply on Sundays or at night.

BELL SYSTEM OVERSEAS TELEPHONE SERVICE



HOW ZEISS IKON CONTAFLEX GETS YOU BETTER PICTURES

Of all 35mm precision cameras, this little beauty lets you see most clearly what you are shooting. It gets what you want speedily and surely. That is why Zeiss Ikon Contaflex is the great success of the year.

You sight through the Zeiss Tessar f/2.8 lens, so that your image is unbelievably brilliant, upright, laterally correct and full picture size. Contaflex has both ground glass and split image focusing. Built-in flash synchronization. Speeds to 1/500.

Contaflex eye-level single lens reflex is only $149, at leading dealers. See it today.

Ask us to send you interesting and informative free Contaflex booklet. Address Dept. CN 14.

CARL ZEISS, INC. 485 Fifth Ave., N. Y.

World Famous Zeiss Ikon Cameras are precision made in West Germany

Taylor's Plymouth STORMOGUIDE* Combination includes accurate barometer, thermometer and hygrometer. STORMOGUIDE dial gives detailed weather forecasts. Altitude adjustment permits sea level readings. Both are Taylor exclusives. Handsome natural maple case, grained aluminum dial, brass bezels and rings; hangs or stands.

$18.95

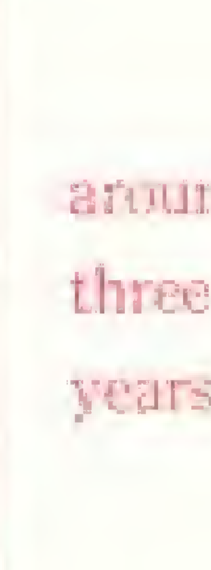
At leading Department, Jewelry, Optical, Hardware and Stationery stores.

Taylor *Reg. U.S. Pat. Off.

INSTRUMENTS MEAN ACCURACY FIRST

around one year . . .

around two years . . .



around three years . . .

around four years . . .

What are the greatest hazards at these ages?

TODAY, ACCIDENTS are the greatest single hazard of early childhood. In fact, accidents in and about the home take the lives of about 3,000 children yearly in the age group from one to four. Thousands more of our children are injured . . . and many are permanently crippled . . . *by accidents which might have been prevented.*

One way to help safeguard young children is to know something about what a child does at various stages of growth. Around age one, for example, they put practically everything in their mouths. This is why household cleansers, and small objects such as pins and buttons, should be put away.

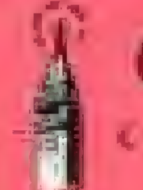
Age two is the time when the child explores and investigates everything around him. So, potentially dangerous things—such as medicines, knives, matches and electrical equipment—should be kept where a child cannot reach them.

The child of three may have a serious fall, especially when he climbs near windows, on furniture, or goes up and down stairs. Windows should have guards on them. Screens need to be firm and securely fastened. Stairs should always be free of objects on which a child can trip.

Four-year-old children are "runabouts." They should be taught to watch for cars in driveways and to ride their tricycles on the sidewalk.

Children need regular health examinations for correcting defects of vision or hearing that could lead to mishaps. If *repeated* accidents occur, a special effort should be made to discover the cause.

Children of school age also have many accidents. So, be sure to remind them of the importance of crossing streets properly, obeying traffic lights and equipping and riding their bicycles for safety.

Metropolitan Life
Insurance  **Company**
(A MUTUAL COMPANY)

1 MADISON AVE., NEW YORK 10, N.Y.

Metropolitan Life Insurance Company
1 Madison Ave., New York 10, N. Y.

Please mail me a free copy of your booklet *A Formula for Child Safety*, 10-56-N.

Name ______________________

Street ______________________

City ______________ State ______________

You're never cold, never too warm

with a G-E Automatic Blanket
New low prices from $29.95*

Amount of warmth is chosen on the G-E Bedside Control. *Sleep-Guard* then maintains that warmth, adjusting to temperature changes automatically.

More than 3,000,000 users have enjoyed the comfort of G-E Automatic Blankets.

Easier bedmaking with just one light General Electric blanket. Custom-Contoured corners are designed with "give" for plenty of foot room. Easily washed.

Six decorator colors in luxurious fabrics by Chatham, with bindings by Skinner. G-E Blankets have earned the trusted Good Housekeeping Guaranty Seal.

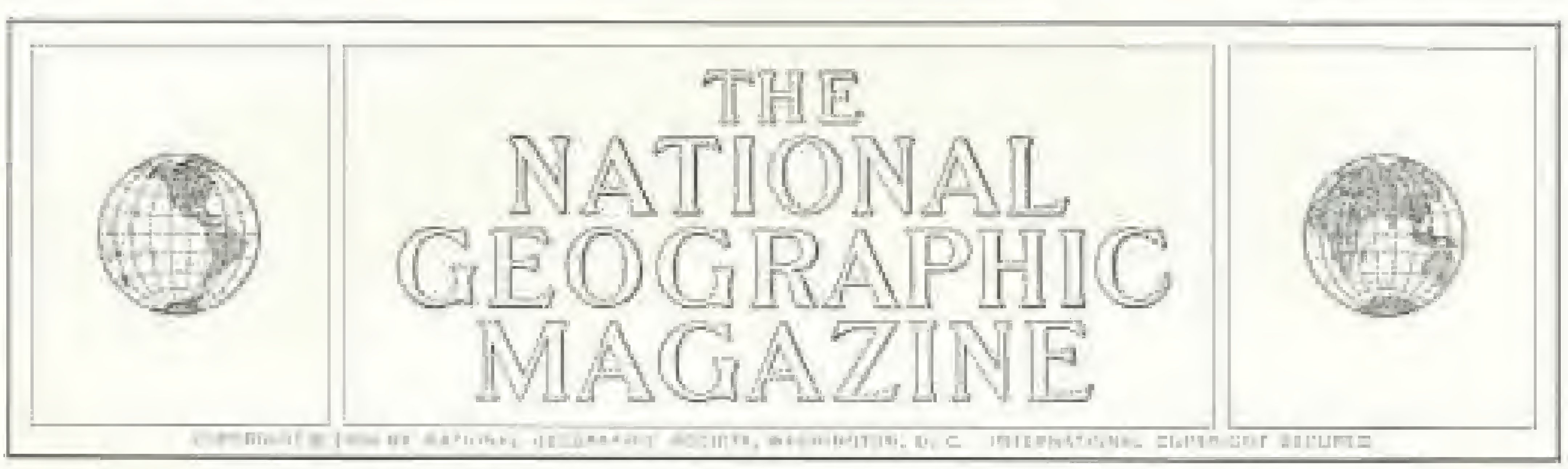
Guaranteed by Good Housekeeping

"Happy Marriage" comfort . . . The dual-control model for double beds lets each sleeper choose a *different* amount of warmth if desired. No one loses precious sleeping hours . . . each is assured of perfect personal comfort. General Electric Company, Automatic Blanket and Fan Dept., Bridgeport 2, Connecticut.

*Manufacturer's recommended retail or Fair Trade price.

Progress Is Our Most Important Product

Vol. CX, No. 4 WASHINGTON October, 1956



Surprising Switzerland

A Landlocked Nation Served by 1,500-passenger Steamers Offers Visitors Everything from Edelweiss and Glaciers to Palm-shaded Beaches

By Jean and Franc Shor

National Geographic Magazine Staff

With Illustrations from Photographs by the Authors

WHEN we got off the boat that brought us to Switzerland, a customs examiner looked askance at our array of cameras and film. Then he noticed the National Geographic Society labels on the cases.

"If you have to Switzerland come for your Magazine an article to write," he said, "I hope you else than the cuckoo clocks, the yodels, and the alpenhorns tell. Here are more things than see most travelers. You will the many surprisings have."

Swiss Fleet Plies Alpine Lakes

He was right. Not the least of those "surprisings" was the discovery that we could enter his country from Germany, France, Italy, or Austria by a good-sized passenger vessel. True, they are fresh-water steamers, plying the Lakes of Constance, Geneva, and Lugano, but they carry as many as 1,500 passengers and form an important link between Switzerland and her neighbors (page 428).

Another shock came a week later when, after a drive through level fields of ripening tobacco, we lazed on a sunny beach in the shade of swaying palm trees. The low-lying Ticino, Switzerland's Italian-speaking Canton, offers a subtropical rebuttal to the idea that the country is all mountain peaks and Alpine valleys (map, page 432).

The third, and perhaps the most significant surprise, occurred in the capital city of Bern, when the gentleman with whom I was chatting suddenly glanced at his watch.

"You'll have to excuse me," he exclaimed, "or I'll miss my bus. Come out to the street with me, and we'll talk while I wait."

And so, standing beside him in a queue while he waited for transportation home, I finished my interview with the Vice President of Switzerland, Herr Dr. Markus Feldmann.

Switzerland, we learned in our summer-long stay, is a remarkable example of man's ability to triumph over nature—including his own. Geographically, economically, and politically the Swiss have faced obstacles that would daunt a less determined race. They recognize this, and are proud of it. Not content merely to surmount their difficulties, they thrive upon them.*

Alluring Vacationland Beckons

For the traveler, Switzerland offers much more than a mere series of surprises. Its 16,000 square miles are crowded with soaring peaks, placid lakes, and beckoning valleys. And the nearly 5,000,000 inhabitants have embellished their crumpled real estate with a profusion of comfortable hotels, excellent roads, and everything else necessary to gladden a vacationer's heart.

* See "Switzerland Guards the Roof of Europe," by William H. Nicholas, National Geographic Magazine, August, 1950.

© National Geographic Society

Soaring Fountain and Flower-decked Quays Welcome the Traveler to Geneva

Famed for its watches, the 2,000-year-old city also ranks as one of Switzerland's favorite resorts. Here Sunday strollers dot the sun-bathed Quai-du-Mont-Blanc. Fountain's milky jet rises nearly 300 feet.

Excursion Steamers Ply Blue Lake of Geneva Between Switzerland and France

Daylong cruises around 90 miles of shoreline attract Swiss and visitors alike. An American, Edward Church, launched the first steamer more than 130 years ago; today 14 passenger ships operate on the lake.

"If you really want to see the country, go by car," said our host Henry Kraehenbuhl, director of the Dolder Grand Hotel, when we called on him in Zürich. "Our trains are fine and our buses famous, but with a car you can set your own pace and see the little out-of-the-way places."

Mr. Adolph M. Welti, president of the Welti-Furrer auto-rental firm, provided us with both a car and some information about Swiss road customs.

"Most of our rules are exactly like yours," he said. "But on the mountain roads the car coming up has the right of way. If the road is too narrow for two to pass, the car headed down must back. And a postal bus—you can tell them because they are painted bright yellow—always has the right of way."

We thanked him and set off. When we returned his car nearly four months later, the total on its speedometer had increased by 8,000 miles, and our knowledge of Switzerland had grown in proportion.

Physically, Switzerland is divided into three principal regions: the Jura in the north, the Alps in the south, and the fertile central plateau that stretches between the two mountain systems. Politically, the country consists of 22 completely independent Cantons, similar to our States. Three of these are divided into autonomous halves, so there are really 25 political entities making up the Swiss Confederation.

"It sounds like a lot of territory to cover," said Henry Kraehenbuhl, "but we're a small country. It's possible to drive from one end to the other in a day.

"Personally, I'd start with Zermatt. That's about the most famous summer resort, and it's also typical of a mountain village. The drive south will take you across the Furka Pass and give you a taste of our mountain roads."

No Automobiles Reach Quiet Zermatt

The next afternoon we parked our car in the railroad garage at Visp, not far from the Italian border, and took the little cogwheel railroad which every year carries hordes of visitors to the home of the famous Matterhorn. We found the quiet village nestled in a sheltered valley, a dream of quaint simplicity (pages 438, 440).

Zermatt is guarded by the highest peak in Switzerland, Monte Rosa, and flanked by such giants as Lyskamm, Castor and Pollux, and the Breithorn. But it is the raw, pyramidlike peak of the Matterhorn that dominates the town and has made it one of the world's most noted tourist centers. Each summer thousands of visitors match their skill and endurance against the mountain's hazards.

One-legged German Conquers Matterhorn

The conquerors of the peak are a strangely assorted lot. A high-school student climbed it in blue jeans and tennis shoes, a one-legged German made it to the top without assistance, and a couple of years ago the barmaid in a Zermatt hotel, tired of listening to the boasts of her patrons, knocked off work after midnight and was on top of the mountain a few hours after sunrise.

"But, even for the best of climbers, it isn't without danger," we were told by Felix Julen, one of the village's many professional guides. "One misstep is all it takes.

"My father and grandfather were both guides," Julen explained as we sipped scalding coffee in his neat log home. "I climbed the Matterhorn first when I was only 14. But I had to wait until I was 18 before I could become an apprentice, and I was 24 when I got my license. Now I work as a guide in the summer and a ski instructor in the winter."

Julen, a lean, tanned man of 35, has scaled the Matterhorn nearly a hundred times. He charges about $30 to take a couple to the top during the summer. In wintertime his services bring $10 a day.

"On the Matterhorn," he said, "everyone starts at about the same time. We climb to the shelter hut the night before, sleep a few hours, and start at dawn. There's only one place where you can pass another climber; so everyone moves at the same pace.

"Coming down is more dangerous than going up. People are tired, and they get careless. But I've never had a client injured.

"I've seen people get pretty scared, though," he laughed. "Last year I started up with two brothers. When we awoke in the hut and started to dress, one of them could find only one sock. I told him he couldn't go that way—might freeze a foot. We lost nearly an hour before we located the other sock.

"That man must have been really nervous. He had both of them on the same foot!"

The oldest of Zermatt's guides still plying his trade, Julen told us, is 72 years old. Most of them retire at 55 or 60, but this hardy

© National Geographic Society

Castle of Chillon on Lake of Geneva Covers a Dungeon Dark and Dank

Bronze Age men inhabited the rocky island, and Caesar's legions fortified it. Peter II of Savoy built this structure in the 13th century. Lord Byron, a visitor in 1816, immortalized the castle with his poem, "The Prisoner of Chillon." "A double dungeon wall and wave have made," the poet wrote, "and like a living grave . . . the dark vault lies wherein we lay . . . and I have felt the winter's spray wash through the bars when winds were high."

oldster refuses to hang up his rope and ice ax.

"As a matter of fact, he's up on the Matterhorn tonight," Julen added. "But I won't tell you his name. Nobody would hire a 72-year-old if they knew his age."

Cog Trains Scale Zermatt Peaks

A couple of easy practice climbs convinced Jean and me that we were in no shape for the big mountain, and we couldn't spend the time to work ourselves into condition. But even for the nonclimber, Zermatt offers many attractions. Its winding streets, crowded with climbers toting knapsack, rope, and ice ax, are a constant source of interest. There are funiculars and cog trains to near-by peaks, where magnificent vistas stretch in every direction. And there are relatively easy climbs to such elevations as the Gornergrat, for which Jean and I settled.

We reached the top without difficulty and were, I fear, feeling a little smug as we began the descent.

"Not in such bad shape as I thought," I told Jean, panting a bit. "I doubt if everyone makes it as quickly as we did."

Around the corner came two children, about seven or eight years old, stepping briskly ahead of mother and father, each of whom was carrying a smaller child pickaback. No one was even breathing hard.

My ego deflated. I asked if they would pose for a picture. They did so graciously, and we sat beside the trail for a chat. They were Dutch, in Zermatt for a two-week holiday. They introduced their children, three

of whom had typically Dutch names. But the oldest boy was called Billy Francis. I asked how he had come by such a characteristically American name.

"Our home was near Arnhem, during World War II," the father answered, "and we used to shelter United States flyers who were being smuggled back to England by the underground. Altogether we took care of eleven, seven at one time. One boy named Billy Francis lived with us for five months.

"A week after he left our home, he was captured by the Nazis. Even though they tortured him, he refused to tell who had hidden him. They shot him. So—when our first son was born . . ."

We waved goodbye as they started up the hill. The younger children sat happily atop their parents' shoulders, and Billy Francis scampered ahead.

Back in Visp we picked up our car and drove west to Sion, center of the wine-growing industry in the region known as the Valais. That medieval city was once famous as the seat of one of the most powerful bishoprics in all Europe (page 464). We were interested in its history, but even more in a local resident named Hermann Geiger.

"Glacier Pilot" Rescues Climbers

Geiger is a stocky, square-faced man of 42 whose calm demeanor belies his dangerous avocation. Professionally, he manages the civil airport at Sion, but he is far better known to Europe's climbers as the "Glacier Pilot of the Alps," a calling in which he risks his life almost weekly. Geiger probably has saved more lives than any other man in Switzerland.

"Several years ago," he told us as we sat in his tiny office at the Sion field, "a friend told me that the Swiss Alpine Club wanted to build a cabin 9,500 feet up on the Mutthorn but was having trouble getting the necessary 50 tons of cement up the steep slope.

"I fitted my Piper Cub with skis and flew over the summit. I circled just above the snow a couple of times and found a relatively smooth stretch. I let down and dragged my skis, planning to take off if they started to sink. They didn't. I made a couple of landings and take-offs and came back and took the contract."

In the next three months Geiger made 620 landings on the Mutthorn, his little plane loaded to capacity. Not long after, he made 420 landings on the soaring Dent Blanche, transporting another 35 tons of cement.

That winter a Swiss Army captain, climbing with a companion on the 11,742-foot Tschingelhorn, was swept off his feet by an avalanche. With a broken leg and shoulder and serious head injuries, he was unable to

Though They Speak Four Tongues, the 5 Million Swiss Stand as One

Switzerland covers less than half the area of the State of Maine. Compensating for the limited land, the Swiss manufacture watches and other precision instruments. For electricity, they harness their tumbling rivers. To turn scenery into cash, they promote mountain climbing and winter sports. German, French, Italian, and Romansh all serve as national languages.

© National Geographic Society

Well-groomed Farms Checkerboard Thur Valley Like Flower Beds in a Formal Garden

Rocky Schafberg Looms Above Hillside Hay Barns and Steepled Alt St. Johann

Hermann Geiger, a One-man Rescue Service, Lands on Glaciers or Mountaintops

In five years the flyer has made nearly 200 sorties to save skiers and climbers injured on Alpine crags. As nimbly as a bird, his ski plane sits down on postage-stamp snow fields as high as 12,000 feet.

move. His companion, who knew of Geiger's glacier freight lift, made his way to a telephone and called Sion.

"I took the extra seat out of my plane and put in a stretcher," Geiger told us. "The captain's friend had covered him with his own bright jacket, so I was able to locate him. I found a smooth stretch about 50 yards away and let down. Two hours later he was in the Sion hospital."

Word of Geiger's feat spread throughout the Alps. When we talked with him, he had made 174 rescue flights.

"The most exciting day I ever had was in 1954," he recalled. "Twelve Swiss villagers were climbing on the Rosablanche. Just above 10,000 feet an avalanche buried the lot. Two of them were covered only to their chests; they managed to dig themselves out and skied down the mountain for two hours to a phone.

"I took off as soon as I got their call. As I circled low above the fresh avalanche, I saw a single ski sticking out of the snow.

"I landed and got that man in the plane, but there was no sign of the others. So I brought him back to Sion and got an avalanche dog."

"What in the world is an avalanche dog?" Jean interrupted to ask.

"A dog trained to find people buried under the snow," Geiger explained. "My neighbor has one. I took the dog back with me, and in three hours we had located every one of the victims and dug them out. Two were already dead, but all the others recovered. I made a total of 10 trips that day."

Scaling Mountains the Easy Way

The idea of landing on a mountain peak appealed to me. I suggested to Geiger that I charter his plane for an hour or two. As we walked out to his four-year-old Piper Cub, fitted with wheels as well as skis operated by a hydraulic lift of Geiger's own design, a flight of Swiss Army jets took off. Our little yellow craft looked strangely fragile against the background of the shrieking monsters.

A minute later we were in the air, spiraling to gain altitude. At 10,000 feet we leveled off over the glacier-capped Rosablanche.

Twenty-five feet above the snowy crust Geiger banked the plane and looked down, studying the glacier intently. Twice he circled, the wing tip seemingly only a few feet above the rough snow. Then he took a final turn, and suddenly we were heading straight into the slope. The nose came up; Geiger lowered the skis onto the icy surface and then gunned the motor as we whipped up the slope at 60 miles an hour. Satisfied with the feel of the crust, he cut the throttle and we dragged to a halt.

I stepped out of the plane and sank to my knees through the fragile crust. Geiger joined me, and together we lifted the tail of the plane and pulled it around, pointing the nose down the slope.

We got back in. The engine labored for a moment against the traction of the skis, then forced them ahead. A spume of snow sparkled on either side as we raced downhill and rose into the air.

"Easiest mountain I ever climbed," I told Geiger.

"Want to do it again?"

We repeated the performance on the Aiguilles Rouges, and I still wasn't satisfied. Never have I experienced a greater thrill. We tried landing at nearly 12,000 feet on the Dent Blanche, and that was even more fun.

Other people can have yachts and fast horses and racing cars. If I were a millionaire, I'd spend most of my time and money hiring Hermann Geiger to land me on the tops of assorted Swiss Alps.

Back in Sion we found the jet fighters

Foghornlike Tones of 15-foot Alpenhorns Can Be Heard for 6 Miles

Echoing through the mountains, the notes sound a mighty amen to evening prayers. Beethoven used the traditional melody in his *Pastoral Symphony*. Robert Christen of Hergiswil splits curved wood (right), hollows it, and glues the pieces together. The completed horn (left) required about 90 working hours.

Willard R. Culver, National Geographic Staff

neatly lined up along one edge of the field.

"What do you fly when you're on army duty?" I asked Geiger. "Are you in a jet squadron?"

"I'm in the infantry," smiled Switzerland's most famous pilot. "I applied for flight duty when I started my army service, but they rejected my application. Said I wasn't adapted to flying."

Armed Neutrality Guards Independence

Mention of the army reminded me that Jean and I had passed troops in training in almost every village along our route. We decided to visit the Federal capital and find out how the little country manages to keep so many men in the field.

Our friend Walter Rubli of the Bern Office of Tourism arranged an appointment with Dr. Hans Rudolf Kurz, a major in the Swiss Army and an official in the Military Department. Dr. Kurz, his lean face intent, sat forward on the edge of his chair when I asked the question.

"Switzerland does not *have* an army," he snapped. "Switzerland *is* an army!"

"Every Swiss is soldier and citizen in one person," Dr. Kurz continued. "The first purpose of our army is to keep us out of war. To do that, we must show any potential aggressor that the price of violating our neutrality is too high to be worthwhile."

That is why every male Swiss, in the major's words, "keeps one foot in the army from the time he is 20 until he is 60," and why more than 30 percent of the national budget is devoted to defense.

Swiss young men, Major Kurz explained, are called for active service in the year of their twentieth birthday. A very few—the figure has never run higher than 15 percent—are excused because of physical defects, and must pay an additional tax every year until they reach the age of 48.

Those who pass their physical examination spend 17 weeks in recruit school. When they graduate they are privates. Each man is given a rifle, 24 rounds of ammunition, a uniform, and all the equipment required for his particular job. He takes those things home and keeps them in constant readiness.

"In Switzerland," said the major, "possession of a gun has always been the sign of a free man. Less than 100 years ago, in some of our Cantons, a pastor was not permitted to perform a marriage unless the groom could show his arms and uniform.

Army a Lifetime Career for Civilians

"From 21 to 36, the young Swiss soldier is a member of the Elite corps and must be ready for active service at any time. From 37 to 48 he is in the Landwehr, which devotes itself principally to supply and transport duties. From 49 to 60 he serves in the Landsturm and goes on duty only in the event of war. At 60 he retires and is allowed to keep his gun and uniform.

"If an invader should strike tomorrow," Major Kurz said confidently, "we would be ready. Practically every important bridge in the country is mined, ready to be blown up at a minute's notice. All important factories have reserve stocks of vital materials. Every family has reserves of food.

"Most important, every able-bodied man has a gun he knows how to use. We want everyone to know how well prepared we are. The cost of neutrality to us is as great as the cost of NATO to you, but we think it's worth it."

A couple of days after our visit with Dr. Kurz, Herr Rubli telephoned. "You asked for an interview with the Vice President of Switzerland," he said, "and we've arranged it for this afternoon. His office is just down the street from your hotel. I won't need to accompany you—he speaks English."

When I referred to Mr. Markus Feldmann as Vice President, I was following general custom. Actually, Switzerland's highest executive authority rests with a seven-man Federal cabinet, the ranking members of which are popularly considered the country's President and Vice President.

Page 438

← Matterhorn, a Beacon of Shining Snow, Helps Fill the Hotels in Zermatt

Edward Whymper, a Briton, was the first to conquer the 14,692-foot peak; his party lost four men on the descent. The date was 1865.

Hundreds now climb the Matterhorn each year, and Zermatt's excellent guides boast that any four of them can get a cow up to the summit. However, the local cemetery, with its many tombstones reading "Lost on the Matterhorn," and "Ascended to glory on the Matterhorn," attests the constant danger of even an oft-conquered mountain.

Zermatt, a cozy village of fewer than 1,300, annually plays host to more than 50,000 visitors (page 440). No automobile roads reach the town; the visitor must come by train or foot, and horse-drawn carriages enhance the charm of narrow streets.

© National Geographic Society

Bus Loaded with Sightseers Rounds a Corner on Furka Pass

"When two vehicles meet on a road too narrow to allow them to pass," the authors write, "Swiss law requires the car headed downward to back up until a wide place is reached. When it happened to us, we were scared to death. It's hard to turn your neck when your heart is in your throat!"

This road over 7,976-foot Furka Pass, one of the highest in Europe, opened in 1867. Switchbacks of the 7,103-foot Grimsel Pass highway lie in the middle distance. Bernese Alps rise in the background.

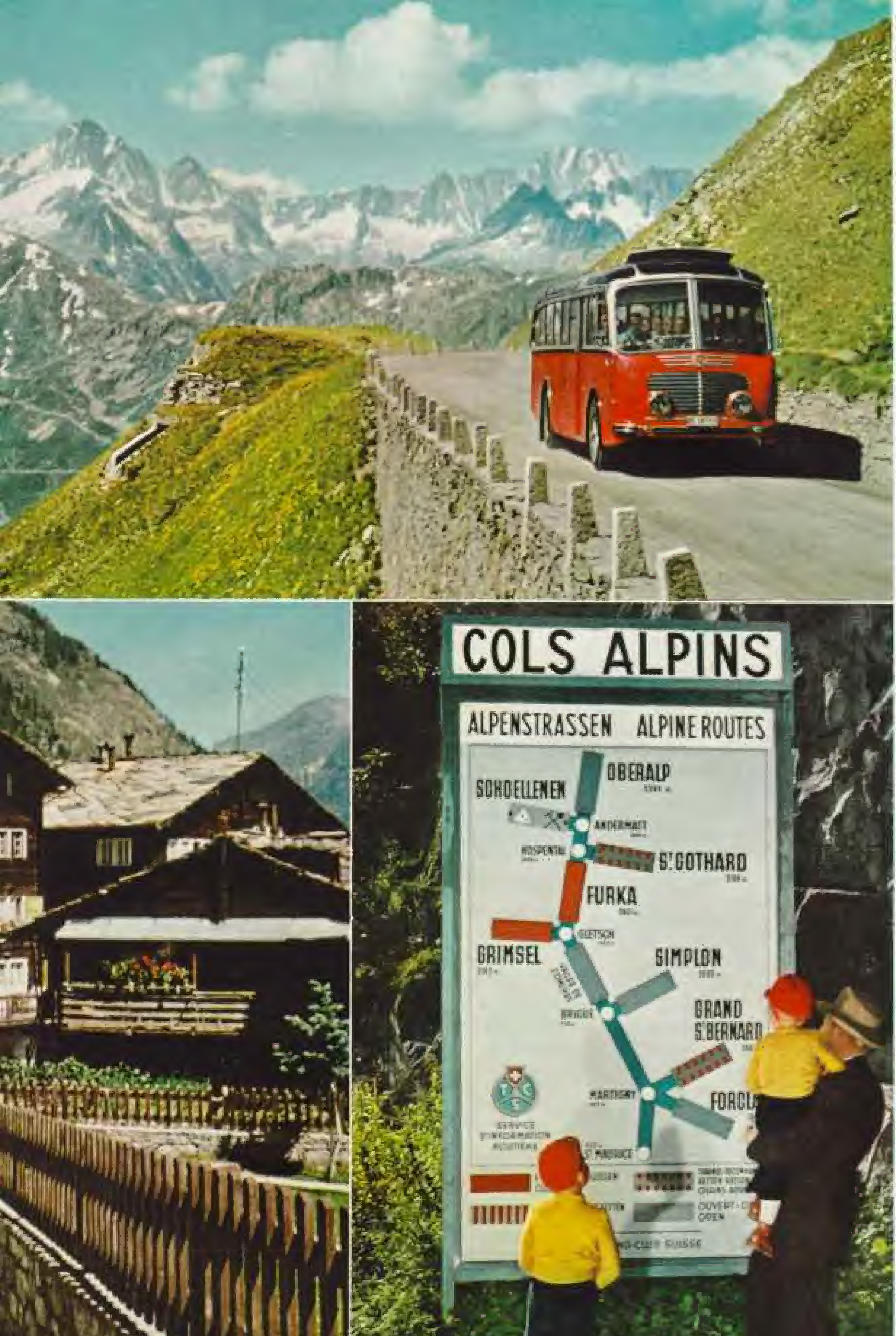
→ Page 441, lower right: Signboards on Swiss roads announce conditions at all passes, many of which are closed in winter. Colored plaques are changed as road conditions vary.

↓ Zermatt's Steep and Narrow Streets Give Climbers a Preliminary Workout

Pack, rope, and ice ax on his shoulders, a mountaineer walks from the train to his pension, one of 43 hotels and lodging houses in the village.

Weathered wooden homes, bright with flowering window boxes and topped with roofs of split stone, announce Zermatt as surely as any sign.

© National Geographic Society


COLS ALPINS
ALPENSTRASSEN
ALPINE ROUTES
OBERALP
St GOTHARD
FURKA
GRIMSEL
SIMPLON
GRAND
St BERNARD

"I was a journalist myself," Mr. Feldmann told us. "Twenty-three years of my life were spent as an editor. So it's always interesting for me to meet former colleagues."

Flattered, I asked the 58-year-old Vice President how he happened to become a newspaperman.

"I took an interest in newspapers from the time I was 10 years old," he said, "and collected newspaper clippings. How can it be, I used to ask myself, that there is always just enough news to fill a newspaper—never too much and never too little? Later on I was to find that a newspaper editor has plenty of other things to worry about.

"I studied law and was admitted to the bar, but I never practiced. I became a reporter, then a foreign editor, and finally editor in chief of the *Neue Berner Zeitung*. As I was on the political side of the paper, I became more and more interested in political problems. But the first two times I ran for local office I was defeated."

No White House for Chief Executive

The Presidency of the Federal Council is rotated among the members, each serving for one year. However, the Presidency cannot go to the same man two years running, Mr. Feldmann told us, although several men have held the office more than once.

I asked the Vice President, who was soon to succeed to the Presidency, if Switzerland had a residence such as our White House, where the chief executive lives during his term of office. "We do not," he replied. "The President of Switzerland lives in his own home.

"I hope during my term of office to see the laws guaranteeing our press freedoms even more clearly defined," he told us. "I was for some years president of the Swiss Press Association, and I regard a free and well-informed press as one of the most important elements in a country's independence." *

Speaking about the visits of Americans to Switzerland as tourists, Vice President Feldmann explained: "We gain more than money from the people who visit us; plenty of travel strengthens the ties between nations. The friendship between Switzerland and the United States has lasted for generations, and I hope to see it become ever stronger."

As Vice President Feldmann waited for his bus, I noticed that while a number of his countrymen greeted him cordially, others paid no attention to his presence in the queue. To Jean and me, who had interviewed oriental potentates with enormous retinues of servants and palaces packed with armed guards, it was a pleasant exercise in real democracy.

Bern, Jean and I decided shortly after our introduction to it, is the loveliest city we have ever seen. The perfectly preserved medieval façades, the clock towers and quaint statues, the soaring Münster church, and the magnificent prospects along the River Aare blend into an American's dream of a European city (page 450). And as capital of the Swiss Confederation it is like Washington, D. C., but with a difference.

The difference is that while Washington is a "made" town, created for the sole purpose of government, Bern has a heritage of its own that far outdates the Swiss Confederation.

"We know that the administrators of the Kingdom of High Burgundy built a fortified city here as early as the 12th century," Walter Rubli, himself a local historian of note, told us. "Excavations indicate that there may have been a city here in Roman times. Oddly enough, the bear seems to have been a symbol of that Roman settlement."

The bear is still the symbol of the Canton of Bern, and the municipal bear pit is one of the city's most popular attractions. Every day hundreds of visitors, tourists and natives alike, crowd around the sunken concrete wells watching the antics of the animals.

Bears Beg for Figs and Carrots

I have never seen more artful begging. Bundles of carrots and baskets of figs are sold to visitors who want to feed the animals. Two bears are kept in each of the three pits, and they constantly compete for the attention of any visitor with food to spare.

"Hang onto your property when you watch the bears," keeper Emil Hanni warned us. "People are always dropping things in there. Just recently an American lady dropped her handbag. The bears scattered money, lipstick, and keys all over the place.

"An Englishman watching laughed so hard his false teeth fell in. One of the animals grabbed them, ran up the tree in the center of the pit, and dropped them to the concrete floor. Not a piece left big enough to pick up."

(Continued on page 451)

* See "Swiss Cherish Their Ancient Liberties," 21 Illustrations, NATIONAL GEOGRAPHIC MAGAZINE, April, 1941.

↑ Teacher's Fairy Tale Enchants Her Class

Accompanied by instructors, Swiss school children go on regular holiday excursions to resorts and national shrines.

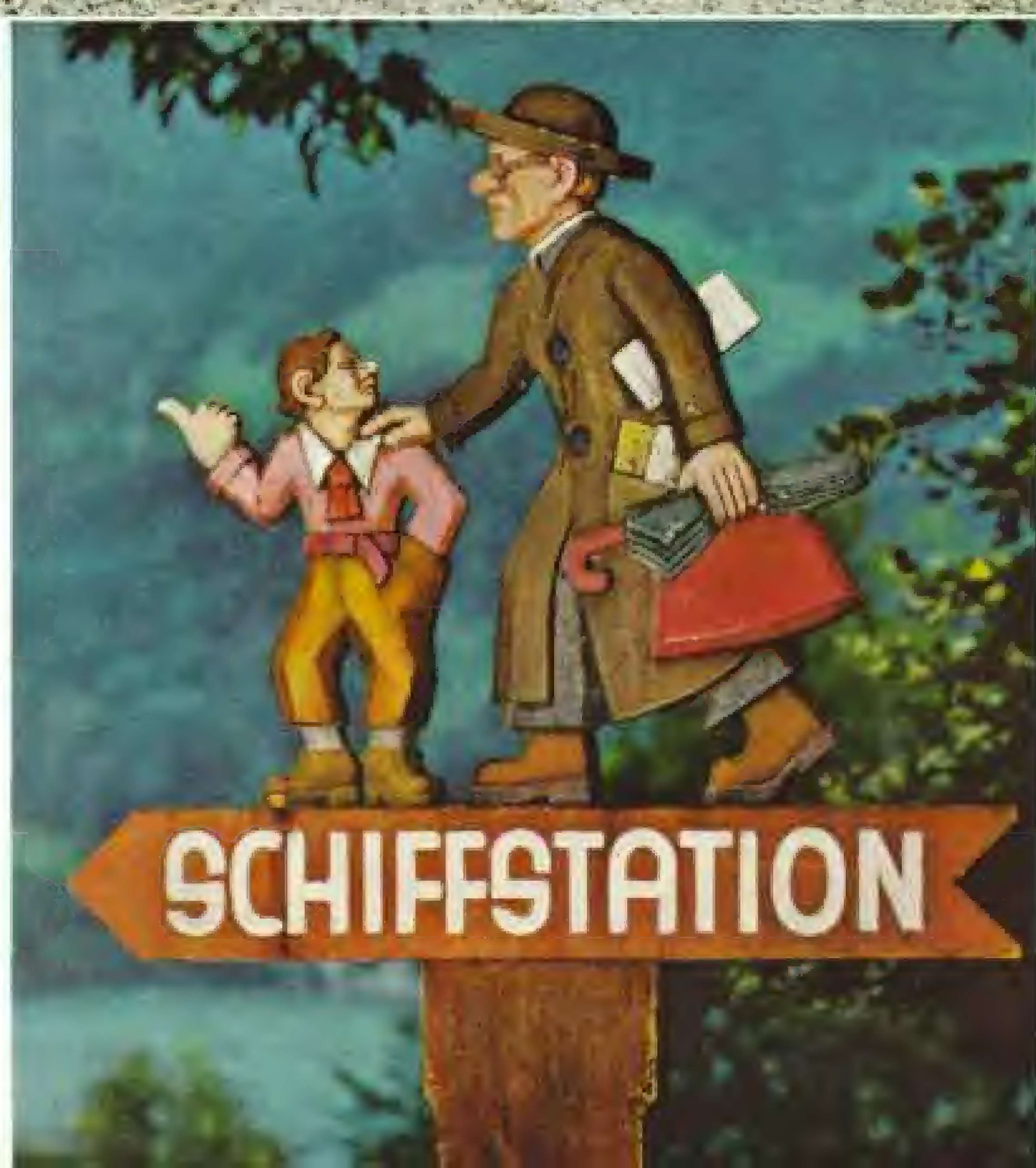
These youngsters from Goldern-Hasleberg, a mountain village in the Canton of Bern, spend a day on Lake of Brienz. They wear folk dress every day in the week.

Carvings Say This Is a Whittlers' Town →

Switzerland's wood-carving industry centers in the village of Brienz, where more than 2,000 artisans carve everything from cuckoo clocks to anatomical models for medical schools. A state-supported school trains young Swiss in the ancient art.

This sign, one of many carved by the students, points the way to the ferry landing.

© National Geographic Society



**Eiger, Mönch, and Jungfrau Challenge Climbers; →
Less Ambitious Travelers May Take a Train**

Seen from the Allmendhubel, this panorama includes three 13,000-foot peaks. The Jungfrau (right) is partly obscured by clouds and the dark precipices of its buttress, the Schwarz Mönch.

Europe's highest railway attains a height of more than 11,000 feet on the Jungfrau. A tunnel 4.4 miles long carries the cog-propelled trains through the rocky Eiger and Mönch. Started in 1896, the line was not completed until 1912.

This hill above the village of Mürren marks the terminus of a cable railway; its station appears in foreground.

© National Geographic Society

← Baby Cradled on Head Frees Mother's Hands for Knitting

Isérables, a mountain village in the Canton of Valais, has steep and rocky paths. Busy housewives walking from house to house carry babies on heads and knit as they go.

This young woman's costume is reserved for Sundays and festive occasions. A knitted cushion supports the cradle.

Jean's Appreciative Audience →

Page 445: While awaiting clear weather for the Jungfrau picture (above) the Shors visited this spot every day for a week. "There was a herd of cows in the meadow," writes Jean, "and this one adopted me. She followed wherever I went, nuzzled my tripod, and tried to nibble our cameras. Silliest animal I ever saw." Here the cow watches Jean change film.

Kodachrome by [illegible] (left)

Costumed Beauties Stage a Swiss Style Show

Until the end of World War I the wearing of distinctive cantonal costumes was a dying tradition in Switzerland. Then the National Costumes' League spurred a revival. Today the league has more than 20,000 members, and many other Swiss wear the garb on festive occasions.

This gathering at Interlaken attracted more than 3,000 participants from every Canton. The three-day party saw parades, folk dancing and singing, alpenhorn concerts, and flag-twirling demonstrations.

Pincushion Headdress → Identifies a Bride from Fribourg

Each Canton has its own distinctive garb, and many villages add special touches of their own. Those familiar with folk fashions can name the wearer's Canton at a glance.

← Page 446: Elaborate headdresses say these three picnickers come from Appenzell, a town famous for its needlework.

In the picture above, the black-lace bonnets at right are from the Canton of Bern. Women on grass in foreground wear Aargau's Sunday best.

© National Geographic Society

← Peaks Float Like Islands in a Sea of Clouds

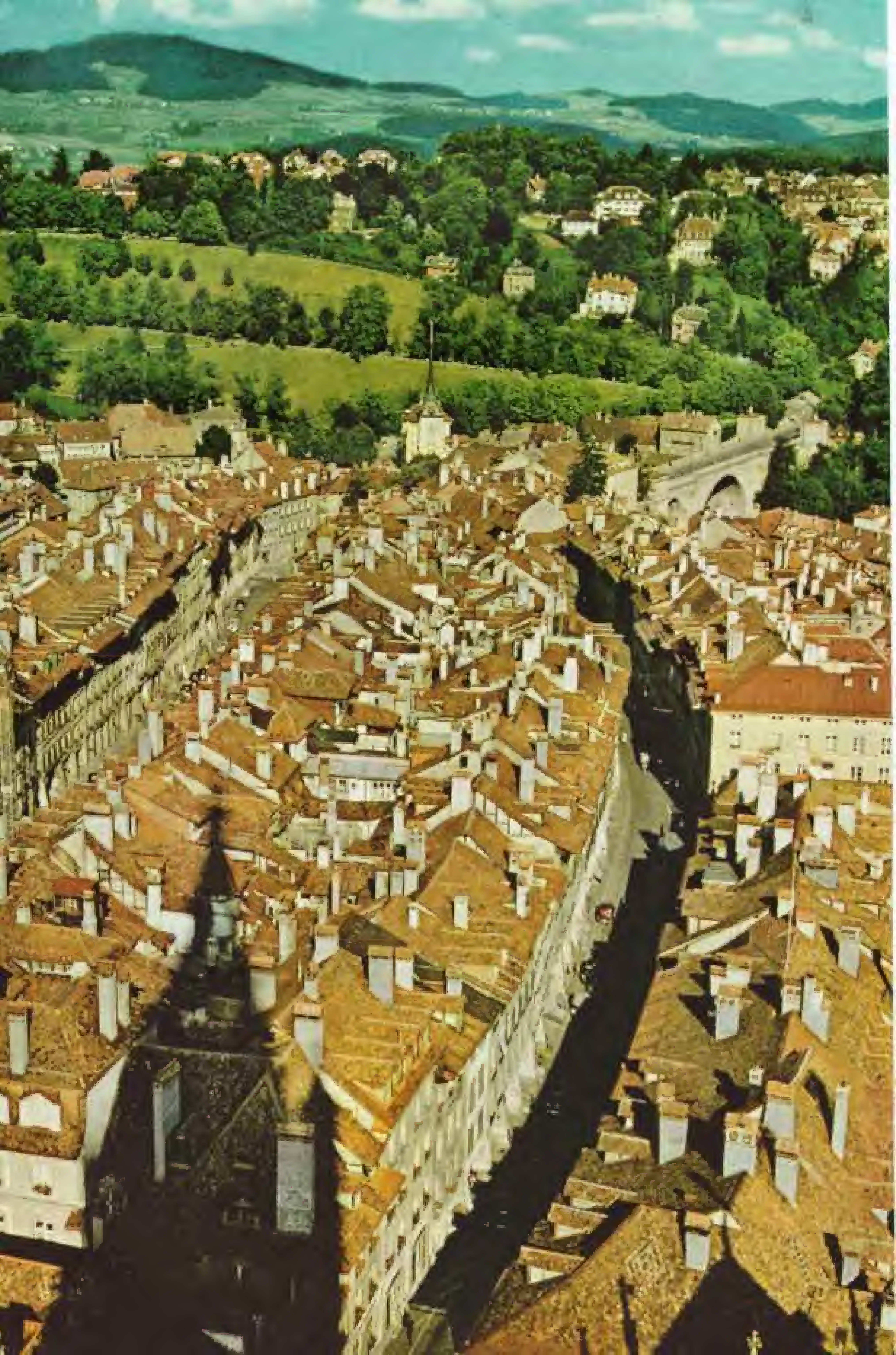
"We took the cog railway at Alpnachstad on a gloomy day," writes Franc Shor. "At 4,000 feet we plunged into a cloud layer and the world disappeared. A thousand feet higher we emerged into blinding sunlight. We had hoped to get a panorama of Lucerne; we settled for the peaks of the Bernese Alps."

© National Geographic Society

↑ Kapell-Brücke Combines Bridge and Art Gallery

This 14th-century covered bridge in Lucerne shelters 112 triangular panels painted about 1600 by Hans Wagmann and his son. Many of their works record the lives of saints and heroes.

←Visitors feed gulls and admire the old Kapell-Brücke from a modern bridge. Thirteenth-century tower (left) stands in the River Reuss.



Rubli had told us that watching the bears was the favorite pastime of the Bernese. We didn't believe it until we saw a bride and groom, still in wedding clothes, come directly from their wedding ceremony and spend an hour feeding the lumbering animals. I asked a member of the wedding party why they had chosen such an unlikely place to begin their honeymoon.

"What's the matter with the bear pit?" he asked indignantly. "They met here. So did my wife and I."

Apologetically, we packed our cameras and went away.

As typical of Bern as its bears are the deep arcades that line the main street. A feature of the city since its earliest recorded history, they offer the present-day stroller, as they did his medieval predecessor, shelter from wind and rain and sun. Modern zoning laws protect them from encroachment by space-hungry proprietors.

Sly Humor Enlivens Medieval Church

Equally famous is the Münster church. Its age is attested by the tablet between the doors of the main portal, which reads:

"In the year after the birth of Christ 1421 on the 11th of March the first stone of the church was laid."

The carving above this portal is one of Switzerland's most precious treasures. The Last Judgment, Rubli pointed out, contains a sly bit of medieval humor.

"That prominent figure in paradise," he said, pointing, "is the Lord Mayor of Bern. Down there with those consigned to perdition is the Lord Mayor of Zürich. The two towns never did get along!"

Münster's tower, completed in 1893, soars 328 feet, the highest in Switzerland. The church's stained-glass windows are famous (page 462). But Jean and I enjoyed most a touch of human pride evident over a small side door. The decoration of this entrance, Herr Rubli told us, was carved by the architect himself. Into the design he had worked, in the Bernese dialect, the words *Machs Na.* It is an idiom, Rubli told us, meaning "Copy this if you can!"

Violinists Dial for Perfect A

I had been impressed, during our travels about the country, with the ease with which one could dial any telephone in Switzerland without bothering to place the call with an operator. So in Bern I called upon Dr. W. A. de Salis, Secretary General of the office of Posts, Telegraphs and Telephones.

"Telephones have long been an important part of Swiss life," he told me. "We installed the first in 1880, and we now have more than 770,000 subscribers."

I had heard that the Swiss offered services not generally available in the United States, and I asked Dr. de Salis if this was so.

"You can get a three-minute summary of the latest news," he said, "or weather predictions, or the results of important sporting events. There's a general information service —where to buy various items, and how to locate a hotel room.

"And if you want to tune your violin, you can dial a number and get a perfect A."

We were on a Sunday drive through the rolling hills north of Bern when I had my first--and last—encounter with the ancient Swiss sport of Hornussen.

In a roadside field two crowds of men were gathered, about a dozen in each group, the two units separated by some 250 yards. One group carried boards about two feet square, mounted on five-foot sticks. The other group watched one of their number flail the air with what looked like a fishing pole with a doorknob on one end.

"You're lucky to see this," our friend Helmut Hassenstein told us as we crossed to the latter party. "Hornussen has just about died out in Switzerland. It's only in these out-of-the-way places that you see it played."

The players were dressed in short, brightly embroidered jackets. Many wore beards. We introduced ourselves and asked if we might watch. They made us welcome and explained the game.

Our side was "at bat." On the ground was set a platform with two steel rails about five feet long. One end of the rails was flat on the platform, the other curved gently upward

---

Page 450

← Münster Church Lances Medieval Bern with the Shadow of Its Gothic Spire

The German poet Goethe, after a visit in 1779, wrote that Bern was the most beautiful town he had ever seen. So little changed is the Swiss capital's old section that Goethe would have no trouble recognizing it if he were alive today.

This view, taken from the church's 328-foot tower, shows the arcaded sidewalks (left), a bridge across the River Aare, and the rolling hills of the rich countryside.

© National Geographic Society

Mountain Villages Preserve Old Ways

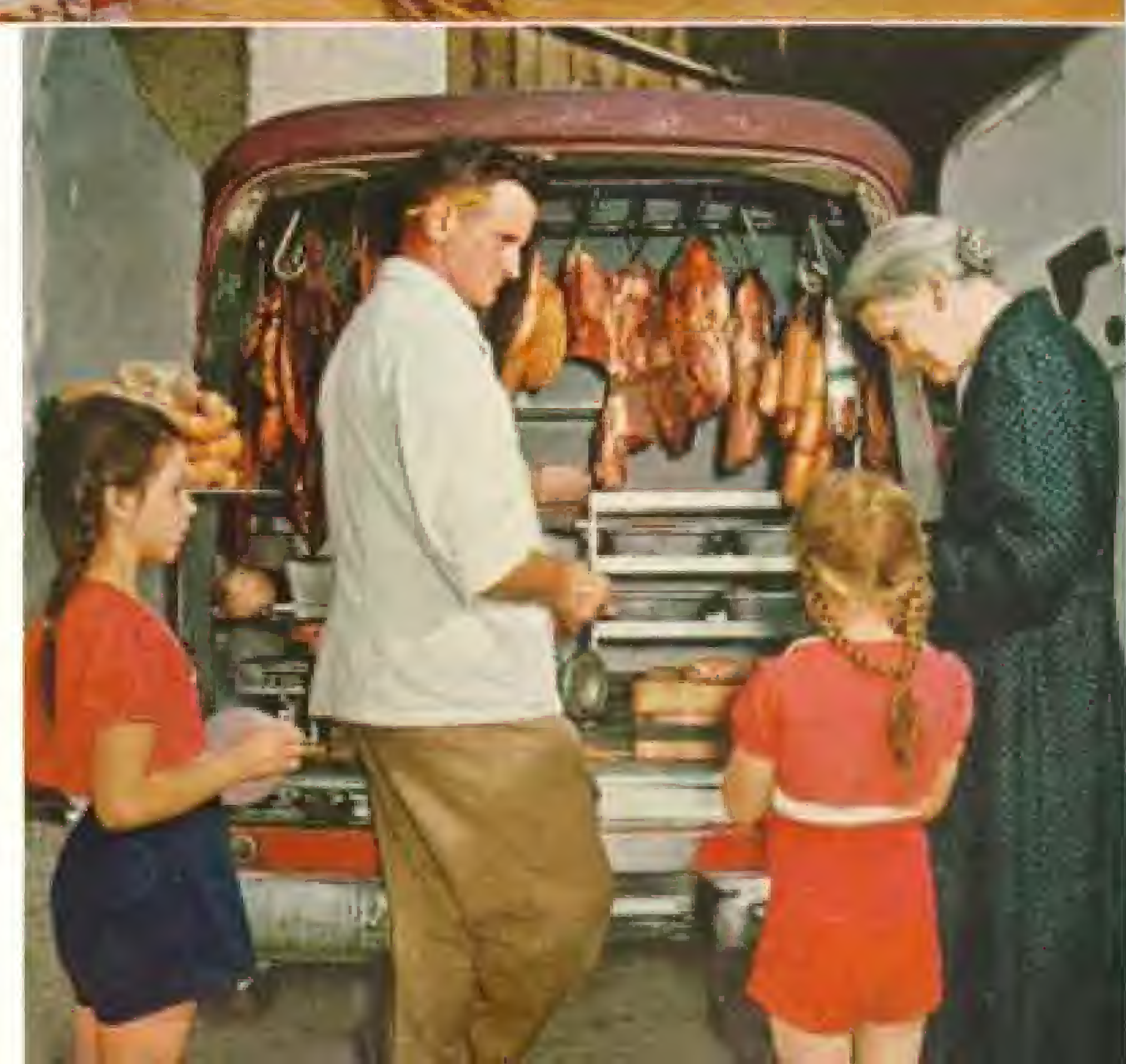
↑ Painted furniture brightens this bedroom in the childhood home of César Ritz, who founded the famous hotels bearing his name. Here in Niederwald his niece, Witfrau Maria Dietzig Ritz, smooths the bed cover.

→ Itinerant vendors in remote villages carry food, clothing, and fuel to people lacking transportation. This butcher shop on wheels delivers sausages to a housewife in Rothenbrunnen, Canton of Grisons.

← Page 452: Guarda, in the lower Engadine, is a perfect example of a Swiss village. Popular subscription restored many of its 18th-century houses.

Ice-cold water fails to dampen the chatter of these laundresses.

© National Geographic Society



to a height of about six inches. At the top was set a mud tee on which rested a hard-rubber disk almost exactly like the puck used in ice hockey.

While we watched, one of the players took an eight-foot rod, very similar to a trout rod, on the end of which was a hard wooden cylinder about three inches long. Standing about ten feet from the puck, he took a couple of practice swings with the swishing stick and then, his body twisting like a hammer thrower's, made a tremendous swipe at the hard-rubber puck.

There was a sharp crack, and the puck spun through the air toward the waiting crowd. They flailed at it with their square boards like men with giant fly swatters trying to strike an insect on the wing.

They were unsuccessful. The puck hit the ground unscathed more than 200 yards from the tee, and our side cheered.

"If they hit it and bring it down, no score is made," one of the players explained. "If it strikes the ground untouched, the distance it travels is scored for our side. The team with the most distance in a given number of shots wins the game."

I watched while half a dozen players took their mighty swings and sent the puck screaming down the field. The rails, it was apparent, were to guide the stick to the puck. Rather simple, I thought, and wished someone would invite me to try.

Hornussen Humbles the Author

Someone did. Smiling, an enormous farmer with a walrus mustache offered me his stick. Politely I refused. He insisted. I yielded, and stepped into the footprints left in the soft turf by my predecessors.

"Better be careful," cautioned Jean.

"This shouldn't be too hard," I belittled. "I play golf and I fish. This seems to be a combination of the two techniques."

I took my two practice swings. Then I wound up and let go with all my might. *Thud.* The stick smacked into the ground three feet behind the rails. Everyone smiled politely while I balanced the stick to get the feel of it a little better and take my second try.

I took it. *Swish.* The limber rod cut the air at least two feet above the puck.

Polite murmurs about how difficult it really was at first. Urgings to try again, perhaps not quite so hard this time.

Stick well back. Pause at top of swing. Then a stroke with all my strength. *Crack!* A beautiful clear crack! I looked up in anticipation. Something was sailing down the field. I looked at the tee.

The puck was still there. I looked at my stick. The wooden cylinder was missing. I had hit the rails with the flexible shaft, snapping the cylinder off. That was what was flying down the field.

More polite murmurs, broken only by Jean's unsuppressed laughter. I insisted on paying for the broken club. My host refused, pointing out that it was a common occurrence, easily mended, and showing me half a dozen sticks in similar condition to prove it. So we thanked everyone profusely and went our way.

"Shouldn't be too hard," mused Jean. "You play golf. You fish. You don't play much Hornussen, though, do you?"

Farmer's Brood Shows Company Manners

Helmut Hassenstein, who witnessed my embarrassment on this occasion, later took us to visit the family of Hans Thierstein. We had expressed a wish to meet a typical farm family of the Emmental.

On a Sunday morning our friend accompanied us up a country road above the village of Bowil. Hans Thierstein was sitting on a hand-hewn wooden bench in front of his century-old home. Nine children in the typical dress of the Emmental sat solemnly beside him. We introduced ourselves to the 63-year-old father, who presented his four daughters and five sons. Each stood in turn, bowed politely, then sat down without uttering a word.

"Come into the house," said Hans. "We can talk without being disturbed."

As we followed him across the threshold, the silent row of youngsters erupted like a covey of quail. Their unnatural sobriety, obviously, had been company manners.

We sat in straight chairs in the combination living and dining room. Most of the space was taken up by a long plank table

Page 455

Textile Printer Colors Handkerchiefs; → Finished Yardage Dries Overhead

This plant in Mitlödi, Canton of Glarus, employs great-grandsons of men hired in its foundation year, 1820. Most of the 130 employees own small farms. "Everyone has at least a cow," said the manager.

© National Geographic Society

GASTHOF

with benches down each side. I congratulated our host on the size of his family.

"You haven't seen them all," he said. "I have 14, but five have married and left home."

We were curious to know how Thierstein supported such a large brood on his 75 rocky acres. Jean and I had, we told him, grown up in the farming and ranching area of our own country, where ten times that acreage might not be considered adequate for a smaller family.

"Milk is our cash crop up here," he told us. "I keep 17 cows, and we sell about 45 gallons a day.

"We have a vegetable garden, a few fruit trees, 23 pigs, 30 chickens, and 10 sheep. Then there are the two horses. Taking care of all of them keeps us pretty busy. We get up at four in summer. In the winter it's too dark so we stay in bed late—six o'clock."

Gray-haired Mrs. Thierstein came from the kitchen to announce that Sunday dinner was ready. A great tureen of beef broth was set before the father, and everyone took his place on the benches (page 468).

Thierstein bowed his head, and we all followed suit. Quietly he thanked God for the food set before us and

Brown Swiss Cattle Stand Sleek and Fat in Appenzell

One of the world's oldest breeds, Brown Swiss are native to the Alps. They serve both the meat and dairy industries. Each autumn some 1,000 head are driven to Appenzell for exhibition.

Hotel Säntis bears the name of the highest peak of the Alpstein. The façade wears its roof like a peaked sunbonnet; windows peer out like multiple eyes.

Clemens Schildknecht

Library of St. Gallen Displays the Treasures of Fifteen Centuries

The Benedictine Abbey Library in St. Gallen takes its name from an Irish missionary who came here about 612 to preach Christianity. After his death the abbey became a seat of learning during the Dark Ages.

Abbot Otmar founded the library in the 8th century. He and his successors preserved priceless manuscripts of the Greek and Roman classics, among them a 5th-century Virgil. Other treasures include 7th-century Irish manuscripts taken to Switzerland by the disciples of St. Gallus.

Today the library houses 100,000 volumes and 2,000 manuscripts. Over the entrance is carved this inscription in Greek: "The Pharmacy of the Soul."

←Page 458: Visitors wear felt slippers over shoes to protect the floor's intricate inlay. This magnificent room, in rococo style, was finished in 1767.

→St. Peter, clutching an enormous key, adorns an illuminated letter D in a prayer book dated 1520.

↓A German monk named Folchart painted this psalterium with its illuminated D about the year 860.

© National Geographic Society

for the bounty of the land. He stopped, and I started to raise my head, but then came the voice of Mrs. Thierstein, adding her own words of gratitude. In the order of their age each child followed with a brief grace. The youngest, a lad of seven, spoke last:

"Thank You, dear God, for all You have given us," he said, and the family fell to.

Mrs. Thierstein ladled the broth into the bowls. When that had gone its way, she brought from the kitchen a huge bowl of boiled beef and set it before her husband. He served it into the same bowls, while his wife and an elder daughter added mounds of plain boiled potatoes and greens. Heads were bent almost to the rims of the plates as the family ate swiftly and silently. Then Mrs. Thierstein whisked away the bowls and returned with loaves of crisp home-baked bread and a wedge of yellow cheese. Still without a word the family finished its meal, and 20 minutes after the first word of grace had been spoken we were back in our chairs.

"We have the same menu every Sunday in the year," Thierstein told us. "Weekdays we don't eat much meat—only cheese and vegetables and boiled potatoes. But no one ever goes hungry, and the youngsters seem to thrive."

I asked our host if his children planned to live as farmers.

"They seem satisfied," he replied. "The five who moved away are all farming. We belong on the land. In Switzerland we're proud of that."

The National Unspunnen Festival—a three-day extravaganza of folk dancing, singing, and costume display—took us to Interlaken. Sponsored by the Swiss Folklore Association, the fete brought 6,000 costumed merrymakers from every Canton (page 446).

We enjoyed the dancing and admired the costumes, but the joviality

His Rope a Lifeline, a Climber Swings down a Granite Finger of the Bregaglia Alps

© Andreas Pedrett

© Andreas Pedrett

The World Falls Away in a Breathless Void Beneath the Legs of a Swiss Guide

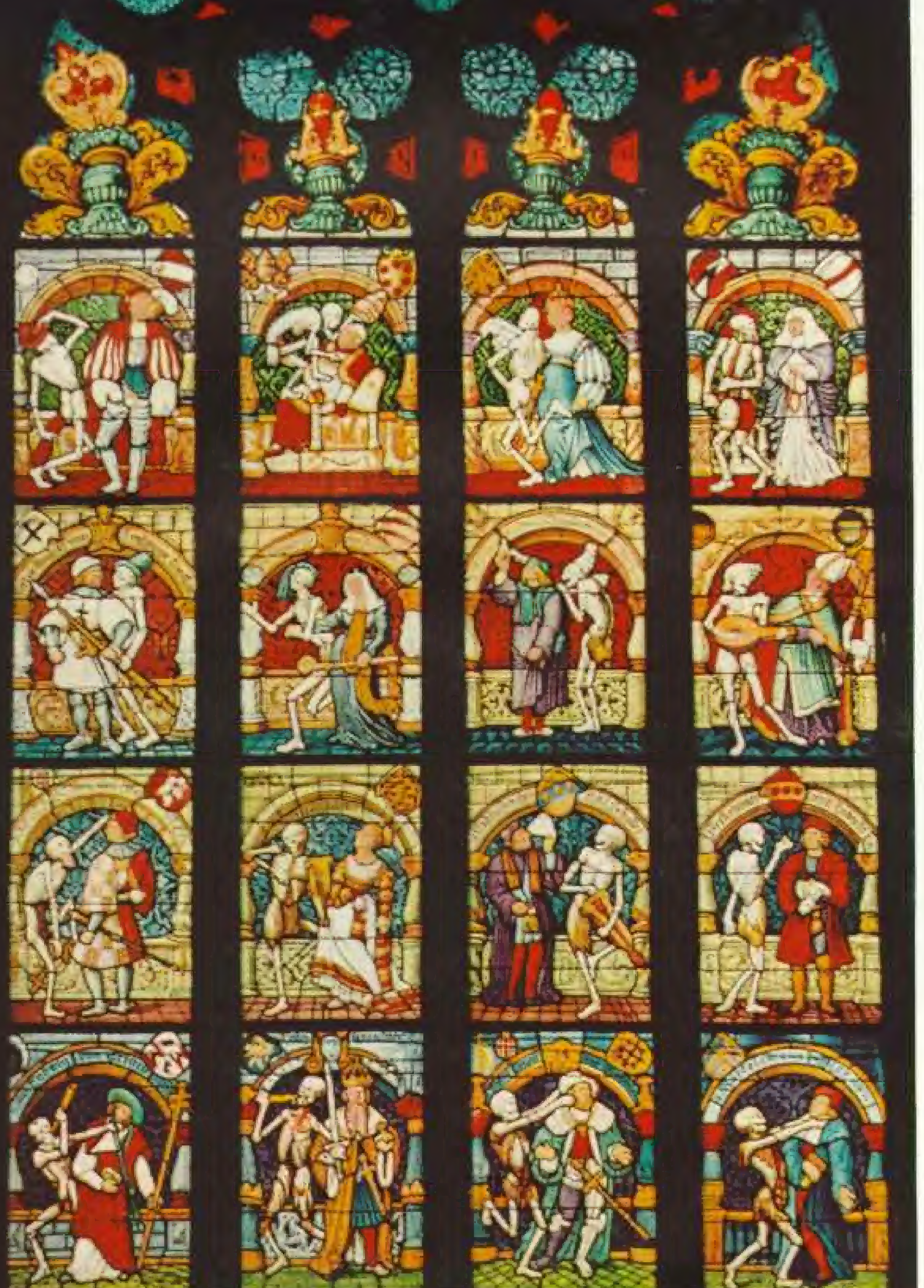
was too much for our sleep. We were staying at Herr Hassenstein's Hotel Splendid, and the hotel's cafe was a favorite gathering place for stay-out-lates. When a team of Appenzell bell ringers and a trio of alpenhorn players from Zug got together on the second night, we decided to head south to the Ticino.

Palms Sway on Swiss "Riviera"

That beautiful drive, on which we crossed the Susten and St. Gotthard Passes, took us from edelweiss to palm trees in a day. Gone were the gleaming glaciers and houses of log and wood. Suddenly we were driving through fields of ripening tobacco, past stucco houses painted pink and blue and ocher. Oleanders, flowering trees, and olives filled the sunlit courtyards.

"Travelers all love the Ticino," we had been told by Raymond Jaussi of the Montreux Tourist Office, "because it has Italian charm and Swiss plumbing." He was right. We visited Ascona, Locarno, and Lugano, sailed on Lake Maggiore and Lake of Lugano, and reveled in pasta, salami, and warm sunshine.

The farmers of the Ticino are probably the poorest in Switzerland, but they are among



© National Geographic Society

Death, Dancing Across a Stained-glass Window, Calls on Every Man, High and Low

Completed only 40 years ago, this colorful window is a favorite with visitors to Bern's Münster church, which was begun in 1421. Each panel shows Death summoning a person of different estate—pope, king, queen, knight, and lady of fashion. In a final panel (not shown) the bony visitor seizes the brush from the artist's hand.

the most hospitable. Everywhere we went, from the cities to the rocky valleys where stone houses are built into the steep hillsides, we were invited in for a cup of coffee or a glass of wine. Fishermen offered us boat rides and samples of their catch. Life moves at a more leisurely pace in the Ticino, and the warm sun is reflected in the local hospitality.

Geneva—Home of Swiss Watches

A long day's drive west over the Simplon Pass brought us to Geneva (page 428). Few tourists leave Switzerland without buying at least one watch, and we wanted to see how they were made.

Mr. M. H. Liengme, chief watchmaker of the Rolex Watch Company, Ltd., showed us around the Geneva plant where the company's products are assembled and tested. We asked how he happened to become a watchmaker.

"I was born one," he assured us. "My great-great-grandfather had his own watchmaking business. Both my grandfathers were watchmakers. My father, at 76, is still a watchmaker."

I had often wondered what the word "chronometer" on a wrist watch signified. I asked Mr. Liengme.

"To get a Government chronometer certificate," he explained, "a watch must not lose as much as 3 nor gain as much as 12 seconds a day. Most people do not realize how difficult that can be.

"There are 86,400 seconds in a day, and a watch makes 2½ oscillations per second. That's 216,000 oscillations per day. If a movement is slow by only 7½ oscillations—7½ out of 216,000, mind you—it can't pass that test."

We watched girls testing waterproof cases under high pressure and listened to an amplifier which turned the almost inaudible tick of a wrist watch into a deafening roar.

"That's like a stethoscope to a doctor," Liengme said. "A good watchmaker can tell a lot from the tick."

Cheese Buyer Tours the Alps

A telephone call from Hans Bürri, a cheese dealer of Interlaken, took us back to central Switzerland. Bürri was going on a buying trip into the mountains, he told us, and we were welcome to go along.

It was five o'clock in the morning when we left Interlaken with Bürri, who handles some 500 tons of Emmentaler, Gruyère, and Sbrinz a year. Our destination was only 20 miles distant as the crow flies, but the Schallenberg and Brienzer Rothorn stood in our way. We drove west, then north, then east, 80 miles in all, to reach our goal.

The first snow of the year was falling as we wound up a narrow back road. Behind us Mr. Bürri's heavy American-made truck whined in protest at the steep grade.

A cluster of men, several of them bearded, stood at one side of the road. Bürri shook hands all around, and turned to inspect the cheese piled neatly in the meadow or racked in specially designed wagons (page 467). He took a cheese auger from a leather holster and thrust the six-inch tube into the top cheese, withdrawing a yellow core. He examined it carefully, smelled it, tasted a piece, and dropped the rest into a wooden box.

Vintage Crop Brings Premium Price

"Cheese has vintage years, like wine," he explained. "It depends on the weather, the feed, and the warmth of the curing sheds. This is an exceptional crop, and I'll pay a premium for it."

The cheese which went into the box, Bürri explained, would be tested to determine its butterfat and water content. He drew a core from the next cheese and showed us its few tiny holes.

"The fewer and smaller the holes, the better," he said. "That means the fermentation has been carefully controlled. That's true even in Emmentaler, which Americans call Swiss. Yet in the United States people seem to prefer big holes and lots of them."

As each new cheese reached the top of the pile, Bürri whacked it soundly with a small hammer, listening to the round "plunk" that resulted. Interior cracks, he said, could be detected by the sound.

"Different countries prefer different sizes," Bürri continued as he worked. "Americans like wheels about ten inches thick. French, Italians, and Germans want them two to four inches thinner. And the Swiss like these—about four or five inches."

As Bürri finished each cheese it was weighed and loaded into the truck. They averaged 65 to 70 pounds, and when the last one was loaded the tally showed nearly 4,500 pounds.

From the truck Bürri brought a few bottles of white wine, which he presented to the farmers. Then, from a strongbox, he counted out more than $2,000 in Swiss francs. The farm-

© National Geographic Society

Castle and Church Sit Like Eagles' Nests Above the City of Sion

From its construction in 1294 to its destruction by fire in 1788, the Castle of Tourbillon housed the Bishops of Sion, who answered only to the Pope. Its crenelated walls still command a magnificent view of the valley.

At the foot of the twin crags, Sion prizes a cathedral, church, and city hall—all centuries old. Now a center of the wine trade, Sion has a population of more than 10,000.

Here Bishops Ruled a Valley and Conquered a Province

In 999 the Bishops of Sion were created Counts of the Valais by Rudolf III of Burgundy. By defeating the Counts of Savoy, they won the lower Canton of Valais, formerly an independent province. This 13th-century church, Notre-Dame-de-Valère, is famous for its intricately curved choir stalls and a 550-year-old organ, the oldest in Switzerland. The small Chapel of Tous-les-Saints stands between the two prominences.

Paul Popper, Ltd.

Barry the 10th Carries On Tradition amid the Snows of Great St. Bernard Pass

For centuries St. Bernard dogs have helped the monks of St. Bernard Hospice rescue lost wayfarers. During the early 1800's a dog named Barry saved at least 41. Since then the strongest dog has borne Barry's name. In snow this seven-year-old uses his enormous paws like paddles. The monk's shoulder bands symbolize clothing given to the poor off the back of St. Bernard de Menthon, founder of the hospice.

ers counted the money a second time, said goodbye, and started back up the hill.

"There are 15 families in that group," Bürri told us as we drove homeward. "They number about 100 people and keep 65 cows. This is their entire summer production of top-quality cheese. The rest, made with half-cream milk, they keep for their own pantries. Each family will get 130-odd dollars from this sale, and that's about the only cash they'll see this summer."

We drove to Bern the next day for lunch with Mr. George Lemann, commercial director of the Swiss Cheese Union, a trade organization that controls the export of Switzerland's best-known commodity.

"Cheese is a vital part of the Swiss economy," Mr. Lemann told us. "In 1954 we exported about 17,000 long tons of Emmentaler, Gruyère, and Sbrinz. It brought some $20,000,000."

"Is the United States your biggest customer?" we queried.

"No, we shipped only 3,600 tons to you people. Italy bought 4,900. You like Emmentaler; they like Sbrinz. We Swiss prefer Gruyère." *

"What's the best way for me to keep Swiss cheese at home?" Jean asked.

