VOLUME CVII NUMBER THREE

THE NATIONAL GEOGRAPHIC MAGAZINE

MARCH, 1955

Ten-Color Supplement Map of Eastern South America

Seventy-two Pages of Illustrations in Color

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

$6.50 A YEAR 65c THE COPY

NATIONAL GEOGRAPHIC SOCIETY

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

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

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

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

In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus. By dating the ruins of vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for 300 years.

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

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

A notable undertaking in astronomy was launched in 1949 by The Society and Palomar Observatory of the California Institute of Technology. This project is photomapping the vast reaches of space and will provide observatories all over the world with the most extensive sky atlas yet made.

In 1948 The Society sent seven expeditions to study the sun's eclipse on a 5,320-mile arc from Burma to the Aleutians.

A Greek cargo ship sunk in the Mediterranean 2,500 years ago was found in 1952 and is being excavated by the National Geographic Society–Calypso Marine Archeological Expedition led by Capt. J.-Y. Cousteau of the French Navy.

The National Geographic Society and the Royal Ontario Museum in 1951 explored and measured newly found Chubb meteor crater, 11,500 feet in diameter, in northern Quebec.

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

One of the 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 in 1938.

Spectacular-from Take-off to Top Performance!

THE STAR CHIEF CUSTOM CATALINA

Once upon a time a man declared that, except for a difference in looks and size, cars were very much alike. He's a changed man today and here's why: *He took a ride behind Pontiac's fabulous all-new Strato-Streak V-8!*

He instantly learned, as you will, that *Pontiac* performance is spectacularly different—brilliantly better in every wonderful way. And there's a very solid reason for Pontiac's special thrills. We not only created an all-new engine, we surrounded it with an entirely new car!

We balanced the terrific drive of Strato-Streak V-8 power with bigger, fast-action brakes. We matched sensational Strato-Streak response with ease of control that is next to automatic driving. And we duplicated its fabulous smoothness and silence in the quiet, cradled ride from an extra-long wheelbase and shock-proof chassis.

That's just a highlight picture, but it suggests why you ought to drive this car. All three lines of Pontiacs—including the many models priced near the very lowest—produce all-around performance like you never knew before.

See your Pontiac dealer and discover how little it costs to change to modern motoring.

PONTIAC MOTOR DIVISION OF GENERAL MOTORS CORPORATION

SEE THE RED BUTTONS SHOW, FRIDAYS—NBC-TV

Add Pontiac power controls—Dual-Range Hydra Matic Drive, Power Brakes and Power Steering—at moderate extra cost to Pontiac's Strato-Streak V-8 power, and you'll have a combination that won't be topped for handling ease and performance.

Pontiac

STRATO-STREAK V-8

FOR Your Protection

Just as you check your car at intervals for safety, your insurance protection should be checked frequently, too. Your insurance may be your most valuable asset—a bulwark against the loss of all you own.

So after checking the above items, if you need advice or assistance, consult with a competent agent or broker. He can make sure that you have proper insurance protection—and you can rely on him to help you safeguard your financial security.

Premiums can now be paid monthly, quarterly, semi-annually or annually. Ask the America Fore agent about this plan.

To reach an agent of the **America Fore INSURANCE GROUP** *call Western Union—Ask for Operator 25*

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

THE CHAIR THAT'S TEACHING AMERICA HOW TO

RELAX

What's different about the BarcaLounger reclining chair? It's a chair you'll find in the finest homes in America. But it wasn't just built for looks or style. It's the first chair scientifically designed from the inside out for *relaxation.*

Just sit down, lean back, and let the BarcaLounger's exclusive "Floating Comfort" take over. Back-rest, seat, and leg-rest are co-ordinated to cradle your body *automatically* in any position from sitting to reclining.

Nowhere else can you find so much comfort in such a handsome, hand-made chair. It's an adventure in relaxation! Write for FREE booklets and name of nearest dealer. Barcalo Manufacturing Company, Dept. C-3, Buffalo, New York.

Sizes and styles to fit almost everyone.

LOOK UNDER THE FOOT-REST FOR THE NAME...

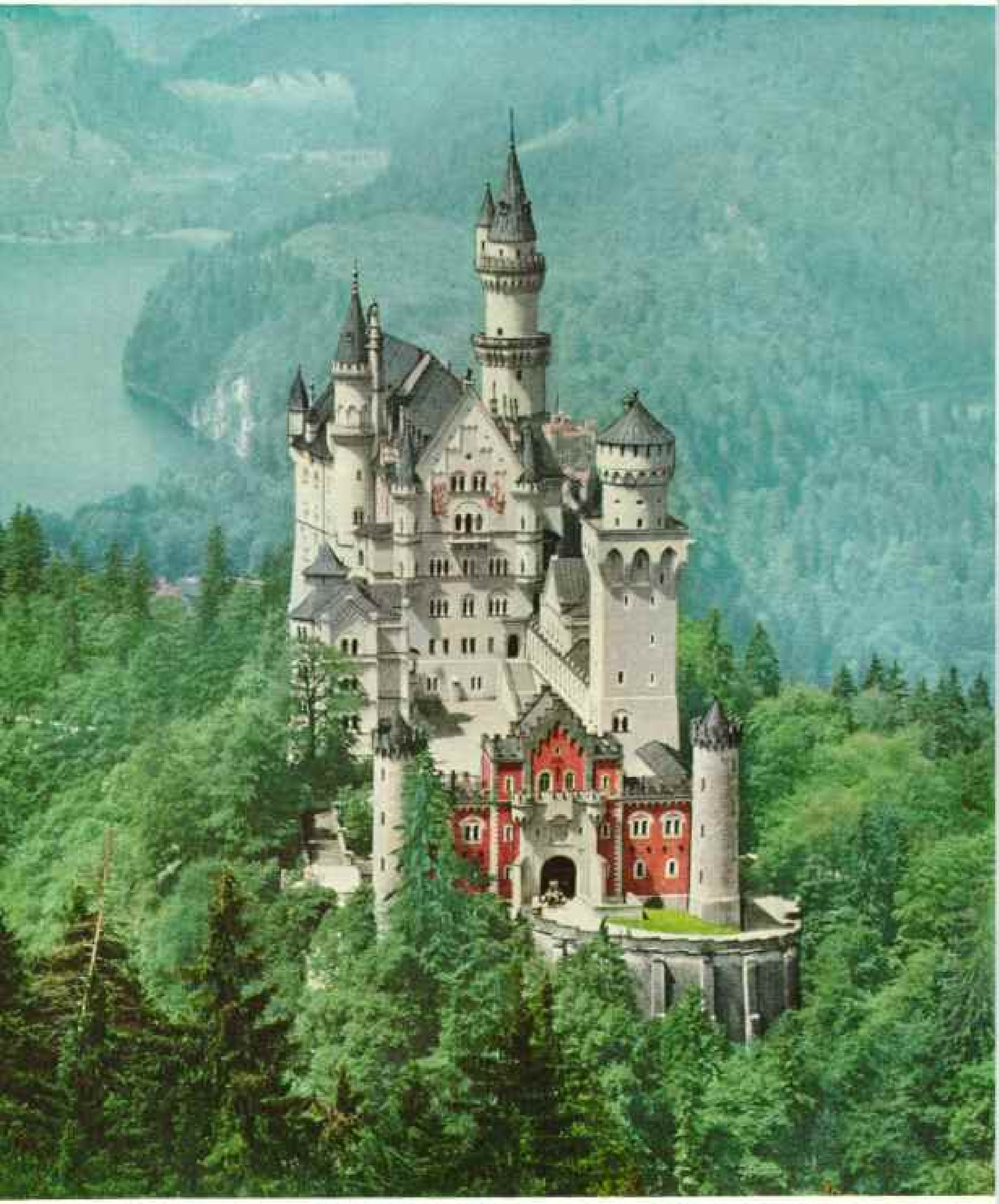
BarcaLounger

Model 520 modern. Lime green nubby weave fabric with interwoven threads of Lurex and cocoa brown. One of many beautiful coverings.

Model W261-5-1 (large photo) covered in rose beige nylon frieze. Head pillow flips back when not in use.

Same chair in sitting position, with head pillow out of sight. Fabrics, leathers, plastics to go with any room in the house!

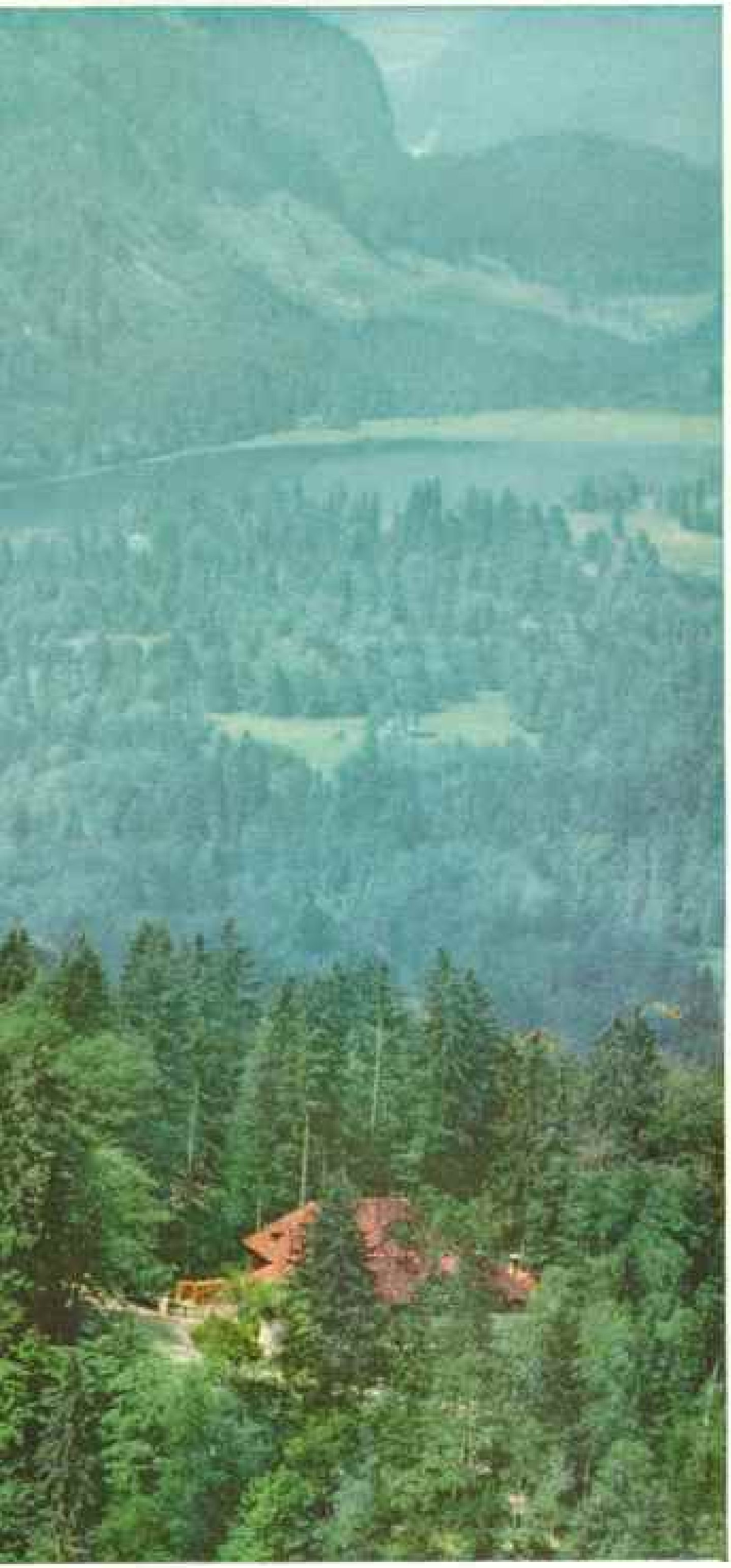
In every man's heart there's a



Could this be your secret place? Is it in Europe, South America or Asia? Get the answer by writing in for your *free* full-color reproduction of this remarkable photograph, size 17" x 11", suitable for framing. "Secret" places like this abound on the routes of Pan American. Write Box 1111, New York 17, N. Y. Dept. GO.

More people

Secret place he would like to go



And now you can go—anywhere—on the new, original Pan Am "Pay-Later" Plan

● *Wherever the secret place is* that has long whispered to your heart, you can visit it *now*. For Pan American World Airways has removed the last two barriers that kept you and your "secret place" apart—(1) it took TOO LONG to get there, (2) TOO MUCH CASH.

There's no more "TOO LONG"! No city in Europe is more than overnight by Clipper*—no place in the world is over 40 hours away.

There's no more "TOO MUCH CASH"! With the Pan Am "Pay-Later" Plan you can put only a few dollars down—*and go!*

The box below shows the facts. The key that opens the door to your "secret place" is as near as your Pan American Travel Agent or Pan American office. One visit. No collateral needed.

*Trade-Mark, Reg. U. S. Pat. Off.

FLY THERE NOW—PAY LATER!

Typical Round Trips	Minimum Down Payment	20 Monthly Payments
Havana or Nassau from Miami	$ 4.30	$ 6.18 (6 payments only)
Mexico City from Houston	8.30	6.36 (12 payments only)
Bermuda from New York or Boston	10.00	5.36
Juneau, Alaska, from Seattle	11.00	5.96
San Juan from New York	13.00	6.90
Guatemala City from New Orleans	13.40	7.38
Hawaii from West Coast Cities	25.00	13.50
London from New York	43.00†	22.80†
Lisbon from New York	43.80†	23.52†
Paris from New York	47.00†	24.84†
Rome from New York	55.40†	29.76†
Rio de Janeiro from New York	73.00	39.00
Istanbul from New York	73.80†	39.24†
Tokyo from West Coast Cities	88.40	47.40

† "Thrift Season" fares good through March 31. U. S. tax on fare, where applicable, collected at time of down payment.

fly overseas by PAN AMERICAN

WORLD'S MOST EXPERIENCED AIRLINE

4 GREAT NEW TV STARS FROM $129.95

lo-boys again set the style with new narrow look...

Low picture for natural-angle viewing

FOUR new models with the smart low look. Handsome TV for any wall space—any decor. Stand-up tuning, reading-angle viewing, new low prices!

G-E Ultra-Vision voted best 7 to 1 by 108,792 shoppers

Best in *all* areas—city and country. UHF and VHF! Best in actual side-by-side showdowns with leading makes. Only G.E. makes Ultra-Vision!

Blonde Lo-Boy. The low look in new version at new low price! 21C152.

Low, wide and handsome mahogany Lo-Boy. Full doors, shelves! 21C156.

pacers ...lowest prices ever on G-E TV

As low as $129.95 for a G-E Pacer. With plus quality features G.E. alone offers at these low prices. Shallower cabinets (table models actually fit into shelves).

New round-the-room wide-angle viewing. New longer life for tubes — less service. Packed with G-E power and performance... Dynapower speaker. Two-way interference protection. See! Compare! General Electric Co., Radio & Television Dept., Syracuse, New York.

Prices include Fed. Excise tax, one-year warranty on picture tube, 90 days on parts. VHF/UHF models and bases for table models at slight additional cost. Prices subject to change without notice.

General Electric Comedy Theatre Presents
"THE RAY MILLAND SHOW"
Television—CBS—Weekly

Value! Full 17-inch picture out-in-front for wide-angle viewing. Shelf-size, saves space. 17T21 only $129.95.

Now—a smart low-priced blonde-oak TV console. Packed with performance features. Ask for Model 21C108.

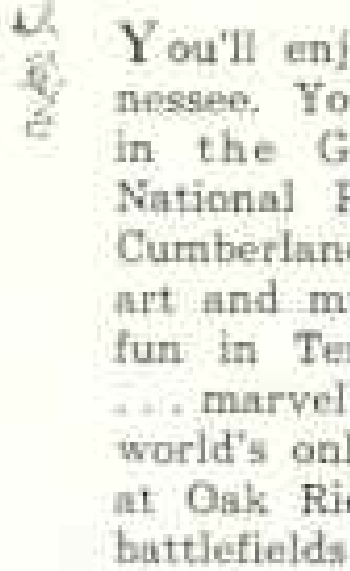
Progress Is Our Most Important Product

GENERAL ELECTRIC

this year ... see Tennessee

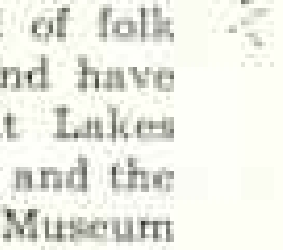
Homes of 3 Presidents
Great Smoky Mountains
19 Great Lakes . . .
wonderful fishing . . .

You'll enjoy every moment in Tennessee. You'll climb above the clouds in the Great Smoky Mountains National Park . . . see the ancient Cumberlands, last stronghold of folk art and music. You'll fish and have fun in Tennessee's 19 Great Lakes . . . marvel at vast TVA dams and the world's only Atomic Energy Museum at Oak Ridge. You'll visit hallowed battlefields and the homes of Presidents Jackson, Johnson and Polk . . . thrill at cotton plantations along the Mississippi . . . Yes, for the perfect vacation, this year SEE TENNESSEE.



Mail Coupon today

FOR **FREE** COLOR BOOK



Tennessee Division
of Information
1247 Cordell Hull Bldg., Nashville, Tenn.
Please send FREE Color Book

NAME _____

ADDRESS _____

CITY & STATE _____

Built to keep Americans out of Canada

Ontario's historic forts were built in bygone years as defense against invasion from the United States! But today, with our two nations so friendly, American visitors find the forts and their museums fascinating attractions!

IN ONTARIO
EVERYONE FINDS FUN

So much to do—sports! touring! shopping! So much to see—historic sites! unspoiled scenery! restful villages and bustling cities! All distinctively Canadian! All so easy-to-reach! Come to uncrowded Ontario for a perfect family vacation—just across the Great Lakes! Send the coupon—today.

TRAVEL TIPS

- Liberal U.S. customs exemptions on fine Canadian and British goods.
- Good food and accommodation.
- More miles of toll-free highways than any State in the Union.

ONTARIO

Canada's
Vacation Playground

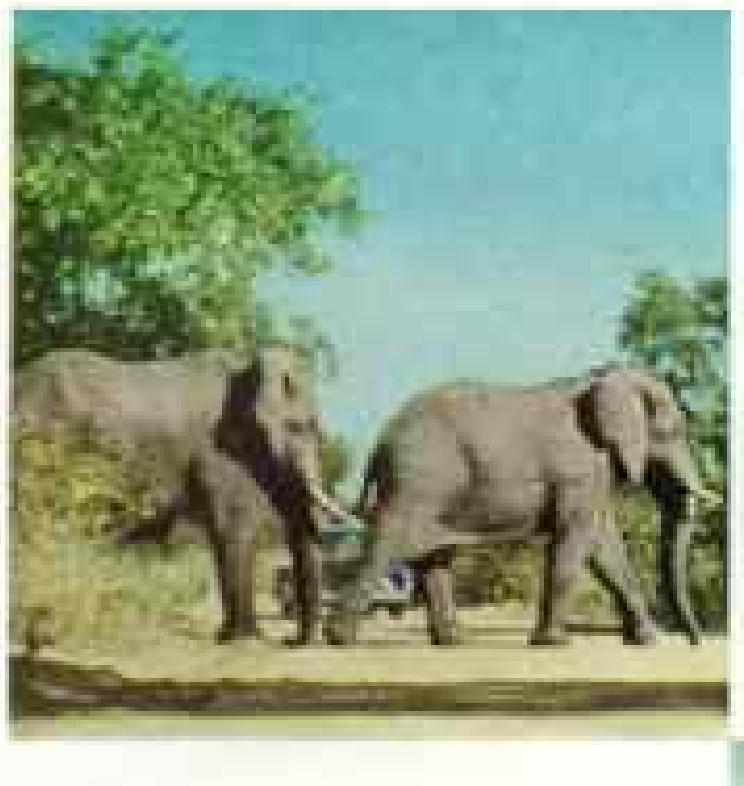
Denise McDonald, Ontario Travel Hostess,
Room 71, Parliament Bldgs., Toronto 2, Ont.

Please send me free literature about Ontario vacations.

NAME _____

STREET _____

CITY _____ STATE _____
PLEASE PRINT



LAND OF CONTRAST

Here, in their glorious natural colors, are some of the sights to be seen in South Africa. Now . . . it's **your** move! Swiftly by air, leisurely by sea, to the land of yesterday, today and tomorrow, where the age-old mysteries of Africa blend in colorful contrast with the wonders of the modern world.

Be sure to bring your camera—great herds of wild game in the Kruger National Park, exotic native dances in the kraals of Zululand, the splendor of beautiful cities like Cape Town, Durban and Johannesburg are but a few of the scenes you will want to capture forever.

Write Dept. C, South African Tourist Corporation, for detailed information and descriptive literature . . . then book your trip to South Africa with your Travel Agent.

SOUTH AFRICA

SOUTH AFRICAN TOURIST CORPORATION
475 Fifth Avenue, New York 17, N. Y.

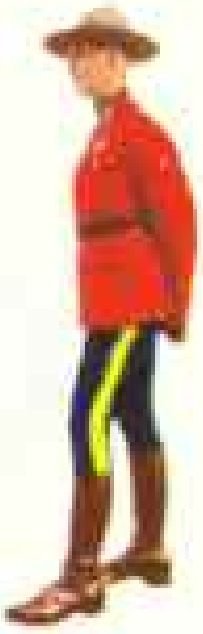
Golfing can be more fun on "fresh" courses —there's a superb selection in Canada.

Riding is just one of the grand summer sports "all hands" will enjoy in Canada.

There's room to relax in uncrowded

CANADA

VACATIONS UNLIMITED



Picture the place and pace that *you* prefer for a holiday—find them in *uncrowded* Canada. Here are a million square miles of magnificent playground ...mountains, seacoasts, lakelands, National Parks, colourful cities. Here you can swim, sail, fish, cruise, hike in settings of vivid natural beauty... here you can rest at congenial resort or scenic campsite, take leisurely tours through historic towns. No pass-port needed. See your travel or transportation agent soon; send the coupon now.

01-1-13-55-02

CANADIAN GOVERNMENT TRAVEL BUREAU,
OTTAWA, CANADA

Please send your NEW 48-page, full-colour book on vacation attractions in all parts of Canada.

Name _____
(PLEASE PRINT)

Address _____

Town _____ *State* _____

YOU'LL BE *Surprised*

when you take your first trip aboard the Vista-Dome California Zephyr . . . the most talked-about train in the country!

You'll be amazed by the many unusual features provided by the California Zephyr to make your trip comfortable and enjoyable. For instance, all private rooms...drawing rooms, compartments, bedrooms and roomettes...have individual controls for lighting, heating, air conditioning, radio or recorded music.

You'll be overwhelmed by the hundreds and hundreds of miles of magnificent mountain scenery you'll see from the Vista-Domes *during daylight hours.* From Denver to Grand Junction...for 275 breathtaking miles...you ride through the very heart of the mighty Colorado Rockies. And crossing the High Sierra into California, you travel the entire length of Feather River Canyon!

You'll be astonished by the spaciousness of the California Zephyr. The 120 seats upstairs in the *five* glass-enclosed Vista-Domes are not sold, not reserved. This is *extra* space for the enjoyment of both Chair Coach and Pullman passengers. What's more, there are *two* Lounge Cars as well as the Diner. There's room to roam!

You'll be surprised by the unique system of dinner reservations in the Dining Car. There's no waiting in line; you reserve your table *in advance!* And the reasonable prices in the Diner, which features such Western delicacies as mountain brook trout, Crab Louie and abalone steaks, are another pleasant surprise!

THE VISTA-DOME *California Zephyr*

DAILY BETWEEN CHICAGO AND SAN FRANCISCO

via Denver and Salt Lake City on the Burlington, Rio Grande and Western Pacific Railroads

(Through Pullman daily between New York and San Francisco)

Include Southern California via San Francisco without additional rail fare!

WESTERN PACIFIC

For colorful California Zephyr booklet, write Joseph G. Wheeler, Passenger Traffic Manager, Western Pacific, 526 Mission St., San Francisco 5, California

This is the Dictabelt *record*...

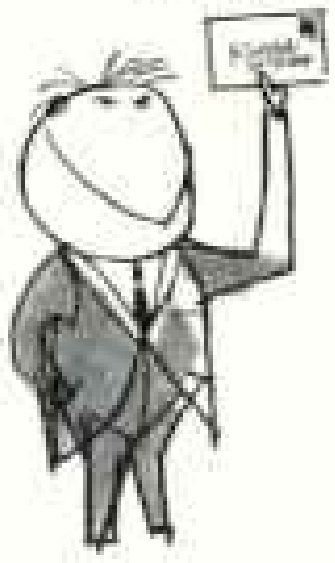
secret of the <u>one</u> dictating machine known and used the world around: the Dictaphone TIME-MASTER

crystal-clear...

unbreakable...

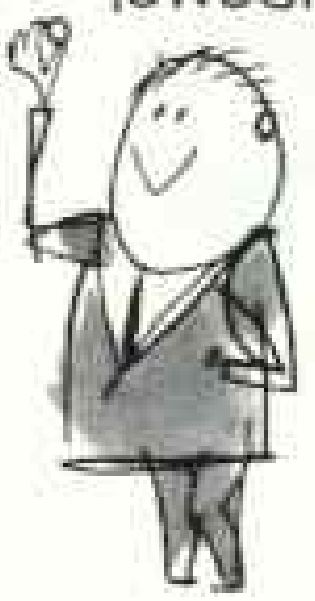
filable...

mailable...



post card size...

lowest cost...



Mail the coupon to learn how the Dictabelt record can help you express yourself faster and better --double your capacity to get things done!

DICTAPHONE® CORPORATION Dept. H-35, 420 Lexington Ave., New York 17, N.Y.

☐ Please send a free *Dictabelt* record and my copy of the new, 12-page illustrated booklet *Success*.

☐ Please contact me to arrange a TIME-MASTER dictating machine demonstration with no obligation implied.

NAME .....

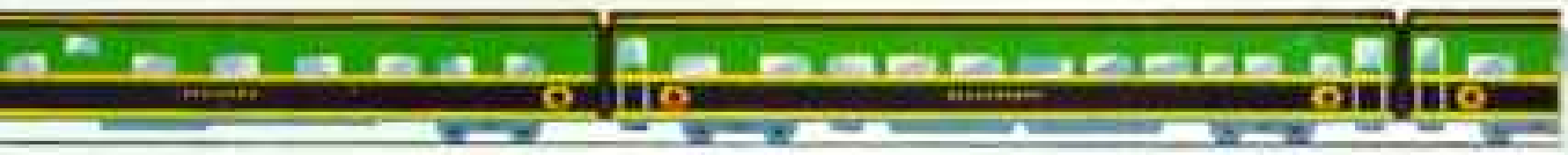
STREET .....

CITY & ZONE ..... STATE .....

Dictaphone, Time-Master and Dictabelt are Reg. Trade Marks of Dictaphone Corp.

Enjoy one of

Canadian Nationals'



10 Top

MAPLE LEAF VACATIONS

CNR's modern compartments provide the utmost in comfort and convenience.

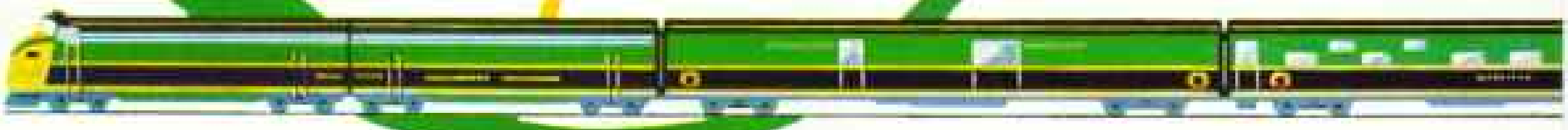
Here's a peaceful, pleasant world—Cape Breton, N.S. Canada's Provinces-by-the Sea.

You'll feel at home in the congenial atmosphere of CNR's smart new lounge cars.

See Pacific Coast cities and sights . . . Vancouver (above); regal Victoria.

JASPER PARK, Showplace of the Canadian Rockies. Lovely Maligne Lake, favorite of visitors to famed Jasper Park Lodge.

anada



This year, Canadian National Railways' famous Ten Top Maple Leaf Vacations are better than ever! That's because Canadian National now operates a magnificent new fleet of passenger cars, providing luxurious, efficient service to everywhere in Canada. CNR offers a complete range of first-class and coach accommodations to suit your needs, to fit *your* budget. So treat yourself to a Canadian National Maple Leaf Vacation—it's the best way to see the best of Canada!

CANADIAN NATIONAL RAILWAYS

The Only Railway Serving all 10 Provinces of Canada.

TEN VACATION CHOICES!

1. The Scenic Route Across Canada
2. **Alaska Cruise** via the Inside Passage
3. **British Columbia** "Triangle Tour"
4. **Jasper** in the Canadian Rockies
5. Sub-Arctic **Hudson Bay** Tour
6. **Lake-of-the-Woods** District (Minaki, Ont.)
7. **Highlands of Ontario**
8. **Eastern Cities** and the **Laurentians**
9. **Romantic French Canada**
10. **Provinces-by-the-Sea**

Start planning now! Canadian National will package a personal tour to include desired stopovers and side trips. Ask about money-saving Family Plan Fares. Canadian National Offices in principal U.S. cities. Or see your Travel Agent. Canadian National Railways, 105 West Adams St., Chicago 3, Ill.

YOU'LL REMEMBER OREGON!

Here's one of the scenic settings for you to enjoy on your Oregon vacation. It's in the Cascade Mountains of Central Oregon. That's forest-clad Mt. Jefferson in the background, and the river is the crystal-clear Metolius. We'd like also to show you the spectacular grandeur of this state's many other *kinds* of recreation areas—and we'll do so, if you'll send the coupon for our *free* color booklet, "Oregon, Cool Green Vacationland."

Travel Information, Room 85, State Highway Dept., Salem, Oregon
Please send free booklet to:

Name_____ Address_____

City_____ Zone____ State_____

See All of Oregon by driving scenic highways

This Newest Electronic Development BY COMPTOMETER

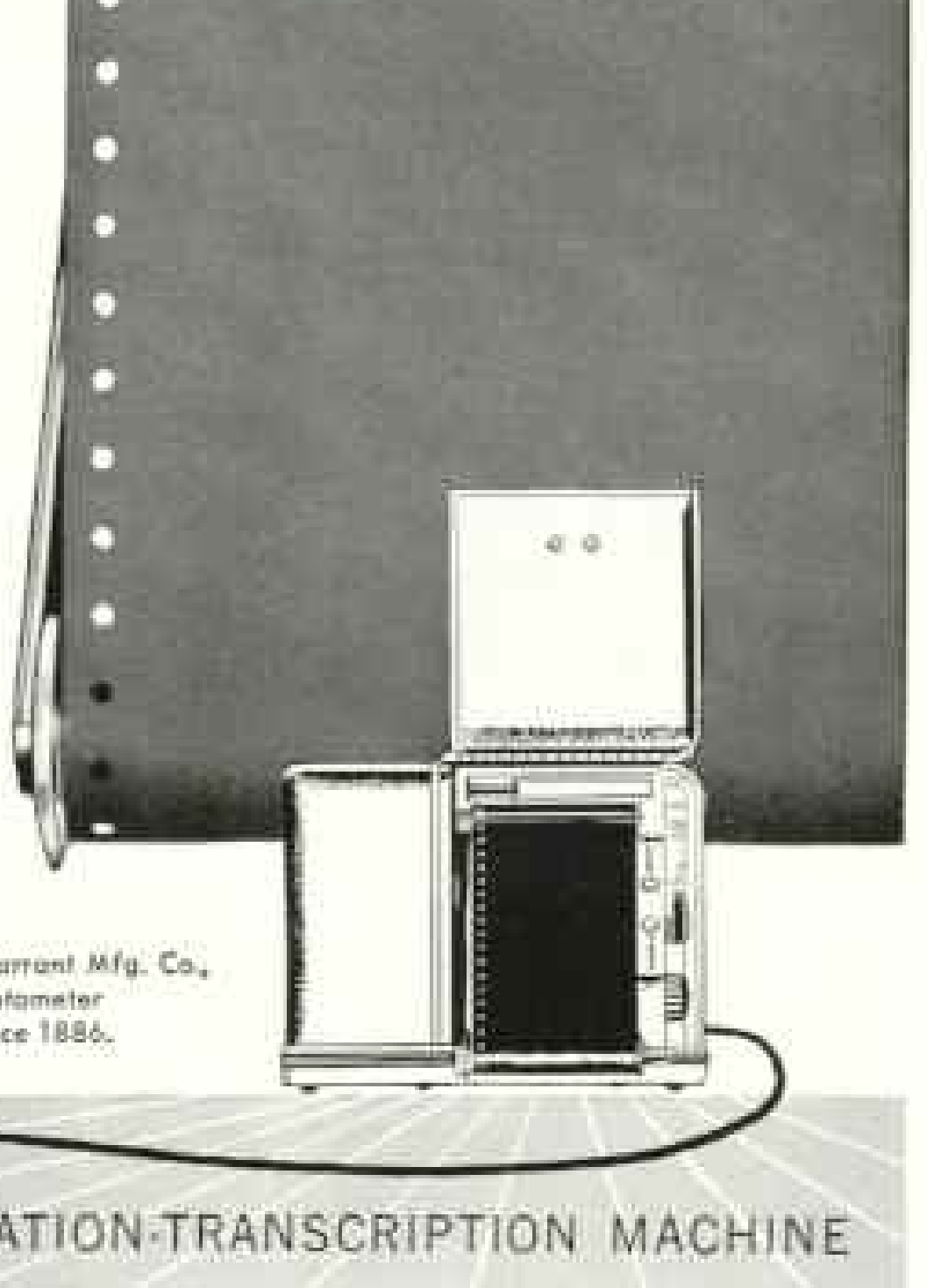
offers you Cost-Free Error-Free Dictation

with matchless

SIMPLICITY

OF OPERATION

Announcing a revolutionary new dictation machine that pays for itself as you enjoy years of the finest, high fidelity, magnetic dictation. No expensive discs, cylinders, tapes or records to buy. You save each time you use the same lifetime guaranteed Erase-O-Matic belt. Use it thousands of times—it's guaranteed never to wear out. Dictating is as natural and easy as talking. Errors are 'erased' automatically. The letters you dictate are so error-free, so easy to understand, because of the high fidelity voice reproduction, that it makes *any* typist a secretary. Here truly, is America's newest and finest dictation-transcription machine with economy features that now bring high fidelity dictation within the means of every business. Mail coupon for complete information on this newest compact electronic achievement by Comptometer.



Another quality product by Felt and Tarrant Mfg. Co., makers of World Famous Comptometer Adding-Calculating machines since 1886.

Comptometer® DICTATION-TRANSCRIPTION MACHINE

WRITE FOR COMPLETE FACTS and FREE TRIAL

COMPTOMETER Dictation Division
Felt & Tarrant Mfg. Co., 1710 N. Paulina St., Chicago 22, Ill.

Gentlemen: We are interested in the new Comptometer Office Dictation-Transcription Machine with the Lifetime Guaranteed Erase-O-Matic Recording Belt. Without cost or obligation:

☐ Please send Complete Information ☐ Arrange for a Demonstration ☐ Arrange for a Free Office Trial

Name_____ Title_____

Company_____

Address_____

City_____ County_____ State_____

Here's the new, clean way to make copies

It's AZOGRAPH—a patented, low-cost way to produce copies and—for the first time—a process that is completely clean from start to finish.

Mail coupon for demonstration and/or information.

A·B·DICK

THE FIRST NAME IN DUPLICATING

A. B. DICK and AZOGRAPH are registered trademarks of A. B. Dick Company

A. B. DICK COMPANY
5700 Touhy Avenue, Chicago 31, Illinois

NG-[illegible]

Without obligation—

☐ Arrange demonstration of AZOGRAPH duplicator

☐ Send information about AZOGRAPH duplicator

Name_____ Position_____

Organization_____

Address_____

City_____ State_____

GIRAFFE—lion—sable antelope—impala—a countless variety of wild game in its natural habitat—Kruger National Park—game which you can see and photograph safely from your car.

64 day SOUTHERN AFRICAN cruise

At sea . . . the utmost luxury in ocean travel! Land tours handled by American Express or Thos. Cook & Son. Ask your Travel Agent for our exciting new cruise booklet.

FARRELL LINES

26 Beaver St., New York 4 WHitehall 4-7460

CONTAX

Striking Pictures

With the famous Contax camera you'll get top-flight pictures under most difficult conditions—at speeds to 1/1250 sec. Auto-focusing range-finder assures ultra-sharp negatives—interchangeable Zeiss lenses, unlimited scope. Fully synchronized. Easy and simple to operate.

See the Contax—at leading dealers.

Write for literature.

Carl Zeiss, Inc., 485 Fifth Ave., New York 17

only TRAILWAYS *offers* THRU-BUS SERVICE *between these important cities*

Thru-liner service means no baggage transfers . . . no changing of buses en route . . . Passengers travel all the way in the same comfortable seat . . . in the same air-conditioned bus . . . AT THE SAME LOW FARES!

THE NATION'S ONLY COAST-TO-COAST THRU-BUS SYSTEM

NEW YORK-CHICAGO-SAN FRANCISCO
NEW YORK < RALEIGH / CHARLOTTE > TAMPA
NEW YORK-CHARLOTTE-ATLANTA
NEW YORK-GREENSBORO-ASHEVILLE
NEW YORK-NORFOLK-WILMINGTON
NEW YORK-RICHMOND-RALEIGH
NEW YORK-ST. LOUIS-DALLAS
CHICAGO-KANSAS CITY-DALLAS
CHICAGO-KNOXVILLE-MIAMI
CHICAGO-MEMPHIS-BILOXI
CHICAGO-MEMPHIS-HOUSTON
CHICAGO-KNOXVILLE-CAMP LeJEUNE
CHICAGO-KNOXVILLE-RALEIGH
MEMPHIS-ROANOKE-NEW YORK
MEMPHIS-ATLANTA-MIAMI
MEMPHIS-ALBUQUERQUE-LOS ANGELES
MEMPHIS-ASHEVILLE < CAMP LeJEUNE / NORFOLK
DALLAS-AMARILLO-DENVER
DALLAS-MONTGOMERY-MIAMI
DALLAS-AUGUSTA-NORFOLK
DALLAS-ALBUQUERQUE-LOS ANGELES
DALLAS-SHREVEPORT-NEW ORLEANS
DALLAS-ATLANTA-NORFOLK
EL PASO-ALBUQUERQUE-DENVER
SALT LAKE CITY-ALBUQUERQUE-EL PASO
NORFOLK-WASHINGTON-SCRANTON

TRAILWAYS, Dept. NG35, 1013 14th St., N.W., Washington 5, D.C.
I am interested in a
☐ Trip ☐ Expense Paid Tour (check one)
FROM_____
TO_____
LEAVING DATE_____
NAME_____
STREET ADDRESS_____
CITY_____ STATE_____

Secretaries

1555

Gregg shorthand

Music Writing

9284

signature stub

General Writing

2668

all purpose—medium

Carbon Copies

9460

for salesmen
(also public counter use)

Students

1551

for school work

You

25 other point styles for every other kind and way of writing.

For easier more comfortable writing

CHOOSE the right point for the way you write . . . by number

Only the Esterbrook Fountain Pen gives you your choice of 30 *numbered* point styles so your Esterbrook can write your way exactly. Choose the point for your kind of writing today . . . at any pen counter.

TO SELECT OR REPLACE . . . HERE'S ALL YOU DO ▶

30 POINT STYLES

Esterbrook®

FOUNTAIN PEN

THE WORLD'S MOST PERSONAL FOUNTAIN PEN

FUN EVERY MINUTE!

— *that's your*
BURLINGTON ZEPHYR
Trip to

Colorful Colorado!

• A million vacation thrills await you in Colorful Colorado—mile-high Denver . . . Rocky Mountain National Park . . . Lookout Mountain . . . Mount Evans . . . Colorado Springs . . . Pike's Peak . . . Garden of the Gods. World-famed resorts . . . authentic dude ranches . . . mountain cabins and camp-sites—Colorado offers your choice, surrounded by scenes of snow-capped splendor. Colorado promises you the vacation of a lifetime . . . and Colorado keeps its promise!

RIDE THE ZEPHYRS between Chicago and Colorado

You'll admire the sleek streamlined beauty and smooth effortless speed of the famous **Denver Zephyr** and **Vista-Dome California Zephyr.** You'll enjoy the luxurious private rooms . . . thrifty de luxe chair coaches . . . distinctive meals . . . congenial lounge cars. And there's no extra fare on *any* Burlington train.

For helpful information, see your Ticket or Travel Agent . . . or mail the coupon.

Whether you travel independently or with a carefree Escorted Tour, you'll travel better "*via Burlington.*" (If you need an auto in Colorado . . . ask your ticket agent to reserve one.)

for illustrated **BOOKLET** *Mail Coupon TODAY!*

Ask about
MONEY-SAVING FAMILY FARES

BURLINGTON TRAVEL HEADQUARTERS
Dept. 705, 547 West Jackson Blvd., Chicago 6, Illinois

I am interested in a *Zephyr* vacation trip to Colorful Colorado this summer. Please send me booklet and complete information—including list of Dude Ranches.

Print Name_____

Address_____ Phone_____

City_____ Zone____ State_____

Burlington Route

TRAVEL QUIZ
(FOR MARCH)

One of earth's rainiest areas is in:

☐ *Indonesia* ☐ *India* ☐ *Indochina*

The state of Assam in India boasts an area averaging over 400 inches of rain a year—one of the world's rainiest. Though it's not recommended as a vacation spot, you *can* cash First National Bank of Chicago Travelers Checks in Assam. Anywhere, in fact! All over the world!

18 is the legal voting age in:

☐ *Oregon* ☐ *Georgia* ☐ *Vermont*

Georgia is the only state that has reduced the legal voting age from 21 to 18. One thing you can be sure of in *any* state is the popularity of First National Bank of Chicago Travelers Checks. They're so safe and convenient. Only you can cash them. Prompt refund if they become lost or are stolen.

The quetzal is a currency unit in:

☐ *Brazil* ☐ *Chile* ☐ *Guatemala*

Guatemala is where you'll trade dollars for quetzals. And you'll do it with ease if you're carrying your travel funds in First National Bank of Chicago Travelers Checks. Ask for them at your bank. In denominations of $10, $20, $50 and $100—each a different color to prevent errors when you cash them.

The First National Bank of Chicago

Travelers Checks

For All Business and Vacation Travel

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

THE BEL AIR 4-DOOR SEDAN

Chevrolet's 3 new engines

put new fun under your foot!

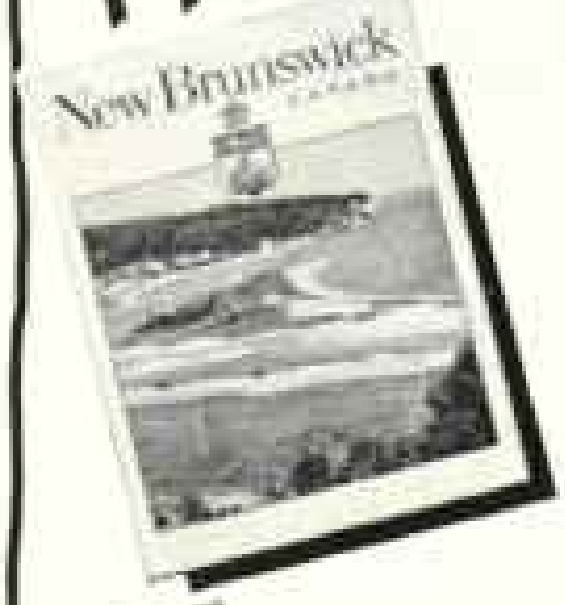
You've got the greatest choice going in the Motoramic Chevrolet! Would you like to boss the new "Turbo-Fire V8" around . . . strictly in charge when the light flashes green . . . calm and confident when the road snakes up a steep grade? (Easy does it—you're handling 162 "horses" with an 8 to 1 compression ratio!) Or would you prefer the equally thrilling performance of one of the two new 6's? There's the new "Blue-Flame 136" teamed with the extra-cost option of a smoother Powerglide. And the new "Blue-Flame 123" with either the new standard transmission or the extra-cost option of new Touch-Down Overdrive. See why Chevrolet is stealing the thunder from the high-priced cars? It has that high-priced, high-fashion look and everything good that goes with it—power, drives, ride, handling ease, *everything*. Let your Chevrolet dealer demonstrate how Chevrolet and General Motors have started a whole new age of low-cost motoring! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

Stealing the thunder from the high-priced cars! ***Motoramic*** CHEVROLET

FREE!

PROVINCE OF
NEW BRUNSWICK
CANADA

Holiday Kit



Enjoy an "armchair" tour of New Brunswick! The Holiday Kit includes a new fully illustrated tour book, complete list of accommodations and a road map.

Write today—and plan now for an exciting holiday in this picturesque Canadian province by the sea.

See Canada's Picture Province this summer!

New Brunswick Travel Bureau
Fredericton, New Brunswick, Canada

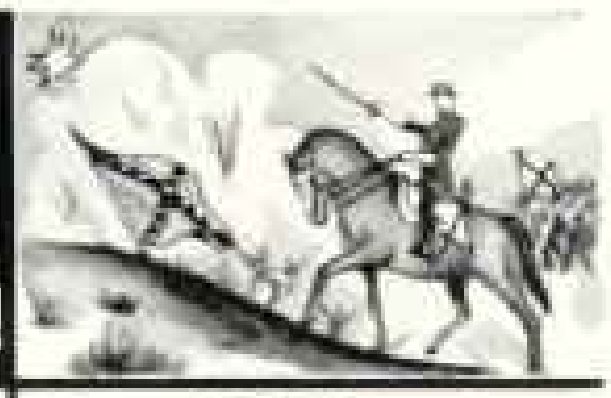
Please send a Province of New Brunswick Holiday Kit to:

Name_____

Street_____

City/Town_____ State_____

Confederate Battle Flags to Battling Bass!



You'll Find Everything In ALABAMA!

It's *all* here! Storybook Old South treasures . . . majestic mountains . . . smooth Gulf beaches . . . vari-colored blossoms everywhere . . . sparkling lakes . . . finest fishing, golf, all sports . . . splendid accommodations and perfect weather!

For full information on an Alabama vacation write: Bureau of Publicity & Information,
State of

ALABAMA
Montgomery, Ala.

FREE!

Bring your camera to West Virginia! Enjoy two million acres of parks, forests and mountain streams!

WEST VIRGINIA
INDUSTRIAL & PUBLICITY COMMISSION
State Capitol, Room 2-B
CHARLESTON 5, WEST VIRGINIA

Please send free Camera-Tour folder.

NAME_____
(Please Print)

ADDRESS_____

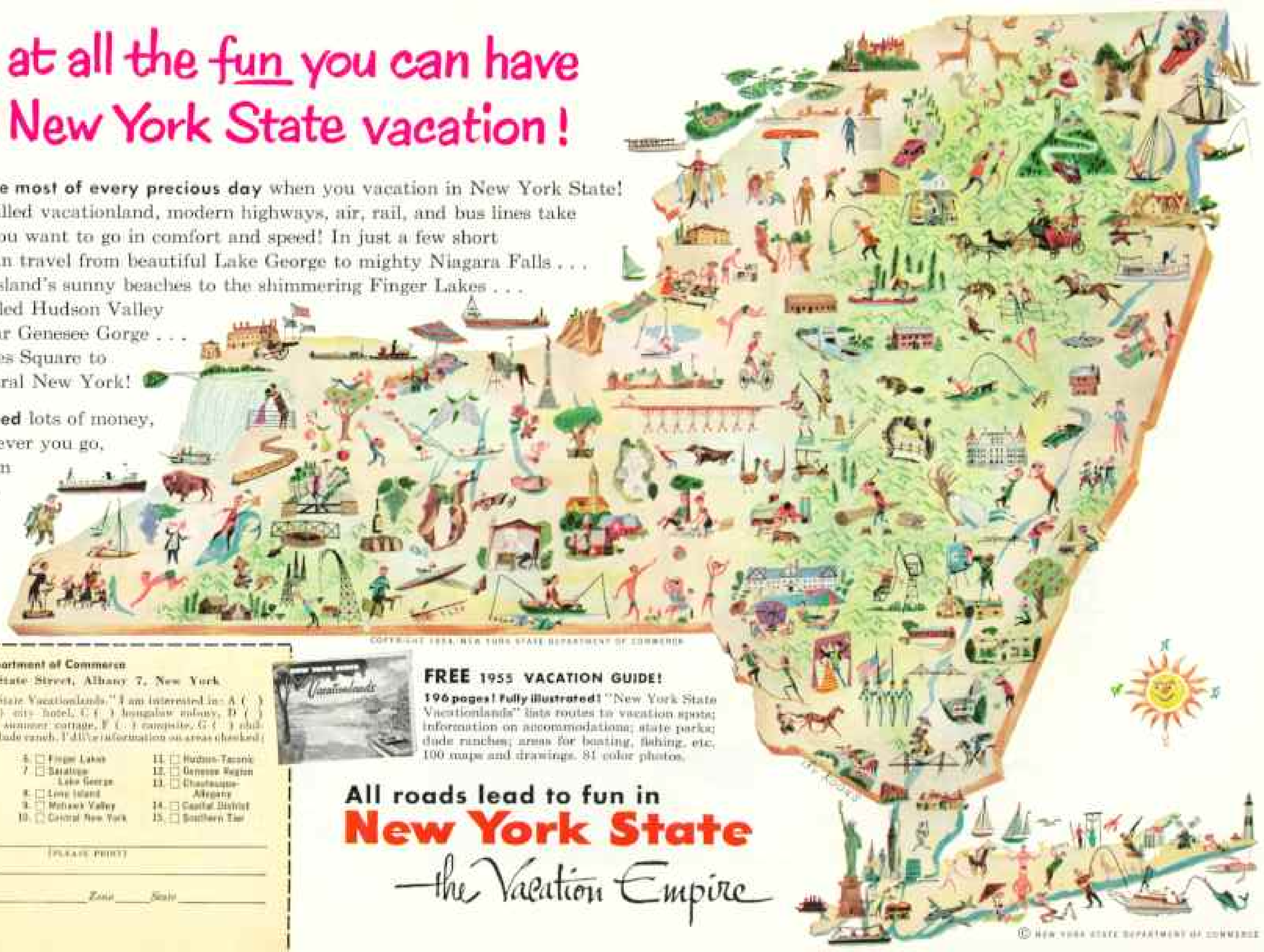
CITY_____ STATE_____

Look at all the fun you can have on a New York State vacation!

You make the most of every precious day when you vacation in New York State! In this fun-filled vacationland, modern highways, air, rail, and bus lines take you where you want to go in comfort and speed! In just a few short hours you can travel from beautiful Lake George to mighty Niagara Falls . . . from Long Island's sunny beaches to the shimmering Finger Lakes . . . from the fabled Hudson Valley to spectacular Genesee Gorge . . . or from Times Square to historic Central New York!

You don't need lots of money, either. Wherever you go, you'll find fun and places to stay to suit your travel budget!

MAIL COUPON TODAY!



New York State Department of Commerce
Room 721, 112 State Street, Albany 7, New York

Send "New York State Vacationlands." I am interested in: A ( ) resort hotel, B ( ) city hotel, C ( ) bungalow colony, D ( ) tourist home, E ( ) summer cottage, F ( ) campsite, G ( ) children's camp, H ( ) dude ranch. I'd like information on areas checked:

1. ☐ Adirondacks	6. ☐ Finger Lakes	11. ☐ Hudson-Taconic
2. ☐ New York City	7. ☐ Saratoga Lake George	12. ☐ Genesee Region
3. ☐ Catskills	8. ☐ Long Island	13. ☐ Chautauqua-Allegany
4. ☐ 1000 Islands-St. Lawrence	9. ☐ Mohawk Valley	14. ☐ Capital District
5. ☐ Niagara Frontier	10. ☐ Central New York	15. ☐ Southern Tier

Name _____ (PLEASE PRINT)

Address _____

City _____ Zone ____ State _____

FREE 1955 VACATION GUIDE!

196 pages! Fully illustrated! "New York State Vacationlands" lists routes to vacation spots; information on accommodations; state parks; dude ranches; areas for boating, fishing, etc. 100 maps and drawings. 81 color photos.

All roads lead to fun in

New York State

—the Vacation Empire

Sure Cure for Homesickness

Rx

The sound of familiar voices... news from home... encouragement, cheer... Talk frequently by Long Distance

When one of the family is away from home, there's nothing like a Long Distance call to keep ties warm and close.

Why not arrange for regular telephone visits with your boy or girl away at school? It means so much. Costs so little.

LONG DISTANCE RATES ARE LOW

Here are some examples:

New York to New Haven	40¢
Baltimore to Pittsburgh	60¢
Cleveland to Atlanta	$1.00
Dallas to Chicago	$1.20
Los Angeles to Boston	$2.00

These are the Station-to-Station rates for the first three minutes, after 6 o'clock every night and all day Sunday. They do not include the federal excise tax.

Call by Number. It's Twice as Fast.

Bell Telephone System

Alaska . . .
Africa . . .

. . . or wherever and whenever safety and dependability are of prime importance . . . the choice is a world famous Grumman . . . first and finest in aluminum watercraft.

Write for free literature. METAL BOAT COMPANY, Dept. G-35, Div. of Grumman Aircraft Engineering Corp., Marathon, N. Y.

GRUMMAN
ALUMINUM CANOES & BOATS

MORE • SEE MORE • HAVE MORE FUN • DO MORE •

St. Petersburg

WHERE EVERYONE HAS FUN!

Come to "The Sunshine City" for an unusual vacation in the world's finest climate. Swim, fish, play golf and other outdoor games all year. See pre-season baseball, races, contests, parades. Write today for free booklet—G. G. Davenport, Chamber of Commerce, St. Petersburg, Florida.

• HAVE MORE FUN • DO MORE • SEE MORE • HAVE MORE FUN • DO MORE • SEE MORE • HAVE MORE FUN • DO MORE • SEE MORE • HAVE MORE FUN •

the Wonder World of Colorful **Colorado**

It's all here—in one place—American's *complete*, and completely enjoyable, vacation for all the family. Drive paved highways through the scenic splendor of the snow-mantled Rockies. See colorful folklore festivals, Old West rodeos, picturesque gold mining camps, historic shrines. It's a picture paradise! Ample accommodations: hotels, motels, dude ranches, mountain lodges, free campsites. Mail coupon

COLORADO Dept. of Public Relations
359 State Capitol, Denver, Colorado

- ☐ Send 34-page full color Vacation Guide
- ☐ Complete list of Statewide Events
- ☐ Full color Colorado State Highway Map
- ☐ Hotel, resort, motel, dude ranch information

Name_____

Address_____

City_____ Zone___ State_____

COLORADO CLIMATE —the Magic Ingredient

Los Angeles is different, fascinating. Palm-lined streets, ranch-style homes, open-air markets and cafes.

You'll recapture the flavor of Spanish days in our missions. Above, Santa Barbara Mission, 168 years old.

See our warm deserts in their gay springtime garb—wildflowers stretching out as far as the eye can see!

Across the West to a SOUTHERN CALIFORNIA vacation!

THE GREAT AMERICAN TRAVEL ADVENTURE

What other vacation journey shows you so *much* of your own country?

Your Southern California trip whisks you across the Great Plains, past the Rockies, into the real West. You see working cowhands, painted deserts. And then—for the *climax* of your adventure—you explore Southern California!

Here is the West with a subtropic flavor. Palm trees and orange groves. Pacific beaches and Spanish missions. Hollywood stars and studios. Gardens glowing the year-round. And, over all, the sunny skies you've read about.

It's *the* great American travel adventure. Yet a Southern California trip is practical too. See the cost statements below.

You've wanted to come. Why not enjoy The Great American Travel Adventure—*this year!*

HOW ABOUT COSTS?

Answers from recent visitors:

"Our Southern California trip cost us $30 more a week than our usual vacation nearer Chicago."—*Hugo E. Nelson, Chicago.*

"Our Southern California vacation cost in the neighborhood of $100 a week for three of us."—*Howard Presley, Cleveland.*

LET YOURSELF GO! THIS YEAR TAKE A...

Southern California Vacation

Get to know the world's biggest ocean. Sunlit waters, booming breakers, salt air. Miles of tempting beaches.

FREE: Color Sightseeing Map of Los Angeles County and all Southern California, 22½" x 25". Locates 645 sights, 80 movie star homes. Mail coupon today!

ALL-YEAR CLUB OF SOUTHERN CALIFORNIA. *This advertisement sponsored by the Los Angeles County Board of Supervisors for the citizens of Glendale, Hollywood, Inglewood, Long Beach, Los Angeles, Pasadena, Pomona, Santa Monica and 182 other communities.*

Hollywood fun can include a lavish floor show with movie stars in the audience, or a gala world premiere.

Typical study in contrasts—snowy Mt. San Antonio soaring two miles above a sun-splashed subtropic valley!

Flowers any time you come, any place you go. "Lawns" of geraniums. Big farms whose only crop is flowers!

All-Year Club of So. California, Dept. B-3
629 South Hill Street, Los Angeles 14, Calif.

Please send me free Color Sightseeing Map.

*Name*_____

*Street*_____

*City*_____ *Zone*_____

*State*_____

PLEASE PRINT NAME AND ADDRESS

IRELAND *invites* AMERICA *to* an tóstal

Our Third Annual Spring Festival

MAY 8—29, 1955

Soon it will be Springtime, and the Emerald Isle will again be a garden of glorious color. A beautiful time to stage a national celebration and that's just what we are going to do! We especially invite our friends in America to join us for the An Tóstal festival. Our traditional Céad Mile Fáilte—the Hundred Thousand Welcomes of the Irish—await you!

Last year, the Pageant of St. Patrick, special sports and cultural events, the fabulous Golden Golf Ball Tournament, and scores of other An Tóstal festivities brought visitors from around the world. This year, An Tóstal will be bigger and better than ever before! Plan to come to Ireland early and you'll see the famous Dublin Spring Show (May 3–7), too, the perfect prelude to An Tóstal.

Write Box 31, 33 East 50th Street, New York 22, N. Y., for a full-color map of Ireland and for details of An Tóstal. Plan your Spring tour soon with your Travel Agent.

Irish
TOURIST INFORMATION BUREAU

33 E. 50th St., New York 22, N. Y. • Tel: Plaza 3-0139

Issued by Córas Fáilte The National Tourist Publicity Organization for Ireland

---

If it's TIGERS you're after... try INDIA

but when you're hunting for Family Fun

come to KENTUCKY

Kentucky is come-and-see country . . . Bluegrass farms ringed by white fences . . . lakes and streams brimming with bass . . . miles of scenic highways that beckon you into beautiful state parks and shrines.

NEW TRAVEL BOOK — Free and full of color. Address postcard to Division of Publicity, Department NG, Frankfort, Ky.

THOUSANDS PREFER

American

Quality-built by a long established company. Nine beautifully appointed, fully equipped '55 models—30' to 41'. Decide now to live and travel the carefree, economical mobile way. Write American Coach Co., Cassopolis, Michigan.

OHIO-TENNESSEE-MISSISSIPPI *River Cruises*

AIR-CONDITIONED S.S. DELTA QUEEN

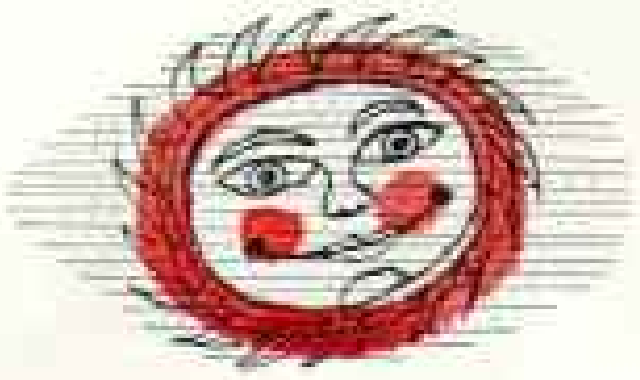
DANCING ENTERTAINMENT SOUTHERN STYLE MEALS

- 20 DAYS—NEW ORLEANS—$275 up plus tax
  Mar. 12—Apr. 2—May 5—Oct. 1 & 22, 1955
- 11 DAYS—MUSCLE SHOALS, ALA.
  June 3, 1955—$140 up plus tax
- 7 DAYS—KENTUCKY LAKE ON TENN. RIVER
  June 25 thru Aug. 27—$65 up plus tax
- 20 DAYS—ST. PAUL, MINN.
  Sept. 18, 1955—$275 up plus tax

For Details, See Your Travel Agent, or Write GREENE LINE STEAMERS, INC. 317 Public Landing, Cincinnati 2, Ohio

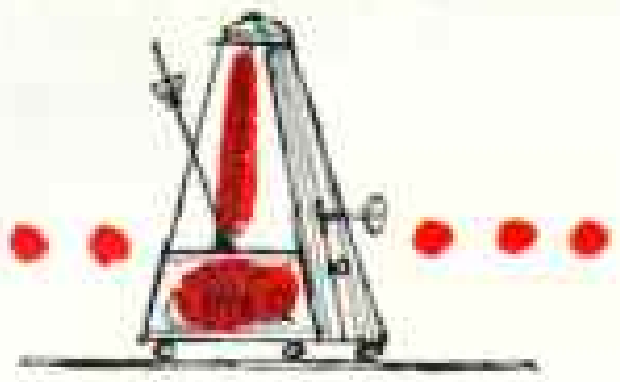
A "primer" of GOOD NUTRITION

B is for breakfast



A well-balanced breakfast is needed every day, even if one is overweight. After going without food for 12 hours or longer, a hearty breakfast is required to renew energy and sustain efficiency. Have a breakfast of foods that provide both proteins and calories.

R is for regular foods



Vital body processes, such as the regular beating of the heart and proper functioning of the thyroid gland, depend upon foods that supply essential vitamins and minerals. A proper diet provides all the vitamins and minerals necessary to keep body organs working properly.

W is for weight control

It is best always to eat just enough of the right foods to keep your weight at the level which the doctor recommends. If one tends to put on excess pounds, it is wise to eat down on weight-producing foods.

V is for variety

Variety is the most important factor in good nutrition. No single food has any "magic powers" healthwise. So, for good nutrition and good health, select daily meals from a wide variety of vegetables, fruits, milk, meats and cereals. Good nutrition also helps control weight.

E is for energy foods

Energy for work, play and all other activities comes from carbohydrates. To make the best use of these foods, proteins, vitamins and minerals are also necessary. Energy foods are especially needed for growing, active children and adults who do heavy labor.

P is for protective foods

The most important of these are the proteins. High-quality proteins come from milk, cheeses, meats, fish, fowl and eggs and supply many essential substances for the upkeep and repair of bones, blood, skin and other parts of the body.

Ed Sullivan, M.C. of Toast of the Town, and Julia Meade introduce New Lincoln. Monitor sets show new rear deck, new longer body, new front assembly.

Camera one! Close up! Take the new Lincoln for 1955

FIRST you notice its unusual beauty: the dramatic new tail-lights, the sweep of chrome, the new front end treatment, the 11½ inch longer body, the lower, flowing look.

But perhaps even more exciting is the story on performance — further enhanced by new Turbo-Drive — biggest news in no-shift driving in almost 15 years. Here is no frustrating lag, no unpleasant jerk, but one unbroken sweep of silent power, from zero to superhighway speeds.

Turbo-Drive is especially designed and built to work in harmony with Lincoln's brand-new, high torque V-8 engine for 1955. But you must *feel* this action to believe it. Your Lincoln dealer will be glad to let you drive a Lincoln or a Lincoln Capri. You'll know you've made a wonderful discovery the moment that Lincoln's wheels begin to turn.

LINCOLN DIVISION • FORD MOTOR COMPANY

NEW 1955

LINCOLN

for modern living
for magnificent driving

VOL. CVII, No. 3 WASHINGTON MARCH, 1955

THE NATIONAL GEOGRAPHIC MAGAZINE

Spectacular Rio de Janeiro

Studded with Mountains and Scalloped with Beaches, Brazil's Booming Capital Is One of the Beauty Queens of the Earth

BY HERNANE TAVARES DE SÁ

With Illustrations by Charles Allmon, National Geographic Magazine Staff

RIO de Janeiro today is like a woman of exceptional beauty who decides she must complete her education, have a career, redecorate the house, raise a family, and be a civic leader—all at the same time.

Beautiful Rio has heavy responsibilities as the capital of giant, sprawling Brazil, until yesterday leisurely and economically primitive, but today rapidly emerging as a modern industrial nation. (See the National Geographic Society's 10-color map, Eastern South America, a supplement to this issue.)*

Rio looks on the young giant with a mixture of wifely tenderness and sophisticated detachment and does her best to humor him. She has become a tangle of factories and assembly plants, a distribution emporium, and a busy transportation terminal, besides being the nerve center of government and leader in cultural pursuits.

Named for a Nonexistent River

All this she has contrived to do without sacrificing the tropical charm, the art of graceful living, and the surpassing scenic grandeur that constitute Rio's claim to the title of City Marvelous. That is how her citizens, the fun-loving, irreverent *Cariocas*, have reverently christened her—*Cidade Maravilhosa*.

Her true name—meaning "River of January"—is a strange geographical misnomer. When a Portuguese navigator sailed into Guanabara Bay on New Year's Day, 1502, he mistakenly thought he had reached the mouth of a large river. According to tradition, the fleet's chief pilot was the Italian Amerigo Vespucci, whose name was to be applied to the whole Western Hemisphere.

Founder Killed by an Indian Arrow

"Carioca" as the term for a resident of Rio is believed by some to come from an Indian expression meaning "white man's home." It dates from about 1567 when the Governor General of Brazil sent his nephew, Estacio de Sá, to storm the ramparts of the French who had settled here, erect a fort, and lay out a town. This the young warrior succeeded in doing, although he was mortally wounded by an Indian arrow in the final assault.

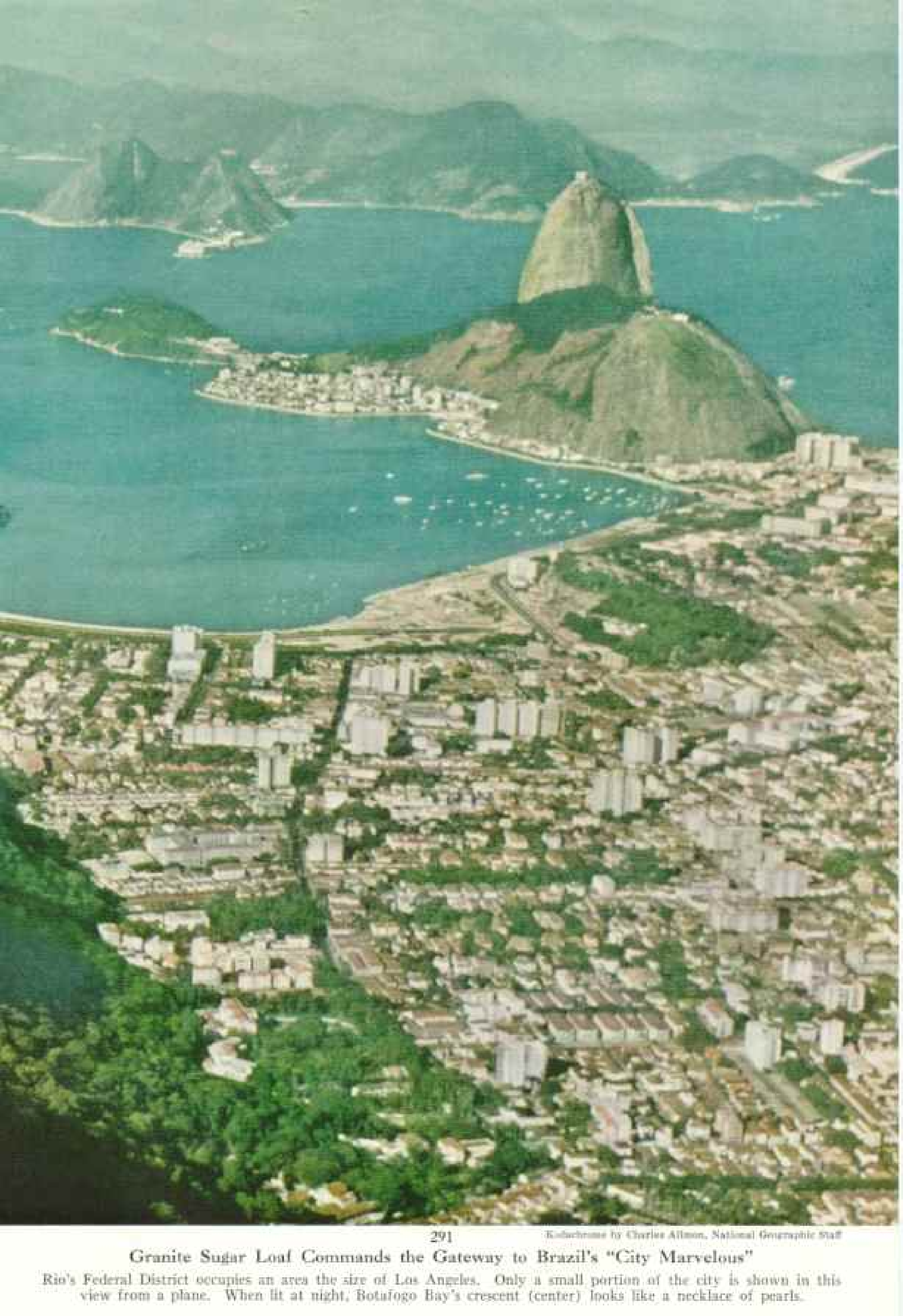
To this day Rio de Janeiro's coat of arms carries a sheaf of arrows. At St. John, one of the fortresses that guard the narrow entrance to Guanabara Bay, a simple monument on the beach marks the spot where the young warrior came ashore.

My own roots lie deep in Rio, but my work as a writer often takes me away. Never do

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Brazil's Potent Weapons," by W. Robert Moore, January, 1944; "Air Cruising Through New Brazil," by Henry Albert Phillips, October, 1942; "Rio Panorama," by W. Robert Moore, September, 1939; and "Gigantic Brazil and Its Glittering Capital," by Frederick Simpich, December, 1930.

Christ the Redeemer, Crowning Corcovado, Spreads Arms in Blessing over Rio de Janeiro

Skyscraper apartments line huge Guanabara Bay. Niterói, capital of the State of Rio de Janeiro, hugs the distant shore. Beckoning ships and planes, the statue stands 2,440 feet above sea.



291 Kodachrome by Charles Allmon, National Geographic Staff

Granite Sugar Loaf Commands the Gateway to Brazil's "City Marvelous"

Rio's Federal District occupies an area the size of Los Angeles. Only a small portion of the city is shown in this view from a plane. When lit at night, Botafogo Bay's crescent (center) looks like a necklace of pearls.

I return by ship or air without feeling the almost physical impact of the city and its setting upon the senses. Then I like to listen to fellow passengers beholding Rio for the first time:

"What a place to build a city!"

"Look at those mountains peering down like giants at a toy town."

Even seasoned old seamen are stirred. They argue at length as to whether Rio—or Istanbul, Sydney, Naples, Hong Kong, San Francisco—is the beauty queen of world ports.

"How tropical it looks," says a passenger, "with all that deep-green vegetation wrapping those mountains almost to the top."

"But look at that one," says another. "It must be as tall as the Empire State Building, and it's one great hunk of solid rock, like a giant exclamation point of stone."

Sugar Loaf: Rio's Tall Trademark

That spectacular rock, of course, is the peak of granite with the whimsical name of Sugar Loaf, which soars 1,296 feet above the city's scalloped shore and island-dotted bay (pages 291, 297, and 324). It is to Rio what the Washington Monument is to the United States Capital or the Eiffel Tower to Paris. Like Washingtonians or Parisians, we take our vantage point for granted and rarely ride to its dizzy top, unless the entertaining of visitors jogs our memories and our civic pride.

Yet from nowhere—unless from 2,310-foot Corcovado (Hunchback)—can you better see Rio as a whole. Here you can take aerial pictures while standing on solid rock.

One afternoon not long ago, I made the ascent again. Inside the little green cable car swinging gently over the void, 18 of us sat on the two benches that run the car's full length.

We were an expectant, strangely mixed group: two well-to-do foreign couples; several pairs of honeymooners; a workman's family from the hinterland, the husband and wife poorly dressed in comparison with their three children's holiday finery; and a camera crew from one of the leading motion-picture studios.

The conductor, a small bespectacled man, warned the cameramen not to move around too much.

"Then there is danger?" someone asked.

The little man became indignant.

"Of course not!" he exclaimed. "The cables are thick as my wrist, and this car hangs from two of them. I have been working here for 21 years and never saw a fatal accident.

"Once, though, a cable broke, so the car could not be pulled home. . . ."

All of us listened as if mesmerized as he told how passengers and crew had waited for hours, suspended over the abyss.

"Now," he added, "we have one of our maintenance men riding on the roof of the car to check the cables."

He jerked a thumb.

"Mario is up there. Really no need for it. But it reassures the public."

Duly reassured, we reached the top.

That was high enough for most of the passengers, but I climbed to the roof terrace of the television station, whose transmission tower crowns the peak.

Walking slowly along the edge of the terrace, I could take in the whole sweep of the city in its glorious setting—the Atlantic Ocean, the tropical forest, Guanabara Bay. Breathing hard—and not only from the climb—I saw, in one encompassing view, what man has done to make Rio worthy of its heritage (page 311).

Far to the right was Paris Square; it covers the equivalent of many city blocks, but from here it looked like the tiny garden on an architect's scale model. From there I could follow famed Avenida Beira Mar (Seashore Avenue) as it hugged the curves of the bay, swept along Flamengo Beach with its many embassies, and finally swung in a sharp loop around Botafogo Bay (see Rio inset on Eastern South America supplement map). Along this avenue at rush hour six endless lanes of cars pound abreast into the city at morning and flee at a furious pace to the beach districts in the evening.

As I moved a few steps for a sight of Copacabana Beach on the other side of the mountains, I noticed a workman in grease-stained overalls leaning against the cement balustrade. It was Mario, the mechanic who had ridden

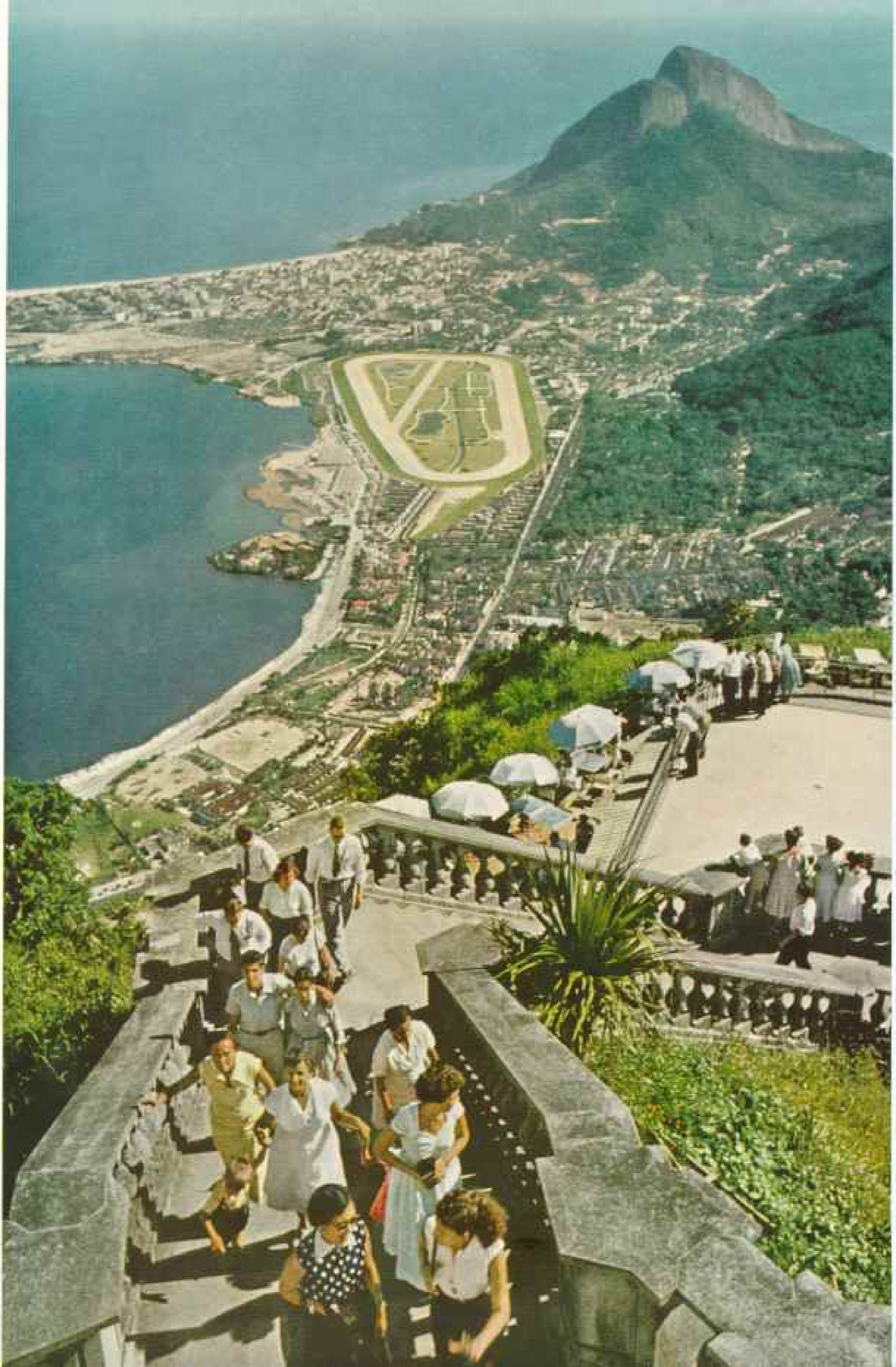
Page 293

Mountain, Sea, and Garden Bound the Jockey Club's Track →

Hundreds of thousands of sight-seers yearly climb the 300-odd steps to the statue of Christ (page 290). From Corcovado's summit they see almost all Rio de Janeiro. The panorama from the umbrellaed terrace includes the Rodrigo de Freitas Lagoon (left), the race track (center), and the wooded Botanical Gardens (upper right).

Leblon Beach stops below the granite towers of Dois Irmãos (Two Brothers) mountain (page 308).

Kodachrome by Charles Allmon, National Geographic Staff



the roof of our cable car. He laughed at the idea that his work was dangerous.

"*Que nada!* [It's nothing.] All I have to do is to be careful not to burn my hands on the running pilot cable," he said.

Mario pointed to one of the hills, using the word *morro*, which Cariocas apply indiscriminately to the smallest hummock and to the loftiest of their mountains.

"From here," he remarked, "I can almost see where I live. Of course you can't see my own little place, but the whole *favela* is quite visible on a day like this."

All over Rio the flanks of even the steeper morros are spotted with favelas, clusters of huts where the poorer residents live.

"I could afford to live in one of the suburbs," said Mario defensively. "But I would have to get up at 5 in the morning to be on time for work. The favela is right in town. And you know, I'm buying a television set on installments. I can see what they put on the air here. . . ." He patted the balustrade possessively.

"There are only two other sets in the favela besides mine. But of course everybody has a radio." He grinned. "Even though none of us has any running water."

As Mario left a few minutes later, humming a Rio Carnival hit tune, I saw that the motion-picture crew was beginning to shoot, focusing first on Copacabana's curving strand.

Home of 2,650,000 Cariocas

But now I was no longer thinking merely of the spectacle—the deep blue of the ocean, the dazzling white of the beaches and the new apartment buildings, the vivid green of the woods and parks embracing the city. Rio de Janeiro is also people, 2,650,000 of them—the resilient, quick-witted Cariocas, always willing to lighten their troubles with a song, always ready to make a joke, even at their own expense.

For instance, some Carioca had dreamed up a story then going the rounds. A visiting Englishman checked into a hotel, started to shave, and discovered he had no water. After a couple of days, when nothing was done about it, he moved to another hotel, only to find he had no electricity. Now thoroughly discouraged, he returned to England, with the parting message: "Your city is still under construction. I'll come back later when the paint begins to dry."

Most Cariocas seem to sense that the baffle-ments and inconveniences of everyday living are the price for one of the swiftest and most radical transformations a large community has ever experienced.

As a diplomat friend put it: "After observing Rio de Janeiro and your other big city, São Paulo, I am convinced that you Brazilians are trying to do in 10 years what the United States did in 150."

I had forgotten the passing of time. Twilight fell. Then, suddenly, the lights went on below, all over the city. In that magic moment the contours of the seashore, the sweep of the main avenues sprang forth limned in light.

Here and there the bunched red, green, and blue of neon signs added a Christmas-tree effect. For miles inland the lights blended into a twinkling, golden haze blanketing the residential districts. Close by, the lamps along the loop of Botafogo Bay seemed almost to clasp together, shaping the *colar de pérolas*, the "necklace of pearls," of which Cariocas speak so proudly. The evening darkness tightly embraced the ocean and bay, but the fairy-tale city was alive and pulsating.

Train Climbs to Majestic View

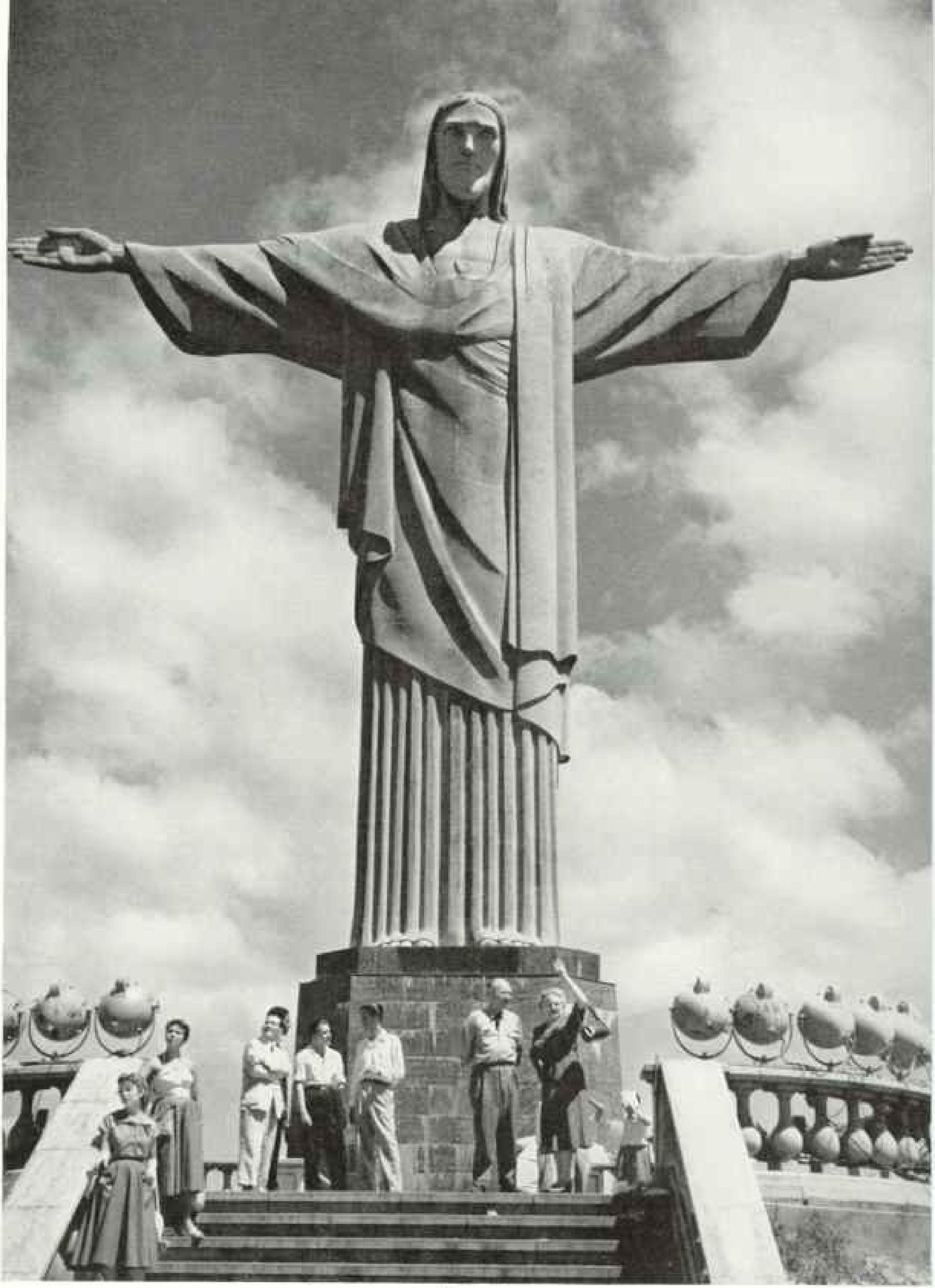
Only one other local view compares, day or night, to the one from Sugar Loaf—that from Corcovado with the great figure which surmounts it (opposite and page 290).

From Corcovado the view unfolds, majestic, almost awesome, in its breath-taking scope. You can see the full expanse of the city, not merely the fashionable southern districts along the ocean, but also the suburbs that reach north and west, some with a population in the hundreds of thousands.

The trip up to Corcovado is hardly a preparation for such boundless horizons of mountain, water, and teeming humanity. An overgrown toy train clatters upward on the steep tracks of a little cog railway. The passenger cars, open on all sides, brush past the cool trees and shrubs that cover the mountain flank.

Once at the top, the impressive close-up view of the statue, with arms outstretched as if to protect the city, compels the first attention of all visitors.

The giant monument, 130 feet tall, was financed by public subscription, completed in five years, and dedicated on Columbus Day, 1931. Ever since, powerful floodlights have played on it through the hours of darkness. The lofty statue can be seen from practically



295

Christ in Concrete Commemorates the First 100 Years of Brazilian Independence

Sculptor Paul Landowski's work was completed in 1931, nine years after Brazil celebrated a century of liberty. Floodlighted, the 130-foot monument appears to float in the night sky (opposite page).

Flights to Santos Dumont Airport Drop Businessmen in Walking Distance of Offices

The sailing ship *Almirante Saldanha* (far left) serves the Brazilian Navy as a training vessel. Brazil's Naval Academy occupies Villegagnon Island off the airport's tip. Rio's port receives 5,000 ships a year.

Kodachromes by Charles Allmon, National Geographic Staff

To Build Its Skyscrapered Center, Rio Leveled a Hill and Pushed It into the Bay

Reinforced concrete supports these lofty buildings; many contain no structural steel. Sugar Loaf stands across Botafogo Bay. Airport land came from Morro do Castelo, the hill from which Rio grew.

Paris-Match, Gamma

Always Room for One More! Trolley Riders Flutter from Windows and Roof

Passengers who ride hanging by the arms are known as *turma do deixando* (the resting brigade) because they leap off at each stop to relax strained muscles. To collect fares, the conductor has to move like an acrobat; even so, he misses some. Young revelers festooning this trolley wear Carnival attire. Outside riders usually perch on a narrow running board on the other side of the car.

every section of the city and from many miles at sea.

The Christ of Corcovado has become Rio de Janeiro's most striking and cherished landmark—and also a good talking point to attract prospective tenants. Apartment-for-rent ads often proclaim that O Cristo do Corcovado can be seen from the bedroom windows.

Tunnels Cut Through Constricting Hills

Rio de Janeiro looked serene from the heights. But when I explored the modern aspects of the city on its own level, the hectic pace, the noise and confusion of the capital at work quickly brought home to me the price we are paying for progress and growth.

Hemmed in on two sides by ocean and bay, split by granite hills into narrow valleys, Rio is by necessity a city of tentacles. Except for the downtown district and some faraway suburbs, it does not spread in a continuous area; instead, long arms reach out for miles.

The morros are responsible. These numerous hills, some rising to 3,000 feet, give the city its jumbled topography and make transportation a nightmare. Bottlenecks created by nature are everywhere.

Tunnels are usually the only means of direct communication between neighboring districts, and the boring of tunnels must often precede the opening of new avenues.

Such topography, together with the soaring population, explains much of the chaos of the city's traffic. Rio's population grows at the rate of some 70,000 a year. Most of the city's people live many miles from where they work, and the electric suburban trains pack them in tighter than New York's subways during rush hours.

The old wooden carriages, of which there

are still quite a number, have passengers perched precariously on the open platforms or hanging from the sides; the more hardy commuters even festoon tender and locomotive.

Until the much-discussed subway comes, public transportation must be by streetcar, bus, and microbus.

Streetcars Packed, Inside and Out

Rio's open trolley cars, called *bondes* from the bond issues that financed them, are the coolest, cheapest, and most popular conveyance. Usually they lumber about with several layers of extra passengers packed along the narrow running board.

Microbuses, seating some 16 passengers, are the worst demons of the city's traffic. They lunge and veer with a dangerous lust for pedestrian and passenger car alike; only full-sized buses dare stand their ground.

A few months ago a microbus rammed a private car that had stopped for a red light. The indignant motorist pulled a gun and shot at the bus driver. He missed, but during the next few weeks microbuses became noticeably more respectful of traffic rules.

Even though private car owners lead a harried life on Rio's streets, their number keeps growing. Many buy United States automobiles, the bigger and shinier the better. Visitors are always amazed by the number of Cadillacs. Small European cars are also popular, because of their low gasoline consumption.

Nowhere is the feverish, blaring beat of Rio more keenly felt than along Avenida Brasil, a new 2-lane boulevard with fluorescent lights. A springboard for highways going south, west, and north, it carries traffic bound to and from half a dozen Brazilian States. Among them are São Paulo, Brazil's Empire State; Bahia, where cacao and tobacco have been grown for centuries; and rubber in recent years; Minas Gerais, which ships goods as romantic as diamonds and rosewood, as prosaic as spinach.*

Rio counts nowadays more than 5,500 industrial establishments, and many of the newer ones have sprung up along the wide cement ribbons of Avenida Brasil.

A well-known United States farm implement concern occupies a functional building that could be mistaken for a fashionable club, were it not for the yellow tractors aligned in front.

Germany's leading automobile company has erected a new assembly and distribution plant, and a small hosiery factory stands close to huge deposits of limestone for one of the country's many cement manufacturers.

The metallurgical works, so new it still looks aseptic and gleaming, uses metal from booming Volta Redonda, Latin America's largest steel mill, less than four hours' drive from here. The mill was erected with the aid of a "good neighbor" loan from the United States (page 314).

On the other hand, many establishments are tiny affairs, employing at most 5 to 10 workers, and no larger than the average home. In fact, the owner and his family often live on the premises.

One day I stopped by a sprawling oil refinery at the very edge of the boulevard. Only a few weeks before, pieces of heavy equipment had been lying around awaiting installation. Now the storage tanks were ready, and the complicated cracking towers reached skyward.

When I commented on the swift progress to a group of workmen, one broke into a grin.

"We have to get this refinery ready because we have to go home," he said.

One of the engineers explained that most of the workmen came from the northeastern States on the bulge of Brazil, and many were saving up to return to their drought-stricken but beloved land to the north.

Big Industries Attract Workers

Rickety trucks bring in thousands of northeasterners a year, and although many of them go home after a few months, such internal migration contributes heavily to Rio's growth.

A reddish twin-towered structure of unmistakably Moorish architecture strikes an incongruous note along Avenida Brasil. It's the Oswaldo Cruz Institute, named after Brazil's greatest public health hero. Early in this century Oswaldo Cruz won decisive battles against yellow fever and other diseases that had been the scourge of Rio.

Whenever his drastic measures, which included tearing down and dynamiting insanitary dwellings, proved too unpopular, "Dr. Oswaldo" would offer to resign rather than swerve from his purpose of cleaning up the city once and for all. His resignations were never accepted.

He introduced sanitary conditions in the urban areas, and after he died from overwork young scientists trained under him stamped

* See "Brazil's Land of Minerals," by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, October, 1948.

Rio Beats the Heat with Ice Cream

Tropical Brazil's first ice was shipped from the United States in 1834. It was used to make sherbet. Commercial milk-and-egg ice cream awaited the recent advent of Kibon, a company launched by an American. Nowadays Kibon's carts splash yellow on many a street corner.

This cart dispenses refreshments before the Ministry of Education Building, an outstanding example of modern architecture. Built of reinforced concrete, the structure's sunny north side exposes a face like an enormous egg crate. Adjustable louvers on each window shut out direct sunlight and deflect glare—a system of shades pioneered in Rio.

A Yankee Strolls Wavy Seas of Stone

Portuguese transplanted the mosaic sidewalk to Brazil. Workmen use no cement in setting the small black and white stones. Strong men sometimes get slightly seasick walking down this promenade.

Kodachromes by Charles Allmon, National Geographic Staff

out malaria in the swampy flats on the outskirts of the city.

Nowadays the institute is an internationally known research center in tropical medicine, and several modern laboratory buildings surround the Moorish castle.

Carnival Takes the City by Storm

But serious exploration of my city was soon interrupted. Once every year, usually late in February, during the four days that precede Ash Wednesday, Carnival grips all Rio and becomes the sole concern of most of the populace. For weeks beforehand the Carnival spirit steadily mounts. If you have any kind of business to transact, don't be surprised if you are courteously put off with the explanation, "Only after Carnival."

A combination of popular fervor and official backing makes Rio's Carnival both spontaneous and lavish. The city government does not limit itself in ornamenting and lighting the main avenues and squares. It also encourages and subsidizes basic pillars of the celebration, such as the *escolas de samba*.

These "samba schools," or clubs, are made up of the black and near-black population of the morros. All year round they prepare for Carnival and hold rehearsals to the tum-tum of drums, the haunting stridency of trumpets, and the rasping rattle of gourds. They scrape and borrow to make garish multicolored costumes. And they learn new sambas—Carnival songs—or sometimes compose their own.

The samba, although it draws on folk dances and songs from all over Brazil and possesses a rhythm heavy with ancestral African influences, is nevertheless an urban product, sprung from this versatile city. It's not much more than a generation old, the first bona fide samba having been launched about 1917.

There was a time when only the favelas produced genuine sambas. I remember sitting at one of the marble-topped tables of the now-defunct Café Nice on Avenida Rio Branco, a gathering place for artists and musicians. The syncopated beat of a hummed samba accompanied by the drumming of finger tips could be heard at the next table.

Presently a shy, poorly dressed Negro walked up and explained haltingly that he was from Salgueiro morro and that he had "imagined" a new samba. He was asked to sing it, and after a while one of the musicians began to jot down the music on the marble top. A few days later a radio station put the song on the air. The untutored composer had been given the chance of a lifetime—not an uncommon occurrence at the Nice, where many a famous tune was thus born.

The samba is not the only typical Carnival song; it shares honors with the *marcha*, which has a gayer, quicker tempo. Both sing mostly of the life and love of Rio's morro dwellers, of the city they cherish, of the fickleness of women and the philandering of men, sometimes of politics. The mood is at times sentimental, more often impish. Now and then lyrics defy even the most benevolent censor, and the police decree that they may not be sung in public.

When Carnival swings around, the samba schools are ready to compete with one another in dancing and singing, on a block-long wooden platform in the center of the city's widest thoroughfare, Avenida Presidente Vargas. Judges stand ready to award substantial cash prizes from the city treasury.

On a lower scale as regards organization and singleness of purpose, but not necessarily zest, stand the *blocos*, groups of people who get together on the first day of Carnival to dance and sing their way through the remaining three days. Some of the blocos begin with a core of revelers wearing the same costumes and bringing along their own amateur musicians, but inevitably they expand as enthusiastic onlookers join in.

I recall during last year's Carnival seeing a bloco come into existence early on Sunday afternoon. Several young men and girls drifted together, struck up a tune, and began to sway and whirl in unison. As they lost themselves in the throngs that were beginning to pack Avenida Rio Branco, I wondered whether they would break apart at the next corner or perhaps sing and dance together during the following days (pages 302, 303, 305).

Revelers Squirt Numbing Fluid

In all these facets of Carnival as it takes place in the streets, spontaneity is the feature that strikes even the casual observer. There is genuine release and mirth, and alcohol has little to do with it. In fact, custom usually bans sale of hard liquor during the four days.

Many revelers, however, carry small metal tubes of a perfumed chemical which they squirt on one another. This substance, used by doctors as a local anesthetic, freezes and numbs the skin; when sniffed from a soaked handkerchief it has an inebriating effect.

Merrymakers Jam the Streets of Rio at Carnival Time

During the four days preceding Lent, Carnival sweeps the city like a tropical storm. Ships discharge visitors from all parts of the world. Brazilians ride in from the ends of their country. And Cariocas, abandoning their businesses, take to the streets. From dawn to dawn musicians everywhere blare hit tunes written afresh for the new Carnival. Thousands sing the catchy refrains and cavort in costumes as grotesque as a goblin or as gay as a giggle. Avenues emerge as ballrooms, and the samba replaces walking.

←Page 302. A hip-shaking samba line (lower center) snakes through a throng on Floriano Square. The statue honors Floriano Peixoto, a President of the Republic. So many allegorical groups emboss the monument that Cariocas irreverently call it *Lotação completa* after the sign used by Rio buses when no more passengers can be squeezed in.

→A buccaneer enters spangled but bare-shouldered.

↓A sequined and pearled guitar makes a musical hat.

The wealthy and the well to do have their own Carnival. Most of it takes place in a round of balls in the preceding weeks, since during the four days many repair to spas, mountain resorts, and faraway beaches.

But even during Carnival days there are enough society people left in town to pack the elegant ball on Saturday night at the Copacabana Palace Hotel, a favorite of the foreign colonies and tourists (page 306). And on Monday the Opera House is ablaze for the most sumptuous ball of them all, where the ladies compete for prizes in costume dresses often costing well over a thousand dollars.

Cariocas Scrimp for Carnival Costumes

My wife's dressmaker, a handsome mulatto who sews with true Parisian flair, works industriously the whole year to earn enough money to buy the elaborate satins and velvets, the plumes and costume jewels needed for her own Carnival gown for the ball at the Opera House (also known as the Municipal Theater). On several occasions she has carried off prizes, though never the coveted Grand Award.

Yet Carnival is not only in the throbbing streets, or in the clubs, hotels, theaters, and cafes. In many an average home the Carnival season provides occasion for family reunions. There you might see a normally staid father dancing with his wife or a teen-age daughter to the latest Carnival tunes blaring from the radio. Children, some of them still in the toddling age, are right in there with their elders, singing and stomping away.

The magic of Carnival never tarnishes for children. Almost without exception, every child in Rio gets a costume, and the little tots look irresistible as ballerinas, pirates, clowns, or gypsies.

Sometimes a whole family turns out in identical costume, from the grandmother down to the baby in arms. They have done without essentials the year round, to save for the glorious four days.

One sees often the touching sight of a whole family of very modest circumstances out in the street, with only the children gaily bedecked. When family funds ran short, the children were given precedence, as usually happens in Brazil.

Historical costumes occasionally strike an incongruous note. Driving through one of Copacabana's tunnels, I saw a gleaming white blotch near its other end. It turned out to be a group of jet-black Negroes dressed in the flowing gold-trimmed robes of Roman patricians.

Second only to Carnival in the fervent devotion of every Carioca, soccer is the country's national sport. Introduced by the English a century ago, it has developed to such a point that crack players are national heroes, commanding salaries equivalent to those of Cabinet ministers. They are traded back and forth by the big clubs for thousands of dollars.

Spectators go wild when their favorite team scores, shooting off fireworks and rockets in their exuberance. So seriously do they take the games that platoons of policemen must march on and off the field with the referees.

The completion of Maracanã Stadium in 1950, barely in time for the World Cup matches, gave Rio the world's most imposing setting for soccer. Holding more than 150,000, Maracanã is a towering mass of reinforced concrete, yet it is designed with graceful simplicity and purity of line (page 327).

Soccer is perhaps the most democratic of all careers in Brazil, since the young aspirant to the glories of Maracanã has an equal chance whether he was born in the poverty of a favela or the comforts of a middle-class district. Rio's leading teams form a cross section of the population's racial make-up, with mulattoes, Negroes, and whites included.

The beaches are a favorite training ground for professionals-to-be. Soccer is allowed on the sands of Copacabana during afternoon hours, but not in the crowded morning.

On one of the beaches beyond Copacabana I recently saw a soccer match by moonlight. The game was played with a white-painted ball and with rousing enthusiasm, although it was not easy to make out precisely what was going on. This was apparently also the referee's

(Continued on page 313)

Page 305

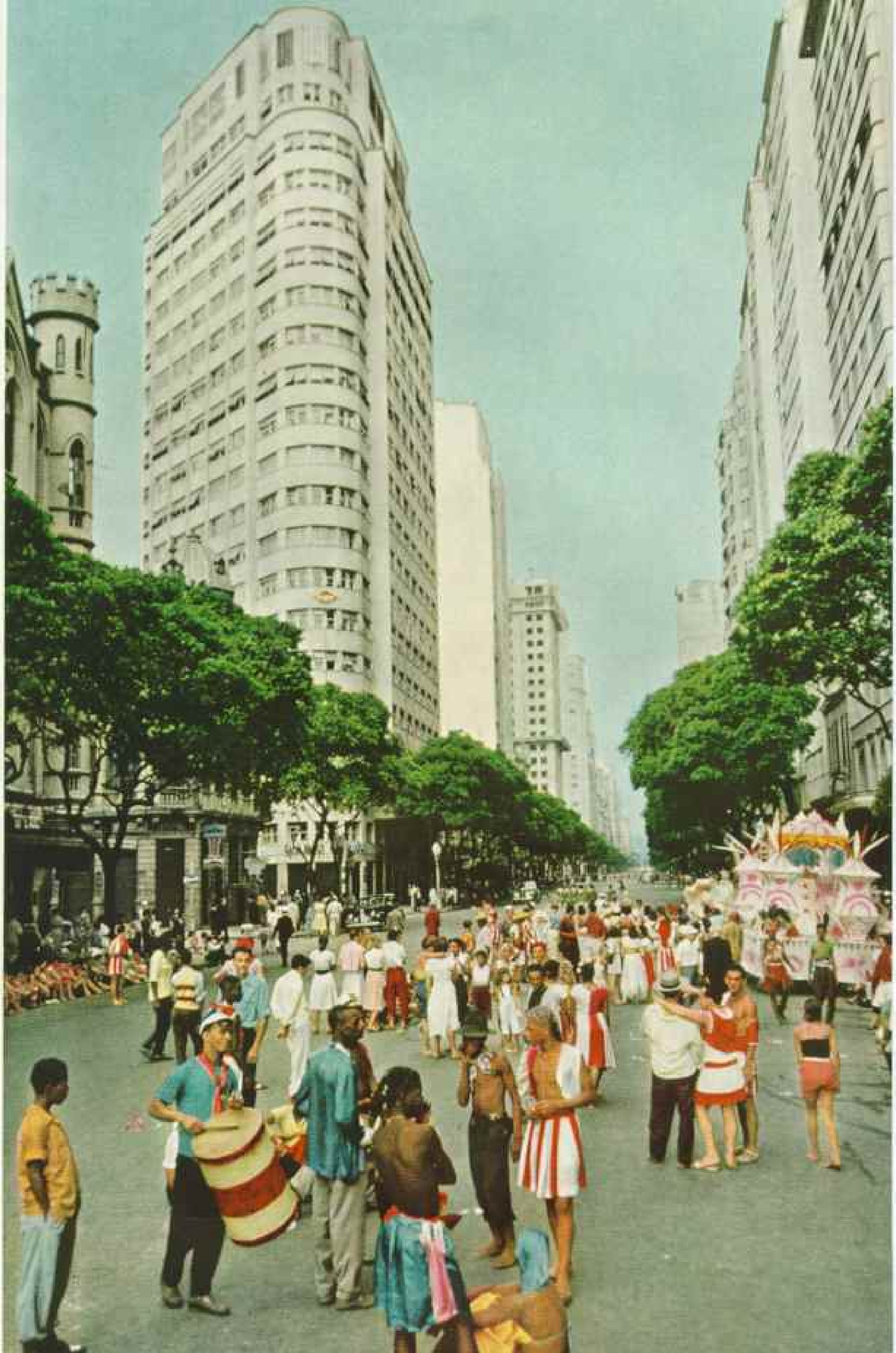
Avenida Rio Branco Before the Parade Suggests the Calm Before the Storm

Rio's Carnival originated in the 17th century as a coronation festival for a Portuguese king.

Planning for Carnival goes on all year. The best artists design floats, costumes, and ballroom decorations. Their elaborate creations, subsidized by the Government, portray themes suggested by news events, movies, and literature.

These marchers congregate at dusk before the grand parade on Ash Wednesday eve. The broad avenue, cleared of all but official traffic, will soon pulsate with samba dance and song as floats (right) start moving.

Kodachrome by Charles Allmon, National Geographic Staff



High Jinks Rule a Midnight-to-dawn Jamboree at the Copacabana Palace Hotel

Many Rio residents and visitors do most of their Carnival celebrating at hotel parties. Police each year decree what types of beverages may be sold. Beer and champagne are usually the strongest allowed.

307 Kodachrome by Charles Allmon, National Geographic Staff

Matador and Raja, Clown and Show Girl, Pirate and Pixie Color the Carnival Picture

During a recent Carnival evening the author made a survey of the Copacabana Palace Hotel. Pushing through 14 crowded ballrooms, he saw 10 orchestras at work, many playing the same hit tune over and over.

Vivid Parasols Mushroom on Arpoador Beach, One of Rio's Front-yard Playgrounds

Having the Atlantic on their doorstep, Cariocas make the daily swim a habit. Their beach umbrellas are standard equipment in nearly every home. Two Brothers mountain guards distant Leblon Beach (page 293).

Kodachrome by Charles Allmon, National Geographic Staff

Sun, Sand, and Surf Call Cariocas by the Thousands on a Sunday Morning

City life guards, stationed every few hundred yards along the beach, protect bathers. When currents run strong, guards fly red flags to prohibit swimming. Few days in the year are too cool for a dip (page 310).

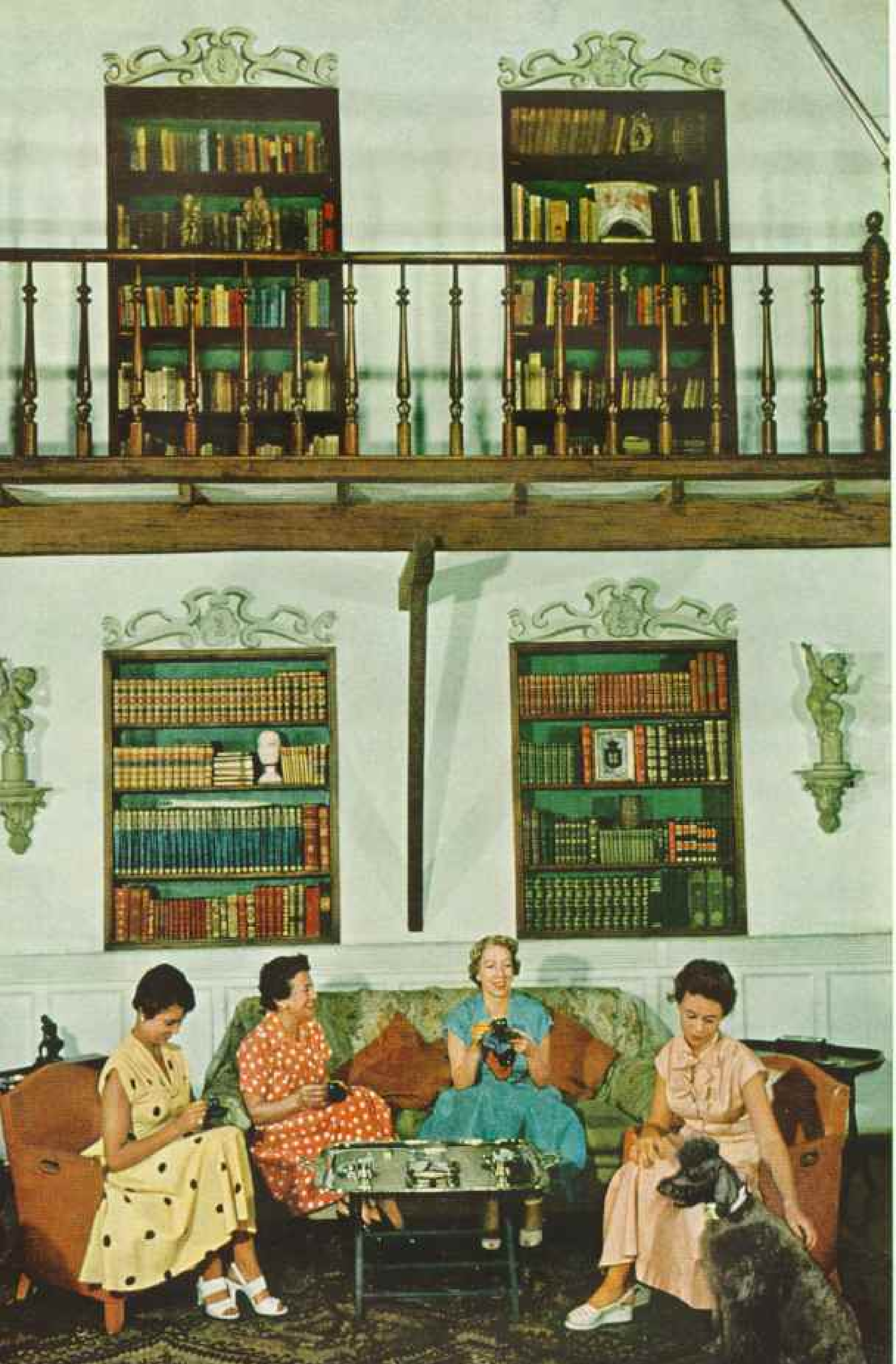
311

Granite Cliffs, Skyscrapers, and Probing Sea Clamp Rio in a Spectacular Vise

Building lots in this southern section bring premium prices. To expand, the city levels mountains and reclaims land from bays such as Botafogo (right).

Vermelha (Red) Beach lies just below these sight-seers on Sugar Loaf. Two-mile-long Copacabana Beach makes a sweeping curve on the left. Corcovado rears at right.

Page 310: Apartment buildings rise in uniform height along Leme and Copacabana Beaches.



opinion, for he held a flashlight in each hand.

Soccer is such an important concern for the masses of the people that the surest way to build up a newspaper's circulation is to hire a couple of top sports writers. In fact, there are weekly newspapers that dedicate most of their space to soccer.

Incidentally, visitors are always amazed by the large number of Rio's dailies. Precise statistics are not easy to give, since newspapers are always sprouting up or fading out, but the average number is 25. Anyone with a bowing acquaintance with the language needs only a casual glance at one of the innumerable newsstands to be certain that freedom of the press is a reality here, even to the point of raucousness.

Almost as popular as soccer is *jogo do bicho*, the "animal game." This version of the numbers game goes back to 1892, when Baron Drummond, director of Rio's zoo, devised it as a way of spurring attendance. Each Sunday he offered ticket holders a chance to win 20 times the price of admission by guessing which of 25 animals he had concealed in a covered cage.

Baron Drummond's zoo became the most popular place in Rio on Sundays, and his animal game quickly became Rio's most eagerly patronized form of gambling. It spread countrywide, and I suppose that today three out of four Brazilians indulge regularly, despite high disfavor from the authorities. The "get rich" lottery (*fique rico*), a Government concession to private individuals, was established in the hope of displacing jogo do bicho. But it has never accomplished that aim despite its own popularity (page 318).

In barbershops, offices, and factories, the *bicheiro*, or bookmaker, makes his morning rounds and returns in the afternoons to pay off the winners. The zoo no longer figures in the game, and the animals are today represented by numbers.

But government is Rio's main concern, and will so remain until the nation's capital is eventually transferred to the central plateau as the Constitution provides.

Meanwhile, the Federal agencies here are served by a working force of more than 100,000. Some of the Ministries occupy huge buildings harboring the equivalent of a small town's population; but Government machinery has expanded so fast that entire floors of downtown office buildings are rented to shelter the overflow.

Alongside the Federal Government, the municipality has an imposing bureaucratic machine of its own, employing some 60,000.

Like Washington, Rio de Janeiro is located in a special territorial and administrative unit —equivalent to the District of Columbia— called the Federal District. Rio's mayor, whose official title is Prefect of the Federal District, is appointed by the President of the Republic and lives in Guanabara Palace, at the end of a street famous for its double row of towering royal palm trees.

Nation and City Share Bills

Both nation and city have a hand in running the capital. The Federal Government foots many of the bills: it pays for Rio's public lighting system, fire department, and most of the police force. On the other hand, the city government maintains numerous schools, runs several hospitals and sanatoriums, the Opera House, a children's theater, and the enormous soccer stadium.

The city's public works department boasts a distinguished woman engineer, whose achievements include the Canoas scenic highway. It climbs spectacularly along Gávea mountain range, resting on nothing but improbably slim pillars of reinforced concrete.

Perhaps the most imaginative and fast-working branch of the city's administration is the one charged with laying out gardens and parks. Under the guidance of Roberto Burle Marx, landscape architect of international fame, gardens of remarkable beauty and ingenuity have been scattered throughout Rio (page 317).

An unexpected feature of Rio's municipal government is that it includes a Department of Agriculture. The reason is that Rio de Janeiro is still far from occupying the Federal District's 450 square miles, of which 60 percent is still forest land and 10 percent is given over to farms.

Rio has always been a cosmopolitan city,

Page 312

← **A Carioca Hostess Serves Coffee, Brazil's National Beverage**

Mrs. Hubert Winans (in blue), Brazilian wife of an American, entertains friends in her home, a Rio show place on the flagstoned Largo do Boticário at the foot of Corcovado. The house, a fine example of Brazilian colonial architecture, combines three small dwellings. Books stand in windowlike alcoves. The dog is Mademoiselle, the Winanses' French poodle.

↑ **A River of Molten Steel Cascades from Open Hearth to Ladle at Volta Redonda**

Brazil's high-grade iron ore reserves are among the world's richest. To use this wealth, Brazilian and United States capital combined during World War II to build Volta Redonda, a steel city 60 miles from Rio de Janeiro. At capacity the mills can produce 600,000 tons of rolled steel products a year, enough to supply a third of Brazil's needs. This metal bubbles at 3,000° F. At tapping, the workman on the right tosses alloying metals into the ladle according to the composition required by the buyer.

↓ A crane having guided the ladle across ingot molds, this worker opens the nozzle with the rod and pours steel.

↑ Cotton Ropings Feed a Drawing Frame

Brazil's textile industry supplies nearly all her needs. Cotton cloth production employs one-fourth of the nation's industrial workers.

In this drawing process, half a dozen loose ropings are joined and pulled into a single uniform sliver. The new roping (not seen) is no thicker than any of its original parts, which are here feeding into the machine. After twisting, the product is called yarn.

Finished Tiles Roll → Off the Assembly Line

Rio's tile factories are booming because architects increasingly employ tile as decorative insulation against heat. For the Ministry of Education Building (page 300), a Brazilian painter designed a 40-foot-long wall of tile.

These white squares are made of pulverized clay compressed in a mold. They have just been fired and brushed clean by the machine in center. Workers pack the tiles for shipment.

and her youth today displays an intense interest in everything from the United States. Youngsters practice American slang and memorize the lyrics of Broadway hits; on the newsstands they buy a steady diet of American comics in translation.

U. S. Movies and Merchandise Popular

Movie houses show a wide variety of French, Italian, British, Swedish, and Brazilian films. Nonetheless, the Hollywood product continues to be the favorite by all odds.

The American colony in Rio is small. Of some 200,000 foreign-born residents, only about two percent are American. The role they play, however, cannot be measured in terms of their numbers. American business enterprise and initiative are much in the public eye.

If you ask a Carioca what he thinks of the operations of American firms in Rio, he will probably base his answers on his own private opinion of Kibon and Sears Roebuck. Kibon sells ice cream (page 300), and Sears sells almost everything else.

In the mountain town of Petrópolis, 30 miles from Rio, Americans will find a tie between their country and Brazil that may surprise them. Here in the palace built by Emperor Dom Pedro II they may see, among the imperial jewels and treasures, one of the earliest telephones.

Dom Pedro was a scholar, much interested in scientific development. In 1876, while visiting the Philadelphia Centennial Exposition, he became fascinated by the newly invented telephone, which he found on display. He spent a great deal of time studying the device and talking to the inventor, Alexander Graham Bell. Partly because of the Emperor's keen interest, the telephone was moved to the judges' hall for further tests and became one of the biggest features of the exposition.

Seeing the City by Night

A few weeks ago I had to go on an expedition into the São Francisco Valley, a remote area centuries removed from the rest of Brazil and now trying to catch up through the harnessing of the river's mighty falls at Paulo Afonso and the opening up of a 1,000-mile stretch to modern navigation.

The plane was to leave at daybreak, so my wife and I decided to stay up and explore Rio through the night hours.

By 10 p.m. we were at the very end of Copacabana waiting for the second show of the Pocket Theater (*Teatro de Bolso*) to begin.

While Rio hasn't yet made up her mind whether to have night clubs or not, the theater has been showing increasing vitality. The city has a score of night clubs, mainly in the Copacabana area, that teeter between success and failure, but even the more obscure playhouses attract good audiences. From April to November—the cool months of glorious weather—theaters offer a wide choice of plays, from musicals through Cocteau to Shakespeare.

The Pocket Theater, with 261 seats, is perhaps the tiniest in Rio, but certainly not the most obscure. A good cross section of Rio's cafe society was on hand to see the play, a political satire written and starred in by Silveira Sampaio, an established pediatrician who gave up his medical practice to immerse himself in the theater.

Such cases are not uncommon. With the mushrooming of little theaters and experimental groups, one of which is composed entirely of Negro players, there are now attractive careers opening for playwrights and actors.

Ex-marine Directs Symphony Orchestra

When it comes to music, Cariocas will inform you proudly that Arturo Toscanini conducted here for the first time. The sumptuous Municipal Theater imports the best that Europe and the United States have to offer in grand opera and ballet. The symphony orchestra is fast gaining world-wide recognition under Eleazar de Carvalho, an ex-marine who studied under Sergei Koussevitzky, the Boston Symphony's late conductor.

When we left the Pocket Theater, one of the latest additions to this long tradition in the lively arts, it was well past midnight. We drove through Copacabana, pulsating with light and movement, and went all the way to the downtown district, almost 10 miles away.

Avenida Rio Branco, the city's most important thoroughfare, lay deserted and still. Its opening in 1906 marked the beginning of Rio's transformation into a modern city. The Avenida was quickly built up with structures of four to six stories, many of them sporting gaudy turn-of-the-century façades.

In recent years most of these have been replaced by office buildings averaging 20 stories. Many are built around a concrete structure, not a steel skeleton.

Brazilians take pride in the fact that Rio and São Paulo have erected the world's tallest

Kodachrome by Charles Allmon, National Geographic Staff

With Each Splash of Paint, a Landscape Architect Visualizes a Garden Ablaze with Color

Roberto Burle Marx (left) designed grounds for the new United States Embassy in Rio de Janeiro.

← A Young Carioca Buys a Chance to Get Rich Quick

Rio residents have been known since pioneer days as *Cariocas*, a word presumably derived from an Indian expression meaning "white man's home."

Even shopgirls earning as little as $40 a month save enough to buy a ticket on the Government-taxed lottery (page 313).

reinforced concrete buildings. Although this is not a Brazilian invention, the techniques were advanced here, and now foreign engineers come to Brazil to learn about concrete structures.

The Brazilian School, one of the world's most imaginative and impetuous movements in architecture, made its start here in Rio some 20 years ago.

Now housing projects, schools, hospitals, factories almost invariably embody the once-revolutionary innovations of the Brazilian School—daring use of reinforced concrete, lifting of buildings on stilts to free the ground space, slanted louvers for keeping out glare and heat, imaginative use of traditional materials such as hand-painted tiles.

On the other hand, some venerable buildings survive. Still serving as the General Post Office is the palace that was the seat of government during the Empire—from independence in 1822 to the advent of the Republic in 1889—and before that the palace of the Viceroys during colonial times. Another old imperial palace is now a museum. Its spacious grounds, a public park, contain the city's zoo.

At one end of Avenida Rio Branco the docks begin, and we could see the ghostly shape of a transatlantic liner. Rio handles 5,000 ocean-going ships a year. Foreign trade is vital to Brazil, and the sea is the country's lifeline.

In brilliant moonlight we wandered on, through narrow streets that seemed to lie dreaming in some remote lost century. The silence was broken only by our footsteps, and then suddenly by the soft song of two young Negro boys, walking slowly, arm in arm.

New U. S. Embassy Wears Sunglasses

Presently we found ourselves upon the Esplanada do Castelo, a wide expanse of ground where Rio's newest downtown district came into existence over the past 25 years. The hill

that stood here with colonial ramparts on its summit (hence the name Castelo) was razed, and the reclaimed area was turned over to office buildings and Government bureaus.

On this historic site three Brazilian Government Ministries rise close together. One is the 12-year-old Ministry of Education, still considered one of the more daring examples of modern architecture (page 300).

From here we strolled to Avenida Presidente Wilson, where the United States Embassy stands. Near by is a small square in which a bronze lady holds the Stars and Stripes and the Brazilian flag, a monument to American-Brazilian friendship.

The new Embassy building, a square-cut structure rising 12 stories, was completed only two years ago. Because of its greenish, glare-reflecting windows, it is sometimes called the Rayban building, after a popular make of sunglasses.

With daybreak close at hand, we retraced our steps to the very edge of the Esplanada do Castelo, where Santos Dumont Airport juts into the bay on a man-made peninsula.

Partly because of the immense distances in Brazil—larger than continental United States by another Texas—Santos Dumont has become one of the world's busiest airports. During daylight hours planes fly in and out incessantly, and traffic is heavy up to midnight. There are more than 70,000 landings and take-offs a year, close to 200 every 24 hours.

Many of the million-odd airplane passengers who pass through here each year are within walking distance of the place where they work, for this airport literally rubs shoulders with the downtown business district (page 296).

On the terrace of the airport's swanky restaurant we sat and drank *café com leite* (coffee with milk) and watched the sunrise before I boarded my plane. A streak of silver broke the darkness first, as light caught the waters of Guanabara Bay. Then the black hulks of the mountains across the bay were shot with purple and orange and crimson as the sun claimed the day.

Copacabana—City Within a City

Behind the dazzling sea front the residential district of Copacabana, Rio's most popular, spreads out. Or, rather, it is squeezed in, for it is really a strip of land compressed between ocean and mountains. Some of the streets run inland a few hundred yards, then come up smack against the granite flank of a morro rising almost vertically.

Mecca for visitors from all parts of the

Brazil's President → Examines Gifts of Stuffed Animals

João Café Filho means John Coffee, Jr., a name as appropriate for a Brazilian President as Mendès-France is for a French Premier. Vice President Café Filho became Chief of State in 1954 following the death of President Getúlio Vargas. He is a former journalist.

Here at his home the President holds a cayman beside a toucan, a fruit-eating native of the tropical New World.

Jean Manzon, Pix

Brazil's Senate: Once a Show Place of St. Louis, Missouri

Ornate Monroe Palace, named for the fifth President of the United States, housed Brazil's exhibits at the St. Louis Exposition in 1904. It was disassembled, moved to Rio, and reconstructed here facing Floriano Square (page 302). So many movie houses flank the square that Cariocas call the place Cinelandia.

←Page 320: To build Avenida Rio Branco, engineers slashed through a tangle of narrow streets in the manner of Napoleon III's workmen, who built the magnificent boulevards of Paris. The job was completed in 1906.

↓ Narrow Lanes Forbid All but Foot Traffic

United States-style department stores are a recent addition to Rio, but specialty shops, such as these on Rua Gonçalves Dias, continue to flourish. Most women have their better dresses made to order. The street serves as a fashionable promenade as well as a shopping center.

Kodachromes by Charles Allmon, National Geographic Staff

world, and for the vast majority of Brazilians as well, Copacabana accepts her role with easy, almost indifferent, grace.

The first and strongest impression of Copacabana, here at water's edge, is still of Nature, not of man. Elsewhere in Rio you find yourself time and again on the shores of Guanabara—breath-taking, wind-swept at many points, yet still landlocked. But if you live on Avenida Atlântica, the luminous South Atlantic Ocean foams at your doorstep.

Gay Blades Help Fishermen Draw Nets

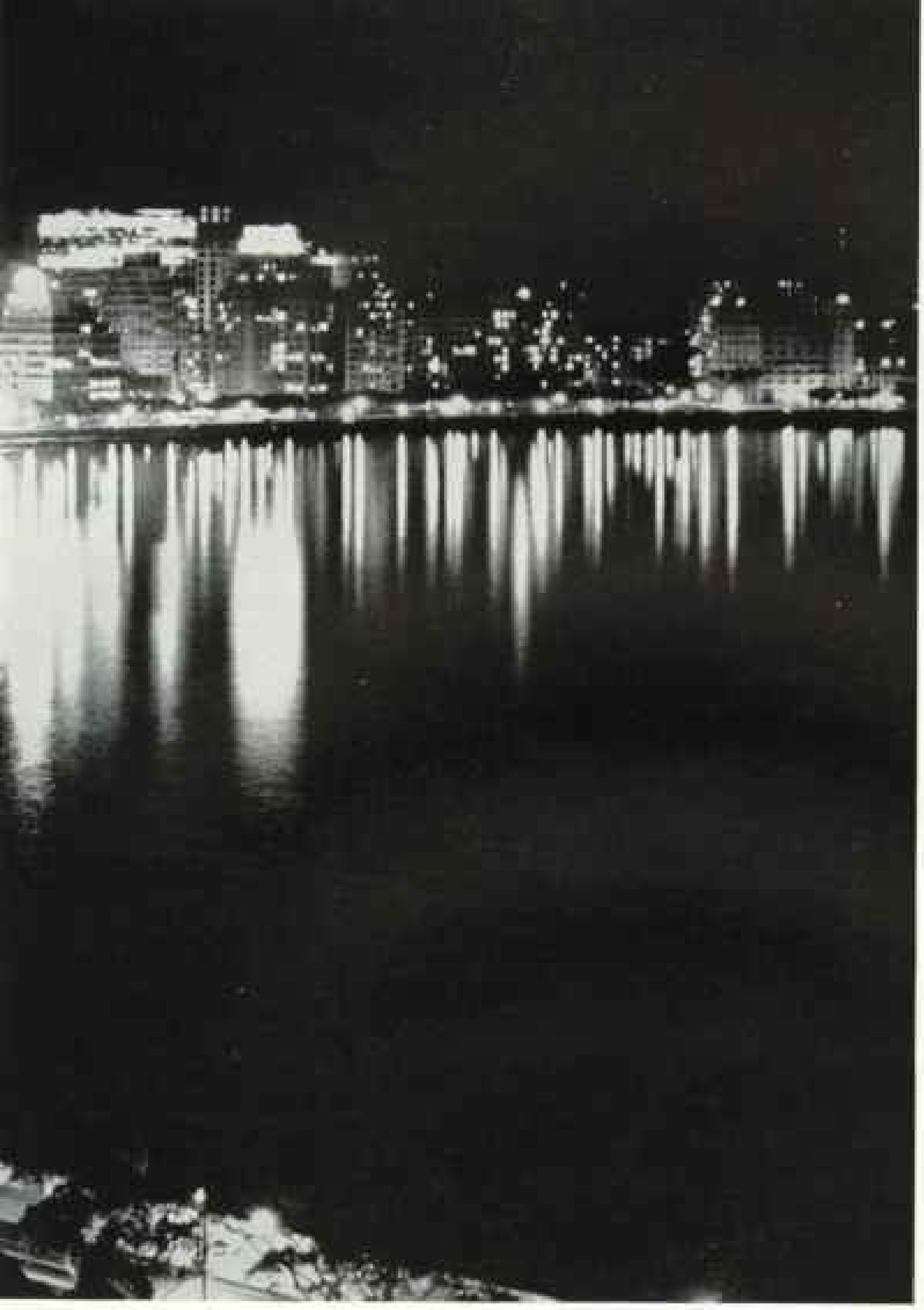
No wonder so many people want to live here that the villas and bungalows that bordered the avenue have been torn down in recent years to make place for apartment buildings, now forming an almost solid concrete phalanx facing the sea (page 310).

On the sands of Copacabana fishermen still set out in their narrow boats trailing a long heavy net, an incongruous note harking back to the 1920's when the beach was only solitary dunes and fishing was Copacabana's main concern.

It is not unusual, on a late afternoon, to come suddenly upon the scene of wet, bronzed fishermen pulling in their day's catch. Often as not, helping to haul the net will be a number of well-dressed *granfinos* (members of cafe society), their cars parked by the shore.

A quarter of a million people have crowded into this district; so private houses are rapidly disappearing, as they have on Avenida Atlântica. Everywhere you are surrounded by apartment houses in different stages of construction; a friend pointed out to me 11 brick and cement skeletons that could be seen from his living-room terrace.

Some of the poor and a few of the very wealthy live in Copacabana, but on the whole it is an upper-middle-class district. The typi-



Guanabara Bay Echoes the Nighttime Glitter of Downtown Rio

Claimed from the bay, Avenida Beira Mar sweeps past Rio's commercial district and borders Paris Square (left), similarly built up from water. A sea wall edges the avenue.

Pan American World Airways System

cal dweller is a Government official, a business executive, a professional man. There are also a great many foreigners: thousands of Europeans, many of them Jews who fled the Old World in the 1940's, a few British (most prefer less crowded sections), and a good portion of the American colony.

Some live in luxurious penthouse apartments facing the Atlantic; a few in ultramodern houses hidden from the streets by tiny walled gardens. But most live, tier on tier, in apartment buildings. Said the doorman of one of the more ornate buildings:

"It's a strange thing, the sacrifices people will make just to live in Copacabana. Our building is one of the better ones, and there is always a long waiting list. But people will take any sort of apartment just to get here.

"I have known two families to move into a tiny apartment together, sharing expenses and spending almost everything they earn on shelter, in order to have a Copacabana address. They could live much more comfortably in one of the suburbs on their salaries, but try to convince them!"

What accounts for this grip on its dwellers? In spite of all its shortcomings, all the rush, noise, and overcrowding, Copacabana has a compelling charm only fully realized by those who have lived here.

I particularly love the unique, carefree flavor of Sunday mornings there. When I walked recently toward the ocean front on one of these sunlit mornings, I overtook whole families ambling along in the same direction, dressed in swimming togs, weighed under a paraphernalia of beach umbrellas, towels, portable radios, fat Sunday papers.

I lingered at the coffee counter by the entrance, over a *cafézinho*, the tiny indispensable cup of jet-black coffee which Brazilians drink a dozen times a day, even though its price has doubled in the past 18 months (page 328). The candy counter across the way was thronged with pretty girls and bronzed youths. Some were in their beach clothes, others in their going-to-church Sunday best.

Careless Swimmers Face Ridicule

Later, when I went swimming, the water temperature was just right, and even though the waves were breaking high enough to allow surf riding, I knew there was no dangerous undertow. All I had to do was look back at the white watchtower behind me. The life guards had hoisted the white-and-green flag, which stands for safe swimming.

It is not always so, and at times a red flag gives grim warning. If an imprudent swimmer

disregards the danger signal and has to be hauled out, a small crowd gathers to watch the life guards revive him. Once the hapless bather is back on his feet, the onlookers may break into hissing and booing, wasting no sympathy on one who ignores a red flag flapping from the watchtower.

I had lunch at one of the restaurants along the beach and sat on its open-air terrace through part of the afternoon, watching the ever-changing spectacle. By 2 p.m. began the Sunday ritual of the slow drive along Avenida Atlântica, which would keep up until late at night. Glistening, purring cars, bumpers almost touching, crawled by, their drivers intent on the clusters of girls with flashing eyes, strolling arm in arm along the mosaic sidewalk that borders the sands of Copacabana.

But Copacabana is more than a setting for a Sunday outing or a fashionable residential district. It is a city within a city. Its schools, hospitals, clinics, banks, and building projects command a small army of workmen and professional people. Its many smart shopping centers, theaters, and night clubs draw crowds from all parts of Rio. A new meat market in Copacabana displays "American-style" cuts.

Swimming Midshipmen Rescue Flyers

Besides its civilian population, Rio has a military establishment of some 50,000 men from the three services. Most of the Army troops stationed here are quartered in the Military Village, a separate community in one of the suburbs, while small units garrison the forts that guard the approaches to Guanabara.

Until completion of the naval bases in Pernambuco and Bahia, facing Africa, the ships of the High Seas Forces continue to be based in Rio, where naval installations also comprise shipyards capable of turning out fighting units up to destroyer size.

The Naval Academy occupies the whole of a small island just off Santos Dumont Airport; as a matter of fact, some years ago the passengers of a plane that flopped into the bay just after take-off were rescued by naval cadets, who, by a fortunate coincidence, were receiving swimming instruction.

The Air Force also has a training school in the Federal District, and several squadrons based on near-by military fields include jets whose powerful whine has become familiar to Carioca ears.

All this makes for an abundance of smart uniforms on the city streets.

As Cariocas See Themselves

While writing this article, I spent an evening with two friends and asked what they considered significant about the Cariocas. Neither was born in Rio: like the native New Yorker, the native Carioca is a somewhat rare bird. However, both have lived here for many years; one manufactures radio sets and electronic equipment; the other is managing editor of a leading newspaper.

"Be sure to mention our gift of gab," said the journalist. "There is probably no other city where there is so much talk, followed by so little action."

"That's a typical misconception," interjected the factory owner. "Cariocas do love to talk and argue, but one reason is that they hate to write. Remember that as much business as possible is transacted by personal contact. It may be wasteful, but it adds to the pleasure of doing business.

"And don't forget that a lot of things do get done. After all, Brazil is one of the first tropical countries to make the grade as an industrial nation. Swing a globe around, and you will notice that Rio de Janeiro is one of the very few cities in this latitude with an up-to-date make-up, both physical and psychological."

Thinking over that exchange of views later, I realized how typical was the mixture of disparagement and civic pride.

To me, the city's way of life is too full of contradictions and oddities, of primitiveness and refinement, of exquisite leisure and exhausting pressures, to permit an easy summing up.

At the one end of the picture there remain, imbedded in the Negro and mulatto population, many of the superstitions their slave ancestors brought over from Africa. Black magic and voodoo are the mysterious com-

---

Page 324

← **Sight-seers Swing to Sugar Loaf Across a Green Abyss**

Sugar Loaf earned its name because it is shaped like an old-time loaf of sugar molded in a conical container (pages 291, 292, 297). The television transmitter is one of South America's first.

A cable of the car snapped in 1951, and passengers hung suspended for nine hours until rescue came.

These two groundlings watch riders going to the summit. They stand on Urca Mountain, where the second stage of the cable-car trip up Sugar Loaf begins.

Kodachrome by Charles Allmon, National Geographic Staff

↑ Golfers Keeping Eye on Ball Spare Not a Glance for Cloud-piercing Gávea Mountain

Gávea Golf and Country Club's 18 holes climb from the coastal plain through forested hills to Gávea's toe. Vistas of the blue Atlantic flash at every turn on the upper links. Here Mario Gonzales, Brazil's open golf champion, crouches as he watches a putt.

↓ Soccer, Brazil's National Sport, Packs Maracanã, World's Largest Stadium

Players are so lionized in Brazil that they live like princes on salaries that reach $20,000 a year. In their honor, composers write songs. White-shirted members of the Vasco da Gama Club here battle Flamengo (in red). A 9-foot moat protects players from scalous fans. Maracanã holds 150,000 spectators.

528 © Leopold Fiedler, Black Star

Stand-up Coffee Bar, a Brazilian Institution, Offers Businessmen a Quick Pickup

Brazil produces nearly half the world's coffee. Despite such abundance, the price in Rio doubled recently. These São Paulo men half-fill cups with sugar from the metal canisters (page 312).

ponents of the *macumba* rites, carried out in the recesses of the more remote favelas.

Special sessions, sometimes organized for the tourist, should be viewed with skepticism, since they will be diluted, tame imitations of real macumba. If, however, the visitor is in Rio over New Year's Eve, he should stroll down late at night to Ipanema or Leblon, the lovely beaches south of Copacabana. With a little luck he will see the poetical homage paid to Yemanjá, goddess of the waters. Black priestesses, clad in flowing white robes, walk to the edge of the sea to cast flowers upon the waves.

Yet Rio has three universities, plus a municipal law school, and it is difficult to find in any other city a more sophisticated, refined society, more closely integrated in the crosscurrents of Western civilization.

Construction Goes On Day and Night

In Rio some 16 buildings are completed every 24 hours. The electric saw in one going up a few doors away may dog your sleep through the night, for construction crews often work in three 8-hour shifts.

On the other hand, you can live in a house only 10 minutes removed from the horse-racing crowds at the track by the Rodrigo de Freitas Lagoon, with the tropical forest all around you, and spend a good deal of your leisure time just deciding what kinds of orchids should be grown in the garden.

Old City's Accent Is on Youth

Of one thing you may be sure. If you are young in years, or young at heart, the enchantment of Rio will grip you. The city will often prove exasperating and frustrating, but finally you will succumb to its charm, its pervading vitality, and its accent on youth.

Three-fourths of Rio's population is under 40; indeed, the visitor gets the impression that streets and parks are turned over to young couples and to children. Lovers are everywhere. With the possible exception of Paris, nowhere else does one see so many couples kissing in public. And, as in most Latin countries, kissing is not limited to lovers.

As to children, they are treated with unfailing kindness and a very special consideration, given the best the parents can—and sometimes cannot—afford.

It is difficult not to love a city that is bursting with such vitality and that believes so strongly in sweethearts and children.

Life Among the Wai Wai Indians

Smithsonian Archeologists, Husband and Wife, Find British Guiana's Pygmy-size Bow-and-arrow Marksmen Facing Extinction

By Clifford Evans and Betty J. Meggers

With Illustrations from Photographs by the Authors

FAR beneath our DC-3, British Guiana's dense jungle unrolled like a thick green carpet. Scudding above it, we could not help feeling that we were flying backward in time—back to that mysterious age before white men set foot in the New World.

Our destination was Gunn's Landing Strip, a dirt runway scratched from the wilderness in the Crown Colony's far south, almost on the Equator. Near there, along the upper Essequibo River, live the Wai Wai Indians, a remote tribe whose way of life has remained virtually unchanged through the centuries. These Carib-speaking aborigines, the only uncivilized people still left in British Guiana, are waging what is probably a losing fight against extinction or absorption. (See The Society's map supplement, Eastern South America, included in this issue.)

In Search of "Live" Archeology

My wife and I had probed many a prehistoric site in tropical South America, but our present expedition promised to be different. This time, by observing the primitive Wai Wai as well as excavating sites, we hoped to catch part of our archeology alive.

As our plane lurched to a stop in the little clearing, we caught our first glimpse of the Indians. They stood by the crude runway, their light-brown skins glistening with red paint. Clad only in the simplest of breechclouts and aprons and carrying long bows, they would not have seemed out of place in Columbus's time save for the strings of glass trade beads girdling necks, legs, and arms.

Beside these stocky Indians stood two of the American missionaries whose help as interpreters was to prove invaluable to us.

Hours later, after a hike through the "big bush" and an upriver journey by dugout canoe, we reached the missionary settlement which was to be our headquarters.

During the next few days we tried to find out about archeological sites. In response to our questions, the Wai Wai chief recalled places that had been pointed out to him when a boy as "ancient" long-abandoned villages. All had names, some simple, some jawbreakers like "Totoyoguyaotontoh."

Almost every geographic feature in Wai Wai country, even each big river bend, has its name. To us, many of them looked alike. Not so to the Indians; they can locate Totoyoguyaotontoh, or any other spot, as easily as a New Yorker can find Times Square.

At dawn several days later we loaded a dugout and embarked on our first exploratory trip. Our guide was Charlie, a civilized Wapishana Indian from a village farther north, who had married a Wai Wai woman. His English words were few, and our conversations with him were thus limited to simple ideas.

Charlie, good-natured and willing, had one big drawback: he was a poor provider. Civilization had robbed him of his native hunting prowess; he had lost the art of silently stalking game in the forest.

Whenever Charlie went off hunting, distant shots would raise our hopes. Almost every time he returned to camp empty-handed.

"What happened?" we would ask.

"Me shoot monkey," he would answer gloomily. "Him stay, hang by tail."

When provisions began to run low, we started looking for a Wai Wai hunter. Yukuma, a young stalwart, accepted the job, and we arranged to pick him up at his village early one morning. Delayed, we arrived hours late, but Yukuma had made no preparations. After all, what is time in the jungle?

Hunters Prefer Bows to Guns

Eventually our hunter assembled his baggage, after taking time to go to the field and cut a dozen sticks of sugar cane. He piled the dugout high with cooking pots, a large basket of cassava bread, his hammock, two bows, stacks of arrows, the sugar cane, and his shotgun.

A few Wai Wai, we discovered, own guns, earned by working for the missionaries. But ammunition is scarce, and, anyway, too many gun blasts frighten off the game. For daily

↑ A Barking Dog Challenges Visitors to a Wai Wai Village

Before the authors, Smithsonian Institution archeologists, studied the Wai Wai, few white men had visited this Carib-speaking tribe of British Guiana's remote rain forests. Here Dr. Betty Meggers and her Indian companions pause before Yewara village. Custom prescribes that they wait for a formal invitation to enter.

←Wai Wai man wears bangs and carries a "vanity case" to apply his make-up.

Beaded Men Feel → Fully Clothed

Page 351: Fastidious dressers sprinkle eagle down on heavily oiled bangs, shave eyebrows, and daub bodies with red.

Upper right: Pigtails, the longer the better, sport toucan and curassow feathers. Monkey teeth dangle from belts.

Women pay less attention to daily make-up.

fare the Indians rely on silent and deadly arrows. Yukuma, though obviously very proud of his firearm, often left it behind when he went hunting.

No longer did we want for fish or game. Whenever our dugout approached a sandbar where the Essequibo ran clear and shallow, Yukuma stood tense in the prow with his long bow ready (opposite). As we glided along, the string twanged and the arrow disappeared. Then the hollow cane shaft reappeared once or twice as the impaled quarry tried vainly to escape to deep water—and a large fish was added to our larder. Yukuma seldom missed.

At the first glimmer of dawn next day, when the dripping jungle rang with the melodies of waking birds, Yukuma reached for his bow and arrows and stole away. Then we heard him imitate a bird call, blowing on a leaf cupped between his hands, and a feathered creature replied. As the sounds continued, we could trace his progress under the forest canopy. Soon he returned with the too-talkative bird for breakfast, and a monkey to add its rich, sweet flavor to our evening stew.

The food problem solved, we turned full attention to archeology. We had come to the Essequibo country seeking missing pieces to a puzzle: Where did tropical forest Indians first develop such skills as agriculture and pottery making? What routes did these agrarians follow in their migrations?

Persistent Riddles from the Past

During the previous 20 years, scientists had progressed rapidly in unraveling the prehistoric past of western South America, Central America, and Mexico.* The more that was learned about these areas, however, the more persistent became the unsolved riddles. Perhaps, it was suggested, South America's jungle-clad lowlands might hold the answers.

Little archeological work had been done in this matted wilderness. We had spent a year (1948-49) in survey work and excavation in Brazil, around the wide mouth of the Amazon. Other archeologists had done similar work in parts of Venezuela. But between these areas lay the almost untouched Guianas—British, Dutch (now called Surinam), and French—on South America's northeastern coast.

We wanted to close this gap. We had already determined that prehistoric Indians did not use the coastal route around the mainland and up the Amazon as a migration highway. Did they, perhaps, work their way through the Guianas, using the Essequibo River as a natural route to the Amazon?

One by one we attacked the sites mentioned by the chief, some 30 in all. Many yielded only a handful of potsherds and other artifacts; a few were more generous. It was tedious and often unrewarding work, never producing such dramatic prizes as sacrificial altars, carved idols, or stone temples. But gradually from our pottery fragments a faint pattern of the life of earlier peoples began to emerge. To our satisfaction, it closely paralleled the firsthand picture we were getting of Wai Wai arts and crafts.

Shallow Diggings Yield Clues

By the time we finished we had determined that the area was not inhabited by pottery-making groups until comparatively recent times, probably within the last 300 years. Our diggings seldom sank more than a foot or so before all evidence of man's occupation petered out. By contrast, some of the excavations in Peru have produced artifacts from depths of 25 feet, covered with the remains left by centuries of succeeding civilizations.†

Thus we refuted previous theories that this was the original source of tropical forest culture like that of the Wai Wai. We know now that the skills of pottery making and agriculture first developed elsewhere and did not reach the Essequibo country until after European explorers came to South America in the 16th century.

So, from an archeological standpoint, the layman might regard our findings, our 100 bags of potsherds, as unspectacular. But layman and scientist alike would find the Wai Wai people exciting as an example of archeology alive.

Having neither time nor language facility to teach Charlie and Yukuma archeological technique, we did almost all the digging ourselves. If the job dragged on, we sent the men hunting; otherwise they waited.

At such times the contrast between an Indian who lives off the jungle and one who has been exposed to civilization was striking. Charlie simply sat and watched or wandered

* See, in the National Geographic Magazine: "Hunting Prehistory in Panama Jungles," August, 1953, and "Expedition Unearths Buried Masterpieces of Jade," September, 1941, both by Matthew W. Stirling; "Yucatán, Home of the Gifted Maya," by Sylvanus Griswold Morley, November, 1936.

† See "Finding the Tomb of a Warrior-God," by William Duncan Strong, National Geographic Magazine, April, 1947.

Bowman Stalks Fish from a Dugout on the Essequibo

No matter how full the larder, hunter Yukuma never missed an opportunity to acquire fresh food for the expedition. Before daybreak he disappeared into the dripping forest seeking birds, monkeys, or perhaps a tapir, largest land animal of the South American jungle.

On boat trips to archeological sites, Yukuma always readied his long bow near sand bars where swift water ran shallow enough to reveal fish. His 6-foot arrows seldom missed.

A few Wai Wai own shotguns but rarely use them because they frighten game.

➔ Yukuma decorates his legs with a plant juice of India-ink permanence. A tarpaulin covers the expedition's gear.

Kodachromes by Betty J. Meggers

334
Moving Day: Dogs Outnumber Indians in Baggage-laden Canoes

Occasionally Wai Wai villagers become dissatisfied with neighbors or worn-out land and pull up stakes. These Indians prepare to shove off for another village. Dogs are favored pets of the Wai Wai. Like apartment dogs, they are walked morning and evening; women frequently carry them to the river for baths.

aimlessly about. Yukuma, however, made little baskets from palm leaves, sharpened the wooden points of his arrows, cleaned his gun, or practiced bird and animal calls. He was never at a loss for something to do.

Frequent stops for hunting and fishing delayed our work. When supper was assured, we became annoyed at further delays to hunt; to us it looked like overstocking. A jungle Indian, however, knows that lean days follow good ones. Even when the larder bulges he neglects no opportunity to add to it.

Yukuma had a special interest in keeping us well stocked—his capacity for food was enormous. One day we kept a record of his consumption: one large bird, several pounds of smoked fish, half a huge cake of cassava bread, half a monkey, two long sticks of sugar

cane, six plantains, and large quantities of pepper-pot broth!

The Wai Wai show a keen sense of humor, and most of all they enjoy a joke on themselves. Yukuma was no exception.

Late one afternoon we returned to camp to find that a hawk, still hovering around, had helped himself to our cache of smoked fish, supposedly hanging safe in a basket from the ridgepole of our tent. Our provider doubled up with laughter, and several times during the evening he recounted the tale, chuckling with glee. What a joke! To think that a mere bird had outwitted the great hunter, Yukuma!

Signs of Tapirs at Riverbank

For us, as for the Indians, the Essequibo was a broad highway. Thick jungle, undisturbed by man, walled its banks monotonously for miles. Natural wonders, however, caught our fancy as we paddled along.

Here a bright-blue morpho butterfly glimmered overhead. There a pale-green spider crouched on his web of golden silk. High in the trees we spotted an ant nest, a lavender orchid, an oriole's cocoonlike nest. Bats clustered on the underside of a dead branch overhanging the water. Now and then along the bank appeared a slide where tapirs—largest land animals in the South American jungle—came to drink.

A heron, gleaming white in a universe of green, stood on a granite outcropping in the river eyeing a little fish skittering over the water's surface. Flights of gaudy macaws scolded incessantly as they passed overhead.

Rapids above the junction of the Kassikaityu and Essequibo Rivers added spice to our journey (page 336). Although experience gave us confidence in the dugout's strength and its ability to skim over submerged dangers, we always breathed a sigh of relief after we had left the rocks behind.

Sometimes we wished that we had a command of the Wai Wai tongue, or that Charlie understood more than a few English words, as we listened to our companions debate the wisdom of each proposed passage. Gestures and strong intonations marked the argument, while the hazardous stretch loomed closer and closer. Decisions were always reserved for the last possible moment.

One rapid barred our way three times on a certain trip. We were particularly relieved when our first try succeeded, and the second passage followed the first with happy results.

Imagine our horror, the third time, when we discovered that Charlie and Yukuma had become bored with the well-tested route and were seeking a new challenge. Again the same discussion and gesturing, the same split-second decision, and we were off on a new tilt with disaster. The fact that we came through safe is a tribute to the skillful maneuvering of the Indians, not to their caution.

Charlie often could give us only the most tenuous idea of the distance to our goal.

"Far a little bit," he would say, or, "Two bends of river."

It was some time before we discovered that only turns of 90 degrees or more were included in Charlie's definition of a "bend." By our reckoning, the goal might be 20 bends away.

As we worked our way upriver, we varied our days with visits to Wai Wai settlements, where we often pitched camp.

In all this vast tangle of southern British Guiana, there is not a living soul aside from the missionaries and the Wai Wai, who number some 60 men, women, and children. These few people live in four villages close to the Essequibo, travel by water, and seldom penetrate the jungle except to hunt. Across the Brazilian border, on the headwaters of the Mapuera River, live another 60 or 70 Wai Wai whose way of life is indistinguishable from that of their Guiana kinsmen.

In the village of Yaka Yaka, the home of our hunter, we had opportunity to examine closely this way of life.

Single Hut Houses Entire Village

A single cone-roofed hut of pole and thatch construction housed the village of 10 people. Near by stood a lean-to where, as we approached, two men were busy with their morning toilet. One repeatedly combed his long jet-black hair, dressing it heavily with palm-nut oil; then he fashioned it into a tight pigtail and encased it in a long cane tube that hung to his hips.

The other drew red designs on his cheeks, using a little wooden paddle for a brush. A boy too young for such make-up watched fascinated (page 330).

Inside the crowded hut, women garbed in bead aprons, arm and leg bands, and necklaces were grating bitter cassava, or manioc, staff of life for thousands across the Tropics of South America. No one knows how primitive man discovered the use of this brown-

River Travelers Sometimes Must Get Out and Push →

British Guiana's southernmost portion is devoid of human beings save for several missionaries and 60 Wai Wai. The authors found this last uncivilized tribe in British Guiana—an example of living archeology—practicing the arts and crafts of their remote predecessors.

Wai Wai seldom probe the trackless jungle except to hunt. For them the Essequibo is a broad highway despite its menacing rapids. They measure distances in paddling time.

Here Dr. Evans, Yukuma, and Charlie, the last a Wapishana Indian guide, push upstream through a rapid.

← Happy Angler Hefts an Easy Half-hour's Catch

Fish abounding in the Essequibo and its backwaters are taken by poisoning, angling with steel hooks, and shooting with arrows. Harpoon heads attached to strong lines are used in the rapids.

Pot Black and Seed Red Offer Sharp Contrast to a Primitive Artist

The Wai Wai lavishly smear red on their bodies, implements, and dogs because they believe evil spirits cannot see anything painted that color. They make pigments of the red coating of the urucú seed and soot mixed with cassava starch.

Although eight days by foot and canoe from civilization, the Wai Wai are beginning to feel the impact of the outside world. This Indian mixes paint in a tin can, and his wrist carries bracelets made of the seamed ends of smaller cans. His little tribe faces a losing fight against extinction or absorption.

←The tribe's chief, weaving a palm-leaf fishing creel, pays no heed to a boy notching an arrow. Pampered Wai Wai children play with large knives from the time they are able to toddle.

In Wai Wai Land the Authors Eat as Wai Wai Do, Dipping Cassava Bread into Pepper Pot

Bitter cassava, or manioc, a poisonous root, provides the Wai Wai staff of life. Women grate it into a pulp, squeeze out the deadly juice, and use the meal in crisp, thin cakes like the one shown on the woven tray. Charlie, a Wapishana Indian who guided the expedition, shares the meal. Married to a Wai Wai, he came from a savanna where Indians wear clothing. Yaka Yaka villager (right) weaves a bead apron.

skinned root, for its white flesh harbors a poison, prussic acid, that spells quick death.

But the Indians have learned how to get rid of the poison. As we watched, a Wai Wai woman stuffed grated manioc into a narrow and flexible basket shaped like a huge sausage, which hung from one of the house poles. Pulling on the lower end with a long stock, lever fashion, she stretched the basket, squeezing till the deadly juices ran out in a stream. Afterwards the flour is spread on a griddle and baked into a crisp, thin cake.

The laborious preparation of this cassava bread is a time-consuming task, and the most that a man will do to help is to sit on the lever that stretches the basket.

Among the Wai Wai there is a strict division of labor between the sexes. Men build the communal house, hunt and fish, clear land, plant, and sometimes help dig root crops. They also do all the weaving of hammocks, baskets, and cloth (opposite).

Women cook, chop firewood, tend children, make cassava graters and pottery, weave bead aprons, fetch water, spin cotton, and carry in the root crops. Like women's work everywhere, their tasks are never done (pages 345 and 346).

No walls or screens partitioned the hut's interior; each family occupied the space between two roof posts. Every compartment boasted its own hearth for cooking and nighttime warmth, the smoke drifting through an opening in the roof.

Women Tend Fire All Night

Hammocks were draped between posts. A woman's was always slung beneath her husband's, for it is her duty to keep the fire going all night.

Feather ornaments, gourds of palm oil, and baskets hung everywhere along the wall. Cassava cakes and smoked meat were piled on racks. The ceiling itself bristled with dozens of 6-foot arrows stuck in the thatch.

Lean dogs lay tethered on special platforms

built along the walls. Red paint daubed their coats, a protection against evil spirits. Although the Wai Wai worship no gods and offer no sacrifices, they believe that harmful spirits may appear unexpectedly and injure them if they do not take precautions. Fortunately, these demons suffer from a peculiar color blindness and can see nothing that is red. Thus the Wai Wai's liberal use of red paint on both dogs and humans is more than just ornamental.

Jungle Dogs Walked on Leashes

Though surrounded by thousands of square miles of jungle, the Wai Wai frequently keep their dogs on leash. Just like city apartment dwellers, they regularly walk their pets.

Late each day at base camp, as the heavy darkness began to settle over the jungle and the booming frogs and howling monkeys tuned up for the evening concert, we would spot the chief making his way into the forest, his red macaw riding on one hand and his favorite dog straining on its leash.

Hospitality among the Wai Wai demands that food be offered to visitors no matter when they arrive. Inside the doorway at Yaka Yaka a woman quickly laid a mat for us, first beating it on a dog to shake out loose dirt. In front of us she placed a large bowl of cassava starch and palm fruit, another of wine made from *cara* (a potatolike tuber) and a steaming pot of pepper broth, and cassava bread (opposite).

The broth set our mouths afire; fortunately, the starch drink quenched the flames, though it tasted about as appetizing as flour paste. The wine proved to be mild and sweet, but quaffing it was something of a feat. The lip of the heavy bowl curved inward, so that the wine flowed more easily into the drinker's nose than into his mouth.

Soon after our arrival we noticed smoke billowing from the jungle. Then, unmistakably, came the roar of flames and the crackling of brush.

On investigation, we saw Indians applying torches to huge trees that littered a clearing.

Palm Leaves, Expertly Woven, Will Thatch a Hut Securely Against the Rains

Slash-and-burn Agriculture: Indian Farmers Raise Crops in a Field of Giant Jackstraws

Like most Indians in South America's tropical forests, the Wai Wai follow a simple but rugged pattern of communal agriculture. Land must be torn from the forest by brute force, and even then the jungle never quite lets go.

Poor soil forces villagers to clear new areas every two or three years. The timber, dense and wet even after drying several months, must be put to the torch repeatedly just to get rid of leaves and small branches. Larger branches are hacked off and the trunks allowed to lie. The meager patches left yield bitter cassava, bananas, plantains, sugar cane, and a potatolike tuber called *cara*.

Fanned by a steady breeze, leaves and smaller branches were blazing.

We had happened on a battle, one engagement in a war that has continued between primitive man and the all-consuming jungle for untold ages. The prize was a few acres of tillable land (opposite).

Wai Wai slash-and-burn agriculture is rugged work, requiring a man to be lumberjack as well as farmer. The poor soil wears out in two or three years. Then villagers must move, hack new clearings in the forest, and build another settlement.

Even with steel axes, felling the hardwood trees is a giant task. After burning off the smaller growth, men must spend days chopping branches from the fallen trees.

Fields Used, Then Abandoned

Ready to plant, a field remains strewn with stumps, and big trunks lie everywhere like giant jackstraws. Crops—manioc, sugar cane, cara, bananas, and pineapples—are planted helter-skelter among them; further clearing would be a waste of time and effort, since the land will be abandoned so soon. Almost never do the Wai Wai return to a previous site.

Perhaps because their tillable land is so hard-won, the Indians could never understand why the missionaries bothered to grow flowers. The Wai Wai do not even have names for individual flowers, although they have a name for every animal, bird, and fish.

Natural Wai Wai courtesy to strangers is shown in many ways other than the quick offering of food. One of the most welcome is the privacy they allow visitors.

During other expeditions our privacy resembled that of the proverbial goldfish under the curious stares of primitive peoples. This was never true on the upper Essequibo.

When we first hung our hammocks under a lean-to at Mawiká, not even the smallest tots came to stand and stare. This reflected no lack of interest, however. Whenever the time seemed proper, the Indians took full advantage of the opportunity to observe.

One of our camps was perched on the riverbank beside a path leading from a village. Several times a day all the women trooped by to bathe or fetch water, each carrying on her hip an infant, a puppy, or an older child who preferred riding to walking.

Often the entire company stopped at our camp to rest and to marvel at our camping equipment. Even the simplest gear caused excited whispers and expressions of wonder. One woman was fascinated by our canvas bucket; on every trip she stopped, full of unbelief, to see if it still held water.

Our Primus stove captivated another aboriginal housewife. She used to show up just at mealtimes to watch it perform. Once she brought her husband; from her excellent imitation of the sound effects we could tell that she gave him a complete description of its workings.

All the Wai Wai eagerly accepted the opportunity to look "through" the ground-glass focusing plate in our camera. To see people upside down drinking out of a bowl and not spilling the liquid was a phenomenon they never tired of watching.

The Indians were much impressed by the size of white people (we stood a good foot above most of the Wai Wai) and told us that they envied our height. Amusement, too, was evident: One Indian cut a straw to the length of Cliff's foot and entertained his fellows hugely by comparing it, in clowning fashion, with his own.

Many things we did struck the Wai Wai funny bone. Usually it was when we inadvertently copied one of their customs. Once the chief caught us eating smoked meat with our fingers, as the Wai Wai do. Apparently the sight appeared as ludicrous to him as the scene he might have made dining at the Waldorf would look to us, for he doubled up with laughter.

Another time we were forced by steep terrain and lack of suitable trees to hang our hammocks one above the other in the style of a Wai Wai couple. That sent the village into gales of laughter: everyone turned out to see that Betty's hammock was properly at the bottom.

Fishing with Poison

One morning as we arrived at an archeological site, we noticed several dugouts tied to the shore just ahead and peculiar activities under way at a near-by pond.

"Me not know," said Charlie in response to our queries; so we went to investigate. When we found that a group of Wai Wai were preparing to poison fish, we decided to watch and let archeology wait a few hours longer.

The Wai Wai had gathered quantities of a vine, one of more than a hundred poisonous plants which South America's Indians know

← Pendants in a Young Man's Necklace Are Brazilian Census Tags

Page 342, upper: Discovering that their cara tubers (page 340) were in danger of spoiling, Yewara villagers turned the surplus into wine and called a marathon festival. On the appointed day shouts from the river announced the arrival of kinsmen with their dogs, hammocks, and cooking pots.

The festival lasted the better part of three days and nights. Time out was called only to let celebrants sleep off their exhaustion. A shuffling, circling dance that filled waking hours was punctuated by shrill whistles and howls and frequent pauses for drinking.

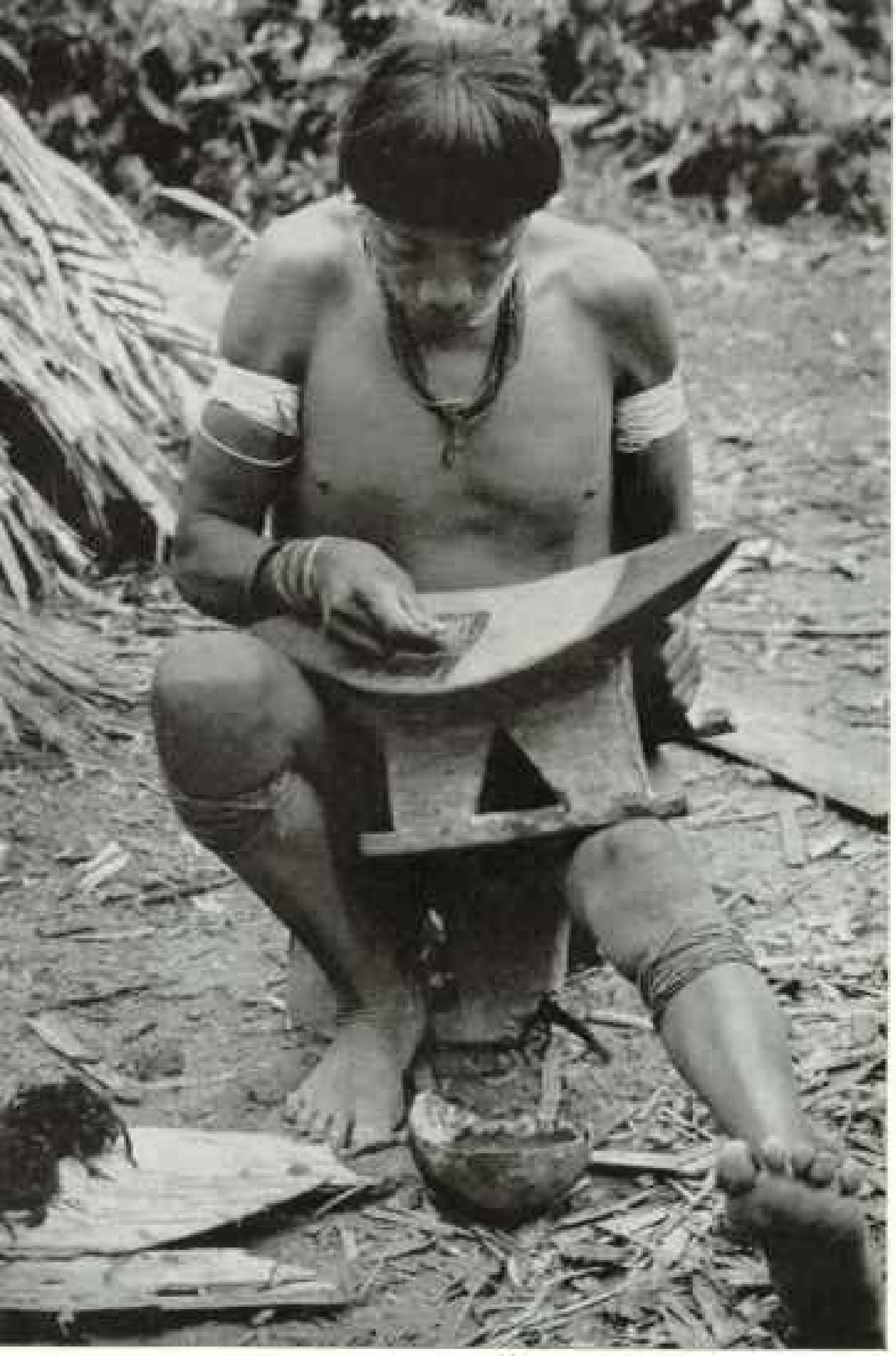
Lower: Two small boys entering the hut dress in their fathers' discarded palm-frond capes. A heel betrays one lad camouflaged from head to ankle.

This pole-and-thatch hut houses the entire village, one of four in British Guiana's Wai Wai land.

Kodachrome by Clifford Evans

↑ Young Man with a Horn Tunes Up for the Festivities

Bark horns, rattles, and reed flutes provide noisy rhythms for the interminable dancing. This youth encases his pigtail in a cane tube to conceal hair that has not yet grown to coveted waist length.



344

Carver Fashions a Stool to Be Used by Men Only

Despite their isolation, 16th-century Wai Wai obtained European trade items from other Indians. Ever since, they have carved with steel rather than stone. This man, the tribe's best stoolmaker, can cut a log into a shaped seat within a day's time, using only machete and knife. Here he decorates his handicraft with soot-and-starch paint. Women sit on mats (opposite).

and use. Beaten to a pulp, the vines were placed in a palm-leaf basket and sloshed vigorously through the water, leaving a wake of milky sap.

Hardly had the Indian passed with his basket of death when small fish began to pop to the surface, gasping and turning over on their sides, for the sap paralyzes the gill action of the fish.

Then the excitement began. If someone tried to grab a fish, it showed sudden vigor and evaded capture. So the Indians set about freely with machetes and butcher knives, stunning their prey. Charlie echoed a typical fisherman's reaction when he muttered, "No good," but the Wai Wai found the tiny fish a welcome addition to the evening's pepper pot.

As our work drew to an end, we learned of plans for a Wai Wai dance. The village of Yewara, finding itself overstocked with cara, decided to convert the tubers into wine and invited tribesmen from the other three villages for a celebration. We shared the invitation.

Late on the appointed afternoon we heard shouting downriver, and soon laden dugouts streamed into the Yewara landing. Dogs, children, hammocks, bundles of palm fibers, cooking gear, and food were pitched on the bank, and the visitors began to set up camp.

All the while, to our surprise, neither visitors nor hosts gave the slightest recognition to each other. Several of the Yewara villagers came down to the river for water, but they filled their jars just as if the overcrowded bank were empty. By Wai Wai custom the time had not yet come to greet the guests.

Amid the hanging of hammocks and kindling of cooking fires, men busied themselves weaving costumes for the dance—long capes of palm leaves and shoulder fringes of yellow fronds. Both sexes took painstaking care in decoration, applying fresh coats of paint, exchanging everyday aprons for fancier garb with feather fringes and tassels, and sprinkling the white eagle down in their well-oiled bangs. Much testing of bark horns, made for the occasion, filled the air with raucous counterpoint (page 342).

Dusk fell; preparations were completed, and the visitors sallied forth to call on their hosts. Returning in the darkness, they donned dance costumes and again climbed the path to the village. We crouched with them at the edge of the clearing, wondering what sign would call them to emerge.

In the fire's dim light we could distinguish the men of Yewara, togged in fancy feather headdress, streamers, and leg and arm bands, as they circled the clearing in single file, keeping time to a solitary gourd rattle in the hands of the leader.

For a quarter of an hour we watched in

silence. Finally came the signal: the dancers stopped in front of the communal hut and stood in a line facing the cleared area.

Our party filed out in two lines, one for men, one for women. Amid the blaring of the horns and the insistent beat of the rattle they joined in the shuffling tempo, first clockwise, then counterclockwise. At intervals all the dancers broke out in shrill whistles and howls; now and then a cane flute replaced the horns, and a harmonica blown haphazardly added to the racket. Through it all babies slept unconcerned in their hammocks or in bark slings draped across their mothers' shoulders.

This was the Shoreweko Dance. So far as we could learn, any symbolic or religious significance was lost beyond the reach of memory; it is preserved purely as a social affair. But what it lacked in meaning it made up in endurance.

Every half-hour at first, and more frequently as energy waned, a large bowl of purple wine passed among the celebrants. At 4 in the morning the night's festivities came to a halt, and only then because of a heavy shower.

Chips of Stone Driven into a Spongy Board Make an Effective Cassava Grater

British Guiana's savanna Indians subsist on cassava meal, but they have lost the art of making cassava graters. For these they must rely on the more primitive Wai Wai. Charlie (page 338) periodically makes trips "outside" to swap Wai Wai graters for beads, knives, and other trade items. When this woman finishes her tedious task, she will apply a coat of milky latex to keep the chips from falling out.

346

Lacking the Potter's Wheel, Indians of the Americas Make Vessels from Coils of Clay

Essequibo clay, rolled between the hands and coiled in layers, is shaped with the fingers and scraped smooth with a piece of gourd. Baked in an open fire, it makes serviceable pottery. Scraps of such vessels uncovered by the authors provide chief evidence of the Wai Wai's predecessors.

Hardly anyone stirred out of his hammock the second day; the night's exertion had been too much. But by dark the dance resumed, and again the third day from noon to dusk.

As the Shoreweko came to a close, so too did our life with the Wai Wai. It was time for us to return to Georgetown, the capital of British Guiana.

We had come to the upper Essequibo by air, in an hour and a half. We returned afoot and by dugout, enduring eight days of exhausting travel before the tropical forest gave way to the savanna and contact with civilization.

As we ended our excursion into the past, we had ample time to reflect on the life of these simple and friendly folk. We can stoutly echo the words of an early English explorer, Robert Harcourt, whose book, *A Relation of a Voyage to Guiana*, described in 1613 this region and its people: "The naturall inhabitants of that Countrey are a loving, tractable, and gentle people . . . with those barbarous people we may live in safety, without suspicion of trechery, or dread of danger. . . ."

What of the future of the Wai Wai? An epidemic of smallpox or measles could wipe them out, as it did their predecessors, the Taruma. And even though they maintain their slim numbers, they can scarcely avoid powerful influences from the outside world, far away as it is. Already the pottery vessel is giving way to the white man's enamelware, and an oil tin takes the place of the time-honored earthenware griddle. In any case, few men in years ahead may see the Wai Wai as we saw them.

Giant Brazil Dominates the Newest National Geographic Map

EVEN the first quick glance at the National Geographic Society's latest map, Eastern South America, reveals why United States Secretary of the Treasury George M. Humphrey recently said, "If I were a young man again, I would go to Brazil."

Gigantic Brazil, dominating the map, shows the earmarks of a land of opportunity. Well-populated East contrasts with challenging open spaces in a West as wild as that of the young United States. New towns and airports are springing up so far in the interior that people there are familiar with planes but many have never seen a train.

In some places low-flying planes have been fired at—and hit—with Indian arrows. Yet along the Atlantic coast there are cities like glittering Rio de Janeiro that were more than 200 years old when Washington, D. C., was born. Rio itself is shown in detail in a large-scale inset prepared by The Society's cartographers chiefly from engineers' surveys (see "Spectacular Rio de Janeiro," page 289).*

Flying Camera Maps Jungle

For members throughout the world, The Society has produced 2,181,050 copies of this newest 10-color map, a supplement to its March Magazine. Thanks to aerial surveys and the cooperation of countries shown, it portrays Brazil and its neighbors with greater accuracy than ever before possible.

Until the flying camera reached it during World War II, much of the jungle-choked Amazon Basin, which takes in half of Brazil, remained little known and inaccurately charted. In this region the new surveys have given rise to important changes. For instance, the Tapajós River, a large tributary of the Amazon, has been shifted as much as 60 miles from where it formerly appeared on maps.

The generous scale of 78.91 miles to the inch has made it possible to include many towns necessarily missing from smaller-scale maps and permitted the showing of political subdivisions of the various countries. The map, 29 by 40½ inches, bears 5,847 place names. A recurring name is Formosa, meaning "lovely" or "beautiful"; it recalls the Far East island of Formosa, which is often in the news today and also was named for its beauty.

The Paraguayan Department Presidente Hayes, which Paraguay and Argentina once fought over, honors Rutherford B. Hayes, who settled the boundary dispute in 1878. In Amazonas, Brazil, a river bears the name of another U. S. President, Theodore Roosevelt.

In southern British Guiana members will find the thinly settled jungle land drained by the Essequibo River, setting for the article on the primitive Wai Wai Indians (page 329).

Place names have been brought up to the minute. A recent Brazilian publication, part of a program to simplify names of cities and towns, reached The Society's headquarters by air mail just in time for use in compiling the map. Many places, as a result, have taken on new spellings and some even totally different names.

A special inset covering the westernmost part was necessary to show all of Brazil, whose 3,288,045 square miles surpass considerably the area of the United States without its Territories. Seven nations with which Brazil rubs boundaries, plus the three Guianas, show at least in part.

A land of immense resources, Brazil today is one of the fastest growing South American republics and also the most industrialized.

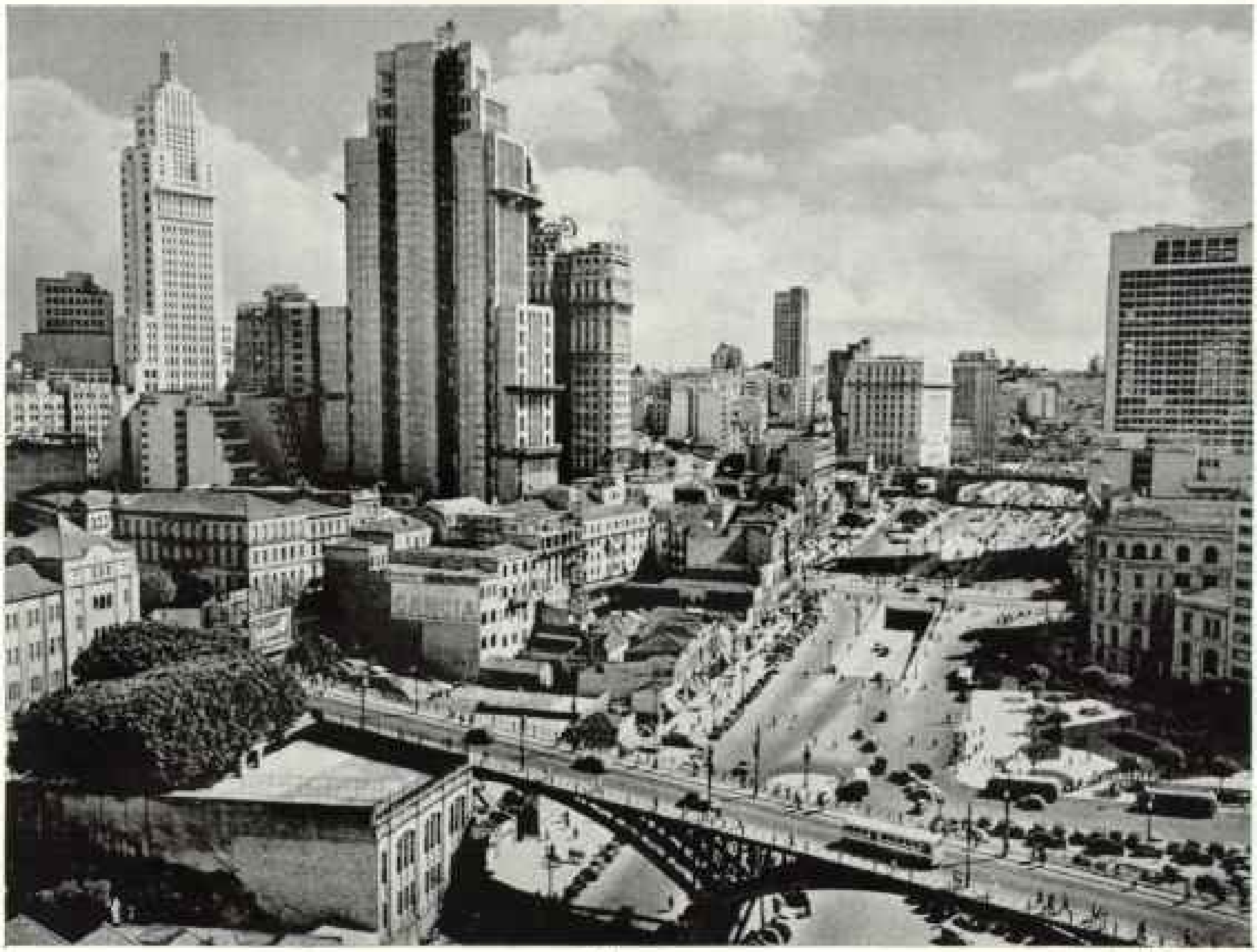
Ambitious São Paulo Grows Apace

Booming, industrial São Paulo, mushrooming at the rate of 35 new buildings a day, now is challenging Rio de Janeiro in population and hopes eventually to surpass Buenos Aires, busy capital of Argentina and largest city in South America (page 348).

São Paulo is the coffee capital of Brazil, whose coffee crop normally accounts for more than half of the world's total. The State of São Paulo produces a third of the nation's farm output as well as more than 55 percent of its manufactured products.

Though three-fourths of Brazil's 57,098,000 people still crowd within a 100-mile-wide coastal strip, they are gradually pushing inland and opening new mines and farms. The Territory of Amapá in the north has recently reported large findings of manganese, essential to the production of steel, as well as

* Members may obtain additional copies of the map of Eastern South America (and of all standard maps published by The Society) by writing to the National Geographic Society, Washington 6, D. C. Prices in the United States and elsewhere, 50¢ each on paper; $1 on fabric; Index, 25¢. All remittances payable in U. S. funds. Postpaid.



Viaducts and Tunnels Speed Brazilians to Work in São Paulo, World Coffee Capital

chromium and iron. But the country's chief mineral producer is Minas Gerais, with its iron and wealth of other ores.

In Brazil the building of roads and airports has progressed more rapidly than construction of railroads, shown by black lines. Other black symbols show oilfields and pipelines.

Map Starred with Many Airports

Red stars symbolize the biggest boost to the nation's mobility. These represent airports, around which many new settlements are being built in frontier Brazil. The total of 270 has jumped from 140 in only five years.

Red lines for highways include an extra-heavy one indicating sections of the Pan American Highway, eventually planned to run almost the length of the Americas.

Landlocked Paraguay, which for years has been almost isolated, had good reason to celebrate when direct shipping service was established from Europe in 1954 and, early this year, from the United States. Previously, goods aboard deep-sea vessels were transferred at Buenos Aires or Montevideo to river boats and railroads. But now river channels have been improved and small freighters go from the Atlantic up the Rio de la Plata, the Paraná, and the Paraguay to Asunción. Shipping time from New York has been cut from eight to four weeks.

Another river development, in eastern Venezuela, is part of a huge new mining project. The Orinoco River has been dredged as far as the new port of Puerto Ordaz to make way for seagoing carriers which haul ore from the fabulous "Iron Mountain," Cerro Bolívar, to the new United States Steel Corporation plant at Morrisville, Pennsylvania. The map shows the new 90-mile railroad built to transport ore from mine to port.

In the same area appear boom towns like El Pao and Palua, which serve the iron-mining operations of Bethlehem Steel Company. Bethlehem has been shipping ore from the El Pao district to its plant at Sparrows Point, Maryland, since 1951.

The map's depth contours and some 300 soundings give a picture of the ocean floor, notably the Continental Shelf, which is remarkably steep and narrow for hundreds of miles south of Cabo de São Roque.

America's First Painters

Indians, Who Once Painted Rocks and Buffalo Hides, Now Use Paper and Canvas to Preserve Ancient Art Forms

By Dorothy Dunn

INDIAN painting was already an ancient art when Spanish conquistadors forded the Rio Grande and moved into the American Southwest. For untold centuries aboriginal artists had expressed their reactions to their native land in pictures carved in rock, engraved on bone, painted on hides, wood, pottery, plaster, and cotton cloth—even drawn in colored sand.

Today descendants of those bygone artists use brushes and paints to revitalize the ancient themes and graphic forms.

Paintings Shown at National Gallery

A representative group of these modern works is presented in full color in this issue. They were selected from a collection of contemporary Indian art which I was privileged to assemble for exhibition at the National Gallery of Art, Smithsonian Institution, Washington, D. C.

The Indian painter poses no models, follows no color theory, gauges no true perspective. He seldom rounds an object by using light and shade. Often he leaves the background to the imagination.

By omitting nonessentials, he produces abstract symbols for plants, animals, earth, and sky. Yet he acutely senses life and movement and can convey mood or intense action with a few lines.

The typical Indian painting is, therefore, imaginative, symbolic, two-dimensional. Its style may vary from seminatural to abstract. Subjects range from archaic religious symbols to portrayals of everyday life, from stylized landscapes to spirited hunting scenes. Painters are continually inventing ways to combine symbols of sky, harvest, or life forms, or to depict a certain dance, occupation, or event.

Indian artists have encountered many discouragements and misunderstandings. Punishment and ostracism were imposed by elders of some communities that frowned on painting shared with outsiders. And, incredible as it now seems, until 25 years ago the Bureau of Indian Affairs forbade native painting in Indian schools.

The modern movement got its start on the Great Plains. Before white settlers took over this wide area, nearly every buffalo-hide tepee, robe, and shield bore vivid figures of horses and men in battles, contests, and hunts, drawn with sweep and dash (page 376).

Such decorations served as emblems of prowess in war, ceremony, or adventure. Then every man was an artist. A brave displayed a painted robe as a soldier of today wears a service decoration or insignia.*

When the buffalo herds disappeared in the tumultuous years of settlement, a new type of painting began. Frustrated Indians turned to makeshift materials.

There was heightened need in those desperate times for self-expression. Army commissary books, traders' ledgers, and lengths of muslin and canvas were filled with pencil and crayon drawings, and paintings were done with ready-made colors and brushes. These were poignant renderings of childhood reminiscenses, youthful exploits, intertribal wars of bygone days, and new battles with the common enemy—the "long knives," as the white men were called.

Indians in prison won vicarious victories and regained wishful freedom through their paintings. Following his escape from prison, one Cheyenne went into battle with his book of drawings strapped to his side. In the winter

The Author and the Paintings

Dorothy Dunn, who dwelt among the American Indians nine years, is an Honorary Associate in Indian Arts of the School of American Research, Museum of New Mexico. In 1932 she founded the School of Indian Painting, United States Indian School, in Santa Fe, New Mexico, and directed its studio for five years. Later she organized and presented exhibitions of Indian paintings in the United States, Great Britain, and France.

The Exhibition of Contemporary American Indian Painting was initiated through the encouragement of Mrs. Benjamin Rogers of New York and organized with the cooperation of various collectors and museums of the United States. Before the Indian paintings were shown at the National Gallery of Art in 1953, Chief Curator John Walker, author of memorable articles in the National Geographic Magazine, brought the exhibition to the attention of the National Geographic Society.

* See "Indians of Our Western Plains," by Matthew W. Stirling, National Geographic Magazine, July, 1944.

Ma-Pe-Wi, in His Yard at Santa Fe, Paints a Buffalo Dance

With this issue the National Geographic Magazine reproduces in full color 18 remarkable paintings by Indian artists. Three are by Ma-Pe-Wi, one of the founders of the contemporary Indian art movement (pages 356, 360, and 371). The work here shown on Ma-Pe-Wi's easel won high honors at the Santa Fe Fiesta exhibit a few months later. Last August the French Government awarded a medal to him at the Inter-Tribal Indian Ceremonial, Gallup, New Mexico.

Western Ways, by Robert Zarvell

of 1878-79 at Fort Robinson, Nebraska, he had refused an adjutant's offer of "any price" for the book. In the fighting a bullet passed through it, killing the Cheyenne. Later the book found its way into the American Museum of Natural History, New York (page 374).

The new Plains art was primarily personal, an individual expression without regard to tradition. It was indeed the first indication of a whole new school of Indian painting, one that was to advance the idea of art separate from tribal needs.

At the same time, in the Southwest the Pueblo Indians and the Navajo continued their native arts much as before the Spaniards came. These tribes had no need, as did those of the Plains, to adopt strange media for their painting.

However, the artistic urge, and perhaps curiosity, prompted a few Southwest Indians to experiment with untried drawing materials.

First Drawings on Wrapping Paper

One Navajo youth, attracted by locomotives that puffed and whistled across the land in the 1880's, tried his hand at drawings with colored crayons on wrapping paper at the trading post.

Some years later the first known drawings of Navajo ceremonial figures on paper were discovered by an artist member of an archeological camp at Pueblo Bonito, New Mexico, an early site in the Navajo area.*

As he entered a trading post, the archeologist noticed the pictures drawn in pencil on cardboard box ends. Crude as they were, these efforts fascinated the visitor. He learned they had been done by Api Begay.

"Where does he live?" the archeologist inquired.

"Over there," volunteered a Navajo, pointing toward a hogan on the horizon.

"What does he do for a living?"

"He don't do anything: he's an artist," someone quipped.

Later the archeologist found Api Begay at his hogan, his wife weaving at her loom, and asked, "Will you make some drawings for me?"

"What will you give me?" asked Api, who had learned a thing or two at the trading post.

"A dollar and this box of colored pencils."

Api was so delighted that he quickly completed his commission—several varicolored

*See in the National Geographic Magazine, "Everyday Life in Pueblo Bonito," September, 1923, and "Pueblo Bonito, the Ancient," July, 1923, both by Neil M. Judd.

drawings of mythical figures from Navajo rites. Two of the drawings now belong to the Laboratory of Anthropology, Santa Fe, New Mexico.

Little attention was paid to such early efforts, but some extraordinary water colors from the Hopi Pueblos were reproduced by the Smithsonian Institution's Bureau of American Ethnology early in the century, and other paintings were preserved through the foresight of a few individuals.

In 1917 a notable incident led to the actual founding of the modern school of Indian painting. An archeological field unit from the Museum of New Mexico was digging in long-abandoned cave dwellings near the plateau where the atomic city of Los Alamos now stands. Crescencio Martinez, a young man from near-by San Ildefonso pueblo, was working as a laborer.

One day the director was admiring pictographs and mural paintings on the soot-blackened walls of a cave, when Crescencio spoke up, "I can make paintings, too." There-

upon the director said he would bring paper and paints if Crescencio would undertake some water colors.

Crescencio gladly did a few at the first opportunity. The director was surprised by the naive but perceptive realism of the paintings. He asked Crescencio if he would paint the dancers of all the summer and winter ceremonials of his pueblo for the museum.

Crescencio painted these—corn dancers, eagle, buffalo, deer, and other dancers, singers, and drummers—with sincere reverence. He finished all but one before he died of influenza in 1918.

Others carried on Crescencio's work. They included his nephew, Awa Tsireh, who did bright water colors at his home in San Ildefonso, then rode into Santa Fe, where he offered them to the museum or to residents.

Ma-Pe-Wi (Red Bird) of Zia (Sia) pueblo, and two Hopi boys, Fred Kabotie and Otis Polelonema, were the first ever to paint at the United States Indian School in Santa Fe. Native art was officially disapproved then, but these three fortunately entered the school at a time when a sympathetic superintendent gave them supplies and encouraged them to paint on their own.

Awa Tsireh, Ma-Pe-Wi, Kabotie, and Polelonema are still painting. Although but middle aged, they may well be called the "old masters" of contemporary Indian painting.

A comparatively early work representing this group is "Buffalo Hunt" by Ma-Pe-Wi (page 356). It shows the trend of this artist's later painting. The slight modeling in men and animals is characteristic of most of Ma-Pe-Wi's life forms, although the flat, two-dimensional treatment of symbolic elements is traditional.

Potters Revive San Ildefonso

Early in the growth of the new school, San Ildefonso became as important a center of influence as Santa Fe. This village of the northern Rio Grande Valley had been dying and impoverished until Maria and Julian Martinez brought about a renaissance in pottery making with their new matte-on-gloss black ware. Their success with this now famous pottery changed both the ceramic style and the economic status of the village.

Inspired by the Martinezes' achievement and by the success of Crescencio and Awa Tsireh, several more young men of the village began to paint water colors. Soon their example was emulated in other pueblos westward to Zuni and the Hopi villages.

John Sloan and other Santa Fe people recognized in the paintings an authentic new art form. They sponsored exhibitions that traveled as far as Madrid, Prague, and Venice.

Then a change in Indian Bureau policy in 1932 brought about the opening of an Indian painting studio in the United States Indian School at Santa Fe—the first sponsored by the Federal Government.

Young people flocked to this school—Pueblo, Navajo, and Apache from New Mexico and Arizona; Sioux from the Dakotas; Cheyenne, Arapaho, and Kiowa from Oklahoma; and many others from distant States.

Every painter evolved a personal style within the tribal character, and each chose subjects, colors, and techniques of his own. One artist specialized in old Plains abstract designs, another in everyday views, and yet others in hunting scenes or the fantasy of tribal mythology.

Murals Decorate Modern Buildings

Artists of the Santa Fe Indian School painted the first modern Indian murals. Because of their flat, decorative style, these murals proved unusually fitting on walls and façades of modern buildings (pages 362 and 377).

After such experiences through the high-school and immediate post-high-school years, many young people became professional artists and exhibited their work from San Francisco to Paris. Two of them eventually took charge of the studio.

Oliver La Farge, in his book *As Long as the Grass Shall Grow*, called the studio's accomplishment "a major demonstration of the contribution Indian culture and genius has to make to American life."

Now the contemporary movement has extended to centers in Oklahoma, Utah, and Montana. Annual Indian exhibitions occur at the Philbrook Art Center in Tulsa and the Denver Art Museum, and another was inaugurated last year at the M. H. de Young Memorial Museum in San Francisco. The Art Institute of Chicago held an important exhibition of Indian paintings in 1954.

Considered by tribes, the paintings reproduced here suggest interesting facts about the areas and artists they represent.

Pueblo painting is precisely patterned,

(Continued on page 361)

Painting from the collection of Mrs. Charles R. Dietrich

Navajo Girl with Sheep · *HARRISON BEGAY (Navajo)*

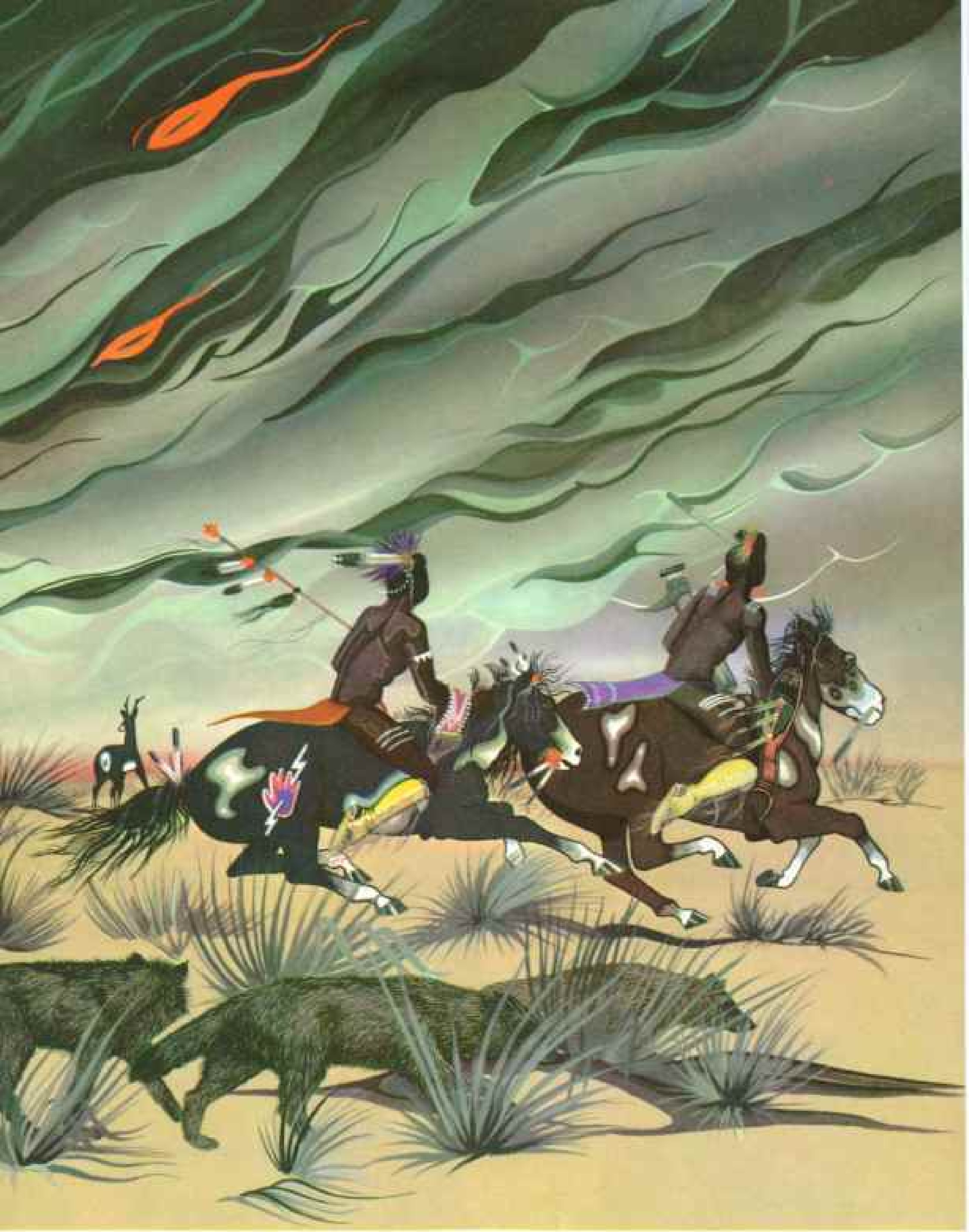
This lovely girl in voluminous tribal dress reveals how well the Navajos have treasured their flocks since Spaniards introduced sheep into the West. Begay, dispensing with models, paints entirely from memory and imagination.

Prairie Fire · *F. BLACKBEAR BOSIN (Kiowa-Comanche)*

When the grass turned dry on the western plains in pioneer days, fire was feared as much by Indians as by white settlers.

Prairie Fire has the spirit and dash of art works done on buffalo hides by Plains Indians a hundred years ago. Those earlier paintings were stylized portrayals of contests and exploits involving men, horses, and buffaloes. Such an event as this would have been noted only by a single symbol in a concisely painted calendar history.

Such is F. Blackbear Bosin's skill that his animals convey a sense of fright; even the grasses reflect foreboding.



355

From the collection of the Philbrook Art Center, Tulsa

Antelopes and Wolves, Their Feuds Forgotten, Flee Across the Plains

In its initial showing the painting won the First Purchase Award over all entries by Plains Indians at the Philbrook Art Center, Tulsa, Oklahoma. Later it attracted the attention of school children and seasoned collectors alike at the National Gallery of Art of the Smithsonian Institution, Washington, D. C., which exhibited this entire series.

In art matters, Bosin is entirely self-taught. While serving with the United States Marines he was hospitalized for six months in Hawaii. There a friend, recognizing his latent talent, encouraged him to make art his career.

↑ *Creek Ball Game* • *NOAH DEERE (Creek)*

Games now known as shinny and lacrosse flourished among sports-loving Indians before the coming of the white man. They originated in the tribes' desire to train young men in valor, honor, or the arts of war; often they were ceremonial in character.

Though the immediate object of this game was to drive the ball through the opponents' goal post, the long-range aim was to test a man's endurance and spirit of team play.

These players are not allowed to touch the ball with their hands; as in lacrosse, they catch and throw it with a racket laced with thongs. The ball itself is made of deerskin stuffed with deer's hair. Play is rugged, sticks are hard, but tempers remain calm. "It is very unusual to see one of the players behave spitefully," says the artist.

Strangely enough, these Creeks in their plumed tailpieces and roached headdresses suggest a procession of youths around a classic Greek vase.

← *Buffalo Hunt* • *MA-PE-WI (Zia Pueblo)*

Zia people, living outside the bison's former range, had no such hunting traditions save as they were handed down by men who occasionally traveled to the buffalo plains hundreds of miles away. Nevertheless, the subject has remained a cherished memory among all the Pueblo peoples. Hopi and Rio Grande pueblos still stage buffalo dances. Taos Indians in northern New Mexico proudly maintain a buffalo herd on their pastures.

Ma-Pe-Wi, whose name means Red Bird, is one of the four "old masters" of contemporary Indian art (pages 360 and 371). Here, in a mixture of the realistic and the abstract, he depicts men and animals against a background of ancient Pueblo symbols. His clouds resemble those used internationally on weather charts, and his Zia sun, rising above stylized mountains, today rides New Mexico's automobile tags and shines on the State flag. Yuccas and piñons, or nut pines, long a source of Indian food, grow between triangular hills.

Horizon indication in both these paintings is unusual in Indian works. Noah Deere (above) stylizes figures against a naturalistic background; Ma-Pe-Wi employs realistic figures in a stylized setting.

As a rule, the Indian artist omits light and shade, perspective, and the third dimension in order to simplify. He stresses action; his animals fairly stampede across paper or plaster.

Paintings from the collections of the Philbrook Art Center, Tulsa, Oklahoma (above) and the Indian Arts Fund, Santa Fe, New Mexico

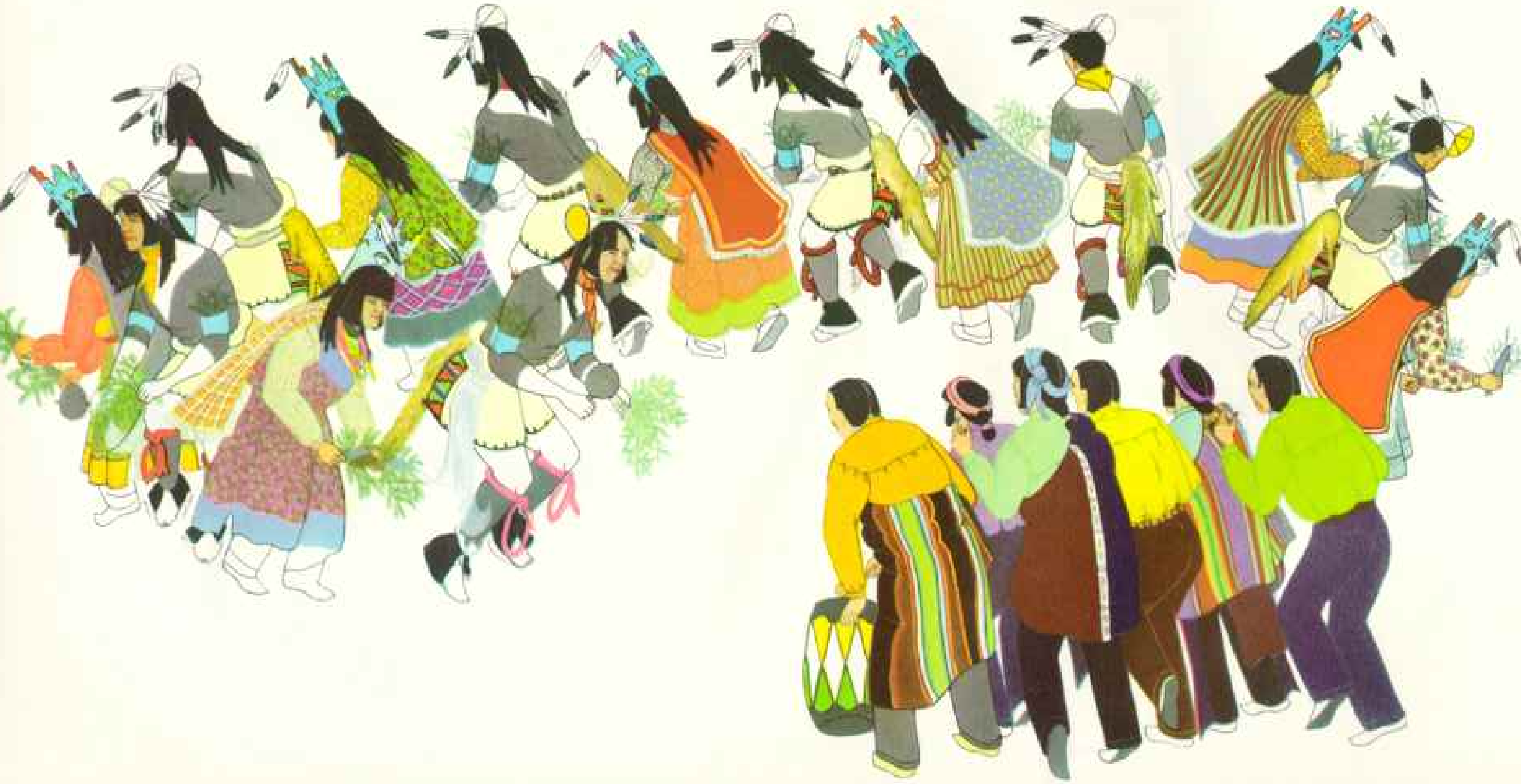
Painting from the collection of the Philbrook Art Center, Tulsa, Oklahoma

↑ *Dance of the Soldier Societies* • W. RICHARD WEST *(Cheyenne)*

Soldier societies trained young Plains Indians in virtue and bravery. These Cheyenne warriors, attended by four women of honorary rank, join in a dance before a ceremonial tepee. Feather bonnet, owl caps, buffalo-mane and coyote headdresses distinguish certain societies. Philbrook Art Center gave its Grand Prize to this work in 1949.

↓ *Corn Dance* • PABLITA VELARDE *(Santa Clara Pueblo)*

Pueblo Indians were cultivating corn long before they abandoned cliff dwellings. Corn remains their daily bread. To ensure the crop's success, they dance for rain every year. Here fir needles, ears of corn, and headdresses all symbolize rain and fertility. The artist depicts her own people (page 369).



↑ *The Hunter* ·
MAPE·WI

The Zia artist has invested his hunter with magic, perhaps through the deer-antler helmet with its eagle-feather ears. Speeding across incredible miles, the enchanted arrow flies straight toward the target. Oblivious of death's approach, the stalwart deer feeds in distant mountains.

← *Parrot, Sikyatki* ·
TWOTSIE (Hopi)

Twoitsie, whose name means Owl, takes inspiration from designs found in prehistoric Hopi pueblos. Sikyatki (Yellow House) was such a ruin. Here, as within a meal bowl, the artist describes a parrot in the abstract manner of ancients and modernists. Its tailfeathers appear at left.

Southwestern Indians ascribe rain-making powers to birds. Stylized tadpoles and dragonflies assist this parrot by fanning out droplets.

Paintings from the collections of William and Leslie Van Ness Denman (above) and Dorothy Dunn

rhythmic, and symbolic. It is a natural expression of a people whose scheme of life is set by the solstices and ordered by the seasons.*

Agriculture is the main pursuit of the Pueblo people, and that in turn is governed by the caprice of a climate that frequently provides drought instead of rain. This fact is reflected in Pueblo art.

It grew as a graphic expression of the dominant need for rainfall, and so it was a part of religion. For instance, a bird painted on a meal bowl served as a prayer that all feathered emissaries bear aloft messages for rain. Likewise a plant painted on an altar or a water jar demonstrated a prayer for food.

Ceremonials and activities ordered by the seasons followed the round of each year. In spring there were the rites, games, and work of planting. In summer came housebuilding, pottery making, field tending, and the dances for rain; in autumn, the harvest, storing of food, and the ceremonials of thanksgiving.

Miss Velarde Records Pueblo Life

Winter brought hunts and hunting dances, in which the game animals were cunningly imitated. Often there were incidental dances, contests, burlesques, and feasts. These varied scenes provide a constant source of subject for contemporary Pueblo painters.

Pablita Velarde's art re-creates her native village of Santa Clara, New Mexico. Her "Corn Dance" depicts the sacred ceremonial enacted in all the Rio Grande pueblos for success of the corn crop and abundant fields in general (page 359). Its every symbol, from the tiny tadpoles painted on the women's headdresses to the thunderous beat of the drum, represents a prayer for rain. Hundreds of people perform the dance in an all-day ceremony. Throughout the pueblo there is feasting and visiting, but an atmosphere of reverence prevails.

From the plaza Miss Velarde leads us into the Pueblo home, in "The Betrothal" (page 369). This painting, in somewhat formal perspective, shows the spotless whitewashed walls and timbered ceiling of the main room. Navajo rugs lie on the floor, and blankets and ceremonial costumes hang on a beam. An old kachina doll swings in a corner, while many modern touches appear elsewhere.

Despite the wealth of details and interests, this composition is well organized to emphasize the three principal characters—the bride-to-be, wearing a white manta embroidered with fertility symbols; the prospective groom, in festive calico shirt and beaded leggings; and the cacique, head of all ceremonials.

Both these paintings are typical of Miss Velarde's strong drawing and minute detail. Today she is considered the principal woman painter of Pueblo life. In 1953 she was the first woman to win the Grand Prize in the annual Indian painting exhibition at the Philbrook Art Center.

When she was only 3 years old, Pablita Velarde lost her mother, and soon afterward she acquired an eye disease that caused two years of blindness and permanently weakened her vision. When she was 5, her father took her to a new life in a Santa Fe mission school, where she learned English.

It was not until she entered the United States Indian School studio that a world of her own opened for Pablita. "From then on, painting became my main interest," she says. There she acquired the basic principles of painting through a study of Pueblo art and an appreciation of world art.

Thereafter Pablita devoted her free time to painting. When her husband went to war, she returned to her pueblo and earned a living by painting and by making silver jewelry.

Her first big success was the sale of a picture at the Philbrook Art Center's annual show. Then came a commission to paint a Pueblo series for the museum at Bandelier National Monument, near Santa Fe, and another to do a mural for an Albuquerque building. Museums began to buy her paintings.

Artist's Sight Restored

Then overtaxing of her sight aggravated the artist's old eye condition, and she thought she would have to give up painting. But a friend helped her find the right oculist, and he restored her sight.

Now Miss Velarde, painting more than ever while managing a home for her husband and two children, is becoming known abroad. Recently she received a letter enclosing a photograph from an English woman, unknown to her, who said she had done anthropological research in Santa Clara long ago and added:

"I have been very much interested in the account of your career in *El Palacio* [journal of the Museum of New Mexico], with reproductions of your beautiful paintings; and I

* See "Indian Tribes of Pueblo Land," by Matthew W. Stirling, NATIONAL GEOGRAPHIC MAGAZINE, November, 1940.

Western Ways, by Robert Carroll

Seventh-graders at Santa Fe Indian School Study Beneath Murals by Former Pupils

Wade Hadley painted the Navajo woman, who gathers corn pollen for ceremonial use. Eva Mirabal painted the Pueblo bread bakers. Teacher Ramona Koomsa, a Kiowa-Comanche, explains a problem at the board.

think you may like to have this copy of a photograph I took of your father and mother on their wedding day in 1910. They were always kind and friendly to me."

The photograph was the first of her mother that Pablita had ever seen!

Another Pueblo artist of strong integrity is Fred Kabotie, who offers a Hopi subject in "The Delight Makers" (page 368). In this scene the spectators sit atop or in front of dwellings overlooking the plaza. Somewhat as in a theater-in-the-round, they witness a ceremonial wherein Hopi clowns play spontaneous pranks to the merriment of all.

A pioneer Southwest anthropologist, Adolph Bandelier, gave to all Pueblo clowns the apt name, "Delight Makers." True to popular belief that clowns are sober beneath their paint, the Delight Makers perform serious duties in private ceremonies.

The versatile Kabotie, entirely self-taught, has won many prizes and honors, including a Guggenheim Fellowship by means of which he did the research to write and illustrate a singular book on Mimbres Valley (New Mexico) art. Recently Kabotie has been guiding Hopi children in their art work at Hopi High School, Oraibi, Arizona.

Twoitsie (Owl), another Hopi painter, studied pottery excavated from Sikyatki (Yellow House), a Hopi village that lay in ruins when the Spaniards arrived. The amazing designs he discovered strongly influenced his later work.

In "Parrot, Sikyatki," Twoitsie paints a design suitable for the most urbane setting (page 360). As modern design shuns nonessentials, the symbolic elements here are so shorn of detail that only a few significant aspects remain. In this instance the effect might be described in Gertrude Stein language as "a curved figure is a beak is a bird," although

this parrot does have fairly recognizable tail feathers and other more ornate plumage.

The older some Indian motifs are, the more abstract they become—and hence more modern looking. This fact is demonstrated in the art of Joe Herrera, whose paintings are considered by many to be the most contemporary in appearance of any recent Indian art. Herrera deliberately abandoned the more representative style learned from his artist mother, Quah Ah, to make an intensive study of very old Indian art forms.

An example of Herrera's work is "Bear Hunt" (page 365). This abstract painting needs no explanation to an Indian. Its every component except paper has been native to Pueblo art for centuries. In Pueblo practice casein tempera paint was made of earth pigments mixed with milk, brushes were the chewed ends of yucca leaves, and when the artists employed spray technique, they used their mouths as atomizers. Herrera's prehistoric symbols may still be seen in pictographs and excavated murals in New Mexico.

Herrera, now 33 and a graduate of the University of New Mexico, held his first public one-man show in the Museum of New Mexico in 1952. It was an instant success, and the artist sold every picture.

Striking Contrasts in Paintings

Turning to Lorenzo Garcia's "Horses Going into the Corral," one realizes the contrasts in Indian art (page 367). This painting is as naive as Herrera's is sophisticated. It is charmingly simple, even in subject.

Each spring while I lived in Santo Domingo this wonderful procession passed my door. The horses that had galloped freely across the mesas all winter were rounded up. Then they were sorted, the new colts branded, the choice animals corralled, and the lucky ones set free for another season. No other horses presented such a nondescript appearance. They were a motley, crossbred, wild-and-woolly lot.

But Garcia, with deft brush and exotic color, has caught them here on the border line between fact and fantasy, as if they were elfin steeds prancing from some unearthly pasture into the reality of captivity, still unmindful of their fate. Only the rider and his mount seem somewhat real.

I remember when this painting was made. About 18 years ago the artist was a silent but strong admirer of the work of the Navajo Gerald Nailor (page 372). Nothing he himself had done in a series of Nailoresque hunting scenes seemed quite his own.

One day Garcia let me see some new sketches. They all showed the same acquired influence save a few little drawings of horses that seemed to have been done rather carelessly. They were enchanting and original.

"These horses are your own!" I said. "Why don't you make a lot of them—a race, a rodeo, or a whole herd going into the corral; all colors and sizes, shaggy ones, spotted ones?"

And so he did, and with a result far more delightful than I could have imagined.

Artist Shows Life Triumphant

Ma-Pe-Wi creates a world of fantasy. His "The Hunter" and "Deer" are two of the most imaginative and fanciful works in recent Pueblo painting (pages 360 and 371). They are actual scenes resourcefully conceived by an artist who can endow serious themes with whimsey and grace. For Ma-Pe-Wi uncannily imbues impending death with the joy of living and causes the observer to feel that life will surely win in the end.

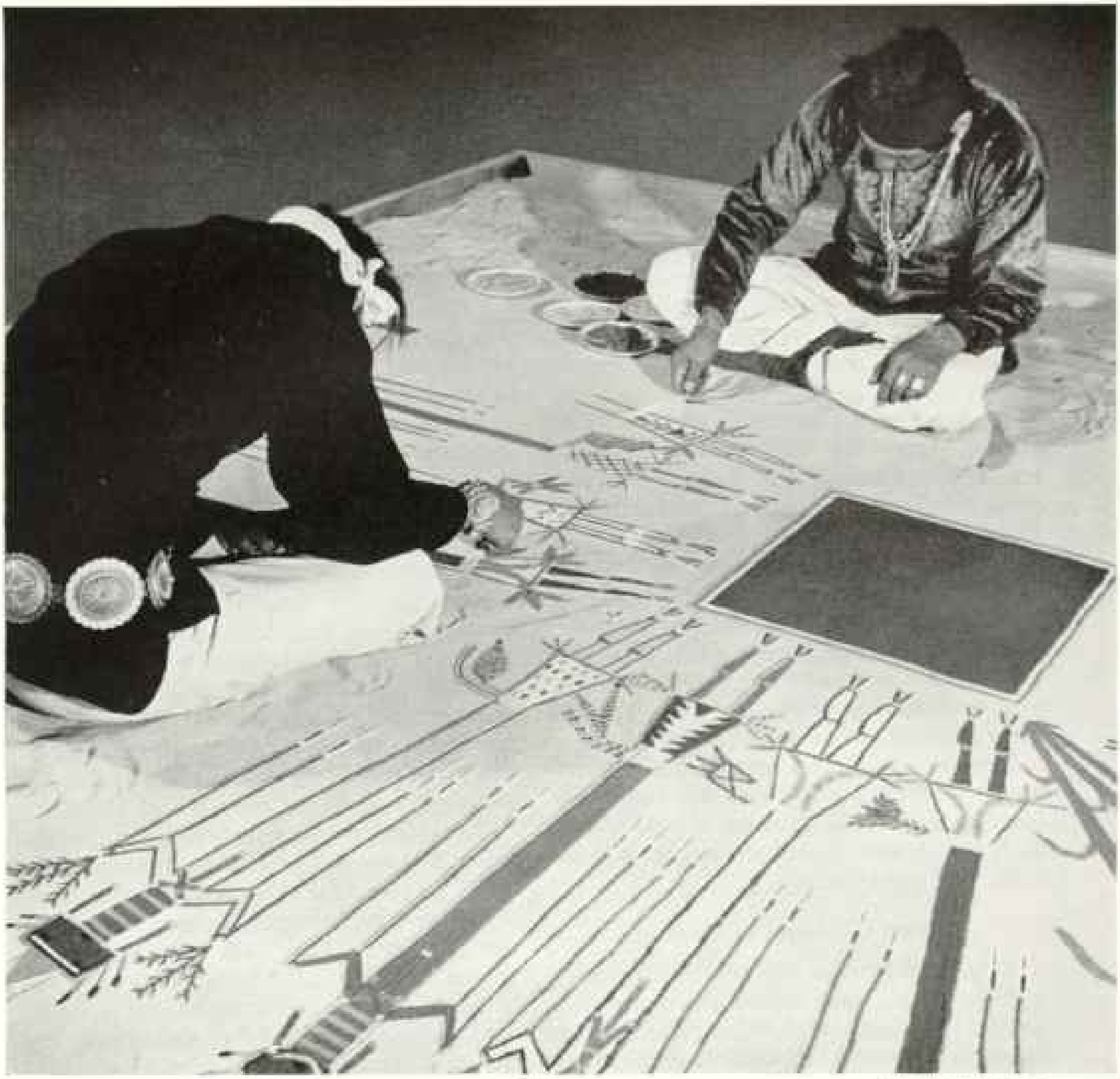
The artist's mystic hunter demonstrates the belief in sympathetic magic held at some time by all peoples. He relies upon his deer headdress and mantle as surely as upon his straight aim and strong bow. His impersonation is so real to him that he believes his prey will be felled through enchantment.

"Deer" is a beautifully harmonious and rhythmic composition where trees, clouds, rain, and the flight of birds are all described by live, buoyant arcs, while fanciful animals play a counterpoint through the swirling pattern.

Ma-Pe-Wi, who has been painting for some 36 years, lives in Santa Fe. There he paints the pictures which he takes to the Museum of New Mexico or to a little gallery off the plaza. There, too, he teaches his young son to paint (page 351). Although he never does a portrait of his beautiful Pueblo wife, many of the women in his paintings look like her.

Because of an unfortunate misunderstanding with tribal elders over his painting many years ago, the artist had to leave his native Zia pueblo, but Ma-Pe-Wi has brought honor to his people through the high respect he has won for his art and for his character as a man.

Contemporary Navajo painters have adopted much in style and technique from their Pueblo neighbors. When the nomadic and warlike Navajo moved down from the north, they also



364

Museum of Modern Art

Navajo Medicine Men Construct a Sand Painting at New York's Museum of Modern Art

Pinches of colored sands and ground pigments make a sacred image on a background of natural sand (opposite page). These artists paint tall *yei*, or supernatural beings, in groups of four at the cardinal points of the compass, and fill up the corners with sacred plants such as corn (lower right). The general style of this work has been firmly fixed for generations; sand painters may improvise only in minor details.

derived many customs from the peace-loving Pueblos. Certain items of Navajo ceremonial, dress, and farm practice resemble those of the Pueblo Indians, although in most respects the two differ strikingly. The Navajo are primarily shepherds and horsemen. The women are weavers, and many of the men are silversmiths.

Drought Is the Navajo's Master

Like Pueblo painters, modern Navajo artists are influenced in their more objective works by tribal customs. They present impressions of ceremonials and views of the rigorous life in the primitive and barren Navajo country.

Water shortage is a brutal taskmaster there, even more so than in the pueblo areas. The Navajo reservation has no central life-giving river such as the Rio Grande, which sustains most of the pueblos.

The rapidly growing Navajo population faces a dwindling water supply. Soil erosion is on the rampage. Flocks have been reduced by Government order. Food and wool are scarce. Disease stalks through unsanitary homes.

Gerald Nailor's "Hauling Water" shows this desperate situation clearly (page 372). This painting, decorative in style but harsh in meaning, emphasizes with the force of a cartoon

(Continued on page 373)

Bear Hunt • *JOE H. HERRERA (Cochiti Pueblo)*

By painting tracks, the artist charts the paths of bear and hunter. As if sighting his quarry, the man finally crouches on all fours. Herrera's composition reveals the Pueblo Indian's concept of Nature's interrelationship. His bear crosses the face of the half-clouded, slit-eyed sun as he might traverse a forest, for life depends on one as much as on the other. A planet (lower right) relates to earth as well as the horned moon (upper right). In Herrera's symbology, rain falls in dotted lines, mountains form zigzag borders, and shaped forms stand for clouds, and a triangular fertility device carries a circular seed.

⚜ *Wind Way* •

BENNIE TILDEN (Navajo)

The artist presents in tempera the record of a picture done in colored sands to cure the sick. Once the medicine man's sand picture has served its purpose, it is swept up and cast to the winds. Since no sand painting may be reproduced exactly for nonceremonial reasons, it is safe to say that the artist altered the original design. Wind Way's tall figures represent supernatural beings. They grasp serpents marked with deer tracks.

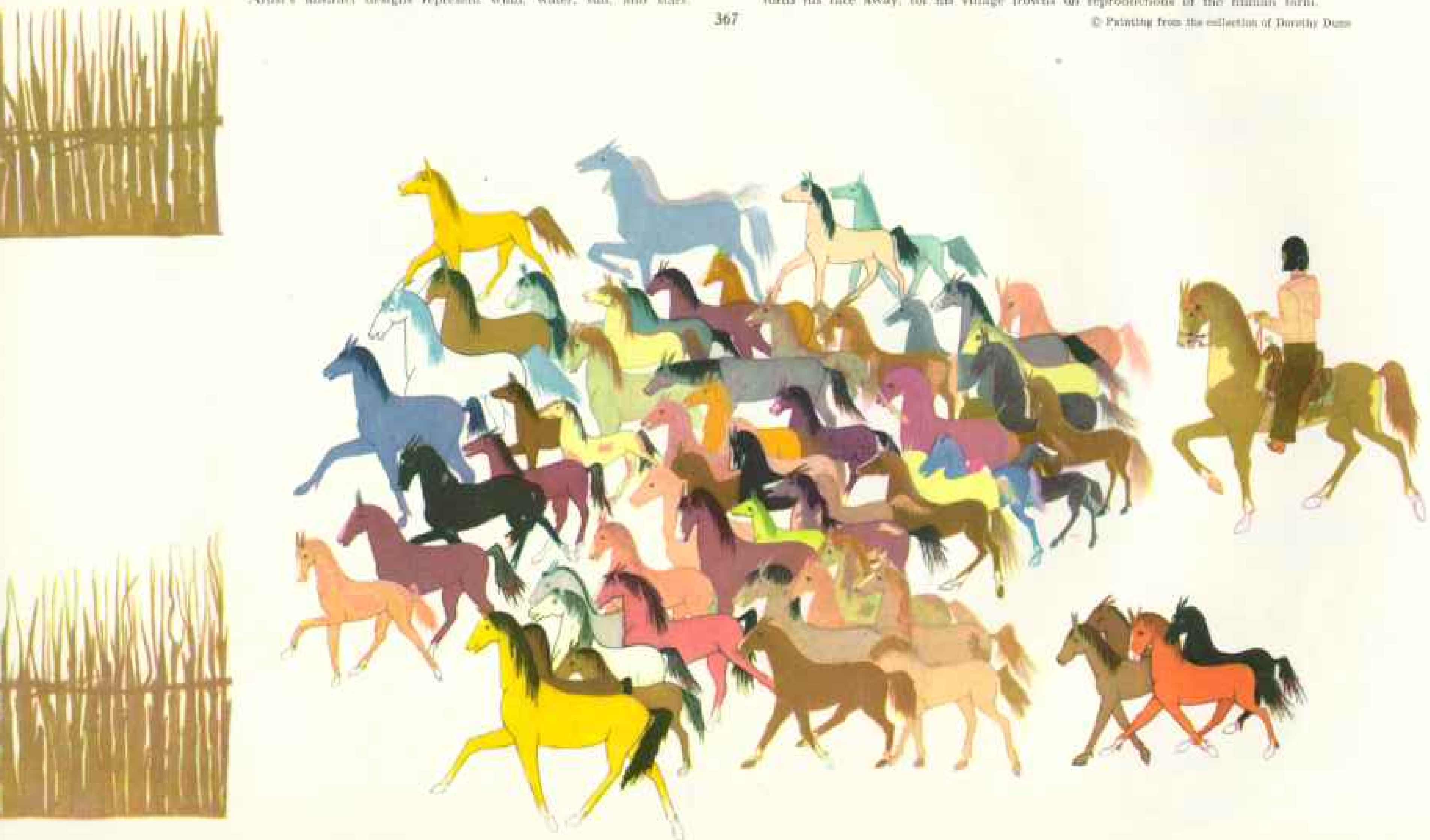
Paintings from the Millicent A. Rogers collection (right) and the Southwest Museum, Los Angeles, California

↑ *Apache Gan Dancers* • *WILSON DEWEY (Apache)*

Men and boys with painted bodies, black masks, crownlike headdresses, and crossed sticks impersonate the Gan, spirit guardians of water, in a spectacular nightlong dance. Artist's abstract designs represent wind, water, sun, and stars.

↓ *Horses Going into the Corral* • *LORENZO GARCIA (Pueblo)*

Wild horses prance into captivity's staked corral unmindful of the galling saddles and hard work ahead. The rider, from the artist's home pueblo of Santo Domingo, turns his face away, for his village frowns on reproductions of the human form.



The Delight Makers •
FRED KABOTIE (Hopi)

Among Pueblo peoples the Delight Makers, or clowns, serve a serious purpose. These painted pranksters, who climb a ladder upside down, are entrusted with important duties; they impersonate ancestral spirits returned to help the villagers pray for rain. Free to engage in all sorts of satire, they occasionally burlesque the tourists who come to watch them.

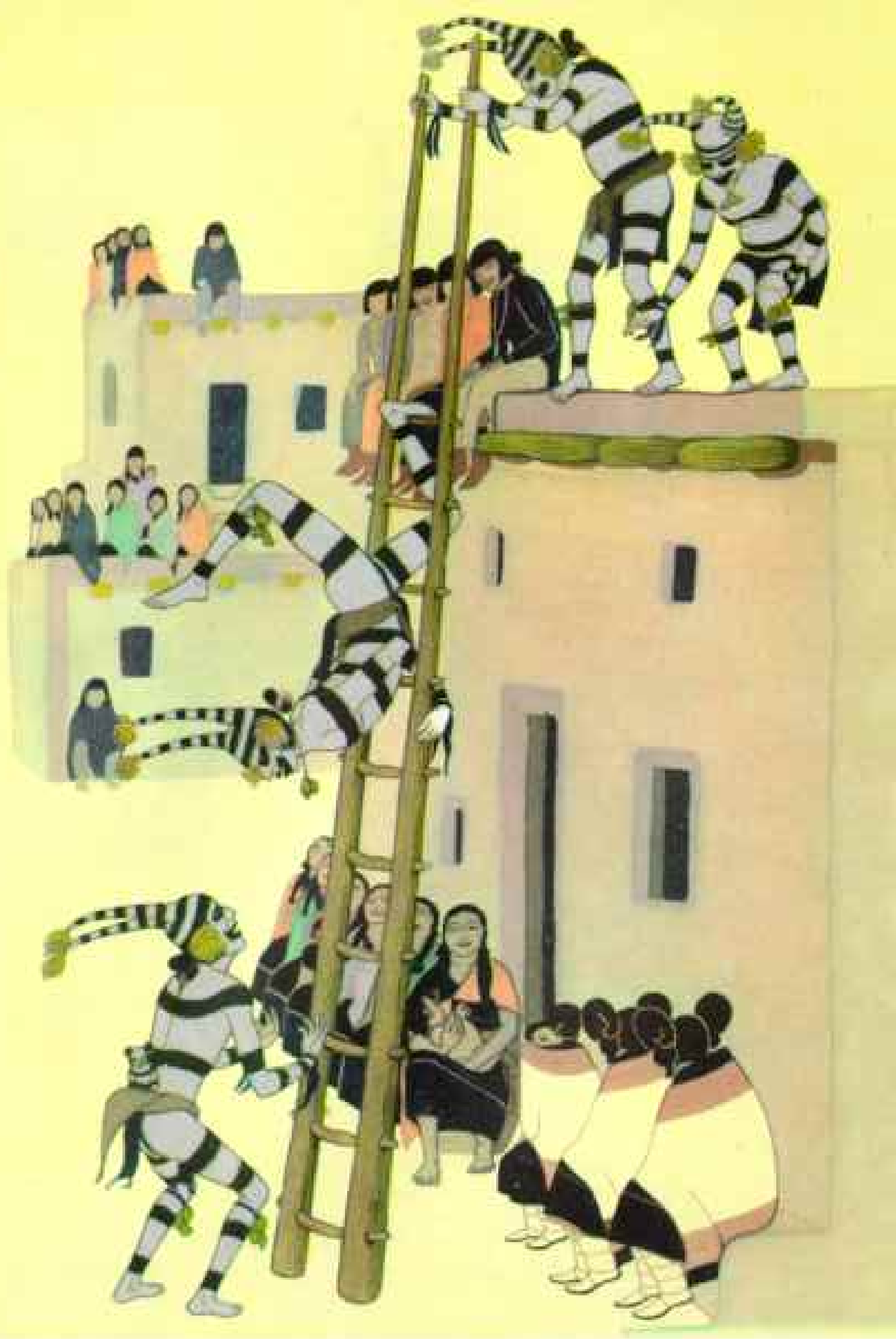
In this happy picture, nearly every face, including the sun's, is smiling, and the misty clouds seem to be dancing as in a chorus line. Acting as messengers from the spirit world, the masked Kachina dancers swish rain sashes, shake rattles, and invoke the clouds to open. Peeping from blankets, three Hopi girls wear their hair in maiden style (lower right).

Painting from the collection of Mr. and Mrs. Charles de Young Elkus

The Betrothal •
PABLITA VELARDE

"Pueblo Indians had engagements and weddings long before the coming of the white man," Miss Velarde writes. Here in a Santa Clara betrothal ceremony she presents a young couple holding a vase of sacred water out of which each is about to sip. Emptied, the vase will be broken so that its fragments may tell fortunes.

Waving two eagle feathers, the old cacique asks the spirits to give the young pair noble thoughts. Seated on the left, the tribal governor, his lieutenant, and war captain await their cue to lecture the couple on the duties of married folk. Parents sit on the right, their smiles and frowns reflecting reactions to the engagement.



People of the Sky · *CALVIN LARVIE (Sioux)*

In this dramatic scene, warriors fly on hail-dappled steeds and lightning crackles from the golden eyes of huge black thunderbirds.

"What does it mean?" museum goers invariably ask on seeing *People of the Sky*. Artist Calvin Larvie gives the answer: "This is a pictorial representation of the happy hunting ground where man found an answer to his prayers. Birds were the carriers of messages to heaven. Lightning symbolized an answer to prayer."

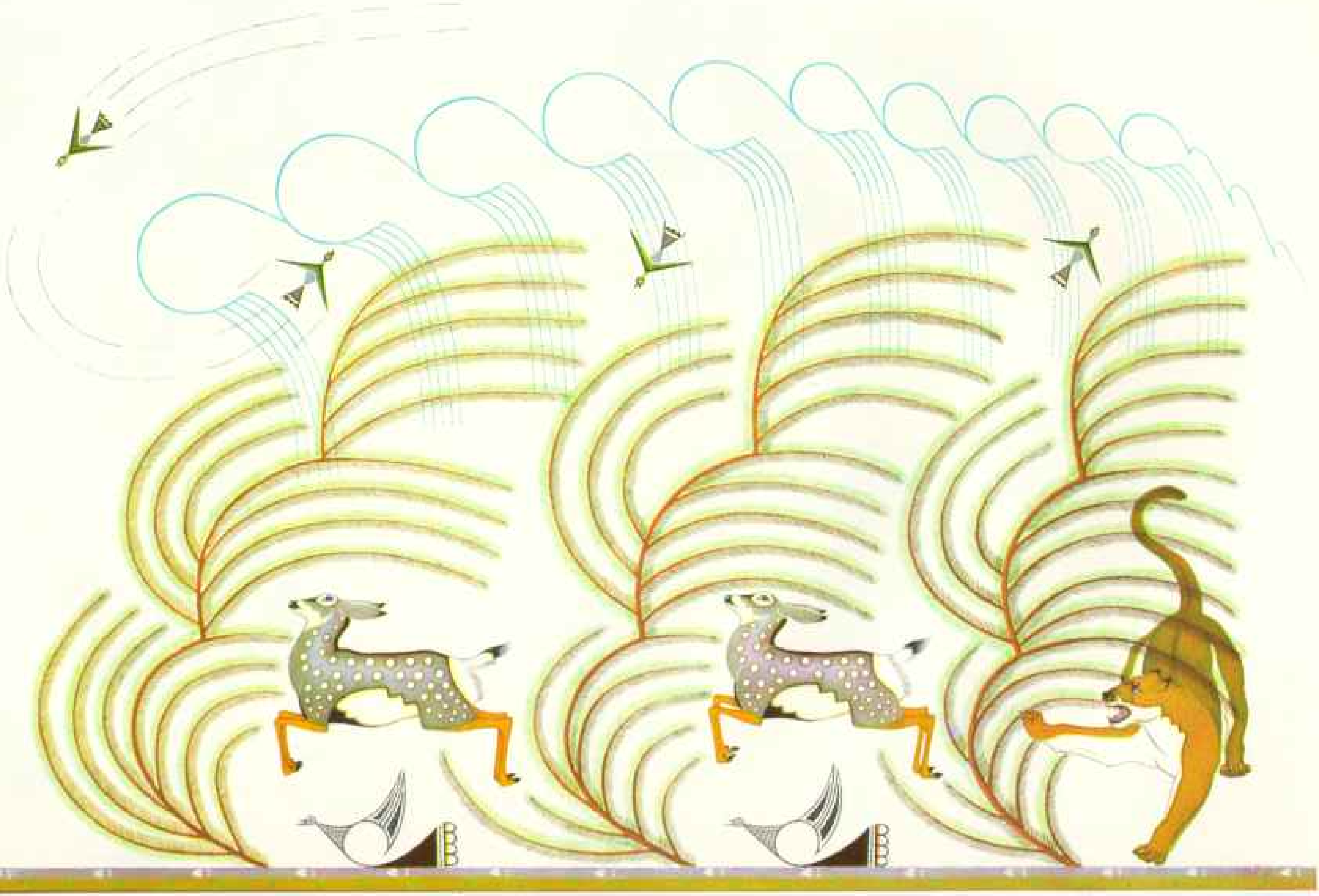
Myths of lightning and thunderbirds antedate the horse by hundreds of years. Introduced by Spaniards in relatively recent times, the useful horse readily found an honored place in Sioux mythology.

Half-moon figures symbolize clouds, a device possibly borrowed from Pueblo artists. Pendent twin triangles say rain is falling.

Painting from the collection of the Philbrook Art Center, Tulsa, Oklahoma

↓ *Deer* · *MA-PE-WI*

Two fawns bound confidently ahead of a mountain lion stalking through a spruce forest. Messenger birds in the sky swish a shower from clouds. Waterfowl in the foreground carry rain symbols in place of wings and little clouds in lieu of tail feathers. The lower border represents the earth fertile with seeds and deer tracks.



Paintings from the collections of Mr. and Mrs. David H. Finley (above) and Dr. Max Kramer

♠ *Hauling Water* • *GERALD NAILOR (Navajo)*

Multiplied in intensity, the Navajo burned sun sucks up what little water there may be on the parched reservation. Taking perhaps a day's journey, the family doggedly bears its burden from one of the few watering places.

♦ *Buffalo Calling* • *WILMER DUPREE (Sioux)*

Men in a ceremony honoring the buffalo, provider of food and clothing, entice their victim by dressing themselves and horses like him. Bodies are painted with designs of rain and lightning to ensure green pastures for the herd.

the grimness of the need and the weariness in the persistent quest for water.

The works of this artist were much in demand for their beauty of line and color and their adroit brushwork.

After finishing his Sante Fe Indian School art work, Nailor maintained studios in Santa Fe and in his wife's pueblo, Picuris. Three years ago his bright career suddenly ended when he was killed in a family quarrel.

Harrison Begay, who painted "Navajo Girl with Sheep," is perhaps the best known of Navajo artists (page 353). He always idealizes Navajo life through his purely decorative style. His fleecy lambs are invariably fat, his horses plump and high-spirited, and his people freshly bathed and groomed.

Except for his study 17 years ago in the Santa Fe Indian School studio and a brief scholarship at Black Mountain College, North Carolina, Begay's art is entirely of his own making. He is meticulous and analytic.

During four years in the Army Begay hardly touched a brush. Discharged, he was discouraged because he could not sell his paintings. He studied radio repair for a while. A Tucson trader told Begay he was wasting his talent and invited the artist to open a studio in his own Indian arts shop. Now Begay paints there in winter and has a summer workshop in Santa Fe.

The Navajo Paint with Sand

The Navajo make tribal paintings quite different from the more pictorial works of Nailor and Begay. Their sand paintings, such as "Wind Way," are intricate abstract designs matured through centuries of evolution. The religious lore of unknown generations is contained in the symbols of the gods and powers of the Navajo world. I believe that from the standpoint of symbolic design Navajo sand paintings are unsurpassed.

Sand paintings are made of colored sands and dry pigments. Colors are poured from thumb and forefinger in little streams upon a ground of sand. The finished works vary in width from about one to twenty feet.

More than 500 different sand paintings are known, their designs retained in memory by certain men. A few such men sit in groups to make the paintings on the floor of the ceremonial hogan as part of tribal rites for curing the sick, warding off evil, ensuring success in war, and for similar purposes (page 364). After several hours the painting is swept into blankets, carried outside, and cast to the winds.

Bennie Tilden, a Navajo, presents in his abstract tempera painting, "Wind Way," an almost exact record of a sand painting (page 365). "Wind Way" is one of several paintings from Wind Chant, a ceremonial from a larger, complex group called Holy Way. Wind Way is used in respiratory, heart, and digestive disorders, and snake and cactus infections.

Sand paintings are said to affect powerfully the subject of the ceremony, and they make mysterious impressions upon observant persons outside the tribe.

Because of tribal taboos, most Navajo artists do not copy an actual sand painting exactly but incorporate a few selected motifs, such as gila monster, tobacco, sun, or rainbow, in more naturalistic pictures. Others improvise on sand-painting themes.

Modern Designers Use Indian Motifs

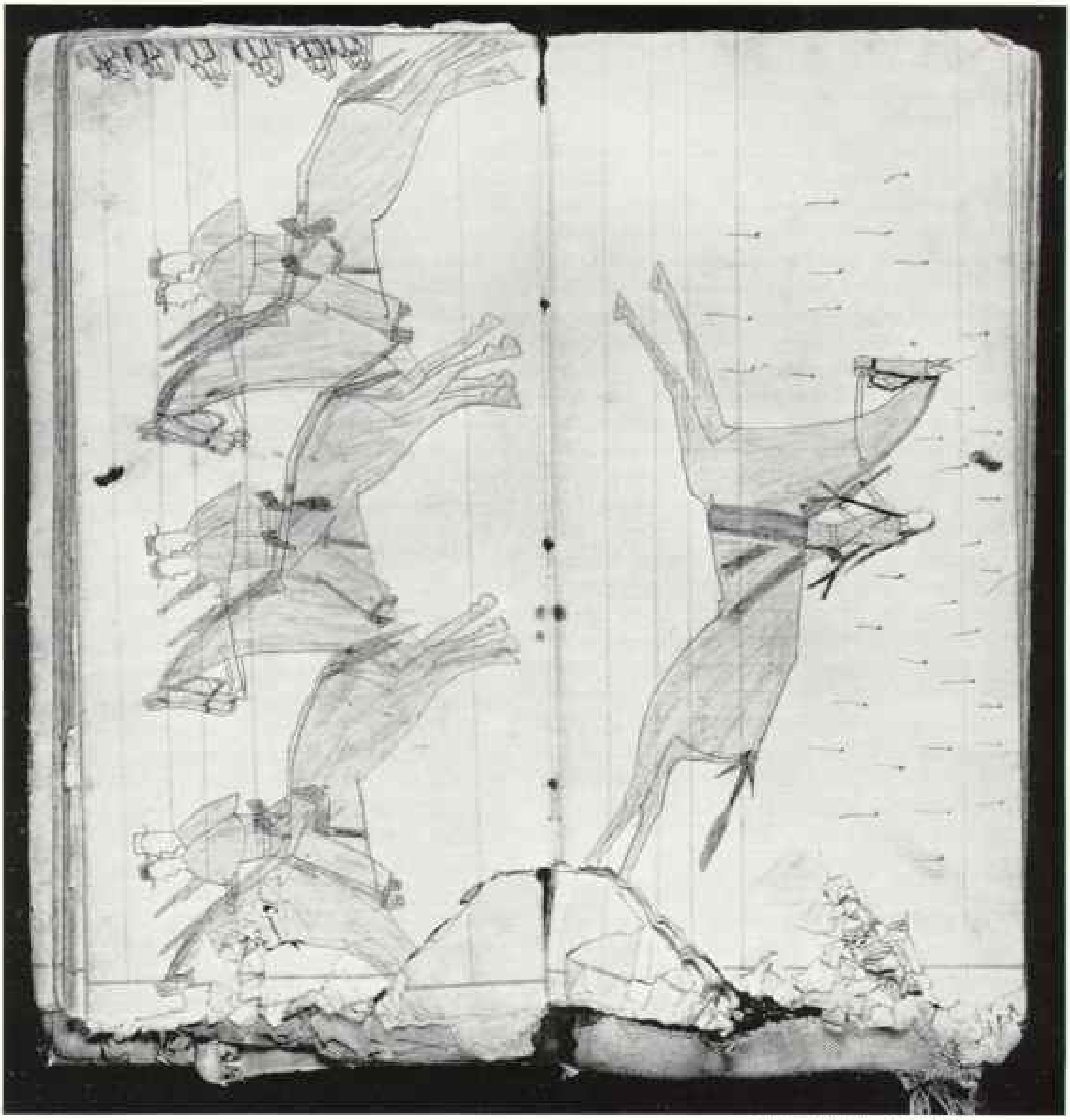
Non-Indian artists and decorators are beginning to recognize the up-to-date style of such designs. For instance, almost full-scale sand-painting motifs are used strikingly in a lounge of the liner *United States*.

The Apaches, linguistic kinsmen of the Navajo, are comparative late-comers to the Southwest, where they roamed at will before the white men came. Today, because of their grassier, better forested reservations, they have a somewhat easier life than the Navajo.

The Apaches have a lesser tradition of sand painting, but a considerable one of painting in the more usual sense. Their bold, angular symbols are unmistakable among others of the Southwest. Red and yellow centipedes, radiating suns, serrated flames, and crosses-of-the-four-winds still mark old Apache camps.

Evil charm-working emblems adorned buckskins and shirts used in war and medicine rites. Long wooden fiddles, hide shields, and huge wooden headdresses all bore the disturbing, restless designs of this nomadic tribe.

Much of Apache painting character apparently derives from the tribal dance; angularity, directness, and force mark both arts. Wilson Dewey, who lives on the Apaches' San Carlos Reservation in Arizona, shows in "Apache Gan Dancers" the similarity between dance patterns and those painted on wands and headdresses (page 366). With the exception of the realistic hawk, most of the painted motifs are abstract and angular, repeating the jagged motion of the dance. The combined effect of dance and painted design



American Museum of Natural History

As Prisoner of War, a Cheyenne Brave Filled the Pages of This Ledger

Released, the young man died (1879) fighting in Wyoming Territory. There a bullet punctured the book's lower margin and entered his body. The left leaf shows Federal cavalrymen advancing with carbines; their reserves are indicated by a row of horses' heads. A Cheyenne (right) rides amid bullets (page 549).

is spectacular and barbaric, yet true to life.

Last summer I saw this dance on the Mescalero Apache Reservation, high in the Sacramento Mountains of southern New Mexico, and I found it almost exactly as I had first seen it 23 years before.

There in the shadows stood the tall, leafy cone of the ceremonial lodge, and there the huge, snapping bonfires shot sparks high into the starry night. The masked, black-bodied Gan stamped and twisted with taut, split-second movements. Their clanking headdresses and clinking pendants staccatoed the flat drumbeats.

Camping out the Fourth of July week, I saw most of the rites. One, the initiation dance of Apache maidens, was so sacred that I had not expected to see it.

Even when, late in the final night, the unanticipated moment came for a glimpse through

the restricted lodge entrance, I stood spellbound and apprehensive lest I should in some way diminish the scene's pure, wild beauty.

From my quick impression, I recall it now —four girls with long black hair and long buckskin dresses, intent, impersonal; fleet, light steps from side to side, shifting like feathers in the mottled glow from the charcoal pit; faint, eerie singing and the rustle of cottonwoods; hidden drumbeats and a forlorn wail from two old women.

When the dance ended, the girls were all but exhausted, but they raced toward the rising sun.

Old Art Forms Enlivened

Contemporary painters of the Plains area prove that old art forms can be enlivened and advanced in a new medium and purpose. They turn for their inspiration to the dramatic paintings on buffalo hides and the eloquent pages of the prisoners' books that express the Plains Indians' West better than it has ever been revealed by the most celebrated artists.

Modern Plains art is more than lively, bright decoration; it is the Indians' own visual document of an immense panorama of events during the last great heyday and the tragic ending of old Plains life.

During the years following the arrival of the Spaniards in the Southwest, all Plains tribes acquired horses—the "great dogs" of Plains lore. Then intertribal contests were rife, horse stealing was an honorable pursuit, and buffalo hunting was on a grand scale.

The buffalo fed, clothed, and sheltered the people of the tented tribes—Sioux, Cheyenne, Crow, Kiowa, and others. So the mighty beasts were honored and enticed in many rites. Even after their final slaughter, the herds were wistfully commemorated in legends.

"Buffalo Calling," by Wilmer Dupree, a Sioux, portrays a performance wherein both men and horses are dressed in buffalo regalia as a charm and an honor to the herds (page 372).

Another Sioux painting, Calvin Larvie's "People of the Sky," depicts an imaginary scene far above the prairies, in which warriors ride as dashingly as they did in the hide paintings of long ago (page 370).

Only a Plains Indian could have conceived an aerial display such as this. And none but the Plains artist might have dared a composition wherein four riders race their steeds breakneck toward the center.

Speed and action are the hallmark of Plains art. "Prairie Fire," by F. Blackbear Bosin, a 34-year-old Kiowa-Comanche artist, retains the spirit and verve of traditional works, though it is different in technique and more naturalistic (page 354).

"Prairie Fire" unites a familiar, exciting subject with an art peculiarly suited to portray it. Through certain universal means of effective painting, this art conveys here the fury and emotion of the triumph of life in the face of disaster.

Of interest is the artist's own statement: "To my knowledge, the subject has never been painted by an Indian artist, and it came purely as a challenge.... I want to realize the glory of portraying the life of the Indian for the eyes of the people who do not know."

Young men of the Plains were trained in virtue and bravery through the soldier societies. Walter Richard West (Wah-Pah-Nah-Yah, or Light Foot) depicts a rite of one of these groups in his "Dance of the Soldier Societies" (page 358).

"My main feeling in doing paintings of this type," says West, "is to preserve and pass to posterity the dress, customs, and habits of my people."

West, 42, has had an all-round career. As a teen-ager he worked in oil fields. Later he went to Haskell Institue in Kansas, then studied with an older Indian artist, Acee Blue Eagle, at Bacone College in Oklahoma. After four years in the United States Navy, West received a master's degree in art from the University of Oklahoma, taught art in the Phoenix Indian School, and since has headed the art department at Bacone College.

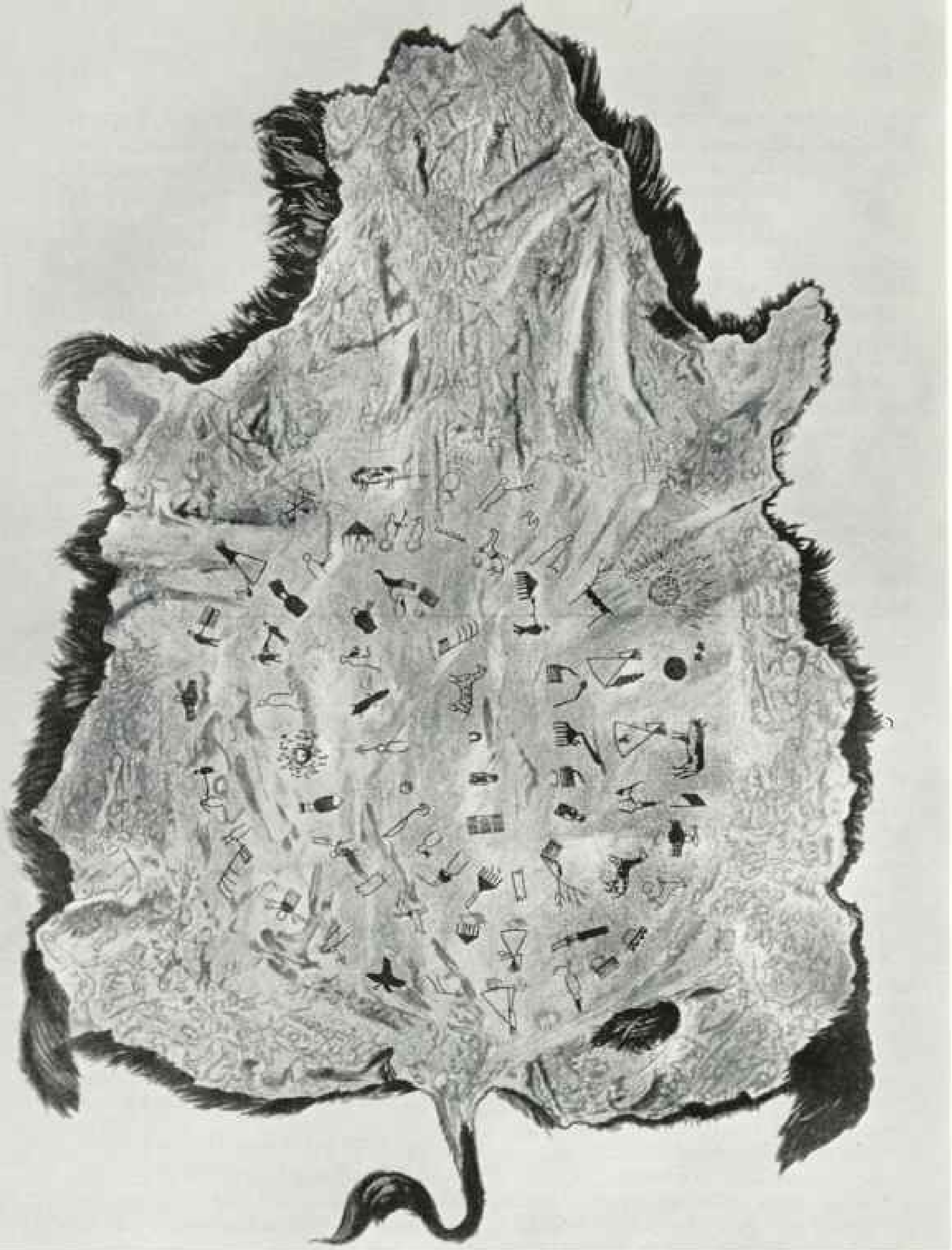
I asked West why he thinks Indian painting should continue, and he answered, "It is a source of enrichment." He believes Indian painting should be a "living, growing thing." And his own art proves that it can be.

Stick Ball Game Depicted

Only one painting from the Woodland tribes is included here, but it is one of the most outstanding of current Indian works. This is "Creek Ball Game" by Noah Deere, who was 21 and a student at Bacone College at the time his painting won a prize at the Philbrook Art Center in 1950 (page 356).

Deere says the Creek Indians call this rough-and-tumble forerunner of lacrosse *takonhon* (stick ball).

Of the 15 Indian artists whose bright colors are reproduced here, eight are still painting.



A Buffalo Robe Painted by Lone Dog Records 71 Winters Among the Dakota Sioux

Several Plains tribes kept calendars wherein they noted the passing years with symbols of important events drawn on skin or cloth. Figures usually ran in a counterclockwise spiral outward from the center.

This winter count begins in 1800, a year shown by 30 parallel lines in three columns close to the center. Each line stands for a Dakota slain by the Crows. Directly above, a spotted figure marks a smallpox epidemic. Next, a horseshoe indicates shod mounts stolen from white men by the Dakotas, whose horses lacked shoes.

Log cabin with a plume of smoke (lower right) indicates a Canadian trader's settlement in 1817-18. A shower of meteorites (left) represents 1833-34, when "the stars fell." A cow (right) stands for 1868-69, when Texas longhorns entered the Dakota country. Blacked-out sun attended by stars shows the eclipse of August 7, 1869.

377 National Geographic Photographer David S. Boyer

Draughtsmen in the Bureau of Indian Affairs Work Beneath an Indian Mural

Allan Hauser, an Oklahoma Apache, painted these horsewomen in the New Interior Building, Washington, D. C.

five cannot be located, one is seriously ill, and one is dead. About 40 Indian artists, nearly all men, devote a substantial amount of their time to painting.

What of the significance of Indian painting to the total American art? There is no better answer than that which David E. Finley, Director of the National Gallery of Art, wrote in his foreword to the catalogue of the Indian art exhibit there:

"The paintings in this exhibition, although contemporary in appearance, derive from the ancient Indian tradition, and both in subject matter and manner of execution make a valuable and unique contribution to the body of creative art in America."

Indeed, Indian painting from every standpoint is inherently and uniquely American. Barely begun to be known and appreciated, it offers unlimited enrichment to the fine arts in every field, and, like any serious painting, to the ethnological and historical record.

↑ Mirror Helps a Girl Learn to Say Sounds She Never Hears

"It is possible to teach the deaf to hear speech with their eyes," Alexander Graham Bell wrote 80 years ago. Marjorie E. Magner uses a mirror in teaching speech at the Clarke School for the Deaf, Northampton, Massachusetts, a United States pioneer in the use of the oral method of teaching deaf children. Mary Jo McCormick watches as the teacher says the sound "oo." She sees the positions and movements of speech and feels them with her hand on the teacher's face. Through the earphones she may detect the voice faintly.

↓ Babbling Voices Vibrate a Balloon; Breath Stirs the Paper Strip

Clarke teachers encourage beginners, relaxed and playful, to babble in order to develop natural voice quality. Here the teacher repeats "buh buh buh" close to the balloon. Stephen Weikart feels the vibration of the voice through his fingers and cheek and then responds.

Phyllis Haley learns to say the word "farm." When she makes the sound of "f" correctly, her breath flutters the strip of paper held before her mouth. "Farm" is only one word of an ever-growing vocabulary that she must learn to speak during the first year.

Deaf Children Learn to Talk at Clarke School

With Patience, Skill, and New Scientific Equipment, Teachers Labor That "the Ears of the Deaf Shall Be Unstopped . . . and the Tongue of the Dumb Sing" (Isaiah 35:5-6)

By Lilian Grosvenor

With Illustrations by National Geographic Photographer Willard R. Culver

"ONE of the greatest achievements in the world," Alexander Graham Bell used to tell his grandchildren, "is that of the child born deaf who learns to talk.

"The blessing of speech seems almost as natural to most of us as breathing," he would say. "You children can't remember when you spoke your first word, but think of the little one who has never heard a human voice! Think of the courage he needs to live among hearing people."

These remarks of long ago sprang to my mind with startling clarity during a recent visit to Clarke School for the Deaf at Northampton, Massachusetts, where the inventor of the telephone was active for 51 years as teacher, consultant, researcher, and president of the board.

School's Influence World-wide

Clarke, and New York City's Lexington School for the Deaf, also founded in 1867, started the movement in America to teach deaf children to speak and read lips, the oral method of education.

Grandfather Bell persuaded Clarke to start the first training course for oral teachers of the deaf in the United States in 1889. Since then, more than 500 have gone from there to every State and 20 foreign countries to teach deaf children to talk. They have opened doors into soundless "rooms" and brought courage to parents from Argentina to Canada, from Australia to Japan, from Turkey to India, from South Africa to Norway.

When I recalled Grandfather's words, I was sitting in an observers' alcove at Clarke School. A one-way window allowed me to see into a schoolroom without disturbing the class. The prettiest 4½-year-old girl I've ever seen was learning to talk.

Blond, blue-eyed, and dimpled, Laura had come to school only a few weeks before. She had never spoken a word in her life. Mistakenly, a layman would call her, and some 70 percent of Clarke's pupils, totally deaf.

I watched the teacher take Laura on her lap and hold one of the tiny hands to her face so the child could feel the vibration when she spoke. Teacher and pupil were facing a mirror (opposite page).

Sometimes slowly, sometimes quickly, the teacher repeated "buh, buh, buh." The little girl, watching the mirror, tried to imitate the action of her teacher's lips and tongue, and then, as her hand was swiftly transferred, to feel the same vibration in her own face.

Pressing my forehead against the window in my excitement, I watched the poignant scene. The teacher worked as if her life depended on Laura's making the sound, and Laura herself was just as eager to capture the magic her eyes couldn't see.

The teacher picked up a bright-colored ball. "See the ball," she said when Laura looked at her. The little girl laughed, and her teacher, laughing too, quickly took one plump hand in her own and pressed it against her face. "See the ball, Laura! Show me the ball."

The teacher purposely used complete sentences. In this way the young beginner, watching her lips, caught a glimmer of the rhythm of spoken language and learned at the start that we do not talk in isolated words.

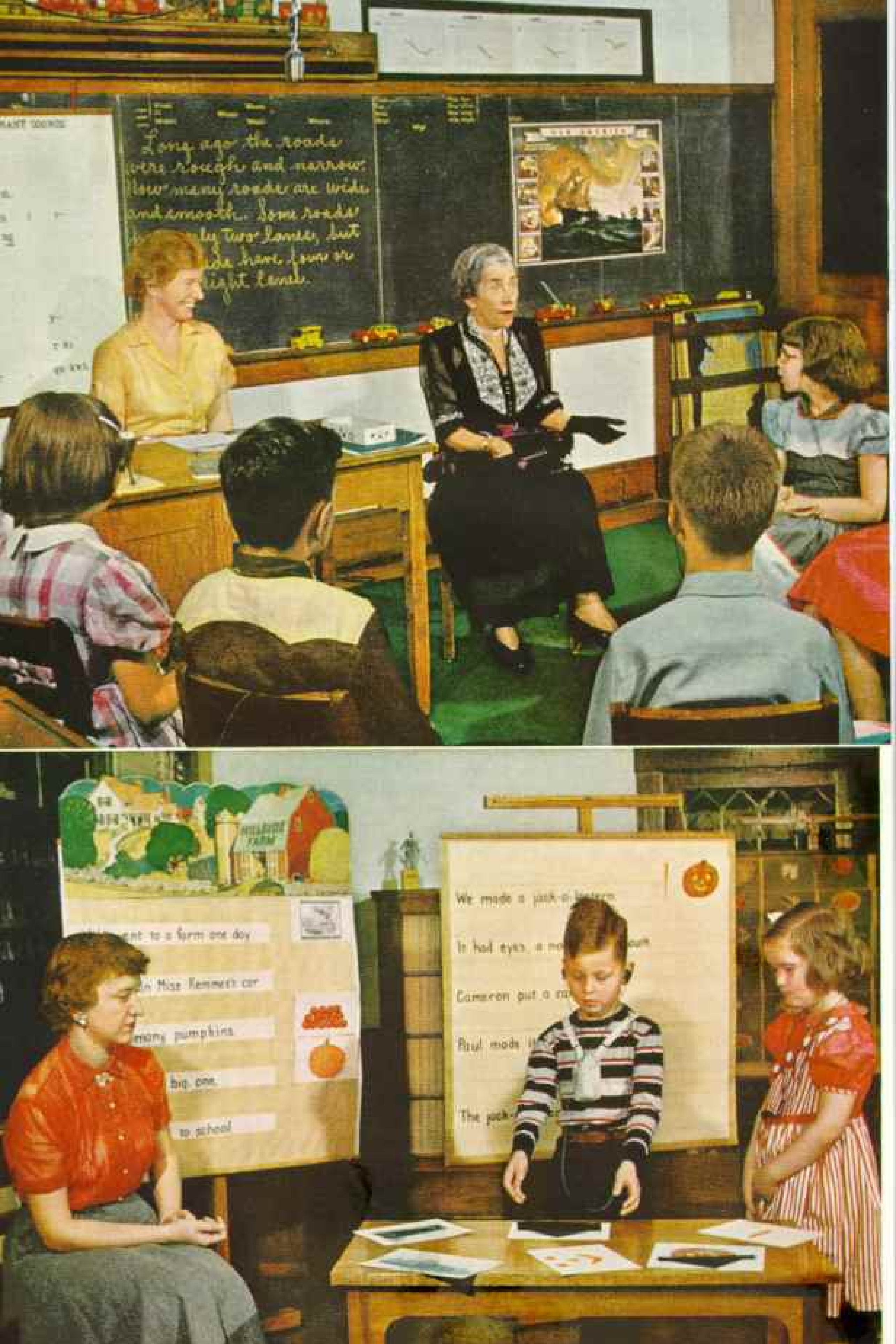
Back and forth the hand went between the faces. Eventually Laura triumphed. She had no way of knowing that her voice, saying her first word, lacked resonance and that the word was not perfectly spoken. She was jubilant. So was her teacher, and so was I.

Games Develop Youngsters' Speech

A few minutes of such concentrated work are enough for a small child, and Laura soon ran off to play.

"Your turn now, Mary," said the teacher, speaking to an elfin creature who had been trying to scramble into her lap. This time she held a strip of paper by one end and showed the child how to puff against it (opposite).

This action was planned to develop Mary's cheek muscles, which needed exercise, since


Long ago the roads were rough and narrow. Now many roads are wide and smooth. Some roads
lay Two lanes, but
ide have four or
ight lanes.
We made a jack-o'-lantern
It had eyes, a
Cameron put a
Paul made
The pack-
Long ago the roads were rough and narrow. Now many roads are wide and smooth. Some roads lay Two lanes, but ide have four or ight lanes.
to a farm one day
Miss Kennedy's car
many pumpkins
big one.
to school

← Mrs. Calvin Coolidge Visits Clarke School, Where She Taught as a Young Woman

"I never hear a deaf child that my heart does not go out to it," Grace Goodhue Coolidge wrote in 1929. "I breathe a prayer that fortune may favor it by bringing it to a school where it may be taught as the children at Clarke School are taught."

Mrs. Coolidge taught three years at Clarke before she married the young Northampton lawyer who became the 30th President of the United States. Her interest in Clarke has never waned. As First Lady she sponsored a $2,000,000 fund-raising campaign for the school, and she served as board president from 1935 to 1952. Today she makes frequent visits from her home in Northampton. Here she tells a dramatic incident.

Eager Youngsters Seek Knowledge to Open the Gates of Silence

Page 380, lower: A Clarke School pupil learns early that he must ask out loud for things he wants. Teachers encourage the children to talk and provide experiences for them to talk about. Excursions about Northampton create the opportunity to learn lessons. Here Paul Jakins selects the right picture to illustrate each sentence in his reading lesson as teacher Shirley Remmes and classmate Barbara Banner watch his work.

↓ Student Teachers Study the Ear's Anatomy

More than 500 Clarke-trained teachers serve throughout the United States and in 20 foreign countries. Norway, Turkey, Cuba, India, Iran, Japan, Australia, Argentina, and Canada have been represented in recent classes. Studies include anatomy, phonetics and speech development, language, lipreading, audiology, child psychology, and art. Louise A. Hopkins lectures to this class.

Kodachromes by National Geographic Photographer Willard R. Culver

she was unable to chatter like a hearing child.

The "game," for such it was to Mary, would also teach her to make the "wh" sound so needed for the continual "Why? why? why?" of the kindergarten set. And she was learning a lesson in controlled breathing, as necessary for good speech as for good singing.

I watched 4-year-old Eddie develop breath control by blowing against a candle flame. Then the teacher turned to Bobby, who was playing with a toy, and touched his arm. When he looked up she said, "Come on, Bobby. Let's find out what you can hear today."

Bobby, of course, couldn't hear a word, but he was watching her face and unconsciously trying to lipread. How can he read lips, I wondered, if he doesn't know words and sentences? And, for that matter, how can he think? His mind is trapped in a soundproof prison, and until he learns language it cannot grow and develop.

The teacher brought out a drum, a cowbell, and a horn. Expectantly, Bobby sat down beside her and turned his back. By turns she rang the bell, blew the horn, or beat the drum until the walls of my booth vibrated.

Bobby's head was bent in concentration. I imagined I could see his ears stretching as he tried to distinguish one sound from another. He was learning to listen, taking an early step in Clarke's auditory training program.

Hearing Fragments Put to Use

Twenty-five years ago Bobby's tiny remnant of hearing might have been wasted, even at Clarke. Today it will be educated to help his eyes read lips and to bring a natural rhythm to his own spoken sentences.

In recent years Clarke has been a world pioneer of auditory training for profoundly deaf children. Using new high-powered group hearing aids, Clarke teaches its pupils to use their fragments of hearing, which many people think useless, to supplement lipreading. The school believes its experience is bringing new hope to deaf youngsters everywhere.

Clarke owes much to its fine modern equipment, to new teaching techniques and research into problems of the deaf, and to the experience and ability of its teachers. But I have often thought that the school's success can be explained only by the unshakable faith of every teacher and pupil—a faith shared by all who believe in the oral method—that the "ears of the deaf shall be unstopped . . . and the tongue of the dumb sing."

This was the faith of Gardiner Greene Hubbard, a Cambridge, Massachusetts, lawyer who became the first president of the National Geographic Society. Long before, he had heard the prophecy of speech for deaf children fulfilled in his own daughter's voice.

Deafened by scarlet fever at the age of four, Mabel Hubbard seemed destined for a life among people unable to talk. Of the 22 schools for those with impaired hearing in the United States in 1861, not one believed she could keep her speech. "She will soon be both deaf and dumb," the Hubbards were told.

Mabel's parents refused to accept such a life for their child. They determined to try to teach her at home.

After the raging fever passed, the little girl lay in bed, listless and unresponsive, for months. Friends gently suggested that her brain as well as her ears had been affected. The Hubbards kept on, trying to catch the child's interest with one thing after another.

Twenty-third Psalm Starts Recovery

One day Mabel's mother repeated to her the 23d Psalm, which the child had known by heart. To her great joy, Mabel, watching her lips, joined in hesitantly with "Goodness and mercy shall follow me." Gradually the entire psalm returned to the child's memory.

With this foundation the Hubbards were able to build a vocabulary, associating words with actions and objects, always insisting that their daughter talk and that her sisters speak to her rather than gesture. Although this is essentially the way deaf children are taught today, in the 1860's the Hubbards were striking out in the dark. But Mabel's progress amazed them. After two years working alone, the Hubbards found a young woman who came to tutor Mabel and their hearing children.

Later they heard that Henry Lippitt, Governor of Rhode Island, had a daughter, Jennie, who had lost her hearing and was being educated to speak and read lips. Like parents of deaf children today, the Hubbards and Lippitts started writing suggestions and encouragement to each other.

Mr. Hubbard wanted to help other deaf children and their families. In 1864 he set out to perstuade the Massachusetts Legislature to appropriate funds for the first oral school in the country. His effort failed.

The plan's most eloquent opponent was Mr. Lewis J. Dudley, one of the legislators. He said he knew from experience that speech for

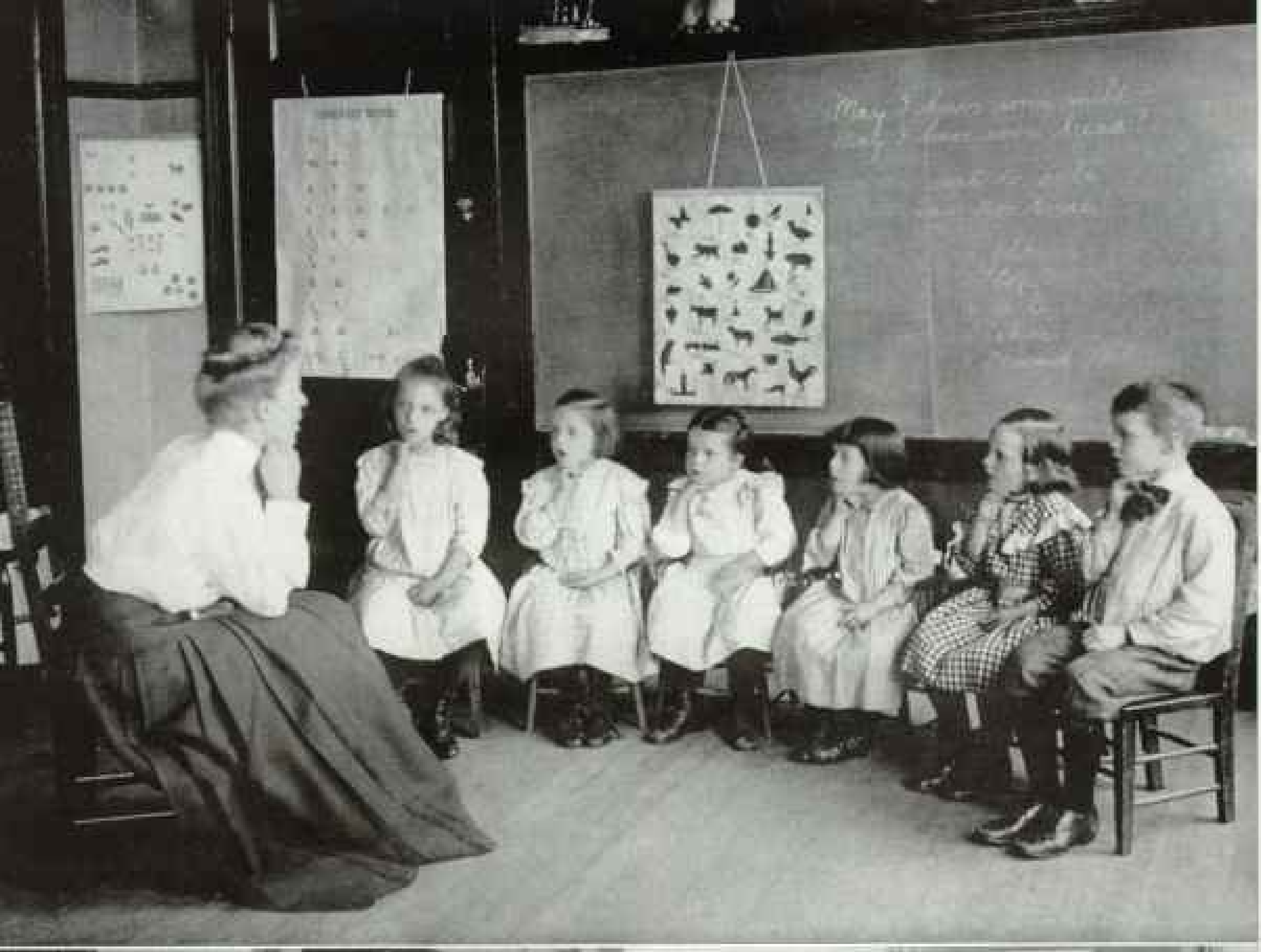
"Let's Talk Picnic!" Pupils Pair Off to Practice Words

"Wh̲g is coming to the Memorial Day picnic?" Kevin Nolan asks Linda Kessler (above). "W̲e w̲gnt a big crowd," Linda replies (right). "D̲g you think we'l̲l̲ have ice cream?" inquires Kevin hopefully (left). Underlined letters denote sounds being spoken when the pictures were made.

Kevin and Linda, like all Clarke pupils, wear hearing aids with dual receivers. Hearing even the slightest drone of a speaker's voice facilitates lipreading. The merest remnant of hearing helps a child improve the pitch of his voice and speak rhythmically.

Most deaf children are not mute; they have normal speech organs but cannot imitate sounds they do not hear. Until they are taught, they live in a world apart.

Clarke School stresses constant speech practice. Classrooms and dormitories buzz with the eager, excited chatter of youngsters happily using their voices.




SILENT NIGH NIGHT!
ALL IS CALM S BRIGH
'ROUND YON N MOTT
AND CHILD. HU ANT
SO TENDER AI
SLEEP IN HEA
PEA

← A Clarke Class of Four Decades Ago Studies the Sound of "K"

Page 384: Ethel A. Hunt, who taught at Clarke from 1905 to 1920, instructs this group to say "milk" and "walk." Then, as today, Clarke kept classes small to give pupils maximum individual instruction.

Yetta Burnaz

Below: Today's Middle School youngsters, singing Christmas carols, feel the piano's rhythmic vibrations through their fingers. Mary E. Numbers plays; Barbara C. Wentworth points out the words.

National Geographic Photographer Bates Littlehales

Alexander Graham Bell Attends the 1918 Graduation Exercises →

"Now we shall have money enough to teach speech to little deaf children," the inventor wrote to his mother when the telephone proved successful. For 51 years he was active at Clarke as teacher, consultant, researcher, and president of the board (page 379).

J. Reynolds Medart took the picture while he was a student at Clarke. He is now a mechanical engineer in St. Louis, Missouri.

children who could not hear was impossible. His own daughter was deaf and unable to talk.

Mr. Hubbard revised his strategy. He helped Miss Harriet B. Rogers start a small school for deaf children at Chelmsford, Massachusetts. The next year he arranged a series of parties for the legislators. To them Miss Rogers brought her most talented pupils, Fanny Cushing and Roscoe Greene. They sat in the drawing room and chatted about the Civil War with Mabel Hubbard and Jeanie Lippitt.

According to our family tradition, when Mr. Dudley attended he broke down and said he would give anything to hear his own Theresa say just one word: "Father." Mr. Hubbard, pulling out his handkerchief and blowing his nose violently, said he knew just how Mr. Dudley felt and would ask Miss Rogers if she would try to teach Theresa the word.

"Miracle" Started Clarke School

This unusual teacher agreed to try, and within a few days Theresa could say "father" and several other halting words. The happy father returned to Northampton and excitedly told a friend, Mr. John Clarke, about the "miracle" he had witnessed in Boston.

Then Mr. Hubbard attacked the legislature again in 1867. This time Mr. Dudley led the fight, and his eloquence was responsible for obtaining an appropriation. Meanwhile, Mr. Clarke had offered $50,000 if the school would locate in Northampton, and when he died, in 1869, he left it $250,000 more.

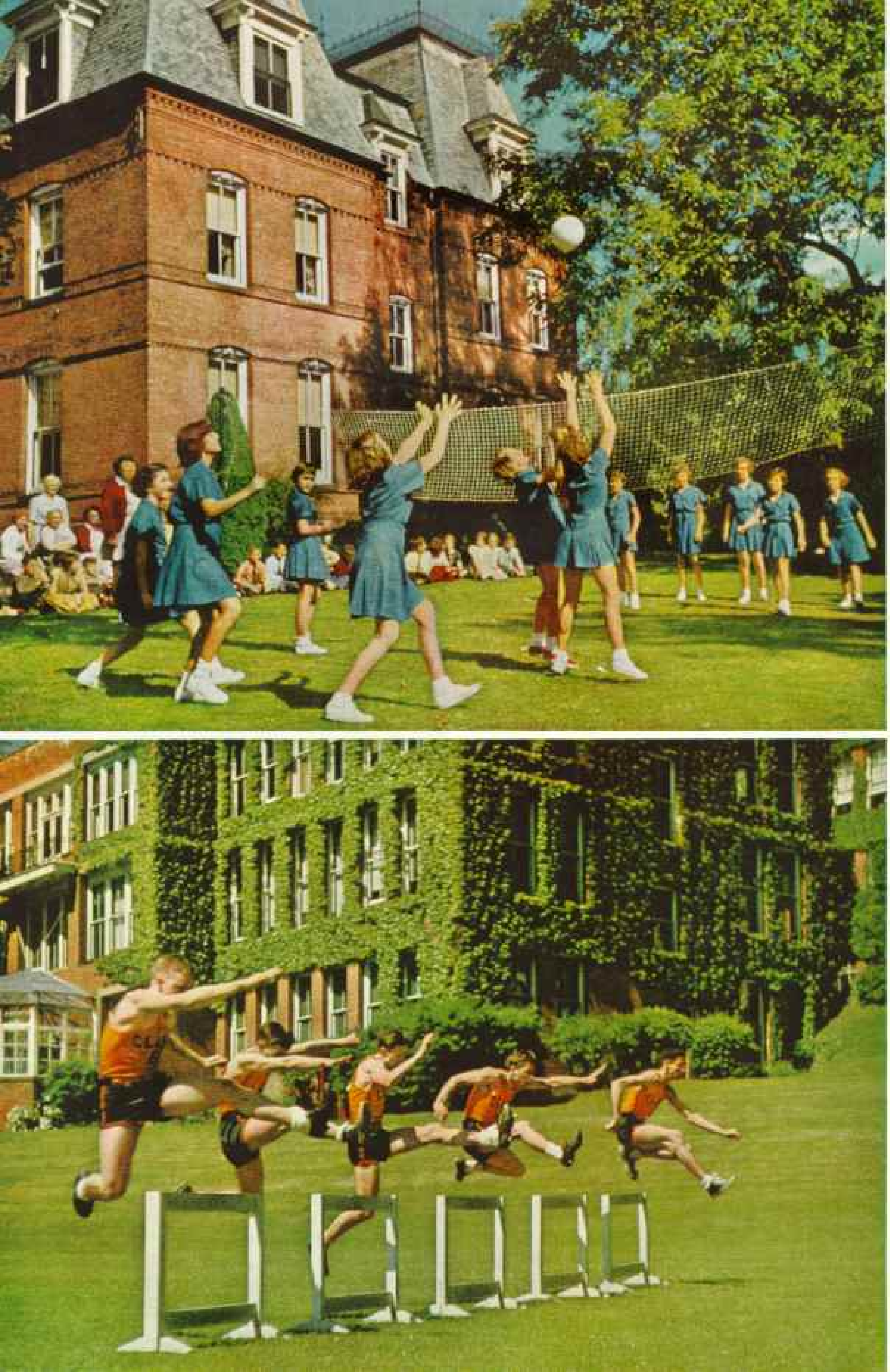
Miss Rogers, first principal of the school, was followed by the indomitable Caroline A.

Yale, of Charlotte, Vermont, who held what may be an all-time record of 63 years' active association with one school.

Miss Yale planned Clarke as it is today—a school of small units, with classes no larger than seven or eight pupils, who are constantly with hearing people. She also made the rule that no one with impaired hearing may be employed at the school.

It was Miss Yale, also, who welcomed young "Prof. A. Graham Bell" in 1871 and carried out several new ideas he suggested. One was the use of Visible Speech invented by his father, Alexander Melville Bell. It was a system of graphic symbols representing the position of the speech organs in making different sounds. Modified Visible Speech is still used at Clarke in teacher-education courses.

One day Miss Yale introduced Professor Bell to Mr. Hubbard. The chain of events the meeting started must have surprised her. In appreciation of the young man's interest in deaf children, Mr. Hubbard offered to



finance certain "experiments in telephony." Later Professor Bell married Mabel Hubbard.

Some years after their marriage, the Bells asked Miss Yale to visit them in Washington, D. C. The inventor-teacher had founded the Volta Bureau, a center of information on deafness, and wanted her advice on how to make it more useful to parents and teachers.

Mr. Hubbard was also a guest at dinner that first evening. Miss Yale noted that the two men seemed to share a secret and that they were as pleased with themselves as a pair of her boys at school who had just added a new word to their vocabulary. After dinner they took her to the library, where a large lighted world globe stood.

Birth of National Geographic Society

"Now, Miss Yale," they said, placing their hands on the globe, "you are here on an historic occasion. Never forget it. This very morning we decided to start a society to increase interest in geography. It will be called the National Geographic Society."

Three Presidents of The Society—Mr. Hubbard, Dr. Bell, and Gilbert Grosvenor—have served a total of 87 years on Clarke School's Board of Corporators.

Although Mr. Hubbard and Mr. Dudley moved off the stage 60 years ago, Clarke School has kept its affinity for fathers. In 1945 the wife of a young teacher in Maryland, George Pratt, discovered while her husband was in Burma that their one-year-old daughter Lynn was unable to hear.

What should she do? When Mr. Pratt returned, the couple trudged from doctor to doctor, without success. Unlike Mabel Hubbard, their child had never heard speech and had no vocabulary on which to build.

Finally a friend told them that the "Telephone Bell" had started a center on deafness: "Volta Bureau, 1537 35th Street, Washington, D. C." George Pratt hurried there.

The Volta Bureau urged him to write Mrs. Spencer Tracy, wife of the motion-picture actor, and get the invaluable correspondence course offered parents of preschool deaf children by the John Tracy Clinic in Los Angeles.

Mr. Pratt was also encouraged to learn of the pioneer work being done by Prof. and Mrs. A. W. G. Ewing with deaf infants at the Victoria University of Manchester, England. In addition, he discovered that the 22 schools Mr. Hubbard had canvassed in 1861 had mushroomed to 300 schools and special classes with an enrollment of 22,000 children.

Some of the schools were teaching by the oral method alone; others preferred the "combined method," using the finger alphabet and French sign language as well as speech.

In 1949 Lynn Pratt entered Clarke. A year later her father was asked to become the principal, and he promptly accepted. Already people in Northampton refer to Mr. Pratt as "Mr. Clarke" and never realize their mistake.

England's High School for the Deaf

While staying with the Pratts recently, I was describing my visit to a school in England, the Mary Hare Grammar School, at Newbury near London.

Mary Hare School is the first of its kind in the English-speaking world, a senior high school for deaf children where speech is used exclusively. After talking with many parents and school heads, I was convinced that there was a vital need for such an institution in the United States.

"But almost all Clarke graduates enter regular high or prep school," said "Mr. Clarke." "We feel they need to compete with hearing students. And they do—very well.

"But don't forget one very important point: our students vary in ability just like hearing youngsters. Besides, some don't have the money to stay in school longer. If they don't go on, we do have the deep satisfaction of knowing we have equipped them to use speech in jobs in the hearing world.

"Why don't you stay a few days in each of the houses and see how we do it?"

I needed no urging, and six months after my earlier visit I found myself again in an observation booth watching Miss Marjorie E. Magner of Nebraska teach a class I had watched before.

This time her pupils were sitting on chairs

← Volleyball and Hurdles Delight Girls and Boys at Athletics

Page 386: Like children everywhere, Clarke students yell and cheer in sports sessions. These girls play outside Gawith Hall, where Mrs. Coolidge lived while teaching at Clarke (page 380). Boys race across the lawns of ivy-walled Hubbard Hall, which houses classrooms, chapel, library, and offices.

A wall plaque in Hubbard Hall bears the inscription: "This building is erected to the memory of Gardiner Greene Hubbard, first president of the Board of Corporators of the Clarke School. To him America owes the inception of the present movement toward the oral education of the deaf."

Science Pupils → Study the Stars

"I am deaf. I am going to Clarke School in Northampton, Massachusetts." With this note pinned to her dress, a Danish diplomat's daughter arrived from China.

Clarke accepts all races and nationalities. Its 144 students and 32 teachers live and work together in 15 buildings spreading across a 20-acre campus on Round Hill, one of Northampton's highest points.

Clarke teachers use only speech and speech reading both in and out of classrooms; they never employ sign language or finger alphabet. Education received through the oral method enables many partially or profoundly deaf graduates to enter high schools with hearing students and to go on to college.

Clarke's Upper School corresponds to junior high. Subjects include English, geography, history, mathematics, civics, current events, science, Bible study, and physical education. Boys learn cabinetmaking, drafting, and printing. Girls take sewing, cooking, and arts and crafts.

← A Halloween Character Beams on His Young Creator

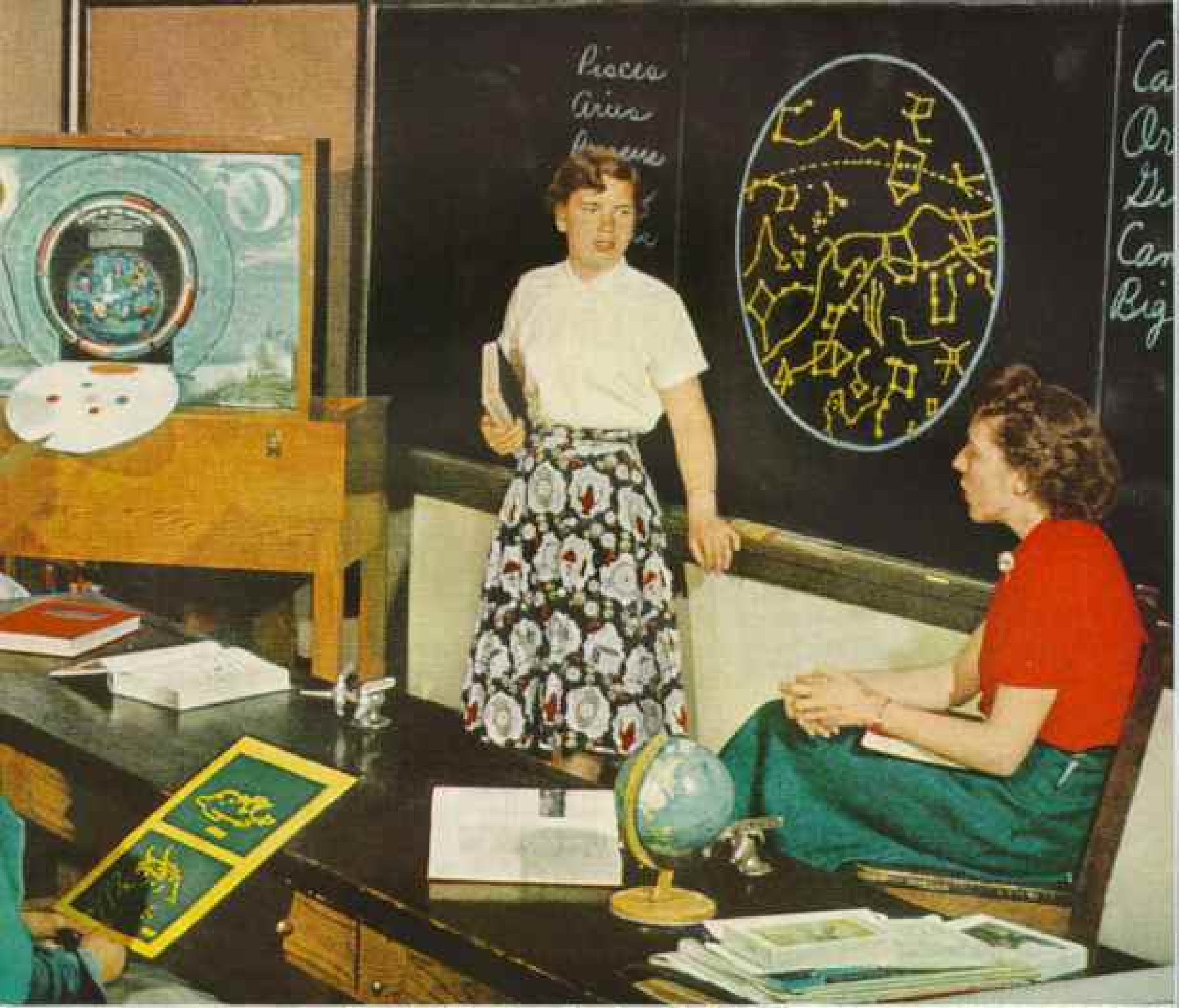
Painting permits deaf children to express their imagination. Art and handicraft classes, together with athletics, foster a sense of rhythm. Loss of hearing proves no handicap to 7-year-old Rebecca Wathen-Dunn in her art work.

"This Is a Girl," Roberta Eadie → Tells Her Classmates

Page 389: Even with the most powerful group hearing aids, many children cannot hear vowels and consonants, but the amplified sound permits pupils to recognize the rhythmic patterns of spoken sentences. They learn to relate the sound vibrations to the language they themselves speak and see on the faces of others.

These children's earphones connect to a master control panel where the volume of sound is adjusted according to each one's degree of hearing loss. By reading lips and using their hearing remnant, many deaf children achieve an almost normal ability to understand the speech of others.

Kodachromes by National Geographic Photographer Willard R. Culver



arranged in a horseshoe, the good-luck shape that continues throughout the next 12 years as the chairs enlarge and grow desks in front of them. They were wearing headphones, each of which was hooked up to a central high-fidelity amplifier in the corner. The microphone hung from an overhead cord.

Miss Magner was teaching vocabulary, telling her pupils to point out objects in pictures. Beside each picture she had written a sentence which they read aloud: "The boy has a top. Mary has a ball." In this way they were getting practice in lipreading, as well as using speech and associating it with written language.

Every teacher of the deaf uses pictures constantly to enlarge vocabularies and widen horizons. NATIONAL GEOGRAPHICS, old and new, are mainstays of Clarke teachers.

After class I congratulated Miss Magner on the number of words the children had learned since my previous visit, and how pleasant their voices sounded.

"Get them to laugh when they are talking," she said. "Then they relax and their voices are more natural."

Lollipop Helps Speech

She told me the trouble Bobby had had sounding the letter "k." He could sound "t" well enough, but couldn't understand how to place his tongue for "k."

Suddenly Miss Magner had an idea and fetched a lollipop. She made Bobby repeat "t-t-t" over and over again while she stuck the lollipop in his mouth and depressed his tongue. In so doing, he said "k-k-k." I think only a teacher of speech would dream up that one!

Little Eddie, she said, had learned to say "k," but the "ee" sound, always difficult for a deaf person, was beyond him. He tried and tried to please her, until she was at her wit's end to know what to do. Then one winter day, when Eddie was romping on the playground, she heard him shouting "EEEE EEEEE" for no reason except good spirits!

Miss Magner rushed out into the snow, grabbed him, and exclaimed, "Wonderful, Eddie! Keep it up!" Making an incident of it, she saved the sound and was able to get him to reproduce it in class next day.

Miss Vivian E. Tilly of Georgia, head of the Lower School and for 35 years a major contributor to Clarke's success, took me to visit an older class. Here each pupil promptly answered "Seven" when asked his or her age.

As each spoke, the other children watched intently; whenever "seven" was pronounced, they broke into chuckles. The position of the tongue when saying "ssss" is difficult to remember at best. When baby front teeth are falling out, children have to discover, without hearing to guide them, a new place to put the tongue.

Recognizing Sentences by Rhythm

The children were learning that every sentence has a rhythmic pattern, just as different kinds of music—the waltz, tango, fox trot—have distinct and individual tempos. A severely deaf child can get rhythmic vibrations through the electric group aids. But he must learn how to interpret them.

To put this idea across, the teacher gave her pupils three or four key sentences such as "How *old* are you?" and "*How* are you?" They understood them by reading her lips. Then with eyes averted, ears straining for the vibration that would come through the group hearing aid, they tried to select and speak aloud the sentence she spoke. It was largely a question of identifying the sentence by its rhythmic pattern. To them her voice sounded only as a low, pulsing murmur.

I sensed an air of quiet jubilation, shared by Miss Tilly and the teacher.

For many months Rachel had sat in the class unable to understand this game, which the other children obviously enjoyed.

The day I was there, however, the teachers felt sure that Rachel realized for the first time that the tingle in her ears was connected with her teacher's moving lips. In other words, she had grasped at last the idea of teamwork between eye and ear.

Too Much Talk—Sometimes

From 9 to 13 years of age, Clarke children live under the wise guidance of Miss Mary E. Numbers of Maryland. At lunch in the Middle School dining room, Miss Numbers remarked ruefully above the babble of voices, "Listen to the noise! We do everything we can to teach these children to talk, and then sometimes I almost wish they wouldn't."

Boys and girls of this age group gobble up new words and chatter all the time. They become show-offs in speech.

The first classes to use the redesigned group hearing aids from the time they entered Clarke seven years ago have now reached Middle

Kodachrome by National Geographic Photographer Willard R. Culver

Words Lose Their Mystery and Take On Meaning When Youngsters Play This Game

Learning grammar is more difficult for deaf children than learning to lipread. Visual aids like this toy house help demonstrate the use of words. When teacher Christina Jones asks about the bird, Jerry Ruthowsky quickly finds it, and Linda Ellis writes about it. At the same time both children speak the word aloud.

School. Teachers comment on an increase in what they call "yak-yaking" in the dining room and corridors. These students seem to find even greater pleasure than the others in talking out loud.

Hearing youngsters come by accent and rhythm naturally, but the deaf child must learn a complex mechanical operation for each sentence. He must think of what he wants to say, figure the mechanics of saying it, and then make his muscles pull together to do what he wishes them to do.

Before a boy leaves Middle School, the mechanics of speaking aloud are tripping him again. His mind has far outrun his tongue. He reminds me of a free-running colt, tasting the succulent green shoots of words. Hardly has he learned to like them when the bridle is put on again.

Many teachers here and abroad have told me that children with the best minds are sometimes those whose speech is hardest to understand. Like 14-year-old George, for instance.

At lunch George stopped at our table bursting to tell Miss Numbers something that had happened on the boys' annual trip to see a Red Sox baseball game in Boston. His face was aglow, and his eyes danced with fun, but the words that poured forth were blurred and almost unintelligible to me.

As severely as the twinkle in her eye permitted, Miss Numbers said, "George, I know you can talk a lot better than that if you try."

I could imagine the bridle reins tightening. George, however, laughed while he mentally checked the grammar of his intended sentences and remembered which sounds were difficult to pronounce. Then he took a deep breath.

"Ted Williams hit a home run right out of the park," he said. "Boston won in the ninth inning."

Speech Calls for Self-discipline

"Hard on him, you think?" Miss Numbers asked when George had left. "Perhaps. He has a bigger vocabulary than any other boy in school, but speech will always be difficult for him. His hearing loss is almost total, and whatever fragment he has left he isn't using.

"If George doesn't learn to talk here so people can understand him," she went on, "how can he get through high school and college? With a fine mind like his, isn't it better for him to learn to discipline himself now than to go without advanced education?"

After breakfast next morning I watched a Protestant girl from Tennessee hold a book and look from it to the moving lips of a Catholic child from Montreal. Yvonne was reciting her catechism in preparation for her first Communion. Some children were leafing through current events bulletins, while others were absorbed in picture books.

Through reading, deaf children learn the casual talk of the hearing, and their vocabularies expand far more than by lipreading alone. A wise teacher knows each child's special interest and uses it to stimulate more reading.

Teachers know that pupils cannot concentrate hour after hour watching a person's face, and when they see the first sign of fatigue they quickly do something to relieve the tension. The students in a grammar class that National Geographic photographer Willard Culver and I visited were practicing the imperative form of the verb. Suddenly Miss Numbers said, "Marion, *wink* at the visitors."

Marion complied, with difficulty. Each owl-like eye twisted up and finally blinked. Everyone laughed, and eyes and throats relaxed.

The World for a Classroom

Clarke, whatever else it may do, turns its students into travelers. Vocabularies start with things around the home and advance to the yard, town, State, and then to wider horizons. Commercial films are shown, and in addition graduates return to give lectures with color slides and movies taken on foreign travels.

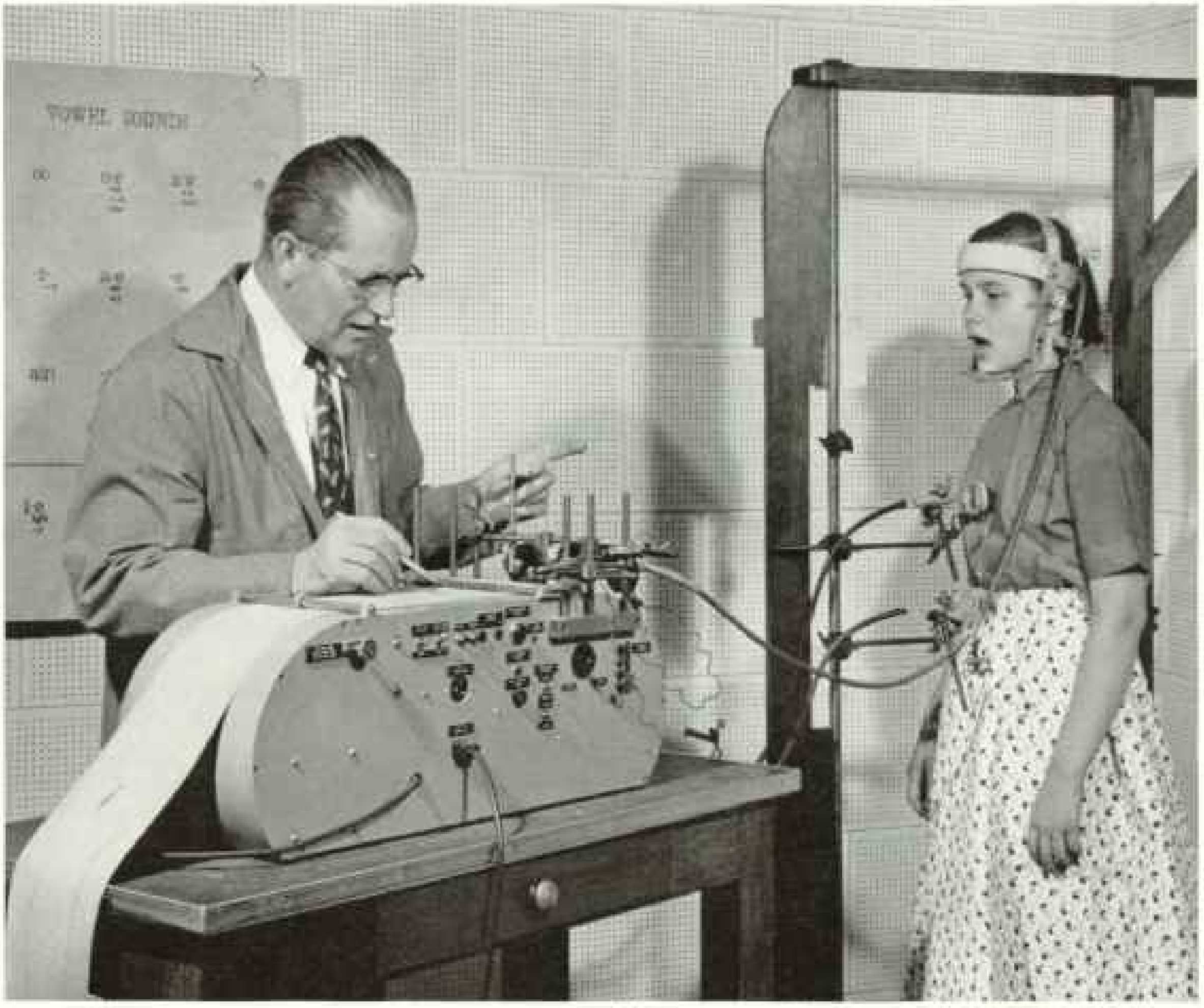
When we visited a geography class that was studying Switzerland, Mr. Culver was asked to tell about his experiences taking photographs in that mountainous republic.

"Talk distinctly, but in a normal voice," he was told. "It won't help to talk loud. The children hear only the drone of your voice, just enough to get the rhythm."

He sat at the teacher's desk, with the microphone hanging just above. The pupils adjusted their earphones and fastened their gaze on Mr. Culver's face. Here was a practical test of the vital teamwork of eye and ear: a new speaker challenged their skill.

Inspired by the most attentive audience he had ever known, Mr. Culver outdid himself. When he stopped, Elsie inquired eagerly, "And did you climb the Matterhorn?"

When girls brighten their faces with a touch of lipstick for parties and boys wear coats to class, they belong to the Upper School.



393 National Geographic Photographer Willard R. Culver

Machines Help the Deaf to Talk by Recording Speech Organs in Action

Recording pens on the kymograph (center) trace the speaker's errors. Jaw movements transmitted by the headgear point up improper pronunciation. Pneumograph attached to chest and abdomen checks breath control. Dr. Clarence V. Hudgins, Clarke's director of research on speech and hearing, tests Jane Blancke.

Scouting, arts and crafts, home economics, and sports widen vocabularies. When Mr. Stanford C. Blish, the guidance counselor, sent a questionnaire to Clarke graduates a few years ago, he learned that in the difficult time after leaving school many made friends because they excelled at sports. They also wished, the answers said, that they had learned to dance and drive a car while in school.

Mr. Blish went to near-by University of Massachusetts and took its safe-driving course. Now, as an accredited instructor, he has trained numerous safe, licensed drivers among Clarke students (page 395).

A Wednesday-evening dancing class was started. With professional teachers, and a parent at the piano, the old gym shakes and rattles to the rhythms of the fox trot, tango, and square dance.

Even though teachers are constantly trying to think of words "indispensable in the hearing world," there are startling slip-ups. For instance, not long ago it was discovered a few days before graduation that not a senior had ever heard the word "soapsuds"!

One afternoon Kendall, a senior, showed us the room where he studied mechanical drawing. It was empty, and I asked him about the other boys in the class. After several attempts I still couldn't understand his answer.

"Wait a minute," he said, and started searching his pockets for his hearing aid, which he had taken off to play baseball. He fitted it on and adjusted the tiny microphone. Almost at once the quality of his voice softened, and his words became clearer.

I knew that Kendall had been born profoundly deaf, but even the slight sound he received helped him regulate his voice. I understood now why Miss Tilly had rejoiced

"It Won't Work . . . and I Can't Hear"

Young George Balsley complains of a faulty hearing aid. Dr. Hudgins adjusts the delicate mechanism.

National Geographic Photographer Bates Littlehales

over 7-year-old Rachel's relating the tickle in her ear with the first simple "How are you?"

Kendall told me that a couple of boys in mechanical drawing class talked too much and disturbed his concentration. (Of course, he would have to stop and study their faces to know what they said.)

"How about you? *You* don't like to talk, I suppose?" I couldn't resist teasing him a bit, for I had been unable to get a word in edgewise.

A laugh rippled across his face, and his eyes sparkled as he answered, "Oh, yes, of course I like to talk—all the time—except in mechanical drawing!"

Visiting in the Upper School, I noticed that maturity brings not only coats, lipstick, and modish hairdos (in which hearing aids are concealed), but confident repose. Students sit quietly attentive, hands out of sight.

Years of effort to stay on the speech honor roll has taught the students that they are less tempted to gesture if they keep their hands in their laps.

Clarke School believes that speech is so difficult for a deaf child to learn that the teaching of it cannot be confined to the classroom. It must be used every waking hour of a student's life.

To encourage talking, Mr. Pratt reads the speech honor roll once a week in the presence of all students. Any teacher can strike a name off the roll by reporting a single lapse outside of class, when a gesture is used in place of spoken words.

"We feel so sorry for Pierre," one of the teachers told me while the boy "listened." "He does fine speech work in class, but no matter how hard he tries he has never made the honor roll. You see, he's French."

But since my visit Pierre, I hear, *has* made the honor roll, not once but several times!

I spent hours studying the answers to the questionnaire Mr. Blish had sent to graduates. Through them ran two themes: the loneliness of the deaf person, and his boundless courage in meeting the issue.

Most answers urged pupils to meet more hearing people during school days. The students need practice in reading the lips of many different people to gain self-confidence.

"A deaf person who is a shrinking violet will never make his way in the hearing world no matter how good his speech and lipreading skills are," warned one gregarious old grad, my friend Dr. H. Latham Breunig. He uses his Ph.D. in chemistry at the Eli Lilly & Company laboratories and thoroughly enjoys making after-dinner speeches.

There was the brilliant young graduate student who advised newly fledged alumni to meet as many people as possible. "Eventually," he said, "you will meet someone in each situation who will pause to help you."

I liked the comment of a young suburban wife. She said she enjoyed using speech most when two or three other housewives dropped in for a leisurely cup of coffee and they did nothing but "just chat."

Because of answers such as these, Mrs. Pratt started asking small groups of Clarke children to her home when she invited children from her son Tommy's school. Clarke board members and friends near by offered hospitality.

Still unsatisfied, Mr. Pratt prods Upper School students to make expeditions on their own and to seize every opportunity to talk with strangers who look good-natured.

Spurred by such promptings, several seniors went to Childs Park one afternoon last year and found some Indians in full regalia. To find out what the redskins were doing there, they approached a friendly looking man and engaged him in conversation. They learned that the Indians were an advance section of the city's tercentenary celebration. Gaining confidence, the students tried their voices a bit further and discovered, incidentally, that the man had a niece in Ireland who was attending a school for deaf children.

Bubbling with happiness over their success in talking with a stranger, they rushed back to school and asked Mr. Pratt to invite their new-found friend to dinner.

"But who is he?" asked Mr. Pratt.

Besides snapping pictures, the girls had remembered to get their new friend's name and address.

"Mr. Cahillane!" exclaimed the principal. "Why, you girls have made friends with the Mayor of Northampton!"

Mr. Cahillane did come to dinner, and later he sat on the platform and watched the girls receive their hard-won diplomas.

Mrs. Calvin Coolidge Advises Clarke

Hundreds of visitors from every corner of the globe come to Clarke each year, but the school's favorite visitor is a former teacher, Mrs. Calvin Coolidge (page 380). While she was a teacher, Grace Goodhue met her future husband, a young lawyer who lived in a building next door. Her pupils followed his courtship with the greatest interest and clustered round when he drove up in a fine barouche to escort her to her first political reception. They lost a gifted teacher when she left to get married.

But for 50 years Mrs. Coolidge has never lost touch with the school. For many years she was president of the board and is now president emeritus. Her advice is sought constantly.

Of course I consulted Mrs. Coolidge concerning this article.

Clarke Seniors Learn the Rules of Traffic

A 16-year-old student may earn a regular operator's permit after five hours of behind-the-wheel training and 20 hours of classroom instruction (page 393). Stanford C. Blish, Clarke's guidance counselor, here explains the right-of-way at intersections to Helene Spitzer.

National Geographic Photographer Bates Littlehales

"Tell about the school's history, because it is really the history of the oral movement in this country," she said. "And explain about our auditory training, because Clarke has pioneered with profoundly deaf children, and so few people know what it can do for them. Then be sure to tell of the need for more oral teachers."

"What kind of person shall I say makes the best oral teacher?" I asked. Without hesitation Mrs. Coolidge answered, "Someone who believes every deaf child can learn to talk, and who wants to help him."

We talked of her own years at Clarke. "Teachers spend such long hours with their pupils both in and out of class. Didn't you find it exhausting?" I asked.

Mrs. Coolidge's expression was radiant. "Never!" she said. "It's the most thrilling and stimulating teaching you can imagine. Every day you have some new success to rejoice over. A child learns to pronounce a difficult sound, or to understand a new word. It buoys you up and keeps you going."

Although the present method of educating fragments of hearing once thought useless is new, scientists have known for years that total deafness is rare. These hearing remnants fascinated teachers and scientists, who knew that deaf children didn't talk because they couldn't hear speech. In most cases nothing was the matter with their speech organs.

Modern intelligence tests which do not depend on language show that the deaf as a group are just as intelligent as hearing people. Yet for centuries no effort was made to educate these human beings, who were physically fit in all other respects.

Early Efforts to Help the Deaf

Then the Church began to make efforts to reach the minds of deaf-mutes. In France a priest named Charles-Michel de l'Epée pioneered in devising a language of gestures, each sign representing an idea or word.

The first permanent school for the deaf in America was founded at Hartford, Connecticut, by Thomas Hopkins Gallaudet in 1817. It adopted the French sign language and the finger alphabet. This method was used almost exclusively in the United States for the next 50 years.

The oral method—teaching children to speak and to read lips—has gained several wonderful tools in the last 30 years. The electronic audiometer, developed in the Bell Telephone Laboratories of the American Telephone and Telegraph Company, tests the degree of a child's hearing loss. It helps determine whether he needs a special school or whether instruction with an individual hearing aid will enable him to go to school with hearing children. Audiologists grade children with hearing difficulties as hard of hearing, partially deaf, and profoundly deaf.

How Useful Is a Scrap of Hearing?

Unfortunately, the audiometer cannot gauge the quality of the hearing fragment. Often several years of hard work are needed before teachers can tell how useful a scrap of hearing will be. A child using his hearing remnant reminds me of a detective making use of clues to solve a mystery. Some are more adept than others, and it is not entirely a question of intelligence.

As an illustration, a teacher reminded me of a boy named John, whom I had seen at Clarke the year before. He had lost most of his hearing when he was six or seven, and she had trained him in the teamwork of eye and ear for several years. Finally he began to respond like one who is only hard of hearing—and was later sent to public school.

On the other hand, I met a handsome lad whose audiogram shows much more hearing than John's. His voice was so resonant and his sentence rhythm so natural that I wondered why he was still at Clarke. Unlike John, this boy had never had normal hearing. What he did have was not giving him independence. He had not been able to perfect the all-important teamwork of eye and ear.

Once more I realized why the teachers had rejoiced when they were sure that little Rachel understood the meaning of this teamwork.

The group hearing aid is a more recent tool than the audiometer. Since the early 1930's partially deaf children at Clarke have made spectacular gains with its help.

During the last seven years Dr. Clarence V. Hudgins, Clarke's director of research on speech and hearing, has carried on important experiments in the use of hearing aids by profoundly deaf children (pages 393, 394). His object is to discover how deaf a child can be and still profit by auditory training.

Special equipment was built to give undistorted power (high fidelity) at all levels of sound up to the limits of auditory tolerance. A safety device prevents the sound from becoming loud enough to break through the

Principal and Mrs. Pratt Treat Middle School Youngsters to a Popcorn Party

When Lynn Pratt (glasses, left) was one year old, her parents discovered she was deaf. At five they enrolled her at Clarke. Her teacher-father became Clarke's principal a short time later (page 387). The Pratts frequently entertain pupils at their campus home. Tommy Pratt (beside father) attends regular school.

"threshold of pain" and hurt the pupil's ears.

After a year's trial with the most severely deaf children, Clarke School discarded its former group hearing aids and installed this new equipment in each of its 20 classrooms.

Parents of Clarke School pupils belong to every walk of life, and requirements for admission are simple: that the child be healthy, sufficiently mature to go to school, and deaf enough. The school gives preference to Massachusetts children, and the State pays their tuition.

Only 13 percent of children now at Clarke became deaf from diseases. A generation ago 25 percent had been suddenly plunged by illness into a silent world.

This heartening example of medical progress is due chiefly to the disappearance of the dreaded mastoiditis. New drugs have eliminated much of the deafness resulting from scarlet fever, mumps, and other such common diseases. They have also lessened the severity of attacks by meningitis, though this disease is still a major cause of deafness.

Because childhood's enemies are being conquered, Clarke is gearing itself more and more to meet the school's most difficult educational challenge—the baby born profoundly deaf.

Every visitor to the school senses there a ceaseless quest by teachers and researchers for the elusive "something" that will allow deaf children to talk easily. Meanwhile, Clarke reaches out to bring the blessing of speech to boys and girls like 10-year-old Lynn Pratt, whose command of spoken language is one of the greatest achievements in the world.

Kodachrome by Jean and Franc Shor, National Geographic Staff

Bengali Farmers in Traditional Garb Learn Modern Methods of Cultivation

Pakistan's Government seeks to diversify East Bengal's long-established jute culture (page 401). These rice farmers discuss new techniques just explained by a lecturer at the East Bengal Agricultural Institute in Dacca, capital of East Pakistan. Summer classes, inaugurated in 1951, draw hundreds of students of all ages.

East Pakistan Drives Back the Jungle

A Land of Elephant Roundups, Bengal Tigers, and a Bamboo Economy Takes Big Strides Toward Becoming a Modern Nation

By Jean and Franc Shor

National Geographic Magazine Staff

With Illustrations from Photographs by the Authors

THE huge swaying elephant on which we rode moved quietly into the edge of the teak forest to let a honking jeep pass along the narrow trail. The Bengali schoolmaster who rode beside me smiled.

"This is symbolic of East Pakistan," he said. "The elephant gives way to the jeep. Our bamboo economy is being modernized. In a single generation we are making the leap from primitive jungle to a modern nation."

My companion may have been a bit optimistic. East Pakistan covers 54,500 square miles of jungles and rivers and alluvial plains. It is enormously fertile. But its population has a low literacy rate, and communications are bad. Time and effort are required to correct these things. Yet the progress East Pakistan has made in the eight years since it achieved freedom speaks well for its future, as does the enthusiasm of its people.

Two Pakistans 1,000 Miles Apart

East Pakistan stands alone geographically, but it is not a separate country. It is a part of Pakistan, a Commonwealth of Nations member created in 1947 out of predominantly Moslem areas of India. Its 42,000,000 people are a majority of Pakistan's population, yet they are crowded into an area one-sixth the size of West Pakistan. And it is separated from West Pakistan by 1,000 miles of unfriendly land (map, page 402).*

The Governor of East Pakistan at the time of our visit, tall, Oxford-educated Malik Firoz Khan Noon, stood beside a wall map in Government House at Dacca and told us of the area's strategic importance.

"If the Chinese Communists should move south from Tibet or west through China proper," he said, "we stand directly in the path. Burma lies on our southeastern border, and India surrounds us to the west, north, and east. Our only communication with West Pakistan is by air or sea.

"We are isolated—but we are not afraid. The morale of our people is high. They feel themselves a part of Pakistan. The bond of Islam holds us together. We will remain one nation—and an independent one!"

East Pakistan is vital to Pakistan's national solvency. Its monsoon climate and rich alluvial soil produce more than 70 percent of the world's jute, the plant fiber used in making burlap and twine. Jute exports provide nearly half of Pakistan's foreign exchange.

But there is much more to East Pakistan than political problems and jute fields. Primitive hill tribes, many of them still a mystery to anthropologists, dwell deep in the teak forests. Wild elephants, Bengal tigers, panthers, and cloudy leopards stalk the tangled jungles. Ruins of the Arakanese Empire dot its southeast corner. And deep in the jungles of the Chittagong Hill Tracts, Jean and I witnessed the thrilling spectacle of a wild elephant roundup.

We were the guests of Governor and Lady Noon. The roundup, or *keddah*, is held annually in the Hill Tracts. The Government had invited the United States Ambassador to witness this one, and we were included.

A comfortable overnight train ride took us to Chittagong, principal port of East Pakistan, nine miles upriver from the Bay of Bengal. From there we drove northeast to Rangamati.

In Search of Wild Elephants

We crossed one river on a trembling wooden bridge, another on a flat wooden ferry poled across the muddy current by small brown-skinned men wearing only sarong-type garments knotted around their waists. As we moved north and east, the hills grew higher and the forest denser. The countryside was a network of narrow, mud-banked canals. Native boats, their high sterns painted in brilliant colors, crowded the waterways.

At Rangamati we joined Lady Noon and

* See, in the National Geographic Magazine: "Pakistan, New Nation in an Old Land," by Jean and Franc Shor, November, 1952, and "'Around the World in Eighty Days,'" by Newman Bumstead, December, 1951.

400

The Majestic Palace of the Nawab of Dacca Looks Down upon a Plebeian Laundry

← **Jute, Pakistan's Golden Fiber, Pays the New Nation's Bills**

East Pakistan is only one-sixth as large as West Pakistan, but its jute exports provide nearly half of the country's foreign exchange. These three men carry bales from warehouse to scales at Narayanganj. Members of a team must match in height so as to keep bales level on their heads.

↓ **Itinerant Salesmen Carry Cloth to Remote Jungle Tribesmen**

Riverside villages in the Chittagong Hill Tracts have no stores. Periodic bazaars meet the needs of the primitive Chakmas and Moghs along the Kasalang's banks. Traders in dugouts move up and down the river on schedule, stopping in each settlement. This dealer measures a length of cloth at Myanimukh.

← East and West Pakistan Stand 1,000 Miles Apart

East Pakistan is crisscrossed by hundreds of rivers; West Pakistan is plagued with drought. Bengali is the language of East Pakistan; Urdu is spoken in the West. Easterners eat rice and fish; Westerners, bread and mutton. Faith in Islam unites these diverse regions under one banner.

The authors rode elephants, jeeps, airplanes, rafts, dugout canoes, and river steamers in their survey of East Pakistan.

Students Welcome → a Gift from the U. S.

Page 403: Education for women gets high priority in Pakistan's plans. These Dacca University girls make good use of the reference library assembled by the United States Information Service.

Kodachrome by Jean and Franc Shor, National Geographic staff

Bay of Bengal

the official party. The next day we set off in jeeps, bouncing over a narrow forest trail newly cut from the dense jungles. During the southwest monsoon, when more than 100 inches of rain falls in four months, the road is impassable. Now, in early January, huge clouds of reddish dust settled on everyone.

Warm Reception at Every Village

Lady Noon rode in the first jeep. Every village along the route had prepared a reception. The settlements were tiny clusters of bamboo houses raised on stilts. Everywhere the entire population rushed to the trail to shout greetings (page 411).

The people along our path were Chakmas, a hill tribe of Burmese extraction. They are small, finely made, with delicate features and graceful bodies. The women were wrapped in homespun cloth of identical pattern, a red border stripe on a black background. They wore hand-wrought silver bracelets and anklets, and large silver earrings. As a final touch, many had silver ornaments set into their noses.

Our path ran near the Kasalang River. Fields of rice and mustard lined the way, interspersed with thickets of young bamboo and patches of gloomy jungle. Flocks of green parrots swept over our heads.

It was nearly dusk when we reached Myanimukh. Our procession left the forest trail, labored up a steep hill, passed under a welcoming arch, and halted in a little clearing where a fairy-tale village of bright new-thatched bamboo houses had been constructed.

There were a dozen of the attractive huts, each an exact copy of a native dwelling. They stood on stilts, and a bamboo ladder led to the porch in front of each doorway. Entering

the house assigned to us, we found two bamboo cots, a bamboo table, and two chairs. Oriental carpets covered floors. A back room held a washstand, a commode, and a galvanized iron tub. It was luxury in the jungle.

Dinner that evening was another surprise. A mess hall stood at the end of our village street. Lamplight shone on white linen, and printed menus were at each place. On came an amazing feast of fruit cocktail, fresh river fish, lamb roasted on skewers, chicken curry, mutton curry, rice, coconut and mango chutneys, a fresh green salad, Pakistani pudding, and coffee. After dinner Lady Noon told us of other keddahs she had seen.

"Elephants are very valuable as work animals in the jungle," she told us. "They are docile, intelligent, and very strong. Timber is the principal product of the Chittagong Hill Tracts. Elephants can move the logs, some of which weigh more than a ton, through forests where machinery can't be used.

"About 60 are captured each year. Private contractors pay the Government one animal from each catch. A strong young male is worth from $800 to $1,400."

The wild elephants, in herds of 10 to 15, come down into the Hill Tracts each winter from the higher areas of near-by Burma, seeking their favorite foods of young bamboo, elephant grass, and wild bananas. A contractor locates a wild herd, assembles several hundred beaters, and builds a keddah near by.

The keddah is a circular stockade, 20 yards in diameter, with reinforced walls of heavy logs 12 to 15 feet high. A heavy log gate slides up and down like a guillotine. A funnel-shaped chute, with walls 200 yards long, leads to the entrance. It is 50 yards wide at the mouth and narrows to the width of the gate.

Vines Camouflage Jungle Trap

"The stockade is carefully camouflaged with green branches and vines," Lady Noon continued. "The contractor must work quickly, for once the newly cut leaves wilt, the elephants will not come near.

"Several hundred beaters form a line across the jungle on the opposite side of the elephants from the keddah. They move slowly toward the stockade, driving the elephants toward the chute.

"In the daytime they shout and beat drums. At night they build fires and burn green bamboo. The moisture in the wood turns to steam, expands inside the bamboo chambers, and explodes with a report like a firecracker.

"There's no guarantee of success. It may take days to get this herd moving in the right direction. The stockade is about five miles from our camp. We will be notified as soon as anything happens."

As in a well-planned scenario, a half-naked barefoot youth came running silently into the firelight. Panting, he spoke rapidly to Lady Noon.

"We're lucky," she said. "The herd has been turned and is headed for the keddah. It is about 12 miles away. Within two days it should be in the corral."

Exploring by Elephant Back

Jean and I spent the next day exploring Myanimukh and near-by villages while the rest of the party went tiger hunting. Mounted on elephants, we moved slowly through the jungle, fording rivers and streams, and forcing our way through dense patches of elephant grass where the tough stalks stood 12 feet tall.

The intelligence and sure-footedness of our huge mounts amazed us. They moved cautiously, testing the footing in swampy ground before putting their weight down. With their trunks they pushed aside young trees and tall bamboo, being careful that we were not brushed. At a steep, muddy riverbank they sat on their haunches and slid to the bottom.

A tiny native mahout sat on the shoulder of each animal. Armed only with an iron-tipped stick, he kept the elephant under perfect control. Most of the time, that is.

Jean's pachyderm created a mild sensation. A great she-animal, her forehead tattooed in red and black, she knelt politely at the mahout's command. Jean struggled up to the burlap pad on the broad back. The mahout tapped the elephant's head. Slowly she started to rise. Then, surprisingly, she settled back to her knees. Twice she repeated the process. The angry mahout prodded her with the sharp point of his stick. It got results, but hardly what he had in mind.

Trumpeting, the elephant straightened her hind legs, throwing her weight on her front knees. The massive head went down and braced itself against a sandy bank. Then, while the mahout shouted and flailed away and I watched horrified and Jean held on for dear life, the hind legs rose slowly into the air, the head pressed against the ground, and the elephant stood on her head.

405 Y. Kallaven

Tame Elephants Clamp Wild Tuskers in a Living Vise; Daring Mahouts Apply Nooses

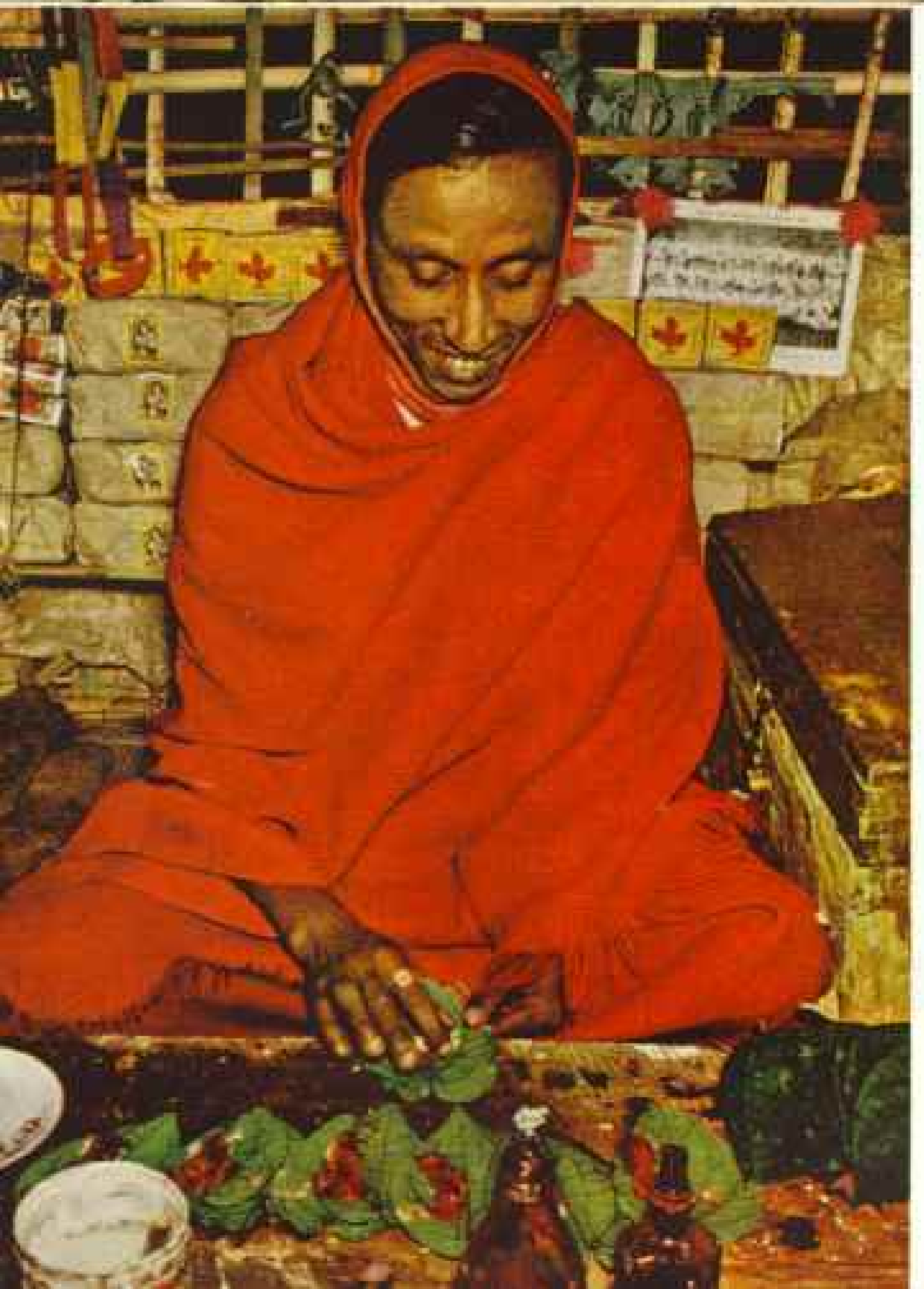
Elephants of India, Pakistan, and Burma move teak logs in forests that machinery cannot penetrate. Herds are replenished from wild animals driven into corrals. These captives will be ready for training in a week (page 407).

↑ A Chakma's Featherweight Loom Travels with Her

Each tribe in East Bengal's Chittagong Hill Tracts weaves a distinctive pattern. This red-and-black design is peculiar to the Chakmas.

Weighing only a few pounds, the loom can be lashed to bamboo supports of houses, or even to trees when the operator is in the jungle. A belt around the weaver's back provides tension to keep the frame taut.

The girl sits on a bamboo porch in a jungle clearing above the junction of the Myani and Kasalang Rivers.



← East Bengal's Daily Chew Comes in a Leaf Wrapper

This merchant in a village on the Kasalang River above Rangamati prepares chews of *pan*, a concoction of betel nut and lime. He wraps them in pan leaves.

Millions of Bengalis consider pan a delicacy and chew it almost constantly. Fashionable women frequently carry the makings in beautifully wrought silver boxes. The betel nut, mildly habit-forming, turns the chewer's gums and lips bright red.

Kodachromes by Joan and Franc Shor, National Geographic Staff

A final gouge from the mahout brought her down. Then, serenely, having demonstrated her independence, she rose properly and stood quietly. The rest of the day she was a perfect lady. But Jean, I am sure, will never really care for elephants.

Good news came that night. The elephants had moved six miles toward the corral. Another 24 hours should see them in the wings.

"The real excitement comes after the elephants are in the corral," said Lady Noon. "They mill around furiously, crashing into the walls in their attempts to escape. They are left two days without food or water, to weaken them. Then a small outer corral is constructed inside the chute. Trained tame elephants enter the keddah. Their mahouts are armed with spears.

"Two of the tame elephants maneuver a wild animal between them. Then they edge him into the outer corral, which is barely large enough for the three to stand upright.

"A daring mahout climbs the wall and crawls among the elephants' feet. Before entering the enclosure, he performs certain religious rites. He touches the feet of the tame beasts so they will not step on him. Then he slips a rope around the back feet of the captive and ties it to the wall.

"A noose is thrown around the animal's neck and tied to the stockade."

Once securely tied, Lady Noon explained, the wild elephant is brought food and water. Its reaction is immediate. Within two or three days it has learned that man is its friend. In a week, it walks docilely in line with tame beasts and is ready for training.

Ringside Seat in a Jungle Tree

At noon the next day we slipped down a jungle stream in native dugouts to a point two miles from the corral. Tame elephants met us there and carried us to a point a few hundred yards from the entrance. We struggled up bamboo ladders to platforms high in the giant trees.

We waited all afternoon. The cries of the beaters and the dull thud of their drums came clearly to our ears. Dusk came, the moon rose, and still we waited.

At 10 o'clock the moon was high and clear, and the forest was alive with sound. Birds made soft night noises; jackals howled. The elephants were coming nearer now—we could hear them feeding.

Suddenly Jean gripped my arm and pointed silently. Fifty yards from us, perhaps a hundred from the mouth of the chute, a tusker stepped into a patch of moonlight. He walked in stately dignity, unhurried, choosing his way carefully. Now he stopped to sample a tender young bamboo. Into the moonlit clearing came another and another. The night seemed full of the ghostly gray shapes.

Steadily they moved toward the mouth of the chute, grazing as they went. From the jungle came the shouts of the beaters. Half an hour passed. Yard by yard the animals moved toward the trap. Half a dozen were already inside the long corridor.

Breathless Moments of Suspense

A big tusker, almost into the chute, spied a clump of bamboo a few yards outside the wall. He sauntered to it. Three females followed. Suddenly all four set off at a fast walk, parallel to the chute.

All was still well. The four might turn and enter the chute. In another minute, when the main body of the herd got past the fire line, the excitement would begin.

Excitement did begin, more than we had ever seen. An overanxious beater, trying to turn the vagrant foursome, leaped into their path, shouting and waving his arms. Another beater, mistaking the signal, fired a gun. The jungle exploded.

The four strays whirled, trumpeting, and made for the rear. The body of the herd followed suit. They spun in their tracks and raced out of the chute, crashing into the camouflaged sides as they ran. The earth trembled under the stampede, and the air was wild with their screams.

A courageous beater tried to set the fire line and turn them. The flames sprang up as he touched the fuel, but it was too late. The blaze lighted massive rumps of the animals careening through the trees. For a few minutes the jungle resounded with the echo; then there was silence.

Comparative silence, that is. For the contractor and his beaters raced into the firelight, screaming imprecations at one another. Everyone blamed someone else.

Sadly we returned to camp. The next morning came a report that the elephants were 10 miles north and still running. There was no chance of turning them for many days. Hence, no keddah.

The official party left by jeep the next morning. Jean and I, with Lady Noon's

Patched Sails and Muscled Arms Drive Butterfly Boats Through the Sundarbans Swamps

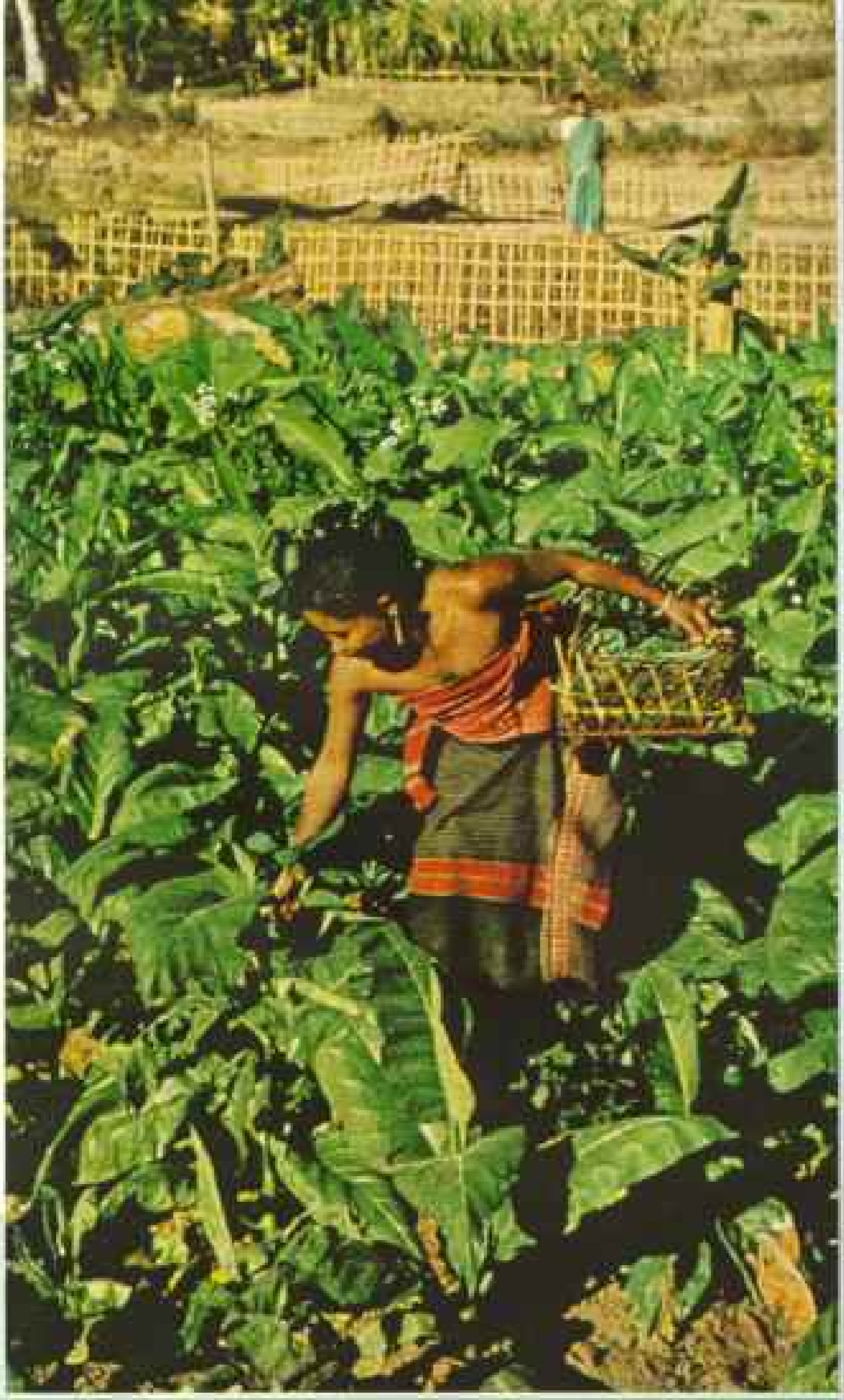
High-prowed wooden vessels carry traffic through watery lanes in the Ganges-Brahmaputra Delta. The authors saw monkeys, crocodiles, and a Bengal tiger on this island. Egrets filled the air at twilight.

Chakmas of All Ages Love Tobacco; They Grow It in Front Yards

Dark and strong, the native leaf is smoked by nearly every member of the tribe, from children of 4 to patriarchs of 80. Pipes are made from gourds and sections of bamboo; some are 3 feet long (page 417).

This young matron, who wears the traditional black-and-red *lungyi* of her tribe, harvests a crop in the Chittagong Hill Tracts. A fence of woven bamboo protects the leaves against raiding animals. Banana plants, which yield a staple of the Chakma diet, grow on the hill in the background.

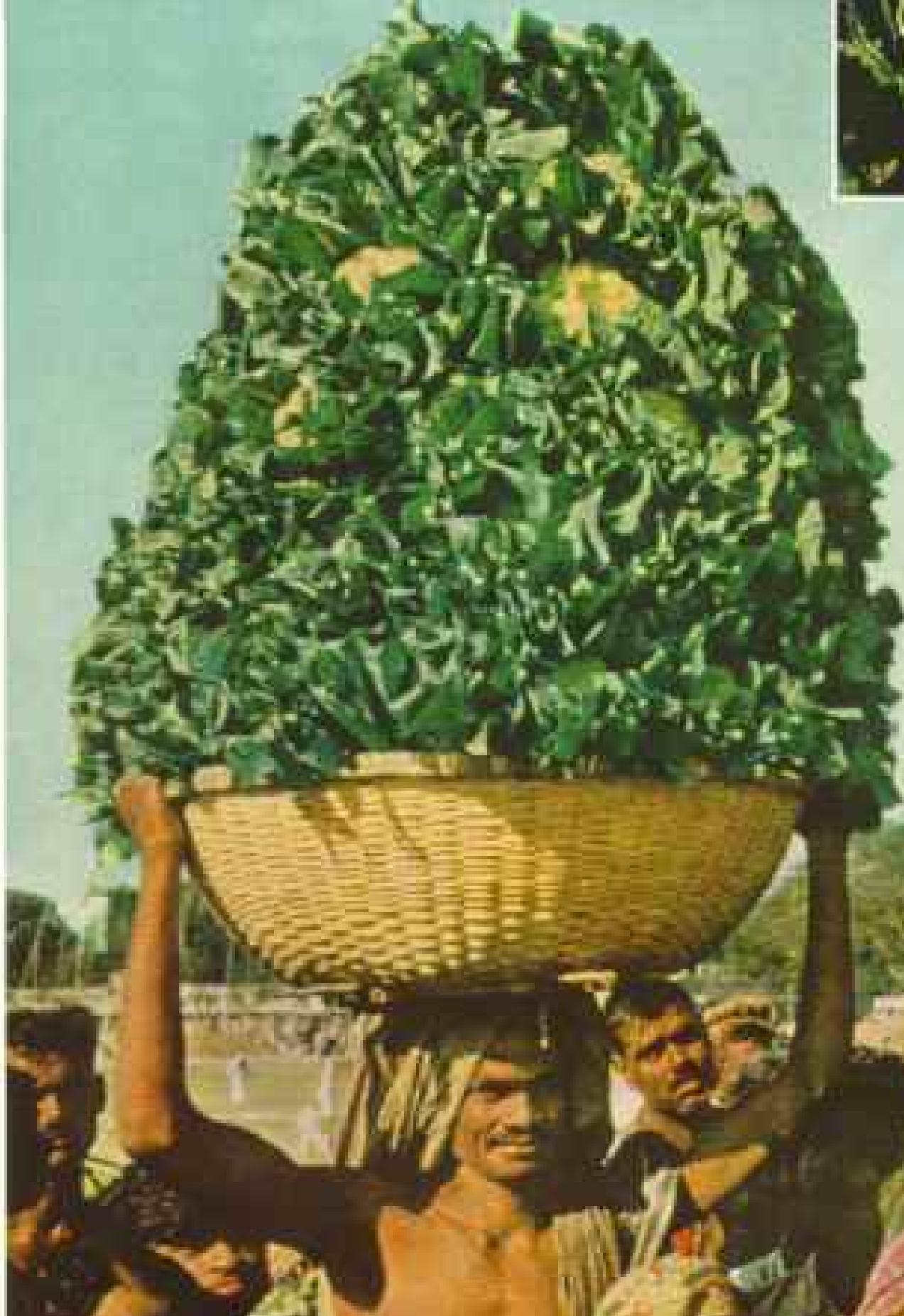
Franc Shor, trying a pipeful of the local tobacco, found it the strongest he had ever tasted.



Cauliflowers Are Stacked in a Way to Make Pilfering Difficult

Farmers send to Dacca market head-borne loads of cauliflowers artistically piled in wicker baskets. They lose 15 minutes packing the vegetables in a carefully arranged pyramid, each head facing outward. The Shors remarked to one farmer that it seemed strange to take such pains to create a pleasing effect.

"That's not the point," the man replied. "With this arrangement the porter can't pick out a head to give to a passing relative. I know he'll get to the market with the load intact."



assistance, had arranged to rent a native craft and float down the Kasalang and Karnaphuli Rivers to Rangamati. Taking leave of our friends, we strolled down to the river. We were in luck. A bazaar was in full swing.

There are no stores in the river villages. River traders supply their needs at monthly bazaars. The traders pole their boats upriver to the last town and spread their wares in the market place. The neighboring hill tribes bring in tobacco, sesame seed, cotton, and bananas to trade for cloth, pots and pans, rice, and silver jewelry. At night the traders float downstream to the next village, where another bazaar is held.

Jungle People Seldom Leave Home

The Myanimukh market area was crowded. One group of men, none more than five feet tall, clung closely together, obviously frightened.

"They are Riangs, from far up the river," our interpreter told us. "They come out of the jungle only once a year. It has taken them six days to float down on their bamboo rafts, and it will take them three weeks to walk home."

The tribesmen have a uniform method of greeting strangers. They press their finger tips together at chest level, pointing upward. Then they nod their heads and raise their hands until finger tips touch the forehead. They are gentle and polite, so we were amazed when one little man, accidentally bumping Jean, turned and stuck out his tongue.

"That's just his way of apologizing," our guide hastened to explain. "Literally, the gesture means, 'I have no words in my mouth which can say how sorry I am.'"

At dusk the traders wrapped their goods in cloth bundles and carried them down to their boats. The hill people lit fires in the market place and cooked an evening meal. Then they began to dance. In the open market place and along the muddy riverbank they circled and leaped and shouted to the accompaniment of drums and wailing flutes. Jean and I watched for hours, then went to bed. When we returned at dawn they were gone. Their once-a-year outing was over, and they had returned to the jungle for the long trek home.

We left for Rangamati the next morning. Our boat was a dugout, 45 feet long and 6 feet wide at the center, hewn from a single log. Arched bamboo matting made a shelter at each end. We occupied the forward "cabin," while the boatmen lived in the after one. The matting was just high enough to enable us to sit upright. To stand, we had to walk to the center, where a fire burned beneath a bubbling rice pot.

One crewman paddled at the stern, a second at the prow. They maintained a rhythmic beat of 28 strokes to the minute. Every hour the third man would relieve a paddler.

Bamboo rafts crowded the river. Some were half a mile long, with hundreds of sections lashed together. Each section was a bundle of 250 poles, 20 feet long. Men with poles guided their progress, warping them around the sharp bends. Frequently rafts blocked the river, and we waited while protesting crewmen untied two sections to make a path.

In the afternoon we pulled ashore to visit a Chakma village where a score of thatched huts housed perhaps 200 people. The headman, Indro Dahn Chakma—all of the tribe conveniently have the same last name—showed us around.

"We plant rice, melons, bananas, and mustard," he said. "Mustard and bamboo are our cash crops. Bamboo is the mainstay of our life. Our houses are made of it, we eat the green shoots, and we sell it. We cook rice in green bamboo sections. We hunt with bamboo blowguns. We use it for chairs and mats and fences. We smoke bamboo pipes and travel on bamboo rafts. Without it we could not exist."

Women Weave and Tend Crops

The Chakmas call themselves Buddhists, but their religion is actually a mixture of Buddhism and Nature worship. They are monogamous, seldom marrying before they are 16. Women do all the weaving and most of the farming. Property is inherited equally by boys and girls.

Women with young babies sat on the platforms outside their homes, weaving and spinning. Many were bare above the waist. My presence did not seem to bother them, but when Jean appeared everyone would seize a scarf and cover her shoulders. When I asked Indro Dahn to explain, he said with a shrug, "Who can explain why women do anything?"

Indro Dahn told me that his people had lived in the Hill Tracts for centuries, coming originally from Burma. Some Chakma customs are peculiarly modern. Quarantine, for instance, has been practiced in the villages for generations.

Kodachromes by Jean and Franc Shor, National Geographic staff

↑ Children's Songs and Waving Flags Greet East Pakistan's First Lady

Released from school, Mogh and Chakma children crowd around the jeep carrying Lady Noon. Wife of the then Governor of East Pakistan, she here visits Buradam villagers in the Chittagong Hill Tracts. Blue-shirted tribesman in center makes a gesture of respect.

↓ Hostess and Guest Compare Jewels on the Lawn of Government House

Social life in Dacca centers around the Governor's spacious residence. Lord Curzon built the palace in 1905, when he was Governor General of India. The Shors found residency life extremely formal, though jackals prowled the grounds at night.

"When smallpox strikes," he said, "a string is tied around the whole village. No one may enter or leave until the disease is gone."

The Chakmas and other hill tribes have primitive remedies for many diseases. A brew of herbs and tree roots is used in cases of snake bite, and Indro Dahn insisted few people died if they drank the bitter brew soon after the bite. The gall bladder of the boa is used for stomach troubles, and the liver of the python, dried, powdered, and dissolved in various liquids, is highly prized in chest and lung complaints.

"Here in the jungle," laughed Indro Dahn, "it is easier to find a python than a doctor."

For a week we lived on the little boat, paddling by day and tying up at night. We lived on oranges, bananas, and boiled rice, and I smoked the strong native tobacco, careful to take only a few puffs at a time. Jean took pictures and chatted with the boatmen. Neither understood what the other was saying, but that did not hinder their conversation.

At villages where we stopped we were welcomed with gifts of fruit and coconut milk and offers of more substantial food. One village headman, impressed by Jean's fair skin and blond hair, called our interpreter to one side.

"The Memsahib is so pale," he said. "Tell me, do you suppose her blood is also white?"

It was a friendly, lazy, pleasant journey. We were not sure that our schoolmaster friend had been right when he praised the coming modernization of the area. The Government, we learned, was building a big dam on the Karnaphuli River, near Rangamati. Soon the river channels would be dredged and deepened, power vessels would replace the graceful dugouts. Electricity would reach into the river villages, and the bamboo economy would be a thing of the past. It would mean the end, we thought, of a very pleasant way of life.

Three R's Reach Hill People

In Rangamati Mr. R. M. Hussain, inspector of schools, offered to take us on a tour of Mogh villages.

"We are establishing new schools for the hill people," he said. "More than 200 have been founded in the past two years."

Hussain's work, we found, had taken him into every tribal village in his district. He loved the hill people, and they responded with equal affection. In every village we were immediately surrounded by his friends.

"These hill tribes are the finest people I have ever met," he told us. "They are gentle and honest and friendly. They take life as it comes and enjoy it more than most people."

Near Thandachari we left our jeep and walked for an hour on jungle trails, crossing innumerable streams and canals, to the village of Bethania, a Mogh settlement of 75 houses, each built upon a high mound.

Chanchurui, the Mogh headman, came from his home to greet us, followed by his wife, Chunila. To our embarrassment, both threw their arms around us in a tight hug, then seized our hands and held them.

"It's their customary form of greeting," Hussain laughed. "When you talk with them, men and women alike will reach out and hold your hand as long as you sit together."

Cows Are Symbols of Prosperity

In Chanchurui's clean, airy house we saw three baskets hanging from the wall of the living room. Each contained a setting hen.

"Keeps the snakes from getting the eggs," Hussain explained.

With Chanchurui we walked about the village. Women, clad in the typical green Mogh homespun, were setting out pepper plants. Cows, the first we had seen in the area, grazed around the houses.

"It is odd that your people should keep cows," Hussain said to Chanchurui. "They don't eat the meat or drink the milk, nor do they use the leather. What's the reason?"

"I'm not sure," smiled Chanchurui. "Having a cow is an index of prosperity and respectability. Perhaps it is because we have lived near Hindus so long. They worship cows. We don't—Moghs are Buddhists—but usually the Hindus were more prosperous than the hill people, and keeping cows was probably a way of showing they could afford a luxury."

Bethania has a population of 800, and it seemed to us that the fields we had seen could hardly feed so many people. We asked Hussain where the food came from.

"They farm the jungle," he said. "Have you never heard of *jhum* cultivation?"

We hadn't, so he explained.

"This is the most primitive form of agriculture in the world," he said. "Each year the people select a hillside tract in the jungle with several hundred acres of bamboo. In early February the entire village moves to the area and with homemade knives cuts the bam-

(Continued on page 421)

Kodachrome by Jean and Franc Shor, National Geographic Staff

Hindu Tea Pickers March into Sylhet Gardens Wearing Empty Baskets Like Hats

Too strong and dark to please Western palates, the Sylhet leaf is blended with more delicate brews from Darjeeling and Ceylon. Trees in this level garden protect bushes from sunburn. Hillside plantations have developed a new technique of contour pruning whereby each plant shades the roots of the bush above it from direct sunlight, which shortens productive life. These girls are paid by the basket. They pick only the tender young leaves.

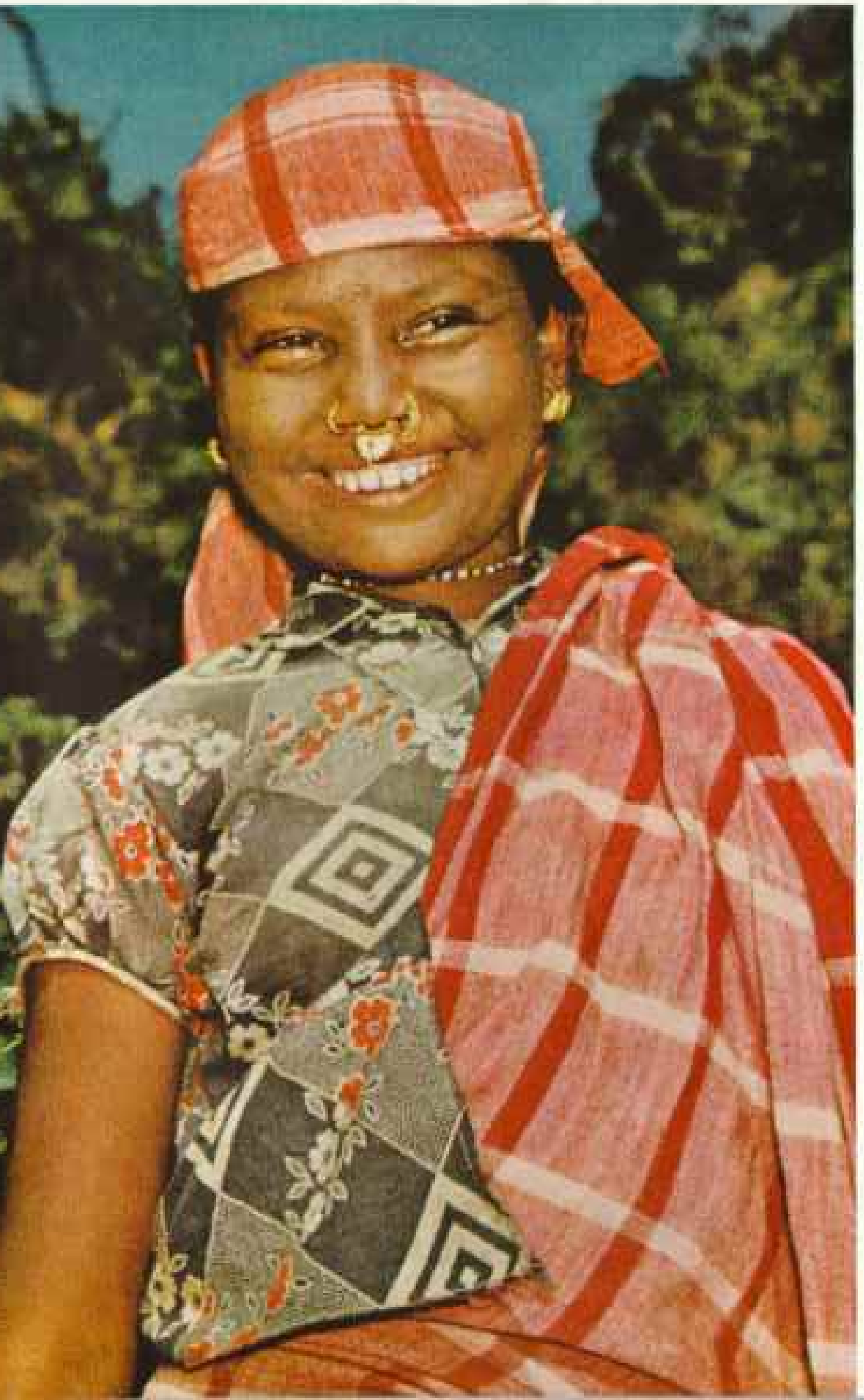
Mogh Women Launder in a Forest Pool Near Rangamati

Primitive Moghs live in bamboo houses, eat rice and fowl and forest fruits, and make an annual journey to market to buy cloth, salt, and sugar. Friendly and affectionate, they customarily hug strangers upon introduction and hold the hand of the person to whom they are talking.

Moghs have great respect for privacy. The Shors, invited to lunch in a Mogh home, were surprised when the 70-year-old grandmother set a dish of chicken curry before them, then quietly withdrew to let them eat alone. She shooed even the curious younger members of the family from the table.

Converted centuries ago to Buddhism, the Moghs retain traces of an earlier Nature worship. Through long contact with neighboring Hindus, they have acquired an almost religious respect for the cow. The more primitive brew medicines from the livers of cobras and pythons. Some jungle tribesmen regard the tiger as an ancestor.

Like other Bengalis, the Moghs chew pan (page 406).



← **A Hindu Girl's Nose and Ears Are Pierced for Beauty**

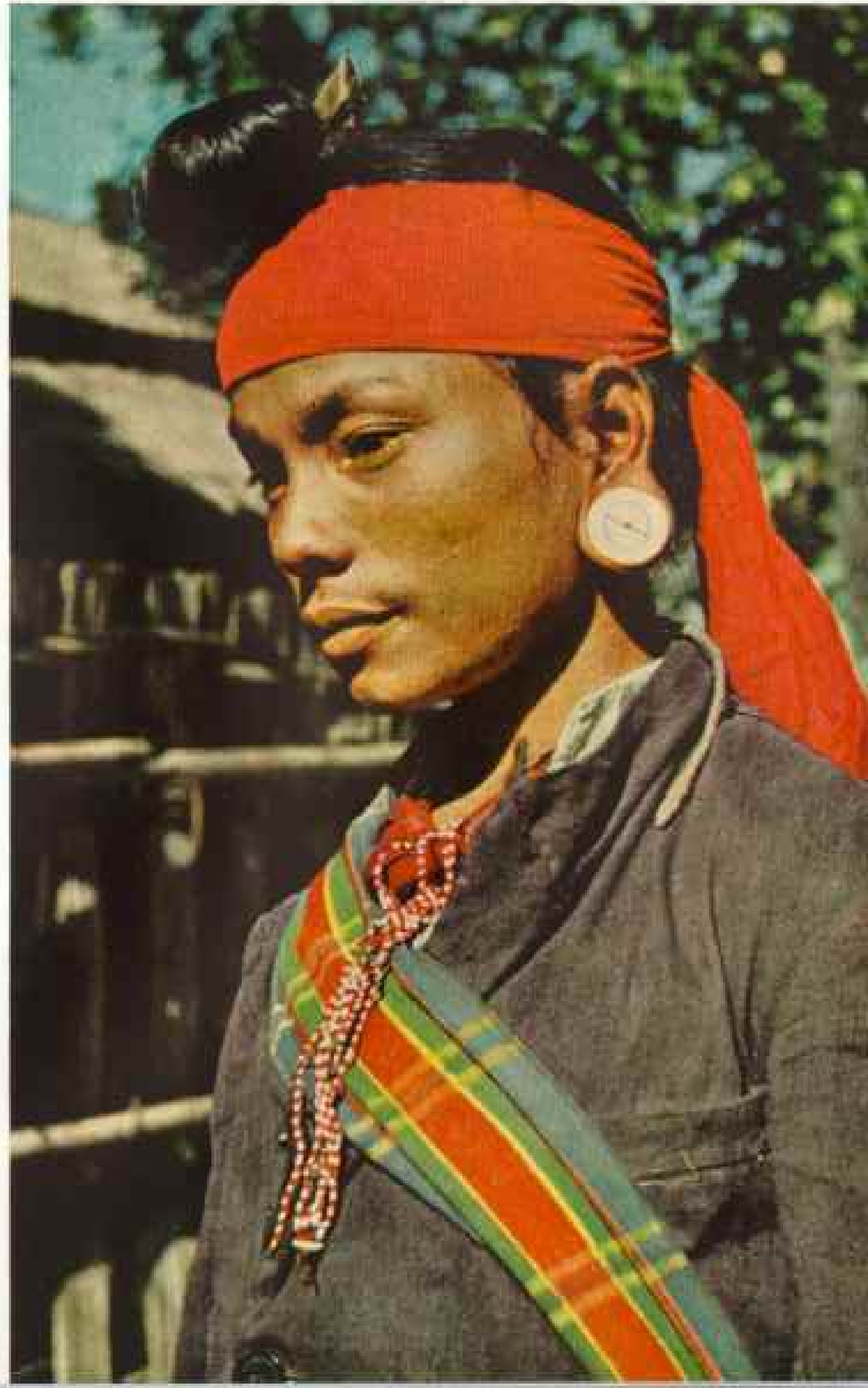
In the first days after partition, when terrorism was common in both India and Pakistan, many Hindu tea pickers fled East Bengal. Returning within the year, they live peacefully among their Moslem neighbors. More than 9,000,000 Hindus currently residing in East Pakistan have minority rights guaranteed by the Government.

This 14-year-old girl had a baby who frequently rode on her back when she went to work in a Sylhet tea garden (page 413).

Son of Head-hunters →
Lives at Peace

This Bunjoogie tribesman, pictured while on a shopping trip to the bazaars of Rangamati, comes from a tribe once regarded as the fiercest in Bengal. His red headband and carefully tended topknot used to be regarded as symbols of luck in head-taking expeditions.

Pierced and stretched ear lobes carry ivory disks that have been handed down from father to son. An expert could glance at the copper comb and beaded necklace and name the tribe.



A Mogh Bride in a New Bamboo Home Prepares Her Husband's Evening Meal

Dwellers in the Chittagong Hill Tracts exist in a bamboo civilization that employs the fast-growing plant in many ways. Poles, rafters, walls, screens, and mats in this dwelling attest bamboo's versatility.

A Chakma's Gourd Pipe Cools Powerful Tobacco

Sitting on the porch of his bamboo hut, the smoker inhales draughts through the gourd, which condenses the smoke. His long-stemmed bowl is made of wood that was hand-turned in the bazaar of Rangamati. The shawl, too, was created by hand.

White trousers and long-tailed shirt mark the fellow as a tribesman who has worked in cities and brought modern customs home to Myanimukh, his native village.

Mother Works with One Hand, Tends Baby with the Other

Children in the steaming jungle wear few clothes. A string of bells slung low over the hips is supposed to ward off evil spirits. These Chakma women live in the village of Langadu Bazar on the Kasalang River.

When the Chakmas build a bamboo hut, they first dig a deep pit and pile the dirt into a hillock. The new home is then built atop the mound to protect it from torrential rains that fall during East Bengal's monsoon.

Tree trunks with notches cut in the sides serve as house steps, and even the family dogs climb the poles to reach the bamboo veranda. Flimsy bamboo bridges stretch from house to house.

↑ Machinery Turns the Wheels in Narayanganj, but Oars Propel Ferries

This busy port, only a few miles from Dacca, is a center of jute mills and cotton spinning. The brickyard, like others in Bengal, works a 24-hour schedule because no satisfactory building stone is quarried in all East Pakistan.

→ Three young Hindu girls draw water from the Kasalang River in the heart of the Chittagong Hill Tracts. The bamboo raft on which they stand is being floated from Myanimukh to Rangamati for sale. A standard raft contains 250 bamboos and sells for about $6.

In Comes Cane, Out Goes Sugar. This Jungle Clearing Contains a Complete Plant

Turned by buffalo power, the press extracts juice from the stalks. Open pans boil the liquid down to lumps of brown sugar.

Goldsheens by Jean and Franc Shor, National Geographic Staff

When This Shopkeeper Says a Print Is Hand-blocked, He Can Show Both Hand and Block

Wooden forms, many of them a century old, print traditional patterns on cotton cloth in a Dacca bazaar. Here the owner folds finished items while his helper prints the pattern. Their product is sturdy and inexpensive.

boo and grass, leaving it to dry in the sun.

"A few days before the monsoon rains come, the villagers burn the whole area. Nearly a foot of ash covers the ground. When the first signs of rain appear, the year's crop is planted."

Each Mogh, Hussain told us, hangs a home-spun bag over his shoulder. In it he places seeds, a fantastic mixture of maize, sesame, mustard, melons, cotton, vegetables, rice, and small grains.

"With his knife he gouges a hole through the ash into the rich soil. In the hole he drops a handful of assorted seeds—whatever comes to hand. The hole is covered with ash and the process repeated, with holes about six feet apart, until the whole area is sown.

Crop Follows Crop, from Same Hole

"In July the harvest begins," Hussain continued. "First the maize ripens and is harvested. Then, each in its turn, the other crops spring out of the same hole. The melons follow the maize, then a variety of vegetables. Rice and other grains come next, and in October the cotton crop is harvested. Then work is over for the year."

In the tilled fields around the village the hill people grow pineapples and sugar cane, and rice in paddies. But the bulk of their food comes from jhum cultivation, a method as old as time and the jungle.

"It is hard on the soil, of course," Hussain added. "One crop exhausts the land. The next year the village picks a new spot. There is plenty of virgin jungle, and in a few years the jhumed area is ready for another crop."

Much of the land in the Hill Tracts is Government-owned. Each family pays a jhum tax of a few rupees a year for the privilege of farming. Tenure is hereditary, and so long as the land is farmed it remains in the same family.

On the wall of Chanchurui's house hung a yellowed, stiffly posed picture of a very young couple, looking thoroughly ill at ease.

"It was our wedding picture," said Chunila. "It was taken nearly 50 years ago, and I have never had one taken since."

We promptly posed the couple for a shot with our picture-in-a-minute camera. It came out well, I thought, and we were certainly not prepared for the reaction it produced. Chunila studied it sadly, then sat down on the mud floor, her chin on her breast, eyes closed, shaking her head.

"So old," she murmured. "So old!"

After the primitive life of the hill tribes, Chittagong seemed a modern metropolis. The principal port of East Pakistan, this bustling, booming city has doubled and trebled its population since 1941. It now has an estimated 260,000 people (page 425).

Chittagong lives by its ocean trade. Pakistan's economic future depends upon the port's efficiency, and the Government has given top priority to its development.

Before India's partition, Bengal's jute went to Calcutta, floating down hundreds of miles of inland waterways. Then Bengal was divided, and political differences halted trade between East Pakistan and India. New markets had to be found for the precious fiber. More important, a way had to be found to get the jute to those markets.

The sleepy little port of Chittagong was the only answer.

Channels had to be deepened. Docks and wharves and warehouse space had to be built. Cranes and rail lines were needed. And it all had to be done with very little material and not much money.

"We worked day and night for months," a harbor commissioner told us. "We lacked mechanical equipment, so we used our hands. We ran out of acetylene for our torches, so we cut steel beams with hack saws. The jute had to go to sea, and we got it there."

Figures tell the story. In 1946-47 the port shipped only 5,566 tons of jute. The next year 67,000 tons crossed the docks. Then the port handled 220,000 tons, 250,000 tons in 1949-50, and 370,000 tons in the fiscal year 1950-51.

Pakistan Builds New Jute Mills

The jute exported from Chittagong helps Pakistan's finances, but the new nation is anxious to do its own processing and thus give employment to more of its people. Heavy investments have been made in jute mills to turn the fiber into cloth and burlap bags.

We were in Governor Noon's office when officials of a new Government mill proudly presented him with the first burlap bag made from jute grown, spun, and finished in Pakistan. An aide told us about the jungle plant.

"Jute is an annual, genus *Corchorus*," he said. "The average plant grows 8 to 10 feet tall, but some varieties get much bigger. Ordinarily it has a single stem.

"It's planted in water, usually in small

W. Kalfaian

This Platform Corral Gives Spectators a Grandstand View of Charging Wild Elephants

← It's Hard to Lead a Captive Tusker to Water . . .

Once safely inside the corral, wild elephants are left two or three days without food or water to weaken them. This beast put up a struggle when tame cow elephants dragged him to a water hole.

. . . But It's Easy → to Make Him Drink!

Three feet high at birth, Indian elephants stand 8 to 10 feet at maturity. Despite legends to the contrary, they seldom live more than 60 years.

Indian beasts carry a single fingerlike projection on the end of the trunk, while their African cousins have two. The African's tusks are heavier. Trained in ancient times for warfare, the African is not widely domesticated today.

This series of pictures was taken in Mysore, India. Other wild elephants roam the jungles of East Pakistan. There one night the authors saw mahouts and beaters round up a large herd. Just as the beasts were approaching the corral, someone shouted a false signal, another man fired a gun, and the herd stampeded to safety (page 407).

Y. Kalfaian

423

Ava Hamilton

Bengal Tiger, Jungle Monarch, Is One Cat That Doesn't Mind Getting His Feet Wet

patches in the jungle. It's harvested after the monsoon, cut with long knives. The stalks are tied in bundles and left for three days for the leaves to drop off. Then the bundles are placed under water for two or three weeks."

In the water the soft pith of the plant ferments, and the long, tough fibers can be stripped easily from the stalks. They are washed and dried, baled, and sent down the river in small boats.

North of Chittagong we visited a strange shrine, the Temple of the Turtles. In a stagnant pool hundreds of enormous specimens floated lazily. Devout Moslem women bought plates of raw meat from pool-side vendors to feed the creatures. Some rubbed the backs of the big turtles, then passed their hands across their own foreheads.

"They believe that it helps them bear sons," our guide explained.

A meat dealer sauntered to my side.

"Hey, sport," he hissed, "where you from? Coney Island?"

This turned out to be the only English he knew.

On the Pakistani ship *Islamabad* we sailed to Cox's Bazar not far from the southern tip of East Bengal. Every inch of deck space was crowded with people sitting, sleeping, cooking, and eating. Some passengers brought live chickens; one sat happily beside a bleating sheep. The most contented person on board was a portly man clad in green-and-red pajamas. He sat cross-legged in a corner, playing Bengali records on a portable phonograph and knitting contentedly.

Cox's Bazar is a fishing and weaving village inhabited by members of the Maung tribe, who came originally from Burma. The houses stand high on stilts, and each is lashed down by ropes for protection against hurricanes. Under every dwelling are looms, where women of all ages sit smoking pipes and weaving cloth of a shocking pink. A good many of the inhabitants are Buddhist, and ancient temples lie on the edges of the surrounding jungles.

Wanted: Plain Building Stone

In Cox's Bazar we met a Government geologist who was making a survey of the area.

"I'm looking for rocks," he said. "Just plain building stone. We have none in East Pakistan and must ship it in by sea. I'd rather find good stone than a gold mine."

A snake charmer in the bazaar furnished the only entertainment in the village. His stock included two cobras, a krait, a python, and a basket of hairy tarantulas. With his bare toes he held three snakes by their tails while a cobra swayed sleepily to the sound of his flute.

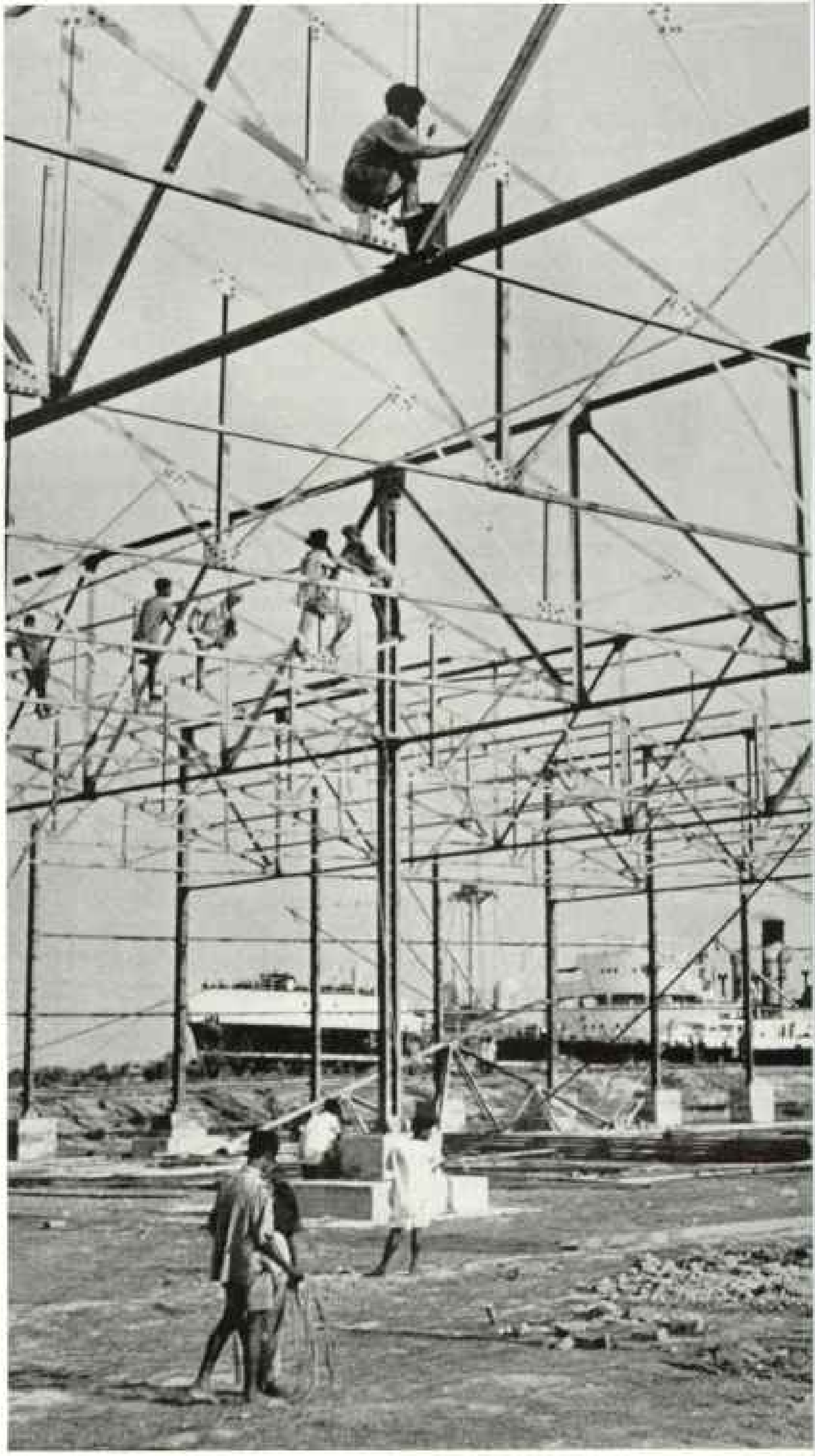
The krait jerked from between his toes and slithered into the crowd, which fled in haste. A fat, barefooted man, in a hurry, stepped

squarely on the python and leaped three feet into the air with a piercing shriek. It would have made a good picture, but Jean and I were moving too fast to focus a camera.

North we journeyed by boat and train to Sylhet, center of East Pakistan's tea gardens. Tea is second only to jute among Bengal's exports. Twenty-five thousand tons were shipped from Chittagong in 1952. Most of the gardens are British-owned, and Mr. W. A. N. Craven, an official of the Khadim Tea Estate, showed us around the 1,600-acre garden (page 413).

"Sylhet tea is a base for most commercial mixtures," he told us. "Other types are added for flavor and aroma, but this is the staple."

We drove through miles of green hillside covered with tea bushes. Wild begonias grew beneath the



J. D. Baird

Pakistanis Weave a Web of Steel for Chittagong's New Port

Partition forced Pakistan to export jute that once went to Calcutta. To meet the need, Chittagong expanded its port fivefold in four years (page 421). When acetylene ran short, construction workers cut metal with hack saws. Modern warehouses (above) and cranes (opposite) replaced wooden shacks and primitive hand lifts, halving ships' turnaround time.

tea leaves, glistening in the winter sunlight.

"Two leaves and a bud are plucked from each branch," said Craven. "Only the delicate end leaves are used. Three days after picking, the tea is sorted, cured, fired, graded, and packed."

Orange pekoe is the top of the eight grades produced at Khadim garden. Craven picked up a handful in the packing shed and carried it to a strong light.

"If you'll look closely," he said, "you will see where it gets the name. Juices from the leaf adhere to fine hairs on the tip. In the firing they are crystallized, and the crystals have an orange hue."

Paddle-wheel Steamer on the Ganges

We returned by train to Dacca, where we changed to river steamer for a trip south to Barisal and Khulna. The big side-wheeler boasted clean, comfortable beds, fine service, and excellent food. Floating down the muddy river, we felt like 19th-century travelers on the Mississippi.

At Barisal we transferred to a police launch, which Governor Noon had made available to us. For a week we cruised the multiple mouths of the Ganges and Brahmaputra.

Our launch took us south into the heart of the Sundarbans, those remarkable alluvial jungles which stretch for nearly 200 miles along the Bay of Bengal. In places the river was nearly a mile wide. Trees on the muddy islands were all the same size and height The tops looked as if they had been cut by a giant mowing machine. Beneath them the mud was slick and shiny. Animal tracks were plain along the shore. In the trees were thousands of clumps of wild orchids.

Huge rafts of wild ducks floated on the river. At dusk the sky was full of snow-white egrets, all heading west. Early one morning we met a Bengal tiger, swimming casually across the stream ahead of us. I tried to rope him with a hawser, but he was up the bank and into the jungle before I could make a loop.

Traffic jammed the river. Fishing vessels, some with pink and orange and blue sails, worked carefully along the banks. Big high-sterned vessels, with half a dozen oarsmen standing to their task on deck, swept down the current. Flat rafts, loaded with the red cooking pots produced in the area, were poled along the shallows.

East Pakistan has known serious troubles since the time of our visit. Political riots in Dacca and Chittagong brought death to scores and forced the Government to suspend provincial self-rule for a few months.

Recently the Government of Pakistan announced a plan to absorb existing administrative units into two provincial governments, one for East Pakistan and one for West Pakistan. Both would be directly responsible to the Federal Government.

In 1954 the worst floods in the area's modern history drowned hundreds living along the Brahmaputra and Ganges Rivers, destroyed much of the food supply, and did millions of dollars of damage to homes and businesses.

American generosity did much to alleviate the sufferings of East Bengal's millions. "Within a matter of hours," Pakistan's Prime Minister Mohammed Ali declared in a message of gratitude, "the Americans rushed Army medical personnel from different parts of the United States and even from Korea and Japan.

"Huge Globemaster aircraft brought personnel and equipment to avoid the danger of epidemic. Army doctors, working with the Pakistan Public Health Service, worked day and night to inoculate people in the stricken area."

East Pakistan's other problems still loom large: poor communications, isolation from the rest of the country, low literacy, bad health—and, perhaps most important, a somewhat casual attitude toward work.

An American consular official in Dacca told us of a Bengali night watchman who quit his job when a time clock was installed.

"He said he wasn't going to stay awake all night just to punch that clock every hour," said the American. "And in many ways that's typical of many workers here."

New Reasons to Work Hard

There are many signs, however, that this is changing. A people who saw little reason to work hard for another nation may find new inspiration in laboring for their own country. And the Government is working at top speed to improve educational and health standards.

A Briton who has spent most of his life in Bengal summed it up for us.

"This country is still a long way from modern," he mused, "but in comparison with what it was 10 years ago, it's unbelievably advanced. Another 10 years of such progress and they'll have their problems licked."

We left convinced he was right. East Pakistan is on the way out of the jungle.

X-Rays Reveal the Inner Beauty of Shells

By Hilary B. Moore

427

C. E. Lane

FOR many years I have been studying shells and marveling at their fragile beauty. But not until I saw their innermost secrets revealed in X-ray photographs did I fully appreciate the wondrous ways in which they are formed.

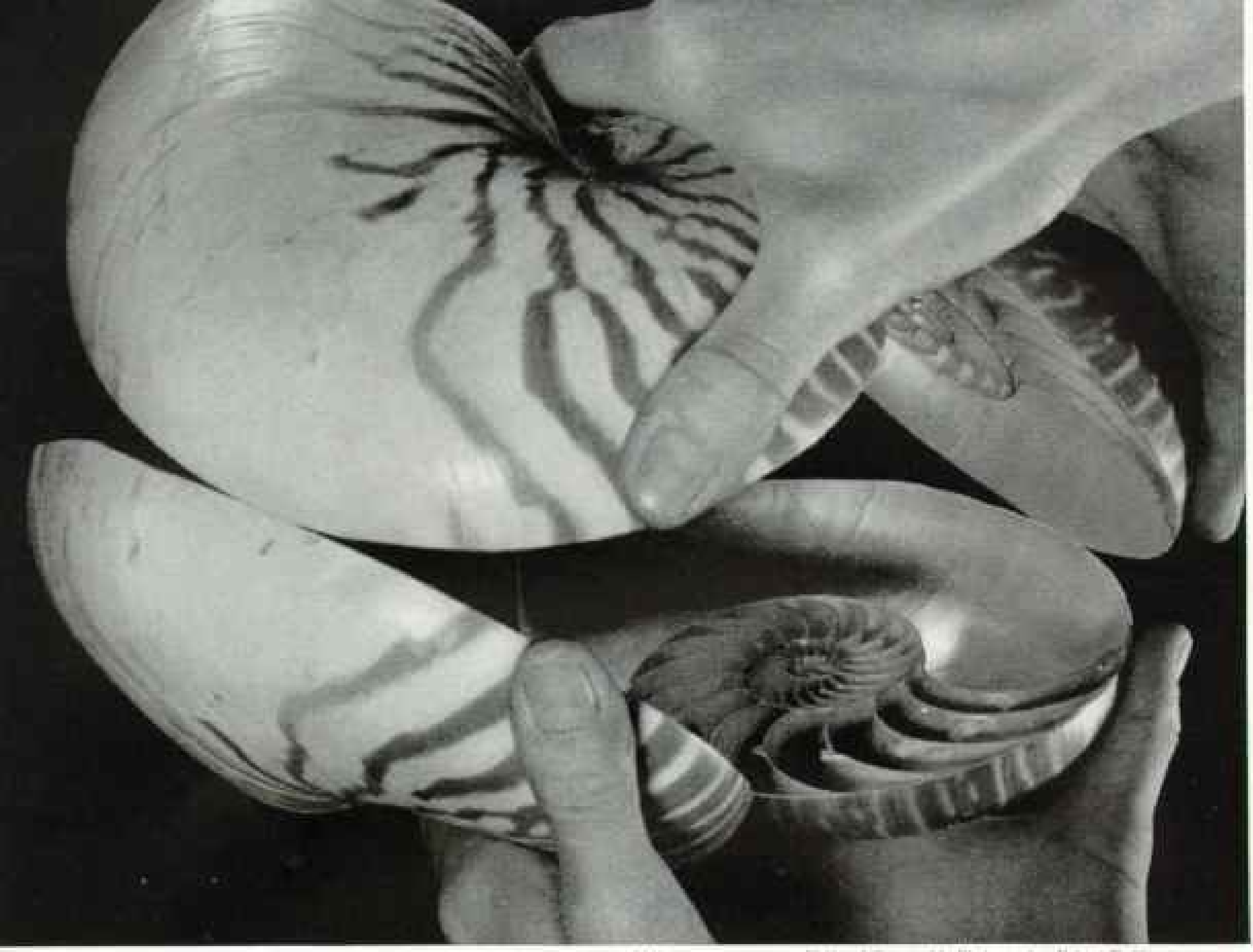
One of the most fascinating shells to study is the chambered nautilus (above), home of the mollusk that inspired the lines of Oliver Wendell Holmes:

> Still, as the spiral grew,
> He left the past year's dwelling for the new,
> Stole with soft step its shining archway through,
> Built up its idle door,
> Stretched in his last-found home,
> and knew the old no more.
> . . . . . .
> "Build thee more stately mansions, O my soul,
> As the swift seasons roll!"

I remember, as a small boy, looking longingly into a curio shop window at a nautilus shell that had been sawed in half to show the mother-of-pearl lining (page 428). I remember, too, being told that an octopuslike animal lived inside. As it grew, it kept moving forward in the ever-enlarging shell, sealing off space behind it with delicate cross walls.

The ghostly photograph of the chambered nautilus in the hand of my colleague, Dr. Charles E. Lane, who made these X-ray pictures, reveals in all their symmetry the curving partitions of each successive home.

At the University of Miami Marine Laboratory Dr. Lane has for years been studying the little animal known as the teredo, or shipworm. This mollusk causes millions of dollars worth of damage every year, mining through



National Geographic Photographer Robert F. Sisson

The Stately Mansion of a Chambered Nautilus Gleams in Mirrored Splendor

Chambered Nautilus, the "ship of pearl" made famous by Oliver Wendell Holmes's poem, yields exquisite beauty, whether seen with the aid of X-rays (preceding page) or when halved with the geologist's diamond-edged saw (above). A white-and-reddish-brown animal armed with about 40 tentacles lives inside the spiral. Sealing off the old rooms, it builds ever-larger chambers for its growing bulk. A delicate hoselike extension of the body runs through each slender partition. An airlike gas fills the chambers and buoys the creature as it forages the ocean floor for crabs, its favorite quarry.

pilings and ship timbers with the rasplike surface of its shells.

X-rays proved valuable in studying the development of the teredo's hidden burrow, and imagination readily suggested to Dr. Lane that the same method could be used to look inside various shells.

In the chambered nautilus X-ray our laboratory engineer sees Nature's parallel to the blades of his centrifugal pumps. To scientists who study the sounds made by fish, the Scotch bonnet shell on page 432 resembles the pattern they see on their oscilloscope screens.

When I look at the X-ray pictures, I marvel at the many clever ways in which mollusks and other marine creatures solve problems of space and weight as they grow.

Chitons build their armor in overlapping plates. Connecting tissues add more shell to the edges of the plates as they need to expand.

The shrimp and crab simply discard their old armor when it becomes too tight, then grow a new suit a size larger.

But the gastropods, including snails, conchs, cowries, and abalones, find such a method impossible. These creatures, so avidly sought by collectors, all live in one-piece homes that cannot be shed but must be enlarged continually to accommodate the growing creature.

For compactness the one-piece shell is wound into a spiral, long and thin as in the augur (page 433) or short as in the cowrie (page 430).

With the aid of X-rays we can look inside the spindle shell (page 433), for example, and see just how each succeeding whorl is bigger than the last, though retaining the same shape. If not coiled, this shell would be much too long for the creature to carry about easily.

We can see, too, how the coils have fused where they touch, forming a pillar running up the center. By a strong muscle attached to

(Continued on page 434)

Miami Waters Yield Mollusks in the Shell

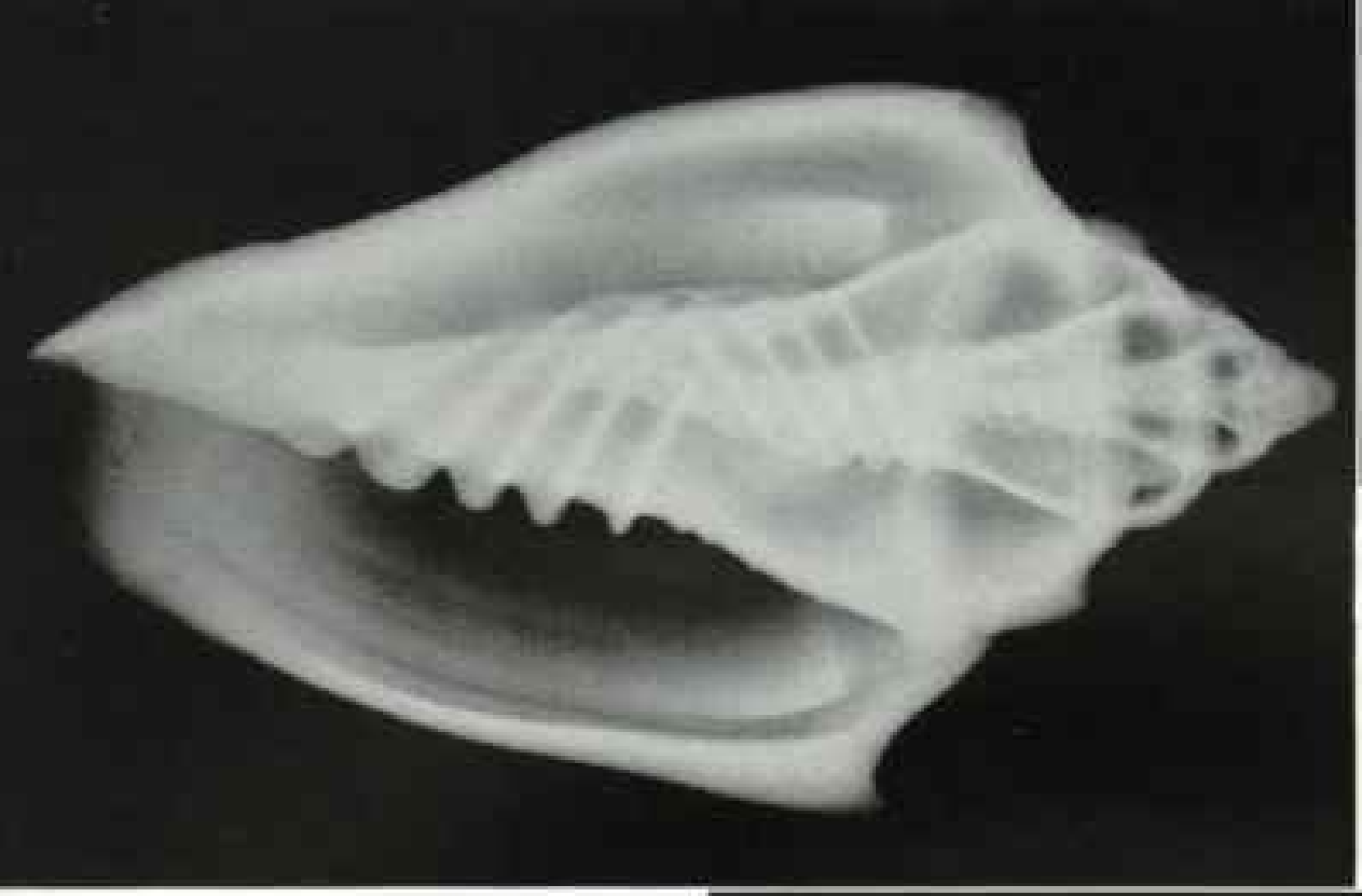
Favorable climate and an enormous variety of marine life make the near-by Gulf Stream an ideal workshop for the University of Miami's Marine Laboratory.

With the aid of the National Geographic Society, the laboratory is filling important gaps in our knowledge of the sea's inhabitants. Its research has added considerable information about plankton, the "floating pastures of the sea," a food to various sea animals and perhaps some day to man.

→ University of Miami students examine an **Atlantic Hairy Triton.**

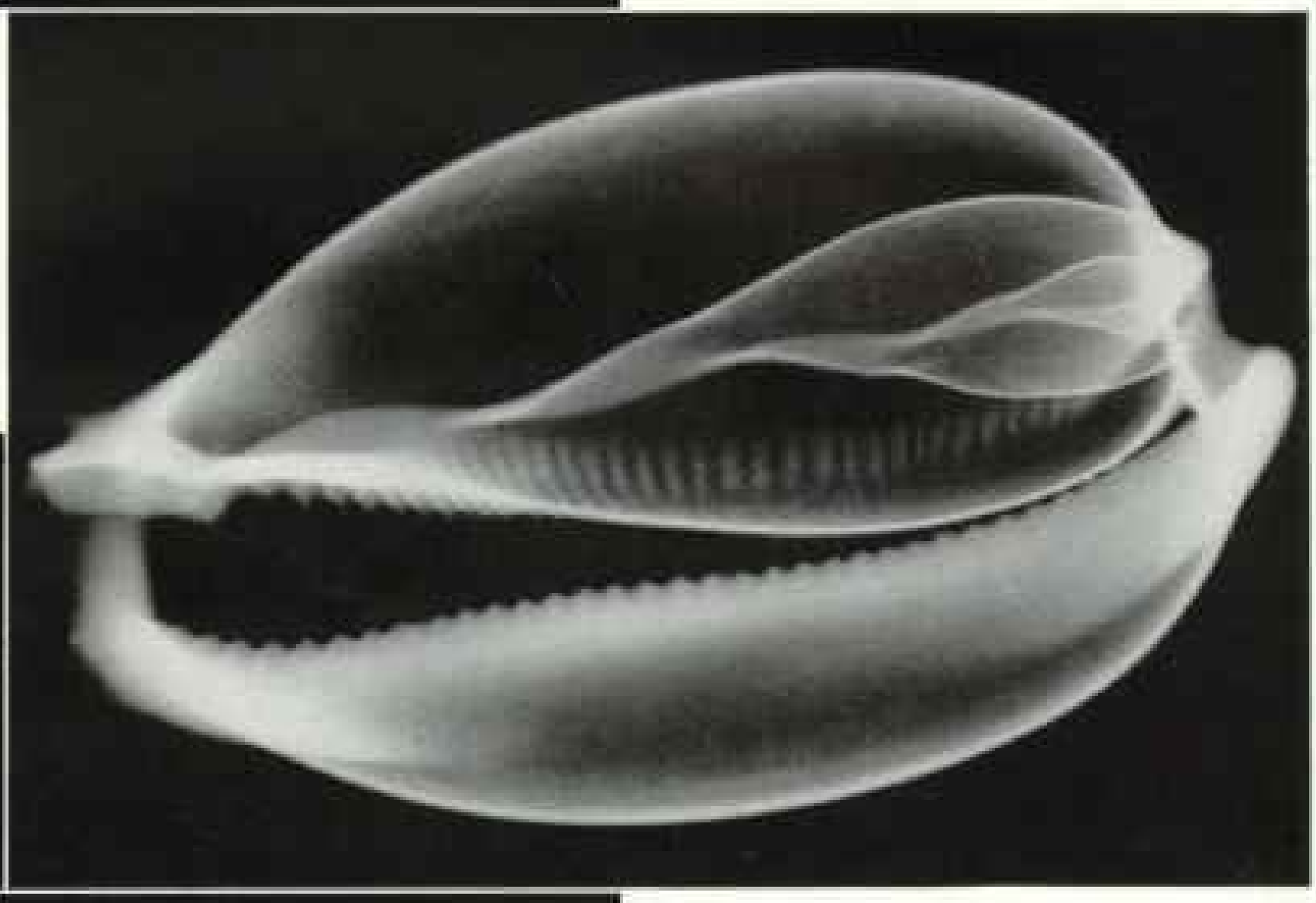
↓ Dr. Hilary B. Moore (left), assistant director of the laboratory, sees one of his students come up with a large **Horse Conch** in Boca Raton Inlet.

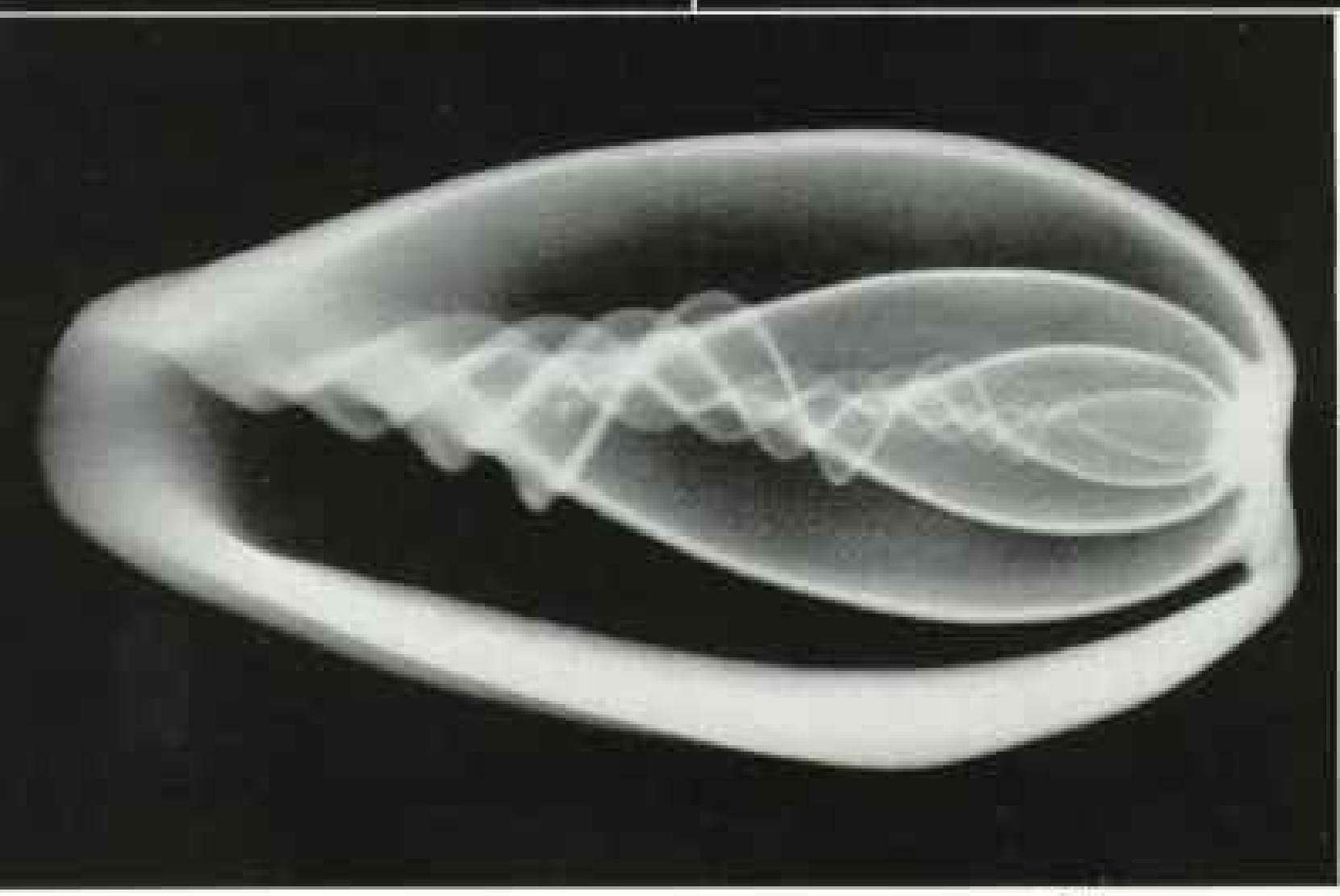
National Geographic Photographer Robert F. Sisson



← ