NUMBER ONE

THE NATIONAL GEOGRAPHIC MAGAZINE

JANUARY, 1950

Peerless Nepal—A Naturalist's Paradise

With 8 Illustrations and Map — S. DILLON RIPLEY
30 Natural Color Photographs — VOLKMAR WENTZEL
1 Painting — WALTER A. WEBER

From Indian Canoes to Submarines at Key West

With 12 Illustrations and Map — FREDERICK SIMPICH
17 Natural Color Photographs — J. BAYLOR ROBERTS

Shores and Sails in the South Seas

With 9 Illustrations and Map
17 Natural Color Photographs — CHARLES ALLMON

New Life for the "Loneliest Isle"

With 2 Illustrations and Map
13 Natural Color Photographs — LEWIS LEWIS

El Sangay, Fire-breathing Giant of the Andes

With 16 Illustrations and Map — G. EDWARD LEWIS

Sixty-four Pages of Illustrations in Color

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

$5.00 A YEAR — 50c THE COPY

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDING

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

GILBERT GROSVENOR, President
ROBERT V. FLEMING, Treasurer
HERBERT A. POOLE, Assistant Treasurer
LYMAN J. BRIGGS, Chairman, Research Committee
ALEXANDER WETMORE, Vice-Chairman, Research Committee

JOHN OLIVER LA GORCE, Vice-President
THOMAS W. McKNEW, Secretary
VERNON H. BREWSTER, Assistant Secretary
MELVIN M. PAYNE, Assistant Secretary
KURTZ M. HANSON, Assistant Secretary

EXECUTIVE STAFF OF THE NATIONAL GEOGRAPHIC MAGAZINE

GILBERT GROSVENOR, EDITOR

JOHN OLIVER LA GORCE, Associate Editor

J. R. HILDEBRAND
Assistant Editor

MELVILLE BELL GROSVENOR
Assistant Editor

JAMES M. DARLEY
Chief Cartographer

NEWMAN BUMSTEAD
Research Cartographer

CHARLES E. RIDDIFORD
Cartographic Staff

WELLMAN CHAMBERLIN
Cartographic Staff

RAYMOND W. WELCH
Director of Advertising

GILBERT G. LA GORCE
Assistant Director of Advertising

FREDERICK SIMPICH
Assistant Editor

LEO A. BORAH
Editorial Staff

FREDERICK G. VOSBURGH
Editorial Staff

LEONARD C. ROY
Chief of School Service

WILLIAM H. NICHOLAS
Editorial Staff

F. BARROWS COLTON
Editorial Staff

INEZ B. RYAN
Research Assistant

GEORGE CROSSETTE
Research Assistant

WILLIAM A. KINNEY
Chief News Bulletin Service

FRANKLIN L. FISHER
Chief Illustrations Division

MAYNARD OWEN WILLIAMS
Chief Foreign Editorial Staff

W. ROBERT MOORE
Foreign Editorial Staff

LUIS MARDEN
Foreign Editorial Staff

EDWIN L. WISHERD
Chief Photographic Laboratory

WALTER MEAYERS EDWARDS
Illustrations Division

KIP ROSS
Illustrations Division

MASON SUTHERLAND
Editorial Staff

BOARD OF TRUSTEES

GEORGE C. MARSHALL
General of the Army, Retired
Formerly Secretary of State

WALTER S. GIFFORD
Chairman of the Board, American Telephone and Telegraph Co.

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

LYMAN J. BRIGGS
Director National Bureau of Standards, Retired

ELISHA HANSON
Lawyer and Naturalist

EMORY S. LAND
Vice Admiral Construction Corps, U. S. Navy, Retired; President, Air Transport Association

GEORGE R. PUTNAM
Commissioner of Lighthouses, Retired

FRANKLIN L. FISHER
Chief Illustrations Division, National Geographic Magazine

ROBERT V. FLEMING
President and Chairman of the Board, Riggs National Bank

CHARLES F. KETTERING
President General Motors Research Corporation

LEROY A. LINCOLN
President, Metropolitan Life Insurance Company

JUAN T. TRIPPE
President, Pan American Airways

DAVID FAIRCHILD
Special Agricultural Explorer, U. S. Department of Agriculture

ALEXANDER WETMORE
Secretary Smithsonian Institution

GILBERT GROSVENOR
Editor of National Geographic Magazine

MELVILLE BELL GROSVENOR
Assistant Editor, National Geographic Magazine

H. H. ARNOLD
General of the Air Force, Retired

CHARLES G. DAWES
Formerly Vice-President of the United States

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

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

ERNEST E. NORRIS
President Southern Railway System

JOHN OLIVER LA GORCE
Associate Editor of the National Geographic Magazine

J. R. HILDEBRAND
Assistant Editor, National Geographic Magazine

THOMAS W. McKNEW
Secretary, National Geographic Society

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded sixty-one years ago the National Geographic Society publishes this 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.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for three hundred years.

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

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society-U. S. Army Air Forces Expedition, from a camp in southern Brazil, photographed and observed the solar eclipse of 1947. This was the seventh expedition of The Society to observe a total eclipse of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted $25,000, and in addition $75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

One of the world's largest icefields and glacial systems outside the polar regions was discovered in Alaska and Yukon by Bradford Washburn while exploring for The Society and the Harvard Institute of Exploration, 1938.

Copyright, 1949, by National Geographic Society, Washington, D. C. International Copyright secured. All rights reserved. [illegible] 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. Marca Registrada.

Studebaker Commander 4-door sedan

This Studebaker's "next look" is a years-ahead look!

GIVE your new-car money an opportunity to buy you the utmost in value this time.

Stop in and go out for a trial drive in this low, long, alluring, new 1950 Studebaker.

It's the aerodynamic "next look" in cars as well as the deep-cushioned "next ride" in cars.

This new Studebaker's designing is trim and sleek. Its wear-resisting craftsmanship is solid and sound. Both help substantially to keep down your outgo for gas and repairs.

Step into a showroom and see the low-price Champion and value-packed Commander sedans, coupes, convertibles—the special extra-long-wheelbase Studebaker Land Cruiser.

NEW 1950 STUDEBAKER

America's most distinctive car

White sidewall tires and wheel discs optional at extra cost

Rich nylon seat upholstery gives distinctive charm to the interiors of Studebaker regal de luxe Commanders and the special, ultra-luxurious, new 1950 Land Cruiser sedans.

Rough going? Not for a Studebaker! Every ride in a 1950 Studebaker is a relaxing, restful, cushioned ride. A brand-new kind of coil spring suspension is one reason why.

Youngsters love those big windows! And so do grown-ups! Huge areas of glass mean safer driving—a panoramic outlook on the passing scene that everyone enjoys.

Studebaker craftsmanship begins early! Many fathers at Studebaker are carefully schooling their own sons to work with or succeed them.

Studebaker Corp'n, South Bend, Ind., U.S.A.

How a Country Doctor Won a Battle

A PLAIN country doctor with a burning ideal . . . a big-hearted man who too often had seen misery and privation move into homes when men died . . . a man of decision who resolved to do something about it . . .

Such a man was Julius Dewey. And, on his own ground, he won a major battle — against ignorance and prejudice — a battle less spectacular, perhaps, but of even greater lasting benefit than that won by his Admiral son in Manila Bay half a century later.

Good causes attract worthy champions . . . and life insurance found an early and staunch advocate in the Vermont doctor. A new idea then, it was looked upon with doubt, suspicion, even open hostility. As he made his daily rounds, Dr. Dewey talked quietly with his friends about this new kind of family protection . . . explained what it could mean to them in simple, understandable terms of hope and security and freedom from want.

On January 17, National Life celebrates the one hundredth anniversary of its founding by Julius Dewey and his friends. Ninth oldest life insurance company in the land, it is today the nationwide institution of the Doctor's dreams. 200,000 policyholders now own more than one billion dollars of National Life protection. They face the future with confidence, knowing they will share in the continued progress of their sound, mutual Company.

Accept this Free Picture Book with Our Compliments — "THE STORY OF OLD VERMONT" — new edition of National Life's popular picture book. Features famous figures and events from New England's historic past — interesting, educational, inspiring. For your free copy, address a penny postcard to: National Life Insurance Company — Dept. 60. — Montpelier, Vermont.

"SOLID AS THE GRANITE HILLS OF VERMONT"

NATIONAL LIFE
Insurance Company · MONTPELIER · VERMONT

FOUNDED IN 1850 · A MUTUAL COMPANY · OWNED BY ITS POLICYHOLDERS

You'll Remember Oregon!

Commercial bulb fields in bloom, as well as multi-hued wildflowers, add seasonal color swaths along Oregon's holiday routes. This daffodil field, below Mount Hood's snow-crowned peak, is in Northwestern Oregon, near Gresham.

Oregon's mountain ranges offer extra-long seasons of winter sports. Here skiing enthusiasts await a helpful rope tow at Tollgate, in the Blue Mountains recreation area of Northeastern Oregon.

Exciting things to see and do will make every day of your vacation in evergreen Oregon a treasured memory. You will thrill to the beauty of deep, cool lakes that mirror snowy mountain ranges... world-famous stands of towering virgin forestland... the awesome grandeur of the Columbia River Gorge... the unforgettable blue of Crater Lake.

From easy-driving highways you will enjoy breath-taking viewpoints along the 400-mile Oregon coast highway; weird geological formations on the high Central Oregon plateau; sparkling-clear rivers and waterfalls. Plan to visit this friendly Pacific Northwest holiday-land soon—and be sure to bring your camera.

SEE ALL OF

Oregon

BY TRAVELING SCENIC HIGHWAYS

Travel Information Dept., Room No. 10
State Highway Commission, Salem, Oregon

Please send free booklet to:

Name ______

Address ______

City ______

Zone ______ State ______

A GREAT FUTURE . . . Down South

BUT crystal balls and seventh sons of seventh sons aren't needed to forecast that new industries will have an exciting, rewarding future in the South.

Even casual observers say, "Here's a land that's going places!" . . . after seeing the record of the South's spectacular, continuing industrial growth . . . after examining its wealth of natural resources and advantages . . . after watching its skilled workers eagerly turning out an ever-increasing volume of new products in the countless new factories that already dot the landscape along the Southern Railway System.

"Look Ahead—Look South!"

Ernest E. Norris
President

SOUTHERN RAILWAY SYSTEM

The Southern Serves the South

The McGuires could never agree on where to go for a vacation. But—one day—they discovered Southern California. Here—in this one place—were *all* the things each member of the family was stumping for . . . ocean, mountains, desert, *everything*. And they could enjoy most of these things *any* time of year! That seemed like a real vacation buy to the McGuires . . . and we believe it will to you, too. Look:

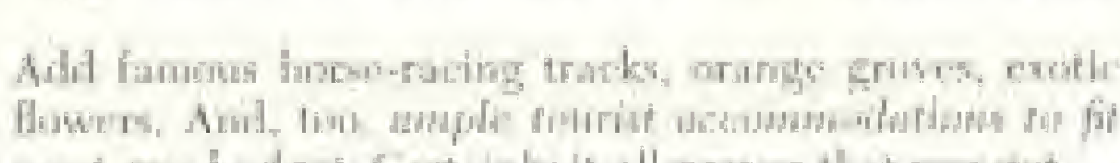
There's the Pacific Ocean with its white beaches where you can swim, fish and sail—look for starfish and sea shells.

You can enjoy the crisp air, the tall pines, rustic resorts and blue lakes of Southern California's high mountains.

Then, there's the desert with its colored cliffs and grotesque cactus. Many resort oases and dude ranches, too.

Of course, if you like the bright lights, there are the movie and radio capital, night clubs, ultra-smart stores.

Add famous horse-racing tracks, orange groves, exotic flowers. And, too, *ample tourist accommodations to fit most any budget*. Certainly it all proves that you get . . .



More for your vacation dollar in

Southern California

America's 4-Season Vacationland

ALL-YEAR CLUB OF SOUTHERN CALIFORNIA, LTD. *This advertisement sponsored by the Los Angeles County Board of Supervisors for the citizens of Beverly Hills, Glendale, Hollywood, Long Beach, Los Angeles, Pasadena, Pomona, Santa Monica and 182 other communities. Copyright, 1949, by All-Year Club of Southern California, Ltd.—a non-profit community organization serving vacationists.*

Come on out this year. But, first send for FREE COLOR BOOKLET that describes Los Angeles County and all Southern California. On arrival, call at All-Year Club's Free Visitors' Bureau, 517 West 6th Street, Los Angeles, for many other booklets and vacation aids.

Advise anyone not to move here unless assured in advance of employment.

Free Color Booklet—Mail Coupon Today

All-Year Club of Southern California, Div. 1-C
629 S. Hill St., Los Angeles 14, California

Please send me your free vacation booklet "WHAT TO DO AND SEE IN SOUTHERN CALIFORNIA."

*Name*____________________

*Street*____________________

*City*________________ *Zone*______

*State*____________________

PLEASE PRINT NAME AND ADDRESS

BUTTONS

He's just a youngster . . . a newcomer to the sea . . . and his duties are simple. Yet the polish on his buttons . . . the neatness of his dress . . . and his smiling courtesy bespeak the pride he takes in the Cunard White Star insignia he wears.

His is the inspiration of a standard that has been set by a more than century-old record . . . a record that inspires ship's officers and men . . . stewards and stewardesses to measure up in performance to the highest traditions of the sea.

In luxurious ships of types and sizes planned to anticipate every travel requirement and in the perfection of service afforded on every one, Cunard White Star offers all that can be desired in a comfortable, dependable transatlantic crossing.

The British tradition distinguishes

CUNARD WHITE STAR

In New York Service

QUEEN ELIZABETH · QUEEN MARY · MAURETANIA · CARONIA · BRITANNIC · MEDIA · PARTHIA

In Canadian Service

AQUITANIA · FRANCONIA · SAMARIA · SCYTHIA · ASCANIA

ELECTRONICS at WORK . . .

A BUSINESSMAN needs a report on his company's production and inventory position, and he has to have it faster than ever before.

A SCIENTIST, working in the atomic energy field, needs to know the exact effect of relativistic mass increases in the slowing down of fast electrons.

AN AIRCRAFT DESIGNER needs to determine the theoretical stresses and strains brought about by the use of new-type controls on a jet-powered, supersonic plane.

Today, these intricate requirements and countless others are being met at amazingly high speed through the use of IBM Electronic Business Machines.

IBM pioneered in the application of the science of electronics to business machines . . . machines which benefit everyone through increasing the productivity of industry and science.

The device shown is the IBM Electronic Counter, basic unit of IBM Electronic Machines which compute arithmetical problems at tremendous speeds.

International Business Machines Corporation

World Headquarters Building

590 Madison Avenue • New York 22, New York

the sun's winter home is Tucson!

WHY NOT MAKE IT YOURS, TOO?

MORE FOR EVERY AGE – This winter follow the sun to Tucson. There's more sun here than in any other resort city. You'll feel 20 years younger in the warm, dry desert air. You'll want to go sight-seeing, ride, golf, visit Old Mexico next door. Extensive building activity has made accommodations of all types plentiful at sensible rates. Choose among smart resort hotels, apartments, motels, cottages, guest ranches. Excellent private schools, U. of Arizona. Make Tucson *your* winter home. Mail coupon now.

SEND FOR FREE ILLUSTRATED BOOKLET

TUCSON SUNSHINE CLIMATE CLUB
4904-D Pueblo, Tucson, Arizona

Name ____________________

Address ____________________

City __________ Zone ____ State ____

I am interested in: (type of accommodation) ____________,

(type of school) ____________ (information on) ____________

VISIT

Bellingrath Gardens

MOBILE, ALABAMA

America's Largest Display of

AZALEAS · CAMELLIAS
MOSS-DRAPED OAKS
SUNNY VISTAS · MIRROR LAKE
RARE SHRUBS

Be one of the many thousands this year who will thrill to the magnificent floral splendor of this "Charm Spot of the Deep South." Plan your trip now to include these internationally famous gardens.

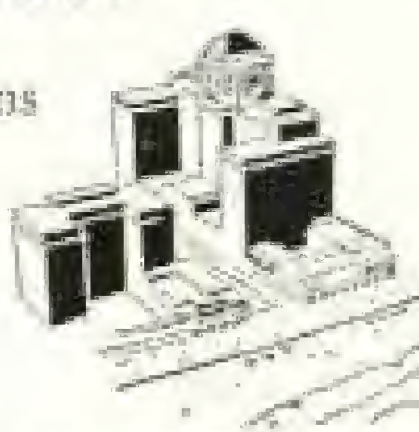
Open the Year 'Round

FREE Color Folder. Write for yours today

BELLINGRATH GARDENS
Dept. A, Mobile, Alabama

RESOLUTIONS

Break all the resolutions you want . . . except the one to visit us this winter.



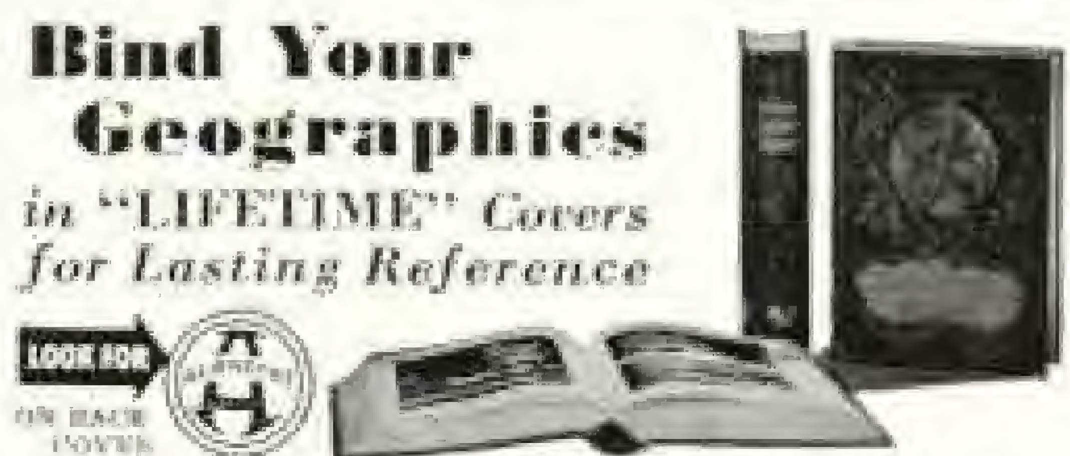
CHALFONTE-HADDON HALL

1126 Boardwalk, Atlantic City, N.J.

Leeds and Lippincott Company
Ownership-Management for more than 50 years

Bind Your Geographics

in "LIFETIME" Covers for Lasting Reference



Your Geographics are of constant value, providing background for important National and International news. Insure their permanence by having them sewed and bound for your Library in handsome, durable ALBRECHT Geographic "Lifetime" Covers.

Important: Authentic ALBRECHT "Lifetime" Covers are identified by (A) mark on back cover. Like Sterling on silver, it's a mark of the best. Write for illustrated folder and name of nearest authorized Albrecht Geographic Binder.

THE ALBRECHT CO. BALTIMORE 1, MD. *Bound to Please*

*This photo of a fire that occurred in a fireproof building near Times Square, New York City, shows what happens to records kept in ordinary files or an obsolete safe.

Imagine what would happen...if these were *your* vital records burned to ashes in *your* office!

For it is your *records*—accounts receivable, receipts, inventories, tax data, contracts, deeds and other legal papers which you *must* have if you are to resume business after a fire. Even adequate fire insurance can't replace *them*. That's why—when the ashes have cooled after a fire—43 out of 100 firms never reopen!

And remember, some of the most disastrous fires have occurred in fireproof buildings.

So, don't be a gambler with *your* business. Keep your records in a reliable Mosler record safe bearing the "A" label of the Underwriters' Laboratories, Inc.—the impartial, nationally-recognized testing organization. This "A" label certifies that your safe has survived their severest test—4 hours trial by fire, impact and explosion. Any safe that does not bear this label cannot be trusted. A Mosler "A" label record safe is the finest protection you can buy. The cost? Less than you may think!

Mosler Money Chest for home or office gives finest protection.

Mosler Non-Grout Vault Doors, for economy, speed and ease of installation. Relocking device saves 10% on burglary insurance premiums. Underwriters' Laboratories, Inc., ½ to 6 hour labels.

Mosler record safe, bearing the Underwriters' Laboratories, Inc. "A" label, with burglary resistive chest inside, giving protection against fire and burglary.

Mosler Insulated Record Container combines the convenience of a file with the protection of a safe. Carries the Underwriters' Laboratories, Inc., "C" label. Insulated receding door locks over file drawers. Available in 2, 3, or 4 drawer heights, letter or legal width—wide variety of finishes.

Mosler "A" label single door record safe. Varied interiors available.

The Mosler Safe Co.

320 Fifth Ave., New York 1, N. Y.

Factories: Hamilton, Ohio

Dealers in principal cities

Largest Builders of Safes and Vaults in the World

Builders of the U. S. Gold Storage Vault Doors at Fort Knox, Ky.

— NO ONE KNOWS WHEN FIRE MAY STRIKE . . . SO FILL OUT THIS COUPON TODAY —

THE MOSLER SAFE CO., Dept. 41
320 Fifth Avenue, New York 1, N. Y.

Please send me:

☐ The free booklet, "What You Should Know About Safes"

☐ The name of my nearest Mosler dealer

Name ________________

Firm ________________

Address ________________

City ________ Zone ____ State ________

Your tour of the BRITISH ISLES will be carefree, enjoyable and economical if you plan in advance.

Secure your transportation and reservations before you leave and right from the British port of entry save 25% on ordinary fares for individual tours.

BRITISH RAILWAYS FACILITIES ARE COMPREHENSIVE

- Rail transportation covering the British Isles
- Attractive rail, motor coach and steamer tours also conducted Motor Coach Tours of London
- Cross channel services to Ireland and the Continent
- 47 Hotels operated by The Hotels Executive, British Transport
- British European Airways Corp. routes in the British Isles.

ADVANCE RESERVATIONS FOR ALL SERVICES

1950—HOLY YEAR . . . BRITISH RAILWAYS—THE PREMIER LINK TO THE CONTINENT . . . Include a visit to the famous shrines of Britain and Ireland.

• ● •

For all your travel needs in the British Isles and to the Continent consult your local travel agent or any British Railways Office.

For British Isles Travel Literature with color map, write Dept. 25 at any of these offices

• NEW YORK 20, N. Y., 9 Rockefeller Pl. • LOS ANGELES 14, Cal., 510 W. 6 St.
• CHICAGO 3, Ill., 39 South La Salle St. • TORONTO, Ont., 69 Yonge St.

The Sunshine City is a family city. It is the outstanding resort center of the Gulf Coast, and it is a clean, orderly community, too. It is known for its many churches, good schools, beautiful parks and homes . . . but it is also known for its amazing variety of fun in the sun. There is something interesting for everyone of every age to do and enjoy in St. Petersburg. Almost all sports, except those which depend upon snow and ice, are available here . . . and the entertainment is equally varied.

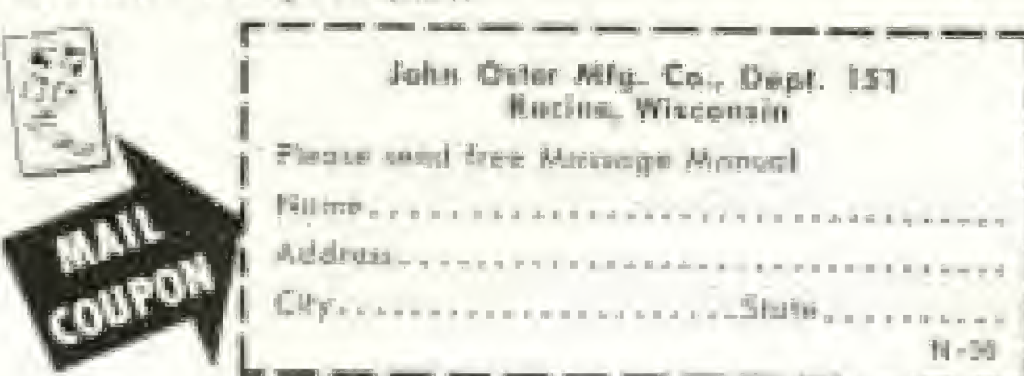
You, too, will like St. Petersburg, Florida's fastest growing city. Plan to come for a wonderful vacation. For illustrated booklets write today to G. G. Davenport, Chamber of Commerce, St. Petersburg, Florida.

Mr SUN INVITES YOU

StPETERSBURG *The Sunshine City*

STIM·U·LAX JUNIOR

Now you'll find massage more valuable than ever because it is more easily and more effectively applied with an OSTER STIM-U-LAX Junior. Amazingly different! The rotating-patting movements delivered by an OSTER are controllable by the pressure of your hand—mildly soothing or deeply penetrating. Only an OSTER can produce this result . . . only an OSTER has Suspended Motor Action. That's why an OSTER is the world's finest massage instrument. Write for FREE Massage Manual.



John Oster Mfg. Co., Dept. 151
Racine, Wisconsin

Please send free Massage Manual

Name..................................

Address..................................

City.......................State..........

N-50

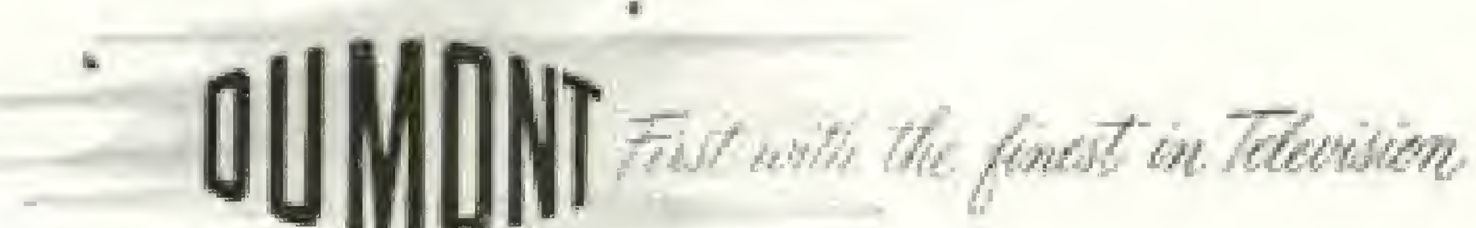
GIVE YOUR FAMILY

Life-size

TELEVISION

There'll be so much to see on television, you'll want to see it at its very best. Only Du Mont makes the Life-size screen. Only Du Mont gives you such a clear, steady picture—even in areas where reception is difficult. And only Du Mont gives you the satisfaction that comes with owning the finest that money can buy.

The Bradford—203 square-inch, direct-view screen on 19-inch tube. FM radio. Player for 45 RPM records. Cabinet of fine mahogany veneers.



Your Du Mont Dealer invites you to see the Morey Amsterdam Show on the Du Mont Television Network.

Allen B. Du Mont Laboratories, Inc., General Television Sales Offices and The Du Mont Television Network, 515 Madison Avenue, New York 22, N. Y. Home Offices and Plants, Passaic, N. J.

Copyright 19[illegible], Allen B. Du Mont Laboratories, Inc.

People come back to Puerto Rico U.S.A.

Days and Nights of Fun! Explore all Puerto Rico along 2,000 miles of fine road. Drive home at night to dance at San Juan's hotels and clubs, or visit its gay casinos.

Bathe and Bask Brown at Puerto Rico's palm-bordered beaches and pools, where the sun smiles 360 days a year. Enjoy golf, tennis, sailing, fishing in this all-year sports climate.

See History Come Alive in landmarks that saw Ponce de Leon...and recall when Drake matched his ships against the Spanish forts.

Ask Your Travel Agent about fine, new hotel accommodations.

PUERTO RICO VISITORS BUREAU
4 West 58th St., New York 19, N.Y.

Please send FREE book on Puerto Rico, Island on the Move, and how to get there in 6½ hours by air...or for as low as $150 round trip.

NAME________________

STREET________________

CITY____________ STATE________

Discover San Antonio ...then start packing

Send now for your free copy of the book of things to see and do in San Antonio. You'll find the rich heritage of Southwestern history and romance unfolded; the Alamo, old Spanish Missions and the Governors' Palace. You'll learn about beautiful parks, great military establishments, sports and play. When you discover San Antonio you'll want to start packing. Come soon!

San Antonio
WHERE LIFE IS DIFFERENT

MUNICIPAL INFORMATION BUREAU
705 Insurance Building—San Antonio, Texas

Name________________

Address________________

City____________ State________

MEET THE MACHINE THAT'S MAKING DICTATING HISTORY!

Never before has one dictating machine so outstripped all others in advantages to the user. It's the most *successful* dictating machine in history. Only 4½" high and letterhead size, the TIME-MASTER helps you save time and cut costs!

The revolutionary Memobelt is the newest, most practical of all recording media. 5 mail in an ordinary envelope for 3¢. The tiny *Memobelt* record is so economical to use that you simply mail, file, or transcribe and discard it after *only one* use!

Unheard-of convenience is yours with the TIME-MASTER at your elbow! Foolproof simplicity of TIME-MASTER operation lets you trap those fleeting thoughts instantly! Just the flick of a switch and you can do your thinking out loud!

"It's a sweetheart!" say secretaries! *Memobelt* clarity and TIME-MASTER's tiny Magic Ear make transcribing a cinch! The TIME-MASTER makes your secretary's job easier and pleasanter—gives her more time to perform other duties!

SEND for your free copy of "Does Your Dictating Date You?"

CALL your local Dictaphone Office for a free TIME-MASTER demonstration!

DICTAPHONE
Electronic Dictation

Only Dictaphone Corporation makes Dictaphone* Machines. (*Reg. U. S. Pat. Off.)

Dictaphone Corp.
420 Lexington Ave., N. Y. 17, N. Y.

I would like to have a free copy of the booklet, "Does Your Dictating Date You?"

Your Name ____________________

Company ____________________

Street Address ____________________

City & Zone ____________________ State __________

Marquesas Morn . . . Leica color photograph by Charles Allmon

How to catch a Magic Moment

Whenever dramatic people or dramatic places offer pictures worth the taking, you can capture *all* the magic of the moment with a LEICA camera. In color or in monochrome . . . in every phase of photography, yours is the assurance of working with the camera that makes it easiest to get the most from any scene or subject. See your Leica Dealer.

Take along a **Leica***

*Registered Trademark

E. LEITZ, Inc., 304 Hudson St., New York 13, N.Y.

For happy living no other city in America has the quiet charm, scenic splendor and cultural advantages of Colorado Springs. Mild, dry, *sunny* winters ... cool, invigorating summers. Snow-pure water, low taxes, fine schools, Colorado College. Live in the sun in Colorado Springs. *Mail coupon.*

Colorado Springs
and MANITOU SPRINGS
at the foot of PIKES PEAK

COLORADO SPRINGS CHAMBER OF COMMERCE
325 Pikes Peak Ave., Colorado Springs, Colorado

Please send me beautifully illustrated, colorful 24-page booklet, "Your Home in Colorado Springs."

Name ____________________

Address ____________________

AMERICA'S FINEST YEAR 'ROUND CLIMATE

Television sets
Electron microscope
Television cameras
45 rpm record playing system
Glass and metal kinescope
Projection television
Portable radios
Radar

Deep are their **roots**

With television you see beyond the horizon. Radio brings you sounds from around the world. Electron microscopes peer deep into an infinitesimal world.

These, and other "leaves" on our new tree of knowledge are rooted in creative research—as carried out at RCA Laboratories in Princeton, N. J. Here, research scientists seek new scientific principles, improve on old ones, or put them to new uses.

Already on their achievement list are hundreds of basic developments in electronics, television, radio, loran, electron tubes, radar, and recorded music. RCA research works continually to give you better products.

Examples now working for you include: Today's sharp-eyed Image Orthicon television cameras, television picture tubes, compact portable radios made possible by tiny electron tubes, the 45 rpm record-playing system with the fastest record changer ever devised and distortion-free records.

Research in your behalf: Creative research into new principles is another way in which RCA Laboratories work to improve your way of living. Leadership in science and engineering adds *value beyond price* to any product or service of RCA and RCA Victor.

Examples of the newest advances in radio, television, and electronics—in action—may be seen at RCA Exhibition Hall, 36 West 49th Street, N. Y. Admission is free. Radio Corporation of America, Radio City, N. Y. 20.

RADIO CORPORATION of AMERICA

World Leader in Radio — First in Television

It's Sun-Time and Fun-Time in Phoenix

Relaxation and respite from worldly worries and strain, is the promise this colorful, captivating sun country makes to those who seek escape from cold, dreary, winter weather.

In a hundred different ways each warm, glorious day is an adventure in this world-famous Valley of the Sun. You can rest, relax and soak up sunshine . . . feast your eyes on a desert and mountain fairyland. Be as active as you like — indulging in your favorite outdoor sport. Or, be as lazy as you wish — loafing in a palm-shaded patio. Give in to your winter wanderlust! Come claim your share of sun and fun in this warm, dry, friendly winter-wonderland!

Accommodations are as varied and inviting as the thousands of things there are to do.

Write today for free descriptive literature

Valley of the Sun Club — Phoenix, Ariz.
492 Chamber of Commerce Building
Please send me free, illustrated literature on PHOENIX and the Valley of the Sun.

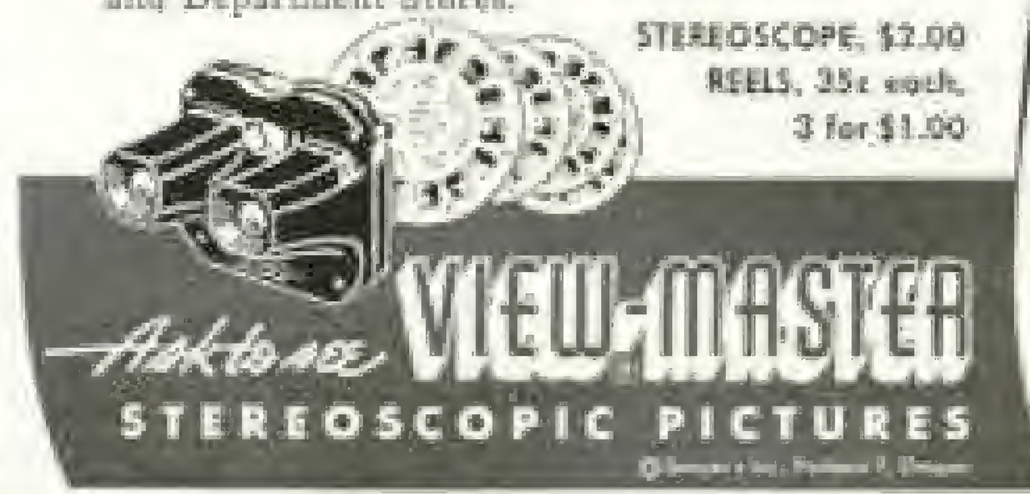
Name____________________
Address____________________
City______________ State______

WARM - DRY - FRIENDLY
Phoenix *Arizona*
IN THE VALLEY OF THE SUN

IN THREE DIMENSIONS

"Journey" to the Garden of Gethsemane, the holy city of Bethlehem, and many other fascinating biblical places with View-Master Holy Land Travelogues, illustrated with full color, three dimension photographs. Over 300 different, seven-scene "travel" Reels are available for use in View-Master Stereoscopes and Projectors. Subjects include Palestine, Italy, Switzerland, Mexico, England, and Hawaii . . . For Children: Fairy Tales, Wild Animals, Indians. At selected Photo, Gift and Department Stores.

STEREOSCOPE, $2.00
REELS, 35c each,
3 for $1.00



SHEPARD HomeLIFT THE QUALITY RESIDENCE ELEVATOR

"Stop Climbing Stairs"

"Taking it easy" on doctor's orders is made possible by Shepard HomeLIFT. Ride upstairs or down with no exertion . . . no stair climbing strain. Easily installed in old or new homes . . . operates from light circuit . . . absolutely safe. Extensively used throughout the nation. Send for catalog.

THE SHEPARD ELEVATOR CO.
Builders of Finest Hospital Elevators
2432 COLERAIN AVENUE CINCINNATI 14, OHIO

Fingers of flame that pierce solid rock

YES, through a dramatic new process known as *jet-piercing* . . . holes can now be *burned* straight and true through solid rock! The harder the rock the more efficient the operation! A special combination of oxygen, fuel, and water does the job . . . and in a fraction of the time required by the old drill attack.

This process is of particular significance to the steel industry today. Why? Because government surveys show that America's reserves of top-grade iron ore — source of steel — are fast being reduced. But there remain almost inexhaustible beds of the once scorned low-grade iron ore called *taconite*.

The extremely hard and dense nature of taconite makes usual mining methods too costly and impractical. But the jet-piercing process—*with 1/10 the equipment and at a reasonable cost*—will burn holes straight into the solid taconite so that it can be blasted into lumps of usable size.

Also, destructive abrasion from the sharp-edged rock on loading and crushing equipment is being better controlled by machine parts made from extra-hard alloy steels. And to concentrate the iron content of the ore, new chemical processes flush away much of the "waste" matter — leaving an ore that is 30% richer, far more efficient for smelting.

The people of Union Carbide created the jet-piercing flame process as well as many of the alloys, chemicals, and other materials essential to today's mining efficiency. And UCC stands ready to help solve problems in other fields of American enterprise . . . wherever better basic materials and better processes are needed.

FREE: *If you would like to know more about many of the things you use every day, send for the illustrated booklet, "Products and Processes." It tells how science and industry use UCC's Alloys, Chemicals, Carbons, Gases, and Plastics. Write for free Booklet J.*

UNION CARBIDE

AND CARBON CORPORATION

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

Trade-marked Products of Divisions and Units include

LINDE Oxygen • PREST-O-LITE Acetylene • PYROFAX Gas • HAYNES STELLITE Alloys
ELECTROMET Alloys and Metals • SYNTHETIC ORGANIC CHEMICALS • BAKELITE, KRENE, VINYON, and VINYLITE Plastics
NATIONAL Carbons • ACHESON Electrodes • EVEREADY Flashlights and Batteries • PRESTONE and TREK Anti-Freezes

Come to

California

on the great streamliner

"City of San Francisco"

Here's a wonderful way to come to California next time:

Take our *City of San Francisco*, fastest thing on wheels between Chicago and the Golden Gate.

Then take our famed overnight *Lark* (San Francisco-Los Angeles) or one of our scenic *Daylight* streamliners through the California countryside.

Homeward, our *Golden State* (Los Angeles-Chicago) the *only* streamliner through Palm Springs and the Southern Arizona resort country, via Phoenix, Tucson, Douglas and El Paso.

Or try our fast *Sunset Limited* to romantic New Orleans and the Old South.

L. C. Ioas, Dept. NT-1
310 So. Michigan Ave., Chicago 4, Ill.

Please send me, free, the photo folder, "*How to See Twice as Much on Your Trip to California*".

NAME________________

ADDRESS________________

CITY________________STATE________

(If school student, state grade________)

"NERVES STILL STEADY AT 60"

"I thought my shaky nerves were due to getting older. But my doctor blamed the caffein in coffee and suggested a switch to POSTUM. Now my nervousness is completely gone and I sleep and feel so much better!"

Are "coffee nerves" making you uncomfortable? ...Jittery by day?...Sleepless at night?... Many people—young and old alike—have found the answer in a switch to POSTUM.

SCIENTIFIC FACTS: Both coffee and tea contain *caffein*—a drug—a nerve stimulant! So, while many people can drink them without ill-effect, others suffer nervousness, indigestion, sleepless nights. POSTUM contains no caffein or other drug—*nothing that can possibly cause sleeplessness, indigestion, or nervousness!*

MAKE THIS TEST: Buy INSTANT POSTUM today—drink it exclusively for 30 days—*judge by results!* INSTANT POSTUM—A Vigorous Drink made from Healthful Wheat and Bran. A Product of General Foods.

---

3 winter vacations all for *one* price SAN DIEGO

the SEA | the DESERT | Old MEXICO

Make all of San Diego County your *winter* playground! Enjoy the lovely coastal areas, *lush* inland valleys, *awesome* vistas in Borrego desert, all close to the gaiety of clean, modern, inviting San Diego on the bay. Vary this with trips into the interior of Old Mexico, *see* Ensenada, Guaymas, Mazatlan, *all* from your San Diego headquarters. San Diego is *warmer* and has less rainfall. Deep sea fishing, sailing, all outdoor sports the year 'round. Yes, San Diego means *three* vacations at the cost of one!

All types of accommodations. Ask your Travel Agent, NOW

San Diego WHERE CALIFORNIA BEGAN

Fill in and mail to: **SAN DIEGO-CALIFORNIA CLUB**
499 W. Broadway, Room 103, San Diego 1, California
Please mail me without cost or obligation your descriptive folder which will help to make my California trip more interesting.

NAME________________

ADDRESS________________

CITY________________ZONE____STATE________

PROGRESS IN THE FIGHT AGAINST
TUBERCULOSIS

The outlook for controlling tuberculosis grows brighter each year. In fact, the death rate from this disease has declined more than 80 per cent since 1900 and more than one third from 1940 through 1948.

Authorities emphasize, however, that continued improvement in the mortality from tuberculosis depends upon *finding every case, treating it promptly, and preventing the spread of infection to others.* They also hope that further technological developments will prove valuable in the treatment of this disease.

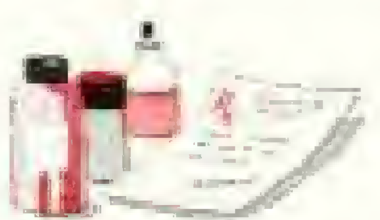
Efforts toward early discovery

New tuberculosis cases are being discovered in greater numbers than heretofore as a result of modern diagnostic techniques. In fact, during the past 8 years, the number of new cases actually reported *increased* by nearly one third. This reflects the progress that physicians, health authorities, and others are making in their efforts to discover tuberculosis *early*. For example, some ten million people in our country are now being X-rayed each year to help protect themselves and their families.

In addition to X-rays, other diagnostic aids such as tuberculin tests and fluoroscopic examinations make it possible to discover tuberculosis in its early stages and commence treatment before it spreads.

Old and New Weapons help in the fight

Rest in bed, preferably in a sanatorium or tuberculosis hospital, is still considered to be an important method of treatment. The use of surgery in some tuberculosis cases has proved to be beneficial; in fact, there are now several operations which may, under proper conditions, help give diseased lung areas extra rest.



There is evidence that the next great advance against tuberculosis may come through treatment with new drugs. One type has already been used successfully in some forms of the disease. Other promising drugs are being tested in the laboratory.

Experiments with a vaccine offer the hope that its use will help certain individuals to build resistance against this disease.

If tuberculosis is discovered early, and treated promptly and properly, there is an excellent chance that it can be controlled. In this event the patient who carefully follows his doctor's advice and adjusts his living habits accordingly can generally return to a nearly normal life.

COPYRIGHT 19[illegible]—METROPOLITAN LIFE INSURANCE COMPANY

Metropolitan Life Insurance Company
(A MUTUAL COMPANY)

1 Madison Avenue, New York 10, N. Y.

Please send me a copy of your booklet, 10-N, "Tuberculosis."

Name ____________________

Street ____________________

City ____________ State ________

IT&T Brings You the new Capehart

It's Tops in
Television
with
Capehart Tone
and
Polatron*
Picture Perfection

With ordinary tube

With Polatron

No other tube does what Polatron does!

The Capehart Overture . . . with AM and FM radio

World famed Capehart Tone available, too, in new phonograph-radios!

The International Telephone and Telegraph Corporation, through its new associate, Capehart-Farnsworth Corporation, brings you

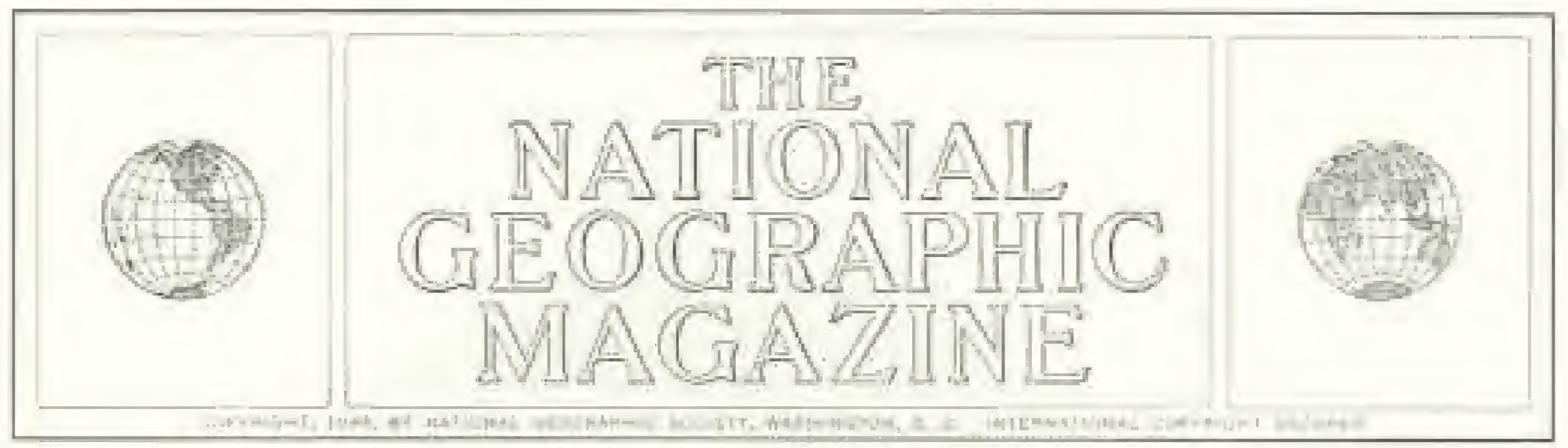
Two New Miracles in Television!

One is the new "Polatron" picture tube—an eye-miracle that produces startling realism, depth and brilliance of image. The other is an ear-miracle known and marvelled at by music lovers the world over—*Capehart tone*—the matchless fidelity only Capehart has produced. Together, they *double* your television pleasure! Together, they give you tops in television . . . in a complete line of home receivers, $269.50† and up.

International Telephone and Telegraph Corporation, New York

**T.M. Reg. Available at slight extra cost. † Plus excise tax. Western prices slightly higher.*

VOL. XCVII, No. 1 WASHINGTON JANUARY, 1950



Peerless Nepal—A Naturalist's Paradise

BY S. DILLON RIPLEY

With Illustrations by National Geographic Photographer Volkmar Wentzel

The author, Associate Curator of the Peabody Museum of Natural History at Yale, led into hitherto officially closed Nepal a scientific expedition sponsored jointly by the National Geographic Society, the Smithsonian Institution, and Yale University.

The expedition returned to the United States with hundreds of rare birds and numerous interesting specimens of little-known small mammals and fishes.

An outstanding ornithological find was the spiny babbler (Acanthoptila nipalensis)*, a bird which had not been reported for 100 years. Before this rediscovery, only four specimens, brought in dead to Sir Brian Hodgson more than a century ago, had been collected, and until Dr. Ripley saw a flock of seven in western Nepal last January, no ornithologist had seen one alive.*

The expedition searched everywhere for the mountain quail (Ophrysia superciliosa)*, which has not been collected since 1876; but their most diligent efforts were futile. However, through the generous cooperation of the Nepal Government the search will be continued indefinitely.*—The Editor.

ON AN EXPEDITION for the Smithsonian Institution and Yale University in the winter of 1946-47 I stayed at New Delhi with my friend, George R. Merrell, then American Chargé d'Affaires in India. Mr. Merrell had just returned from Nepal on an official visit to discuss the opening of diplomatic relations between that hitherto forbidden country and the United States.

He suggested that I should try to visit Nepal. Accordingly, introductions were effected with the Nepalese representative at New Delhi, and a telegram was dispatched to Katmandu, the capital.

The response was an invitation from the then Maharaja of Nepal, or Prime Minister, who is always a member of the ruling Rana family.* With my assistant from the Peabody Museum at Yale, Edward Migdalski, I was able to spend a month collecting birds and animals in and around Katmandu and getting to know the heads of the Government.

Therefore, in 1948, I was busy with plans to return, this time co-sponsored by the National Geographic Society, Yale University, and the Smithsonian Institution. Our party consisted of Edward Migdalski, again as my principal assistant; two graduates of Yale in the spring of 1948, Howard Weaver and Richard Mack, as mammal collectors; Volkmar Wentzel, staff photographer of the NATIONAL GEOGRAPHIC MAGAZINE; and his assistant, Francis Leeson, a young Englishman who had been serving in the Indian Army.

My interest in far-off Nepal dates from my first studies of Indian birds. The birds of that little-known land form an integral part of the bird fauna of India, for Nepal is like a keystone as far as any study of the fauna of the vast Himalaya region is concerned.

A Remarkable Bird Collector

Through the indefatigable research of Sir Brian Houghton Hodgson, who resided at Katmandu more than a century ago, some 563 species of birds have been recorded from there.

Hodgson, a young East India Company employee, was sent from Calcutta to the hills,

* In Nepal all power is vested in the Prime Minister, who also bears the titles of Maharaja and Supreme Commander in Chief and Marshal of Nepal. The King is known as the Maharajadhiraja.

Headwoman of Rekcha Village Gives the Author a Piece of Her Mind

S. Dillon Ripley (seated) led a National Geographic Society-Yale University-Smithsonian Institution expedition into little-known Nepal in search of rare birds, mammals, and fishes. In the roadless interior Americans camped in Rekcha. The village's elderly headwoman, at first unfriendly, grew so fond of them that she visited camp daily, bringing gifts of food (page 16). Richard Mack (left) wears a Nepalese men's necklace, for which he traded a watch.

suffering with tuberculosis, his days seemingly numbered. However, the climate of the remote Valley of Katmandu proved highly beneficial.

He performed prodigious political and economic services for his employers as their Resident at the court of Nepal from 1833 to 1843, and in addition sent out trained Nepalese searchers to the back country to collect the fauna of the mountain kingdom.

In the 1830's and 1840's he turned out many scientific papers describing his new finds, most of which he had never seen alive. On this research of Hodgson a considerable proportion of the scientific names of the Indian fauna is based.

I knew, however, that his original collections, which were given at a later date to the British Museum in London, are now faded and in poor condition because of the tropical climate in which they were kept for many years. Since Hodgson's time only a few fragmentary collections have been made, mostly in the vicinity of the capital.

A Land of Mighty Rivers

Nepal is a rectangle, 500 miles long by roughly 100 broad, sandwiched in between India and Tibet (map, page 4). It is an independent kingdom with a population of nearly 7,000,000.*

*See, in the National Geographic Magazine: "Nepal, the Sequestered Kingdom," by Penelope Chetwode, March, 1935; and "Nepal: A Little-known Kingdom," by John Claude White, October, 1920.

A Young Bride, Too Curious to Stay Hidden, Opens Litter Curtains and Exposes Her Face

This bridal party in Chainpur, eastern Nepal, hired two Tibetans as litter bearers. The bridegroom carried an umbrella, not against rain or sun, but for his dignity. His bride appeared to be not more than ten years old. Villagers had seen only one other Westerner, they told American members of the expedition.

The terrain has favored the country's independence. The southern strip bordering India is flat and highly malarial, at an altitude of about 350 feet above sea level.

Great rivers swirling down from the Himalayas spread over it in the monsoon season of floods, bringing millions of tons of silt from the violent contours above, creating new channels, and sweeping all before them on their way to the mighty Ganges.

Most of this lowland, the *Terai*, is now cultivated, with a ribbon of excellent timber forest paralleling the base of the hills to the north.

Beyond the Terai lie "the Hills," at first the lower Siwalik Range, a geologically old ridge of tumbled rocks and clay, thinly set with pines, scrub, and grasses. Beyond, across narrow valleys, lie the first hills of the Himalayas, which sweep ever up and up into the snows, serried range on range of vertical peaks.

One among them, usually hidden by its surrounding bastions, is Mount Everest (29,002 feet), the mightiest of all, but here merely another of the hundreds of unconquered, unknown mountains that make up the backbone of Nepal (pages 28 and 29).

From earliest times the Valley—the central valley wherein Katmandu, the capital, lies—has been the heart of Nepal. Most Nepalese call the Valley "Nepal" and use the word in that sense and not as a name for the whole country.

Indeed, in the outlying portions the inhabitants think of themselves not as Nepalese but as members of various tribes—Magars,

In remote Nepal first color photographs were made of rare birds, places, and peoples by a joint expedition of the National Geographic Society, the Smithsonian Institution, and Yale University.

Drawn by Theodore F. Thompson and Irvin E. Alleman

Top-of-the-world Nepal, Crowned by Everest and Kanchenjunga, Stretches Beyond Reach of International Highways

Gurungs, Gurkhas (Gorkhalis), Newars, Tamungs, Bhutias, and so on, coming from a certain district or place.

If I ask a man if he is a Nepalese, I probably get a blank stare. It doesn't occur to him that he belongs to a nation.

Since early times this central Valley has been the only area in which foreigners have been allowed. There is one route up from the Indian border and down again, and in recorded history perhaps 200 Europeans and 30 Americans have been invited by the rulers or by the British Resident to visit this remote capital and a radius of territory about it of no more than 15 miles.

My visit in 1947 was important, for it seemed to me that now, if ever, would be a good time to try to arrange a trip into the back country of Nepal to visit unknown areas and to collect species which Hodgson had described a hundred years before, but whose home sites had never been visited by a naturalist.

Expedition Planned by Invitation

After World War II the rulers of Nepal had decided to undertake a new program of development and contact with the outside world. I found the then Maharaja, Prime Minister Padma, and his cousin, the Commander in Chief, the present Maharaja, cordial. My plans for collecting in the western and eastern valleys were approved, and I returned to the United States.

Our equipment for the expedition of 1948, to a considerable extent, was procured in the United States. Any such party as this would need large numbers of coolie porters in the hills, and I was anxious to minimize the number by cutting down weight. Human bearers of burdens are expensive, and the food and supply problem looms very large.

By exercising care in cutting down weight, we were able to keep our coolies' number down in the low forties most of the time, although high up in eastern Nepal we had more than sixty.

The chief lightweight items were tents and dehydrated food, both of which served us extremely well. A comfortable 10-by-12-foot tent, which with side walls and ground sheet weighs only 25 pounds, was unheard of a few years ago.

All members of the party joined forces in India in October, 1948.

India has changed perceptibly since August, 1947.* There is new energy, enthusiasm, and a spirit of cooperation at the top government levels, although there are plenty of growing pains at the bottom.

Although free entry had been accorded equipment for this expedition by the Central Government at New Delhi, I found that the official papers had not arrived at the customs offices in Bombay and Calcutta. The customs officers were naturally unwilling to take my word for the fact that the papers I had were true copies of the original Government documents given me by the American Embassy.

As a result, we tarried 10 days before we were able to clear our shipments through the port authorities. These ripples of frustration tended to smooth out magically as we got aboard a train and set forth from Calcutta for the Nepal border.

All traffic to and from Katmandu goes through the small Indian border village of Raxaul, in Bihar Province, which is primarily a railroad siding. There are two guesthouses here for overnight visitors, one maintained by the Nepal Government for its officials and members of the ruling family, and the other, far more spacious, run by the Indian Government for members of the Indian and British Embassies and their guests. All except official visitors are here issued a pass to enter the country.

From Raxaul there is a Nepal Government Railway, a narrow-gauge line built in 1927, which crosses the Terai 29 miles to Amlekganj. At this point people and goods are transferred and crammed into terrifying buses which wheeze and sway through the Siwalik foothills, another 28 miles to Bhimphedi, a hamlet at the base of an impressive hill.

"Where Do We Go from Here?"

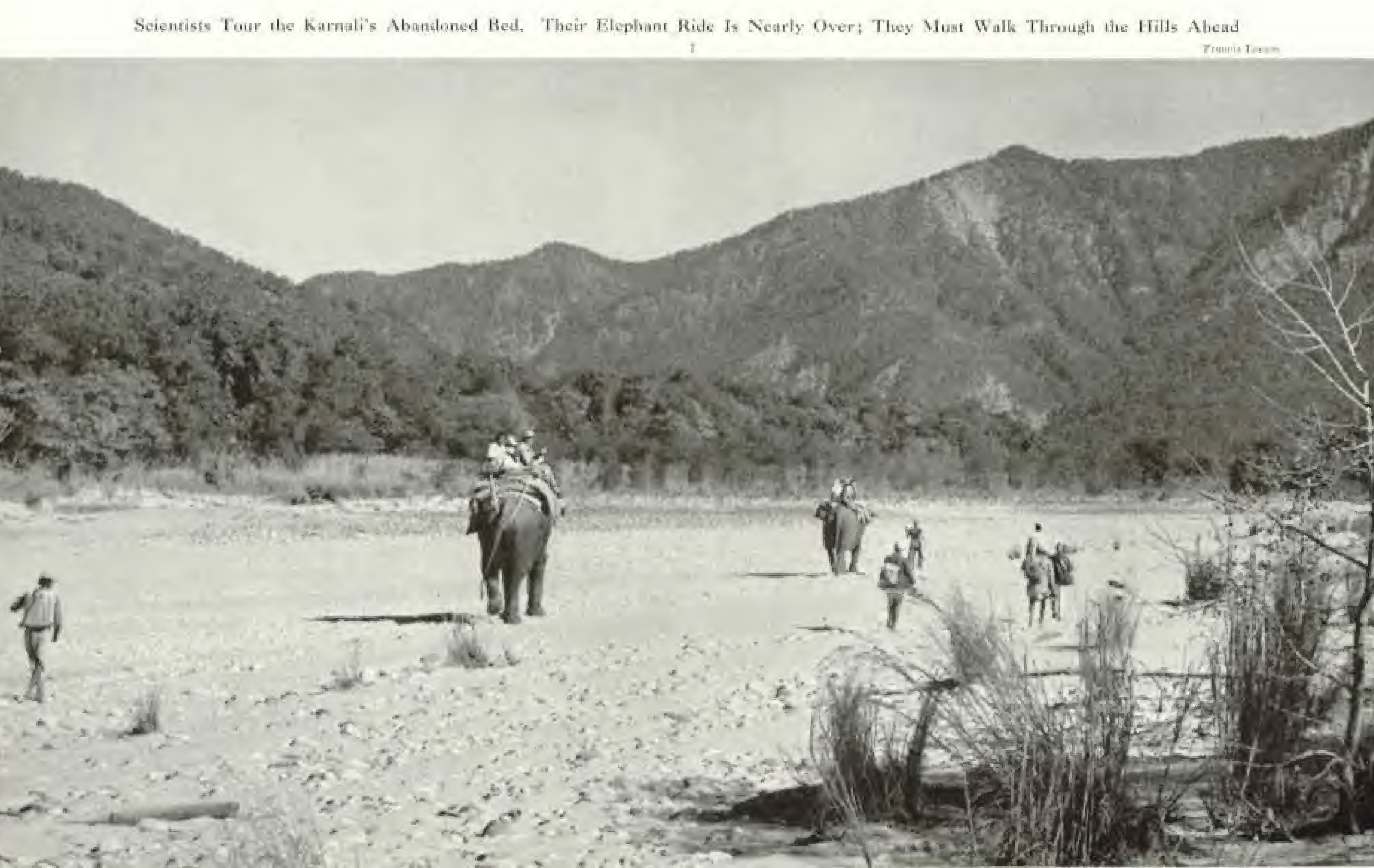
Here we all dismounted. On asking, "Where do we go from here?" we were shown a ribbon of a trail winding directly up a 2,500-foot hill. It was a good hour and a half on foot, by pony, or in one of two sorts of coolie-transported litters to a pleasant two-story stone resthouse perched on the edge of a superb view.

There electric light, a fire (for it is always cool here at night), and hot tea were waiting for us. After a jolting and tiring day this house with its comparative comforts made us glad we had persevered in coming.

The next day was a mingled trial and pleasure, with a 16-mile walk, or pony or litter ride, up and down, up and down, over two passes 7,000 feet above sea level. On the

* See, in the National Geographic Magazine: "Delhi, Capital of a New Dominion," by Phillips Talbot, November, 1947; "India Mosaic," by Peter Muir and Frances Muir, April, 1946; "India—Yesterday, Today, and Tomorrow," by Lord Halifax, October, 1943; "New Delhi Goes Full Time," by Maynard Owen Williams, October, 1942.

Camp in Rekohu Is Set Up Around a Hindu Shrine (Posts and Bell) and a Playground (Swing). Expedition Members Eat Lunch



Scientists Tour the Karnali's Abandoned Bed. Their Elephant Ride Is Nearly Over; They Must Walk Through the Hills Ahead

intermittent flat areas the road wound delightfully between hamlets and farm lands aglow with fields of barley, rice (page 34), or wild mustard, and spotted sometimes with the delicate bursts of flowering cherry and the paler almond.

On the slopes the road degenerates into a track of shaley gravel spotted with rolling stones, or sometimes cobbled with the remains of stone stairs. Up and down this rude track hundreds of coolies toil every day carrying heavy loads.

Everything taken into the Valley beyond, except sacks of stores that can be transported by an electrically driven ropeway, comes in on the backs of men and women. Indeed, it is this way everywhere in the mountain country of Nepal, for all the tracks and roads are of inferior type except the motor roads in the central valley itself.

The most spectacular sight on the road to Katmandu is a car being transported by 60 to 120 coolies (page 35). Atop a framework of poles the car is placed with only wheels and bumpers removed and a dust cloth thrown over all. Then the carriers simply bend down, lift the whole thing to their shoulders, and start off chanting and walking slowly in time.

The last pass, Chandragiri, was a revelation. Looking over the crest, which was framed in the thin, moss-draped, twisted branches of silver-leaved oaks and rhododendrons, we saw a Shangri La. The Valley spread out to the east in myriad terraced fields and toylike towns.

In the center, the white blocks of palaces and public buildings standing clear and unbelievable, lay the capital city, Katmandu. A single white needlelike tower standing up over there was the famous "folly" of Bhim Sen Thapa, built by the great Prime Minister of the 1830's, so it is said, "to amaze the populace" (page 32).

The sacred rivers wound through the plain below, shining, ribbonlike.

High above, rising over the clouds, were the snow peaks, Anapurna, Himalchuli, Gosainthan, massive, corrugated. The names rang out in my imagination as strange and as far-off as mystic Xanadu.

Down the last slope we clattered, wondering how much farther we would have to go, and then suddenly at the bottom was a small village where motorcars awaited us in a cobbled square.

To me Katmandu seemed an Oriental capital, with all that word implies in contrast. The city has a magnificent broad parade ground in the center, a feature of all Nepalese towns. There are fine broad macadamized streets with white stucco palaces and public buildings galore. There are old temples with pagodalike roofs in series. There are narrow tortuous streets with jutting, overhanging buildings, and open drains redolent of a bygone Gothic age.

Everywhere swarm the people, mostly white-clothed. The men wear odd-shaped cloth caps, characteristic jodhpurlike trousers and felt slippers, and long shirts, almost knee-length, which tie with strings at the side of the chest. The women wear Indian-style saris in town.

Hill women, who come down carrying loads of wood, wear voluminous red skirts surmounted by tight colored jackets with rows and rows of glass or china beads and silver coins, multitudinous glass or silver bracelets, and brass or coin earrings. Their hair is done in two plaits which hang down over the front of each shoulder, and they usually have a scarf of some sort on the head.

Soldiers and police were everywhere, for this is a military government and all the chief rulers are generals.

Our expedition passed ten days in Katmandu, visiting the sights of the Valley, the outlying towns, Patan and Bhadgaon, and the temples (pages 10 and 12). We got in some collecting besides.

Audience with the Prime Minister

Our main purpose, however, was to have an audience with the present Maharaja-Prime Minister, His Highness Maharaja Mohun Shamsher Jang Bahadur Rana, G.C.I.E., G.B.E., Supreme Commander in Chief and Marshal of Nepal.

This leader of the Rana family, the hereditary rulers of Nepal, had been Commander in Chief, the post next in line to the prime ministership, when I had last been in Nepal.

We found the Maharaja courteous and charming, a liberal-minded autocrat and aristocrat, who is trying with patience and tact to bring some of the outer world's progress and new ideas into Nepal, and endeavoring to make the transition as painless as possible.

The Maharaja approved of our plans and in fact gave us full permission to collect specimens for as long as we wanted. How sorry I was that we could not take advantage of this gracious and unprecedented kindness for longer than 14 weeks.

Our short Katmandu visit luckily coincided with that of the new United States Ambassador to India and Minister to Nepal, Mr. Loy W. Henderson. We were fortunate to be able to

© National Geographic Society I Kodachrome by Volkmar Wentzel

A Nepalese Bride Wears a Fortune in Jewels, Gold, Coral, Silk, and Coins

This hill girl with a Hindu religious mark on her forehead was observed by the author in forbidden Nepal during a 3½-month expedition which collected rare zoological specimens.

© National Geographic Society

Kodachrome by Volkmar Wentzel

Marketers Throng the Main Square of Patan, an Ancient Art Center, Where a Domed Temple Rubs Elbows with Pagodalike Shrines

In a Dazzling, Scarlet Durbar, the Hereditary Maharaja of Nepal Is Invested with the United States Order of the Legion of Merit

Loy Henderson (center), Ambassador to India and Minister to Nepal, stands on the palace steps after the ceremony in Katmandu. The Maharaja is on his right.

© National Geographic Society

Kodachrome by Volkmar Wentzel

© National Geographic Society

Kodachrome by E. Thomas Gilliard

Gilded Parasol Atop a Temple in Swayambhunath Proclaims a Saint's Treasured Relics

The *Chaitya*, sacred to Buddhists, has a plaster dome. Eyes painted on walls signify the all-seeing power of the godhead. Question-mark "noses" are stylizations. Precious objects of the saint rest under the dome.

© National Geographic Society

Kodachrome by Volkmar Wentzel

A Tibetan Lama in Belchola Blows His Trumpet Call on a Human Thigh Bone

This Red Sect monk is one of thousands of pilgrims passing through Nepal each winter to Buddh Gaya, a Buddhist shrine in India. Spun by his left hand, the double-faced drum is beaten by twin clappers.

From This Lovely Site Explorers Fled as for Their Lives When Snows Piled High

Camp Mangalbaré, 9,700 feet in the Himalayas, saw Dr. S. Dillon Ripley and his associates hemmed in by a sticky, 14-inch fall late in February, 1949. Tents collapsed beneath the white blanket, fires died out, and food ran dangerously low. Barefoot coolies, unused to working in snow, sank into a mute lethargy.

Finally, soaking wet, knee-deep in snow, expedition members broke camp and trudged to safety in a valley.

Here, after the first night's fall, a serene sky gives no hint of danger still to come. Mrs. Gertrude Legendre, a naturalist, works unconcernedly on her notes. A fresh leopard skin is stuffed and frozen so stiff that it resembles a living animal. Bird nets and clothing are strung to dry on a tent.

Magnificent rhododendron trees of the world's largest species, *R. arboreum*, tower 60 feet (pages 28-29). Come spring, blossoms will paint them scarlet.

The National Geographic Society's flag hangs beneath the Stars and Stripes. Other expedition sponsors were Yale University and the Smithsonian Institution.

© National Geographic Society

Kodachrome by Volkmar Wentzel

The Author Uses Shotgun and Silk Net to Collect Birds in Open Plain and Tangled Forest

The leader (left) and his Yale associate take their ease as a laborer pushes their handcar along the Nepal Government Railway near Raxaul. A young Gurkha serves as a gunbearer. Right: A coolie helps stretch a bird net in western Nepal.

© National Geographic Society

Kodachromes by Volkmar Wentzel

© National Geographic Society

Kodachromes by Volkmar Wentzel

▲ Radio Music Amazes Rekcha Hill Folk: They Never Heard of America

As scientists sought shelter here from the rain on a chilly Christmas Eve, the shawl-draped woman (center) shoved them off her porch lest their "low caste" defile her. A five-rupee note changed her mind; she produced a rice-and-curry dinner and shelter in an outhouse.

▼ Richard Mack Establishes an Outdoor Oven and Kneads Bread Dough

Whenever he cooked, Mr. Mack served a California ranch-style meal. Colleagues enjoyed his smoked venison, prepared as a titbit for carrying on the trail. His boulder-strewn campfire is set up in a cool shady glade near the Karnali River.

photograph the two Durbar ceremonies when the new Minister presented his credentials to His Majesty the King and was also entertained by the Maharaja (page 11).

Occasions like this are virtually the only ones when the King makes a public appearance, for since 1867 the kings of Nepal have been without power, although they are titular heads of the State.

A Court in Medieval Style

I was most fortunate on this trip to meet His Majesty, Maharajadhiraja Tribhubana Bir Bikram Jang Bahadur Shah Bahadur Shamsher Jang, to give him his full name, a handsome man of 43. When appearing in public, he is always led by the Maharaja hand in hand in courtly medieval style.

The clothes worn by the royal family and the members of the ruling Rana family on these occasions were dazzling in splendor.

Atop a military uniform of scarlet or white, according to the season, above a tunic sparkling with orders and gold lace, the Nepalese rulers wore a sort of crown unlike any other known to the world today. The base was of tightly fitting inverted basketwork covered with seed pearls. The rim all around was adorned with a design, a ropelike affair set with precious stones, usually diamonds. From the lower edge hung pear-shaped emeralds.

In front there was an ornament, usually of diamonds. In addition, there was a jeweled holder, just above the forehead, from which sprang an enormous plume which swept up and over and down in back. It was composed of the flank plumes of the greater bird of paradise, the New Guinea species which has been an article of trade and a badge of royalty for centuries in the East. Only in Nepal is this royal insignia still worn.

The crown of the Maharaja had a huge spinel ruby bead on the center of the top, memento of the imperial Chinese order accorded his father, Maharaja Chandra.

On one side, next to a great grape cluster of emeralds, was set a famous carved emerald which belonged to Nadir Shah, the Persian conqueror who pillaged Delhi in 1739, and later to the Nana Sahib, the general in the Indian Mutiny of 1857 responsible for the massacre of Cawnpore.

No less fine are the great flatted diamonds on the King's crown. These glittering jewels stirred the imagination with thoughts of Oriental history, so often ruthless and violent.

The Durbar Hall, with its lines of chairs and thrones at the end, was magnificent with gleaming chandeliers, portraits, velvet and gold-embroidered rugs, stuffed tigers, and gigantic brass lions spouting electric lights from their mouths.

Added to this panorama of splendor and incongruity were the figures of the rulers, glittering with stars and jewels and surmounted with their shining panaches of plumes. The high priests were there in orange-colored gold brocade; the dignitaries in black and gold carrying golden trays set with boxes and goblets of attar and *pan*—rose water and betel nut.

The court criers, like medieval heralds in red and white with golden staves, called the turns of the elaborate protocol ceremonies in tones like nothing so much as those of a tobacco auctioneer down South.

We left Katmandu before the final festivities were completed, because we were eager to get off into the back country.

Our first project was western Nepal, least developed and least known.

To travel from place to place in Nepal, if long distances are involved, it is easier to return to India and take a train to the nearest rail terminus.

From Bengal west into the United Provinces stretch the spidery meter-gauge tracks of the Oudh and Tirhut Railway, one of the longest meter-gauge railways in the world, and certainly the most tiresome.

Back and forth across the network of foaming rivers that flow south into the Ganges from Nepal the tracks weave, stopping at a multitude of way stations.

This is a great jute and sugar-cane belt, although it was once an old home of the indigo plant, a crop which largely died out before World War I.

A Tedious Train Trip

To get to west Nepal from Raxaul, we had to take a train journey of more than 800 miles, lasting 40 hours with four changes. Fortunately, the railroad, knowing the vicissitudes of its own line, allowed passengers to rent a whole car by merely paying the normal fare for the number of passengers which the car would ordinarily carry. A double first car, so-called, had accommodations for six first-class passengers and three servants.

The car itself, although called a first-class wagon, was always incredibly dusty and dirty, with yanked-out electric-light fixtures and faulty fans. At least, though, we had it to ourselves, and could revel in the luxury of having it shunted onto the other trains at the changes without having to get out and shift our mountains of luggage. We always seemed to have to change trains in the middle of the night.

Francis Leeson

Barefoot Porters, One with a Trunk, Struggle Down the Slippery "Road" from West Nepal

Returning to India, expedition members followed the Karnali River. When its banks grew too steep and rough, they had to portage through the forest of sal trees. Here the coolies, laden with cots, bedding, food, and animal skins, return to the river bed. Grass, interspersed with wild ginger, hangs like weeping willow.

In the early morning of December 10 we arrived at a wide place in the enveloping plain called Kauriala Ghat. Far north, just over the pinkish ground haze, we could see the snow peaks of northwest Nepal.

The Indian Government of the United Provinces, through their late fascinating and able governor, Her Excellency Madame Sarojini Naidu, had kindly provided tents for us here. Later, after several days packing and arranging, we were able to get off across the Terai toward the hills.

The local Indian officials provided us with one elephant and some bullock carts. The local Nepalese official produced an elephant of his own and later three Nepal Government elephants. These we rode on, while our heavy boxes, cook, bearer, and two taxidermists from Bombay rode in the bullock carts.

Both means of transportation were equally uncomfortable; yet the elephants had a certain advantage in being faster. Of course the excitement of riding an elephant never quite wears off despite the discomfort (page 26).

This time we closed the door on the 20th century and moved back into the 16th. Three days of riding the ponderous back-breaking pachyderms and we arrived at the base of the hills. Here we made camp at a gap where the sinuous silken green torrents of

the Karnali River pour out into the broad plain (page 7).

The river was magnificent, quietly rolling past at more than nine miles an hour, giving an impression of immense strength. It was clear green in the winter, although a foaming, dull, silt-filled torrent in the summer after the rains. Little flocks of female mergansers floated down past us, and a whole family of Indian otters mewed and did Aquacade stunts in midstream.

First Sight of Interesting Birds

Here we hunted a bit, getting our first interesting birds. Many were high-altitude species which come down to the fringe of the hills on the edge of the lowland Terai during the cold weather.

One of the birds collected here gave me a terrible start. It was a little fellow, as small as the smallest warbler but completely without a tail.

I got much excited, thinking that here I had a brand-new species of one of the little wren warblers of a group of tiny and elusive birds found in the Himalayas. At first I preened myself considerably on this discovery, and even wrote a letter back to the Smithsonian saying that I thought I had something very "new."

Fortunately, however, with ornithologists there are always second thoughts. I worried that little bird in my mind like a cat worrying a ball of string. Lacking all the proper reference books, I devoted a couple of months and some more letter writing to it.

Lo and behold, after that time the little fellow turned out to be nothing but a tailless wonder, a little-known warbler of the hills. I had never collected it before, and this specimen just happened to lack a tail. Such are the mental hazards of bird collecting.

Deer of three species also occurred here, and we saw fresh pug marks of tiger and the smaller wildcats; but our mammal collecting, as always, was primarily of the very small animals—rats, mice, bats, shrews, and squirrels.

After a few days we had assembled enough coolies from passing throngs of hillmen, who come down the river valley trails each winter, to move upward. Dismissing the elephants and bullock carts, which could go no farther, we set off on a steep, narrow trail covered with old avalanche falls.

After three days of marching along the banks of the Karnali and its feeder rivers, of crossing the river by dugout canoe (page 30), of walking under the immense canopy of original hardwood forests which still clothe these interior valleys, we came to the foot of the farther hills. On top of this first ridge we clambered to Rekcha (pages 6 and 16).

Two of us made it to Rekcha at dusk on Christmas Eve after a wild all-day scramble up the rocky slopes from the river level 4,000 feet below. Finding our own way without guides and with the rest of the party struggling with the indolent coolies far behind, we sought shelter from the sudden rush of cold as the orange sunset light faded.

The village consisted of 40 mud and thatch houses straggling along the edge of a flat cultivated plateau at 5,000 feet. A larger brick house was set apart from the others.

A wrinkled shawl-draped crone, her beads and earrings indicating a person of prominence, hobbled out and shooed us off the porch. She cackled away in Hindustani that she was a big Brahman, and because of her high caste we would defile her household by our presence. I asked for food and shelter, saying that we would pay.

After long entreaties and the flourishing of a five-rupee note, two cooked portions of rice served on green-leaf platters, some curry stuff that burned like a red-hot coal, and a little leaf dish of a green sticky vegetable something like spinach were shoved out on the porch for us.

Meanwhile, I had called through the open door that we were big people in our own right and what about some shelter? We were shown into a square room with a depression in the center of the clay floor in which we could build a fire. Here, with a passing Nepalese as a companion, we huddled most of the night behind a closed door. We almost suffocated from the smoke, trying to keep out the bitterly chill night air.

Christmas in the Hills

Early Christmas morning, with the stars well out and the frost crackling, the first coolies caught up with us, and we heard that two more of our party were camped in a hut half a mile away. Since it seemed to me that anything was better than our smoke-filled room, we left the place and teetered along narrow pathways between rice fields in the pale light of the stars.

As we drew near the hut, we heard voices and saw a fire, and just for the effect the two of us broke into a hastily improvised "Silent night, holy night."

Crackers, chocolate, and a little precious saved-up spirits made a welcome midnight repast. By the next day the whole party was finally reunited, and we had a Christmas dinner with all the fixings in our own tents

Larger than the Forty Thieves' Jars Are Tharus' Urns Storing Mustard Oil

Shy children of Tikapur hid from the photographer until he charmed them with a toy monkey worn like a glove. These five huddle around the fireplace in a dark room; one holds a gift of flash bulbs. Childish handprints decorate a wall of mud plastered over sticks. The enormous jars, one with a basketlike lid, serve as fuel reservoirs for cooking and for mustard-oil lamps. Fields around Tikapur were yellow with mustard.

under the unbelieving stares of the old woman and the other villagers.

Later, when I asked the crone who she thought we were, she ventured "Punjabis," tall, sallow-colored people from northern India. She had never heard of Americans and only barely of a nation across the sea (the "Black Water," as pious Hindus term it) called the "Angreez"—the English.

This tiny village was one of our best collecting localities. Five thousand feet is an ideal collecting zone in tropical or subtropical mountains. It is too high for the lowland species and too low for the wide-ranging northern species usually found at the highest altitudes even in the tropical zones of Asia.

Game Animals and Birds Disappearing

One of my ambitions in coming all the way to Rekcha was to try to rediscover *Ophrysia superciliosa*, the mountain quail, a bird last seen in the adjacent Indian Himalayas to the northwest in 1876. Only eight specimens of this pretty little game bird are known today, and there seems to be no explanation for its disappearance.

I had hoped that, as the countryside changed about the hill towns of Naini Tal

Picassolike Figures, Bordered by Sacred Serpents, Adorn a Tharu Mud Wall in Tikapur

These shy people, who ran at first sight of the photographer, invited him into their home after he let them look through his camera's view finder (pages 38, 39). They are animists, who revere such objects in nature as lightning and waterfalls. Their fresco, colored with earthen pigments, shows camel, tiger, peacock, fish, elephant with mahout, and men with feather-duster heads. A woman (right) smokes a water pipe.

and Mussoorie, in the United Provinces, perhaps the species might have retreated into the less-developed areas of Nepal next door.

Possibly the development of agriculture and the resulting destruction of the original grasslands have had something to do with the disappearance of this species. That might explain, I thought, why we did not find this elusive little bird in west Nepal.

To our great surprise, we found that Nepal was just as heavily farmed and erosion was just as bad as in near-by India (page 23). Nepal is a little-known country, but, paradoxically, that unknown back country which sounds so mysterious turned out to be literally crawling with people.

Cultivation went all the way up virtually to the mountain tree line. Grazing cattle wandered up over 12,000 feet! The hill forests are steadily and inexorably retreating. Game animals and birds are disappearing.

Erosion is a fearful menace, as the enormous silt deposits in the rivers in floodtime demonstrate. If changes in the countryside are responsible for the disappearance of the mountain quail, then Nepal is no last refuge for this lost species.

I had a painting of the quail which I showed

to native trappers (page 25). The Maharaja's son, Major General Bijaya, an extraordinarily active, efficient, and charming man, took great interest in our search and had photographs of the painting distributed throughout the districts. But no information about the bird has so far come to light.

Native trappers went out into near-by districts for me and found only the common hill partridge. We staged beats, our coolies charging down toward us through the underbrush; but all to no avail.

Perhaps with a well-trained bird dog we might have been able to prove the matter finally, but a Labrador retriever which I was hoping to borrow failed to materialize. The mystery of the mountain quail remains just as much a mystery as ever. In a negative sense, though, we can take some satisfaction in having looked and failed to find it in west Nepal.

Luck wasn't always against us, however. On Christmas Day, walking through an overgrown scrub pasture outside Rekcha, I saw a small family party of perhaps seven birds about the size of mocking birds or small thrushes scrabbling about half on the ground, half in a low thick bush. Careful stalking, for the birds were very shy, brought me within reach, and I fired and secured one bird.

Found—A Spiny Babbler!

There in my hand lay a spiny babbler, *Acanthoptila nipalensis*, a species lost to science for 106 years (page 40)!

Apparently not more than four other specimens exist in collections today, all taken by the native collectors of Sir Brian Hodgson in the 1840's (page 2). No ornithologist had ever before seen the species alive.

The birds disappeared at my shot as if by magic, and no amount of searching during the following 10 days produced another spiny babbler.

That, I may add, is one of the trials of an ornithologist in Nepal. So dry is the country, so nearly gone the forest, especially in the hills, that in numerous cases a certain species of bird will be seen only once and not again during the relatively few days or weeks that an observer is in the area.

It all reminded me a bit of the observation about how fast the sheep have to be in certain parts of our West, where they must keep on the run to get enough blades of grass to live on. Flocks of birds would come over from the next mountain ridge, settle on the small patch of trees on the ridge where we happened to be camped, and then move on, probably covering a huge territory.

Even if this is the habit of many species of birds in these hills in the wintertime, as it is known to be with the family of finches, for example, how much farther and faster they must have to move nowadays than before the present devastation of the forests!

Birds of "Incomparable Beauty"

Many of these high-mountain birds were of incomparable beauty.

There was the delicate hedge sparrow, so well named *Prunella immaculata*, with its warm gray tones, white-streaked head, and rusty-red wing edges. There were the rose finches of many species, my particular choice looking like my childhood's favorite dessert, chocolate ice cream and raspberry ice together in a mold. There were the yellow-billed blue magpies, with blue wings, yellow bill, orange feet, and a breast of palest salmon color overlain with a miraculous all-pervading yellow wash.

Every day there were different species to be seen—babblers and warblers by the score, thrushes and flycatchers by the dozen, and almost every day one fleeting glimpse of something not seen before. This was the real excitement of our expedition, far more than any hair-raising adventures or thrilling accidents (page 27).

After 10 days, with our food stocks almost gone and the coolies grumbling for lack of rice or flour, we left Rekcha and returned to the Terai again by a slightly different route.

Again our trail lay along the sand and boulders of the riverbank, crossing and recrossing by rude dugout canoes. These trails crisscrossing the wilderness of inner Nepal are thronged during the winter with literally thousands of hillmen and boys coming down to the plains of India to work. Villages like Rekcha are deserted at this season except for the women.

The strange thing is that the men seem not to be changed by their travels. Perhaps it is because they go together in crowds and most of them never learn to speak Hindustani. Down from the hills they would come in groups in October, November, and December, bringing with them produce, fruit perhaps, or *ghee* (clarified buffalo butter), or some hill flour or cloth.

In the Terai they would visit a Nepal trading village and exchange their goods for Indian money. With this pittance they would buy a third-class railway ticket from the border to some big center, often one of the ports like Bombay, where they would work for two or three months unloading ships.

With the extra rupees acquired, the men

S. Dillon Ripley

Erosion, Nepal's Worst Enemy, Rips Ever-widening Gullies Out of Fertile Farmlands

Rivers are allowed to fill with precious topsoil and forests retreat to the hilltops. With the vanishing trees go Nepal's game birds and furred animals (page 21).

would then have enough to go back the way they came, and again at the same little trading town to buy cloth, cooking pots, or salt and return to their native villages by spring.

When we came again to Kauriala Ghat, the train was crowded with these wanderers; so crowded that arms and legs and small bundles were sticking out at all angles from the train doors and windows. Fortunately, such trains move slowly, and there were no smashups on the line.

By mid-January we had reached eastern Nepal, our hundreds of specimens from the west safely packed ready for shipment home.

Industries of Eastern Nepal

Eastern Nepal was a far more developed area than the western, although the expression is, of course, relative. Here there was an actual town, Biratnagar, which has become Nepal's industrial center. There were one jute mill and another being built, a cotton-spinning mill, a sugar mill, and a number of small home-type industries, besides a powerhouse.

The daily production of jute was about 20 tons, or, translated into the number of bags produced, 17,280. These are the familiar burlap bags of world commerce.

Nepal's lack of income tax and her favorable customs arrangements have attracted Indian capital under an arrangement with the Nepal Government. The sugar and cotton twist were for local internal consumption.

Most of the labor was Indian, a fact which presented political and other problems to the Government; but plans were under way to recruit Nepalese labor with greatly improved working conditions, school and hospital arrangements, and other amenities.

In addition to Biratnagar, east Nepal is now the site of the projected Kosi Dam, which when completed will be between 750 and 800 feet high, higher than the Hoover Dam in the Colorado River. This monster dam, to be financed and constructed primarily by the Indian Government with American engineering advice, is to be designed for flood control first and foremost. The annual rampages of the Kosi River have always been among the worst in India.

There are also said to be great irrigation and hydroelectric potentialities. The survey alone has consumed two years, and it is still too early to know whether the scheme will be acted upon. If it is carried out, eastern Nepal will become a modern community with roads, railroads, electric light, and other modern facilities.

At least, there was enough of a road through the Terai of east Nepal so that we could travel north from Biratnagar in style in a command car and truck. If not picturesque, it saved us two days each way. At the foot of the hills we again collected coolies for the onward journey. Here too we gathered in an addition to the party, Mrs. Sidney Legendre, world traveler and explorer, who hunted and hiked with us for a month.

Leaving the Terai, we crossed the Siwalik Range and the Tamur River beyond and climbed steadily upward until we made our main camp six marches later at a place called Mangalbaré, about 9,700 feet above sea level. It was an unforgettable spot (page 14).

A Lavish Panorama

At dawn each morning we could look out to the north where, framed in 60-foot rhododendrons, spread the most lavish panorama in the world. The whole massif of Everest, with its complex of supporting mountains extending for miles on either side, lay stretched before us, 60 miles away, almost at arm's length in that brittle air * (pages 28 and 29).

To the right rose Makalu, the most majestic sight of all. It is a wonderfully balanced mountain, the central peak flanked by ridges evenly spaced like the shoulders and arms of a majestic sitting figure. To the left lay a huge, flat, unnamed ridge, and far to the left the icy pinnacle of Gauri Sankar.

A five-minute walk brought us to the edge of our own steep ridge, and there before us, amid swirling masses of cloud, lay the wild jumbled masses of Kanchenjunga, the world's third highest mountain.

By about 9 or 10 in the morning all this would be blotted out by the swift-ranging clouds. As we walked over the hills, over open screes of rock and stunted grass, through clusters of moist, dripping rhododendrons and tangles of stunted fir and bamboo, clammy eddies of cloud would drift by, enveloping us in silence.

What few birds there were seemed to vanish then, and all was quiet except for the faint sighing of the wind and sometimes, far away, the notes of the curled dragon horns of the hill people.

February is one of the wedding months in the Hindu calendar. Every day we could hear horns echoing up from the valleys, and drums, and sometimes shrill squeals of clarinetlike shawms and the boom of a muzzle-loading gun (pages 5 and 9).

On the eighth day snow started, softly compelling, piling in endlessly in swirling eddies. The wind had changed to the north-east, and we were in for it. Our tents began to give way under the weight, for it was wet, heavy snow. No one seemed to have the right sort of shoes; the coolies had none.

In no time the camp was a weltering, half-frozen mess. It was difficult to keep fires going. Most of the servants had never seen snow before and were apprehensive, to say the least. In spite of our hopes, the snow came on and on.

By the third day, with 14 inches of snow blocking the pass behind us, it was time to get out fast. The coolies had sunk into a kind of apathy, huddling over their fires in their leaf huts. Food would be gone in another day, but they seemed not to realize or care. By breaking up the fires, kicking snow into the huts, and shouting at the top of my lungs, I managed to get them out and on the move.

Soaking wet, we finally trudged off through the knee-deep drifts down another trail leading into a deep valley. The last snow was at 6,000 feet. We were out of it by that night without serious trouble and with a deep sense of thankfulness.

Eight more days of marching through the Kosi Valley and we were again in the Terai, our adventures over, and the richer by a magnificent collection of 500 more bird specimens and a good number of mammals (page 27).

Now we closed the door on the 16th century, on the silences of the high cliffs, the quaint, neat villages, the tinkling bells of the temples, and the wild bray of the curling horns. After five weeks of walking, jeeps and trucks looked strange indeed, but welcome.

The last morning in Biratnagar I walked out before breakfast. The heat haze of the Terai had not yet formed, and there in the pink dawn light were the tips of the hills rising in space like the dragon teeth of Cadmus, magical and evanescent. It seemed only a moment before the sharp shapes were blotted out by puffy cloud and the hills were gone.

An hour later the train moved out. We had left Nepal, starting back on the long and tortuous trek home with our precious cargo of specimens.

Much remains to be done in the way of research. It will be many months before our work on the expedition is completed. None of us, I am sure, will ever forget the months that we were privileged to step back into a microcosm of vanished time, into the high hills of Nepal.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Aërial Conquest of Everest," by Lt. Col. L. V. S. Blacker, August, 1933.

© National Geographic Society

Kodachromes by Volkmar Wentzel

↑ Colored Pictures Are Shown in Vain; the Lost Mountain Quail Stays Lost

Thus did the leader pursue his quest among villagers in Rekcha; they brought in only the common hill partridge. Beaters scoured the bush; nothing availed. The author fears that *Ophrysia superciliosa*, last seen in 1876, is extinct.

↓ An Ichthyological Team Seines for Rare Fish in Karnali River

Mr. Migdalski (left) and Francis Leeson winced as they waded barefoot over hard stones. Their companions on shore laughed at their misery. The two succeeded, however, in capturing many small fish, some belonging to species virtually unknown.

Travel by Elephantback Is as Exasperating as It Is Exciting

For three days Mr. Migdalski (left), Dr. Ripley, and fellow scientists rode this ambling, uncomfortable conveyance across the roadless lowlands into the hills of western Nepal.

Their progress was a jolting 12 miles a day, and it was expensive, for the beast consumed an enormous amount of feed.

The Americans had two other choices: (a) bullock cart, which was rougher and slower, and (b) foot power, the most tedious of all.

Looking back, the leader is glad he chose the elephant. "The excitement never quite wears off," he said.

This docile cow appears to be about half a century old. Her ears have been torn to rags by age and the mahout's hook, which serves as bridle, reins, and bit.

© National Geographic Society

Kodachrome by Volkmar Wentzel

Mr. Mack, a Mammalogist, Skins a Yellow-throated Himalayan Marten; Mr. Migdalski, an Ornithologist, Catalogues Birds

In western Nepal the scientists gathered hundreds of rare prizes. Their supreme triumph was the discovery of the spiny babbler, never before seen alive by ornithologists (page 46). Search as they would, they were unable to find the lost mountain quail (page 75). Mr. Mack's catches consisted, by design, of small animals. Avian specimens (right) include hill partridge, slaty-headed parakeet, white-throated laughing thrush, bush lark, and Darjeeling woodpecker.

© National Geographic Society

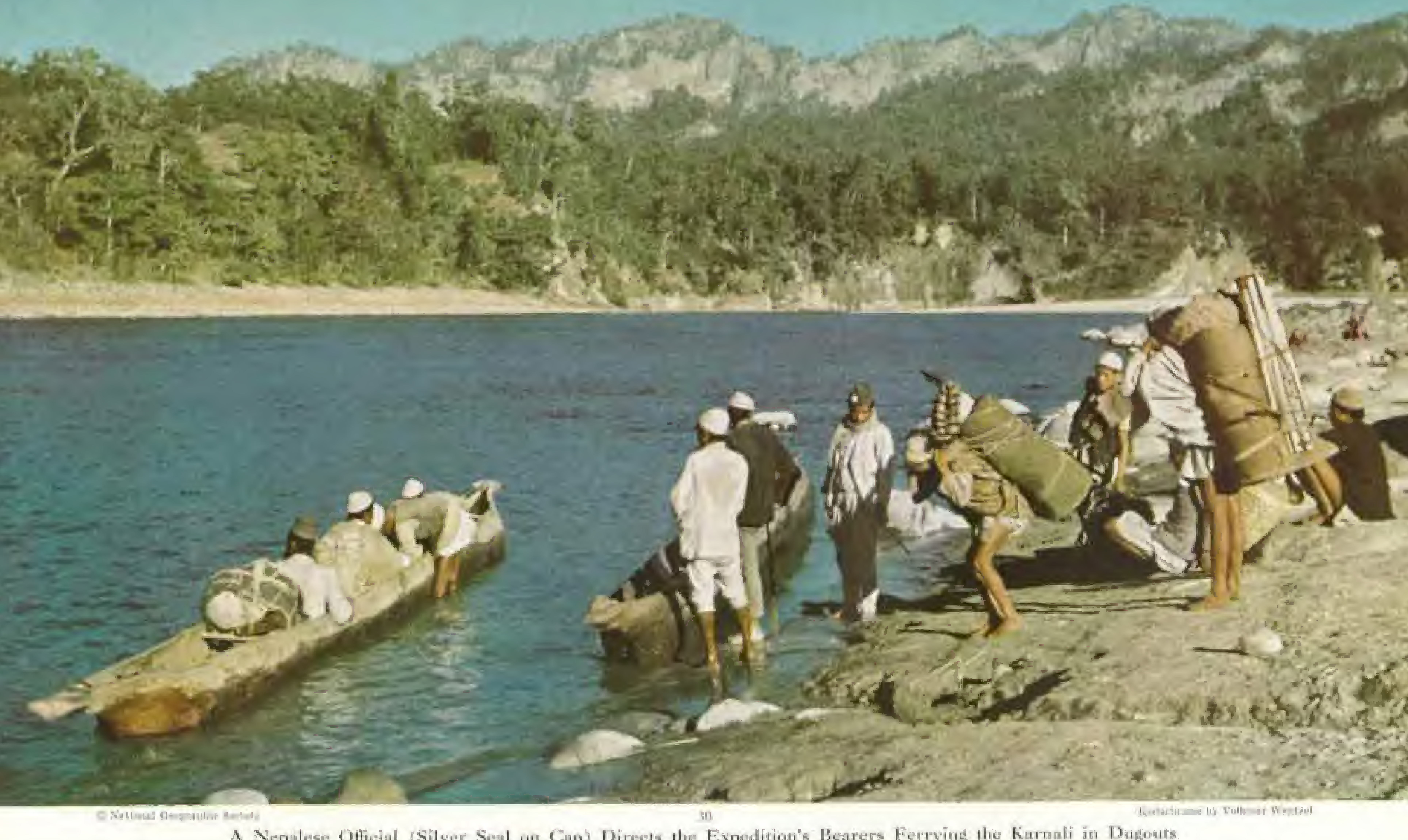
Kodachromes by Volkmar Wentzel

© National Geographic Society

Mangalbaré's Icy Rhododendrons Frame a Matchless Panorama on the World's Ridgepole

Kodachrome by Volkmar Wentzel

Mount Everest (Left), Seen Across 60 Miles, Appears Topped by Lesser Makalu (Right)



© National Geographic Society

Kodachrome by Volkmar Wentzel

A Nepalese Official (Silver Seal on Cap) Directs the Expedition's Bearers Ferrying the Karnali in Dugouts

On this beach the explorers rested soon after their elephant journey (page 26). The glacial river rolls nine miles an hour past eroded hills of the Siwalik Range. Here in winter the stream is a restful blue; summer's rains will turn it a silty yellow.

Canoeist and Fishermen Earn Their Living on Nepal's Rivers

The ferryman paddles his dugout across the Karnali at Kune Ghat. In season his canoe is fairly swamped by hillmen going down to the plains to hunt jobs.

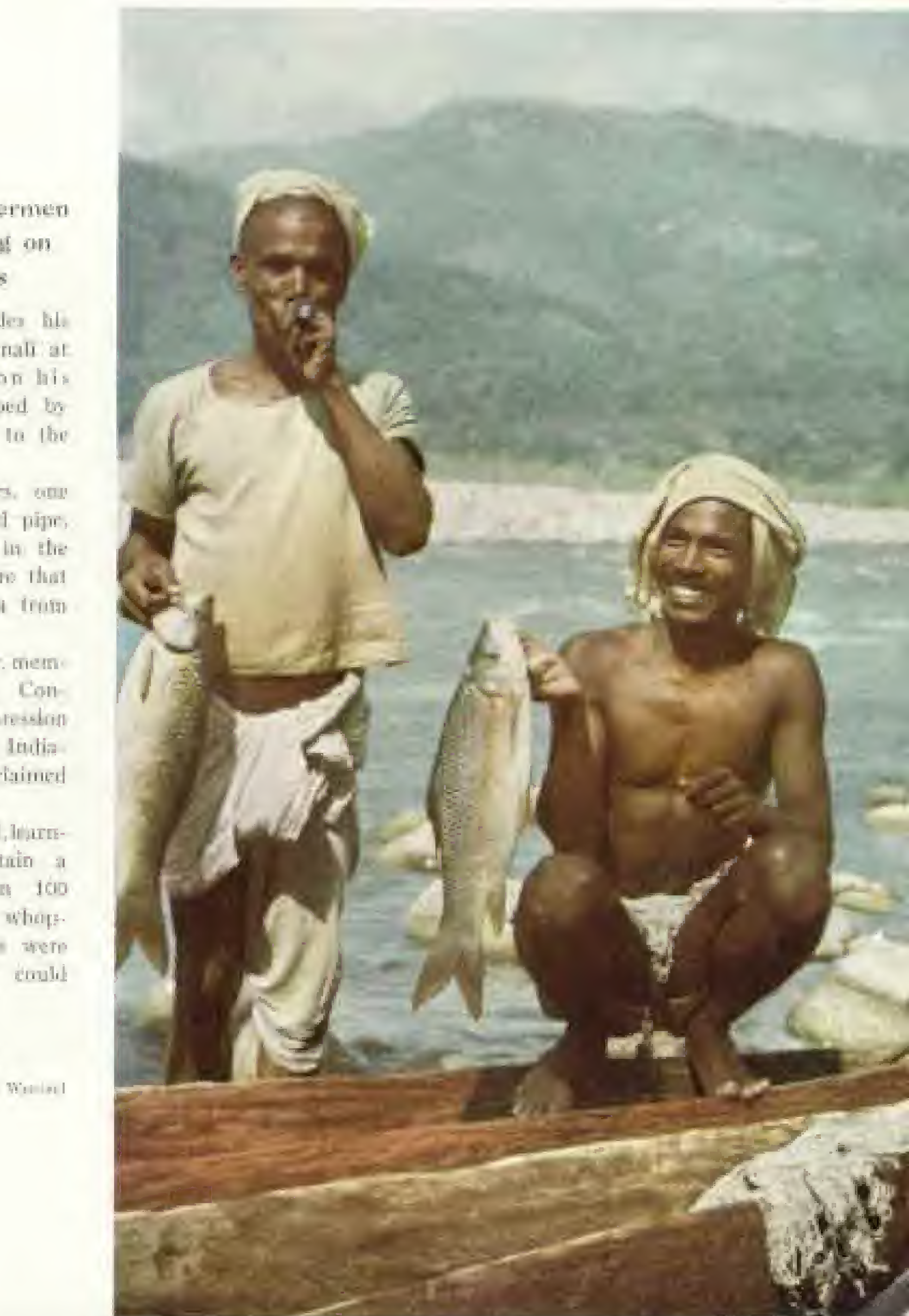
Two fishing partners, one smoking a cigar-shaped pipe, display prizes caught in the Kosi at the point where that stream spills into India from Nepal.

These fish are mahseer, members of the carp family. Contrary to the West's impression of sluggish carp, their India-Burma relatives are acclaimed as valiant fighters.

Photographer Wentzel, learning that mahseer attain a weight of more than 100 pounds, searched for a whopper, but these midgets were the best his camera could catch.

© National Geographic Society

Kodachromes by Volkmar Wentzel



© National Geographic Society

Kodachrome by Volkmar Wentzel

Within a Cradle of Snow Peaks Sits Katmandu, the Remote and Mystic Capital of Incredible Nepal

Washington's "magnificent distances" shrink by comparison. Fifty miles away, Mount Gosainthan (left center) rears its icy head unbelievably clear. Katmandu has broad paved avenues and chasmlike alleys. It was founded about A. D. 723 by Raja Gunakamadeva. These bright mansions are comparatively modern. Palaces of the Rana family, the illustrious house of Nepal's hereditary Prime Ministers, stand on the left. The view is from "Bhim Sen's folly," a nearly 200-foot tower. Tibet lies over the mountains.

Rai Tribeswomen Visit Camp Mangalbaré and Burst into Bashful Giggles at Sight of Americans with Their Cameras

For this social occasion the ladies wear their finest shawls, brass nose rings, bead and coin necklaces, and voluminous cotton skirts. Sashes, which seem to proclaim maternity cases, actually support overloaded waistline pockets

© National Geographic Society

Kodachrome by Volkmar Wentzel

© National Geographic Society

Kodachrome by Volkmar Wentzel

Nepalese Farm Women, Trudging Up a Steep Trail from the Distant Rice Terraces, Carry Almost as Much as the Men

Instead of Cars Carrying Workers, Nepal Has Workers Carrying Cars on the Rocky, Hilly Trail from Katmandu

Here automobiles, stripped of wheels and bumpers, are shoulder-borne to and from the capital, only Nepalese city with modern roads. This old German-made Mercedes is going to India as a trade-in on a shiny American model. Some 60 coolies, moving to the rhythm of a chant, balance it on long poles.

© National Geographic Society Kodachrome by Volkmar Wentzel

© National Geographic Society Kodachrome by Toni Hagen

Hill Men and Women Stagger into Dhankuta Beneath Atlaslike Burdens. One Leads Two Goats as Well

These porters, when resting, lower tumpline-suspended cargoes upon walking sticks. Tangerines and herbs fill the split-bamboo baskets. These products the carriers trade for salt, cloth, thread, and pans. The photographer, hefting a woman's load, estimated its weight at 100 pounds.

Graybeard and Youth Inspect the Camp at Mangalbaré

One of the expedition's porters stands among snows of the first night's blizzard (page 14). He has smeared a red powder around his eyes to diminish ice glare. Scarred face shows he has survived smallpox, a not uncommon disease in Nepal. When on the trail he uses his stick to rest his burden.

The old man is a farmer who, if judged by his tatters, has not been too prosperous.

The author, expecting to see Nepal underpopulated and underexploited, found exactly the reverse. To feed themselves, the people cultivated every slanting acre to the point where soil erosion threatened their future.

© National Geographic Society

Kodachromes by Volkmar Wentzel

© National Geographic Society

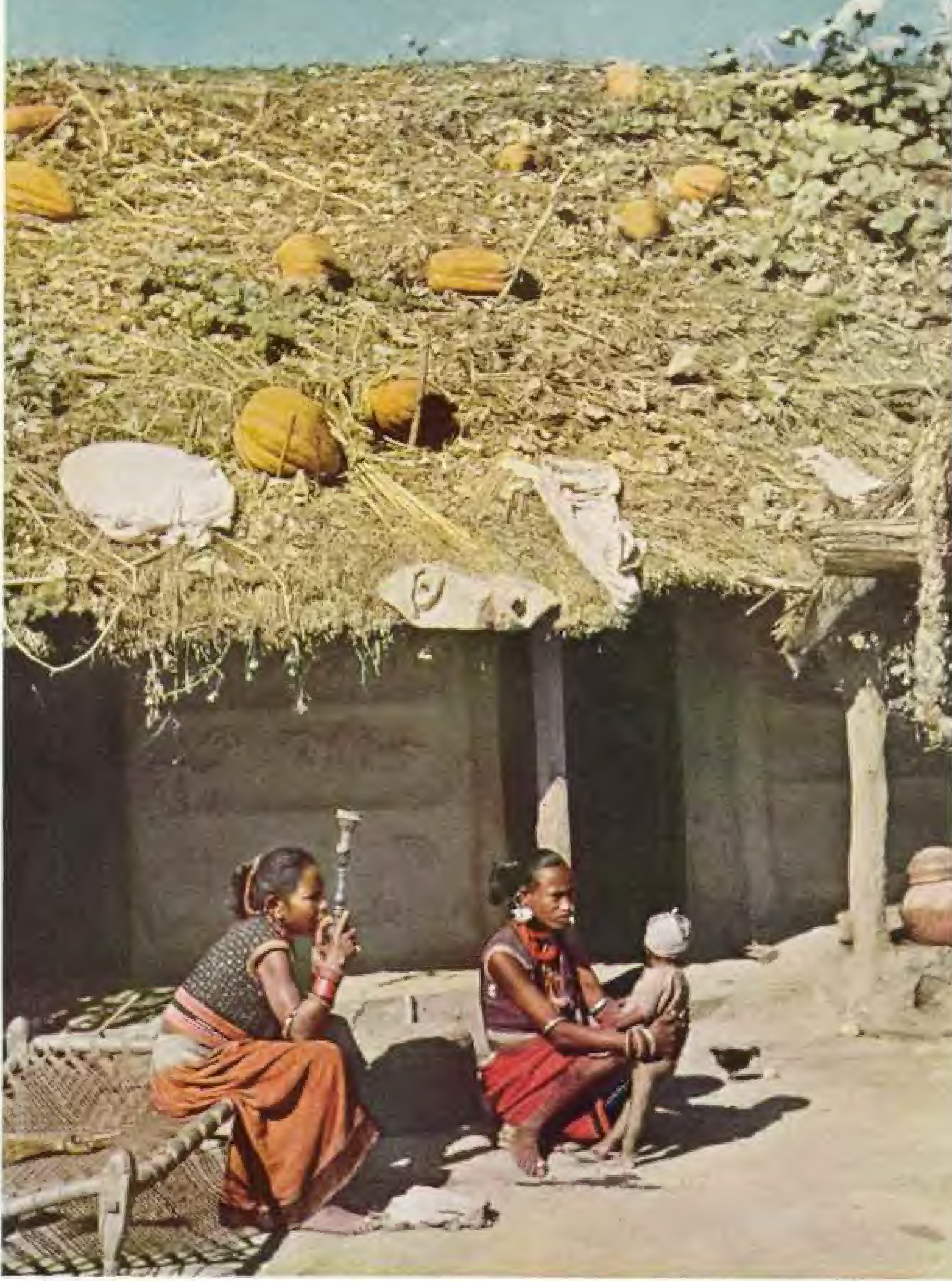
Kodachromes by Volkmar Wentzel

↑ Tattoos on Legs and Rings on Toes Are Vanities of a Tharu Mother

These shy people live in Tikapur, a village surrounded by yellow fields of mustard, whose seeds they grind into oil for lamps and cooking vessels.

↓ Her Beaming Neighbors Load Necks with Silver, Heads with Jars

Tharus grow all their food and make virtually everything they use. They fish and trap with homemade seines and snares; they weave beautiful baskets.



© National Geographic Society Kodachrome by Volkmar Wentzel

Tharus Use Every Inch of Soil; Squashes Grow Even on Their Thatched Sod Roofs

Animal figures have been shaped on mud walls of this house in Tikapur. One woman smokes a water pipe with coconut bowl. Tharus, who dwell in mosquito-ridden lowlands, are noteworthy for hereditary resistance to malaria.

© National Geographic Society

Painting by Walter A. Weber

Spiny Babbler, Lost to Science for 106 Years, Is Pictured Among Flowering Rhododendrons

Yellow-billed blue magpies perch above, rose finch and rufous-chinned laughing thrushes below. Dr. Ripley collected the fifth known specimen of *Acanthoptila nipalensis*, the spiny babbler.

From Indian Canoes to Submarines at Key West

By Frederick Simpich

Illustrations by National Geographic Photographer J. Baylor Roberts

WALK the length of Duval Street in this odd island city of Key West and you've passed from the Atlantic Ocean to the Gulf of Mexico. If you'd been here during a certain hurricane, you could have seen giant turtles swimming along this same street, cast up from their pens on the city's water front by big waves.

There's not another city under the American flag just like Key West.

It's a part of Florida, built on a tiny island 60 miles off the southernmost mainland tip of that sunshiny State, and set on the edge of the mighty Gulf Stream.* It's so far from Tallahassee, Florida's capital, that its member of the State Legislature has been humorously called the "Ambassador from Key West."

On the map, the city lies 375 miles south of the latitude of Cairo, Egypt, and only 100 miles across the Gulf Stream from Habana (page 43).

"For 50 years Key West has held its supremacy as the most populous city of the State," wrote Jefferson B. Browne in the National Geographic Magazine of June, 1896.

It was a rich city then, with busy ocean trade. That was through the middle 1800's, before any road linked it with the mainland.

Then it had horse-drawn streetcars, ice plants, banks, salt-evaporation works, sponge fisheries, and, above all, big cigar factories built by wealthy Cubans, which made world-famous brands of clear Habana cigars such as *Optimo*, *Cortez*, and *El Principe de Gales*.

But when railroads from the north began to spread deep into Florida with the rise of such seaports as Jacksonville, Tampa, and Miami, Key West's sea trade faded away. Its cigar factories moved upstate to Tampa, and thousands of Cuban workers followed.

A "Seagoing" Railway

When Henry M. Flagler extended his spectacular "seagoing" Florida East Coast Railway south from Miami and sent it island-hopping along the keys all the way to Key West, it looked like the dawn of a new day for the town. Business began to revive. Car-ferry service was started with Habana, and heavy tourist traffic began.

Then came that terrifying Labor Day hurricane of 1935. It killed some 400 people, washed out about 40 miles of the "overseas" railroad, and the costly, unique overseas line was abandoned.

Some people felt that might be the end for Key West. It seemed on its way to join such vanished cities as Nineveh and Tyre. But today, boasting more lives than a cat, it's on its feet again because of two important events.

Fisherman's Choice

First of these is, of course, the advent of that high-speed scenic automobile, bus, and truck highway which now hops the keys along the line of the vanished railway (page 49).

Over this route, into Key West, annually come thousands of visitors. They pack the hotels, crowd the cafes and curio stores, and pay top rents for "party boats" to go fishing. A fisherman's choice indeed, for both the waters of the Atlantic and the Gulf of Mexico are at hand (pages 60, 67, and 70).

Second source of abundant prosperity is the training station which Uncle Sam has set up here for his busy Atlantic Fleet Submarine Force, with a naval air station, a Sonar school, and other mysterious shore installations.

Fat pay rolls spent here by all this Navy personnel and Navy wives adds to the cheerful jingle of the local cash registers! †

So again the stagehands of history have shifted scenery in life's melodrama for stubborn, never-say-die Key West. It lacks the swanky night clubs of Miami Beach. No ponies nose under the wire here, and no yelping hounds reach for that artificial rabbit.

But here may be found some of the world's finest fishing, savory sea foods, and peppery Cuban dishes for those who like them; and, best of all, a friendly people whose rich, romantic past endears them to playwrights and tellers of adventure tales—tales of pirates, wreckers, buccaneers, Cuban gunrunners, and the heroic exploits of our Navy when it was young.

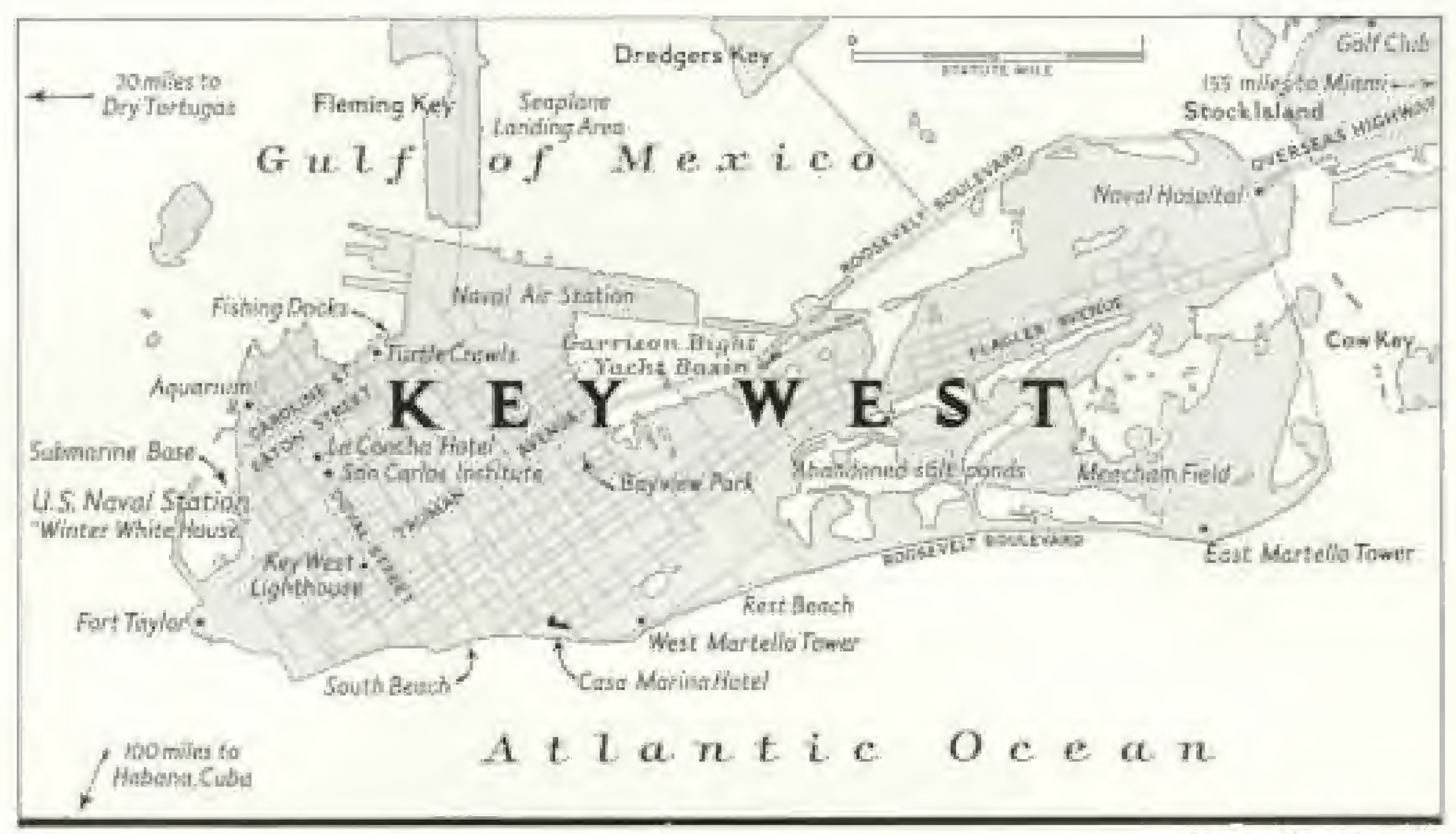
Ernest Hemingway owns a house here;

* See, in the National Geographic Magazine: "Florida—The Fountain of Youth," by John Oliver La Gorce, January, 1930.

† See, in the National Geographic Magazine: "How We Use the Gulf of Mexico," by Frederick Simpich, January, 1944.

***Amberjack,* Like a Speeding Sailfish, Cleaves the Gulf Stream at 15 Knots**

By using her breathing tube, the submarine could stay down 30 days or more without resort to batteries (page 59).



Drawn by Harry S. Oliver

Key West, Motorists' End of the Line. Florida's Seagoing Highway Stops Here

his novel, *To Have and Have Not*, has a Key West background.

The town's picturesque water front is alive with painters (page 69). One group conducts an art school in an old tobacco factory.

Spaniards named this place Cayo Hueso, or Bone Key. That was because they found here so many skeletons of Indians scattered about like match stubs on poolroom floors—bones left when one tribe rubbed out another. But, so goes one explanation, early English sailors couldn't say "Cayo Hueso"; they mispronounced it "Key West." That name stuck. But that bone strewing didn't stop with the Indians.

In all our seven seas few graveyards for ships are more dangerous than these coral ledges along the Florida Keys, that long string of flat, brush-grown, barely-above-sea-level islands that dangles southwest from the Florida mainland. Before lighthouses rose to aid mariners, literally hundreds of ships piled up on these treacherous coral reefs.

That's why so many professional Bahama wreckers moved here from Nassau. Some loaded their wooden houses on schooners and hauled them to Key West, where you still find a few—pioneer examples of prefabricated homes!

Just how many skippers, mates, cooks, crews, and passengers disappeared in these wrecks and mixed their bones with those of the Indians of Cayo Hueso and other keys, nobody will ever know.

Key West had so many wrecks that in 1828 Uncle Sam set up a court here to try prize and other admiralty cases. Judge William Marvin, of this new court, wrote *A Treatise on the Law of Wreck and Salvage*, published in 1858, which became a standard authority.

After lighthouses multiplied along the reefs (page 58) and steam followed sail, wrecks became less frequent. But people remember. I talked with one aged wrecker who migrated here from the Bahamas. He told me the biggest salvage fee he ever got was $12,000.

"Is it true," I asked, "that you once held a dead man for ransom?"

"That wasn't me," he insisted. "Some salvagers I knew were taking cases of goods from a wreck. They opened one long box, thinking it might be laces, cotton goods, shawls—anything. But it was an embalmed man, shipped from New Orleans to New York. When they opened the box, he looked straight up at 'em. It's a rumor they charged his family a salvage fee."

When Navy Chased Key West Pirates

With wreckers and pirates our Navy shared many a stirring adventure when Key West was rough and reckless.

Since 1822, shortly after Commodore David Porter came chasing buccaneers and protecting our sea trade from local "Brethren of the Coast," this has been a naval station, though often almost abandoned.

Even early as Porter's day our sea trade

Key West, Southernmost United States City, Spreads Across a Coral Dot, "The Rock"

This four-mile-long island, home of 19,000 people, stretches from Gulf to Atlantic. It has tales to tell of Indian dugouts, Spanish galleons, and pirate ships. Latest is submarines; the Navy's sub base lies at lower left.

Tropic Sun and Gulf Breeze Kiss Frostproof Shores. Hurricane Is the City's Mortal Enemy

Roosevelt Boulevard leads in (center, left) from distant keys and Overseas Highway (page 49). Navy's Boca Chica airfield sits in the upper right, the Yacht Basin in the upper left. Old Fort Taylor stands in the foreground.

Toy Ships, Deadly Serious, Teach Navy Men to "See" with Sonar, the Underwater Radar

Sonar's wave searches the depths like an invisible searchlight. When it strikes an object, a microphone picks up the echo, another instrument measures the distance, and a "firefly" lights up the position on a screen. This antisubmarine-warfare class, composed of surface-craft and air officers, attends the Fleet Sonar School.

hereabouts was heavy. American ships alone calling at Cuban ports averaged 50 a week.

Pirates swarmed. Spain paid them tribute to spare her ships. But not Sea Hawk Porter! He chased them as far away as Puerto Rico.

When they fled for safety into shallows along Florida Keys, he chased them with barges. From New York he brought an old ferryboat, the *Sea Gull*, to tow these barges from fight to fight. The amazing career of Porter, who finally died while serving as American Minister in Turkey, was one of daredevil adventure to stir the imagination of even a Sabatini.

Indians, too, felt the sting of Navy's musket balls. In the Seminole War the old frigate *Constitution* took a hand. How whites on the keys were massacred or escaped by hiding in cisterns and under wharves was told me by descendants of these New England and Bahama Island pioneers who settled here.

One night a dog lay asleep on top a big empty water barrel. Aroused by fleas, he scratched, thumping a hind foot loudly against the top of the barrel. "An Indian signal drum!" somebody yelled—and the panic was on!

A keen observer of international rivalry over Caribbean trade and naval bases was Commodore John Rodgers.

"The first important naval contest in which this country shall be engaged will be in the neighborhood of this very island." So wrote Rodgers from Key West in 1823. When our fleet left this base to fight the Spaniards off Cuba in 1898, that prophecy was fulfilled.

Early Settlers from Cuba

Key West shouted "Cuba Libre!" and got more excited over that war than did any other American city. That's because it's so near Habana, and so many Cubans live here (page 72).

Along Duval Street you hear almost as much Spanish as English; music stores sell

Isle of Pines Winter Produce Arrives in Key West on Wings

Key West catches fish and turtles, but grows little. These Cuban vegetables were timed to reach United States markets before Florida crops matured. One January afternoon the author counted eight freight planes coming into the airport with cucumbers (page 48).

stacks of Cuban music and records. Stroll any street toward dusk and you may catch that garlicky scent of Cuban cooking.

Strife in Cuba started its people migrating to Key West early as 1869.

Exiled Habana journalists settled here and printed papers in Spanish, and here were formed the *juntas*, or committees, that plotted against Spain's rule in Cuba. From here went the gunrunners, keeping our Navy busy stalking them.

Old-timers still talk of one noted Key West filibuster, Col. Narciso López. With him on one raid went the American adventurer, Theodore O'Hara, who wrote *The Bivouac of the Dead*. Alert Spaniards finally trapped López, took him to Habana, and garroted him.

These exiles, and especially the wealthy Cuban merchants and owners of the great cigar factories, helped build Key West.

Today a few old Cubans still make excellent cigars by hand. Thousands of others, mostly American citizens now, work for the Navy at the airports, in the shops and hotels, drive trucks, or are busy in Key West's big fishing and turtle trade.

This water front is probably busier now than ever, but not with ocean liners and freighters. From your plane, or the top of La Concha Hotel, the town's one tall building, you can look out over the Gulf Stream and see a steady parade of big ships passing; but they don't stop here. Only a barge line runs between here and Miami.

Navy Crowds Key West Waters

What you see crowding Key West waters now are the Navy's big submarines, tenders, tankers, supply ships, crash boats, rescue ships, and other craft, as well as the scores of turtle boats and fishing smacks and the many visiting yachts.

Besides all the freight and express that moves over the highway between here and

Miami, an astonishing volume comes in and out by air (page 47).

One Sunday I saw eight big freight planes glide in from the Isle of Pines, loaded with cucumbers. Back to Cuba they take live chickens, drugs, radios, dry goods, machinery, and occasionally cattle.

Passenger planes of Cuban-owned Aerovias Q shuttle crowds of passengers daily between here and Habana, and National Airlines connects with Miami.

When aurora borealis cracks his frosty whip in northern skies sun hunters swarm down here to get tanned and hear the coconuts falling. Along swanky beach resorts retired Army and Navy officers build cosy winter homes with terraces overlooking the sea, from whence they watch the submarines at play.

"Hardest job here," they say, "is trying to get a conch out of its shell. . . . That's why Key Westers are called 'Conchs'—it's so hard to get them off this island. Many have never been off it."

But not all old families came as wreckers, or retired from the Navy and settled here—and married Key West girls. New England sent its quota; so did Georgia and Mississippi, especially in early days when coastal sailing ships traded here.

The Spottswood family, for example, has lived here six generations.

At 322 Duval Street Mrs. Stephen William Douglass lives in what may be Key West's oldest house. It is one of six similar wooden houses built in New England in 1825 and shipped down here on a naval vessel. Mrs. Douglass's grandfather was a sea captain who bought one of these houses. One of his daughters, unmarried, lived in this house 82 years. In its rear is a detached kitchen, with a great oven, where once slave cooks presided.

The "Winter White House"

Every visitor wants to see President Harry S. Truman's "winter White House." His choice of this modest but satisfying spot for spending his cold-weather vacations pleased but did not astonish complacent Key Westers (page 61).

This new part-time White House is a rambling wooden structure inside the high wire fence that surrounds the Naval Station.

If anyone wants to know first just what kind of fish he may catch, he can go to Key West's very good aquarium and see for himself. They're all there, along with a motley company of other wriggling, cold-eyed creatures too canny looking to be fooled by any colored feather or the whirling glitter of a nickel spoon (page 70).

Navy took cameraman Roberts and me on the rescue vessel *Chanticleer* (page 51) for a trip to the Dry Tortugas, that group of flat islands 70 miles west of Key West. Ponce de León passed this way in 1513 on his cruise around the Florida peninsula.

Because of its strategic spot in the Gulf, Uncle Sam began in 1846 to build on Garden Key, in the Dry Tortugas, a mammoth hexagonal casemented fortification named Fort Jefferson.* Though 243 big guns were mounted, not one of them was ever fired in anger (pages 52, 53, and 71).

In the Civil War the Federals used this as a military prison; many died of yellow fever. Noted among the inmates was Dr. Samuel A. Mudd, who was wrongly charged with complicity in the assassination of President Lincoln. With consummate courage Dr. Mudd fought the fever epidemic and saved many lives. Finally he was pardoned and returned to his Maryland farm.

In 1898 the Navy based here in the war with Spain, and from here the *Maine* sailed to that catastrophe in Habana harbor. Now Fort Jefferson is a National Monument, but few visitors ever see it, since there is no regular communication with Key West. All food except fish, and even fresh water, must be hauled out from Key West.

Here is stationed an "official historian," though nothing has happened here to make history since the *Maine* sailed away in 1898.

Time Out for Fishing and Diving

Roberts and I took time out to wet a fish line. As long as fish kept their weight down, I got by. But when I hooked a 48-pound amberjack, which fought me for an hour, play turned to work. From the engine room the skipper, in mock kindness, brought a bunch of waste and wiped my perspiring brow. Roberts seemed to think that very funny!

But his turn came. On the way back to the ship, divers on our small boat rigged him out with mask, air hose, life line, and spear, and said "Go down and kill one."

In deep, clear water near an old wreck I watched. It was plain that taking pictures is one art, and fish spearing another. Roberts belched up air bubbles big as pumpkins, then dropped his spear and shinnied up that life line like a monkey on a grapevine. He claimed he got cold!

* See, in the National Geographic Magazine: "Blizzard of Birds: The Tortugas Terns," by Alexander Sprunt, Jr., February, 1947; and "Life on a Coral Reef (Dry Tortugas)," by W. H. Longley, January, 1927.

© National Geographic Society

Kodachrome by William Stapleton

Overseas Highway Skips 100 Miles Across the Gulf from Mainland Florida to Key West

Last February 47,400 automobiles entered or left Key West by this toll road. Motorists, in a leisurely four-hour drive, had every convenience. These young men on a rubber raft fish with goggles and spears.

Blimp Pilots Pursue a Speeding "Guppy" off Key West

Deep water and good weather combine to make the Key West area ideal for the Navy's submarine and antisubmarine warfare training.

Blimp and submarine, war's natural enemies, train together here, each striving to outwit the other for the good of the Navy. Lessons learned in this mock chase could spell the difference between defeat or victory in battle against a strong submarine power.

The dirigible, hovering like a stationary platform, easily keeps its surfaced partner under observation. When the submarine dives, the airmen mark the spot with a bag of dye, staining the sea. Using the sub's last known position, they deduce her direction under water. By using radio, the blimp can report the sub's movements to a destroyer or any accident to a rescue vessel.

By methods known to the Navy, the dirigible may communicate with the submarine, though the latter be submerged.

The submarine is one of Navy's new streamlined guppies, from which guns have been removed and deck fittings recessed within the superstructure.

© National Geographic Society

Kodachrome by J. Baylor Roberts

Sea's Colored Surface Was Snapped Below Its Dark Waves

Lt. Comdr. E. L. Beach, captain of the submarine *Amberjack*, lent his periscope camera to the National Geographic staff photographer, and with it Joe Roberts made this Kodachrome view of U. S. S. *Chanticleer* off Key West.

This type of camera, which looks "upstairs" through a periscope, was used in World War II to identify enemy ships and interpret enemy shores.

The periscope's lens makes *Chanticleer* seem close; actually she is hundreds of yards distant. Parallel lines on the left, when correlated with the masthead height, give the range. Wherever submarines operate, such ships stand by with divers, diving bells, and other emergency equipment (page 56).

Most of *Chanticleer's* officers are veterans of undersea service.

Only volunteers may join a sub's crew. Navy psychiatrists screen out all candidates save those in dead earnest.

© National Geographic Society

Kodachrome by J. Baylor Roberts

© National Geographic Society

Ghostly Fort Jefferson, Once the "Key to the Gulf," Stands in Solitude and Ruins

Begun in 1846, the 42-million brick structure was abandoned after suffering hurricane, yellow fever, and obsolescence; today it is a national monument. Its cannon never fired a ball in anger.

Kodachrome by J. Baylor Roberts

A Medieval Wet Moat in the Midst of an Ocean Guarded Against Raids and Jail Breaks

Garden Key, on which the fort stands, is one of the Dry Tortugas (or Turtle Islands), so named by Ponce de León when his sailors captured 160 turtles in a night. From the key the *Maine* sailed to her death at Habana.

© National Geographic Society

Kodachrome by J. Baylor Roberts

Navy Divers, at Work and Play, Explore Hidden Wrecks and Spear Fish on Key West Coral Reefs

Divers working in shallow waters wear masks, weights, and swim fins. They can carry their own oxygen supply or breathe air pumped to them from boats. Two of these men survey the reef through glass (left); the other spears a fish. The grounded target ship, the U. S. S. *Coral*, shows scars left by Navy's aerial gunners.

Troubles Are Deliberately Created in Navy's Sonar Laboratory for Students to Detect and Repair

Fleet Sonar School teaches sailors to locate and track down distant ships by means of Sound, Navigation, and Ranging (Sonar). These enlisted men, having shown special aptitude, were sent to Key West from ships and naval districts all over the map. Later they will be trained in Sonar work at sea.

© National Geographic Society

Kodachrome by J. Baylor Roberts

© National Geographic Society

Kodachrome by J. Baylor Roberts

Diving Bell, Hot, Cramped, Oppressive, Can Save Every Man Aboard a Crippled Submarine

Each Navy rescue vessel carries such a bell ever ready to be lowered and coupled to a grounded sub's escape hatch. Sound and dry, a dozen men at a time may be hauled to safety through hundreds of feet of water.

There was a real diver on that ship, an Ozark boy named G. W. McCullough, who had just set a Navy deep-sea diving record—485 feet. It took 1 hour and 13 minutes to bring him up, slowly, for decompression. His suit weighed 250 pounds; and he had a telephone rigged inside his helmet. Every now and then somebody up topside called and asked how he was.

"What did you think about, all the way up?" I asked.

"Sleep."

"See any fish?"

"Not away down there. Plenty around 60 and 75 feet down. Sharks, too. Some big fish would drift up, stare right into my face, then dart off and come back with more, to see me."

This rescue vessel *Chanticleer* carries a big diving bell that will hold a dozen or more men (page 56). For practice, a submarine will settle on the bottom and pretend to be in trouble. Then this big bell is let down and connected with an escape hatch on the U-boat's deck. Part of the crew and officers then crawl up into the bell and are hauled to the surface. That's how they saved so many men from the *Squalus*, which sank off New Hampshire in 1939.

"Turtleburgers" and Lime Pie

Cruising back to Key West, we looked at the charts. They show wrecks strewn along these keys. On the Marquesas Keys lobster fishermen were camped, with their traps laid out to dry.

Heading also for Key West, we saw many fishing smacks, and a big smelly turtle catcher coming back from the coasts of Yucatán or Honduras. Her big, stout turtle nets were stacked astern.*

In whatever form you choose turtle, whether as meat, soup, or "turtleburger," Key West has it (page 66). It has lime pie, too. In it, lime juice is used like lemon juice in lemon pie. Tourist housewives take home the recipe.

Almost no food is grown on this island; meats, milk, fruits, vegetables—nearly everything but fish—is trucked from the mainland.

Vegetables would grow; you see a few. But most families seem to prefer flower gardens. To see what a profusion of ornamental shrubs and gorgeous blossoms will grow here, you have only to walk through the fascinating Jack Baker Nursery.

Mr. Roberts made color shots in some of the city's more formal gardens; here and there broken treetops and whipped-out bougainvillea vines showed with what fury a hurricane had swept across this island.

Amid these charming old gardens and in their aging ante-bellum homes with their slat shutters, or jalousies, a diminishing colony of elderly Key Westers still enjoy their leisurely days (pages 62 and 68).

Some recall having entertained war correspondent Richard Harding Davis and John T. McCutcheon, famous cartoonist, when they waited vainly for a press boat to Cuba in the days of Sampson, Schley, and Shafter, of Leonard Wood and Theodore Roosevelt at San Juan Hill.

They like to read about Audubon, who came here long ago on the cutter *Marion* and found that bird he named "Key West pigeon," now known as the Key West quail-dove. They feed their own wild birds and cultivate their flower gardens.

The transient tourist horde and the opulent sun worshipers who swarm at swanky Casa Marina beach resort (page 65) intrigue these old-timers but mildly. Navy officers pay them fair rents for their cool, spacious, old, weatherbeaten wooden houses; but Navy's tremendous training task—which involves some 7,000 men—and the secret work that goes on behind the high wire fences about the station leave them incurious, some even apathetic.

Not so their children and grandchildren. Navy includes many officers and men who came from Key West, Pensacola, and other Gulf of Mexico naval bases. Crowds of the present-day generation of Key Westers also work for Navy here, in its shops, its Sonar school, its big hospital, and its naval air station at near-by Boca Chica.

Teaching Men to "See" Sounds

Few casual passers-by even suspect it. But here, at the mysterious Fleet Sonar School, Navy does a job of tremendous significance; what men learn here may someday save us from our enemies (pages 46 and 55).

"No machine or gadget will take the place of brains," says a sign in the office of Capt. Archibald G. W. McFadden, head of the hush-hush, brainy Sonar school. "Sonar is our word for 'sound, navigation, and ranging,'" he explained. "With it we locate targets under water and measure their distance from us, just as we use radar in the air for the same end. It's been aptly said our next war may be won with musicians. That means a submerged submarine can keep its position secret from everything but sound."

Any boy who has ever knocked two rocks

* See "Capturing Giant Turtles in the Caribbean," by David D. Duncan, NATIONAL GEOGRAPHIC MAGAZINE, August, 1943.

Hurricane Waves Find No Masonry to Batter; Rebecca Shoal Light Stands on Stilts

This unattended light, 50 miles west of Key West, directs traffic between Gulf of Mexico and Straits of Florida. Its automatic flash warns of a treacherous reef lurking beneath a calm sea often as shiny as crinkled tinfoil or molten lead. A working party of the United States Coast Guard here pays a duty call.

together under water at old swimming holes knows how sound travels through water. But it goes faster than through air. And in Sonar a different wave, a supersonic one of pitch so high the human ear can't hear it (like a dog whistle), is used.

This wave, or "ping," is sent from a projector in any desired direction, and made to "feel around" like a searchlight hunting something in the dark. When it strikes an object in the water, a Sonar microphone picks up the returning echo.

Other instruments magnify the echo to make it audible to men's ears; still another records the distance and direction from which the echo bounces back; and yet another flashes a "firefly" on a screen to show its location. Finally, all these facts are recorded on paper.

A higher pitch of your ping echo indicates an approaching target; a lower pitch means it's going away.

In sea water (say at 39° F.) sound goes at the rate of about 4,000 yards in 2¼ seconds; so, if you send out your ping and it bounces back in 2½ seconds, you know your enemy is only 2,000 yards away. You know *where* he is by the direction in which your projector is pointing when you get back the ping.

Now both Navy's submarines and surface ships are Sonar-equipped.

When students have been thoroughly grounded in Sonar work at this Key West shore school, they take to the sea in patrol vessels and destroyers—antisubmarine vessels of the most effective types—and simulate attacks as in actual warfare against our own submarine fleet, training in these waters.

Submarine Training in Key West Waters

Today at least two-thirds of antisubmarine education is imparted at this Key West school, disproving that old-time naval officer who, when the Naval Academy at Annapolis was planned, complained that "you might as well try to teach a duck to swim in the attic."

Like a Breaching Whale, *Amberjack* Leaps out of Water and Raises a Niagara of Foam

This streamlined submarine, in a remarkable demonstration, sticks her nose at the 9 a. m. sun. When she dived, the author-passenger "didn't know whether to grab at the floor or the ceiling"

"This Key West base is perfect for our purpose," said Rear Admiral James Fife, Commander Submarine Force, U. S. Atlantic Fleet. "There's plenty of deep water close at hand and ample shore facilities for berthing and caring for our ships.

"Go on out with the fleet, you and Roberts, and see us training, and working with Sonar. We'd like all those Midwest lads who read the NATIONAL GEOGRAPHIC to know more about life on the submarines."

We went.

In a new-type submarine, a 312-foot "guppy" named *Amberjack*, we went down hundreds of feet, watched the cook fry steaks, and then helped eat 'em (page 42).

Movies Under the Sea

Against torpedo heads some of the crew set up a screen and showed movies, while others played gin rummy (page 64).

What astounded me was the speed with which these submarines dive. When skipper Ned Beach said, "Take her down," we all dropped through that bridge hatch like prairie dogs jumping down their holes, and in a few seconds were under water.

Down we went, so steeply I didn't know whether to grab at the floor or the ceiling; then up we came, just as steeply.

Deep down, of course, a submarine must run on its storage batteries.

But coming up, at a few feet below the waves, the Diesel engines can be started with the aid of the "snorkel," and propulsive power shifted from batteries to engines. The "snorkel" is a breathing tube, an invention which Germans took over from the Dutch (page 60).

With its aid fresh air is drawn down through a tube to the Diesels; so, saving its batteries with their voracious consumption of costly lead plates, the boat can run, slightly submerged, on its fuel-oil-burning engines.

Since snorkel's advent, rumor says one German U-boat stayed under water for 70 days; ours have been down for 30; they could stay longer.

While Roberts made pictures of the sub's

Periscope Eye and Snorkel Nose Are Like the Visible Fraction of an Iceberg; the Submarine's Solid Bulk Moves Below Water

Using her long breathing tube in Key West waters, *Amberjack* runs on her air-consuming Diesels. Lacking this warborn device, she would have to proceed on batteries, which must be recharged later on the surface. Snorkels enable our new submarines to hide below the surface indefinitely (page 59).

Tarpon and Barracuda May Be Caught from Boardwalks and Docks. These Visitors Fish off Old Highway Bridge at Big Pine Key

Whenever the President Goes to the Winter White House, Key West Lines the Streets and Strikes Up the Band

Mr. Truman, atop the rear seat of a convertible, turns into Caroline Street. He is met by cameramen and hundreds of cheering Key Westers. Music is by the high-school band. The President's vacation-time home is a rambling wooden structure on the grounds of the Naval Station (page 48).

Narrow Stairs Climb a Rooftop Captain's Walk Overlooking the Sea

Mrs. Eugene Otto, who holds her Yorkshire terrier, lives with her artist husband in an old-fashioned home built by his father half a century ago. Walls are upholstered with linen to keep the wallpaper from cracking when hurricanes rock the house. Older Key West houses use wooden pins instead of nails.

He Walked Through Watery Wonders Like a Landlubber Through Airy Gardens

Give a sailor a day off and he rows around the nearest lake. This Navy diver, attached to the rescue vessel *Chanticleer*, takes his busman's holiday under water near the Dry Tortugas. John Joseph Roche is an expert in the use of the underwater spear gun for bagging large fish. Here he collects another conch.

busy crew, I watched the Sonar and radar men at work. The latter picked up and located every craft anywhere near us, and even showed me on his screen a "firefly" that meant the Sand Key Light.

Later, on surface ships and even up in a blimp, we saw how, by Sonar and Sonar-plus-radio, communication can be held between submarines, surface, and airships.

Expanding Navy Base

Blimp-cruising low over Key West, I was amazed to see the vast extent of Navy installations, as compared with the original town. But the city still keeps its character.

Most older houses have a surface cistern built beside them to catch rain water which runs off the roof. For generations that was all the fresh water Key West had. Now the city gets ample water from the mainland through a long, long steel pipe, which Navy helped pay for.

Conspicuous features of old Key West are the crumbling Martello Towers and coast artillery forts built long ago, the now abandoned salt-drying flats, and the old lighthouse, from whose high platform tourists now get a good view of the city.

From far out at sea the most prominent Key West landmark is the white-painted sky-scraping La Concha Hotel.

Pilots let me sit away out in front, in the blimp's glassed-in nose (page 50). This is the best seat from which to observe just how one of these big, noisy, clumsy-looking airships is launched and landed.

Outside, Tons of Water; Inside, the "Breeze" of Submariners' Leisure-time Conversation

It takes six to nine months to qualify a submarine crewman, and he must withstand cramped conditions. These men, crowded into *Amberjack's* forward torpedo room, find space to mend a fishing rod

You can't take one off, or land it alone, like a plane. This job takes a numerous ground crew. The men push and haul about the tall mobile anchor tower and swing on to the blimp's many dangling ropes to keep it under control. They're hard to launch and land in much of a wind. Even after you take off, long ropes drag under you and dangle below as you fly.

We cruised all over town, then went out, still low, for a look down at shallow waters along the keys.

We plainly saw sharks switching their tails like horses, giant rays, or mantas, and schools of other fish.

Farther out at sea a sailfish played below us, his dorsal fin cutting the water like a periscope. When a dye marker was dropped into the sea as a target, the boys let me "bomb" it with a dud bomb; of course I missed.

When we turned back inland, golfers on Key West's municipal course waved at us.

History-soaked Spot

It's from the air, and the nose of a low-floating blimp, that you best see how crowded and compact this tight little isle is (pages 44 and 45). It's only about one mile by four; yet it is one of the most history-soaked spots under our flag. Think what all has happened, here beside the Gulf Stream, since Ponce de León ventured by and since Indians parked their war canoes where the sleek, streamlined, high-speed subs now tie up side by side.

For additional articles on Florida and the Florida Keys, see "National Geographic Magazine Cumulative Index, 1899-1948."

© National Geographic Society

Kodachromes by J. Baylor Roberts

↑ Old-timers Gather at the Water Front; Their Topic Invariably Is the Sea

Key West's retired skippers, once comfortably enthroned on their favorite bench, will spin many a tale about wreckers, filibusters, gunrunners, and rumrunners. Charter boats, some renting for $50 a day, rock in Garrison Bight Yacht Basin.

↓ Tennis Star Sarah Palfrey Cooke (Left) Gives a Lesson to a Winter Visitor

In the thirties so many calamities befell Key West that 12,000 residents depended on relief. To restore prosperity, the city dressed up as a tropical resort. Citizens cleaned beaches, redecorated houses. Forty thousand visitors came the first season.

© National Geographic Society Kodachrome by William Stapleton

From a Fattening Pen Comes Soup-in-the-shell

In Key West, market port of many a Grand Cayman turtle schooner, "turtleburger" is a common luxury. This monster, captured off his Central American feeding grounds, leaves the crawl where he was kept alive.

© National Geographic Society

Kodachrome by J. Baylor Roberts

Porpoises, at Sound of a Dinner Bell, Race to the Feeding Platform and Leap for Food

These mammals perform at Theater of the Sea on Windley Key. As gentle as pets, they sometimes snatch fish held in the attendant's teeth. Falling back into their tide-swept pool, they oftentimes splash visitors.

© National Geographic Society

Kodachrome by J. Baylor Roberts

Northern Tan Hunters Challenge the Sun; Shade-loving Key West Keeps Shutters Drawn

Most dwellings are of wood; many have weathered under the corrosion of salt air. These bright houses, seen on Eaton Street, are in Bahama style; two were shipped from Nassau. Tropical shrubs flourish in every yard.

© National Geographic Society

Kodachrome by J. Baylor Roberts

Art Students Love the Water Front; Can Almost Paint Its Squeaky Noises and Tarry Odors

John James Audubon and Winslow Homer were two of many celebrated artists who wintered in Key West. Writers, among them Ernest Hemingway, found material here. These students are from the Island City School of Art.

© National Geographic Society

Kodachrome by J. Baylor Roberts

Key West Anglers Recognize No Season as Best; Fishing Is Good All the Time

Fish grab a worm on a bent pin or a hunk of meat on a shark hook. Deep-sea anglers like to prowl the Gulf Stream near by. A charter boat landed these prizes. A barracuda bares wicked teeth behind the girl.

© National Geographic Society

Kodachrome by J. Baylor Roberts

Navy Sons Heft a Grouper Caught by Their Fathers Near Old Fort Jefferson

Tarpon, amberjack, barracuda, sailfish, dolphin, and bonito are a few of the 300 fish caught around the keys. Shark, pompano, and bonefish are others. Lanny Banister and George Wales, Jr., display this catch.

© National Geographic Society

Kodachrome by J. Baylor Roberts

School Recesses: Young Cuban Americans Raise Flags and Milk Bottles

Cuban revolutionary patriot José Martí is honored at San Carlos Institute, Key West.

Shores and Sails in the South Seas

By Charles Allmon

With Illustrations from Photographs by the Author

RAINY NIGHTS, when little ships snuggle close to harbor, I think of the *Vaitere* loading at Tahiti for our voyage to the Marquesas, cannibal islands of yesterday (map, page 77).

The Tahitian wives and sweethearts who came down to the schooner that morning to bid farewell to their brave young men were drenched. Aboard, big husky Marquesan crewmen huddled on the Pullman-sized deck aft and shouted promises to women on shore. Six or seven weeks would elapse before they returned from this voyage across the sea.

I clutched a tarpaulin about me—no one expected me to promise anything—and tried to steady my footing as the *Vaitere* tugged at her moorings.

Lines were cast off, two shrill blasts issued from the vessel, and we headed for the narrow pass in the barrier reef. Heavy seas pounded the coral heads. Now the *Vaitere* lurched and dipped as she fought the strong current pushing through the pass.

I felt about as secure as a carrot in a pressure cooker ready to explode. Ostrich-fashion, I covered my eyes, but only for a blink. The sea broke across the deck, up to my knees.

If I am going to wash away, I decided, I should at least know when it happens.

Into the Open Sea

A good skipper, Lou Lecaill got us through the pass and into open sea. With determination the *Vaitere* nosed her way through the driving rain toward the Marquesas. Behind now was the island of Tahiti and the town of Papeete—port of adventure.

By the fifth night I was ready to send out a dove, but at dawn on the sixth morning the sun climbed smugly into place.

As the mists cleared, land loomed to starboard where the lava-blown, wind-polished peaks of the island of Ua Pu strain 4,000 feet skyward out of the Pacific (page 102). My eyes smarted, unaccustomed to the dazzling glare. Ahead wide laps of the sea smacked corrugated cliffs and churned up spray nine times the height of a man. The regurgitation of blowholes shot geysers into the air.

Between stern sentinel rocks the *Vaitere* slithered into Taiohaé Bay in the island of Nuku Hiva, Marquesas (pages 88, 91).

We dropped anchor at 2:30 in the afternoon. Over the side went the first whaleboat, its gunwales bulging with young Marquesans, pigs, chickens, and bedding.

I elbowed my way into the second boatload. Ashore, I received an invitation from the French administrator of the island group, who also is resident medical doctor, to a feast the following Sunday.

Then I asked directions to the community bathhouse, where I loosened the crust of salt I had accumulated in our tempestuous voyage. I have had luxurious baths before, but few have provided the comfort of this tepid pool shared with half a dozen of my brown-skinned fellow travelers.

Afterward, just to walk, just to plant one foot before another with the conviction that it would stay put until your own muscles moved it, was wonderful. Just to lean against a palm tree, something rigid, was reassuring.

Coconut Milk Fresh from the Tree

The palm tree against which I leaned seemed strange. Closer examination showed it had been notched. While I studied it, a Marquesan lad approached me.

He grinned obligingly. Then, with his ankles braced about eight inches apart by leaves of the palm frond, which held securely in the notched trunk, he literally pulled himself up by his bootstraps. He knocked down a few coconuts, deftly cracked one, and offered me a tall drink of coconut milk. The process took less time than it takes the counter boy to draw a limeade at the corner drugstore. And the result was just as satisfying.

As the young lad ran across the beach, I could imagine proud Polynesian adventurers who lived at Taiohaé before white men came. How did they watch the imperial procession—admirals, governors, warships, troops, prisons, plantations, schools—invading the bay? With bewilderment? Resignation? Resentment? About the bay stand the remnants of the imperial procession, a small group of government buildings over which the Tricolor flutters.

The French have had their flag over the Marquesas since 1842. Magellan, in his voyage around the world in 1519-21, may have passed between the Marquesas and the Tuamotu Archipelago.*

* See, in the National Geographic Magazine: "Greatest Voyage in the Annals of the Sea," by J. R. Hildebrand, December, 1932.

Rosewood Bowls, Elaborately Carved by Hand, Are the Pots and Pans of Polynesia

The chief of Fatu Hiva Island, who collects Marquesan carvings, owns these three prizes. His family has preserved the center one 70 years (page 104).

In 1595 Spanish ships sent from Callao by Don García Hurtado de Mendoza, Viceroy of Peru, found the southeast group of islands, and their commander, Alvaro de Mendaña, named it for his patron's wife—Las Marquesas de Mendoza.

One hundred and seventy-nine years later, in 1774, Captain Cook came to the Marquesas while on his second voyage through the South Seas and added Fatu Huku to the list.*

In the brig *Hope*, of Boston, Capt. Joseph Ingraham, a former mate on Capt. Robert Gray's *Columbia* (the famous vessel which started the Boston trade to our Northwest coast), visited Nuku Hiva in 1791 and called the islands Washington Islands for his beloved hero, George Washington.

The same year a Frenchman, Etienne Marchand, also visited the northern group of islands. Marchand, the fires of liberty blazing high in his native land, named the group the Iles de la Révolution.

One hundred and thirty-seven years ago the Stars and Stripes flew over the little hill overlooking the bay of Taiohaé. A light now stands there, and its friendly gleam in the night means a haven for mariners venturing into the Marquesas.

The Adventures of Captain Porter

The adventures of Capt. David Porter, the American, were as strange and romantic as those of any of the hundreds of gypsies of the sea who sailed these southern waters.†

Porter had left the United States in command of the frigate *Essex* to destroy British shipping and to capture their ships and sailors. He harassed the British in the Atlantic, rounded Cape Horn, and attacked in the South Seas. At last, with prisoners and prize crews aboard some of the captured vessels,

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Columbus of the Pacific (Cook)," by J. R. Hildebrand, January, 1927.

† See, in the NATIONAL GEOGRAPHIC MAGAZINE: "American Pathfinders in the Pacific," by William H. Nicholas, May, 1946

Crewmen Dump Hiva Oa's Copra into *Vaitere's* Hold

Copra—coconut meat today, soap tomorrow—provides the Marquesas' money crop. Bags are emptied at the hold, for loose storage allows more bulk (pages 88 and 89).

he made for the Marquesas to refresh his men, repair his ships, and get water, food, and wood for the voyage home. In Taiohaé Bay he moored his ships.

Captain Porter failed to establish American rule in 1813 in Nuku Hiva, which he called Madison; otherwise the Marquesas might today be flying the American flag.

Taiohaé became the whites' chief city in the group.

The little whaleboats, shuttling through the surf with their provisions and mail, marked the greatest activity Taiohaé had seen since the *Vaitere's* last call. By sundown the bay and valley seemed empty. The sun slid over the rim of the mountains, red, intense.

Aboard the *Vaitere* again, I watched the moon rise over placid waters. For the first time in a week I was to have a night's rest undisturbed by a tossing ship.

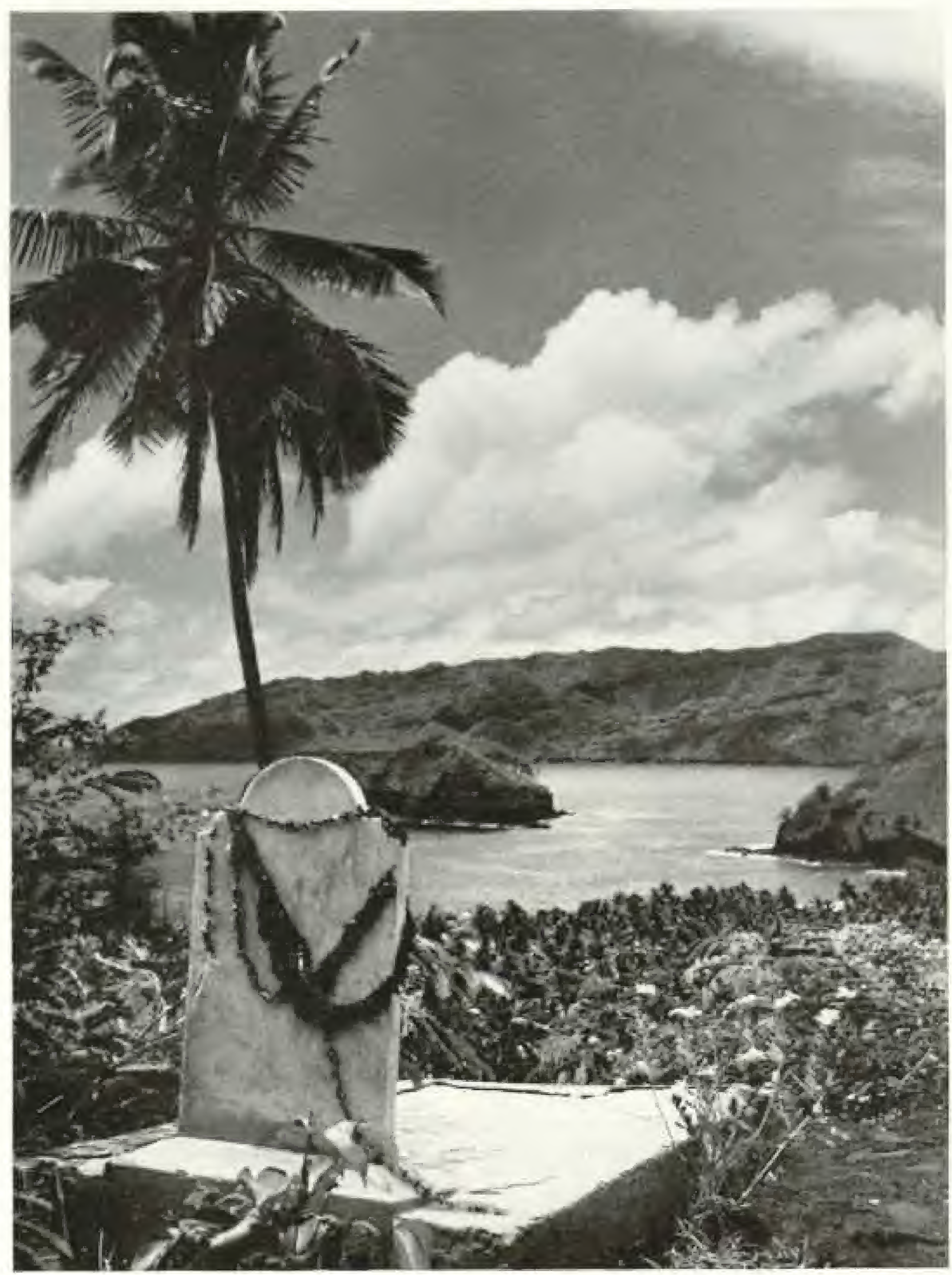
The Marquesan crew had gathered on the afterdeck. In low voices they sang old Tahitian and Marquesan songs to the soft strumming of a guitar. A laugh and a chuckle broke the spell once or twice, and then I was asleep.

Sometime that night the *Vaitere* pulled anchor and cruised around to Hatiheu Bay (Baie Atiheu), on Nuku Hiva's north coast (pages 83 and 94). Mountains here lie close to the sea. On the right side of this bay are four slender obelisks not unlike formations of rock I have seen in Bryce Canyon, Utah. Lush green vegetation abounds, for the tall mountaintops puncture passing clouds and rob them of their rain.

Coconut Palm Is Tree of Life

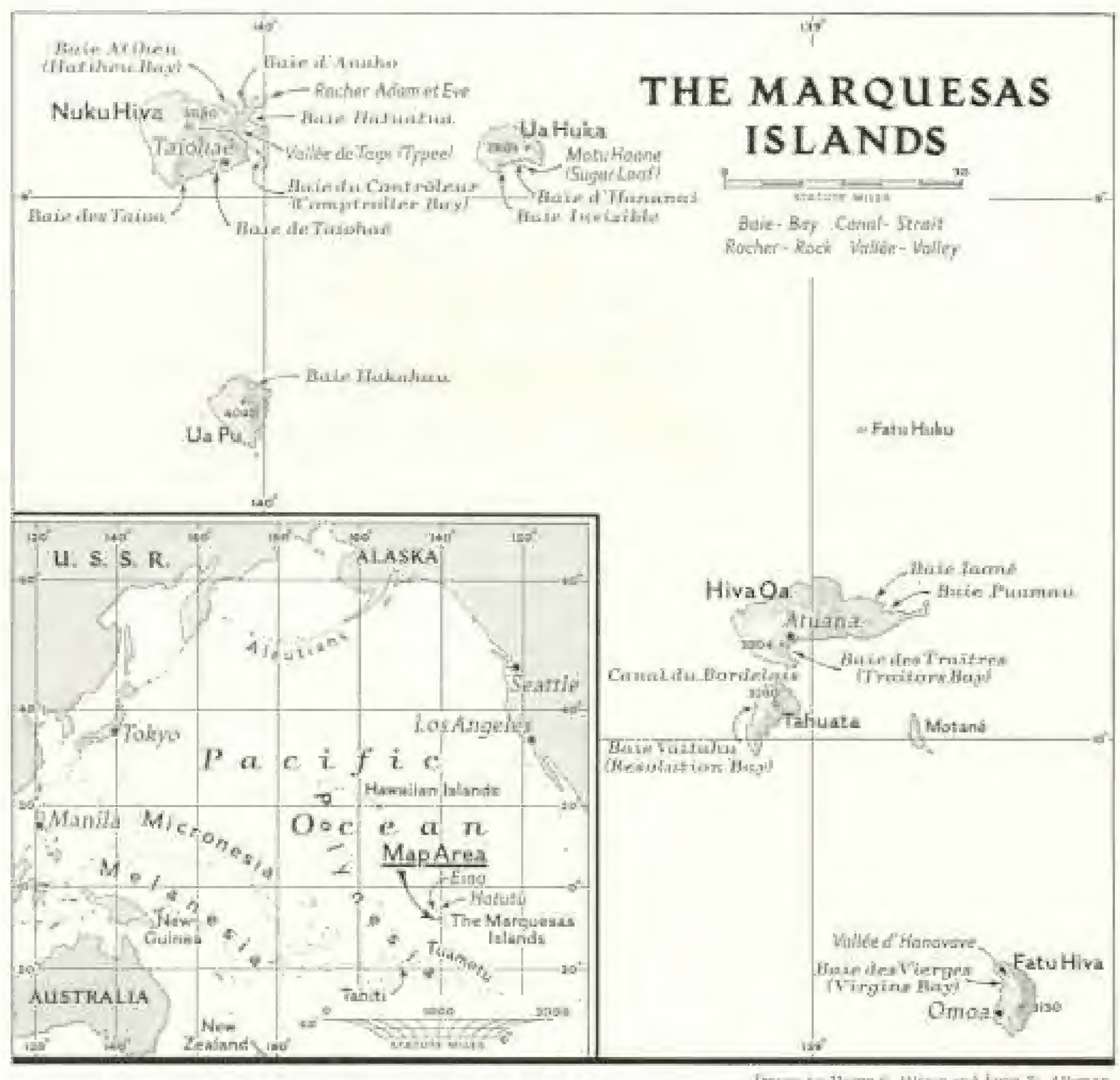
Already the whaleboats were going ashore with flour, sugar, bolts of cloth, tinned goods, building materials, and various odds and ends. This is an important stop, for here the Donald Company of Tahiti has built a copra shed.

In the Polynesian Garden of Eden the Tree of Life is the coconut palm (pages 88 and 89). Not only does this versatile tree



The Grave of Paul Gauguin Looks Out upon His Beloved Hiva Oa

Gauguin, an obscure Parisian, forsook wife, children, and job to devote his time to art. Going to Tahiti, he adopted the natives' life. Their portraits, painted against color-splashed backgrounds, made him famous. Gauguin spent his last years in the Marquesas. Dying in 1903, he was buried above Traitors Bay (Baie des Traîtres) (p. 82).



Drawn by Harry S. Oliver and Irvin E. Alleman

The Lonely Marquesas Rise Out of the Pacific 850 Miles Northeast of Tahiti (Inset)

Less than 150 years ago some 100,000 happy Polynesians inhabited this fertile archipelago. Today there are a melancholy 2,500. So isolated are the islands that no one has seriously tried to repopulate them. All that the people see of the world comes to them through the trading schooner from Tahiti.

supply food, clothing, and shelter for the natives, but it has a high commercial value. In exchange for copra, the dried meat of the coconut, the natives buy the variety of objects the *Vaitere* brings.

In this part of the world the economy is built upon the production and trade of copra. Shipped to industrial markets in America or Europe, oil is extracted for the making of soap and for use in other industries.

Today the skipper could accompany me. We hesitated before a trail which wound back and forth over the mountains south to Taiohaé.

"How about it?" I asked.

"Too ambitious," he laughed. "Besides, I want to show you something."

I followed him along a trail that led through palm groves and then up into grazing land. Contented cows and sheep munched on the grass. A wire spool hanging on a fence post spelled out "Chicago, Illinois."

"Ever been there?" I asked the skipper.

He shook his head.

"You probably wouldn't like it, anyway," I said cheerfully.

When we stopped to rest, we looked down into the valley and bay below. Our schooner's white hull glistened in the morning sun. The skipper's eyes were all for her. The *Vaitere* was built in the shipyards of Tahiti in 1941 of native woods. Ever since, at quarterly intervals, she has been tacking her way

across the nine degrees of latitude and ten degrees of longitude to the Marquesas.

In several hours we reached the crest of the ridge. Anaho Bay, an emerald green, sparkled in the distance. White breakers fringed the shore. The coconut plantation through which we had hiked was deeper green, and the mountains, where they were exposed, were rust-brown.

Far, far out was the vivid blue sea. A bird can wing its way to this height and poise in flight; it can come often, can even nest here; but all that I could see I must remember, perhaps forever.

"Your mind has a camera of its own," the skipper philosophized. "Memory."

An Indelible Picture

It is true. I have carried that picture of Anaho Bay about with me in my memory as a man will carry a snapshot in his billfold (page 90).

When we returned to the beach that afternoon, the crew was still working with the boats, bringing supplies ashore and carrying back copra. The surf was running high, and all hands were alert lest a comber capsize them.

Maneuvering a whaleboat safely through heavy surf to deep water requires skill and experience. A few minutes elapse between large breakers, and during these minutes the men pull hard. Fifteen men standing in water up to their waists exert every effort in shoving the boat off. Only the man at the steering oar sees the water ahead. The lives of all aboard depend on his judgment. When he shouts, they pull. Out they go.

Toward them rushes another comber. Will they make it before the green wall of water breaks over? For an instant they shoot skyward and we cannot see them. Again they climb up on a swell. They are safely out. The men's grip upon the oars relaxes, and they pull easily out to the schooner.

One we watched did not fare so well. A comber struck it and turned it end for end. Oars, bags of copra, and men flew through the air. A heavy oar could crush a man's skull, and a capsized boat could smash his body. This time no one was hurt; but would they be so lucky another time?

"Next stop, Hatuatua Bay," the skipper told me as we once again hauled the anchor aboard.

Two rock configurations which rise 500 feet above the sea at the entrance to Hatuatua are called Adam and Eve.

We were stopping here to pick up logs of the valuable tou wood, used in cabinetmaking and shipbuilding.

The whaleboat went within 50 yards of land, and eight of the crew dived overboard and swam ashore. They would shove the logs into the surf, only to have some of them thrown up on the shore again. But the strong-bodied Polynesians persisted and pushed through the breakers.

I was grimly fascinated, as I had been when the whaleboat had overturned at Anaho, to watch two heads bobbing there in the breakers, separated by a tou log. The boys would shoot up one side of a swell and slide down the other. This dangerous occupation would not be my choice.

One family lives at Hatuatua. The man, his wife, and their six children have only one another for company and might welcome the diversion of the *Vaitere's* crew, but at this port the crew must work so hard that little energy is left. There was no singing as the moon rose over our bow.

Passages between the islands are made at night. The skipper manages to enter the bays precisely at dawn.

The island of Ua Huka, 25 miles east of Nuku Hiva, is like the Painted Desert in the southwestern United States. Copper-colored cliffs rise sheer out of the water at Invisible Bay, so named because it is not distinguishable until you reach its mouth.

The Perils of a Tidal Wave

When a tidal wave struck the narrow bay in 1946, water receded until the spot where we now anchored was not much more than a mere pool. Later, the water returned and rushed up the valley, sweeping away every building in its path.

I estimated that no more than fifty people now live in the valley, though once it must have supported many times that number. I examined retaining walls, embankments, and footpaths several hundred years old.

The natives watched me, smiling. As I walked up the main pathway of a small village, I heard a shout from below. Running up the steep slope toward me came a woman swathed in bright-red calico, a basket in her hand. She was out of breath when she reached me, but she said something amiable in the island language and handed me four huge mangoes. Before I returned to the schooner, other gifts were added to this—pineapples, oranges, and papayas.

On the beach an orderly community program of copra drying had been arranged. The meat of the coconut was placed on a platform more than 100 feet long and 10 feet wide. A platform constructed of small saplings propped it above the ground to prevent hogs

from fattening themselves on the only money crop of the island. It takes 5,000 to 6,000 coconuts to make a ton of copra.

In July, 1941, copra in the Marquesas brought $4 per ton from the trading schooner calling there. At the time of my visit it was bringing $174 per ton in the Tahiti market. Production in the Marquesas is about 3,000 tons a year, and brings a premium for high quality.

The natives barter copra for trade goods and building materials. The skipper checks weights of bags on portable scales, all weights determined in kilos (page 88).

Wild Pigeons of Invisible Bay

Invisible Bay harbors hundreds of wild pigeons. The skipper, who is a good shot, and I (who imitated his technique as best I could) bagged 18 for eating aboard the schooner. Earlier in the morning he had shot a bird which looked like a raven. It was even tastier than the others.

Fishing Is Sport, Cleaning Drudgery, the World Over

Fish—baked, boiled, or stewed—puts protein into the Marquesan diet. A favorite dish is made by wrapping fish in leaves and baking them over hot stones in outdoor ovens. The wooden bowl is a homemade product of Tahuata.

Sailing along the coast, we saw a large table rock jutting out of the water. Several hundred yards in diameter, it was separated from the mainland by a deep channel. Sooty terns nested here by thousands. When we were quite close, the schooner's Klaxon sounded. The birds blackened the air as they flew up.

"Say," I hinted to the skipper, "this would be a good place to take photographs."

"Sure thing," he said obligingly. We circled the rock and then continued to Sugar Loaf (Motu Haane) (page 86).

This rock resembles Sugar Loaf at Rio de Janeiro. Close as we were to land, we could not anchor, as the water is about 20 fathoms. Lines were put off each end of the schooner and made fast to sharp rocks ashore.

More copra was taken aboard, along with horses and cattle (page 87). Led by ropes around their necks, the animals swam unwillingly out through the surf to the schooner. The horses were then hauled aboard with a rope sling. All the while they protested by thumping the hull of the vessel with their hoofs. However, they were soon mollified by fresh grass which had been placed aboard for them.

As for the cattle, they received less considerate treatment. A member of the crew would dive down and fasten a rope about one hind leg; by this the animal would then be dragged up to the deck. What bellowing! I thought of this as a possible substitute for the *Queen Mary's* foghorn, should it ever fail.

"Think I can bathe around here?" I asked the skipper.

"First stream to the left," he indicated.

Apparently it is customary for the children of the village to accompany bathers, for while I washed myself in the cool water 20 youngsters kept up a constant babble.

The group spirit prevails in Ua Huka, where many enterprises are carried out in communal fashion. The entire community of Hananai Bay was building a 40-foot surfboat. Some workmen cut the timber; others did the actual building. They expected to complete this particular boat in two months, so that they could travel to adjacent islands.

Thanksgiving on Ua Huka

Thursday, and Thanksgiving at that! I did not suppose that we would celebrate it, but the Polynesians, who enjoy a feast for any reason, saw that bountiful fare was provided aboard the *Vaitere*.

We were anchored in a bay on Ua Huka where a plentiful supply of chickens and pigs is always on hand. One of the latter, roasted a deep brown, was brought to our table. Someone had thoughtfully placed behind each ear a hibiscus flower—in Polynesia the "flower of friendship."

Sunday was the day of the feast in Taiohaé to which I had been invited by the island administrator. This time a sizable mutton, which had been barbecued over a charcoal fire, was placed in the center of the table on two banana leaves. The guests, knives in hand, attacked the carcass. When each had cut off a portion to his liking, just the skeleton remained.

"And have you been yet to Typee (Taipi) Valley?" the administrator inquired.

"Not yet," I answered. "I want to go there. I've read Melville's book."

"It's very different now," he said. "No more tattooing; that's been outlawed. You know, the natives used to undergo great torture and danger of blood poisoning to decorate their bodies. The French outlawed it."

"How about cannibalism?" I asked.

"Oh, there's no more of that," he assured me.

Three days later the *Vaitere* entered Comptroller Bay (Baie du Contrôleur), the door to Typee Valley, on Nuku Hiva's southeast coast.

During the war, huge transports such as the *Queen Elizabeth*, *Monterey*, and *Coolidge* rendezvoused here for refueling. The Marquesans, who have been throwing rocks all their lives either in war or in hunting goats, tried to heave stones up to the first deck. Few succeeded, and they reported to their families that the steamers were "big like hell."

Typee Valley is a South Seas "ghost town" (page 93). Fence rows of stone stretched up the mountainsides. Still standing were many *paepaes*, stone platforms or house foundations, some 30 feet square. Built without mortar or cement, they are still habitable, but there are only a few families left to use them.

Bloody battles took place in Typee Valley. It was here that Herman Melville, captive among savages, was treated as a king. *Typee*, his personal account of experiences on Nuku Hiva, has been read in many languages. I read it for the first time in an American literature course at Purdue University and found it thrilling.

Though the disintegration of the race here in the Marquesas was not of our time, nevertheless little has been done to help these people. Their decline is a tragedy which I could not help thinking about as I wandered through this beautiful valley.

It is watered by the largest stream (nine miles long) in the Marquesas. Everywhere grow mangoes, bananas, *fei* (red mountain bananas), papayas, limes, breadfruit, and other tropical fruits. Once it was a Marquesan custom to plant breadfruit trees upon the birth of a child, to ensure food for the days ahead.

A Swim in a Mountain Stream

I enjoyed a swim in the cool mountain stream and ate in the approved fashion a fresh watermelon which the natives gave me.

My second approach to Typee Valley was over the mountains with the skipper. We started from Taiohaé Bay the next morning at 6:30 on two sturdy horses. As on the day when we had hiked to see Anaho Bay from a mountaintop, I could watch the changing vegetation as we gained altitude. Up to 800 feet coconuts grew profusely. Beyond that they dwindled and soon disappeared (page 104).

Things were extremely dry up to about a thousand feet; then the higher we climbed, the greener the plant life. Heavy underbrush off the trail now was all but impenetrable. Lush green grass grew everywhere, and a number of horses had been tethered along the trail for grazing.

From one of the switchbacks I looked down at Taiohaé Bay. There our schooner quivered in the morning sun. To the right and left of the bay and far into the distance the parched ridges along the coast contrasted boldly with the scene at hand.

© National Geographic Society

Kodachrome by Charles Allmon

Live Cargo Rides the Deck of the Schooner *Vaitere* from the Marquesas to Tahiti

For 41 days the author-photographer accompanied the skipper on a 2,700-mile trading voyage. He saw the sheep's wool gather brine from crashing seas and watched Piggie enjoy his sun bath. Cattle got seasick.

Vaitere Drops Anchor → Beneath Hiva Oa's Frowning Cliffs

Hiva Oa gained the sobriquet "Bloody" because it resisted its French conquerors long and fiercely. Victims of the white man's diseases, the independent Polynesians who inhabited its high plateau are gone, their domain abandoned to wild dogs, cattle, and pigs.

Copra, dried meat of the coconut palms rustling on the shore, is the island's export, and the *Vaitere* has stopped in Traitors Bay (Baie des Traîtres) to collect the crop. In return, she puts ashore trade goods.

The schooner, built in Papeete, is 110 feet long. Two Diesel engines assist her sails. Her crew consists of 14 husky Marquesans.

← Launching a Whaleboat

In Hatiheu Bay, Nuku Hiva, one of the Marquesas, crewmen load a boat with sacks of copra. Soon they will be rowing toward *Vaitere*, moored in the distance. Their backs to the surging sea, the oarsmen depend for their lives on orders shouted by the coxswain, who stands at the steering oar. Only husky, experienced hands can run the breakers, which sometimes rise eight to ten feet.

© National Geographic Society

Kodachrome by Charles Allmon

© National Geographic Society

To This Green Island Came the Outsiders in 1595; Fatu Hiva's Evil Days Began

Sailors, whalers, and traders brought such a plague of ills that the population dropped from thousands to hundreds. Palms hide a village's ugly iron roofs. The steepled church stands out.

Kodachrome by Charles Allmon

Far up Hanavave Valley, Hemmed by Lofty Sierras, Tufted Coconut Palms Extend

The little stream flows into Virgins Bay, so named for the fantastic lava pinnacles resembling cloaked and hooded virgins which guard the entrance. An imperfect example is the crag on the right.

© National Geographic Society

Kodachrome by Charles Allmon

A 500-foot Rock, a Sugar Loaf Like Rio de Janeiro's, Springs from the Sea Off Ua Huka

With lines attached to opposite points on shore, *Yankee* rolls in 30 fathoms of water, too deep for her anchor. She waits to load livestock (opposite page). Natives sometimes use Sugar Loaf as a fish-spearing platform.

Dragged Swimming Through the Surf, a Tired Horse Accepts an Ignoble Embarkation Without Complaint

At that, the horse is lucky. Cattle, bellowing their protests, swing aboard on a rope attached to one hind leg.

© National Geographic Society

Kodachrome by Charles Allmon

© National Geographic Society

Kodachromes by Charles Allmon

▲ **Islander, Daughter, and Pony Walk to Market with Copra**

Beside this quiet, palm-ringed bay on Nuku Hiva sits Taiohaé, which in its days of glory boasted of having bishops, governors, prisons, saloons, and warships. A death-dealing opium habit, enslaving the people, left only ruin. This load of dried coconut meat represents a month's work.

▼ ***Vaitere's* Skipper Checks Each Purchase on His Portable Scale**

Here on Ua Huka the captain is a man of dignity, the islanders' periodic contact with the world. His assistants, who carry a 250-pound load of copra, are sailors at sea, stevedores on shore. They bear out the Marquesans' reputation of being the best physical specimens in the South Seas.

© National Geographic Society

Kodachrome by Charles Allmon

Nuku Hiva Coconut, Dried on a Pig-proof Platform, Becomes the Copra of Commerce

The stately palm shades and feeds the Polynesian, makes his baskets, twine, and fans, kindles his fires. Its nutty drink slakes his thirst. It is more than the ancestral Tree of Life; it is cash in hand.

© National Geographic Society

Kodachrome by Charles Allmon

In Anaho Bay, Nuku Hiva, Robert Louis Stevenson Met His First Marquesans, "Stalwart Six-foot Men in Every Stage of Undress"

Curiosity-filled visitors thronged Stevenson's ship, "regarding me in silence with embarrassing eyes . . . A kind of despair came over me . . . to think they were beyond the reach of articulate communication, like furred animals . . . or dwellers of some alien planet" (*In the South Seas*, Charles Scribner's Sons).

The Coconut Palm, Like Man, Clings to the Shore of Taiohaé Bay, Nuku Hiva Island. Lava Mountains Reflect Six Years of Drought

Herman Melville, jumping ship in 1842, escaped through these hills and dwelt among the kindly cannibals, as he related in *Typee*.

© National Geographic Society

Kodachrome by Charles Allmon

© National Geographic Society

Kodachrome by Charles Allmon

Spirelike Lava Cores of Weathered Old Volcanoes Puncture the Clouds Above Ua Pu

These humble homes belong to one of the island's small villages. The children were amazed by the photographer and his camera.

Nuku Hiva's Grassy Plateau Looks Down into Typee (Taipi) Valley. Melville's Barbaric Paradise Is But a Graveyard Now

© National Geographic Society

Kodachrome by Charles Allmon

◄ **Palms and Pinnacles Ring Hatiheu Bay on Nuku Hiva**

On a dark night the photographer saw the skipper guide *Vaitere* into the cove by taking a sight on these lava plugs.

Children on the beach represent a pitiful fraction of the happy, spirited thousands whom Capt. David Porter found on Nuku Hiva in 1813.

Porter, commander of the frigate *Essex* in the War of 1812, ran up the American flag, called the island Madison, and took possession in the name of the United States. In an amazing campaign—guns against war clubs—he defeated the cannibal tribes.

Sailing away, Porter was captured by the British. A garrison which he left ashore was destroyed in a rebellion. Finally, the United States declined to ratify the annexation. France later took over.

▼ **Ua Huka Gets Lumber**

In 1946 a tidal wave swept into this valley, destroying all homes within its path. *Vaitere* has put ashore these boards for fresh construction. Before civilization spoiled them, the islanders would have been content with their native coconut logs.

Ua Huka's barren hillsides reminded the photographer of Arizona's Painted Desert.

© National Geographic Society

Kodachromes by Charles Allmon

© National Geographic Society

Kodachrome by Charles Allmon

▲ Marquesan Helmsman Steers the Ship

Using a compass, each man in the crew takes his turn at the wheel and, with the bell, sounds every hour. If he thinks the captain isn't looking, he may sneak a smoke while on duty. On the voyage home, every inch of *Vaitere*'s deck is piled high with cargo.

▼ Crew's Mess Is Served on Boxes and Bags

These robust fellows think nothing of working 14 hours a day handling 125-pound bags of copra. Scorning shoes, they love to climb the rigging. Rice, fish, and corned beef compose their staple fare, which they wash down with coffee.

"I almost shook hands with myself on that turn," I laughed to the skipper as we rounded a sharp switchback.

Near the summit vegetation thinned. Small trees and bushes gave way to grassy slopes. Soon we were out in the open and on top. Over the crest we trotted and looked out upon a great expanse of gently rolling, green grazing land.

"This is the route your Melville took in his escape from the whaler," the skipper informed me.

Waterfalls of Typee Valley

Typee Valley forks at the head. In the left branch we could see two cascading waterfalls, perhaps 500 feet high. The right branch was green. At the very head I could see the trail leading over the next range of mountains, across the island to Hatiheu Bay on the north side. Likely it was similar to the route we had just followed, worn two feet deep by centuries of use.

"Now you've had a worm's-eye view and a bird's-eye view of Typee," the skipper said. "You've seen it from its floor, and you've seen it from its roof."

"Can't we stay here awhile?" I wondered. But we couldn't, and back we headed. We met a native and his family on their way to Typee. The man rode a handsome horse; behind trailed his wife, all five children, four dogs, and a cat.

In the Marquesas a horse is a valuable asset. The open sea confronts you at every turn, and a visit into the next valley requires a ride over several mountain ranges. On a few of the islands, where the mountains do not drop so abruptly into the sea, the trails wind along the coast.

A small throng had gathered at Taiohaé when we arrived late in the afternoon. They were examining a 25-foot native sailing craft just in from the island of Ua Pu, 30 miles distant. A heavy sea had been running, and this flimsy craft, with four occupants, had made the voyage in six hours, bailing all the way.

The purpose of their journey was to obtain two liters of red wine from Bob McKittrick, a Scottish storekeeper who has lived in Taiohaé 38 years. Wine is rationed to the natives in these islands; otherwise, there would be no work and all play.

Bob's new Servel kerosene refrigerator, which arrived with our schooner, was already paying handsome dividends.

The kids were buying ice cubes from Bob for a franc. Bob gave me four ice cubes, no charge, in appreciation of suggestions I had given him on the operation of the new refrigerator. I had used the same kind in the Tropics in Central America and Africa, but had never realized a franc apiece on ice cubes!

At the mission house in Taiohaé I picked up a 1919 NATIONAL GEOGRAPHIC MAGAZINE and browsed through it.

Outside, flamboyant trees were in full bloom—another picture for my mind's "camera!"

By late afternoon my attention had been distracted by the sand flies. Nuku Hiva is full of these pests, which raise red welts similar to mosquito bites on vulnerable white skin. They itch—and citronella doesn't help!

Moving along the coast from Taiohaé, we entered Taioa Bay under the shadow of majestic mountains which towered more than 1,600 feet beside and above us. The right fork of the bay was a favorite spot of whalers to beach their ships and repair hulls.

Charles Conlon, the supercargo, and I hiked up the valley to see a waterfall. We met Marquesans typical of earlier generations—tall, muscular men, stocky women.

Before one grass hut women were grinding breadfruit, which they would allow to ferment for *poipoi*. In early days a hole was dug in the center of the houses for storage of poipoi.

The women were wearing garments of tapa cloth, pounded from the bark of the breadfruit tree. Banyan, paper mulberry, and other barks also may be used for clothing. When the cloth *pareu* was introduced into Polynesia, it quickly replaced tapa cloth, which does not wear well and disintegrates in water.

2,000-Foot Shower Bath

We found our waterfall at the head of the valley and somewhat to the left. From where we stood, it must have fallen a thousand feet. All of it was not visible, and estimates have it that this cascade is over 2,000 feet in height.

At the base of the falls is a stream. In this warm climate a mountain stream is always an invitation to bathe. This is the first time I have ever had a 2,000-foot shower bath at my disposal!

A silver ribbon of water splashing down outcroppings of a half-hidden mountain on a pebble of an island in the South Pacific—this is another of the pictures exposed in my mental camera.

"Pheasants?" I asked the supercargo quizzically as we retraced our footsteps.

"Ha, ha," he laughed. "Wild chickens!"

But they did look like pheasants. They had brilliant plumage and a sheen to their feathers. They would run through the underbrush and take wing just as a pheasant does.

They were strong, swift flyers; some of them stayed in the air for at least 200 yards.

"The natives sometimes capture a cock or hen alive," the supercargo told me, "and mate it with their domestic fowl. The people of Polynesia are great for cockfights, and once in a while an offspring from a wild bird finds its way to Tahiti to take honors in the cockfights there."

Taioa Bay is on the edge of the desert land of Nuku Hiva's west coast. We saw wild goats, but they scampered up rocky cliffs out of sight at the sound of the Klaxon. On a previous trip along the western end of the island I saw herds of wild cattle grazing on parched slopes. Early explorers found pigs in the Marquesas, but cattle, sheep, and goats were brought in sailing vessels. Today cattle and goats are found wild on every island.

Hunting Cattle with Harpoons

Natives, lacking guns and ammunition, hunt cattle with harpoons. Two men station themselves in trees and hover over trails visited by the large herds. As a bull comes by, he usually falls into the trap, but terrific battles are sometimes staged.

A good hunting dog will grab a cow or bull by the tender nose and hold it while hunters rush in with their harpoons. Although there may be some savage satisfaction in killing cattle this way, the animals are hunted only for food, not for sport.

In the bay we caught a 150-pound tuna. The cook cut it into small bits, soaked it in lime juice, and then served it with coconut cream. I smack my lips just thinking of it!

The islands' largest settlement is the village of Atuana, on Hiva Oa, once administrative center of the islands. Like Taiohaé, Atuana has radio communication with Tahiti. Tons of supplies went ashore here.

Wooden casks, containing 50 gallons each of red wine from French North Africa, were dropped overboard into the sea. Geysers flew half the height of the masts, for the casks resembled depth charges being put down. Crew members, swimming in the water, jockey the casks near enough to shore to be washed onto the beach by breakers.

What a happy day it is when one cask accidentally drops upon another and breaks open! The crew members gulp up a mixture of salt water and red wine.

I walked with a bishop of the mission at Atuana to Paul Gauguin's grave. The bishop, who has lived in the islands 55 years, and the artist were friends. Gauguin died in 1903 and is buried on a knoll overlooking the settlement and bay (page 76).

On the north coast of Hiva Oa we put into the small bay of Ianoé. The valley behind it is owned by a Norwegian, Henry Lie. He was waiting on the beach, waiting for mail from Tahiti and his beloved Norway, and for the large demijohn of red wine for Christmas celebration.

Lie, who speaks English easily, told me a little of his 40 years in the Marquesas. He was a cabin boy on a trading vessel operating from Europe—a German four-master. Life in those days aboard sailing vessels was rugged for a lad of 14 years. Jumping ship on one of the small islands, he has been here ever since, with an occasional trip to Tahiti and once in awhile to New Zealand. He was for a time supercargo on a trading schooner operating out of Tahiti.

Cannibalism had disappeared when Lie arrived, but he related a story about his son's great-great-grandparent, Kekela. The Reverend James Kekela was a full-blooded Hawaiian who came to Puamau Bay as a missionary.

For several years he labored hard trying to convert the natives to Christianity. Then a blackbirder carried off several men and women. The tribe swore vengeance on the next white ship entering the bay.

In 1860 an American whaler put in to obtain water and food. The first mate, a man named Whalon, was captured while ashore and was immediately handed over to the chefs for "long pig." Fires were prepared, and Whalon was about to be placed in the oven. Only the men would eat, as "long pig" was tabu for women.

Historic Rescue

Kekela's first pleas to the chief were in vain. The fires burned brighter; Whalon was soon to toast.

Kekela offered a black frock coat, then a rifle. Finally a canoe carved by a master boatbuilder aroused the chief's interest. Whalon was set free.

When Whalon returned to the United States, his thrilling adventure in the South Seas received publicity. President Abraham Lincoln then sent Kekela, in the name of the Government of the United States, a written testimony of appreciation for his intervention, together with an inscribed gold watch and telescope.

At the head of Puamau Valley, where Kekela carried on his missionary activities, are the largest stone images in the Marquesas. I stood beside one stone *tiki*, or god, measuring eight to nine feet in height.

Some were lying on the ground as if toppled over. One tiki was said to represent a woman

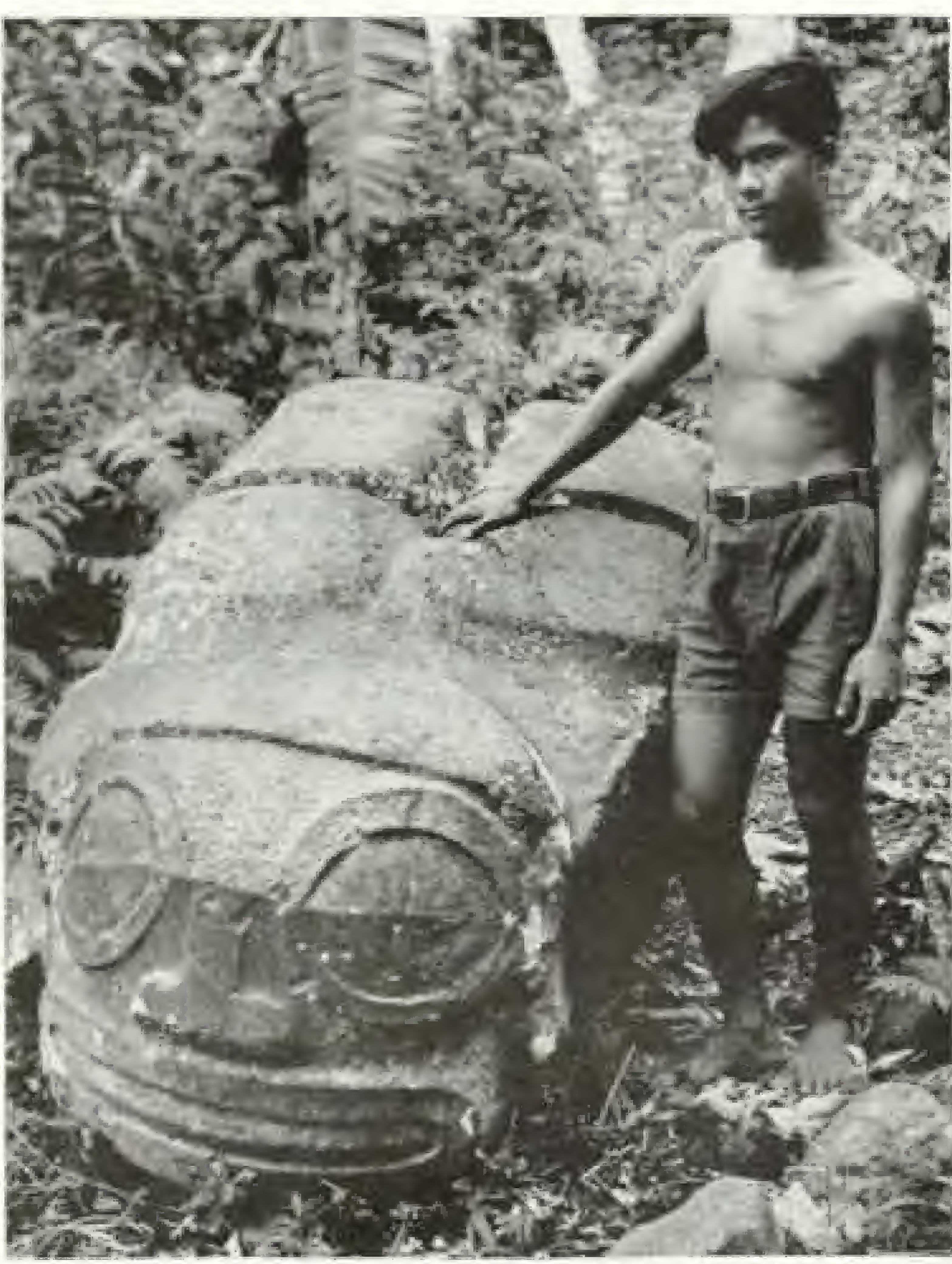
kneeling, head on the ground, in position for childbirth.

Although I got to the shore about 5 p. m., it took us more than an hour in the whaleboat to get through the surf to the schooner.

Through Bordelais Strait we moved on to Tahuata and Resolution Bay (Baie Vaitahu), named for Captain Cook's command ship, which visited here in April, 1774. The valley sloped up to the mountains from the water's edge. The ruins of an old French fort are visible, relic of a campaign to subdue the natives.

A monument to commemorate French soldiers and sailors who lost their lives in fighting the fierce tribes of the island was erected 50 yards back from the beach.

The tidal wave of April, 1946, tore the monument from its foundation. The huge slab of concrete toppled over. The plaque is gone, possibly to furnish metal tips for the natives' fishing spears. An old ship's cannon remains, however, pointing out to sea.



Goggle-eyed Images Reflect Hiva Oa's Pagan Days

The author saw many toppled *tiki*, or gods, some measuring nine feet. This centuries-old stone figure is believed to represent a woman in childbirth.

The morning of December 9 I awoke to see the jagged spirelike peaks of Ua Pu (pages 92, 102, and 103). We were anchored at Hakahau Bay, and dozens of native canoes were coming out to visit the schooner.

In 1815 the sailing ship *Matilda*, under Captain Fowler, put in at Hakahau Bay for a cargo of sandalwood. Controversy over women caused the natives at night to cut her anchor chain. A heavy sea was running, putting her on the rocks in short order, and she sank before daybreak.

The 1946 tidal wave washed ashore the hull which had been submerged for 131 years. Never was the old ship more needed, for most of the buildings along the beach had been carried out by the tidal wave.

Landings any place on Ua Pu are dangerous. Bays are short and poorly protected. Certain bays are calm in one season, dangerous and difficult a few months later. At times the northeast trades blow this way, causing bays on the north side to have heavy surf.

The Chief of Omoa

The middle of December we reached Fatu Hiva.* At Omoa we anchored well in. The general orderliness of the small settlement was conspicuous. A small avenue runs from the beach for half a mile up the valley. On either side, native houses have neat yards with grass and flowers.

* See "Turning Back Time in the South Seas," by Thor Heyerdahl, National Geographic Magazine, January, 1941.

Like Castaways, Omoa Villagers Dejectedly Watch the World Sail Away from Fatu Hiva

Four times a year the islanders rejoice in a visit from the trading schooner *Vaitere*. Their only contact with other people, she brings salt, sugar, calico, canned goods, and mail.

Men, Women, Children, and Dogs Line the Rocky Shore; Their Solitude Closes In Again

Every soul in the village sees the schooner off. She bears away baskets of fruit, their parting gift. Here the author took his last picture of the Marquesas (page 104).

Lava Steeples Hide Their Heads in Rain Clouds 4,000 Feet Above Ua Pu

No reefs protect Ua Pu's bays. Heavy surf and treacherous currents make landings hazardous. The whaleboat, after putting provisions ashore, battled massive rollers on its way back to the schooner (page 92).

Vaitere Drops Anchor in Hakahau Bay. An Entire Community Paddles Out to Meet Her

Once every three months when the schooner calls, Ua Pu folk race to get a head start in the trading. Girls exchange pandanus hats for cheap perfume; men bargain for tobacco. These dugouts, carrying outriggers on the starboard, were fashioned by hand from breadfruit trunks.

Hoofbeats Break the Silence of Typee Valley, Once the Noisy Eden of a Happy People

Just over a hundred years ago Herman Melville jumped ship on Nuku Hiva and lived like a hostage king among Typee's handsome cannibals and fair maidens. He immortalized the valley in his novel, *Typee.* Today it is deserted save for a few people living in thatched huts scattered through the coconut grove (page 93).

The chief's hobby is collecting Marquesan carvings. He has three bowls, each more than 30 inches in diameter and carved by hand, of miro, a rosewood. Elaborate designs on the outside mark the work of a master craftsman.

One of these bowls has been in his family 70 years (page 74). Fatu Hiva has the best wood carvers in the entire group.

North along the coast from Omoa we made our way, close in to shore. Steep cliffs now towered above us. In the lee of the island the sea here was as calm as a river and 40 fathoms deep. There was no danger of running aground.

Fantastic Rock Formations

At last, as we rounded a headland jutting out several hundred yards, Virgins Bay (Baie des Vierges) lay directly ahead. The wheel was hard to starboard, as auxiliary motors were throttled back. It was late afternoon, and the fantastic, grotesque rock formations here took on a yellow hue.

The Hanavave Valley runs back from the sea through two gaunt rock formations (pages 84 and 85). Here and there a tin roof catches the long rays of the disappearing sun.

The whole population came down to the landing place when it was time for us to go. They proffered baskets of fresh fruit. Perhaps three months would pass before the *Vaitere* touched here once again (pages 100 and 101).

"Apai! Kaohae!" I shouted with the crew as we put out to sea. All hands pulled on halyards as the mainsail went up. A gust of wind filled the canvas overhead. The foresail was up now; the jibs had been set earlier.

I walked aft and took my last picture of the Marquesas, as the southeast trades abeam began to drive us into the evening sun.*

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "At Home on the Oceans," by Edith Bauer Strout, July, 1939; "Romance of Science in Polynesia," by Robert Cushman Murphy, October, 1925; "Dream Ship," by Ralph Stock, January, 1921; and "Vanishing People of the South Seas (Marquesans)," by John W. Church, October, 1919.

New Life for the "Loneliest Isle"

By Lewis Lewis

With Illustrations from Photographs by the Author

BECAUSE the world needs more food, a tiny, windswept speck of land in the middle of the South Atlantic has lost its status as the "Loneliest Isle" and become, instead, the busy scene of a unique industrial experiment.

The island is Tristan, a volcanic fragment 24 miles in circumference crowned by an extinct crater rising to 6,760 feet. It is the largest and only regularly inhabited member of the Tristan da Cunha group, lying midway between South Africa and South America (map, page 108).*

Isolated Outpost

Since 1816 Tristan has supported a small colony of the British Empire's isolated subjects. For 134 years they have wrested a meager living from hostile sea and grudging soil. Periodic failure of their one crop, potatoes, has brought them close to starvation. Despite such tribulations, they have resisted their government's efforts to evacuate them to friendlier lands.

Now a new and more prosperous way of life is in the offing because of the crayfish, or spiny lobster, a clawless, brilliantly colored cousin of the North American lobster. These crustaceans, their large, fan-shaped tails packed with nourishing meat, breed in vast swarms among the rocks and kelp jungles off Tristan's forbidding shores.

Ways have been found to land, process, and transport Tristan crayfish to world markets. Nearing completion on the main island are two freezing plants, built by South African fisheries concerns. As an initial target the plants aim at an annual production of 50,000 cases, each containing 20 pounds of frozen lobster tails. One prospective market is the Pacific Coast of the United States.

Tristanites, experts in the handling of small boats, will be employed as fishermen. To the islanders it will mean a higher standard of living, and participation in world trade.

Over the years, many have suggested commercializing the Tristan da Cunha crayfish beds, but the idea was considered impracticable because of the islands' weather. Communication with the outside world is difficult because of dense fogs, fierce gales, and mountainous seas. There is no harbor. Ships, on rare calls, must stand offshore and await calm before sending small boats through the surf to the cindery black beaches (pages 107 and 109).

Another discouraging factor was the islands' remoteness. They lie 1,700 miles from Capetown and 2,100 from Rio de Janeiro. Of the other islands of the group only Inaccessible, 20 miles southwest of Tristan, has been inhabited, and that for irregular periods.

The rest—Stoltenhoff, Middle, and Nightingale Islands—are home only to seals, penguins, and such birds as petrels, skuas, albatrosses, flightless rails, and greater shearwaters. The nearest populated place is St. Helena, 1,500 miles away.

In 1948, five Capetown firms joined forces with the Union of South Africa Government and the British Colonial Office in an expedition to investigate ways of overcoming obstacles so that Tristan's marine food resources might be put to work.

Aboard the expedition's motorship *Pequena* were marine biologists, surveyors, engineers, an agriculturist, a physician, sociologist, and other experts in various fields. I went along as official cameraman.

Leader of the *Pequena* party was the Rev. C. P. Lawrence, a Church of England minister, for whom the expedition represented a personal triumph. As chaplain of a Royal Navy meteorological unit he had spent more than two years on Tristan during World War II.

A sailor before he became a clergyman, the Rev. Mr. Lawrence insisted that, despite Tristan's weather, the island's towering volcanic peak must provide a lee safe enough for fishing. He analyzed the meteorological records, and showed how this lee can be followed no matter how sudden or violent the weather changes.

I saw dramatic proof of the sailor-clergyman's theory on a terrible day when a 75-mile wind tossed *Pequena* about like a chip. Through staggering seas we fought our way under the lofty cliffs into a triangle of water that was calm enough for dinghy fishing.

Parent Vessels to Collect Catches

Tristan da Cunha's crayfish will be netted from 14-foot dinghies similar to those used by fishermen along the South African coast.

* See "Tristan da Cunha, Isles of Contentment," by W. Robert Foran, National Geographic Magazine, November, 1938.

Tristan Women Are Seldom Idle. These Three Gossip as They Card Wool

Next step is spinning the fibers into yarn, used in knitting sweaters, underwear, and the long white stockings worn by all islanders. So valuable for wool are Tristan's flocks that sheep are slaughtered for food only on special occasions, such as Christmas (page 108).

Catches will be transferred to Diesel-powered parent vessels which, in turn, will discharge their cargo onto beaches near the two freezing plants. Wartime "ducks," or amphibious jeeps, are among the craft being considered for the job of transferring catches from parent vessel to beach.

Edinburgh, the island settlement, was chosen as the site of one freezing plant. The other will be at Sandy Point, on the east side of the island. These plants will process crayfish caught off Tristan and its immediate neighbors as well as off Gough Island, another British possession 250 miles southeast of Tristan. Several times a year the plants will ship their accumulated stocks to Capetown.

In addition to crayfish, the *Pequena* survey also found 18 species of fish in Tristan waters. Some may prove valuable for their vitamin oils.

Still another Tristan resource, of possible commercial value, is a species of Macrocystis, a giant seaweed that surrounds the islands like an aquatic wilderness. Macrocystis is a rich source of alginic acid.

Alginic acid is a stabilizing and gelling agent, used in ice cream to give it smooth body and texture. It is used in many other manufacturing processes, among them the making of dentists' moldings, cosmetics, water paints, and in protective coatings for cheese. It is also used in brewing to give clarity to beer.

When World War II shut off supplies of jute from India and Burma, Scottish scientists discovered a method of turning alginic acid into yarn which was woven into a substitute for burlap.

Pirates and Buried Treasure

A tale of pirates and buried treasure is told of Tristan da Cunha, named for the Portuguese mariner who discovered the islands in 1506.

Tristanites Battle Angry Surf to Land on Storm-beaten Nightingale Island

Several times a year Tristanites journey to rocky, uninhabited Nightingale to collect birds' eggs (page 108). Together with near-by Inaccessible, it is the only known breeding place of the petrel *Pterodroma incerta*. These islanders, in their canvas-covered longboat, pass stores to members of a South African expedition.

An early settler was Jonathan Lambert, of Salem, Massachusetts, who arrived with three companions in 1810.

Lambert styled himself "Emperor of Tristan da Cunha" and even published a proclamation to that effect in the Boston *Gazette* of July, 1811. Among Lambert's possessions, it was rumored, was a chest full of plunder.

None challenged Lambert's claims to sovereignty, but the Governor of the Cape of Good Hope once suggested that Britain should occupy the islands. This was not done, however, until 1816, when H. M. S. *Falmouth* landed soldiers who formally annexed Tristan and established a garrison.

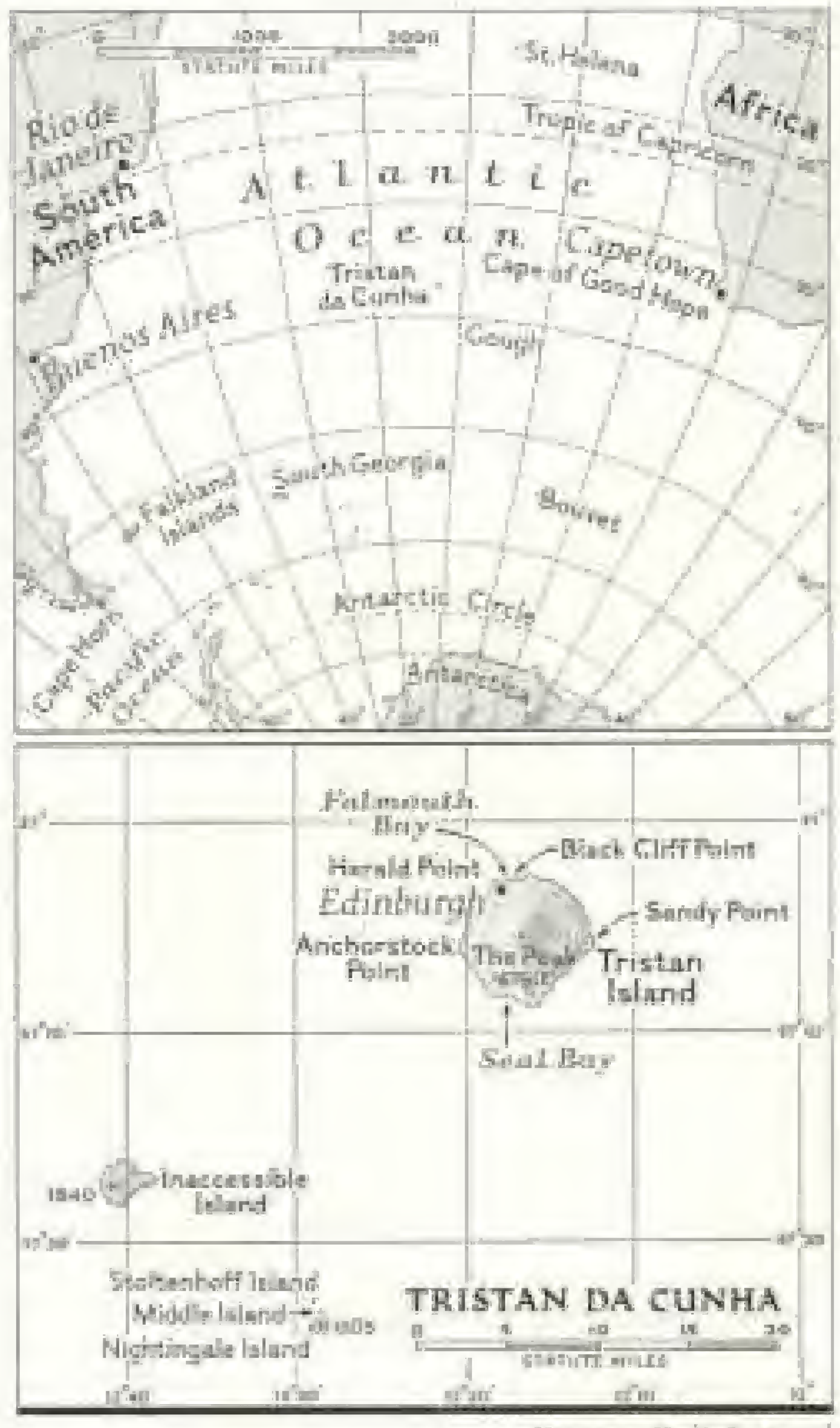
According to some historians, Britain occupied Tristan to prevent its use as a base from which Napoleon Bonaparte's escape from St. Helena could be organized.

Only one of Lambert's settlers remained when the English arrived. The rest were supposed to have drowned while fishing at sea. The lone survivor was Tomaso Corri, an Italian, who spoke of great riches buried in a secret spot on Tristan. Occasionally, it is said, he would vanish into the brush and return with handfuls of gold coins.

Corri once told the English where the treasure might be found, but diligent search yielded nothing.

When Britain withdrew her garrison in 1817 (four years before Napoleon's death on St. Helena), a Scottish corporal, William Glass, was granted permission to settle permanently on the island with his wife and two children. Two bachelor soldiers, Samuel Burnell and John Nankivel, elected to join the Glass family.

Burnell soon departed, but other roamers of the sea later "swallowed the anchor" and settled down on Tristan. Among them was Thomas Swain, who claimed he was one of those who caught Admiral Horatio Nelson as he fell to H. M. S. *Victory's* deck at Trafalgar.



Atlantic Wastes Surround Lonely Tristan da Cunha

The islands lie 1,700 miles from Capetown and 2,100 from Rio de Janeiro. A 6,760-foot extinct volcano crowns Tristan, largest and only regularly inhabited member of the group. The British outpost's 230-odd people live in a settlement named for the Duke of Edinburgh

By 1826, the arrival of shipwrecked mariners had raised the population to seven men, two women, and two children. In 1827, at the request of the five bachelors, the captain of a passing ship persuaded five women from St. Helena to become brides of the lonely men on Tristan.

Islanders Are of Many Strains

Today, there are 230-odd men, women, and children on the island, apart from the South African fisheries workers. All the inhabitants are related to each other by inter-marriage, and there are only seven surnames—Glass, Green, Hagan, Lavarello, Repetto, Rogers, and Swain—among the sixty families.

Tristanites are of mixed descent—English, Scottish, Dutch, Italian, American, and natives of St. Helena (page 116). Their common language is English, but visitors have difficulty understanding local idioms.

Willie Repetto is the island headman. His mother, Frances Repetto, widow of a shipwreck survivor who came to Tristan in 1890, was "queen" until her death in 1948.

Islanders live in gabled stone cottages similar to those of Scottish crofters (pages 110 and 112). Roofs are thatched with New Zealand flax, which grows in nearly every garden. A layer of turf, held in place by wire, keeps rain from coming in at the top.

In most homes, floors are of bare, hard-packed earth. The only lumber available is driftwood salvaged from the beaches; this is used to finish some interiors and in building graceful, double-ended fishing boats. Driftwood also serves as fuel, along with branches of a large shrublike bush, a species of buckthorn known as the "island tree."

Fish and potatoes, the latter grown in stone-walled patches on a plateau near Edinburgh, are the main diet of Tristanites (page 114). For additional food the islanders travel in their homemade boats to Nightingale and Inaccessible Islands to collect birds' eggs.

Plagues of caterpillars and rats frequently ravage the potato vines. The fisheries concerns plan a campaign to combat these pests and to improve Tristan's agricultural methods.

Although the islanders own several hundred sheep and cattle, they seldom eat meat. Sheep are valued for wool, which is carded by the women and spun on old-fashioned wheels (page 106). The women are deft knitters; among their products are long white stockings worn by every islander. Moccasins, distinctive Tristan footgear, are made of cowhide (page 115).

Tristan has no currency of its own; the family with the most potatoes in storage is the richest. Crime is virtually unknown. To illustrate the quiet, peaceful way in which they pursue their affairs, islanders like to tell of a man who committed suicide by cutting his throat and wrists. The victim was found with the instrument of the deed, a razor, neatly folded in his pocket.

A school was opened in 1942, when Royal Navy and South African Air Force personnel, some with their families, established weather and wireless stations on the island. Before that the only teaching was by missionaries sent out from London by the Society for the Propagation of the Gospel in Foreign Parts.

Mrs. A. E. Handley, widow of a missionary who died in 1948, remained as schoolmistress and leader of a Girl Guide troop. As part of the fisheries project, the school will be enlarged and staffed with teachers from the outside world.

© National Geographic Society

Ansco color by Lewis Lewis

South Atlantic's Seas and Winds Endlessly Buffet Tristan da Cunha, the Lonely Isle

In former years few strangers visited Tristan, a forbidding, extinct volcano thrust up out of the sea midway between Capetown and Rio de Janeiro. In 1948 South Africans arrived to process and ship Tristan's spiny lobsters.

Portugal's Tristão da Cunha discovered the group in 1506. Britain annexed it in 1816, and a few British soldiers founded a colony now numbering about 230.

These islanders beach their boat beneath a 2,000-foot precipice. In such small craft they venture to neighboring Nightingale and Inaccessible Islands for birds' eggs.

© National Geographic Society

Ansco colors by Lewis Lewis

Tristan da Cunha Men Make Fishing Line and Rope with a Twisting Machine Salvaged from a Shipwreck

Bearded Sam Swain, operating the device with the help of friends, is Tristan's oldest inhabitant. He is descended from Thomas Swain, an early colonist, who was credited with catching Admiral Horatio Nelson as he fell mortally wounded to the deck of H.M.S. *Victory* at the Battle of Trafalgar.

She Faces Washday with a Cheery Smile

Like all Tristanites, this housewife starts the day with sunrise prayer at the island church. A block of lava serves as her washboard.

© National Geographic Society

A Sculptured Castaway Stares Seaward

Many ships have come to grief off the South Atlantic isle's treacherous coast. This figurehead once adorned the four-masted bark *Admiral Karpfanger*.

Ansco-color by Lewis Lewis

All Hands Join to Build a Home for Tristan Newlyweds

Walls are made of tuff, a soft lava stone quarried from the volcanic mountainside and shaped with axes. The roof is thatched with New Zealand flax, grown in every island garden. A blanket of turf is laid on the ridge top to keep out rain.

Labor is freely given, as at American husking bees, by friends of the bridegroom.

In the age of sail, Tristanites traded with Yankee whalers. At times as many as 70 windjammers stood offshore.

With steam's advent and whales' departure, Tristan became the Lonely Isle. For years the only visitors were the annual supply vessel and an occasional cruise ship. An English missionary conducted church; his wife taught school.

Britain tried several times to evacuate Tristan, but the people stubbornly clung to their island, though each passing year sank them deeper into poverty.

Now Tristan hums with activity; prosperity is in sight. South Africans, surveying its kelp-laden waters, found them teeming with crayfish, or spiny lobsters. A freezing plant was built, and Tristan lobster tails are on their way to world markets.

© National Geographic Society

Ansco color by Lewis Lewis

Oxcarts Haul Blocks of Lava for Building

This cart must follow a rough trail, for Tristan has no paved highways. For lumber, carpenters sometimes use planks salvaged from shipwrecks.

© National Geographic Society

Tristan's Houses Rise from the Earth

One islander squares soft lava blocks with an ax, his companion smooths rough spots with a scraper. Most cottages have but two rooms.

Ansco colors by Louis Lewis

© National Geographic Society

Ansco color by Lewis Lewis

Tristan Lives on Fish, Birds' Eggs, and the Potatoes Grown in These Stone-walled Plots; Meat Is Rare

At intervals the cattle barriers are torn down, stone by stone, the dogs turned loose, and hordes of nesting rats killed. Then the walls are rebuilt. Each family owns several patches of this farm. An occasional potato failure brings the island close to famine.

Mamma Rides and Knits; Junior Sits

Donkey needs no piloting, as it bears mother and son over a familiar trail from Edinburgh, the settlement, to the potato fields, three miles distant.

© National Geographic Society

Every Tristanite Is His Own Shoemaker

Moccasins of sheep, cow, or donkey hide are worn over homespun stockings. "Store" shoes from the outside world are for special occasions.

Ansco colors by Lewis Lewis

© National Geographic Society

Ansco colors by Lewis Lewis

↑ Harvest Puts Entire Families to Work

After Tristan menfolk dig the potatoes, women sort them. Oxcarts haul the crops to storehouses. Children toil as insect exterminators.

↓ Tristan Faces Reveal Many Strains

Islanders trace their origins to Britain, the Netherlands, Italy, America, and polyglot St. Helena. Ages of these four women total more than 300 years.

El Sangay, Fire-breathing Giant of the Andes

By G. Edward Lewis

United States Geological Survey

With Illustrations from Photographs by the Author

HALF AN hour out of Quito our plane still climbed through solid cloud. We seemed to hang motionless in the murky shroud.

Suddenly the gray scud thinned. We leaped out of the "soup" into the blazing glare of the rising sun.

The earth had passed from our ken. As far as the eye could see, wind-tossed billows of alto-cumulus at an altitude of 17,000 feet floored our empty world.

The fluffy blanket below shut off from view the rugged, mysterious land approaches we had hoped to spy out leading toward mighty El Sangay, most active of Andean volcanoes (map, page 121).

The cloud cover was a disappointment—not our first. For days we had been trying to trace from the air possible trails to the great peak. Foul weather and mechanical trouble so far had foiled each attempt.

Whether this trip failed or succeeded, we had decided that today's effort would ring down the curtain on survey flights. Tomorrow, willy-nilly, we would set out to penetrate El Sangay's stronghold by ground attack. Our goal, after all, was to set foot on the slopes of the little-known eruptive giant.

Now our spirits soared as we spotted seven volcano cones frosted with snow and ice. Poking through the clouds, they looked like scoops of ice cream dotting an endless sea of meringue.

Along "Volcano Row"

These confectionery landmarks stretched from the Colombian border to El Sangay itself, target of our flight.

El Cotopaxi loomed before us. Moments later we stared down into its half-mile-wide smoldering maw (pages 124 and 125). Cameras clicked and pencils scrawled busily in notebooks. El Altar slid beneath us, and El Chimborazo's eternal snows glistened in the high heavens 30 miles away, rearing 20,577 feet into the sky.

At closer view, these towering volcanoes, thrown up from the earth's hot interior, shattered any fancied resemblance to ice cream!

With cold-numbed fingers we changed films, loading up for the "flaming terror of the Andes." That was the name given El Sangay by G. M. Dyott, first explorer to reach its slopes.*

Though we were flying higher than El Chimborazo's gleaming peak, we used no oxygen. Our scant supply had to be hoarded against possible emergencies.

Ports were open to allow picture taking. Bitter cold air poured into the cabin. We had had no breakfast, so didn't feel too chipper.

Ten minutes more and we were circling over Pluto's postern gate, the summit of El Sangay (pages 119 and 127). Judging from what we saw coming out, the powers of the nether world were having a hot time down below!

A howling easterly gale with heavy clouds in its teeth swept up off the Amazonian jungles.

Glittering and glowering above the racing scud rose a thousand feet of lava-belching cone, swathed in ash and lava, snow and ice.

El Sangay Throws Up House-size Rocks

We were awestruck at the violent spectacle below.

Steam, ashes, and huge lumps of volcanic rock, some as big as a small hut, surged up in a jet from the summit vent. The wind seized the noxious vapors and ash and whipped them away westward. Ash fell on the western slopes and mantled them in sooty black.

The snowy east slopes were rent here and there by flows of dark erupted material from which hot gases issued to join steam from the melted snow and ice. This veiling smoke screen hid much of the surface detail.

Everyone felt a wholesome respect for the roaring monster as we soared above his evil throat. Jets and blocks of lava spewed up to sail through the air like high-hit flies over a ball park, only to fall back and sizzle in the snows below.

Had any one of these natural projectiles hit us, our journey would have ended then and there. Some have been reported to shoot up to a height of some 45,000 feet above sea level. They are said to attain a velocity of more than 1,000 miles an hour—six times the speed of our C-47 and faster than the speed of sound.

Most modern jet planes would have a scant half the speed necessary to escape one of

* See "Volcanoes of Ecuador, Guideposts in Crossing South America," by G. M. Dyott, National Geographic Magazine, January, 1929.

El Sangay's Challengers Feasted on Wild Deer Grazing on the Volcano's Ashy Slopes

In 1946 the author, heading a mapping expedition for the American and Ecuadorian Governments, surveyed two routes to the cone, but was turned back from the summit by an eruption. G. M. Dyott, first explorer to reach Sangay's snowfield, met defeat only 400 feet from the crater. Robert T. Moore's party in 1929 made the only successful ascent, so far as the record shows. Here a titbit diverts a dog from the butchering.

El Sangay's deadly blasts. As it was, our pilot, Maj. M. J. Gatewood, kept us over the slopes but out of the danger zone.

So we winged out of range of the "flaming terror." On the flight back to Quito we reviewed the results of half an hour of observations.

We had seen an impressive sample of the volcanological repertoire offered by the mighty Andean chain.

The cloud curtain had, however, denied us any glimpse of the little-known terrain which we should have to traverse to stalk remote El Sangay afoot.

We had added to our knowledge of, and respect for, our sulphurous adversary, but had learned nothing more about how to track him down to his lair. That would have to be done the hard way, on shanks' mare.

This was September, 1946. The American and Ecuadorian Governments were cooperating in exploration and mapping of El Sangay. The violent upheavals of this restless volcano were legendary all over western South America. They were all too real to isolated Indians inhabiting the rugged country around the peak's sooty skirts.

Our aim was to explore the approaches to the mountain, select the best, and map it for future use by other parties of travelers and surveyors.

On the Doorstep of the Caterpillar Club

A good bird's-eye view from the air may save much time on the ground; hence our flights in the C-47. But bad weather, almost without letup, time and again thwarted our attempts to preview the approaches to El Sangay.

The great Andes of the Equator always were mantled with cloud. They looked like huge heaps of llama fleece, the color of my pearl-gray poncho.

On one attempt we had lifted above ground

El Sangay's Vapor Mingles with Clouds Stretching to El Chimborazo, 50 Miles Away

Flying, the author photographed El Sangay's snow-clad cone, whose flank he later reached by foot. In the same picture he caught, far to the northwest, the dome of El Chimborazo, 20,577-foot monarch of the Ecuadorian Andes. Simón Bolívar, the South American liberator, called Chimborazo "the watchtower of the universe." In his day it was considered the world's highest mountain.

fog over the airport to face one of the earth's most stupendous sights, the double row of great snow-clad Andes lying athwart the Equator. It seemed we were in luck as the plane soared southward.

But alas! Over the grim slopes of El Cotopaxi Major Gatewood noticed that our starboard engine was dangerously hot. The oil pressure started to drop.

We all wore parachutes, which was some small comfort. But the tempest-strafed crags below, and the thin air between us and them, made this a poor place to pick for initiation into the Caterpillar Club.

Major Gatewood feathered the starboard propeller, and I am sure his skillful shepherding was worth as much as the port engine in getting us back safe across the jagged massifs to the Quito airport (page 130).

As the C-47 rolled to a stop, we piled out to find that the main oil line had burst, spreading its precious fluid over the landing gear. We were deeply thankful to Divine Providence, Major Gatewood, and the port engine.

The calendar allowed us no more flying. Making swift preparations, we started out by jeep for Riobamba and the treacherous terrain at the threshold of El Sangay.

A trip to Ecuadorian Amazonia a few years earlier had proved that an eastern approach was feasible but plagued with hazards. That route clearly was hard and long, because of trying climate, wild terrain, and the aborigines.

Masters of Murder

Oriente, the "wild East" of Ecuador, supports some deadly denizens. Curare-tipped blowgun darts of the Jivaro tribe carry sudden death in their sting. If the game is human, the savages hack off the victim's head and shrink it to the size of an orange.*

* See "Over Trail and Through Jungle in Ecuador," by H. E. Anthony, National Geographic Magazine, October, 1921.

El Tulabug's Harsh Crater Rim Overlooks Smiling Quebrada Colorada Valley

These boys survey plots of wheat, barley, peas, lima beans, corn, and potatoes. The distant eucalyptus grove shelters the village of Punín, where the geologist-author spent several months studying the terrain around sleeping Tulabug. He unearthed fossil wolf, horse, mastodon, saber-tooth tiger, ground sloth, and other creatures of the Pleistocene era. Indians cultivate slopes of the distant Sierra de Yaruquíes up to 11,000 feet.

Yet the Jivaro are gentle, peaceful folk compared with the murderous Awishira. Their range, luckily, lies mostly north and east of the stretch of country between the Río Pastaza and El Sangay.

Early in 1942 the Shell Oil Company had a construction gang of nearly 100 men chopping an airfield out of the jungle of the upper Río Arajuno.

The Awishira resented this trespass upon their forest primeval. Three of the tribe, armed only with spears of chonta palm, attacked the whole force of workers and routed them in panicked flight.

They left spears as calling cards in the bodies of two peons and a foreman. A Shell plane dropped rifles and ammunition to the besieged survivors, who were able to stand off the foe and escape their fellows' tragic fate.

The Awishira had staged a first-class massacre about the time of our flights. I saw some of the spears they left in their victims.

The old Conquistador trail from Riobamba to Macas in Oriente passes south of El Sangay. A miserable track of slimy mud, it traverses the bleak, wet, and windy *páramo* (barren highlands of the Andes), then plunges into

Drawn by Theodore F. Thompson and Irvin E. Alleman

Explosive El Sangay Guards the Eastern Flank of Ecuador's Cloud-scraping Volcanoes

Ecuador's craters—alive, sleeping, and dead—form part of the circum-Pacific "ring of fire" touching Central America, Mexico, the United States, Alaska, Japan, the Philippines, the East Indies, New Zealand, Antarctica, and the southern Andes. Extinct El Chimborazo tops all Old World volcanoes but yields 1,000 feet to a few Andean supergiants. To track down 17,749-foot Sangay, the author jeeped from Riobamba to Hacienda Santa Rosa. Afoot and in the saddle, he surveyed two trails to the volcano's flank.

Amazonian jungles. We wrote it off as a possible, but undesirable, approach, to be followed only as a last resort.

This narrowed the choice to west and northwest of El Sangay. Commander Dyott had used the latter, working up the valley of Alao, over the divide, and down the Rio Culebrillas to the lower slopes of El Sangay.

We decided to retrace Commander Dyott's steps that far, for the experience and breaking in which we needed. Then we would pioneer a new route, sidling up to our hulking quarry from the west. Our most important chore, of course, would be to map as we went along.

In 1929, four years after Commander Dyott's pioneer exploration, a party led by Robert T. Moore set out from the valley of Alao over the Dyott route. They reached the summit after two unsuccessful assaults, and were the first to conquer the formidable peak. They were fortunate in arriving at a time when the monster was having one of its rare slumbers; there were no eruptions, although "dense clouds of light-colored gas poured from the orifice." Even with the help of the original exploration record, the Moore party had to

National Geographic Photographer W. Robert Moore

First Aid for His Pack, Not for His Toe, Concerns the Indian Porter

Innocent of shoes, the Andean highlander's feet are as tough as leather, but almost as nimble as his hands. This man has dropped his hay-cradled load of pottery to repair his tattered rope-net pack. Holding one end of an agave leaf with his toes, he shreds the fibers and twists them into cord. Agave (better known as century plant, henequin, or sisal) makes the Indians' rope. Its juices yield a cleansing fluid; its flower provides food.

struggle through Sangay's flanking fastnesses for "fifteen days to reach the base of the cone . . . from camp in Culebrillas Valley."

Terris Moore, a member of the party and son of the leader, later made the first ascent of 24,900-foot Minya Konka in western China.*

On an exploratory flight in 1943 I had seen a long highland buttress, cut by only one large river, jutting out eastward toward El Sangay from the Cordillera Oriental at the head of Guargualla Valley. There was a chance that this would turn out to be a good avenue of access.

The divide had to be climbed, whether or no. If we could stay atop the knife-edged ridges from the divide onward, we should be spared the breakneck drops and heart-rending climbs of the other possible approaches.

At every turn individuals, private and official, whose paths we crossed promoted our plans. Ecuadorian Ambassador Galo Plaza, who was elected President of Ecuador in 1948, helped to organize the expedition in Washington.

Don Romeo Cordovez of Quito, Dr. Félix Abad Avilés of Riobamba, and Dr. Silvio Luis Haro of Punin overwhelmed us with the proverbial hospitality of Ecuador.

Rough Going, Even for Jeeps

The American Ambassador and the U. S. Army Air Mission generously provided the magic carpet for our scouting flights. Major Gortaire of the Ecuadorian Armored Forces arranged to have Sergeants Pacheco and Palacios drive a pair of jeeps to the roadhead for us (page 128).

Wallace Estill, of the American Embassy's legal staff, joined me for our first journey.

* See, in the National Geographic Magazine: "Climbing Mighty Minya Konka," by Richard L. Burdsall and Terris Moore, May, 1943.

Leaving volcano-ringed Riobamba, our road lay first up the Rio Chambo. It led across the lower slopes of El Tulabug, a small extinct volcano, and through the town of Licto (page 120). Some years before, while living with Dr. Haro in Punin, to the northwest, we had studied the geology of this volcano and its surroundings. Thus far, therefore, we were on familiar ground.

From Licto onward all was new.

Down steep, rocky cliffs, across the bridge over the boiling Rio Chambo, and up the east wall of its canyon our drivers jockeyed the jeeps. Passing the village of Pungalá, the twisting track followed the Chambo to the mouth of the Rio de Alao.

Swinging eastward up the Alao, we came face to face with a magnificent sight. The valley of Alao had been gouged deep by glaciers of the Ice Age. We swept out of the bleak inter-Andean trough to enter lush alpine meadows (page 132). It was like plunging out of Navajo country into Switzerland.

Far ahead, at the top of the valley, the gleaming snow and ice on the heights of the Cordillera Oriental beckoned us. That was the skyscraping divide we had to cross.

Halfway between the Rio Chambo and the divide, Hacienda Santa Rosa flashed into view. We drove in to a warm welcome.

The genial *hacendado*, Don Alfonso Merino, greeted us. His home, his possessions, and his services were ours for the asking, he said. We learned this was no flowery gesture; his hospitality was prodigal. The Merino family had helped Commander Dyott years before, and favored us in kind. The major-domo was sent to arrange for peons, horses, and mules. We stood on the threshold of another adventure.

A flurry of excitement attended our departure. Some of the hacienda's livestock had strayed across the divide. A troop of cowboys and Don Roberto Merino came along to round up any animals they might find (page 129).

Snow cloaked the mountains to within a few hundred feet above the hacienda. The air was chill and damp, with the promise of rain and more snow from the lowering clouds.

As the cavalcade climbed higher and higher, boggy meadows gave way to a dripping belt of forest. Our animals slipped and slithered through deep mud, fallen logs, and lush vegetation.

Still the way led up and up. Above 13,000 feet we entered bunch grass and bog terrain.

Landslides cut the trail at intervals. Endless rains had left the sodden ground in terrible condition for travel. The few level spots were nothing but quagmires. In places our sturdy mountain steeds could not carry us. Foundered in the muck, they had to be lifted and hauled across by the straining cowboys (page 136).

Upward through rain and sleet plodded man and beast to a dreary lunch of cold K rations and wet grass on the crest of the divide. We could see scarcely 50 feet ahead through the thick clouds. Had the weather broken, there must have been a fine view of El Sangay.

Nature Builds an Obstacle Course

Starting off anew, the dripping caravan worked down the eastern slopes until, at long last, several mountain torrents joined to form the Rio Culebrillas. This name, which means "Little Snakes River," is an apt choice, for the stream twists and turns continuously. Landslides have repeatedly poured into the valley and swept across its floor to smash against the far walls.

Forced by these avalanches of rock and mud to find new channels, the river worms its way through a jumbled mass of rocks, tree trunks, grass, and mud, almost impassable going for horses or pack animals.

At last we reached the shelter of Culebrillas *Tambo* (*tambo* means resthouse in the Andes). Beyond this point it was easier to walk than to try forcing the animals through the natural obstacle course.

Now in sad disrepair, this hut was used by Commander Dyott. Only Carniceria Tambo intervened between us and Dyott's farthest camp on El Sangay.

Cold rain had drenched us without letup since leaving Hacienda Santa Rosa. But fires soon were blazing. Our benumbed stiffness was speedily thawed out.

Don Alfonso Merino's son, Roberto, set out shortly with the cowboys to round up the choicer wild cattle. These fierce beasts were unbelievably agile and pugnacious. The caravan had started up several along the trail. They stood their ground and came to bay, but the dogs worried them and kept them busy while we slipped past.

One fine bull turned the tables on a dog and chased him to a cutback. Driving him over the brink into the river, 15 feet below, he dived in after the dog and gored his luckless victim in the water!

Game was abundant, and the next day we feasted on fresh venison. Our Indian peons painstakingly removed the bladder from the carcass and tied it off to save the contents. They told us it was "good medicine for belly pains."

El Cotopaxi: "A Scoop of Chocolate Ice Cream Topped with Marshmallow Sauce"

Tallest of the world's active volcanoes is 19,344-foot Cotopaxi. In the Ecuadorian Andes only extinct El Chimborazo stands higher. A sea of clouds veils their heads to earth-bound men much of the time.

Three Andean Giants Puncture the Cottony Clouds of a Silent, Empty World

Flying from Quito, the author spotted seven cones along "volcano row." Both El Cayambe (far left) and El Antisana (distant right) exceed 18,000 feet. Cayambe, 60 miles from the camera, stands on the Equator.

Courtesy Dr. Silvio Luis Haro

An Antique Spanish Document Adds 100 Years to El Sangay's Flaming History

In 1628 the authorities of Riobamba, Ecuador, feared "this city and its inhabitants will be destroyed." El Sangay, erupting, covered their pastures with so much ash that cattle were starving. Dust blotted out the sun, day became like night. This charred sheet, buried in a forgotten packet in which rats were nesting, was found in Riobamba by Dr. Silvio Luis Haro, an Ecuadorian collaborator with the author's expedition. His discovery proved Sangay active a century earlier than published accounts indicated (page 133).

Malignant El Sangay Resists Trespass with Barrages of Ash, Lava, and Vapor

At times ejected material is estimated to shoot 45,000 feet into the air at speeds exceeding 1,000 miles an hour (page 117). A bright interval at Carniceria camp brushes away the prevailing clouds.

The terrain before us was even worse than that we had traversed, and the weather was abominable. We decided to return to the valley of Alao. We had all the information about the Dyott route that we needed for comparison with other approaches.

Near sundown the afternoon before leaving Culebrillas resthouse, we had our first real view of El Sangay. The dark overcast suddenly split to let through a few rays of sunshine. The great symmetric cone burst into view in all its wild glory, with a plume of steam rising from the summit (page 119 and above).

Night Eruption Looks Like Fireworks

At that moment a violent eruption blasted up from the crater. Its thunderous roar struck our ears seconds later. Then, like a curtain slowly closing on a dramatic episode, the clouds drew a veil, little by little, across the scene, and the rains commenced anew.

Again that night we had a brief awe-inspiring glimpse of white-hot ash and lava rising in a fountain from the volcano and falling back, like fireworks, to splash El Sangay's slopes with glowing rock.

Next day we followed the cattle drive back to the valley of Alao.

Up to this time, all authorities on the subject, from Charles Marie de La Condamine, who led the French Academy of Sciences expedition to Ecuador in the 18th century, down to the latest treatises on volcanology, had maintained that El Sangay had never been known to erupt in historic times before the year 1728.

There were geologic proofs, however, that there had been continuous eruptions since long before that date. Surely, we thought, some lost historic records might be found to give a firsthand account of those unchronicled outbursts to which scientific evidence bore witness.

Accordingly, Dr. Haro volunteered to undertake a painstaking paleographic research

Jaunty Jeeps Scale the Lower Andes to the Limit of Their Endurance. Pack Animals and, Finally, Men Alone Will Carry on the Climb

Hacienda Santa Rosa showered expedition members with hospitality. Don Alfonso Merino, the owner, offered his every possession to further the trip to El Sangay. His ranch hands occupied the grass-thatched cabin. An extension of this road over the Cordillera Oriental into the Amazon basin is being built.

Indian Cowboys in Thick Felt Hats Saddle Mounts for a Roundup of Stray Cattle on the High Grasslands

Runaway cattle were "unbelievably agile and pugnacious"; one bull drove a dog into a river and gored him (page 123). Here Wallace Estill (left) finishes breakfast and Don Roberto Merino (just beyond the dog) directs his riders. Their thatched camp is called Culebrillas Tambo (Little Snakes resthouse).

Lofty Quito Nestles in the Andes. Patchwork Fields Climb the Slopes of El Pichincha, a Sleeping Volcano

Ecuador's capital was founded in 1534 on the site of an ancient Inca town. Pichincha, erupting between 1566 and 1660, often threatened to wipe out the city.

Indian Women Drive Sheep up a Cobbled Road on El Chimborazo's Lower Slopes. A Solitary Llama Appears to Lead the Flock

The best road in the Ecuadorian Andes here follows the old Inca trail from Cuzco, Peru, to Quito, Ecuador. Quechua women, digging earth and shaping cobbles, keep it in constant repair. Parallel stripes are composed of larger stones. At 12,000 feet all cultivation has been left behind.

A Shaggy Colt Leads the Pack Train Beneath the Frowning Cordillera Oriental, Eastern Range of the Andes

This party made the reconnaissance journey over the old Dyott trail to El Sangay. Riders are Mr. Estill (left) and author Lewis. Livestock but no crops are raised here in the upper valley of Alao. A rain forest clothes the slopes on the right.

in the official manuscript archives of Riobamba's colonial government. Imagine our delight when one day he came upon just what we wanted!

The document we had sought was a discolored, crumbling, partly burned sheet of paper (page 126). It was buried in a centuries-old packet in which rats were nesting! Dr. Haro transcribed the old Spanish. Translated, it read as follows:

> Proceedings of the City Council, on the Fiesta of Our Lady of the Assumption. Dignitaries present: the Mayor and Selectmen Ordinary.
>
> In Riobamba, on the third day of the month of November of the year One Thousand Six Hundred and Twenty-Eight, there met in open session of the City Council Captain Don Rodrigo de Castro, Magistrate and Chief Justice; Master Rodrigo de Araujo, Vicar and Perpetual Curate of this city; Master Sancho Ruiz de Montenegro, Curate of Cajabamba; Pablo Fernández de Medellín, Selectman Ordinary; Juan Bautista Terán, Trustee General; Fernando de Santiago, Faithful Executor; Matías Díaz de Villalobos, Procurator General; Don Juan Páez de Castillejo; the Auditor, Rodrigo Troncoso de Sotomayor; Captain Martín Alonso de Villarroel; Master Juan de Espinosa de los Monteros, Selectman of the Militia of the Holy Brotherhood; Pedro Manzero; Juan Guerra de Soto; Domingo de Aguirre; Gerónimo de Heredia; and Francisco Cobello; all citizens of the aforementioned city, upon which, about one month ago, the volcano of El Sangay, which lies toward the Province of Macas, burst asunder. And since the aforementioned time, it has thrown out enormous quantities of ash in this direction, which has spread out upon this district, blotting out the light of the sun and making the days dark, as it is this very day. Be it known that the city in general is terrorized, and that, in addition to the injuries to cattle, great and small, which are to be seen on every hand, all the fields and pastures are covered with ash so that the cattle will not eat and are dying of hunger, and it is expected that if God, in His Divine Mercy, does not remedy the situation, most of the cattle will die, and this city and its inhabitants will be destroyed, for they have been reduced to the utmost misery in their sustenance, considering what has befallen their potatoes and other plantings. . . .

Here, then, was conclusive evidence that the record in the rocks, the geologic proof, had been read correctly. Thanks to the zeal of Dr. Haro, we now had historic evidence of a series of terrible eruptions a century earlier than was previously believed to be the case.

A thorough search of these and other old documents probably would give us a fairly complete account of the eruptions of most of Ecuador's volcanoes since the coming of the Conquistadores early in the 16th century.

We still had to pioneer a new route to the volcano.

Jammed into a jeep, we set out once again, this time in the company of Col. Eduardo Mancheno, Commandant of the Riobamba area. He left us at Licto to return to his duties at headquarters.

In parting, he promised to send a sergeant and a corporal to serve as general factotum and cook, respectively. He offered, also, all the horses we might need. As if this were not enough, he generously placed at our disposal his hacienda in the valley of Guargualla, where his major-domo and several peons would be detailed to join us.

To Colonel Mancheno and Don Alfonso Merino we owe much of our expedition's success.

The night was spent at Hacienda Santa Rosa. Next morning a platoon of cavalry clattered up, accompanied by an army truck carrying a group of typical Andean musicians; so we had a send-off serenade as we rode away over the mountains between the Río de Alao and the Río Guargualla.

Sergeant Nuñez and Corporal Huilka rendered yeoman service, as had Sergeants Pacheco and Palacios before them.

Indians Carry Amazing Loads

After two days' march we reached Tres Cruces Tambo. The horses were left there, and sturdy peons took up the loads. It is amazing to see these Indian mountaineers trotting up and down steep slopes with heavy burdens on their backs.

Don Romeo Cordovez had come this far, but now had to turn back to Quito.

The valley of the Río de Tres Cruces lies directly in the path of the winds which whip up out of the Amazon basin, across El Sangay, and on to the west. As our cavalcade topped Llullumpala Pass and dropped into the valley, great quantities of black basaltic ash swirled down with the rain and sleet out of the dull skies. Eyes and noses of man and beast suffered alike. There was more and more of this abrasive "precipitation" as we neared the volcano.

Tres Cruces Valley itself has been filled with hundreds of feet of black ash, up to the very level of the pass of the Arenal de Pancahuán. We fought our way eastward through this gateway against elements and terrain.

There were no trails from Tres Cruces Tambo onward, only the interwoven tracks of numerous deer. The animals bounded away as we came upon them out of the mists.

We forged ahead atop the high knife-edge ridge which zigzagged ever eastward. We clung to the wet bunch grass and pulled ourselves along. There was danger of slipping and falling down the steep, landslide-scarred

National Geographic Photographer W. Robert Moore

Farm Wives, Loaded with Produce, Trudge to Market at Saquisilí

Shadows are short and intense under the equatorial sun near Quito. Herds of cattle feed on grassy plains. A clump of pampas grass decorates the roadside.

slopes, which dropped away below our feet on both sides.

After 10 hours of this turtle-paced progress we emerged on a small ash-paved flat. There we set up our little army mountain tents and built a shelter hut thatched with grass. The Indians christened it "Gringo Tambo."

Rubber ponchos notwithstanding, we were all cold and soaking wet. There was no firewood, but we had a little GI stove. We shot a deer, and in no time at all plenty of steaming hot tea, fried venison, boiled corn, and beans had given us all a new lease on life.

Eruptions Blare a Noisy Welcome

After a good night's sleep our little band set off in the rain again along the narrow divide. Hearteningly, it continued on toward the east. Late that afternoon a clump of small, gnarled trees loomed up through the fog. We had reached Carnicería Tambo, nearly three miles above sea level, which was our base camp under El Sangay.

The ripping wind once again performed the miracle of snatching away the clouds for half an hour, and El Sangay appeared as if by magic. Eruption after violent eruption burst from the huge looming cone (page 127).

The best of luck had attended us. The western approach was a practicable route; we had successfully traced it in its entirety. The going had been hard but perfectly feasible. The idea of keeping to the highlands running eastward from the Cordillera Oriental had paid big dividends.

All the small streams which flowed north and south from the divide became raging torrents a few miles downstream, running in deep canyons flanked by precipitous spurs. Progress along the way we had chosen was twice as easy as any route we could have picked following the tumbling, deeply entrenched watercourses.

Our path, moreover, was the shortest and most direct of all. We had read no published accounts of previous attempts to reach El

National Geographic Photographer W. Robert Moore

Laundresses Use Agave Juice as Soap and Irrigation Ditch as Rinsing Trough

Indian farm wives carry garments in a bowl carved from a single piece of wood. Eucalyptus trees near Ibarra lift swaying fingers toward Imbabura, a dormant volcano.

Sangay by this approach. Nevertheless, we were not surprised to learn that natives on hunting trips had used this same general route in the past.

Having done so well thus far, we were overtaken by bad luck. The peons had been given a three-week grubstake at Colonel Mancheno's hacienda. Now, only a few days later, when we had reached our goal, they announced that they had no more food.

Questioning revealed that these simple folk had left almost all their rations cached away at Tres Cruces Tambo, "in order to lighten our loads in the days to come, señor patrón"!

Game—deer, tapirs, pumas, and rabbits—was unbelievably plentiful all around El Sangay; Carnicería Tambo means "slaughterhouse camp." I refused to turn back for more supplies; I knew there was no danger of starving in a region so heavily populated with four-footed creatures.

For days we ate venison—broiled, roasted, fried, stewed, boiled, and jerked. Tapir meat was too tough. Rabbits were too small and hard to shoot in the dense bunch grass.

By the time we left Carnicería Tambo, any one of us would have traded a whole prime deer carcass for a single potato or ear of corn.

Our first morning at this camp the good Corporal Huilka complained of toothache. It developed that he had "many attacked teeth, but one very bad upper molar, señor, has a great mother cavity."

He had nonetheless left his barracks full of faith in a tiny vial of oil of cloves. He soaked small pledgets of cotton with this liquid and packed them with a matchstick into the "great mother cavity."

While this treatment soothed his throbbing jaw, it did not help the infection and abscess. His face swelled as if he had the mumps. The enlarged inflammation shut his left eye tight.

So we had a most unhappy cook. The damp cold, wet clothing, and smoky, drafty hut did not help matters. Corporal Huilka's native pluck, however, supported by some

Riders, Yanking Lariat and Tail, Rescue a Horse Belly-deep in a Quaking Bog

At 13,000 feet in the Cordillera Oriental ground-soddening rains fell almost continuously. The author was amazed by the lack of drainage on 60-degree slopes. Knife-edged bunch grass grew everywhere.

of my primitive treatment and sulfa tablets, carried him through in a few days.

Then Sergeant Nuñez, usually a careful and painstaking fellow, had a momentary lapse which cost us much time and trouble. It also caused him considerable pain.

We had a pack of lean, hungry, ferocious dogs for hunting and as a guard against surprise attacks by any raiding savages whose range we might enter. The mounting pile of deer bones at Carniceria Tambo was the mecca where this snarling, snapping pack gathered nightly to feed and fight.

Ferocious Dogs Give Trouble

Nuñez arose from his bedroll one night and, still half asleep, blundered outside the hut. He had neglected to put on shoes or stockings. Worse yet, he kicked at a dog who was crunching a marrow bone and blocking the path between the hut and the charnel pile.

The dog seized him by the heel and laid open the sole of his foot. Frontier first aid and sulfa, plus several days' rest, once again saved the day. Onias Nuñez was able to hobble about within a week. Still, this accident was a real setback to our plans.

To add to this sorry score, Carranqui, one of the peons, told us one morning that his foot was so bad he couldn't get up. This was our first inkling that he was having trouble with his feet. I found that he had deep, infected cuts in five toes, the result of a mattock blow suffered in his potato patch some days before he joined the expedition.

The faithful, hard-working, uncomplaining fellow had trotted barefoot with us for days, up mountains and down cliffs, through morasses and across jagged lava rock, saying nothing about his ailment. It must have caused him real agony. The foot was so dirt-encrusted that we hadn't noticed the injury.

Now Carranqui's whole leg was greatly swollen, the lymph glands inflamed up to the groin. Serious blood poisoning threatened,

Barefoot Porters Carry Ecuadorian Soldiers Piggyback to Keep Army Shoes Dry

Barrel-chested, stout-legged Andean Indians haul astonishing burdens without complaint. Some of their loads the author could not budge. Here one porter uses staffs to cross the slippery torrent.

so we gave the poor man repeated doses of sulfa tablets until only half my supply remained.

The wounds were cleaned and dressed, and Spartan treatment was prescribed for our patient. Luckily our improvised medicine turned the trick, and the good fellow recovered.

These experiences were depressing, especially in such eerie surroundings. The country reminded me of some of Gustave Doré's illustrations for Dante's *Inferno*.

"Black Rain" Coats Land with Soot

Biting gales swept dark scud in from the east night and day. We could not see a hundred yards most of the time, but now and then jagged black crags loomed up out of the mists.

El Sangay seemed to resent our intrusion. As if to frighten us away from its secret domain, the mighty volcano sent deafening roars to crash on our ears. It shook the ground as if its flanks quaked with diabolic laughter.

We had tracked our fire-breathing giant to his lair (page 127). And now we felt as if we had a bear by the tail in the dark.

Rain without cease washed irritating black ash down from the skies in tiny sooty lumps. Grass, flowers, and brush all were besmudged.

Deer by the dozen came and went through the fog, unafraid of man, perhaps because of the greater terror reigning above them. No stag's antlers bore more than four points, and when we butchered them we found their teeth worn down to the gums. We attributed this to the quantities of abrasive wet ash which clung to every blade of grass.

Our guess was that these deer never get the chance to grow to full maturity, but wear down their teeth early in life and eventually grow weak from undernourishment. So enfeebled, they fall easy prey to the pumas. We saw many skeletons of deer that had been pulled down.

The "Aleutian" weather—almost on the Equator!—and the men's mishaps saddled us with irksome inactivity, broken by forays into the swirling fog on fresh-meat hunts.

I decided to see if an advance camp high on the volcano would be feasible. Very early one morning, when the drizzle had thinned to a mist, I set out on this scouting trip. I circled the headwaters of the Río del Volcán and started up the south slope of El Sangay.

To blaze my route, I topped clumps of páramo grass at intervals. There are no trails, and it would be hard to retrace one's steps without leaving some sign.

A Try for the Top

At first the ascent was not steep. Poor visibility, dripping bunch grass, and mountain torrents were the barriers. On the southern flank vegetation thinned and finally vanished, while the streams now ran parallel to my course instead of across it.

Ever steeper slopes and the stiff climb in thinning air along sharp crests of loose, wet ash made the going harder and harder. At last I reached the final obstacle—soft, damp snow.

Commander Dyott's attempts to scale El Sangay met defeat because he had no snowshoes or snow goggles. His progress in the snow was laborious, and his singular good luck in having sunny weather was more than offset when he went snow-blind.

The Moore party was well-prepared with all the paraphernalia of alpinists: ice axes, crampons, alpine rope, snow goggles, ice tent, and cinema paint, as well as with snowshoes. They did not have to use these last, however, for they found plenty of ice but no soft snow, doubtless because the volcano's quiescent state had allowed freezing without melting.

I packed snowshoes and combination respirator-snow goggles to cope with the fine ash and glare, but to no avail. The overcast was so thick that it prevented picking out a route from below. Besides, the giant whose flanks I trod was trembling and roaring. The volcano's activity clearly was at a much higher pitch than during the two previous visits.

Hot ejecta in assorted sizes fell thickly in the snow at about 16,000 feet, and even reached far below. It was unsafe to set up a light tent.

Likewise, climbing or camping on the upper slopes would be at too much peril of our lives, not only from the eruptions themselves but also from the melt water and avalanches which hot erupted material might cause on hitting the snow.

I had hoped to reach the 17,749-foot summit, or at least to camp close to it for intimate study. This would have topped off our more important objectives. Reluctantly, however, we abandoned the final assault until some future date, when El Sangay's mood may be more benign.

Notable success had crowned our efforts to gain firsthand knowledge of possible approaches to the peak. We had to be satisfied with our geologic and volcanological studies and with our specimen collections.

We had recorded, furthermore, the observations necessary to compile the first reasonably detailed sketch map of the terrain to the east and southeast of Riobamba. This is the area beyond the San Luis-Chambo region which is already mapped in good detail by the Servicio Geográfico Militar of the Ecuadorian Government.

A few more moments of clear sky were granted us. They seemed to come always toward sunset and again between 8 and 9 in the evening.

As we worked our way back toward civilization across the wind- and rain-swept passes where great condors soared overhead, we carried with us, etched forever in memory, the terrifying but majestic panoply of El Sangay's defenses. And on film also we had a record of the restless volcano's rocky ramparts and its bulwarks of cliff and canyon, fog, wind, and rain.

We had gained respect for this Andean monster, always growling, hissing, or grumbling. We would long remember how it nursed its fury up to white heat, finally to roar forth its anger like a thousand battleships firing broadsides into a raging thunderstorm.

A Never-to-be-forgotten Scene

In our mind's eye we would see the imposing cone, crowned by day with a piebald pattern of blackest lava and whitest snow, and plumed with steam and noisome gas. We would recall the spectacle of the shapely monarch hurling aloft ash and lava bombs to besmirch the snow slopes with sooty black.

We would picture the peak at night, too, a dull reddish glow suffusing the waving plume. Then, suddenly, the rosy cap would pale to nothing as a violent spasm shot sprays of white-hot lava high into the dark sky to fall as incandescent showers.

Spellbound, we would gaze upward in awe to see sparklets and plummeting fireballs fall back to hiss and quench in snow and ice, leaving the aloof cone agleam in pale light of stars and fading lava.

With Kodachrome Film in your miniature camera you get this

Double Reward

1. brilliant screen projection of your Kodachrome pictures . . . finished as color slides without extra charge

2. gorgeous Kodachrome Prints made to order . . . in the reasonably priced 2X size shown, or in larger sizes

Breath-taking beauty in the *full-color* pictures you can easily take! Just load a miniature camera having *f*/6.3 lens or better with Kodachrome Film. The cameras and projectors described below are all *quality* instruments. See them at your Kodak dealer's.

Kodak Flash Bantam *f*/4.5 Camera—Palm-size miniature big in ability. 4 shutter speeds to 1/200. $49.50, including Federal Tax.

Kodak 35 Camera with range finder—Lumenized *f*/3.5 lens, 5 shutter speeds to 1/200. $86.75, including Federal Tax.

Kodaslide Projector, Model 1A—For big, brilliant images. $27.50. Other Kodaslide Projectors, $47.50 up. Illustrated above—*Master Model.*

Kodaslide Table Viewer—Holds 75 color slides, projects them on built-in screen. $95.

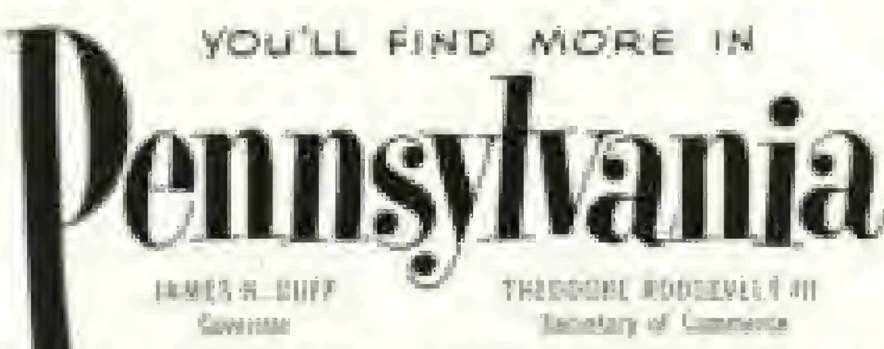
Eastman Kodak Company, Rochester 4, N. Y.

It's Kodak for Color

Kodak
TRADE MARK

The postman doesn't have to ring twice when folks are waiting for the new booklet with all the facts about Pennsylvania vacations.

Vacation in Pennsylvania is a real family affair. It's not one thing to remember; it's several. Beautiful mountains. Lush farm land. Millions of acres of forests. Hunting and fishing that are famous throughout the East. Clean, comfortable resorts for every budget. Swimming, boating, tennis, golf, hiking, riding. Historic spots like Gettysburg and Valley Forge. They're all within easy reach over Pennsylvania highways. *Plus* the picturesque old-time customs of the Amish, Mennonites, and other plain sects.



PENNSYLVANIA DEPARTMENT OF COMMERCE
SUITE 301, HARRISBURG, PA.

I want to know more about Pennsylvania Vacation Lands. Please send me your new, free booklet.

Name ______________________

Address ______________________

City __________ Zone ______ State __________

I'M VERY **DEAF** BUT I **HEAR**

Everything with My New

ZENITH® "MINIATURE" HEARING AID

Don't let deafness kill the joys of living. Let a Zenith home trial prove you, too, can even hear a whisper. Here's Zenith's amazing guarantee—if any $200.00 hearing aid outperforms Zenith's newest, tiny, 6¾ oz. single-unit "Miniature" Radionic Hearing Aid in efficiency or economy, your *money back*—under our 10-Day Return Privilege. Only $75.00 complete, ready to wear. For authorized Zenith Hearing Aid Dealer in your locality, consult your classified telephone book; or write us for complete coast-to-coast dealer list. Free descriptive literature on request. Address—

Zenith Radio Corporation, Hearing Aid Division
Dept. 164, 5801 W. Dickens Ave., Chicago 39, Ill.

Makers of World Famous Zenith Radio, FM and Television Sets

NATIONAL GEOGRAPHIC BOOKLETS
Beautifully Color-illustrated

The British Way: Forty-eight pages of British historical paintings in FULL COLOR and an article by Sir Evelyn Wrench, reprinted from the April, 1949, NATIONAL GEOGRAPHIC, portray Britain's gifts to freedom, democracy, science, and society.

Also included are a richly decorated, 26½ x 32½-inch wall map of the British Isles in ten colors; an article by Gilbert Grosvenor on this valuable map supplement; and an article by Franklin L. Fisher on the paintings. This 132-page booklet will be prized for its beauty, interest, and permanent educational value. Gray paper covers; 7 x 10 inches. 75¢ in U. S. and Possessions. Elsewhere, 85¢.

Shells Take You Over World Horizons: This exquisite shell presentation, as featured in the July, 1949, NATIONAL GEOGRAPHIC, is now available as a separate reprint. In 32 FULL-COLOR pages, an incomparable series of 41 Kodachromes by Rutherford Platt presents and identifies hundreds of shells of land and sea, showing their varied shapes and glistening color patterns in sharpest detail. An accompanying article by Mr. Platt with 16 monochrome illustrations reveals the magic of the shell world and some of its biological secrets. 52 pages; 7 x 10 inches. 50¢ in U. S. and elsewhere.

POSTPAID. OBTAINABLE ONLY FROM

NATIONAL GEOGRAPHIC SOCIETY
Dept. E-O, Washington 6, D. C.

The Fine Stationery in the Plain Box

American stationery is mailed to you in a plain, stout carton. There are no frills to the package. All the value is in the stationery itself—200 note sheets and 100 envelopes of crisp, white rag content bond paper—all printed with your name and address—for only $1.00! But simple packaging alone does not make this great value possible. It is also the result of specialized manufacture and 34 years of experience in making fine stationery inexpensive . . . Ideal for informal and household business correspondence. Try it!

Order in quantities as stated. No "split-package" orders accepted. Maximum printing—4 lines, 30 characters per line. Remit with order. West of Denver, Colo., and in U. S. possessions add 10% to prices (no foreign orders accepted). We pay postage. *Satisfaction guaranteed.*

THE AMERICAN STATIONERY COMPANY
300 PARK AVENUE • PERU, INDIANA

DeLuxe Package

For those who prefer *long* style sheets and envelopes in heavier paper. 125 sheets (6¾ x 10½) and 125 envelopes to match. Printed $2.00

Envelope Package

For those who need lots of envelopes for paying by check, etc. 200 envelopes only (envelopes as in Standard Package). Printed . $1.00

AMERICAN STATIONERY

Standard Package { 200 Note Sheets, 100 Envelopes — *Printed with Your Name and Address.* } $1.00

KEEP POSTED! FOLLOW WORLD EVENTS ON *NATIONAL GEOGRAPHIC* MAPS

National Geographic Society
Dept. E-O, Washington 6, D. C. ____________ 1950
Please send me items indicated below:

These ten-color maps come on either paper or linen. *Indexes are available for maps marked with asterisk.* All items are sent postage prepaid.	How Many Copies Desired		
	Paper Maps 50c each in U.S. & Poss. Elsewhere 75c each	Linen Maps $1 each in U.S. & Poss. Elsewhere $1.25 each	Indexes 25c each in U.S. & Poss. Elsewhere 50c each
Africa*			
Asia and Adjacent Areas*			
Atlantic Ocean			x
Australia*			
Bible Lands*		x	
British Isles*			
Canada, Alaska, Greenland*			
China*			
Classical Lands of Medit.*			
Countries of the Caribbean* (Mex., Cen. Am., & West Indies)			
E. & W. Hemispheres			x
Europe & Mediterranean* (Boundaries Jan. 1, 1938.)	x		
Europe and Near East*			
Central Europe & Medit.*			
Germany & Approaches*			
India & Burma*			
Indian Ocean			x
Japan & Adjacent Regions of Asia & Pacific Ocean*			
Japan & Korea in detail*			
North America*			
No. & So. Hemispheres*			
Pacific & Bay of Bengal*			
Pacific Ocean* (With 73 Island Insets.)			
Philippines*			
South America*		x	
Southeast Asia*			
Top of the World*			
The World*			
U.S.S.R. (Russia)*			
Pocket Map of Central & Suburban Wash., D. C.			Index printed on Map
United States—1946*			
North Central U. S.*			
Northeast United States*			
Northwest United States		x	x
South Central U. S.*			
Southeast United States*			
Southwest United States*			

X in columns above indicates item is NOT available. Paper maps are folded for convenient filing. Linen maps come rolled.

Also ___ copies Map Case, $2.50 in U. S. & Poss.; elsewhere, $2.75.

ENLARGED MAPS On Heavy Chart Paper	How Many Copies Desired	
	Maps $2 each in U. S. & Poss. Elsewhere $2.25	Indexes 25c each in U. S. & Poss. Elsewhere 50c
Bible Lands*		
United States*		
The World*		
No. & So. Hemispheres*		

Enlarged Maps are mailed rolled to U. S. and Possessions. Postal regulations necessitate folding these maps for mailing to all other places.

I enclose remittance of $______ payable in U. S. funds

Name ______________________

Address ______________________

Ten-color series includes new map of Mediterranean Area

THE National Geographic Society's maps cover the world. Just published is a valuable new map of Classical Lands of the Mediterranean, 32 x 22 inches, a companion to the map of Bible Lands. By completing your collection of The Society's maps you can build up at minimum cost a unique map library unsurpassed for timeliness and reference value! Because The Society's spelling is followed by major press associations, all place names in today's news are easily found on these legible *ten-color charts.*

MAP INDEXES: Available for maps marked with an asterisk (*) in the adjoining order blank, these Indexes make easy the location of names on corresponding maps and describe the areas covered.

MAP CASE: This handy 7¾ x 10¾-inch file, bound like a book, preserves maps for instant use. Ten pockets can hold 20 *folded paper* maps of *standard* sizes or 10 *folded paper* maps with Indexes.

Enlarged Maps

BIBLE LANDS—64½" x 44½": Bible and classical students and teachers will welcome this *ten-color enlargement* of the timely map issued with the December, 1946, NATIONAL GEOGRAPHIC MAGAZINE. This legible map shows principal railroads, oil pipe lines, roads, ancient sites, 248 historical notes and references, 5,779 place names. Insets feature the Holy Land today and in Biblical times, Jerusalem, Crusades, routes of the Exodus and of Saint Paul.

UNITED STATES—67" x 43½": A superb *ten-color enlargement* of The Society's 1946 U. S. Map. This companion to the World Map listed below shows main highways, national parks and monuments, large dams and the reservoirs they create, canals, elevations, 10,750 place names. Special inset features Canadian Provinces east of Maine.

THE WORLD—67" x 43½": Using Van der Grinten's projection, this *enlarged ten-color* map portrays the earth in one unified picture. Insets feature polar regions, spread of 1st and 2nd World Wars. Shows main railroads, time zones, 4,874 place names, elevations and depths, international boundaries as of Sept. 1, 1939.

NO. and SO. HEMISPHERES—67" x 35½": Visualizes short cuts by air across polar regions. Airline tables give 924 great-circle distances. Insets show time zones, deserts, farmland, forests, arctic tundra, etc. 4,262 place names. A useful, *ten-color enlargement.*

PRICES: Please refer to coupon for separate prices in "U. S. & Poss." and "Elsewhere." Remittances should be payable in U. S. Funds. All items sent postage prepaid.

Obtainable only from the NATIONAL GEOGRAPHIC SOCIETY, Dept. E-O, Washington 6, D. C.

Judd & Detweiler, Inc.

(Established in 1868)

Printers

ECKINGTON PLACE AND FLORIDA AVENUE
WASHINGTON, D. C.

THIS MAGAZINE IS OUR INDORSEMENT

FLORIDA KEYS BECKON

Drive the Overseas Highway from Miami to Key West . . . .

Along 150 miles of gleaming highway, these friendly island stepping-stones invite you to loaf and play. Excellent accommodations and ample campsites en route. Sunny climate, cooled by ocean breezes. Unexcelled fishing in both the Atlantic and the Gulf of Mexico, from bridges, beaches and boats. For illustrated booklet address:

Overseas Road and Toll Bridge District, Dept. G,
Marathon, Florida

Follow The OCEAN HIWAY

Pines to Palms

Going South!

NEW YORK TO FLORIDA
FASTEST & SAFEST
Avoid Dangers of Big City Traffic Congestion.
FREE 1950 MAP FOLDER
• Postpaid by Return Mail •
INCLUDES MAP OF FLORIDA
FOR ONLY 35 CENTS WE WILL SEND, POSTPAID, THE NEW "PENINSULA PETE" ILLUSTRATED 80-PAGE GUIDE BOOK OF THE OCEAN HIWAY.

OCEAN HIWAY ASSOC. — DEPT. N — P. O. BOX 1552 — WILMINGTON, DELAWARE

PLEASE FILL IN BLANK BELOW, DETACH, AND MAIL TO THE SECRETARY

Recommendation for Membership

IN THE

NATIONAL GEOGRAPHIC SOCIETY

** The Membership Dues, Which Are for the Calendar Year, Include Subscription to the National Geographic Magazine*

To the Secretary, National Geographic Society,
Sixteenth and M Streets Northwest, Washington 6, D. C.: ____________1950

I nominate ______________________________
PRINT NAME OF NOMINEE

Occupation ______________________________
(This information is important for the records)

Address ______________________________
PRINT ADDRESS OF NOMINEE

______________________________ *for membership in The Society.*

Name of nominating member ______________________________
PLEASE PRINT

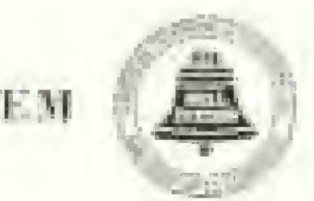
Address ______________________________

* DUES: Annual membership in United States, $4.00; Canada, $5.00; abroad, $5.00. Life Membership, $100.00 U. S. funds. Remittances should be payable to National Geographic Society. Remittances from outside of continental United States and Canada should be made by New York draft or international money order.

1-50

BIG VALUE AT LOW COST

The telephone is a big bargain in security, convenience and
good times for every member of the family.
Just in the steps it saves, it more than pays for itself. Its value in emergencies
is often beyond price. Day and night, every day, the telephone
is at your service. And the cost is only pennies per call.

BELL TELEPHONE SYSTEM 

In the islands and at sea... hospitality reigns

Cruise to Hawaii on the new Lurline

Relaxing in the Pacific sun is just one pleasant pastime aboard the Lurline—loveliest ship afloat. You'll also play deck games, swim, dance, meet new friends, see movies, go to concerts.

You'll enjoy splendid service and dine superbly. For Matson knows the true spirit of Island hospitality. Let your travel agent help you plan the finest cruise anywhere—to Hawaii on the Lurline.

Matson Line Offices: *New York* · *Chicago* · *San Francisco*
Los Angeles · *Seattle* · *Portland* · *San Diego* · *Honolulu*

Matson

San Francisco and Los Angeles TO HAWAII

All delicious...all genuine

HORMEL HAM

HORMEL
GOOD FOOD

WHOLE . . . skinned, boned, cooked in the can . . . 6¾ pounds and every bit good to eat, *mighty* good.

Geo. A. Hormel & Co., Austin, Minn.

QUARTER . . . just right for family dinner —enough tender, delicious meat to serve four. 1½ pounds.

CHOPPED . . . bite-size chunks compressed in a 12-ounce loaf. Slice for cold cuts, sandwiches or frying, or bake whole.

DEVILED . . . smooth, spicy spread for sandwiches, canapes, salads. Special Hormel recipe makes it extra special.