"Buy from the wheel in pieces of about two pounds," Mr. Lemann suggested. "Wrap the wedge in a cloth soaked in lightly salted water and store it in the refrigerator. Always take it out at least two hours before serving."

"A wedge takes up so much space in the icebox," Jean mentioned. "Have you ever considered making square cheeses?"

"We'd love to," Mr. Lemann smiled, "but when a cheese starts to ferment, it swells and tries to get round. If you start with a square, you get a very peculiar shape."

It was late summer, and the grapes were ripening on the shores of Lake of Geneva. Raymond Jaussi had promised to take us on

(Continued on page 475)

* See "An August First in Gruyères," by Melville Bell Grosvenor, National Geographic Magazine, August, 1956.

© National Geographic Society

Rubber-tired Wagon Exposes Golden Wheels of Cheese to Autumn's First Snow

High on the slopes of the Brienzer Rothorn, a farmer and his three sons offer the fruit of their summer's labor. Testing for quality, a buyer plunges his auger into a wheel of Spalen, a cheese seldom exported.

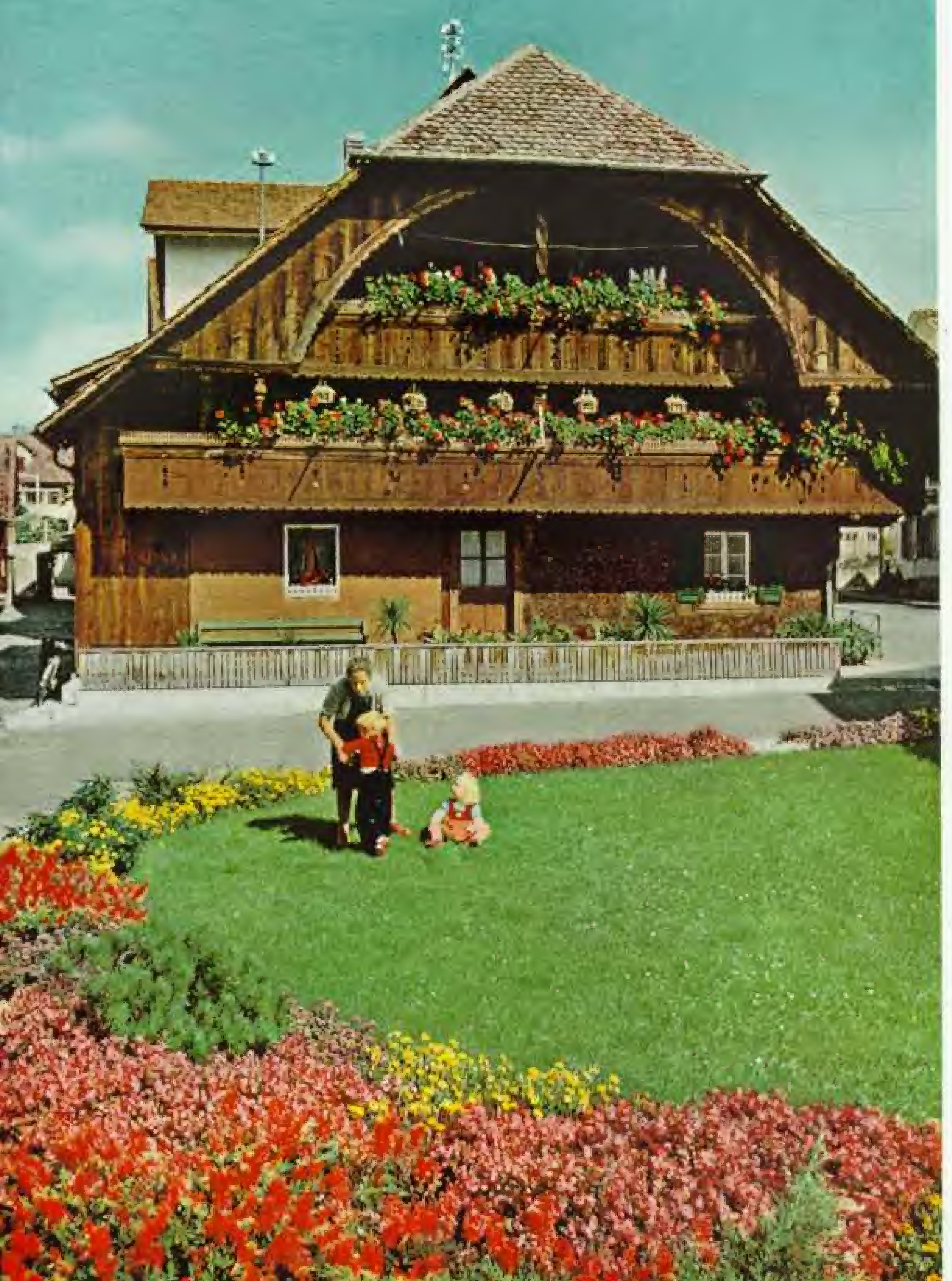
↑ American Cyclists Admire a Fountain in Lucerne

←Page 468 upper: Zürich youngster on a parapet of the Quai-Brücke baits his hook to test the waters of the Limmat River, which flows out of the Lake of Zürich. Arches of the Münster Bridge rise downstream. Highest steeple on left belongs to the Fraumünster, built in the 13th century.

←With his wife and children, farmer Hans Thierstein enjoys Sunday dinner in the Canton of Bern. Once a week the nine youngsters put on Bernese costumes for a four-mile walk to church and back. Father has now asked grace, allowing each member of the family to add his prayer. With lusty appetites, the Thiersteins attack beef broth, beef, greens, boiled potatoes, bread, and cheese.

© National Geographic Society

Kodachrome (above) by Kip Ross, National Geographic Staff



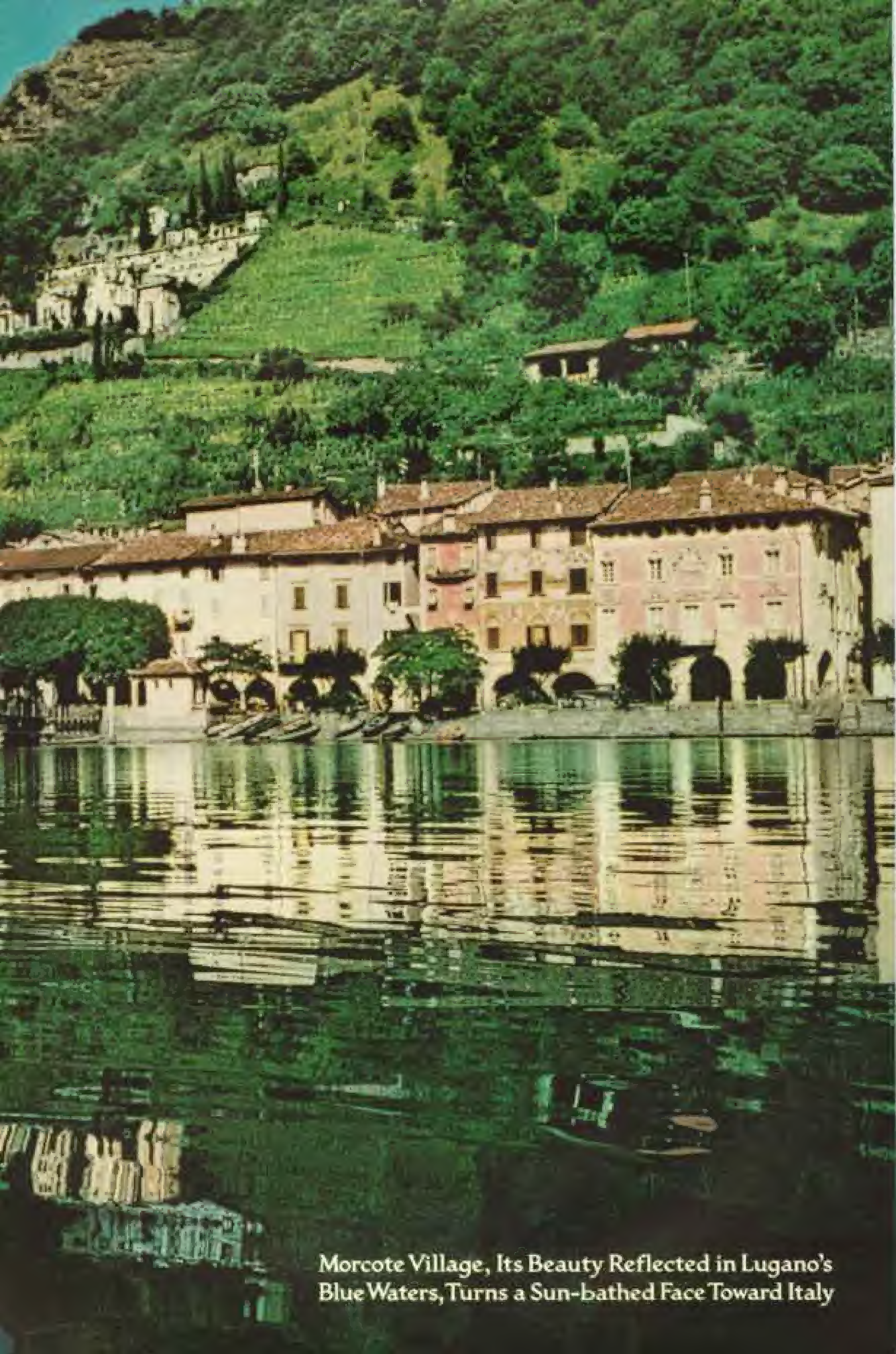
© National Geographic Society

Overhanging Eaves Shelter Flower-laden Window Boxes in Steffisburg

Severe winters plague the Canton of Bern, but summer's bright sunshine and frequent rains produce a profusion of flowers. This weathered house is typical of the Emmental region. Steffisburg village makes pottery.

"Imagine Someone Wanting to Photograph *Our* House! It's Just Like Any Other"

These three youngsters could not understand why the authors were interested in their petunia- and geranium-decked front porch. They live near Bowil, about 12 miles southeast of Bern.



Morcote Village, Its Beauty Reflected in Lugano's Blue Waters, Turns a Sun-bathed Face Toward Italy

© National Geographic Society

Gandria, on Lugano, Speaks and Looks Italian. Even Olive Trees Seem to Say "Italy"

a tour of the vineyards; so we drove southwest from Bern toward Montreux, stopping for a visit to the Nestlé chocolate plant at Broc. There, as in many Swiss factories, we were astonished at the careful control of each phase of manufacture and at the small batches in which the product was made.

"I don't use better ingredients in my own kitchen," Jean said. "Whole nuts, fresh cherries, the finest sugar—and some of their cooking vessels aren't much bigger than mine."

We were offered numerous opportunities to taste as we went along. Neither of us cared for any dinner that night.

Montreux is an island of tourism surrounded by a sea of vineyards. The grape picking was just beginning, and Jaussi escorted us to a chateau owned by a friend of his, where operations were in full swing.

Men and women picked together on the steep slopes, dropping the ripe clusters into tall wooden tubs where men crushed the fruit with heavy paddles. Occasionally one of the male pickers would give an odd little yelp, seize a girl, and kiss her.

"If a girl misses a bunch and a man finds it, that's his reward," Jaussi explained. "I'm not sure it's always accidental."

Jaussi is fond of good food and an expert on Swiss specialties. One of his favorites, he told us, was a dish called *raclette*.

"You can get it in restaurants," he said, "but to enjoy it properly you should eat it in a typical Swiss home. Tomorrow we'll drive to Chamoson and eat with an old friend of mine."

Voting Relatives Elect a President

Chamoson sits a mile off the main road to Sion, and the narrow lane winds between solid fields of vines. Julien Carrupt, our host, is a wine wholesaler. He is also president of the village.

We congratulated him on being so honored by his fellow townsmen, but he laughingly disclaimed credit. "It isn't hard for me to get elected," he explained. "There are 36 Carrupts on the voting rolls here."

Carrupt took us on a tour of the village, pointing with particular pride to a new pumping plant that enables the vine growers to irrigate their thirsty crops.

Each field is allowed only three sprayings during the growing season, he told us. The schedule is determined by lot before the season begins.

"The man who gets his water on a day when it rains is out of luck," the village president added. "Last year that happened to me on two of my three days."

Back in his home our host took us to his cellar. The cool, dark room was lined with huge oaken barrels, dark with age. In tiny glasses he offered us sips of half a dozen vintages and asked us to name our favorite. When we chose a very dry and light white wine he was delighted.

"That's a Petite Arvine, one of the specialties of my own vineyards," he beamed. "We can't grow enough to meet the demand."

Women and Children Serve Their Men

Upstairs in a pleasant paneled room we met Mrs. Carrupt and the family's grown son and his wife, and then the three of them withdrew to the kitchen.

"This is an old-fashioned family," Mr. Jaussi explained. "The women and children serve when father has guests. They'll eat later."

I found it an interesting custom, but Jean, already incensed by the fact that women have no vote in Switzerland, was indignant. Not so indignant, however, as to lose her appetite for the raclette.

Mrs. Carrupt placed an electric heater on the sideboard. Facing it, upright in a wire rack, was a blackened, well-aged cheese. In a minute the face of the cheese began to melt, and Mrs. Carrupt deftly scraped a large dollop onto a plate, placed a boiled potato beside it, and put it before Jean.

"Sprinkle it with pepper and try to eat all the cheese in one bite," Jaussi instructed.

Jean did her best, but the fluid cheese wouldn't remain on her fork. She made it in two gulps.

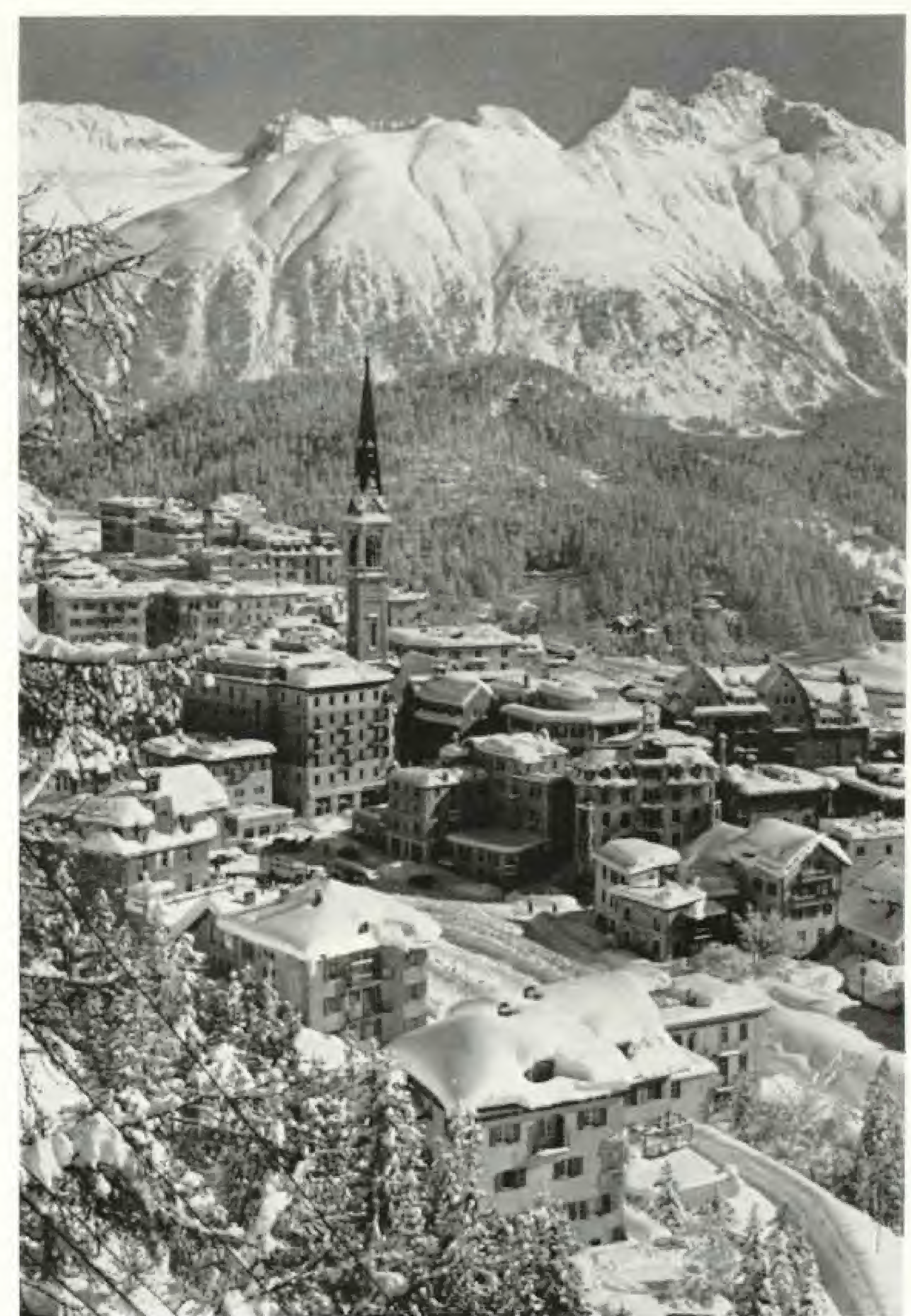
"Don't worry," laughed Jaussi, deftly twirling his fork in his own portion and carrying it intact to his mouth. "After half a dozen portions you'll get the knack."

"I could never eat that much," Jean protested.

"Sure you will," said our friend. "I've seen people at this table put away twenty-one servings."

We were no threat to that record, but we did manage seven portions apiece. And we mastered the technique of lifting a three-inch puddle of melted cheese in a single forkful.

When we left, Mr. Carrupt insisted we take with us a bottle of his precious Petite



Arvine and a five-pound wedge of premium cheese.

"That's Sbrinz," he said, "and you probably can't buy it in America. Invite your friends in some night and give them a real Swiss meal."

I plan to do that, too. Just as soon as I can get Jean to agree to serve while my friends and I sit at the table!

In the bright sunshine of early autumn we ranged Switzerland from end to end. We visited Basel, serene above the Rhine in the northwest, and the textile town of St. Gallen in the northeast. We wandered through the venerable streets of Stein-am-Rhein, where the walls of buildings are painted with historic scenes. We drove through St. Moritz, quiet in its between-season lull. We sailed on beautiful Lake of Lucerne and attended village festivals in every part of the country.

Not Enough Holidays to Go Around

"The Swiss love festivals," a friend told us. "Our trouble is we have so many we don't have enough holidays to go around!"

Most of our travels were by car, but frequently we used the extensive network of the Swiss Federal Railways. Swiss trains are famed throughout Europe for comfort and punctuality, and a special holiday ticket gives the visitor a lot of mileage for very few francs.

Everywhere we went there was an air of peace and prosperity. When we returned to Zürich, we called on Mr. Paul Hugle, assistant manager of the Swiss Credit Bank, one of the nation's largest, to find out why the tiny country does so well.

"Our economy is generally very sound right now," Mr. Hugle agreed. "The national income in 1954 was 22 billion francs—about 5 billion dollars. That was a nearly 45 percent increase over 1945.

"The building industry is booming like your own in the United States. Our banks loan as much as 60 percent of the value of a new house at only 3½ percent interest. I think that is about the lowest mortgage rate in the world."

Tourism, Mr. Hugle told us, plays a smaller part in the national wealth than most foreigners realize. Fewer than 100,000 Swiss are year-round employees of the hotel trade—less than 2 percent of the population.

"The income is important, though," he added. "Foreign tourists spent more than $200,000,000 here in 1954, and the Swiss probably spent at least as much. We're great travelers, and we like to see our own country."

"Since World War II we have invested about a billion dollars in foreign countries," he estimated. "And

Snow Caps the Roofs of St. Moritz

Four or five months of dry, thawless winter make the town a ranking winter-sports centre. Here in the 1800's the original deep-walled, high-speed toboggan run took shape for the first racing bobsled. St. Moritz also cradled skiing as a sport.

Towered Palace Hotel (right) borders snow-covered Lake of St. Moritz, where horses often race on ice.

© Andreas Pedrett

Capuchin Nuns Labor in Hay Fields to Sustain Lives Dedicated to Prayer

Sisters of the Wonnenstein Cloister near Teufen live in a timeless world patterned during the Middle Ages. Italian wine bottles serve as their water jugs. Framework at left will support a haystack.

in 1954 our net income from foreign investments was more than $100,000,000. The largest single investment was in shares of United States companies.

"I believe Switzerland has extended more credit abroad per head of population than any other country in the world.

Swiss Confident of the Future

"We have more savings accounts than we have people, and a lot of foreigners keep money here. They know the Swiss franc is one of the world's soundest currencies."

Mr. Hugle sees no reason to worry about the future.

"Our strength lies in the quality of our products, the beauty of our country, and the excellent relations between workers and employers. As long as we keep manufacturing costs within reason, we will be prosperous."

I hope so. Since the three forest communities of Uri, Schwyz, and the lower valley of the Unterwalden signed their "covenant of perpetual alliance" on August 1, 1291, the Swiss have shown incredible courage and an unflagging determination in their pursuit of peace and prosperity. They have become more than a nation; they have become a symbol. Where they have led, other nations may follow.

Back to the Historic Black Hills

The Old West Rubs Elbows with the New in a Frontier Vacationland Rich with Memories of Indians, Covered Wagons, and Gold Fever

By Leland D. Case

With Illustrations by National Geographic Photographer Bates Littlehales

"SO you're going to the Black Hills of South Dakota!"

Delight shone in the lady's eyes, and there was a trill in her voice.

"Jim and I just discovered them, and we're going back next summer. Real mountains, only 900 miles from our home here in Chicago! They're not black, but green, like an emerald on the prairie. They're big, but so beautiful they don't overpower my ego. Have you ever seen them?"

Had I, indeed! I grew up in the Black Hills.

"To the Sioux they were *Paha Sapa*, literally 'Hills Black,'" I said. "And they *are* mountains. Harney Peak rises 7,242 feet above sea level."

Friendly Hills, Exciting History

Half an hour later I was still talking, in fancy at Red Canyon digging for a gold brick stolen by Big Nose George from the Deadwood stagecoach, when a glance from my wife speeded up my tale.

Black Hillers are that way, I fear. Our conversational brakes grip lightly when we talk about our friendly Hills. And we like to tell of that new arrival in heaven who was perturbed to see some people in shackles.

"Oh, they're from the Black Hills," explained St. Peter. "If we don't keep 'em chained, they'll head for home."

Vacationers, too, feel the spell of these mountains on the prairie and want to return. That Chicago couple was typical.

So was Calvin Coolidge. In the Black Hills he learned to grin under a 10-gallon hat—and to play. It was here, in his Summer White House, that he made history in 1927 by announcing, "I do not choose to run." The Black Hills reminded him of his boyhood in the Green Mountains of Vermont, and shortly before his death he was planning to return.

I wasn't surprised, therefore, at what happened to Bates Littlehales, the National Geographic photographer assigned to make color pictures for this article.

I met Bates at Sturgis one mellow June afternoon. In our motel cabin that evening he was twanging his guitar and trying a new cowboy song, when he suddenly stopped.

"Already I've seen enough of your Black Hills to know one thing," he declared. "Tonight I write my family back in Washington that they must see them too. If not this summer, then the next."

"Not very original," I bantered, "but you're in good company. Listen to what Gen. George A. Custer wrote to his beautiful wife when he was here in 1874."

I dug from my bag a book, *Boots and Saddles*, by Elizabeth B. Custer, and read:

"It would have been such a treat to have had you see all that we have seen this summer, and shared the enjoyment of this beautiful land. But, never mind, you shall come next summer, for we all hope to return . . ."

"To clinch the coincidence for you," I went on, "Custer was within sight of Bear Butte when he wrote the letter, and that's where we're going tomorrow."

Upside-down Ice-cream Cone

Bear Butte still looked precisely as it did to me as a youngster—like an upside-down ice-cream cone. Towering 1,400 feet above the prairie just east of the Hills' outer escarpment, it is as dramatic a landmark for tourists today as it was in years past for Indians, trappers, explorers, soldiers, prospectors, and homesteaders (map, page 485).*

Geologists admire Bear Butte too; they cite it as a classic laccolith. In layman's language, this means a volcano that didn't quite make it. Eons ago internal pressures found a weak spot in the earth's skin and squished up this blob of lava.

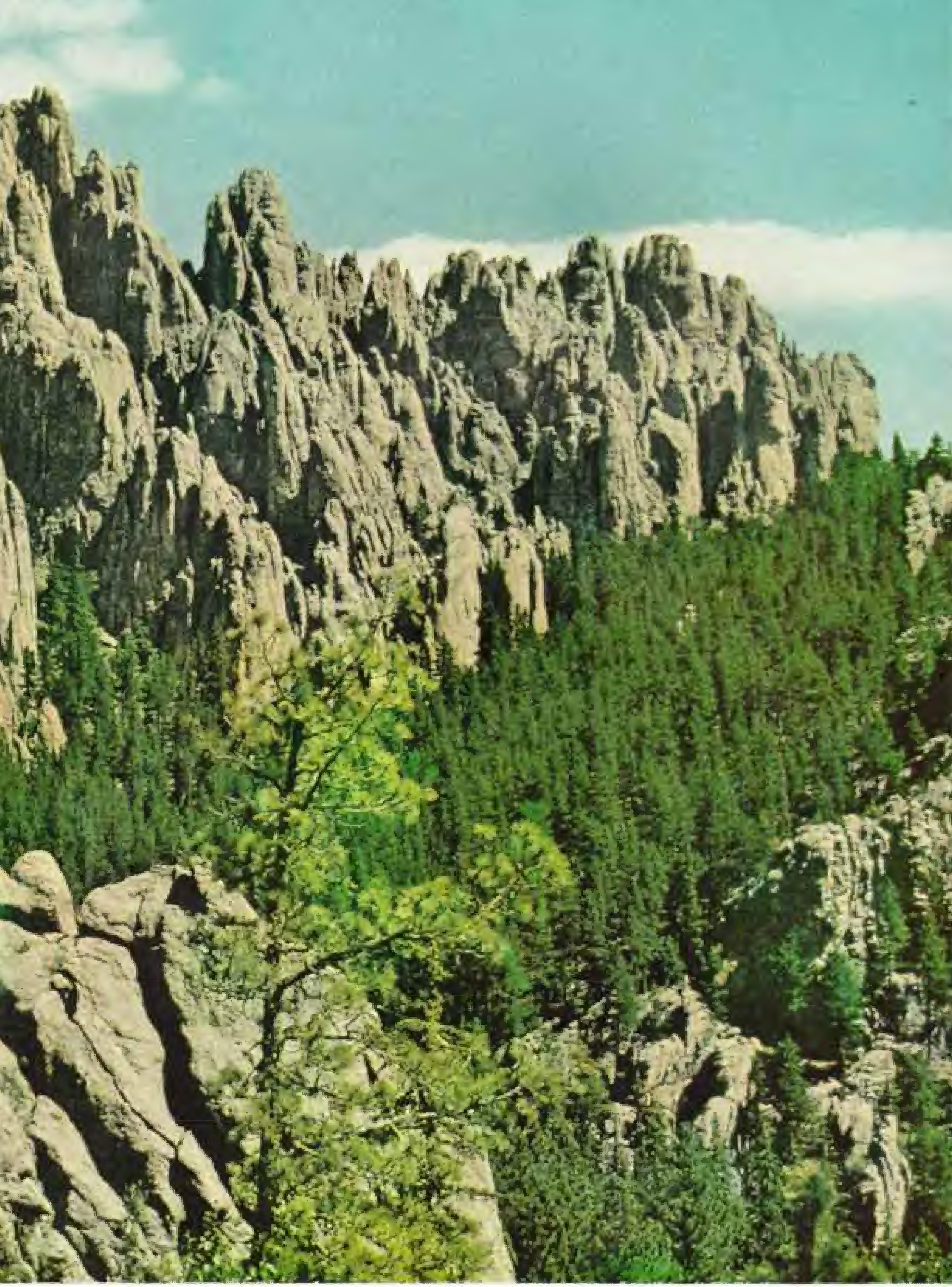
Erosion laid bare the butte, now decorated with ponderosa pines. We could hear winds soughing through them as Sumner Bovee cinched saddles and we climbed aboard his stumbleproof burros.

* See "South Dakota Keeps Its West Wild," by Frederick Simpich, National Geographic Magazine, May, 1947.

© National Geographic Society

Sky-lancing Cathedral Spires, a Sanctuary of Granite in South Dakota's Black Hills . . .

In Custer State Park rock climbers find a challenging playground among more than 100 spiny summits. This red-shirted leader explores a route up Rubaiyat Spire; his companion belays a rope for safety.



. . . Are Gaunt Ribs of a Vast Dome Wasted Away by Millenniums of Weathering

Some 500 million years ago fingers of molten rock penetrated deep shales and sandstones, then hardened into granite. Later, when the area rose in a bulge, wind and water eroded the softer rocks.

Halfway up we stopped at "Chimney Rock," a natural fireplace and flue still stained by Indian soot. I could almost see a breechclouted redskin on top shaking a buffalo skin to billow out smoky dots and dashes.

Crossing a wind-whipped ridge, we searched for a prospector's tunnel where Sumner's brother Amos and I once staked claim to fame. We had heard the tale that young George Washington carved his initials on the Natural Bridge of Virginia; so in a deep recess we left ours. But *sic transit gloria*, the tunnel had caved in.

Our burros zigzagged back to the trail. The top lap is too steep even for them, but the view repays the scramble on foot.

We were 4,426 feet above sea level. To the east ruffled prairies unrolled like a map. Broad green bands lined forks of the Cheyenne River, which bracket the Hills and then mingle on their way to the Missouri. Far southeast we saw the Badlands, their sculptured castles and cathedrals in the soft focus of haze. To the southwest rose the Black Hills in heaped green windrows.

Fables Tell of Hills' Creation

There's a legend that Paul Bunyan made these mountains in the Winter of the Blue Snow. That winter his crew ate so many flapjacks he had boys with slabs of bacon strapped to their feet skating on the griddle to keep it greased. One day Babe, his fabulous blue ox, gulped down the flapjacks and red-hot griddle, then died of heartburn.

Paul scraped a sizable mound of dirt and rocks over the remains. Later, rains plowed out gullies that grew into gulches, then birds and chipmunks seeded them. And so the Black Hills were made.

Indians have other versions.

One says the Great Spirit stood on Bear Butte, where we were resting, and in a voice heard for miles spoke to tribal chiefs squatting on buffalo skins below. These hills were holy, he said. In them he had scattered shining stones colored like the rainbow. Souls of brave warriors could see them after death to prepare their eyes for splendors of the happy hunting grounds. Living Indians might come to the foothills for tepee poles or to hunt. But if they stayed, they would be destroyed by the capricious *wakan*, or spirit, that no sacrifice or dance could placate; lightning.

Until recent years no Indians are known to have dwelt deep in the Hills. But below, where the chiefs sat and heard the Great Spirit's words, we found tepee rings—circles of rocks that once held down buffalo-skin tents.

To the Cheyennes Bear Butte is still a shrine. They lived in the vicinity until the time of the American Revolution, when the Teton Sioux, jostled by eastern tribes that had guns, began to bump them west.

Indian Rain Makers Visit Black Hills

"Cheyennes come every summer from Montana, sometimes from Oklahoma," Sumner told us. "They fast and pray. Usually it's for rain. Believe it or not, when they do, we seem to get rain!"

Earlier Indians guided François and Louis-Joseph de la Vérendrye out here in 1743 in their search for a new route to the spice and silk isles. Possibly they scaled Bear Butte before turning back. Under a rock cairn along the Missouri, 150 miles east, they buried a stamped lead plate claiming the region for Louis XV.

That bit of metal is today a prized possession of the State Historical Society at Pierre, South Dakota's capital, within sight of the hill where, in 1913, school children kicked it up. Adults dissuaded them just in time from offering it as junk for a nickel.

American history could have been drastically changed here on old Bear Butte, I mused, as we remounted our burros. If those Vérendrye brothers had pushed into the Hills, if they had found gold, if Frenchmen had poured into this region before the American Revolution—well, whose flag would fly here now?

Page 483

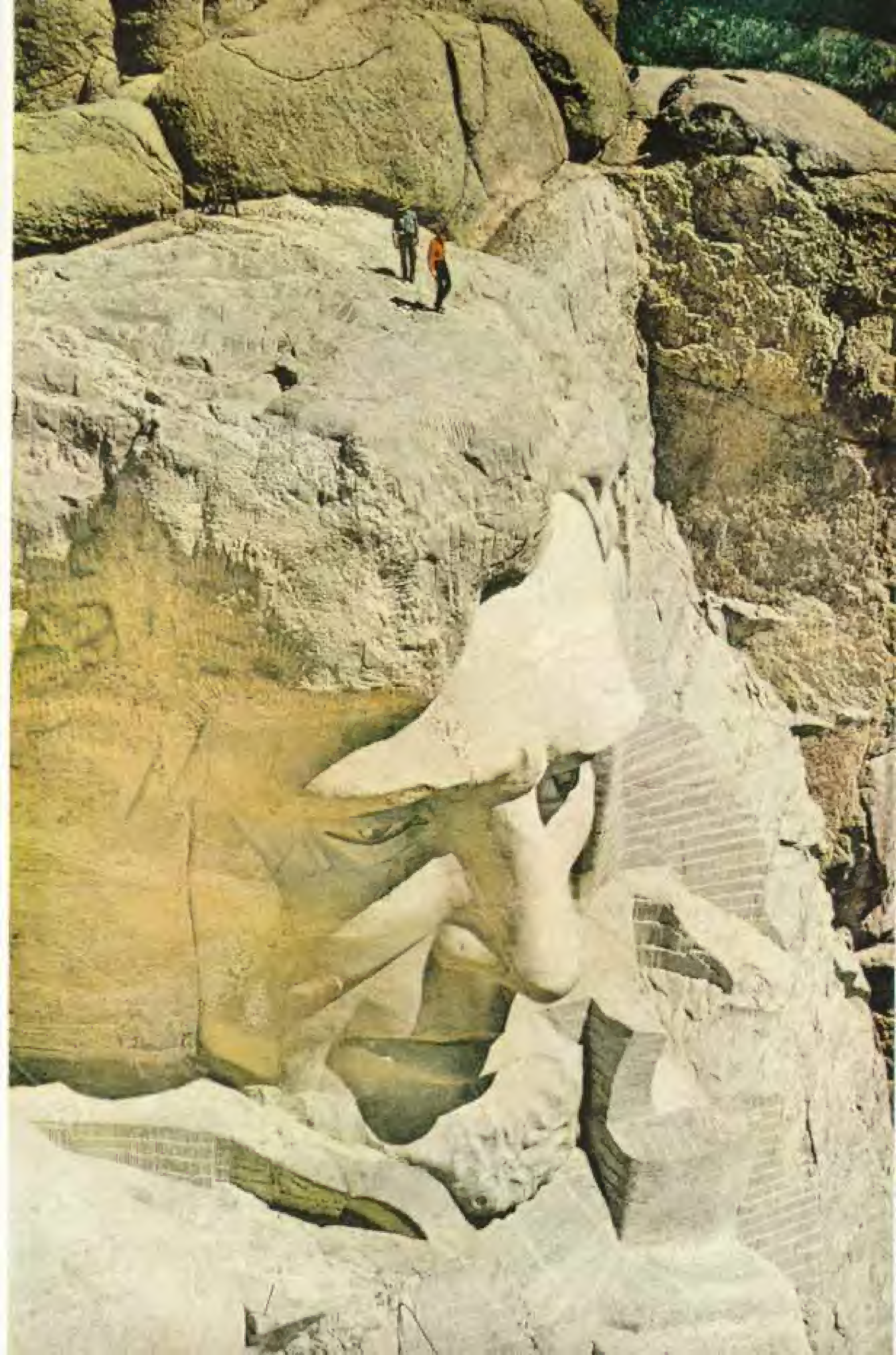
Abraham Lincoln Faces the Ages atop Mount Rushmore →

"I want somewhere in America," sculptor Gutzon Borglum wrote, "a few feet of stone that bears witness [to] the great things we accomplished as a nation, placed so high it won't pay to pull it down for lesser purposes . . . carved . . . as close to heaven as we can."

In 14 years of work Borglum created colossal likenesses in living granite of Presidents Washington, Jefferson, Theodore Roosevelt, and Lincoln. Here the face of Lincoln stretches 60 feet from hairline to chin. The nose alone is longer than the entire face of Egypt's Sphinx.

Borglum's workers first roughed out the head with dynamite, then shaped it with air drills that left the slash marks on hair and surrounding stone. Pneumatic chisels smoothed the face.

© National Geographic Society



But fate reserved the gold discovery role for Custer. With more than a thousand men he sliced like a cleaver through the heart of the then mysterious Black Hills (page 501). That was in 1874, a year so epochal that all prior events here could well be dated B.C.—"Before Custer."

"We're where Custer started back out of the Hills to Fort Abraham Lincoln in North Dakota," I reminded Bates. "Now let's swing around the northern Hills to where he entered from the west. On top of Inyan Kara Mountain, Bear Butte's counterpart on the Wyoming side, is a rock on which he chiseled 'G.A.C. 74.' It might make a picture."

I had never seen the rock myself—just knew about it from an explorer's report. But Pete Smith, a cattleman, had told me he would help us look for it.

Search for Custer's Mark

We found Pete, who stands six-feet-seven, and his Norwegian-born wife at their Ranch A on Sand Creek (pages 502-3). Only a stream in Switzerland has superior trout fishing, some angling authorities say.

Senator John Bricker of Ohio once landed a 14-pound rainbow here. A platter heaped with its younger cousins, hot and crisp, fortified us for Inyan Kara. We were rolling at 7 a.m., our expedition augmented by Jess Driskill, a young rancher, and two decorative coeds from the University of Wyoming, who were waiting table at the lodge. Our saddle horses rode ahead in a rumbling truck.

Inyan Kara is strange. Shaped like a horseshoe, it encloses another timbered mountain. No trail leads to its summit; so we found our own zigzag route up the side. A drizzle began as we mounted. It proved a bad omen, alas, for after a rugged ride and a scramble we found no rock carved "G.A.C. 74."

Our disappointment was relieved by Carl Wiehe, an old friend at the town named for Custer, deep in the Hills.

"We got a Custer marking right near here," he confided. "We don't show it to many. But jump in my bus and I'll take you to it."

It had been discovered some years before, he explained, by the Reverend Carl H. Loocke, who was taking pictures at French Creek, near the site where gold was first panned. On a granite outcropping he spotted the legend "G.C. U.S. 74." imbedded in lichen.

When Bates saw it, he beamed. Planting his tripod on the very edge of the sheer granite cliff, he squinted into his Leica view-finder. Suddenly a rocky knuckle gave way under his feet. For seconds that seemed longer than minutes, he teetered. My stomach did a falling leaf. Finally Bates snared a bush overhead.

"Whew!" I exploded. But Bates grinned. "All in the day's work," he said, and coolly clicked the camera.

Below us, in a meadow beside Stockade Lake, a rebuilt stockade and a monument remind visitors of the women who helped civilize the West—in this case one Anna D. Tallent. When news of Custer's discovery of gold reached Sioux City, Iowa, in 1874, Anna's husband joined a party of prospectors. She and her nine-year-old son went along.

A "lady," as the West understood the term, Mrs. Tallent could take it. When her shoes gave out, she trudged along in gunny-sack pacs, cheering the men and nursing those who sickened. She shed tears of loneliness where no one saw her, and for comfort she read and reread Milton's *Paradise Lost*.

When troopers flushed out the party in the spring—for the Hills were Sioux lands until 1877—she rode out on a Government mule with her chin up. Later she returned, taught school, was active in the Episcopal Church, and with delightful whimsey wrote a book on the changes her eyes had seen in this land.

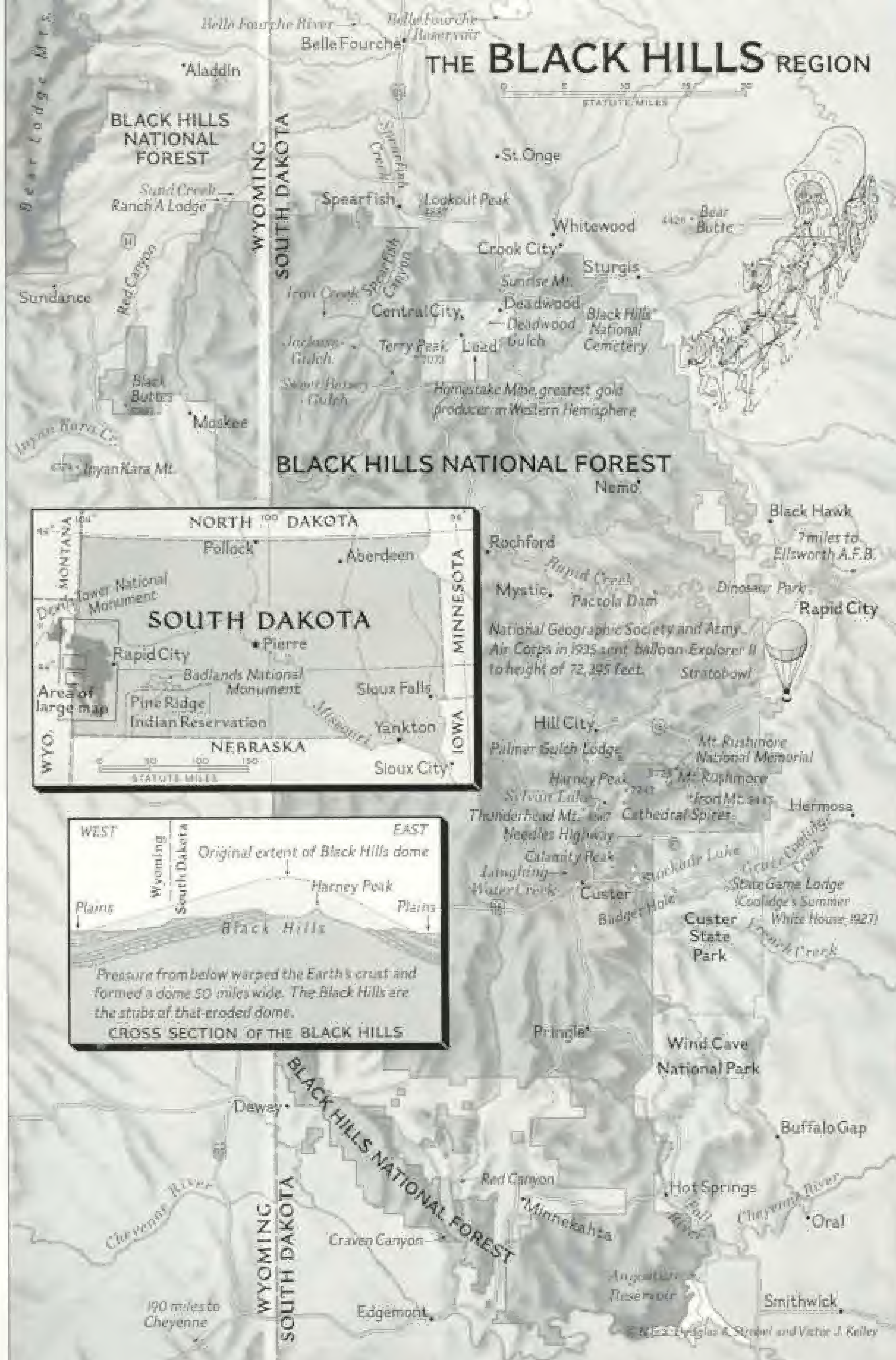
Calamity Jane Goes to Church

Just back of the stockade a bald bulge of granite recalls Calamity Jane, quite a different sort. Calamity Peak it is called, because Jane, they say, wearing rubber-soled shoes, was first to climb it.

Born Martha Jane Canary in Illinois, or perhaps Missouri, and orphaned early, Calamity Jane was a chip on the choppy tide that swept through the army and mining camps. An efficient bullwhacker, she possessed a vocabulary rich in ecclesiastical terms used in an unecclesiastical way.

But she did nurse miners stricken with smallpox, and that's what Deadwood remembered in 1903 when she died lonely and penniless. A few old-timers called on the Methodist preacher, the Reverend C. B. Clark, to ask if he'd say a few words. The funeral was to be at the city hall. No church, they said, would want Calamity.

"She won't damage my church a bit," said the parson. "You bring her up the hill."


THE BLACK HILLS REGION
STATUTE MILES
BLACK HILLS NATIONAL FOREST
Belle Fourche River
Belle Fourche
Belle Fourche Reservoir
Aladdin
St. Onge
Spearfish
Lookout Peak
Whitewood
Bear Butte
Crook City
Sturgis
Sundance
Red Canyon
Spearfish Canyon
Central City
Deadwood
Deadwood Gulch
Black Hills National Cemetery
Lead
Terry Peak
Homestake Mine, greatest gold producer in Western Hemisphere
Moskee
Inyan Kara Mt.
BLACK HILLS NATIONAL FOREST
Nemo
Black Hawk
Rochford
Mystic
Pactola Dam
Dinosaur Park
Rapid City
National Geographic Society and Army Air Corps in 1935 sent balloon Explorer II to height of 72,395 feet.
Stratobowl
Hill City
Palmer Gulch Lodge
Mt. Rushmore National Memorial
Harney Peak
Mt. Rushmore
Sylvan Lake
Hermosa
Thunderhead Mt.
Cathedral Spires
Needles Highway
Calamity Peak
Custer
State Game Lodge (Coolidge's Summer White House, 1927)
Custer State Park
Pringle
Wind Cave National Park
Dewey
BLACK HILLS NATIONAL FOREST
Buffalo Gap
Red Canyon
Hot Springs
Minnekahta
Cheyenne River
Oral
Craven Canyon
Smithwick
190 miles to Cheyenne
Edgemont
WYOMING
SOUTH DAKOTA
NORTH DAKOTA
MONTANA
MINNESOTA
SOUTH DAKOTA
Pollock
Aberdeen
Devils Tower National Monument
Pierre
Rapid City
Badlands National Monument
Sioux Falls
Area of large map
Pine Ridge Indian Reservation
Yankton
NEBRASKA
IOWA
WYO.
Sioux City
WEST
EAST
Original extent of Black Hills dome
Harney Peak
Plains
Black Hills
Pressure from below warped the Earth's crust and formed a dome 50 miles wide. The Black Hills are the stubs of that eroded dome.
CROSS SECTION OF THE BLACK HILLS
N.G.S. Douglas A. Strobel and Victor J. Kelley

← Blast of Dynamite Spews Dust at the Site of a Gigantic Memorial to the American Indian

The Black Hills belonged by treaty to the Teton Sioux. But with the discovery of gold on French Creek in 1874, the white man surged in. Indians took to the warpath under Crazy Horse and other Sioux leaders, wiping out Gen. George A. Custer and 241 men at the Battle of the Little Bighorn.

In 1949 sculptor Korczak Ziolkowski began blasting a 563-foot statue of Crazy Horse from the granite of Thunderhead Mountain. These visitors watch the work from the artist's porch. A model of the statue shows how the mountain may eventually look.

Crazy Horse's head (right) is a wood carving.

← Page 486, lower: Shortly before his death war-bonneted Iron Hail, or Dewey Beard, one of the last survivors of the Sioux who fought at the Little Bighorn, described the battle for author Leland Case. Mrs. Beard and John Brugulier (right), onetime Army scout, interpret.

↓ According to the sculptor, the model illustrates Crazy Horse's words, "My lands are where my dead lie buried."

© National Geographic Society

And that's how Calamity finally went to church.

At Calamity Jane's request she was laid beside Wild Bill Hickok in Mount Moriah Cemetery, overlooking Deadwood.

"Good thing Bill ain't alive," Seth Bullock, Deadwood's first sheriff, muttered aside to cronies as clods fell. "He wouldn't have stood for this!" For Wild Bill wore a Prince Albert and was of a different social caste.

Wild Bill, Prince of Pistoleers

Dead timber was still being cleared from the gulch in June, 1876, when Wild Bill, preceded by his fame for quick shooting in Kansas, rode into Lard Pail Billy Raddick's camp. Billy once told me how he cocked silver dollars on a stump 25 yards away and the "Prince of Pistoleers" hit them every time.

Crooked Nose Jack McCall won a sort of immortality because one day in No. 10 Saloon Wild Bill broke his own rule always to face the door while playing poker. Jack slipped up behind, pulled the trigger of his .45, and Wild Bill's handsome six-foot figure wilted.

McCall was later legally hanged over at Yankton, the territorial capital. But in tolerant Deadwood his extemporized plea that Wild Bill had shot his brother in Kansas won acquittal at a trial now re-enacted for the hilarious edification of tourists. They love it.

Tourists swarm up Mount Moriah, too, to poke cameras through the wire mesh enclosing the graves of Calamity, Wild Bill, and Potato Creek Johnny Perrett.

Visitors adored bewhiskered Potato Creek Johnny, who washed out a 7½-ounce nugget, largest ever found in the Hills. He stood a scant five feet, with spectacles forever sliding down his nose. Once, he told me, a college girl suspected his beard was false and gave it a two-handed yank—then colored crimson.

Only Statue's Feet Remain

Also on Mount Moriah sleeps Preacher Smith. So voracious have been souvenir hunters that only feet remain of the red sandstone statue of this first clergyman in the Hills. It was Sunday, August 20, 1876, after preaching in front of Bent & Deetken's Drugstore, that he tacked on his cabin door this note: "Gone to Crook City, and if God is willing, be back at 2 p.m."

Sioux, gloating over annihilation of Custer's command, were known to be skulking about. Friends urged Smith to carry a gun.

"No," he said, tapping his Bible, "this is my protection." He stuffed sermon notes in his pocket and strode off. His body was found, hands folded across his breast and still holding his Bible, which had saved him from scalping by the remorseful Sioux. Every August, Hills people hold memorial services near the scene of his martyrdom.

"Why isn't Deadwood Dick in Mount Moriah, too?" a Minnesotan asked, as we chatted with the caretaker. "Because," volunteered a native, "he isn't real."

That's a moot point. Dick began as a fiction of dime novelists. So prodigious was his legend, however, that in 1924, when the town of Deadwood started its "Days of '76" celebrations, there just had to be a Deadwood Dick. They picked Richard Clark, who used to sit and whittle across the street from where I worked on the *Lead Daily Call*.

Clark's weathered face and pruned mustache went well with buckskin, and from the highly publicized moment he climbed off a plane in Chicago he *was* Deadwood Dick to the world. Now he lies in a tomb blasted into Sunrise Mountain, embalmed in fame even the dime novelists couldn't conceive.

Gold Dust Used as Small Change

Society quickly stratified in rich, youthful Deadwood. Up on the hillsides perched elegant homes with square pianos and horsehair sofas, freighted in by ox trains.

Down in the gulch fringing the business section lay Chinatown and "The Badlands," where dance halls and gambling flourished on gold dust and cupidity. Some croupiers let their fingernails grow like claws, and others slept with a pea bound between thumb and forefinger to make a depression, all the better to get a bigger pinch of the yellow stuff as small change.

Guns and gowns and other mementos of the Hills' early days are displayed at the Adams Memorial Hall museum. None needles imagination more than a slice of yellow sandstone about eight inches square. Louis Thoen found it on Lookout Peak, near Spearfish, in 1887. As he rubbed the dirt away, he saw this scratched inscription:

> Came to these hills in 1833 seven of us DeLacompt Ezra Kind G W Wood T Brown R Kent Wm King Indian Crow all ded but me Ezra Kind—Killed by Ind beyond the high hill got our gold June 1834

On the reverse side, this:

> Got all of the gold we could carry our ponys all got by the Indians I hav lost my gun and nothing to eat and indians hunting me

"It's authentic, all right," I was assured by Frank Thomson, of Spearfish, who has spent years tracing and interviewing relatives of persons named. "Incidentally, the Indians must have got Ezra Kind too."

A curious legend links the Hills' gold rush of the 1870's with the earlier one to California. Among the 49'ers were goldsmiths. So grateful were they for the cool waters and green vineyards of the Sacramento Valley that they designed jewelry with a motif of grape leaves and tendrils. The pattern became traditional, and in 1878 it was brought to Deadwood by bearded S. T. Butler. Now, three generations later, goldsmith Frank Thorpe carries on along the same Main Street.

"Your mother taught you to wipe your feet on the doormat before you entered," he said with a grin as we went behind the showcases. "Here you do it when you leave."

It's because of the precious dust that falls to the floor as a score of girls at benches punch and file. Even cigarette ashes are saved, and traps in washbasins collect sediment.

"Twice a year we have a cleanup," Frank explained, "and recover a few thousand dollars' worth of gold."

The basic leaf-and-vine design continues, but red and green gold, made from copper and silver alloys, give the distinctive touch to Black Hills jewelry.

"How're things back in Deadwood?" a croupier at Las Vegas once asked without looking up from his chips. He had seen a Black Hills ring on a patron's finger.

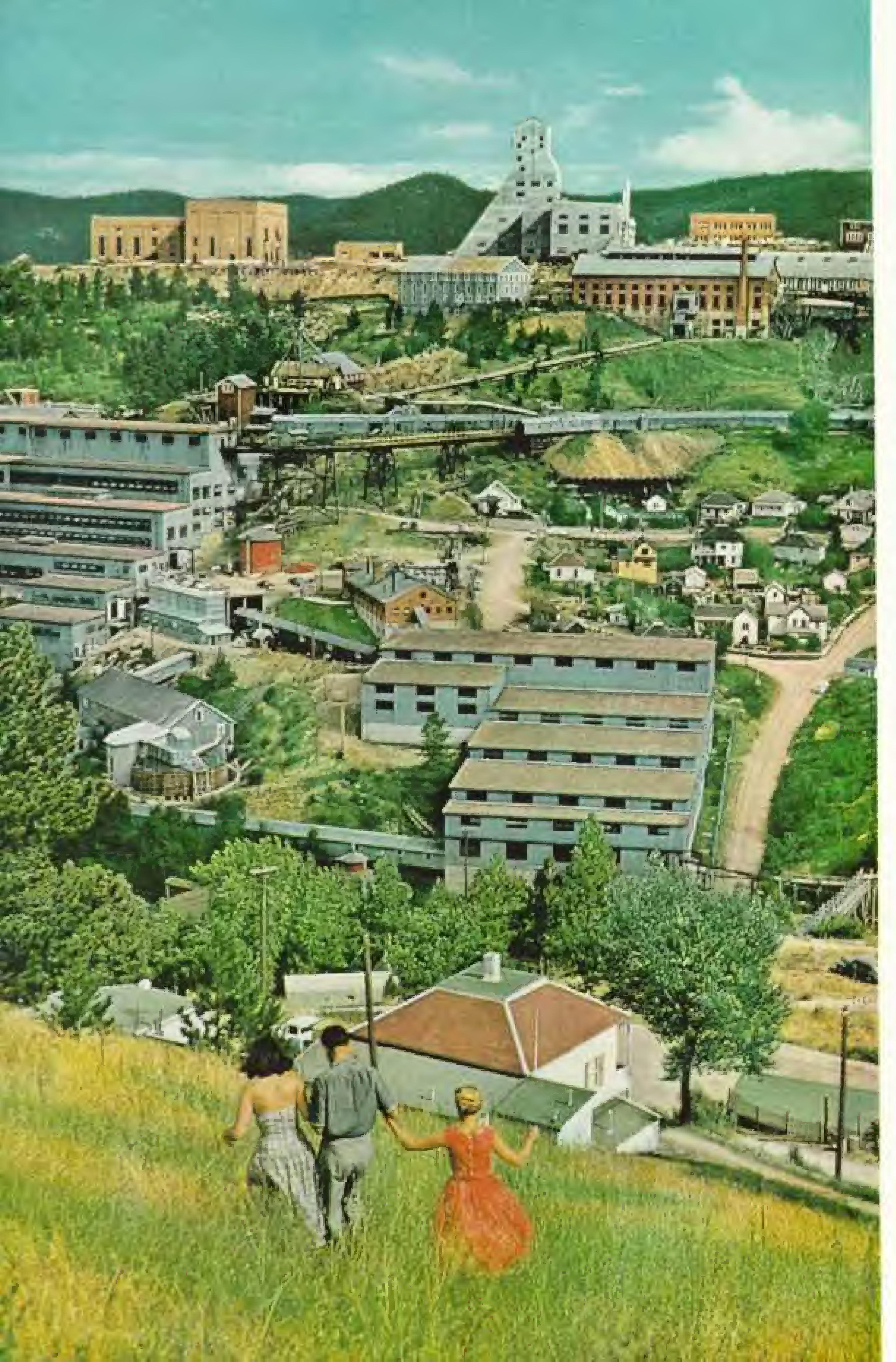
"Color" Remains in Black Hills Streams

Grizzled prospectors sluiced the nuggets and dust out of Deadwood Gulch long ago; the painstaking Chinese took what was left. But "color" is still there. At Central City we watched a giggling grandmother who stood knee-deep in the water panning traces of gold.

President Nets Trout in French Creek

Dwight D. Eisenhower fishes the stream in which gold was discovered in 1874. He spent a few relaxing days in the Black Hills in 1953.

Wide World Photos



Lead (pronounced *led*), three miles from Deadwood, is the place to see modern gold mining. We used to call it the "mile-high city," but "Leaders" now boast that it's a mile high, a mile wide, and a mile deep. Actually, the great Homestake mine runs even deeper than that. More than half a billion dollars' worth of gold has been pounded out of the "hard rock" here since 1878.

"But we have our problems," Kenneth Kellar, chief Homestake attorney, said. "Costs of labor and everything we buy have skyrocketed, while the price of the gold we sell has been fixed since 1934 at $35 an ounce."

College girls tell the Homestake story as they guide visitors through the surface workings. Only miners are permitted to enter the cages lowered by seemingly endless cables.

Visitors Pocket Broken Boot's Ore

Visitors get an idea of what goes on underground, however, at the reopened Broken Boot Mine on Deadwood's outskirts. Here they emerge from a tunnel with brown helmets on their heads, smears of graphite on their cheeks, and their pockets full of ore.

"We figure they tote out a hundred pounds of rock a day," said Allen Burke, who is a veteran hard-rocker and one of the guides. "That's O.K., though. We have plenty—and the more they take, the bigger our hole gets."

Visitors to the northern Hills who miss Spearfish Canyon cheat themselves outrageously. From the ski lift at Terry Peak they can get a rocking-chair view of this scenic fissure, with its sheer sandstone and limestone walls ranging from white to red and green.

As we loitered down riotous Spearfish Creek, fishermen were wading hip-deep, flinging their flies in graceful arcs. Children in sun suits played beside cabins half hidden by the bluish Black Hills spruce that nurserymen have popularized.* A towering 65-foot specimen, aged 65 years, was President Eisenhower's 1955 Christmas tree.

Sweet Betsey and Jackass Gulches tempted, but it was Iron Creek that lured us to detour up a valley laced like a shoe by old beaver dams. In a green meadow speckled with lupine and dandelions, we stopped at a deserted cabin of mud-chinked logs.

"Ah!" sighed a Princeton student who had thumbed a ride with us to the next fishing spot. "What a dream place to write the great American novel!"

Evidently someone before him had had a like idea. Inside were a rickety table, a footstool with frayed cotton padding, a heap of Bull Durham tobacco sacks, and a litter of typewritten paper. I picked up a sheet.

"This book," it started off, "was designed to instill peace, kindness, and understanding in peoples of all nations . . ."

Passion Play Moves to South Dakota

Spearfish Creek races spryly out of the canyon through the town of Spearfish, below the Black Hills Teachers College, and on to water a fertile valley that in May is scented with apple blossoms. Here in a natural amphitheater Josef Meier in 1938 found a New World home for what he offers as the world's oldest passion play, dating from 1242 at Lünen, Germany.

Meier is seventh of his name to play the Christus, and his nephew Heinrich is being groomed to succeed him. Professionals have leading roles, but local churches take turns supplying extras. A druggist's daughter is typical. She started at four as the Child and is now a woman in the Bethany scene.

Summer nights the great drama unfolds on a lighted stage almost three blocks long, running from Jerusalem's gates to Golgotha. So intense is the realism that audiences never applaud. When we chatted with Josef Meier after the performance, he still perspired from carrying the 160-pound cross, though it was a topcoat night.

North 14 miles, past Meier's white-fenced cattle ranch, sprawls Belle Fourche (locally pronounced *bell foosh*), proud of its tradition as a prairie cow town.

"We'd take skinny longhorns from Texas," an old-timer told me, "turn 'em on that buff'lo grass, and in six weeks every one of 'em was

Page 490

← Homestake's Mills Sit a Mile Above the New World's Richest Gold Lode

Two pick-and-shovel prospectors, the Manuel brothers, discovered gold here at Lead in 1876, but soon sold out to a California syndicate.

Except for shutdowns due to fire, labor trouble, and World War II, the mine has operated continuously since 1878, producing gold worth nearly $600,000,000.

Few Homestake miners ever see the metal they dig from the ground. Gold is so diffused in hard rock that a ton of ore yields only about enough for a wedding ring.

© National Geographic Society

* See "Wealth and Wonder of Northern State Trees," by William A. Dayton, NATIONAL GEOGRAPHIC MAGAZINE, November, 1955.

© National Geographic Society

Man-made Brontosaur Surveys the Land That Heard the Thunder of Its Walk

Some 135,000,000 years ago the original grew 80 feet long and 40 tons heavy. Simple peg teeth were all it needed for a vegetable diet. This replica can be seen for 10 miles.

Horseback Riders Meet the Life-size Monster in Dinosaur Park near Rapid City

Sculptor Emmett A. Sullivan constructed the extinct reptile and four of its contemporaries in the mid-1930's. Steel tubing forms the bones; steel mesh and concrete, the body.

H. Lee Wells, Jr.

Explorer II Strains at Its Leashes. Minutes Later It Headed for the Stratosphere

On Armistice Day, 1935, Captains Orvil A. Anderson and Albert W. Stevens cast off from the Stratobowl near Rapid City, South Dakota. Their helium-filled balloon rose 72,395 feet above sea level, still the record altitude for a manned balloon. For an hour and forty minutes it dangled more than 13 miles above the earth, man's longest stay at such a height. Flight sponsors were the National Geographic Society and the United States Army Air Corps.

so fat they had double chins and dimples in their knees."

For fun the cowboys used to show off in town, riding and roping as they did on round-ups. That's how, in 1918, the annual Black Hills Round-up started (page 505).

R. L. Bronson, who was managing the Round-up in 1927, dreamed of Calvin and Mrs. Coolidge as honor guests on July Fourth. Bronson presented his invitation to the President at the Summer White House in Custer State Park and waited breathlessly.

"Mister Bronson," Coolidge finally said with New England deliberateness, "you will have one big day on July Fourth anyway. Suppose I come on the fifth. Then you will have two big days."

Belle Fourche thrives as biggest of the "dam towns" in the sugar-beet area irrigated from Belle Fourche Reservoir, but it has discovered another bonanza in the soil. It's bentonite, a clay that has uses ranging from cosmetics to steel-making.

Where a World's Altitude Record Was Made

Swinging down the eastern rim of the Hills, past Sturgis again and the Black Hills National Cemetery, the "Arlington of the West," we reached Rapid City just in time. At Ellsworth Air Force Base, the Singing Tribe of Wahoo was to make "wahoopee."

Wahoos are businessmen and their wives who dress up as Indians in seriocomic ceremonials and, with a real Sioux to speak the language, induct visitors into their tribe as "chiefs." I had once been dubbed "Comes Back Laughing," so I could sit this one out.

"Shoots At" was the name Bates got from Chief Hot Water, who in real life is Web Hill, a ladies' wear merchant.

Web's wife is a daughter of the late Maj. "Long John" Brennan, one of the pioneers who, with a pocket compass, laid out Rapid City in 1876. It grew quickly into a robust cowboy town. My friend Sam Porter's father used to buy plate-glass mirrors half a dozen at a time for his bar, and he put sheet iron under beds upstairs to stop wayward bullets.

When the 11-story Alex Johnson Hotel was built, it loomed like the Washington Monument. But Long John's prophecy that Rapid would become the "Denver of the Hills" has come true. Today Rapid is busting its buttons, and Ellsworth Air Force Base near by roars with activity as Uncle Sam's biggest bombers and speediest jets land and take off.

Government interest in the aviation possibilities of the region zoomed when, on Armistice Day in 1935, *Explorer II* made aeronautical history. That great balloon, launched under auspices of the Army Air Corps and the National Geographic Society, soared to a record-breaking 72,395 feet.*

"That stratosphere flight of *Explorer II*," Thomas W. McKnew, Vice-President and Secretary of The Society, said at the 20th anniversary celebration of the event last November, "has assumed greater proportions in the intervening years than we dreamed of at the time. Scientific records obtained have been useful in ways that even today cannot be discussed."

Stratobowl, the circular valley from which *Explorer II* was launched, has become a popular stopover spot for tourists en route to the West's most famous sculpture, Mount Rushmore National Memorial.

The memorial was conceived in the poetic mind of state historian Doane Robinson, but it was the genius and pertinacity of sculptor Gutzon Borglum that blasted and tooled this granite Gibraltar into likenesses of Washington, Jefferson, Theodore Roosevelt, and Lincoln (pages 483 and 496).

Last summer alone, almost a million persons stood awed before this shrine and listened to its story from National Park Service rangers. If the busts were full figures, they would be statues 465 feet tall. Iron Mountain road, where the heads are framed by three successive tunnels, provides the favorite views.

Longer Nose Adds Million Years

When someone asked how long the heads would last, Borglum chuckled: "When I learned that this granite erodes perhaps an inch in 100,000 years, I added a foot to Washington's nose. Nobody could tell the difference, and it will give him another million years!"

After Borglum's death in 1941, a few finishing touches were needed. Lincoln Borglum, his son, provided them with a skill and care to which I can attest. One day we rode in the plank box that creaked up the 1,400-foot cable from the studio to the heads. While I waited on top, Lincoln dangled mysteriously in a "saddle" in front of Jefferson's face.

* See "Twentieth Anniversary of the Epoch-making Stratosphere Flight by *Explorer II*," National Geographic Magazine, November, 1955.

Giants of History Stand Visible for 60 Miles: George Washington, Thomas Jefferson . . .

"His right eye looked a bit sleepy in the morning light," he explained as we skidded back to the studio, "so I daubed red paint in the pupil to look like a shadow. We'll study it a few days. If it's right, we'll chisel the rock to get the same effect."

Plenty of Mountains Left Uncarved

To outlanders who deplore "carving up your mountains," the Black Hiller's stock answer is, "We've plenty left. Come and see!"

Best place to do it is Custer State Park, a 69,000-acre vacationland south of Rushmore. It is threaded by rolling ribbons of asphalt laid out for unhurried people. Their brakes should be good, too. Not because the highways are unusually hazardous, but because the fellow ahead is always stopping suddenly to look.

Sometimes he is brought up short by a breath-taking vista such as the one from the spired Needles Highway (pages 480-481). Or the man ahead may jam on the brakes when a deer leaps aside and stands and stares, while children in the car squeal with delight. Or perhaps it's a buffalo switching flies under a pine.

"If Mr. Buffalo is on the road, be careful," I heard Les Price, park superintendent, warn tourists. "He can be a mean jaywalker. Take your picture but heed that sign, 'Buffalo are dangerous. Stay close to your car.'"

Experts say that 50 or maybe 75 million buffalo, properly called bison, once roamed North America. An old Indian described the plains in those days as "one great robe." Then came the hide and tongue hunters. Dr. William T. Hornaday, the naturalist, estimated that by 1889 few more than 1,000 bison

497 Black Hills Studios, Inc.

. . . Theodore Roosevelt, and Abraham Lincoln

survived in the whole of North America.

They have staged a comeback. Some 1,200, one of the largest herds in the country, browse in Custer State Park, reproducing rapidly under expert care.

"We've learned that with a ratio of one bull to ten cows, heifers often calve at two years instead of three," Les told me. "Now, to hold the herd to what the land will feed, we butcher surplus animals and sell $75,000 worth of meat a year."

Black Hills Treat: Buffalo Chow Mein

Buffalo tastes much like beef, but the fat is a rich yellow. Buffalo steaks and buffaloburgers are common items on menus of Black Hills restaurants. One drive-in features buffalo chow mein.

Hollywood has discovered the buffalo here. The controversial calf-birth scene in Walt Disney's "The Vanishing Prairie" was shot in Wind Cave National Park. In adjoining Custer State Park a thousand bison starred with Robert Taylor and Stewart Granger recently in MGM's "The Last Hunt."

Mother Nature was stingy with only one thing needed to make the Hills an ideal playground: lakes. But man has made many. Biggest in the Hills has just been completed on upper Rapid Creek to supply water for Rapid City and the near-by air base.

To me, the prettiest lake is Sylvan, a turquoise set amid granite boulders. Above it stands a modern hotel with celebrated Indian murals by Erika Lohmann.

The four-mile trail to Harney Peak starts from Sylvan. A few years ago the wrangler here told me about a lady of comfortable proportions who came for a horse. He asked whether she preferred an English saddle, sometimes called a chafing dish out here, or the Western type, with a horn.

"English," she replied. "I'll not go on the highway, so I won't need a horn."

Now most people ride up Harney in a bright-yellow jeep. Lyle McCarty, who sits behind the wheel, adds to the fun.

"See that hanging rock?" he bellows as visitors whiz uphill. "Don't talk. The echo might make it fall!"

Mountain goats, both human and animal, love this rugged country. The former enjoy pounding pitons into crevices and crawling over pinnacles. At the ranger's lookout atop Harney we saw the real thing, the kind that grows horns.

Harney, the giant of the Hills, immortalizes Gen. W. S. Harney, a gruff Indian fighter who probably never glimpsed it. An ambitious young lieutenant, Gouverneur K. Warren, later to win fame as the Union officer who took and held pivotal Little Round Top at Gettysburg, saw it from the prairies in 1857 and named it for his superior.

To me, the view from Harney is peerless.

The wilderness below is as virginal as when white men first looked upon it fourscore years ago. And in autumn the birches and aspens among the pines glisten with gold.

On Harney it's easy to see why the Hills are called a geological textbook. Long before the Rockies or Alps rose, internal pressures heaved this 100-mile-long bulge. As the top wore away, erosion exposed the central core of granite. Around it in concentric ovals are frayed layers of water-laid limestone, sandstone, white gypsum, and shale. The Black Hills could be likened to a geological rose on the prairie.

While we talked, a soiled fleece of clouds that sagged over a lower peak thickened and spread. Suddenly there was a deafening crack of thunder and a dart of snake-tongued lightning. I could understand why Indians were afraid of this mountain wilderness.

A short drive later we were at State Game Lodge dining on elk steak. This chaletlike building looks just as it did when the Coolidges rocked on the front porch and chatted with neighbors. There were scoffers when U. S. Senator Francis Case, then a weekly newspaper publisher at Hot Springs, telegraphed an invitation for the President and his lady to vacation in the little-known Black Hills. But in 1927 they came.*

Big Day for a Young Clergyman

A few miles from the lodge stands the white Congregational Church in Hermosa where they worshiped. Twenty-two-year-old Rolf Lium was the summer preacher. When told the President of the United States would be in his congregation, young Lium broke into a cold sweat and looked seasick.

"Excuse me," he said. "I think I'll go home and get a clean handkerchief."

Col. Edmund W. Starling, head of the Secret Service's White House Detail, supplied one, then proceeded to buck up the young clergyman by telling him how proud his mother would be.

"The President is just a country boy like the rest of us," he went on. "You ought to see the size of the church he goes to up in Vermont."

Young Lium took a deep breath—and all went well. Before they left for Washington the Coolidges had him over for dinner.

Coolidge enjoyed trout fishing here—with worms, newspapermen let the world know. Maybe he never learned that the big ones he landed were liver-fed brood trout brought in at night from the hatchery at Spearfish. No one knows for sure.

But there was no special stocking for President Eisenhower, who fished here in 1953 (page 489). His manipulation of flies on French Creek won admiration from local Waltonians, but his luck was best with a No. 2 Colorado spinner. I can reveal that piscatorial secret because my wife and I summered near by in a cabin beside what we called Ike's Peak, and I know the man who supplied the lure.

English to Sioux to Sign Language

To put Hills history in the present tense, we had asked Paul Bellesievre, manager of the Black Hills and Badlands Association, to round up three men who had helped make it: John Sitting Bull, 95, adopted son of famed Sitting Bull; Iron Hail, or Dewey Beard, said to be 98, who fought under Crazy Horse against Custer; and John Bruguier, 87, an Army scout in the Messiah War of 1890.

I was to put my questions to Bruguier, who was to relay them in Sioux to Iron Hail, who would sign-language them to John Sitting Bull. Being a deaf-mute, John could speak neither Sioux nor English. Answers would take the linguistic circuit in reverse. A tape recorder would perpetuate the interview.

We met Paul at the Alex Johnson Hotel in Rapid, but his face was as long as a boot.

"I drove 135 miles down to Pine Ridge Reservation to get Sitting Bull," he said. "John died last week!"

The show had to go on, of course. It opened and closed with Iron Hail, resplendent in buckskin and feathers, tom-tomming a song that ended in a wild whoop. His wife Alice, 79, and Bruguier translated (page 486). Whether we dredged up new facts about the Custer battle, historians can decide from the tape, which will be turned over to the Library of Congress. It proved to be Iron Hail's last recounting of the history he helped make. A few months later he too was dead.

I wished for Bates's recorder again while chatting with histrionic Mountain Ed Ryan, who carries on the old Western tradition of tickling the tenderfoot. He has a white bush-

(Continued on page 507)

* For an interesting account of the Black Hills of 30 years ago, see "The Black Hills, Once Hunting Grounds of the Red Men," NATIONAL GEOGRAPHIC MAGAZINE, September, 1927.

© National Geographic Society

Make-believe Guard Rides a Toy Stagecoach in Frontier Museum, Custer State Park

An injured logger while convalescing fashioned the coach from orange crates and apple boxes. Willie Wiebe, watched by Mom and Dad, aims a Colt .45.

Climbers Scramble up Inyan Kara in the Footsteps of General Custer

The United States in 1874 ordered Gen. George A. Custer to lead a reconnaissance expedition into the Black Hills territory of the Sioux.

Custer, his yellow hair flowing above fringed buckskin, rode out of Fort Abraham Lincoln on July 2 to the music of a band. More than 1,000 men, including civilian scientists, followed.

Three weeks later the expedition skirted the Black Buttes of Wyoming (background). Continuing across the valley (center), the cavalcade camped near Inyan Kara, whose Indian name means "mountain within a mountain." Custer and his staff climbed to the peak and then marched on to nearby "Floral Valley."

"Our march," wrote Custer, "was amid flowers of the most exquisite colors and perfume. So luxuriant in growth were they that the men plucked them without dismounting . . . It was a strange sight to glance back at the advancing columns of cavalry and behold . . . the horses . . . with wreaths of flowers fit to crown a queen of May."

←Page 500, lower: In Custer's day prairie dogs by the millions inhabited underground cities that sometimes stretched for miles. Few of the big dog towns have survived the cattlemen's poison bait. A species of ground squirrel, the rodent gets its common name from barking calls.

Wind Cave National Park protects these prairie dogs, one at lunch, the other at his doorway. The entranceway descends some 10 feet before leveling off into a subway. Niches opening onto the corridor serve as bedrooms.

↓ Carved Dancer Holds Snake in Mouth

This petroglyph near Hot Springs appears to have been made before the Sioux invaded the Black Hills about the time of the American Revolution.

© National Geographic Society

Sparkling Sand Creek Divides Ranch A, Home of a Million Rainbow Trout

In the early 1930's a wealthy Philadelphia publisher ordered trout in a Black Hills restaurant and found it so delicious he bought Sand Creek (center), whence his meal came.

In time a fabulous million-dollar retreat rose around the trout preserve. The estate is now owned by Peter F. Smith, here seen with his horse on the rim of Sand Creek canyon.

Sand Creek, fed by springs on the property, varies only two degrees in temperature throughout the year. The 56° average makes it a natural home for trout and an ideal site for the hatchery installed in its waters.

The ranch's main lodge and four guest cottages show among the trees at left; the barn rides the hill. A 10-foot fence encloses elk and deer on 685 acres.

↓ Owners Entertain in Ranch A's Lodge

The building's hand-hewed logs were calked with oakum. Handmade furniture surrounds a large Navajo rug.

Mr. Smith sits on the floor at left, his wife behind him.

© National Geographic Society

© National Geographic Society

Brahman Bull Tosses a Cowboy Like a Rag Doll

In bull riding, rodeo's most dangerous event, the cowboy tries to stay atop a ton of murder for eight seconds. His only anchor is a loose rope around the animal's middle. ↓ On his feet, the rider must now run for his life. A clown (right) jumps in and out of his barrel to divert the bull's attention. Horns are blunted, the only concession to safety.

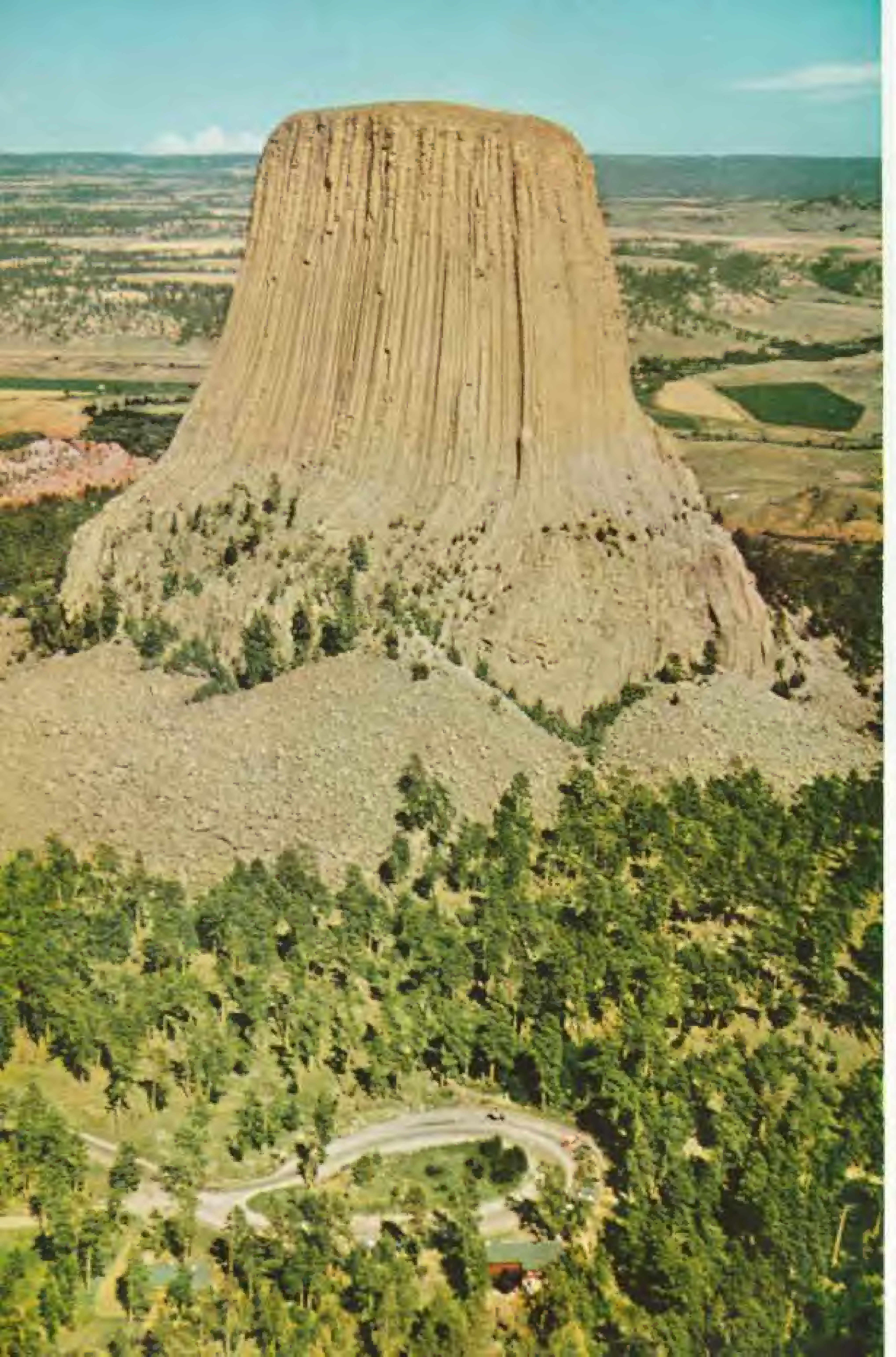
↑ Bronc's Four Feet Leave the Earth

The bucking horse is the trademark of Belle Fourche, a cow town since its founding on a new rail line in 1891. Eleven years later the town boasted it was shipping more range cattle than any other point in the world. The Black Hills Round-up has been presented each year since it began in 1918.

On March 4, 1905, 62 ranch hands, mostly from the Black Hills, descended on Washington, D. C., to help their old friend Teddy Roosevelt celebrate his inauguration as President. They amused themselves during the parade by roping policemen and citizens; later they staged a shoot-up on a diplomat's lawn.

→Saddle-bucking contestant holds the rein with one hand. Rules require him to dull-spur his mount for frenzied bucking.

© National Geographic Society



size beard and blue eyes which, as he puts it, can "cry easy." Once a tourist asked if the mica particles that sparkle in Custer's broad Main Street are gold.

"Yes, they are, ma'am," he replied gravely. "The genu-wine article. But there's something mighty pee-culiar about this gold. It's been exposed to the sun so long it's lost all commercial value."

Tall Tales Enrich the Hills

Too bad Ed couldn't have matched tall tales with Smoky Thomas, who used to tell them to the livery-stable crowd at Sturgis. I remember how he described the plight he got into once when bullwhacking from Pierre.

"I camped where there wa'n't no wood," he related, "not even a buffler chip. So I started the grass to burnin', follerin't along with my fryin' pan. Then the wind whipped up right smart, but I kept on. Time my bacon was cooked, I was 15 mile from camp!"

Old-timers really let their imaginations go on what poet Stephen Vincent Benét called "the snakeskin-titles of mining-claims." Once a prospector suggested that his partner name their mine for his wife. He did—and it has been "Holy Terror" ever since.

Camille Yuill, Deadwood newspaperwoman, boasts she was born in Custer on Laughing Water Creek, fed by "Giggle Springs out of Jackass Gulch." But pioneer poesy had nothing to do with the village of Mystic. A Burlington railroad worker found a mistake on his map and noted it plain as could be: "Mystic."

The old West's joshing tradition crops up among guides at Wind Cave. One used to say that the cave's Bridal Chamber was so named because of a young lady who told her mother she would marry no man on the face of the earth.

"So the knot was tied down here," he would add, "but soon we had to call a halt to such goings on. Didn't want to run the institution of matrimony into the ground."

Wind Cave, one of many dissolved out of the limestone, is famed among spelunkers because of white calcite crystals and a brownish-red boxwork that resembles pigeonholes. The cavern is a great earthen lung. When the barometer falls, air usually rushes out; when it rises, the wind blows in. Sioux say that when tom-toms boomed from the earth here, they knew the Great Spirit was telling them buffalo were near.

A farmer named C. L. Bell, from McDonald, Kansas, had a happy surprise at Wind Cave in August of last year, when superintendent Earl M. Semingsen announced, "You're it—our millionth visitor!" Bell, his wife, and daughter were feted royally at Hot Springs.

River That Flows Upside Down

Most Hills towns were started as mining or ranching centers; Hot Springs was created to dispense health and pleasure. Fall River, which babbles along Main Street past pebbly cliffs, is so tempered by thermal springs that bullfrogs croak even on winter nights. Mallards, knowing a good thing, live here the year round, fattening on shelled corn bought by tourist pennies from vending machines.

A respected Hot Springs citizen passed on to me last summer a story about a traveling man. Told that the water in Fall River never froze, he filled his radiator. Next morning his engine block was cracked—and he threatened to sue the city!

Hot Springs was "town" for the cow country at the southern end of the Hills in those romantic days when every maid was a belle. Cowboys thought nothing of swimming their broncs across the Cheyenne River to come in for a big night. But the Cheyenne, once so muddy it was called "the river that flows upside down," is now dammed, and farmers raise sugar beets and beans, corn and alfalfa, where coyotes used to chase jack rabbits in the sagebrush.

The Atomic Age has come to the Hills too. Uncle Sam has Atomic Energy Commission offices in Rapid City and Hot Springs, and

Page 506

← **Devils Tower Soars Like the Stump of a Monster Tree**

In September, 1906, President Theodore Roosevelt declared the Wyoming wonder the first national monument. This anniversary year the formation will attract more than 100,000 visitors.

Geologists debate the manner of the tower's birth. Most agree that at one time, possibly 50 million years ago, molten basalt welled up within the earth and, cooling, cracked into columns. Erosion uncovered this remnant, leaving the talus at its base like chips from a logger's ax. The platformlike top covers about an acre. It sits 857 feet above the parking circle and 1,267 above the distant Belle Fourche River.

A number of climbers have attained the summit; in 1941 a parachutist did it the "easy" way by dropping from a plane. Unable to dismount, he shivered for a week through rain, wind, and snow, sustained by supplies from an airlift. Finally a rescue party helped him down.

© National Geographic Society

there is a uranium mill at Edgemont. South Dakota's Governor Joe Foss broke ground for the mill with a bulldozer as handily as he maneuvered planes to become a leading Marine Corps ace of World War II.

"Everyone around here's a uranium prospector," Joy Hauptmann told me. "We've got uranium fever bad, and like it."

He should know. As a side line to his lunch counter and curio store in Hot Springs, he has sold $25,000 worth of scintillation counters and "buzz boxes"—Geiger counters.*

Big companies are moving in, but little ones with big ideas start overnight. Someday their fancy stock certificates may be worth fortunes—or worthless, like those of forgotten gold mines papering a wall in a summer cabin near Sturgis.

Photographer Starts a Uranium Rush

Jerry G. Brennan, a young Rapid City attorney, started the rush. One June Sunday in 1951, while photographing Indian petroglyphs in Craven Canyon, he picked up a yellow rock he thought just might be carnotite. It was.

The uranium rush isn't as rootin'-tootin' as the gold stampede of '76, but already there has been one celebrated dispute over claims.

A gang of workmen moved into a section of Red Canyon, northeast of Edgemont, staked by Roy and Jeannie Chord. Jeannie, a grandmother with the figure of a coed and the courage of a bobcat, found them. Armed with nothing but a lipstick, she stepped in the bulldozer's path and dared the driver to come on. He crunched within inches—then lost his nerve.

The now famous Chord case went to court and was settled in a decorous decision, contrasting with claim-jumping sequels in '76.

Once Sheriff Seth Bullock connived with a Deadwood druggist to outwit some jumpers. They had set up housekeeping in a tunnel and, with rifles across their knees, proposed to sit out the act. Bullock sifted asafetida down the stovepipe into their hot stove, and the lawbreakers broke for fresh air!

There's lost-mine lore in every scarred gulch in the Hills, confirming the credulity of man and his deep desire for sudden riches. Tracing such stories, one is usually soon in will-o'-the-wisp land. But Troy Parker, proprietor of the Palmer Gulch Lodge, unwittingly started a valid legend. A Hill City mechanic found a chunk of rich gold ore lodged in the chassis of Parker's Mercury.

"I'd give a lot," Troy told me, "to know where I picked that up!"

And in a barbershop at Custer I heard about an eccentric who died a few years ago near the Wyoming line, lamenting that no one would grubstake him even to truck in several bags of "radium rock." Now everybody wonders. Was it uranium ore? Maybe it was an ore of tungsten, lithium, or tantalum. Or it might have been columbium or beryllium, also now in great demand.

As wealth pours from the mines and as tourists invade their once sacred Paha Sapa, the Sioux must think lugubrious thoughts. Remembering that they lost the Black Hills by forced treaty in 1877, I can sympathize with Sam Brave Bear who, over at Pollock, was fined for breaking the white man's law.

"I owe you $25," he told Judge Harry Mundt. "You owe me for the Black Hills. When you pay me, I pay you."

Disregarding the Great Spirit's injunction, the Sioux are leaving reservations to find homes and jobs in Hills towns. More than 3,000 have settled in Rapid City; there, in a white cottage with lilacs at the door, I found 74-year-old Mrs. George W. Hill.

Indian Woman's Club Helps Orphans

She and her husband, who is an Oneida, own nine rental units as well as their home. Their children went to college, and she is a leader in the Winona Club.

"We have committee reports like any woman's club," she explained. "Then we sew. Make quilts and fancywork to sell. We raise money for the new Bennett Memorial Hospital and send money to the Abbott House Children's Home. Sometimes we buy food or clothing for poor Indians."

Listening as she recalled a thrilling buffalo hunt she had seen near Edgemont as a girl, I realized afresh how short is the span between the present and the past in these Black Hills. A single lifetime bridges it—Custer to Coolidge, gold stampede to uranium rush, Sioux travois to the jets at Ellsworth.

On a visit after the railroad came, Buffalo Bill declared that Deadwood would never really grow old because it had been young so long.

He could have been speaking of the entire Black Hills.

* See "Hunting Uranium Around the World," by Robert D. Nininger, NATIONAL GEOGRAPHIC MAGAZINE, October, 1954.

With Pageant and Parade, Deadwood Returns to the Roaring Days of 1876

The cry of "Gold!" started a stampede to this pine-clad gulch. Every adventurer was technically an outlaw in a land still legally Indian. Six-shooters ruled in the hands of such as Wild Bill Hickok and Calamity Jane (page 484).

Honey Eaters of Currumbin

Hundreds of Colorful Lorikeets Commute from Distant Forest Homes to Feed on the Lawn of a Friendly Australian Beekeeper

By Paul A. Zahl

With Illustrations from Photographs by the Author

RIPPLES of excitement, unmistakable as the wash of South Pacific rollers on the village shore, stirred the crowd. Suddenly someone pointed at a tall eucalyptus tree. Glowing in the rays of a setting sun, a flock of dazzling birds settled high in its branches, arranging and rearranging themselves in fretful hops and circlings.

I had joined the expectant crowd this summer afternoon at Currumbin, on Australia's Queensland coast, to witness an extraordinary sight: the hundreds of wild rainbow lorikeets that come morning and evening to feed tamely from the hands of their friend Alex Griffiths.

Joining in the excitement, I kept my eyes on the birds. Their breasts were flame colored and their backs bright green. The remaining plumage wove a tapestry of many hues. This is where the name came from, I thought—those lovely rainbow colors.

Lorikeets Mass in Dazzling Display

My reverie was dispelled by the arrival of a larger flock of the brilliant birds, flashing a study in speed and pounding wing beat. Another group came, and then another.

Tree limbs sagged under the massed weight of some 500 birds. Rainbow hues daubed a bamboo thicket, a mulberry tree, a grape arbor. Then, as if to a murmured signal, scores of lorikeets flew toward a slightly built man with a bucket and a tall stack of pie tins. They had recognized Alex Griffiths, their friend and founder of the Currumbin sanctuary (page 518).

With practiced speed Griffiths handed the plates to eager visitors, then filled them with cupfuls of mash made of bread crumbs, water, and honey. In a moment scores of tins were clutched in outstretched hands or held high over heads.

Thanks to the patient example of Griffiths, the lorikeets needed no urging. The flocks disintegrated like dissolving rainbows. Aggressive birds jammed the rims of plates. Others, too late for seats, clung to the clothing of the plate holders. Delighted cries arose from the crowd, punctuated here and there with squeals as hungry birds flew close to faces or alighted on shoulders and heads.

From the shape of the beak it is apparent that lorikeets belong to the parrot family. But, watching them close up, I could see how different their eating equipment is from that of the seed eaters. Lorikeets lap floral sirups with tongues like brushes.

Bachelor Lives with Birds and Bees

The display ended after a thrill-packed 20 minutes. A few late-arriving lorikeets lingered on, lapping at what was left of the honey mash. Others, with appetites sated, tarried on near-by branches to launder the honey drippings from their colorful bibs. But most had flown off like bright confetti toward their forest roosting places.

The afternoon had passed like many others for Alex Griffiths. A bachelor whose life abounds in birds, he takes his livelihood from bees. And the bees fortuitously brought the lorikeets to Currumbin.

Like most Queenslanders, Griffiths knew that lorikeets inhabit the eucalyptus forests that extend for miles behind Currumbin. Hidden by leafy walls, they share the woodland with the arboreal koala "bear" and the kangaroo.

Nomadic and wary, lorikeets nest deep in

(Continued on page 519)

Page 511

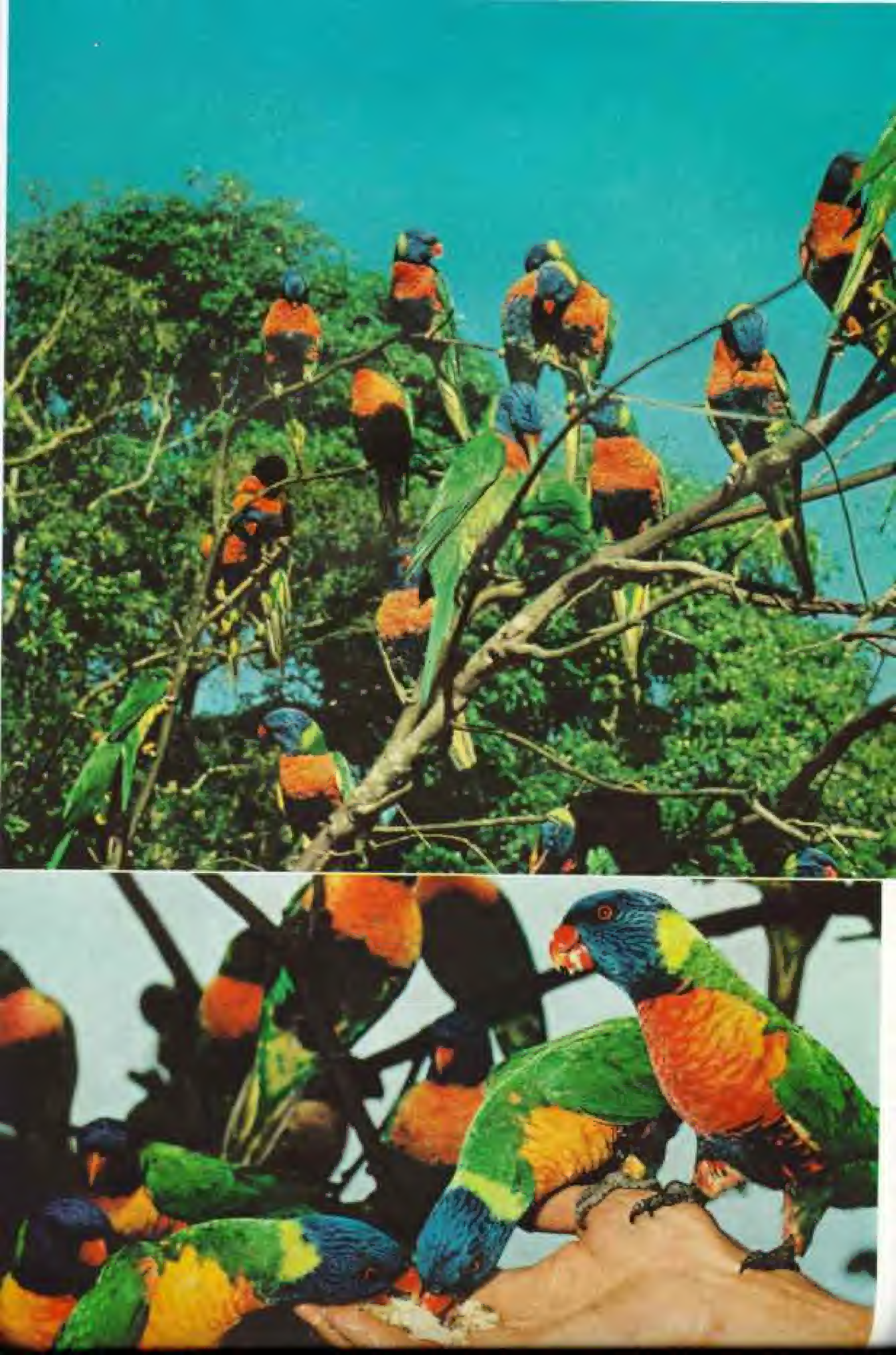
Rainbow Lorikeets in Flaming Bibs → Await a Gift of Honey

Like bees searching a garden for blossoms, lorikeets range the eucalyptus forests of eastern Australia for nectar and fruit. When streaking in the sunlight, air whistling through wings, they suggest colored confetti. Nesting, they hide in the hollow limbs or trunks of trees.

The sexes display gentle attachment, expressed at mating time in courtly bowing and dancing.

These birds strike an intimate pose in Currumbin, Queensland. Forgetting native shyness, they have been lured into man's domain by gifts of honey. Their benefactor, beekeeper Alex Griffiths, maintains a sanctuary primarily for lorikeets.

© National Geographic Society



Branches Sag Beneath Gaudy Beggars Calling for Their Daily Dole

A paintbrush tongue for lapping nectar distinguishes the lorikeet from the ordinary parrot, which opens seeds with its beak.

Male and female wear identical colors. Only a trained eye could separate them in this flock perching outside the Griffiths home at dawn.

←Page 512, lower: Lorikeets first visited the Griffiths homestead to pick up driblets of honey running from beehives. Their numbers increased spectacularly, compelling Griffiths to dilute their ration with bread crumbs and water. Now his guests consume about 10 gallons of mash daily.

Here two lorikeets bury their heads bill-deep in the bread and honey. Making haste to get a second helping, another bird gulps a beakful.

↓ Hands or Hair: Any Perch Will Do

Visitors learn that the birds tolerate light stroking but resist restraint with determined bites.

© National Geographic Society

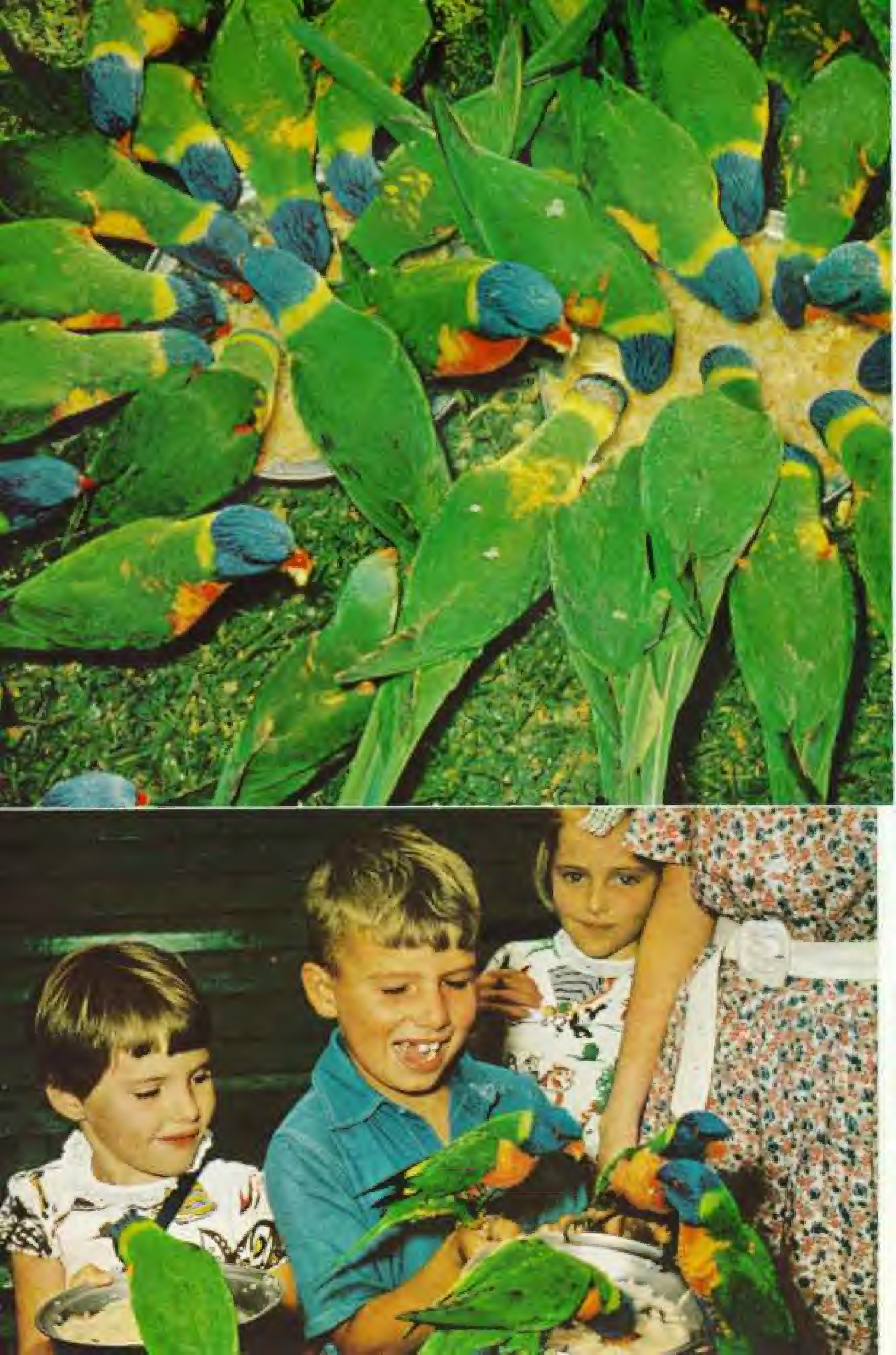
© National Geographic Society

Australians Express Wonder and Delight at Being So Close to Wild Creatures

When heavy rains wash nectar from woodland blossoms, the lorikeets may arrive half an hour early; when wild nectar flows freely, they are often a trifle late. In the forest these birds would allow no one to come near.

"Look, Mommie!" Excited Voices Cry. "They're Feeding out of My Hands!"

Lorikeets in the wilds make their presence known with a musical bickering. At the feeding station they shriek their arrivals and departures. "On occasion," says Mr. Griffiths, "they have been heard a mile away."



Bright Battalions Descend on Dishes at Feeding Time

"Lorikeets should not be kept in captivity," says beekeeper Griffiths. "Though they are protected by law, many are snared and caged. Very few survive; their frantic fight for freedom proves too much. From time to time I have confined a bird with broken wing or other injury, but have released it once it could take to the air."

Unlike some members of the parrot family, individual lorikeets do not post themselves as sentinels to guard their fellows against predators. Instead, the flock takes alarm from the cries of other birds. Warned of their mortal enemies, the falcons, which seem to strike from nowhere, they take to the air in a flash.

The usual feeding attracts 150 to 500 birds, but rains may drive as many as 900 to the sanctuary. On such occasions Mr. Griffiths, like an overtaxed restaurateur, sets additional plates on the banquet table.

← Page 516, lower: Open mouth expresses the emotion of a boy whose hand is accepted as a perch.

↓ Tailfeathers tickle the chin of a youthful visitor.

© National Geographic Society

© National Geographic Society

Alex Griffiths Wears a Belt of Flashing Colors. Birds Form Epaulets on His Shoulders

Rainbow lorikeets weigh only four to six ounces. But birds crowded this tray in such numbers that the beekeeper had difficulty holding it. He recalls times when "almost a hundred were clinging all over me."

the hollow limbs and trunks of lofty trees. The identically colored sexes are warmly fond of each other, high-pointing their affection in extravagant bowing and dancing during courtship. Constant seekers for food, they roam long distances when the supply becomes scarce in their usual neighborhoods. Noisy flocks often descend upon orchards and gardens.

Queenslanders have given the birds several names: Blue Mountain parrot, blue-bellied parrot, or rainbow lorikeet. Scientifically, they are *Trichoglossus moluccanus*.* Scaly-breasted lorikeets (*Trichoglossus chlorolepidotus*), identifiable by their green heads, also appear in the flocks, but the blue-headed rainbows always outnumber them.

Leaking Beehives Call Hungry Birds

To Alex Griffiths the lorikeets first came as unexpected visitors a few years ago. Flying low over Currumbin, they dived in to investigate a row of gladioli in a garden. Near by they discovered driblets of honey overrun from beehives. Memories of its taste returned with them to the forests. Next day they came back.

Griffiths encouraged their patronage with a pie dish of honey on his kitchen window sill. Half a dozen lorikeets ventured in, lapped up his offering, and then departed. Next day he set out another tin and counted twice the original number waiting in the shrubbery. The visitors increased as time passed, and the refectory had to be moved from its cramped window space to the lawn.

Within a year hundreds of assured, fractious lorikeets marshaled daily at dusk and dawn, chattering demands for food. Griffiths schooled them progressively—first with tempting pie tins of honey, then with handfuls. Emboldened, they nestled on his shoulders, clung to his clothing, and even perched on his head.

Thus Alex Griffiths's long-quiet Currumbin lawn was transformed into a wild lorikeet sanctuary—so designated by the beekeeper to allay any notion that he operated a sideshow or carnival attraction. Neighbors trooped in to witness the strange goings-on. Cars with out-of-state licenses ground to Griffiths's doorway, and new faces asked, "When does the feeding begin?"

Alex didn't mind in the least. A lover of birds, he welcomed the opportunity to share his hobby with others. Week-end and holiday crowds, sometimes numbering 2,000, drifted to his store to purchase jars of iron bark, yellow box, brush box, spotted gum, and other honeys.

He built a low railing to hold the crowds in bounds. Appreciative visitors dropped coins in a container to help buy additional pie plates and more honey mash. The cost of the latter had mounted: lorikeets lapped a full five gallons each morning and evening.

Sometimes the feedings terminated dramatically in skyward rushes of birds which, moments before, had crowded with rapt concentration beside the honey mash. Unlike their relatives the cockatoos, lorikeets do not post sentinels, but place reliance on the soldier bird, butcher bird, currawong, or peewee to announce the presence of their mortal enemies, the falcons. Lightninglike responses greet the alarms. Wheeling in tight formations, the flocks stream rainbow colors through tree openings, sometimes winging across the very sky paths roamed by their enemy moments before.

Kangaroo Joins Griffiths Household

Griffiths's reputation as the lorikeets' friend has populated his grounds with wildlife of other kinds as well. My wife and I delighted especially in Jock, a baby kangaroo that Alex fed from a bottle. Each evening the drowsy 'roo turned for slumber to the shelter of a fabric bag that Alex had improvised as a substitute for the mother's pouch.

The fame of Alex Griffiths's sanctuary has traveled even to the most remote districts of Australia's outback. One afternoon I watched two burly men alight from a road-beaten truck and ask in crisp backwoods accent, "Where's the bird-and-beast man?"

Alex suggested that he might qualify.

"Here, can ya give these a home?" the visitors asked, handing over two little flying opossums they had found after felling a tree.

Unlike baby kangaroos or opossums, however, no lorikeet ever willingly remains at the sanctuary. Some with broken wings or other injuries are occasionally harbored until time to take to the air again.

"But they don't react kindly to captivity," Alex said. "They try unceasingly to regain freedom, and often die in the attempt."

With accustomed directness, Alex sums up the feelings of his bright-feathered visitors: "They should not be kept in cages."

* Ornithologists who consider all forms of the widely ranging birds as a single species call this lorikeet *Trichoglossus haematodus moluccanus*.

Himalayan Pilgrimage

By Christopher Rand

PAHALGAM, in the mountains of Kashmir, was like a gold-rush camp when I went there at the end of July. The pilgrimage to Amarnath Cave—one of the great yearly events of the Hindu faith—was about to start. Pilgrims by the busload, rich and poor, kept arriving and were set down with their gear beside the dusty road. Then they hunted out campsites on the broad meadow by the little town, pitched their tents, and lit fires. Hundreds of the tents were dotted about, and wood smoke was rising everywhere in the sunshine.

Faith Draws Hindus to Mountain Shrine

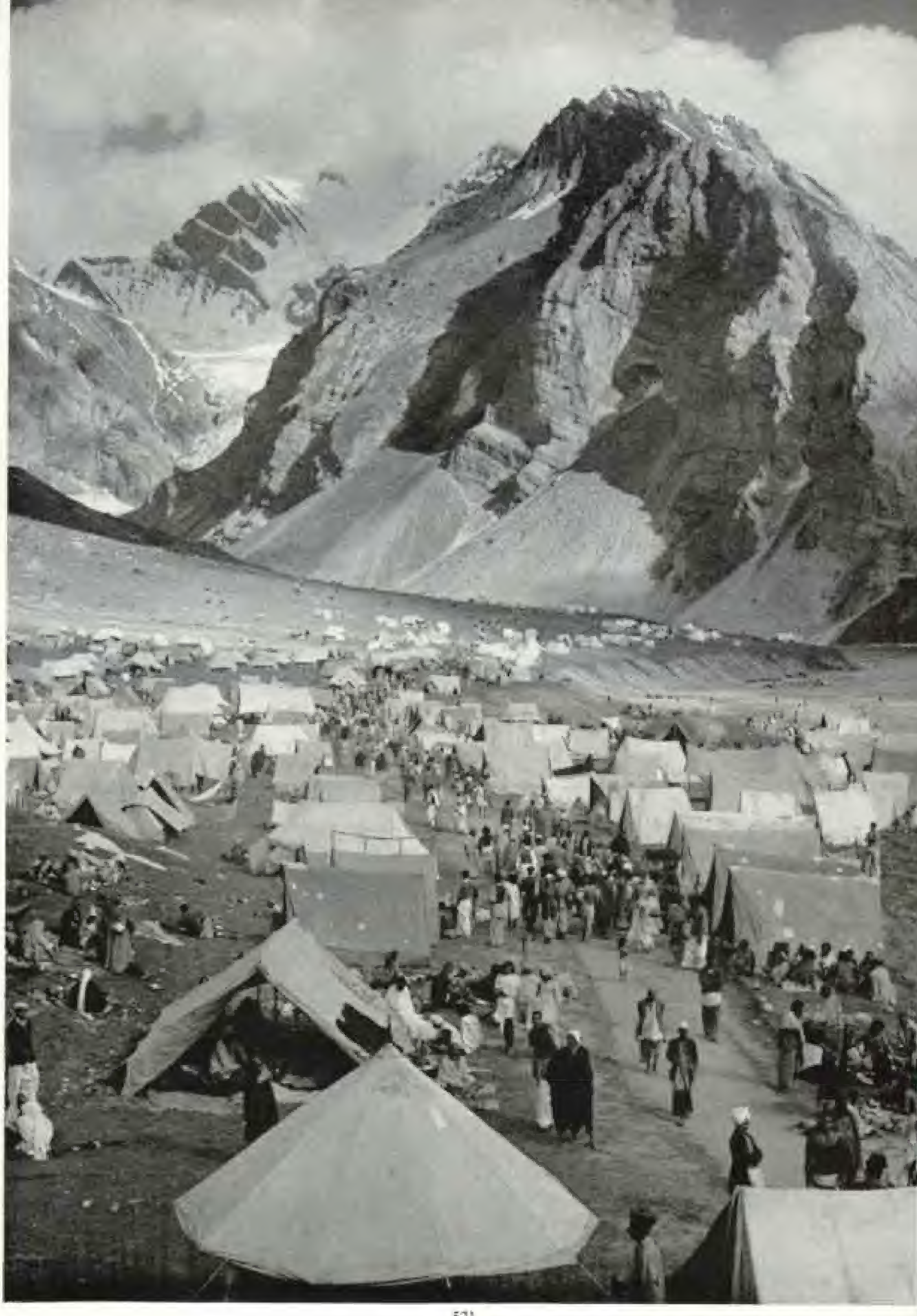
Amarnath is a remote and lonely Himalayan cave, sacred to Siva, one of the most widely worshiped of Hindu deities. Discovered probably by shepherds before the time of Christ, the cave is as holy to Hindu believers as Bethlehem is to Christians. Siva himself is supposed to have lived in it with his wife, Parvati; some devout Hindus, indeed, believe that

Amarnath Pilgrims Set Up a Canvas Town

High in the Himalayan foothills, Hindus make the last camp of their march to a holy cave. The goal lies five miles ahead.

↓ A sadhu, or holy man, sits beside an umbrella-shaded altar holding bell, photographs, and sacred objects. Tridents symbolize Siva, one of the Hindu trinity.

[illegible]



Sam Tata, Black Star

Devotees Chant Scriptures Beneath a Tent Housing the Silver Mace

Hindus believe the scepter once belonged to Siva himself. It precedes the pilgrims on their way to Amarnath.

he still lives there. The pilgrims who make the journey come from every corner of India and beyond.*

Our party included photographer Sam Tata; my 16-year-old twins, Dick and Mary; and several Kashmiri guides and servants. We found a place away from the crowd, where a cold mountain stream came roaring down through boulders, flashing in the sun. Beyond it the valley wall rose abruptly, clad in dark-green pines; behind our tents spread the meadow, green and closely grazed, covered by the tents of Indian pilgrims.

The motor road ends at Pahalgam. Beyond stretches the wild high country of Kashmir, famed as a summer paradise for campers.† The holy cave of Amarnath lies deep in this wilderness, at an altitude of more than 12,000 feet and distant about 25 miles from our camp (map, page 525).

The pilgrims had gathered to walk and ride there, timing their journey to see the place itself at dawn on the full-moon day of August. They were to set out from Pahalgam the next morning; the Kashmiri police, who were supervising the trip, would let no one start beforehand. Already, several thousand pilgrims had gathered, and the authorities wished to keep them together in case of a storm or other emergency.

Sadhus Wander with Few Belongings

After lunch we wandered through the camp, watching the pilgrims cook, or rest, or pitch their tents. They were of all ages. I was struck especially by the great number of infants and old women.

Here and there we came on *sadhus*, as the Hindu ascetics who roam India are called. Some traveled alone, but most were in groups. They belong to various religious orders, a pilgrim told me. Some of them wore long saffron-colored gowns; others were almost naked. Most had no tents, but merely spread

* See "A Pilgrimage to Amarnath, Himalayan Shrine of the Hindu Faith," by Louise Ahl Jessop, NATIONAL GEOGRAPHIC MAGAZINE, November, 1921.

† See "The Idyllic Vale of Kashmir," by Volkmar Wentzel, NATIONAL GEOGRAPHIC MAGAZINE, April, 1948.

pieces of cloth beneath them on the ground.

According to Hindu tradition, sadhus give up the comforts of life and take to wandering with a bare minimum of possessions—perhaps only a pot, a staff, and a few pieces of cloth. By this self-denial they hope to turn their thoughts away from material things. Some undergo long fasts and vigils; many of the sadhus on the pilgrimage had an emaciated look.

Fasting Holy Men Imitate Siva

It was natural that there should be a large proportion of these holy men on the pilgrimage. The three main Hindu gods are Brahma, the Creator; Vishnu, the Preserver; and Siva, the Destroyer. Brahma is regarded as the creator of all things, Vishnu sustains them through life, and Siva finally removes them to make way for new life.

Siva is particularly associated with immortality—hence the name Amarnath, which means "immortal lord." Siva is also the special patron of ascetics like the sadhus; according to Hindu writings, the god himself led a life of rigorous self-denial and fasting in the Himalayan peaks.

One holy man caught our eye especially, because every time we passed him that afternoon he was standing on one foot, as motionless as a crane, with the sole of the other foot against his knee. This is one of the yoga exercises, also regarded as helpful in tuning the nervous system to spiritual impulses. A dozen or so pilgrims sat near by, watching him deferentially.

That evening we saw him again, but seated now, cross-legged, before a good fire. Several pilgrims were with him still, gathered round the blaze. He was not speaking to them but was communicating by gestures. His hair was long, ropy, and bleached. His arms, trunk, and legs, bare in the chilly evening, were very thin. After a while he produced a religious tract in Hindi, and one of the pilgrims read aloud from it.

Itinerant Cook Toasts Wheat Cakes on a Hot Stone Griddle

Spiced vegetables fill the bowl at right. Most pilgrims prepare their own meals (page 532).

Sam Tata, Black Star

Sam Tata, Black Star

Sandaled Moslem Porters Carry Ill and Aged Hindus on the Tortuous March

To lighten their task, the bearers sing as they climb boulder-strewn trails, ford swift streams, and cross treacherous snow bridges. Pilgrim sits cross-legged in the sedan chair. A canopy rolls down in wind or rain.

The whole camp was ablaze with fires that evening. The pilgrimage had a center, so to speak: an umbrellalike tent under which was displayed a silver mace, an emblem of Siva, surrounded by offerings of flowers. Now, as it grew dark, a throng gathered round the tent, sat on the ground, and chanted scriptures in the light of a gasoline lamp (page 522).

First Pilgrims Start at Dawn

We slept soundly that night in our tents by the roaring stream, and the next day we rose early to watch the camp being struck. This process began before dawn and still had far to go by midmorning, when our party hit the trail.

Many of the sadhus left by the earliest light. Then came an endless stream of ordinary pilgrims—men, women, and children—afoot, on horseback, or even being carried in dandies, the sedan chairs used in the hills of north India.

Nearly all the grooms, chair carriers, and other workmen were Moslems; the Moslem religion, in fact, largely dominates the region, though Kashmir comes under the political control of both Moslem Pakistan and India, which is chiefly Hindu.

These Moslem hillmen did not recognize any religious significance in the pilgrimage, but they had come from scores of miles around to earn money by transporting the devout Hindus and their equipment. At the campsites they kept to themselves, wearing their distinctive skullcaps and praying toward Mecca at dawn and dusk. On the trail, however, they were much in evidence, whether carrying pilgrims or herding their animals along.

Often there were traffic jams on the trail, and then the Moslem packmen would call for gangway by shouting "*Hosh!*" Many of the animals' packs were wide, or had tent poles sticking from them awkwardly, and the packmen had to be constantly alert lest these cause trouble.

When we were a day or two out of Pahalgam the police estimated that there were 9,000 Hindu pilgrims along and 4,000 non-Hindu grooms and porters. It was the biggest Amarnath pilgrimage on record, they said.

On wide stretches of the trail two people could walk or ride abreast at reasonable speed, but there were frequent interruptions—sharp climbs, or detours, or narrow passages between boulders. Here the animal transport piled up badly, and sometimes it took more than an hour to get started again (page 526). It was therefore quicker to go on foot, slipping between the waiting animals and striking out through the brush.

I had a pony on the trip, but most of the time I left him with the groom and walked ahead by myself. My daughter Mary rode

Proceeding at Snail's Pace, the Caravan Zigzags up a 2,000-foot Headwall

On the second day's march, humans and animals jam together on Pisu Ghati's steep face. Kashmiri police accompanying the pilgrims keep traffic moving on the innumerable turns and switchbacks.

Sue Tam. Black Star

Animals Struggle for Footing on the Rocky Path; Heartier Walkers Take a Short Cut

Trees become fewer and smaller as the wayfarers approach timber line. Snow generally blankets the trail from September to June. Pilgrim in foreground carries kerosene lanterns; mule beside him transports a tent.

Sam Tata, Black Star

↑ **Young Pilgrim Rides a Wicker Chair**

Many children made the journey on the backs of parents or porters. Apparently they found it comfortable, says the author, for they slept most of the way.

→ Straining on his crutches, a one-legged sadhu bravely pushes forward.

nearly all the way, and so did Sam Tata, the photographer. Dick—who is six feet tall, with long legs—hardly rode at all but strode ahead rapidly, taking short cuts and passing the others on the trail.

Friendships Grow Along the Trail

We did not try to stay together, but followed our separate speeds and hunted each other out when we reached a campsite. Even then we would have to await our tents, which would straggle in far behind us on pack horses.

There was a tendency, I found, for conversations to spring up on the trail. I talked with one enormously fat man, obviously sophisticated, who said he had come from Calcutta, which is about a thousand miles from Kashmir. He wore horn-rimmed spectacles, long hair, and an orange robe over his great body. He was struggling ahead laboriously with the help of a cane when I overtook him. He remarked cheerfully that it was not easy to get 304 pounds over the trail.

"It is marvelous," I said in frank admiration, and asked him why he was making the pilgrimage.

"Because of belief," he answered. "I am an educated man, and of course I don't think the god Siva actually lives in the cave. But I believe in him, and above all I believe in Parvati. I am visiting the cave to pay my respects, because the place is sacred to them."

We had a few more words, and then he stopped to rest his bulk and I went on ahead. I saw him two or three times after that and can report that he walked all the way, with painful slowness, sometimes leaning on the shoulder of a friend.

Sam Tata, Black Star

Tublike Sedan Chair Saves This Pilgrim from Sore Feet and Aching Muscles

For him the journey was a way to symbolize his devotion. For others, though, it specifically offered immortality or similar concrete benefits. Some women had come in hopes of bearing children as a result, and some invalids in hopes of being cured. The more learned pilgrims with whom I talked tended to regard these hopes as superstitions.

Symbol of Man's Spiritual Search

"It is a question of faith," one well-educated Hindu said. "Faith can do so much. These people believe that a journey to the cave of Amarnath will make their wishes come true, and therefore it may well do so." He compared it with the belief in holy relics in some Christian countries and the marvelous cures that faith had effected.

I let it go at that, merely concluding that all, or nearly all, of the pilgrims believed in a divine order of some sort, and that they were paying tribute to it by this arduous trip into the mountains (which, incidentally, made a healthful vacation for them). I found that some of the pilgrims, including a number of sadhus, were habitual worshipers of Vishnu, but were taking part in this Siva ceremony because of a broad belief in the holiness of all such observances.

The Hindus, I learned, regard a pilgrimage as a symbol of man's spiritual search. They have a great many of them, staged in different parts of India and near-by lands. The most arduous leads pilgrims to mount Kailas, on the Tibetan plateau beyond the Himalayas. This takes many weeks; it involves exposure to bandits and the crossing of very high passes; only a few people, comparatively, can fit it into their lifetime.

By contrast, the Amarnath pilgrimage is easy and popular. Yet it is not without its rigors, and indeed its risks. During an Amarnath pilgrimage of the 1920's a freak storm came up and wiped out scores of people. The storm lasted for days, the weather growing colder and more severe. Streams swelled across the trail, and the pilgrims found themselves cut off from food and shelter. The weaker simply died from cold and hunger before help could arrive.

Procession Moves in Easy Stages

For three days we traveled in six- or seven-mile stages. These were rather short for most of us, but they were imposed by the police, who wished to keep the expedition as close together as possible. Besides, the delays and struggles on the trail made each day's trip seem longer than it was. It took the pilgrimage several hours to pass a given point, and

after the main procession stragglers would pass for several hours more.

Our camping arrangements were de luxe, almost shamefully so in comparison with those of most of the pilgrims. We were traveling in the approved style worked out by the British, during their residency in Kashmir, for trekking in the hills. Able guides and servants waited on us diligently. Our staff included a major-domo, a cook, and two lesser servants. They all slept in one tent; I had another tent to myself; and Dick and Mary shared a third. Sam Tata, who had organized his trip independently of us, had a tent and a cook of his own.

Comforts of Home on Mountain Trek

When our staff reached a campsite in the afternoon, they would start at once to pitch the tents and make a fire. Soon they would serve us tea, a mainstay of British-style camping. They could even supply us with hot baths, if we wished, in a little canvas tub.

We had a table and chairs, and we slept on canvas cots made up with sheets and blankets. Our meals were served with full regalia of crockery, cutlery, and napery, though for lunch on the trail we had sandwiches carried in a hamper by a guide.

As we climbed higher into the Himalayas, I wore a couple of sweaters at night and slept under two blankets. But I noted that many sadhus, though they had come but recently from the hot plains of India, slept almost naked in the open, with only a fire to warm one side of them.

Often our path crossed directly over patches of glacial snow, and now and then I saw an old woman walking barefoot all the way, despite the snow, gravel, and sharp rocks. The pilgrimage could be arduous, if one made it so. There was even a one-legged sadhu along, attempting the pilgrimage on crutches. He made fairly good time and always seemed cheerful (page 528).

Many of the little children on the trip were carried by Kashmiri porters, who often had basketwork chairs slung on their backs for this purpose. A couple of times I saw a porter carrying two children, one fore and

Their Cherished Goal in Sight, Hindus Trudge Through Snow

Amarnath Cave pierces the rocky cliff above the line of pilgrims. Stream (right) flows out of glacial snow. Many of the pilgrims bathed in its frigid waters (page 534).

Sam Tata, Black Star

one aft. The porters seemed to treat the children tenderly; in fact the latter slept a good deal of the time.

The Kashmiri Government also provided a mobile post office and mobile first-aid station. A few professional teashops and food shops traveled with us too. They would set up at good halting places before the main body of the caravan got there, and sell tea, cakes, curry, rice, and the like to us when we arrived. The price of wayside tea went up, understandably enough, as we progressed, from two annas to three and even four (an anna being worth a little more than an American cent).

Most pilgrims, however, seemed not to patronize these shops but to live on simple fare they carried with them. Many of them were very poor, I gathered, and had saved up for the pilgrimage over a long period.

Mattan Pandas Manage Pilgrimages

The religious side of the pilgrimage was managed by a special body of men called *pandas*, all of them hailing from Mattan, a town not far from Pahalgam on the highway. Their job is hereditary, and they are part of the Brahman caste (usually called the highest class of the Hindus). I walked for some time with a youth who was the grandson of a Mattan panda—he was entitled to be a panda himself by birth, but had decided not to become one, being inclined toward the scientific outlook.

Holy Men Share in Gifts to Siva

There were about a hundred Mattan pandas traveling with the pilgrimage, he said, and this was their big job of the summer season. In the winter, the young man told me, they often go down to the Indian plains and recruit pilgrims for the following year. Aside from the pilgrimage, they have charge of the Amarnath Cave the year round (though they can't get to it in the winter), and a share of all gifts offered there is set aside for them.

On the trail I also learned a bit more about sadhus from a middle-aged Kashmiri Brahman. This man's wife was along. She was tired, so I lent her my pony for a few miles, while her husband walked with me. He was especially a worshiper of Siva, he said, as were many of the sadhus on the pilgrimage. You could tell the followers of Siva from the other sadhus because they adorned themselves with special symbols: leopard skins, snakes, ropes of hair, and tridents, or three-pronged spears.

My Brahman informant told me that he would always respect, and give alms to, a sadhu who carried the symbols of Siva, even if he knew the man was personally self-indulgent and faithless to his vows.

Most sadhus, he added, live a life of sincere renunciation. To explain their spirit he quoted from Shakespeare's *As You Like It.*

"'Seeking the food he eats,'" he said. "'And pleas'd with what he gets.' That is how a sadhu should be. He should care for nothing but the worship of God."

On our third day out we reached Panchtarni, or "Five Rivers," an upland meadow with good grazing and with snow-clad peaks near by. The snow was powdery and carved in drift shapes by the wind. In the evening it gleamed beautifully under the full moon, but we went to bed early, shutting out the cold.

Last Lap Starts Before Dawn

On the morrow we rose in the small hours, for this was the big day, and many pilgrims wished to reach the cave, still five miles distant, at dawn or not long after. Our party left camp at half past three, starting together but soon getting separated in the press of pilgrims on the trail. Animals were not allowed on this last stage; they would have choked the movement hopelessly.

← Journey's End: Fervent Pilgrims Worship Before Siva's Icy Symbol

Devotees crowd the grotto for a glimpse of the formation created by water seeping from a spring in the rock wall. On a full-moon night in primeval time, they believe, Siva revealed the secret of immortality to Parvati, his wife, in Amarnath Cave. Hindus regard the grayish-white pillar as a living symbol of the god, because it attains its maximum height at full moon.

↓ Flowers, candy, dried fruit, jewels, coins, and silk and velvet garments are strewn before the pillar as offerings.

Sam Tata, Black Star (left) and B. Sata Kosen, F??

It was dark when we started and grew yet darker for a while, for peaks veiled the fading moon. We walked along slowly, close together, often stopping while those ahead filed through a narrow part. Crossing many patches of snow, the trail followed a gorge awhile, and then began climbing a hillside in a series of long switchbacks.

As we walked slowly upward, we could look across the gorge at another hillside facing us in the dark. Someone had lit a fire there, and it stood out like a jewel on black velvet. From time to time, as we climbed, a pilgrim would shout the praises of Siva, and others would take up the cry.

We climbed to the end of the switchbacks and rounded the brow of a hill, and a pilgrim told me we were now in the valley of the cave itself. In time the blackness turned gray, and after a while I made out a set of cliffs and was told that the sacred cave was in them.

Pilgrims Bathe in Icy Stream

The trail descended gradually to a glacier-fed stream, and there I found myself in the company of two young men. One of them wished to tell me something but couldn't speak English, so the other interpreted. The first youth was plainly devout, and overflowing with good spirit and enthusiasm. He taught me some words in praise of Siva and said these would make me immortal if I repeated them often.

Finally, he said the stream itself would give immortality. He urged me to take off my clothes and immerse myself in it—which some of the other pilgrims had begun to do—and he said I could dry myself with a towel he had brought along. I compromised by kneeling down and sloshing my face and head.

The stream, of course, was the purest ice water. Yet I watched an old man, among others, strip down and plunge himself in it thoroughly, again and again. I saw a baby getting bathed in it, too, and screaming mightily.

As I drew near the cave, I could see that it was shallow, rather like a big outdoor stage. The path climbed steeply over gravel and boulders to reach it.

This was the goal, the object of the pilgrimage. There was a growing sense of excitement as we approached it, and I could appreciate the feelings of the devout pilgrims around me. As for myself, I did not know quite what to expect. Then, as I got to the entrance to the cave, I came on a truly astonishing sight.

From the ground at the back of the cave rose a great glistening column of ice. No wonder, I thought, that the shepherds, stumbling unexpectedly on this sight two thousand years or more ago, felt that Siva himself must be present in the cave. For a pillar, or *linga*, as the Hindus call it, is one of the most used symbols of the god. Along with the tridents and leopard skins, it appears on altars and in temples wherever Siva is worshiped.

Column Waxes and Wanes with Moon

The column, formed naturally by water freezing as it flows from a spring in the rock wall of the cave, has stood unbroken and unmelted for centuries. Most of the pilgrims believe, too, that it miraculously waxes and wanes with the phases of the moon. This, I reflected, could also be caused nonmiraculously: ground water, which supplies the spring, might well be affected by the moon, as tides are.

To protect the column, a stout iron fence had been built in front of it. A policeman and several other officials in plain clothes—Mattan pandas—helped to stop worshipers a few feet away from the ice. Many of them, however, threw flowers and other offerings on it, and some of these clung to its surface (page 533).

Pandas Daub Color on Pilgrims' Foreheads

There were no formal ceremonies and no sermons or speeches at the cave, yet an expression of exaltation on the faces of many of the pilgrims showed how they felt. Some simply stood and stared at the linga. Others crowded up to the pandas to give alms and to have spots of colored pigment daubed on their foreheads. All had removed their shoes and stood either barefoot or in stocking feet.

All at once a murmur rose from the crowd, and I saw many of them looking up at the ceiling of the cave, where several pigeons fluttered. These, too, were evidence of the cave's holiness. According to legend, Siva conferred immortality on a pair of pigeons that lived in his cave. These two birds, the pilgrims believed, had made their home there ever since, and might well be among the ones we were looking at.

Some yards distant, outside the fence, there was a narrow entrance to another, smaller

H. Sara Kosan, Pix

Bearded Holy Man Passes Out Sweets to Worshipers Entering the Cave

Some 100 priests, known as pandas, supervise the annual pilgrimage. Their reward is a share of all gifts

cave, and inside it was a sadhu who had lived there steadily, as a hermit, for the past 14 months, according to several of the pilgrims. For much of this time he had been utterly snowbound, but he had kept going by burning charcoal and eating flour made from water chestnuts, having laid in a big stock of both in the preceding summer. There was a pile of charcoal bags outside his cave now. Pilgrims were struggling up into the cave's entrance to have a look at him, for he was thought to be exceptionally holy.

Friendly Farewells Mark Homeward Trip

Finally we started back. At the foot of the steep descent Dick, Mary, and I bought a cup of tea, then continued down along the stream, passing a number of bathers. A thick file of pilgrims was still approaching, and apparently the peak of the flood had not yet arrived. We who were homeward bound left the trail itself for these latecomers—they filled it completely and often had to stand still—and made our own way separately over the rocks and snow.

When we reached the end of the cave's own valley, we rounded the brow of a hill and started down the long switchbacks. These, too, were lined solidly with cave-bound pilgrims. Police were holding them in single file to permit two-way traffic; shortcuts were not permitted on that slope, for the footing was loose.

We walked slowly, and on the way I met a number of people whose company I had enjoyed on the outward trip. I was able to say a few words of farewell to them before the homeward stream bore me past.

The farewells were made in the greatest friendliness, for a sort of Christmas spirit prevailed here near the journey's goal. All the pilgrims were happy and glad that the others were happy, and friendships made on the trip ended in a glow that one could remember warmly.

A New Look at Kenya's "Treetops"

Though Mau Mau Raiders Burned Down the Famous Hotel-in-a-tree, Elephants and Rhinos Still Crowd This Game-watcher's Paradise

By Quentin Keynes

With Illustrations from Photographs by the Author

BABOONS broke in once in a while and tore up the lampshades. But as a rule, Treetops was orderly and comfortable, and in all Africa it was unique: a five-room house with a balcony, set so high in a fig tree that wild animals on the ground could not catch the scent of its occupants.

Elephants, rhinos, and many lesser animals disported almost nightly at the water hole and by the salt lick in the clearing below the structure. Word of so beguiling a view drew visitors from all over the world to this snug hide-out in east Africa's Aberdare National Park, in the Kenya highlands.

From Princess to Queen at Treetops

You entered Treetops on a retractable ladder. Once safely up, you enjoyed tea, dinner, some rest, and then breakfast—all between long looks at uninhibited wildlife. On really dark nights the guide made the animals visible by switching on a dull electric "moon." If neither elephant, nor rhino, nor buffalo showed up, you got your money back.

On February 5, 1952, Princess Elizabeth climbed this ladder. Thousands of miles away in England, her father, King George VI, died in his sleep. The young girl who had gone into the tree house a princess descended the next morning a queen.

Thanks to Treetops' balcony and to almost incredible luck, I had once captured 67 elephants on film there in a single afternoon.* But now, I heard, marauding Mau Mau rebels had left Treetops a charred ruin. Had the animals been frightened away as well? Curious to see for myself, I returned to Kenya not long ago at the invitation of Susie Marrian, a young American friend of mine who farms with her English husband at the edge of the forest.

Peter Marrian met me at Nairobi, and after a 100-mile trip north in his little Cessna plane we landed on a grassy airstrip adjoining his farm. I planned to return to the Treetops clearing with my cameras and see what luck I would have this time, shooting from the ground. But the local Army commander refused to let me do it; there would be danger not only from Mau Mau, he pointed out, but from his own patrols, which could not be notified in time. Even Eric Sherbrooke Walker, the Kenya settler who built Treetops in 1932, had been allowed in only once to inspect its remains.

Hearing that I had arrived near by, Walker asked me to lunch at his farm. "I stayed at the clearing just long enough to pick out some trees for a new Treetops," he told me. "I'd welcome an opportunity to go back."

Luckily, a few days later the Army turned the Treetops section of the forest over to the local police for patrolling. Again I asked permission to visit Treetops.

"If you'll accept a police escort, and don't mind my coming too," police chief John Fletcher said, "my answer is 'yes.'"

It was cold and drizzling when Walker, Fletcher, and two African policemen picked me up at the Marrians' at 2:30 one afternoon. Two farm guards also joined the party. We piled into a couple of Land Rovers, along with Col. George Jarman, who had guided scores of visitors on trips to Treetops.

Elephant Screams at Forest Edge

As we wound our way along slippery farm tracks in the rain, I felt a keen sense of impending danger. This was not lessened by the screaming of an elephant as we reached the forest's edge.

Leaving the policemen in charge of the cars, our party headed single file into the tangled undergrowth beneath the tall trees. Even though we were in a national forest, where hunting is forbidden, everyone except myself carried arms in case of trouble with the Mau Mau.

Every 50 yards or so Jarman would stop dead, signaling us to do likewise. We listened to every sound, straining our eyes to catch

* See "Africa's Uncaged Elephants," by Quentin Keynes, National Geographic Magazine, March, 1951.

Keystone Press

Shortly After the Picture Was Taken, Mau Mau Set Fire to This Lofty Tree House

Undaunted, Eric Sherbrooke Walker, the builder, plans another Treetops Hotel. His new animal observatory will have running water, refrigeration, an electric "moon," and a "tree hostess" to serve meals on dishes that cannot be broken by prowling baboons. Here Walker carries a double-barreled elephant rifle.

the slightest movement in the underbrush. There was much to watch for—not only the Mau Mau, but also rhinos, buffaloes, and snakes. Occasionally we heard elephants breaking branches in the distance.

After what seemed hours, we emerged at the clearing. Not an animal was to be seen.

I walked over to the remains of Treetops. The 30-foot-high trunk of the once proud wild fig tree stood naked but massive as ever against the gray sky. A few truncated limbs thrust jaggedly upward. From them dangled strands of wire netting that had covered the roof and underpart of the tree house, to dis-

Treetops' Jagged Skeleton Overlooks a Water Hole, the Goal of Thirsty Game

A suspicious rhinoceros (left) sniffs the air. Aimless shots fired a few seconds later put the beast to flight.

courage visits from inquisitive leopards and baboons.

The clearing seemed larger than I remembered; apparently, increasing numbers of game had trodden down the bushes around the edges. With excitement I noticed hundreds of fresh footprints made by elephants and rhinos in the mud around the pool. Evidently the game had not been intimidated by air raids on near-by Mau Mau encampments.

Rhinos Perform for Visiting Princess

As I got my cameras ready, I tried to imagine the historic occasion when Princess Elizabeth and her husband, the Duke of Edinburgh, arrived at Treetops to join the renowned Col. Jim Corbett, hunter of man-eating tigers and leopards in India.

During her visit the Princess watched a sparring match between two huffing and puffing rhinos, and a fight in which one waterbuck gored another to death. She later told Corbett that it all added up to her most thrilling experience.

A movement at the edge of the forest cut short my reverie. From the corner of my eye I saw first the ear of an elephant and then its huge body. Within seconds another silently appeared, followed by a third and a fourth. They seemed suspicious and halted a hundred yards away.

Some raised their trunks with unhurried dignity, attempting to get a whiff of us. Because we were downwind from them, this produced no results, and they resumed their stately walk. I hastily snapped two still pictures. Then I obeyed Colonel Jarman's whispered instructions to retreat. He did not have to repeat that order!

As the elephants kept advancing, we crept around the clearing until we had reached a point almost diagonally across from them. By this time, with no more sound than the four beasts had made, many more elephants were streaming into this natural arena—tiny ones which could not have been more than a few weeks old; young bulls hustling each other like teen-agers at a party; sedate old

cows intent only on quenching their thirst in the shallow water (page 540).

I was fumbling with my lenses and awkwardly bending this way and that to catch glimpses of the herd without being spotted myself. Then an enormous bull swayed into view not more than 60 feet from me. He towered over all the others and was plainly in command.

Elephant-magnetic Author

Watching him carefully, I maneuvered myself into a space not obscured by branches. Colonel Jarman protected me with his rifle while I shot some brief motion-picture sequences of the remarkable scene around us.

Walker leaned toward me and said quietly: "Keynes, that is the biggest bull I've ever seen at Treetops!" He was elated. "I've been here a thousand times in the past 23 years, but I can't remember having been among so many elephants on the ground. "Keynes, you're elephant-magnetic!"

He was referring not only to the present scene but to my previous lucky visit, when I had photographed the 67 elephants. Now, again, I was only a few yards from 48 of the lumbering giants. But this time there was a difference in my own position: instead of being safe in the treehouse above the animals, I was among them.

Every now and then, when the herd boss wasn't looking, I popped up from the bushes and tried for shots of elephants right in front of the scorched tree trunk. This was difficult, because I didn't dare go too far out into the open. Also, the light was still poor.

In the midst of one of these attempts, we were all startled by several shots ringing out in the forest. I looked nervously at police chief Fletcher. He looked back, puzzled. No patrols were operating that afternoon. As far as he knew, there was no one in the forest but us and perhaps a marauding Mau Mau band.

The elephants seemed unperturbed. Many had already left the clearing and were browsing on trees deep in the forest. Tugging at my arm, Walker pointed to some massive trees near the burned trunk.

"Look at those blasted elephants! They're destroying the scaffolding of my future house." There was a tremendous crack; a young bull was wrenching off one of the biggest branches that Walker had hoped to use.

The suspense was beginning to tell on me.

Elephants Pass the Ruined Scaffolding. The Photographer Hid in This Thicket

© National Geographic Society

Bull Elephants at the Treetops Water Hole Cross Ivory Swords in Friendly Joust . . .

I found myself wishing the elephants would leave so that we could get out of the forest before it got too dark.

At last the elephants began to leave the clearing, some taking the direction of the Marrians' farm. But two frisky young bulls now started to fight in earnest.

Shots Halt Elephant Battle

One animal pushed the other toward the water, but found his adversary's trunk entwining his own in a viselike grip. I approached the fighting pair and filmed the battle close up.

Again shots went off some distance away. The young elephants separated and left the clearing. We were alone.

"Let's get out of here!" someone said, expressing what we were all thinking. The gunfire had made the atmosphere too tense for comfort.

Just as I was gathering my equipment, there was a rustling beyond the water hole. As if we hadn't had enough excitement for one afternoon, a lone rhinoceros shuffled to the edge of the water. He took a drink and began ambling our way.

Suddenly a string of shots rang out. The rhino looked up in alarm. He turned rapidly, his little tail flicking above his fat rump, and crashed off into the bush.

I was as scared as the rhino. Who was firing at whom? Clearly the shots had not been intended for us; they came from too far away. I wondered whether the Mau Mau were attacking our waiting policemen.

. . . While a Herd Sentry, with Ears Spread, Stands Alert for Sounds of Danger

"Things are getting rather unhealthy around here," John Fletcher remarked calmly. "Are you ready to leave yet, Keynes?"

I was quite ready. We followed one another, bending low along the narrow trail back to the cars. When we had covered half the distance, I began to feel oddly lightheaded. I was certain we were in for a Mau Mau ambush. Well, at least I was approaching death with my boots on.

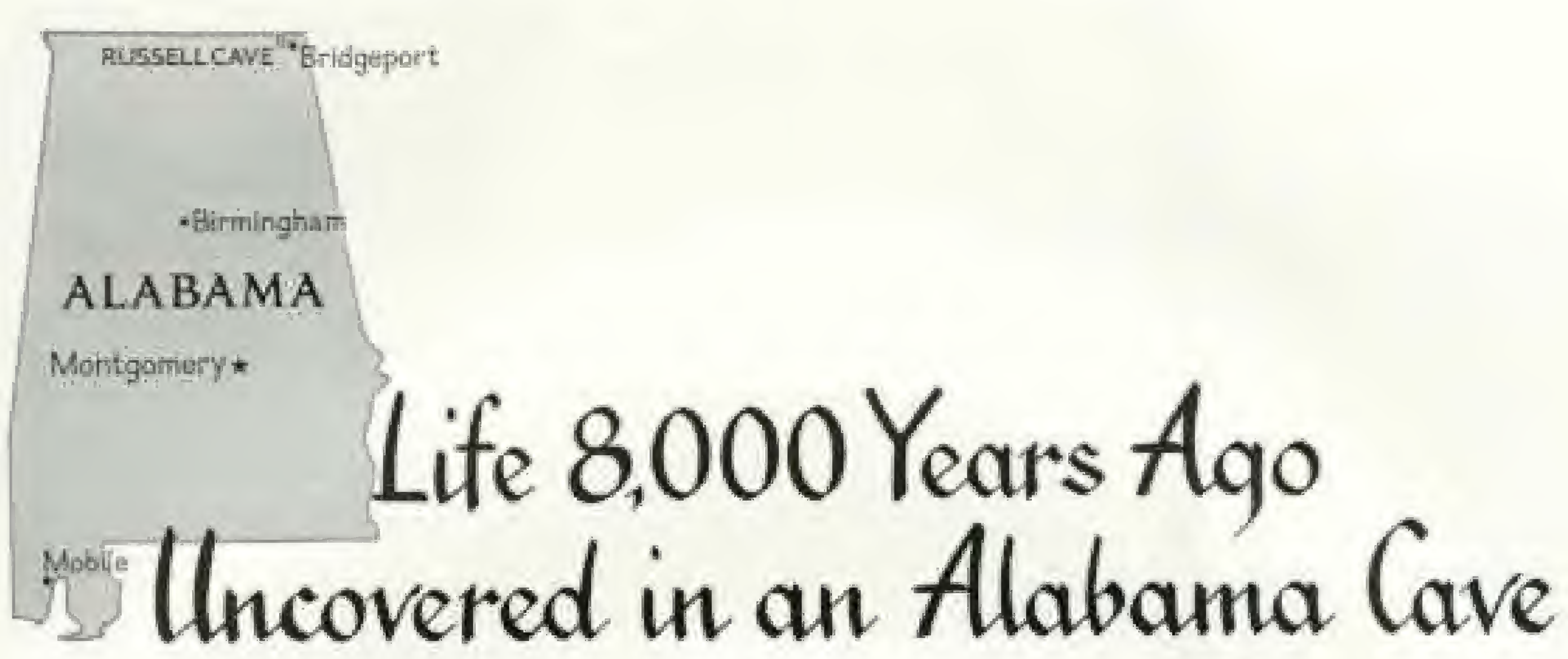
More Gunfire on Return Journey

Two bullets cracked by on my right. We were almost at the edge of the thick undergrowth. Fletcher shouted in loud Swahili to the policemen, who, we hoped, were still guarding the Land Rovers. There was silence. Then two voices answered together. Yes, they were all right, but they were scared so badly they could hardly talk.

Out in the open at last, we inspected the cars. There was no damage. Fletcher's questioning of the Africans produced much incoherent jabber, but he managed to piece together what had happened.

Some elephants, straying from the main herd at the clearing, had come straight for the cars. Scared out of their wits, the men had fired over the heads of the animals to frighten them away.

Back at the farm we enjoyed 5 o'clock tea with Peter and Susie Marrian. My hand shook a bit as I held the cup. But, I told Susie, I wouldn't have missed this opportunity to revisit Treetops for all the Mau Mau in Kenya. After all, I am elephant-magnetic!



Life 8,000 Years Ago Uncovered in an Alabama Cave

A NATIONAL GEOGRAPHIC SOCIETY-SMITHSONIAN INSTITUTION EXPEDITION ALSO REVEALS THE 4,000-YEAR-OLD SKELETON OF A CAVE MAN

By Carl F. Miller, Expedition Leader

MORE than 3,000 years before the building of the Great Pyramid of Egypt, the fires of Stone Age men flickered in a cave in Alabama.

This we now know as a result of excavations under the joint auspices of the Smithsonian Institution and the National Geographic Society which thus far have reached the 14-foot level in a limestone cave on a farm in the northeast corner of the State.

An Archeologist's Dream Come True

Man-made charcoal found there has been tested by the radioactive carbon 14 method and has proved to be approximately 8,000 years old—the oldest material of human origin yet tested from the southeastern United States.

Specifically the test indicates an age of 8,160 years, plus or minus 300. A human skeleton found at the 6-foot level—and also the bones of a dog—are about half as old.

As an archeological site the cave is in many respects unique on this continent. No other site has revealed so detailed a record of occupancy for so long a period—from 6200 B. C. or earlier until about A. D. 1650. Its contents—bones, tools, weapons, and implements—have lain buried for thousands of years, protected from rain, wind, erosion, silting, and flood. They lie where the occupants left them, layer upon layer, a record as easy to read as the tree rings in a giant sequoia.

These layers, clearly visible in the cross section of our excavation, provide us with a slice of history—an archeological book of life—revealing, century by century, the story of

(Continued on page 548)

Russell Cave, → Scene of the Find

↑
33 feet to Earth's surface

Roof

NORTH WALL in CROSS SECTION

Time Scale

Present cave floor

Scale in feet

0

Landing of the Pilgrims A.D. 1620 – A.D. 1650 *Last date of Indian occupation*

A.D.

Birth of Christ

B.C.

Pottery and arrowheads found to 5 feet

1000 B.C.

Human skeleton

5

Great Pyramid of Egypt – 2600 B.C.

Stone pestle and charred remains of basket containing seeds

Sumerian cuneiform writing – 3000 B.C.

4000 B.C.

Fallen limestone slabs

10

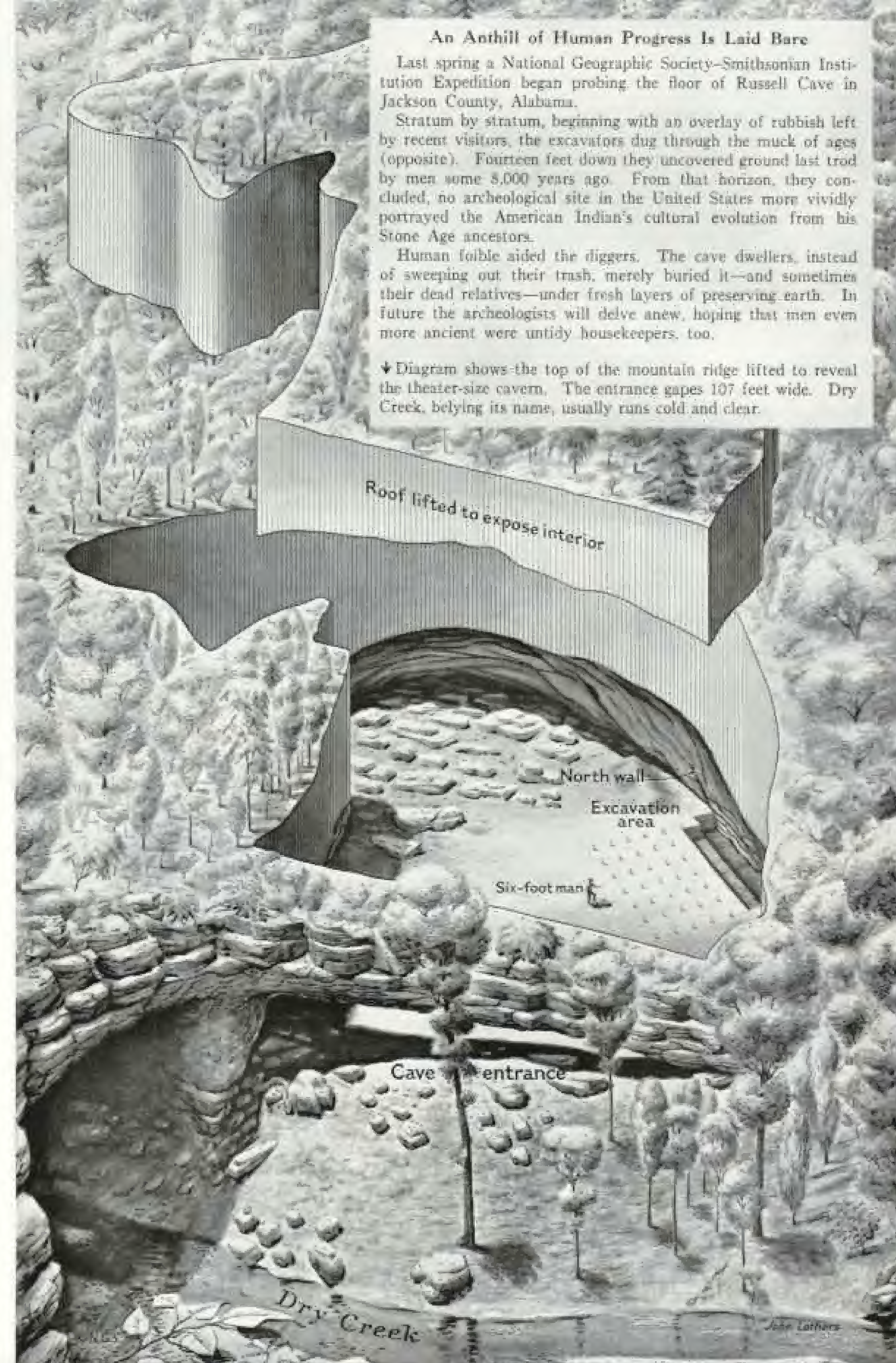
Remains of stone weight used on atlatl, a spear-throwing device (Shown at left)

6000 B.C.

14

Deepest level uncovered (Date established by carbon 14 test of charcoal from ancient campfires)

©N.G.S. Gilbert H. Emerson



An Anthill of Human Progress Is Laid Bare

Last spring a National Geographic Society–Smithsonian Institution Expedition began probing the floor of Russell Cave in Jackson County, Alabama.

Stratum by stratum, beginning with an overlay of rubbish left by recent visitors, the excavators dug through the muck of ages (opposite). Fourteen feet down they uncovered ground last trod by men some 8,000 years ago. From that horizon, they concluded, no archeological site in the United States more vividly portrayed the American Indian's cultural evolution from his Stone Age ancestors.

Human foible aided the diggers. The cave dwellers, instead of sweeping out their trash, merely buried it—and sometimes their dead relatives—under fresh layers of preserving earth. In future the archeologists will delve anew, hoping that men even more ancient were untidy housekeepers, too.

↓ Diagram shows the top of the mountain ridge lifted to reveal the theater-size cavern. The entrance gapes 107 feet wide. Dry Creek, belying its name, usually runs cold and clear.

Diggers Sift the Sands of Time; Stakes Tell Them Where to Work

A vaulted wall, deeply grooved by subterranean waters, overhangs the archeologists' main trench. The ladderlike contrivance separates artifacts by age groups.

←Page 546, lower left: Claud Holloway unearths the skeleton of a 5-foot-2 Indian who died about 2000 B.C. and was buried doubled up on his side.

Right, above: Prehistoric men, making 1½-inch fishhooks from the toe bones of deer, failed to complete the lower one. Below: Cave dwellers sharpened bone awls on this sandstone hone. Grooves shaped the points to various sizes.

↓ Wavy Lines Mark Former Floor Levels

Author Carl Miller (right) inspects a 6-foot cross section spanning some 4,000 years. Dipping strata lines indicate fire pits dug long ago and covered. Bits of charcoal, vital for age tests of radioactive carbon 14, form black specks in the wall. Carbon analysis reveals the age of the earliest explored level as 8,160 years, plus or minus a 300-year margin of error.

© National Geographic Society

Brooks Honeycutt

548 Willard R. Culver, National Geographic Staff

Weapon Tips Found in the Cave Span 7,600 Years

Before 1000 B. C. the bow was unknown to Indians. Only the two small points near the top belonged to arrows. Other heads in this collection were made for spears and knives. All were chipped from chalcedony.

man in this part of America.

Here many generations of cave men squatted and chipped out stone weapons and bone tools and wove baskets of grass. They hunted animals in the woods near by and cooked them on fires under this rock roof. And here they slept at night around their fires, protected by the stone walls from cold and enemies.

Since digging began last May Day, we have uncovered literally thousands of primitive stone, bone, shell, and pottery objects. Interspersed with tools, ornaments, and weapons are the ashes and charcoal from the fires the cave men built.

How It All Began

As so often happens with archeological sites, Russell Cave was first brought to the attention of the Smithsonian Institution by amateurs.

In 1951 Mr. Paul H. Brown, a civil engineer with the Tennessee Valley Authority and an amateur archeologist, heard from a friend in charge of a power-line survey crew about projectile points that had been found along their route. He asked his friend to point out the sites on a map.

Studying the map, Brown noticed that it showed the existence of a cave not far from the Indian sites. It occurred to him that the cave, if habitable, might be a good place to dig for relics.

Two years passed before Brown had a chance to visit the cave. When he did, he took along a fellow member of the Chattanooga Chapter of the Tennessee Archaeological Society. Later they got the

permission of Mr. Oscar Ridley, owner of the farm on which the cave lies, and started digging.

They were astonished and delighted. The first few feet of earth dug from the cave floor were an archeological treasure trove, filled with a profusion of stone points, bone tools, pottery, and shell ornaments. Suspecting they had made a major discovery, they showed their artifacts to Dr. Matthew W. Stirling, Director of the Smithsonian's Bureau of American Ethnology.*

Brooks Honeycutt

Deer Antler Chips Flint to a Deadly Point

Primitive men split flakes from large pieces of flint with hammerstones and then shaped the edges with bone tools. Scientists at the Smithsonian Institution have learned how to duplicate the process.

By good luck, I had an archeological assignment in near-by Tennessee at about this time. At Dr. Stirling's request, I drove to Bridgeport and met Mr. Ridley and Mr. Brown and some of his colleagues. They led me to the cave, which lies beside a cornfield.

Cave Cooled by Natural Air Conditioning

I remember my growing excitement at the first sight of the cave. If there was a place where Stone Age cave men *ought* to have lived, this was it.

Russell Cave stands high and relatively dry in a cliff by the side of a pleasant five-mile-long valley known as Doran Cove. Its mouth, 107 feet across and 26 feet high, faces the east and the morning sun. The cave curves 270 feet into a limestone mountain. Most of its floor is level and smooth, accessible by walking up an easy slope from the valley floor. Best of all, the cave is naturally air-conditioned.

Actually, Russell is the smaller of two caves which gape side by side in the cliff face. The other, which tunnels deep into the mountain, is uninhabitable because a stream, Dry Creek, covers most of its floor. This same stream emerges from the mountainside about two miles away.

A fissure at the rear of Russell Cave connects it with this enormous water-cooled cavern, and through the hole, by natural convection, runs a constant stream of chill air.

When I entered the cave, I saw that Paul Brown and his friends had dug a series of small pits, one of which was six feet deep, but that the fill—that is, the material deposited since human occupancy began—apparently ran a great deal deeper. Just how deep it was impossible to tell.

From an inspection of the cavern and some

Two Spearheads Show How Skill Ebbed

Folsom man, nomad of the Ice Age, fashioned the fluted point at left 10,000 years ago. Alabama Indians made the other 2,000 years later. Most workmanlike of all the points found in Russell Cave, it cannot compare with the Folsom artifact. Folsom levels have not been reached in the cave.

Volkmar Wentzel, National Geographic Staff

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Indians of the Southeastern United States," January, 1946; and "America's First Settlers, the Indians," November, 1937, both by Matthew W. Stirling. Also see The Society's new book, *National Geographic on INDIANS OF THE AMERICAS, A Color-Illustrated Record*, 1955 (second printing now available, $7.50 in the United States and U. S. possessions; elsewhere $7.75. Postpaid)

© National Geographic Society

Brooks Honeycutt

Gasoline Lanterns Cut the Stygian Gloom: Man's Ancient Works Come to Light

Coal miners became enthusiastic archeological workers. The author marveled at their skill in dynamiting boulders without bringing down the roof. Paper bags on the cave floor hold spearheads, awls, and stone knives.

of the artifacts it had yielded, I concluded it was a promising site indeed—as nearly perfect as any I had ever seen. I reported enthusiastically to Dr. Stirling, who in turn described the discovery to the Research Committee of the National Geographic Society.

Society Grant Permits Digging to Start

With a National Geographic grant, I returned to Russell Cave in April, 1956. The Society also sent a photographer, Mr. Brooks Honeycutt, to record the progress of the dig.

Our first jobs were to hire men to help with the digging and to choose and stake off an area to excavate.

We were fortunate in being able to recruit some experienced coal miners in near-by South Pittsburg, Tennessee. Archeological digging and mining coal are far apart in method, yet their mining experience proved invaluable before we were through.

As for choosing an area, after studying the cave we selected a site 30 feet square near the north wall, 60 feet back from the entrance. We picked this spot for a number of reasons. Primarily we chose it because it was a likely place for the cave men to have lived—near enough to the entrance to be light in daytime, far enough back to be out of the wind and rain; secondly, because the surface here was relatively free of large stones.

Treasure Appears on First Day

With a crew of seven men we began the actual digging at 7:30 a.m. on May 1. Almost from the first turn of the first trowel the cave began to yield its treasure.

The first day of digging, in fact, and the first thin layers of fill we removed, took us back more than 300 years. For except on the very top of the cave floor, where we found rubbish left by recent visitors, we saw no traces of any white man's objects. From this we assumed that the topmost Indian deposits must date from about 1650, for not long after that time white traders appeared in the area, selling trinkets: copper bracelets, brass sleigh bells, and glass beads. We found none of these.

For the first several feet our dig produced mainly pieces of broken pottery, or potsherds, and cracked and broken bones of deer, bear, raccoon, turkey, and turtle—the scrapings and utensils from hundreds of primitive meals. The cave man wasted no food. Bones were split to remove marrow, and even skulls were cracked so brain tissue could be dug out and eaten.

There were also small stone arrowheads, finely shaped products of what archeologists call the Mississippian and Woodland periods (roughly A. D. 1600 to 1000 B. C.). As we dug deeper, these disappeared, and we knew we had reached a time before the introduction of the bow and arrow.

Larger stone points, used primarily as spearheads but sometimes doubling as knives, retold a story already familiar to me: that as time progressed, primitive Americans grew less skillful (or less painstaking) at shaping stone (pages 548-9). The finest points are the oldest—the Folsom points of 10,000 or more years ago.

Paper Bags Keep Records Straight

We kept careful records of where each bone and artifact came from. To the layman our methods might seem complex. They certainly did to the miners, who were more accustomed to digging, as the song says, 16 tons a day rather than a few ounces at a time.

We divided our 30-foot plot into smaller squares, each five feet on a side. These were excavated—using a mason's pointing trowel, not a shovel—six inches at a time. Beside each workman stood a paper bag carefully labeled to show which square he was digging and how deep. Each square got a new bag for every six inches of depth.

When a digger found a bone, a stone point, or any other solid object, he placed it in the bag. Each trowelful of dirt was examined, then shoveled into a wheelbarrow and carefully sifted through wire screens to make sure nothing had been missed.

At first the miners, who were being paid better wages than they received for mining coal, regarded this slow progress as a frightful waste of time and money. Left to their own methods, they could have emptied the entire cave in a few days. But gradually they changed their views. As each man found some valuable relic—a polished bone awl, a fishhook carved from a deer's toe bone (page 546), a fragile shell ornament—I would explain its significance to him and sometimes estimate its age. Impressed, the miners competed among themselves to see who could find the best artifacts.

There was also, especially at first, another element of excitement. Many of the men half

The Pit Grows Deeper; Workers Peel Back Layers of Prehistory

Fourteen feet down, the worker beside the measuring rod (left) digs ground where cave men squatted about 6200 B.C. Charcoal left by their fires is the oldest yet tested from the southeastern United States.

Workers struck gluey clay near the lower level. Mud stuck to shoes until men were barely able to walk. Like cooks kneading dough, they squeezed the stuff through their fingers to find artifacts.

Page 552, lower: John Vinson (right) found the skeleton pictured on page 546.

↓ College Students Visit the Archeological Site

Men and women from the University of Chattanooga hear a lecture by archeologist Miller, excavating the site for the Smithsonian Institution and the National Geographic Society. Using a trowel, Mr. Holloway demonstrates the way to keep the pit sides smooth.

© National Geographic Society
Brooks Honeycutt

554 Willard R. Culver, National Geographic Staff

Animal Bones Tell the Story of Ancient Man as a Hunter

Upper: Russell Cave's tenants of 2000 B. C. appear to have esteemed dogs, for they interred them carefully. The large skull came from such a burial. Smaller raccoon skull was crushed for its tasty brain tissue.

Lower: Most layers in the cavern revealed bear bones, including this lower jaw—evidence that Alabama men hunted the animals thousands of years ago.

believed that any turn of the trowel might uncover a hoard of buried gold. Legends passed on from the days of early settlers (among them Thomas Russell, for whom the cave was named) hinted at gold hidden by the Creek and Cherokee Indians who had lived in the area.

Another story, from the early days of Bridgeport, Alabama, told of a train robbery in which two armed men made off with a fortune in gold. A posse tracked them to Russell Cave. Both bandits were killed, but the gold was never found. Was it buried in the cave? If so, we dug in the wrong place, for we found not a nugget.

As we worked our way downward, the pottery showed a change in hardness and decoration. At about five feet it disappeared altogether.

This was significant; it meant we had reached a recognized level of human prehistory, the beginning of Woodland culture and the end of what we term Archaic. The date for this change has been established at about 1,000 years before the birth of Christ.

Time Moves Backward

Gasoline lanterns were our only lights, and as we dug in the dim and shadowy cave the effect was almost as if we were personally traveling backward in time, cut off from the modern world by thick limestone walls. Now, at 1000 B. C., it was fascinating to think of what would be happening in the rest of the world.

About this time King Solomon would be ruling in Israel. The ancient Egyptian civilization along the Nile had already passed its peak. Rome and Carthage would not even be built for another two centuries.

What was it like to live in a cave in 1000 B. C.? From things we found in the Alabama deposits (and from things we did not find), we can deduce a reasonably clear picture of a cave man's daily life.

Since we found no agricultural implements at this depth we surmised he did not grow any of his food. His sole sources of supply must have been hunting, fishing, and gathering of wild grain, nuts, and fruits.

He fished with bone hooks, probably using worms and insects for bait. He cracked mussels and other shellfish. With stone-tipped weapons he killed rabbits, turkeys, raccoons, opossums, deer, and other animals.

His chief pride, however, must have been killing bear—a formidable adversary for a man armed only with a spear. Evidences of this are not only the bones we found at most levels but bears' teeth grooved to be worn as necklaces, doubtless as marks of prestige.

Russell Cave's inhabitants fashioned not only necklaces but rings and ear plugs of stone, shell, and bone, and painted themselves with hematite; chunks of this red ore were found in the cave.

Postholes Hint at Rainproof Shelters

The cave dwellers must have been annoyed, as we were at times, by water dripping from the roof. Though this water apparently is not laden heavily enough with minerals to produce the large stalactites found in some caves, it could have made sleeping uncomfortable. From postholes we found still clearly outlined, we could guess that the cave families protected themselves from the dripping water by erecting some kind of a canopy—probably of hides sewed together.

Fires were built in holes in the cave floor. The depressions are still there, filled with ashes and charcoal. Smoke, incidentally, was quickly wafted away by the same air current that cools the cave in summer. The cave dwellers ate around the fire, and when they finished gnawing the bones, they threw them untidily on the floor.

Eventually the debris from old fires and last month's meals grew too strong for even primitive housewives, and they carried in quantities of earth and covered it all up, laying a clean new floor.

We have assumed, in fact, that much of the fill in the cave must have been carried in for this purpose. It is difficult to see how else it could have been deposited, since the floor seems too high to have been flooded often, and windborne dust could scarcely account for so much material.

Before pottery was devised, the Archaic people depended on hide vessels and baskets, though of course these continued in use to some extent even after pottery. So it was significant that at about seven feet we came upon a basket.

The basket was saucer shaped, about 10 inches in diameter, and made of coiled strands of grass fiber sewed together. It was filled with small seeds, probably some wild grain the cave men gathered and ate. Both seeds and basket were charred.

Removing an object like this from the packed earth of the cave was a delicate operation. After thousands of years it had become extremely fragile—so much so that a brush rather than a trowel would have to be used to remove the dirt around it.

Since it was late in the evening when we found the basket, I decided to wait until morning before trying to dig it out. I did pick up a small loose section of it and some of the seeds.

The miners, by now all confirmed amateur archeologists, were nearly as excited as I was about the discovery. As we drove home that night (most of us commuted to the dig from South Pittsburg, 15 miles away), all we talked about was the basket: how old it might be, what we could learn from its construction and shape, what the seeds in it were.

But when we entered the cave the next morning, we were dismayed to find it gone—basket, seeds, and all. During the night some one had vandalized the cave, not only destroying the basket but also gouging several large holes in the side and floor of our pit. What else he (or they) found and removed we have no way of knowing.

From that time on we were forced to have a night watchman on duty—something I had not thought necessary before, since the relics, though of great scientific importance, have little monetary value.

Cave Man Suffered from Bad Teeth

It was while cleaning up after our night visitors that we found a human burial. If the vandals had dug four inches farther, they would have found him, too—a middle-aged gentleman interred in a semiflexed position. He had been placed some 4,000 years ago in a shallow hole and covered with debris. Limestone slabs had been laid on top of the grave, and these in time had settled and partially crushed the skeleton (page 546).

Of our whole crew, the one who developed the keenest interest in the archeological work was Claud Holloway, a young veteran who had lost a leg in World War II. He now undertook to dig the skeleton out. He spent three days at it, wielding his brush and trowel with almost incredible patience and care.

From a preliminary examination on the site we learned that this cave dweller had been 5 feet 2 inches tall, about 45 years old when he died, and suffering from an advanced case of pyorrhea. A detailed study of the skeleton

at the Smithsonian Institution in Washington, D. C., will eventually teach us much more about this Stone Age American.

Buried with the body were two large projectile points and, oddly, a heavy, cylindrical stone pestle about 12 inches long, used for grinding food—probably wild grain—against a rock mortar.

Interestingly enough, the skeleton of a small dog we found at a slightly lower level had been given a much more careful burial than the man. Its tomb was better built, with a stone base and slab sides to protect the body. It is well established, in fact, that dogs were scarce in this Archaic time, and highly valued for hunting. A broken stone blade had been buried with this one, perhaps as a token of affection.

The deeper we dug, the further back we progressed in time—and the more impatient we grew to progress still further. Archaic culture dates back, roughly, to 8000 B. C. Prior to that we find a culture that includes the very earliest known inhabitants of North America. The term used to designate these people is Paleo-Indian. We were eager to find their traces in Russell Cave.

One of the best known and surest signs of the Paleo-Indian is the Folsom point, a delicately flaked and curiously grooved stone weapon tip quite unlike the points we had been finding. The name comes from the village of Folsom, New Mexico, where such points were first discovered in association with the bones of now extinct animals. Their age has been established at 10,000 years and older (page 549).*

Reward Offered for a Folsom Point

Though Folsom points have been found in the eastern United States—some, in fact, not far from Russell Cave—none has been found undisturbed in company with the charcoal, bones, and other artifacts left by early man. And since a stone object by itself cannot be

* See "Ice Age Man, the First American," by Thomas R. Henry, NATIONAL GEOGRAPHIC MAGAZINE, December, 1955.

Cave Owners and Archeologist Examine a Mussel Shell Worn by an Aboriginal Alabamian

Without the cooperation of Mr. and Mrs. Oscar Ridley, author Miller (center) could not have fathomed the cave men's secrets. This conference took place beside the Ridleys' log smokehouse.

Brooks Honeycutt

dated by the carbon 14 method, the age of a Folsom point can only be determined when it is found with material of organic origin.

Thanks to photographer Brooks Honeycutt, we had some excellent pictures of Folsom points the NATIONAL GEOGRAPHIC MAGAZINE had published earlier. A $25 prize was offered to the man who found the first one.

But as our excitement grew, our progress slowed down. Below the eight-foot level in the cave, the sandy fill in which we had been digging gave way to soft, sticky clay, much harder to work. And in the clay, a little lower, we began running into large limestone slabs, obviously portions of the cave roof that had fallen thousands of years earlier. Some of these weighed tons.

557 Willard R. Culver, National Geographic Staff

With These Bone Awls, Cave Women Fashioned Suits of Skin

Primitive artisans used deer and turkey bones to make household aids. Sharp implements punched holes in skins to receive lacings. Dull one may have helped in leatherworking; grooves decorate its handle.

This was where the previous mining experience of our men proved invaluable. They knew exactly how to break them up with a minimum of damage.

There was a sort of ritual involved. After sticks of dynamite had been strategically placed, a cry would ring out:

"Fire in the hole!"

Everyone would then leave the cave except the man who lighted the fuse. Next came a series of shouts from within:

"Fire number one!"

"Fire number two!"

"Fire number three!"

Then the last man would come running out, and a few seconds later a thundering roar would echo from the cave. Invariably the slab would be knocked into pieces.

I had feared at first that the explosions might cause new rockfalls, or even wreck the dig itself. But, thanks to the skill of the miners, the only damage was to the stones.

The blasting itself delayed us, however, for it left the pit filled with sour-smelling, eye-stinging smoke that took an hour or more to dissipate. We would try to blast, when possible, just before our 30-minute lunch period or before quitting at night.

As we went deeper, the clay grew stickier. It clung to the soles of our shoes, forming great clods that made it difficult to walk. It disintegrated the bottoms of our paper bags, so that a board had to be placed under each one. Finally, sifting became impossible. Instead, each ounce of fill had to be kneaded through the fingers like dough to find the stone and bone artifacts.

$25 Prize Remains Unclaimed

Occasionally one of the men would be sure he had found a Folsom point. He would hold up a muddy object and shout excitedly:

"Hey, Doc! I think I've got it!"

But each time, when the clay was washed off, we were disappointed. Near the 14-foot level, it is true, we were finding projectile points from the earliest Archaic period, and

Willard R. Culver, National Geographic Staff

Imagination Pictures Snail Shells Strung in a Necklace, the Mussel Used as a Spoon

Excavators believe both men and women wore this jewelry. Ring at right neatly fits a man's finger; smaller ring in center served an unknown purpose. Mushroom-shaped plug at top adorned a pierced ear.

some which may also have been used by Paleo-Indians.

We also uncovered, near the lowest level, a pierced stone which I identified as part of an *atlatl*, a primitive spear-throwing device. The name comes from the Aztecs, who used it in hunting and warfare. The smooth, round hole in the stone was probably bored with a hollow reed rolled between the palms, using sand on the tip as an abrasive (page 544).

But we have yet to find a Folsom point, and the $25 prize is still unclaimed.

Mystery Still Lies Underfoot

It is by no means certain that we shall find Paleo-Indians and their relics as we dig deeper. A few inches farther down we may strike bedrock, and that will be that.

If so, Russell Cave will still rank as a major archeological discovery. Other digs have produced older material than we have yet found, and a few have gone deeper, but no other site in North America has provided such detailed stratification covering so long a time span.

In all layers we found not only abundant artifacts and bone relics, but also charcoal. When carbon 14 tests of this charcoal are finished, we will have a unique timetable dating our tools, shells, bones, and ornaments almost century by century.

This will throw new light on the history of the whole southeastern United States—not only its primitive people but its plant and animal life as well.

Judging by the floor level of the unfilled cavern next to it, however, the rock bottom of Russell Cave may lie as much as 26 feet below the present floor. That would leave us 12 feet more to dig.

If men occupied the cave at this lowest level, the importance of the site will be increased tremendously. This is speculation. Only time and more work will tell us what still lies in the ancient soil beneath our feet.

Whatever we find, much credit is due to the men who brought the cave to our attention: Mr. Paul H. Brown, Mr. LeBaron W. Pahmeyer, Mr. Charles K. Peacock, and Mr. J. B. Graham. These four, all members of the Tennessee Archaeological Society, not only recognized the importance of Russell Cave, but also realized that its contents merited study by a national scientific organization.

Shipworms, Saboteurs of the Sea

Scientists Seek Ways to Combat Teredos, Tiny Wood-boring Mollusks That Topple Wharves and Sink Ships

By F. G. Walton Smith

Director, The Marine Laboratory, University of Miami

SHIPS sunk in battle, docks wrecked by aerial bombs, or vessels lost in storms or collisions—all these are visible, audible, and entirely understandable forms of destruction. But ever since man launched his first primitive wooden craft, there has been an equally destructive force at work—unseen, silent, and often unsuspected.

Wherever a wharf or piling stands in salt water or a wooden ship lies in the sea, secret enemies wait to attack. Their activities account for many millions of dollars in damage each year.

The principal villain is an insignificant-looking, soft-bodied creature called the teredo. The shipworm, as it is also termed, enters submerged timbers while very small and grows rapidly inside the wood as it works. Myriads of the creatures riddle the interior until the whole structure has been honeycombed.

Thus, without damage noticeable on the outside, an entire structure may suddenly collapse in as little as three months from the time it was built.

Ship Departs with Dock Attached

The fate of a fishing vessel tied to a San Francisco wharf dramatizes the unseen, unsuspected nature of the shipworm. While its crew went ashore for lunch, not only the ship but part of the wharf drifted away in a heavy wind. Weakened by shipworms, the wharf's underwater timbers had simply broken off.

In tropic seas especially, shipworms multiply so rapidly that the effective life of untreated timber may be little more than six months.

A few years ago a long wooden trestle was built off Sand Island opposite Honolulu Harbor to carry the equipment used in laying a concrete sewer outfall. Since the trestle was needed only temporarily, it was not treated for protection against marine borers. But the shipworms won the race: in less than 70 days large sections collapsed, dropping heavy machinery into the sea.

What kind of creature is this marine subversive? To begin with, it is not even remotely related to a worm. Despite outward appearances, the teredo is a mollusk related to the oyster, clam, and mussel.

At first sight the creature appears to be simply a long, soft, unprotected body. Closer examination reveals that the paired shells common to bivalve mollusks have here become reduced to two small curved plates that lie alongside the head. Most of the shell surface is equipped with rows of fine teeth for rasping away the wood as the animal excavates its tunnel (page 563).

Why structures collapse and boats sink without warning is easy to understand if we look at the burrow itself. Although the borer's home is about a quarter-inch wide throughout its meanderings in the wood, the entrance appears as scarcely more than a pinhole.

At the Marine Laboratory, University of Miami, where marine borers are being intensively studied, it is possible to watch the living shipworm in sea-water tanks. All over the surface of an infested piece of wood tiny tubes, or siphons, stick out. Each pair belongs to a single shipworm. It draws in water for its breathing through one tube and expels the exhausted water with waste products through the other (page 565).

Shipworm Lays 100,000,000 Eggs

Research at Miami has shown that shipworms may become sexually mature within two months of entering the wood. During the course of a year some shipworms release into the water the amazing total of 100,000,000 eggs. Thus the infestation may spread quickly, once unprotected timber provides a home for borers.

In certain kinds of shipworms the eggs develop into larvae inside the burrow of the female. Whichever happens, sooner or later the little borer is swimming about in the water. It is very small, perhaps 1/200 of an inch in diameter. This is the reason why, when it finally enters the wood, only a small burrow need be made.

560 Robert F. Sisson, National Geographic Staff

Pearl-like Head Identifies Shipworm as a Mollusk

Voracious cousin of oyster and clam, the teredo can eat its way with ease through most woods. Twin valves armed with microscopic teeth spell ruin for unprotected ships' bottoms and marine timbers. The average adult measures four to six inches. This teredo, magnified four times, is drawn from a test block at the Marine Laboratory of the University of Miami. Dark wedge on the left of the spherical head outlines the mouth.

As the invader rasps its way into the wood, it grows rapidly and soon makes a burrow about the width of a pencil or wider, according to the species. But in each case the entrance remains no larger than is necessary for the siphons to project.

Thus a boat's planks may seem sound on the outside, even though riddled with worms. When this happens, only one breakthrough at a weak point is necessary to open up an extensive leak and perhaps sink the craft.

To combat the shipworm, it is necessary to know how it operates, so scientists at Miami have been watching the way in which the little creature enters the wood.

Biologist Don Menker, for instance, may dip some of the larvae from a breeding tank and observe them under the microscope as they swim in sea water. At this stage the shipworm is roughly spherical and has two delicate transparent shells, which cover most of the body.

Baby Stops Swimming, Attacks Wood

Gradually giving up its free-swimming career, the baby begins to glide or crawl on wooden surfaces by means of its foot, a long projection like that of a snail.

The tip of the waving fingerlike foot seems to seek out a good spot on the wood. Before long the infant shipworm begins to burrow straight down into the wood, the foot becomes smaller, and, as the burrow progresses, the body lengthens into the adult form. From now on the burrow parallels the surface of the wood.

Looking at the larva, one can envisage the evolution of shipworms from a clamlike ancestor, which, from simply burrowing in mud or sand, began to make shallow holes in wood for its protection. To paraphrase Ogden Nash:

> Some primal shipworm found some wood,
> And tasted it and found it good.
> That is why your cousin May
> Fell with the dock in the sea today!*

There are many different species of shipworms throughout the world. Most of them can survive only in sea water. This accounted for a second period of wharf collapse near San Francisco.

*See *Good Intentions*, by Ogden Nash, Little, Brown and Company, © 1942 by Ogden Nash.

Frank Beardsley, Asbury Park Press

↑ **Teredos Felled This Drawbridge**

Wooden timbers supporting the Brielle, New Jersey, span collapsed without warning in 1946. A motorist, seeing the structure settle, stopped just in time. The 10-year-old bridge had to be replaced.

↓ **Ravaged Pile Betrays the Gribble**

Unlike the secretive shipworm, this easily spotted marine borer attacks the surface of wood, destroying it layer by layer (page 563). Non-boring barnacles also foul this timber at Key West, Florida

Robert F. Sisson, National Geographic Staff

At Mare Island, because of the relative freshness of the water, little damage was done by shipworms until 1919. In that year the rainfall was the lowest in four decades. As a result, salt water came farther and farther into the harbor, encouraging the spread of shipworms upstream.

By the fall of 1919 wharves began to collapse of their own weight, or through the impact of docking vessels. Before anyone realized what was happening, the damage reached a toll of $25,000,000!

Some species of shipworm grow to considerable size. In Australia a marine borer called *Dicyathifer* exceeds an inch in diameter and six feet in length! Fortunately,

Enlarged 14 times

Robert F. Sisson, National Geographic Staff

Looking down the Throat: the Business End of a Teredo Projects from a Test Board

On either side of the mouth appear the twin valves, or shells—movable curved plates with rows of teeth like those of a file (opposite)—which rasp away the wood. Feeding on the wood pulp, the shipworm grows as he tunnels. A sailmaker's needle indicates size.

this monster is restricted in its distribution.

Although teredos cause tremendous damage every year, they also serve a useful purpose—as food. In Thailand, some natives plant pieces of soft wood at the mouths of streams. Later they raise the wood and eat the shipworms inside it. And many Australian aborigines have a high regard for the food value of shipworms. Both there and in the Fiji Islands, teredos are eaten raw (pages 565 and 566).

In addition to the true shipworms, other mollusks bore into wood, though they make only rather superficial holes. For this reason, *Xylophaga* and *Martesia*, as they are called, rarely cause serious damage.

Besides the molluscan forms, other borers damage submerged wood; some of them are capable of doing more harm than the shipworm. Fortunately, their burrows are easily seen, so they give plenty of warning.

The most widespread and destructive of

these is the gribble, a crustacean related to the pill bug and about the size of a grain of rice. This animal bores into wood by means of stout jaws, one on either side of the mouth. Both of them are provided with sets of sharp teeth, which are more conspicuous on the left-hand member. Together the jaws form a rasp and file tool.

The gribble burrows only a fraction of an inch below the wood's surface and can leave through the wide entrance and so infest new wood. As the burrows spread, the wood breaks away, and the gribble starts new burrows under the newly exposed surface. Gradually it penetrates, layer by layer, until the wood is destroyed (page 561).

Ancients Battled Wood-hungry Borers

Marine borers have been a problem since man first ventured onto the sea. From the earliest times, wax, pitch, and tar were used as protective coatings. Records show the use of arsenic and sulphur mixed with oil in 412 B. C.

The Greeks used lead sheathing to protect their ships at least as early as the third century B. C. The vessels of Archimedes of Syracuse had lead sheaths fastened with heavy bolts.

During the time of Edward VI (1537-1553) a description of an exploratory vessel states, "...they had heard that in certaine parts of the Ocean, a kinde of wormes is bredde, which many times pearceth and eateth through the strongest oake that is...[so]...they cover a piece of the keele of the shippe with thinne sheetes of leade..." In the reign of Charles II (1660-1685) it was ordered that lead sheath be used on naval vessels. Unfortunately, by this time iron fittings were in common use on sailing vessels, and the galvanic effect between lead and iron was so bad that the metal parts of the rudders were eaten away. Eventually, lead was abandoned and the time-honored mixtures of tar, pitch, oil, and sulphur came back into use.

Copper sheathing was highly favored during the 18th and early 19th centuries. But increasing cost and the necessity of constant replacement conspired to banish it.

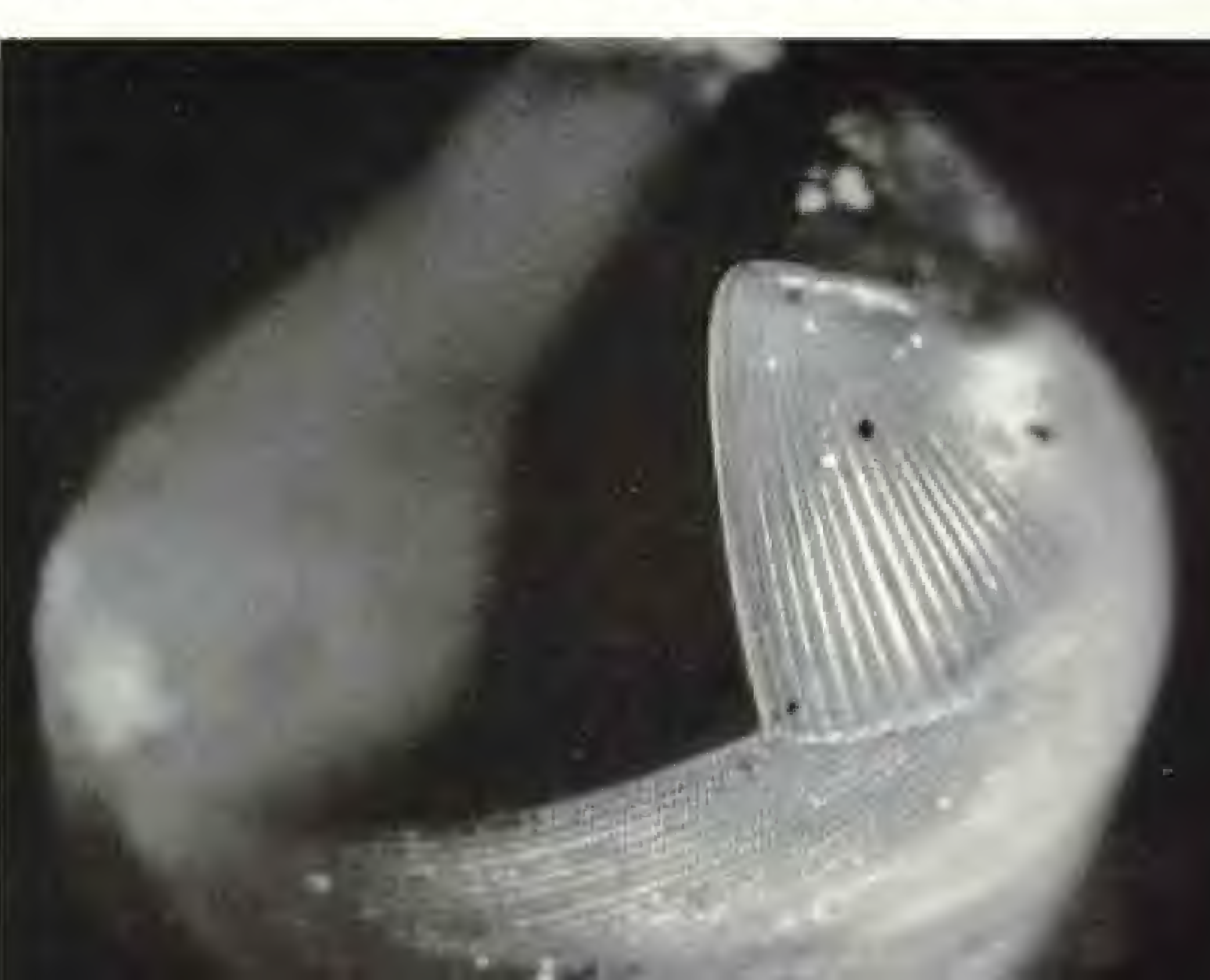
Since then, many attempts have been made to find a treatment for wooden hulls and piles that would keep out the borers.

The many mixtures tried have included quicksilver, plumbago, silicates, gutta-percha, asphalt, shellac, guano, cow dung, clay, fat, sawdust, hair glue, oil, and soot. Various woods, too, have been tried, including eucalyptus, greenheart, and others that have an inherent resistance, either because of tough silica inclusions or natural oils. None has shown complete immunity, though some, like teak, are highly resistant.

At present, pressure treatment with creosote or creosote-coal tar solution is the best method for preserving pilings, while a good antifouling paint affords maximum protection for boats.

Despite the almost world-wide distribution of shipworms, there was little scientific interest in them until fairly recent years, although the damage they caused was recorded as far back as the classical writings of Theophrastus and Pliny.

Some of the questions that call for an answer if the shipworm is to be routed completely are: How does the baby teredo manage, with its delicate shell, to enter the wood? What are the weak spots in the body chem-



Teredo's Teeth Suggest Rows of Seed Pearls

Unlike the clam, whose paired valves serve as its home, this strange mollusk wears toothed shells on its head. Photograph shows most of one "jaw" magnified 100 times.

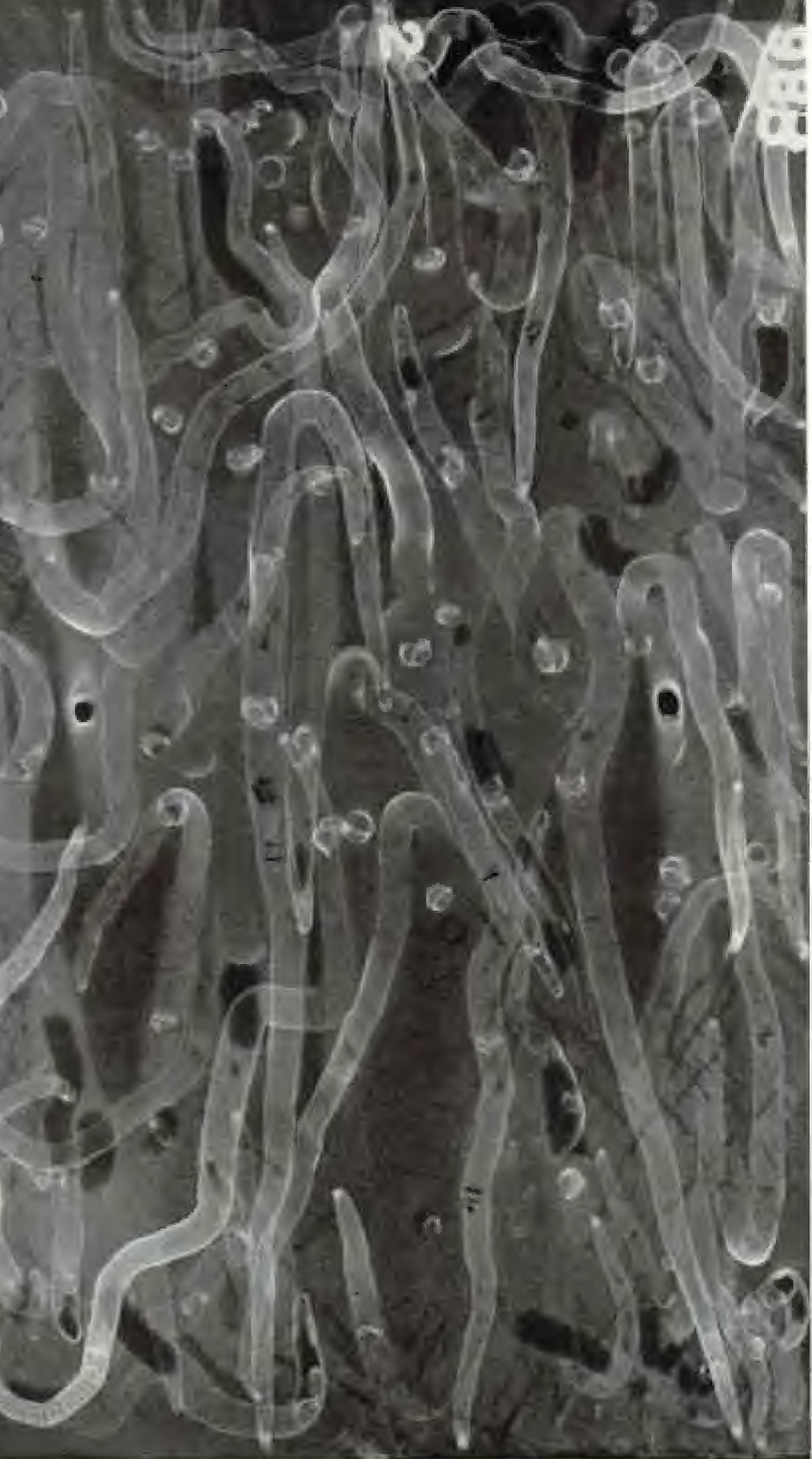
Robert F. Sisson, National Geographic Staff

istry of these creatures that may open the way to an even better protection than creosote? Also, of course, since creosote impregnation affords the most effective protection against shipworms, how does it work?

Creosote is a complex mixture of scores of chemical by-products from the distillation of coal during the manufacture of coke or coal gas. At Miami experiments performed for the Navy have shown that the young shipworm is sensitive to very low quantities of creosote shaken up with sea water. Concentrations of less than one part in a million kill the shipworm in less than three hours at the stage when it is trying to enter the wood.

Dr. Charles E. Lane, of the Marine Laboratory, has devised a delicate and sensitive method to test separate elements of the creosote. Borers are placed in a specially designed piece of glassware and kept under rigidly controlled conditions of temperature. The apparatus, known as a respirometer, measures the rate at which the young shipworm or gribble absorbs oxygen from the water as part of the normal process of breathing. Amounts of creosote too small to kill the borers may be detected with this apparatus through the adverse effect that creosote exerts upon the breathing activity.

In a series of tests Dr. Lane and Edmund Clancey have discovered that concentrations of creosote in sea water as low as one part to 200,000,000



564 — Charles E. Lane

Borers Honeycombed This Timber in 15 Weeks

Shipworms tend to avoid knots and other hard areas in the wood. Their burrows cross but never connect; respiration fails and the animal dies if the tunnel wall is punctured.

University of Miami scientists took this life-size X ray of a test panel submerged in Biscayne Bay. Dark spots at the end of burrows are gas bubbles from dead shipworms. White-tipped, pinhole-size entrances show where teredos began boring as minute larvae. Growth depends upon nature of the wood and surrounding water. These four- and five-inch burrows indicate favorable conditions.

Numerals inked in on photograph record the progress of individuals.

may be detected. Thus it is possible to compare the relative value as borer deterrents of constituents of creosote separated by the chemical work of Dr. Thomas Sweeney at the Naval Research Laboratory.

In other experiments Don Menker and Sigmund Miller, of the University of Miami, are finding the answer to an equally important question. It is plain that creosote is a powerful poison to shipworms. But this is not enough; shipworms might be killed as easily by placing them in a cup of strong coffee—or in fresh water, for that matter. The trick is to find something that is not only poisonous but can be incorporated into the wood

Jane C. Goodale

↓ Tiny Tubes Reveal the Shipworm

With intake and exhaust siphons, teredos draw in water and food and expel waste from burrows. When frightened, they pull in siphons and block the entrance with twin calcareous plugs.

Enlarged 10 times

↑ Melville Islander Downs a Teredo

Australian aborigines eat shipworms "alla same oyster"—raw and on the spot—because they spoil quickly. This diner sucks in the borer, squeezing out mud and wood fragments.

Robert F. Sisson, National Geographic Staff

by some method such as impregnation, the pressure treatment under which creosote is applied.

Even then a problem arises: The shipworm preventive must be so little soluble in water that it will not soak out of the wood over a period of many years. The rate at which creosote and other preservatives leach out of wood is studied in the Miami laboratory by means of accelerated hot-water leaching baths.

Flowing Water Foils Borers

A curious thing about shipworms is that boats that spend most of their time at sea are less liable to damage than those lying in a harbor. A test at the laboratory has shown that there is a simple reason for this behavior.

Water was run through wooden conduits graduated from a wide end to a very narrow end. In this way the water passed over the wooden surfaces at a fraction of a knot at the wide end and gradually increased its speed until it left the narrow end at a rate exceeding two knots. The harbor water entering the conduit was well loaded with baby shipworms, but only the wood at the wide end was attacked. A calculation showed that the borers cannot enter wood unless the current of water passing it is flowing at less than about 1½ knots.

Dr. Lane has confirmed the knowledge that shipworms digest and make use of the wood they excavate. He has also shown that they may obtain food from microscopic sea life, the plankton, which is taken in by way of the little tubes, or siphons, which project from the wood.*

These activities are only part of the battle. Scientists in England, France, Japan, and Australia, as well as in the United States, are attacking the shipworm problem from various angles. The Battelle Memorial Institute, Columbus, Ohio, for instance, is developing X-ray machines for examining pilings below the water for signs of shipworm invasion.

Meanwhile the silent and practically invisible underwater attack goes on. Perhaps one day the tiny teredo, which has plagued man since his ships first took to water, will be brought under rigid control and the many millions of dollars of damage it causes each year will be prevented.

* See "Strange Babies of the Sea," by Hilary B. Moore, National Geographic Magazine, July, 1952.

Delicious! An Australian Aborigine Harvests Shipworms

Teredos in the coastal mangrove swamps may grow several feet long. These are wild shipworms, not the "garden variety" cultivated by some natives (page 562).

© Donald F. Thomson

Kodak
TRADE-MARK

Notable on both sides of the Atlantic—Kodak's Retina IIIc Camera

A world-wide favorite with people who take pride in owning the finer things in life

When you talk to Retina owners—at home or abroad—they will give you a number of different reasons why this camera means so much to them.

Many will call your attention to the Retina's great lens—its ability to produce the ultimate in color slides and black-and-white pictures. Others point out the auxiliary wide-angle and telephoto components, or the built-in photoelectric exposure meter, or the rapid lever-action film wind. The Retina has so many features.

With its complete family of auxiliary aids—starting with the superb telephoto and wide-angle lens components—the Retina represents an outstanding system of photography. Your Kodak dealer will be pleased to demonstrate. See him at your earliest opportunity.

Eastman Kodak Company
Rochester 4, N. Y.

The Kodak Retina IIIc Camera with Retina-Xenon C 50mm f/2 lens, $190. The Retina IIc with f/2.8 lens, $139.50. Also available: 35mm f/5.6 Curtar (wide-angle) and 80mm f/4 Longar (telephoto) lens components; 35—80 optical finder. Ask your Kodak dealer about small down payment and easy terms. *Prices include Federal Tax, are subject to change without notice.*

Can your office safe pass this free

"Risk Detector" Test?

FIND OUT. The amazing Mosler testing device shown above tells you in 2 to 5 minutes if your office safe really is a safe place for your records. Flashes up to 15 warning signals if it isn't. Stop *wondering* what would happen to your accounts receivable and other business records if a fire ever started. Find out. Then rest easy . . . or *know* what you should do. Mail coupon, right now, for your free Mosler "Risk Detector."

IF IT'S MOSLER . . . IT'S SAFE

The **Mosler Safe** Company Since 1848

World's Largest Builders of Safes and Bank Vaults

FREE!

The Mosler Safe Company, Dept. NG-74
320 Fifth Avenue, New York 1, N. Y.
Please rush a *free* Mosler "Risk Detector" to me at once.

NAME . . . .

POSITION . . . .

COMPANY . . . .

ADDRESS . . . .

CITY . . . . ZONE . . . . .

STATE . . . .

TAKE COLOR PICTURES
in 3 popular sizes

Large Super Slide transparencies, fit 2 x 2 projectors and viewers.

Rolleicord
the fine camera for everyone

The *only* camera with this versatility . . . large 2¼" x 2¼" size for best color prints . . . big 38 x 38 mm Super Slide transparencies for viewing and projecting . . . and 35 mm size as well. The same versatility for black and white. See Rolleicord at dealers, or write for literature showing why Rollei is the best camera for you.

Burleigh Brooks, Inc., 10 W. 46th St., New York 36, N.Y.
PONDER & BEST, INC., 814 N. Cole Ave., Hollywood 38, Calif.

ENGINEERS are "King" at Douglas

Douglas Aircraft is an "engineer's outfit." The three top executive positions are held by engineers. And every effort is made to give engineers the kind of work they like best. Why not write us about opportunities in aircraft or missile research, design, development and testing?

Send resume to
C. C. LaVene
Box 620E
Santa Monica, Calif.

automatic dictation is here!

NEW

★★★★ HIGH FIDELITY

COMPTOMETER COMMANDER

dictation-transcription machine by Comptometer with amazing UNIMATIC remote-control microphone

... makes dictating as easy as talking—An electronic miracle in the simplification of dictation has been achieved by Comptometer. Now you can forget the mechanics of recording and have your mind free and clear for better dictation. All you do is talk into the Unimatic remote control microphone which fits the palm of your hand. One simple button lets you dictate, listen, reverse to review, or even to "erase" and replace a word or phrase. When finished dictating, press other button to mark length of letter—everything is automatically recorded by remote control.

... saves more than it costs—The flexible Mylar* magnetic recording belt can be used for thousands of dictations. It "wipes" clean in just one second, ready for re-use. The day-after-day savings over costly ordinary one-use belts or records more than return your Commander investment. And only Comptometer guarantees these mailable belts for life.

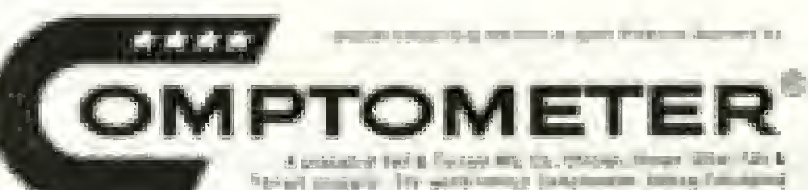
... erases unwanted words—You will hand your secretary error-free dictation she will transcribe twice as fast and right the first time. Error-free because you can electronically "erase" any unwanted part of your dictation and replace with the new or correct thought—No extra correction instructions to add. And, for economy-minded offices, the same Commander unit can be used for both dictation and transcription.

SEE ALL THESE YEARS-AHEAD FEATURES DEMONSTRATED IN YOUR OWN OFFICE!

NEW! NEW! NEW! NEW! NEW! NEW!

NEW! Dual speakers — NEW! Modern design

NEW! Removable cover — NEW! Lighter weight — NEW! High Fidelity



Also available in Canada

Comptometer Dictation Div., Felt & Tarrant Mfg. Co., 1710 Marshfield St., Chicago 22, Ill.
Gentlemen: Without any cost or obligation please arrange:
☐ FREE DEMONSTRATION ☐ FREE 10 DAY TRIAL ☐ Send complete information

Name ______ Title ______
Company ______
Address ______
City ______ County ______ State ______

complete with case

Simplified WESTON (direct reading) EXPOSURE METER

The best meter for travellers and occasional camera users because it's *so* compact, so simple to use. Instantly gives correct lens setting for crisp, true-to-life exposures, *with no calculations or effort on your part.* Use it for color or black and white, with still cameras, stereo, movie or Polaroid-Land. Made by Weston—your assurance of perfect photography, always. At all photo dealers.

WESTON EXPOSURE METERS

See the Satellites, Stars, Planets Close Up!

Assemble a BIG 100 POWER, 3" REFLECTING TELESCOPE . . . with This Complete 87 Piece "Do-It-Yourself" Kit

[illegible]

Stock No. 85,025-D . . . . . . $29.50 f.o.b. Barrington, N. J.

WRITE FOR FREE CATALOG—D

EDMUND SCIENTIFIC CORP. • Barrington, N. J.

Step in your HomeLIFT, press the button . . . in a few seconds you *step out* at the next floor. Enjoy *one*-floor convenience in your multi-story home. Easy to install and operate. Write for facts or phone your SW dealer.

SHEPARD WARNER ELEVATOR COMPANY
5004 Brotherton Road, Cincinnati 9, Ohio

to: EDUCATORS *and* PARENTS *of school-age children*

As a reader of this Magazine you well know *its* value in education . . . but we'd also like you to get acquainted with GEOGRAPHIC SCHOOL BULLETINS, a weekly, 5-article Society publication for classroom and home study.

Ideal for the busy teacher, useful for the helping parent, BULLETINS bring extra advantage to the progressing student. Indeed they are designed for him—to enliven and develop his interest in geography, history, social studies, and science. In concise, illustrated articles he (or perhaps it is she!) will ride with gauchos of Uruguay . . . tap rubber in Liberia . . . peer at Mars sweeping close to earth.

Published throughout the school year as an Educational Service of The Society for:

teachers . . .
. . parents . .
. . . students!

☐ Special 3-year Rate: U. S. only, $2.00 for 90 issues

☐ 1-Year Rate 30 Issues: U. S., 75¢; Canada, $1; Elsewhere, $1.25

Enclosed find $_____ for _____ subscription(s) to GEOGRAPHIC SCHOOL BULLETINS

Name____________________

Address____________________

NATIONAL GEOGRAPHIC SOCIETY
department 610 • Washington 6, D.C.

If you are longing for a vacation you'll cherish forever, Europe is the place to go. And modern transportation makes a European holiday possible even within a limited length of time. Whenever you go, you'll find a refreshingly different world, a gracious way of life and genial people, adept in the art of making you feel at home. But if you go in the FALL, WINTER or SPRING, you'll avoid the peak tourist crowds and see Europe as the Europeans know it. Then, too, transportation and reservations are easy to obtain.

A holiday in Europe costs less than you might think!

See your Travel Agent now! For further information, write each country in which interested; Address: National Tourist Office (Name of Country) Box 258, Dept. N-1, New York 17, N. Y.

EUROPEAN TRAVEL COMMISSION

AUSTRIA • BELGIUM • DENMARK • FINLAND • FRANCE • GERMANY • GREAT BRITAIN
GREECE • ICELAND • IRELAND • ITALY • LUXEMBOURG • MONACO • NETHERLANDS
NORWAY • PORTUGAL • SPAIN • SWEDEN • SWITZERLAND • TURKEY • YUGOSLAVIA

ONLY YOU CAN SPEND YOUR

NCB TRAVELERS CHECKS

That's because you sign your name on them when you buy them at your BANK. That makes them YOURS and yours alone. And here are important reasons why travelers have favored this famous travel currency for over half a century:

Welcome around the globe like cash • Promptly refunded if lost or stolen • Backed by America's leading world-wide bank • Issued in $10, $20, $50 and $100 denominations • Buy them at your bank

FIRST NATIONAL CITY BANK TRAVELERS CHECKS

Backed by The First National City Bank of New York
Member Federal Deposit Insurance Corporation

RECOMMENDATION FOR MEMBERSHIP

PLEASE FILL IN BLANK BELOW, DETACH, AND MAIL TO

The Secretary, National Geographic Society
Washington 6, D. C.

______________1956

I nominate ______________________________
PRINT NAME OF NOMINEE

____
STREET

____
CITY, ZONE, & STATE

____
OCCUPATION

for membership in

NATIONAL GEOGRAPHIC SOCIETY

Membership dues, which are for the calendar year, include Subscription to the National Geographic Magazine.

____
PRINT NAME OF NOMINATING MEMBER

____
ADDRESS

Please fill in these spaces IF this is a GIFT membership:
I enclose $__________ for nominee's dues. Please send gift announcement card in my name to my nominee: ☐ Yes. ☐ No.

DUES: Annual membership in United States, U.S. Poss., and Canada, $6.00; countries in the Postal Union of the Americas and Spain, $6.50; British Isles, £2 10s 0d British sterling ($7.00); elsewhere, $7.00. Life Membership, $150.00 U.S. funds. Make remittances payable to and send direct to National Geographic Society. 10-56

LINGUAPHONE for LANGUAGES

THE NATURAL WAY TO LEARN

FRENCH • SPANISH • GERMAN ITALIAN • MODERN GREEK RUSSIAN—any of 34 languages available by Linguaphone, The World's Standard Conversational Method

Learn another language AT HOME as easily, naturally as you learned English before you went to school. Modern, life-like recordings transport you to another land. You LISTEN—you hear 8 to 12 of the world's best up-to-date native language teachers speak—YOU understand—YOU SPEAK. You learn to read and write. You can learn in only 20 minutes a day.

Used internationally by schools, colleges, governments and business firms. Over a million home-study students of all ages have learned another language this natural, conversational way. Send for FREE BOOK, "Passport to a New World" and details of FREE TRIAL.

LINGUAPHONE INSTITUTE, T-253-106 Rock. Plaza, N. Y. 20, N. Y.

YOU CAN STILL GET KODAK PROCESSING BY MAIL!

KODACHROME 35mm 16mm 8mm

MAIL FILM TO US FOR FAST, DEPENDABLE SERVICE

35mm 20 EXP. ROLL, $1.50 35mm 36 EXP. ROLL, $2.50

U.S. Orders Returned 1st Class Postpaid

Send for Free Film Mailer and Complete Price List

COLOR PRINTS from KODACHROME EKTACHROME ANSCOCHROME ANSCOCOLOR **25¢** 2½ X 3½

3½ X 5 **45¢** | 5 X 7 **$1** | 8 X 10 **$2**

Min. Order, $1 No COD, please.

Anscochrome—Ektachrome Processed 35mm, 120, 620—$1

Duplicate 35mm Slides, 25¢ MONEY-BACK GUARANTEE

Authorized Ansco Color Laboratory—Kodak Dealer

COLORFAX LABORATORIES

1160-G Bonifant St., Silver Spring, Md.

Quick Easy Way to Clean False Teeth

NO BRUSHING

You will never be without ORA once you discover how safely and quickly it cleans dentures and bridges without dangerous brushing. It banishes the risk of unpleasant "denture breath"—makes mouth tissues feel so comfortable because your denture is sparkling clean! It's easy, quick. Just place denture in denture bath or glass of water with one-half teaspoonful of ORA for 15 minutes or overnight—no brushing needed. ORA is pure, contains no tell-tale flavoring and costs less than a penny a day. Get the large economy size at your drugstore, today.

A product of McKESSON & ROBBINS

Removes unsightly tobacco stains

FOR YOUR LIBRARY—FOR THOUGHTFUL GIVING, TOO—

"the Book of Fishes"

This famous book adds pleasure to fishermen's sport and opens a fascinating underwater world to all readers. Edited by John Oliver La Gorce, it brings you 15 engrossing chapters of high adventure and practical information—identifying 236 species of game and food fishes and other aquatic life in United States salt and fresh waters.

- 159 full-color pages
- 116 color paintings
- 91 color photographs
- 340 pages, clothbound

$6.50 in U.S. & Poss. Elsewhere $6.75 in U.S. funds. Postpaid.

NATIONAL GEOGRAPHIC SOCIETY

Department 610 • Washington 6, D. C.

Enclosed please find $________ for which send me ______ copies of THE BOOK OF FISHES.

Name ____________________

Address ____________________

Just calling up can brighten your day

The telephone can be priceless in emergencies. It's the world's best helper when it comes to saving time, trips and trouble.

But one of its greatest uses has nothing to do with sudden need or calls to the grocer, dentist, hairdresser, electrician, department store, etc.

It's to bring friends and families together.

Just to be able to lift the receiver and talk to others is one of the joys of the telephone.

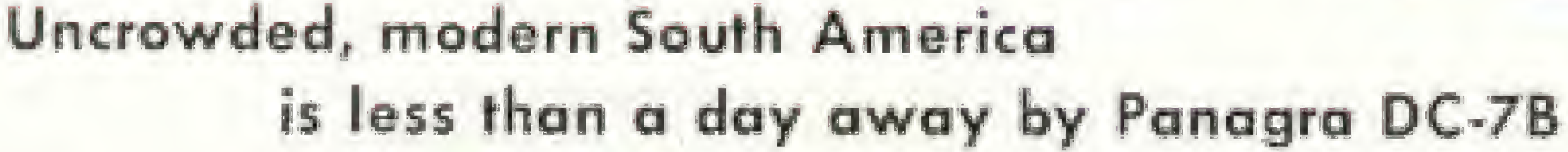
Isn't there some news you'd like to share with someone right now? And hasn't that someone some news you'd like to hear?

A telephone call that costs so little can do so much to brighten the day at both ends of the line.

BELL TELEPHONE SYSTEM

TUNE IN "TELEPHONE TIME"... the TV program with John Nesbitt's real life stories the whole family can enjoy together... Every Sunday over CBS.

Your dollars go farther than ever in the friendliest continent of them all



Ultramodern hotels offer low rates and pleasing old-time service. No wonder experienced tourists who've discovered South America call it the "friendliest" continent of them all.

You can visit the fabulous Argentine-Chilean lake district, colorful cities, sunny beaches. Favorable exchange rates in countries on Panagra's route . . . plus new excursion fares, *30% off*, create low-cost tours that include modern hotel rooms, sightseeing, round-trip flights.

For example, 28 days 'round South America $924 from New York—for each of two, on new Pan Am Holiday #703. You fly *El Pacifico* DC-6B, or for slightly higher fare *El InterAmericano* DC-7B with radar. Both fly daily.

No change from New York to "B.A." over the routes of National, Pan Am and Panagra. Call your Travel Agent or PAA, U. S. Sales Agent for

PAN AMERICAN-GRACE AIRWAYS

"Coke" is a registered trade-mark. Copr. 1958 The Coca-Cola Company.

Coca-Cola puts you at your sparkling best

With Coca-Cola on hand, ice-cold, you're always ready to serve your guests the refreshment almost everyone prefers. With its real great taste and delightful little lift, Coke puts your friends and you at your sparkling best. Nothing else says "Make yourself at home" quite like serving Coca-Cola.

"BRING HOME THE COKE."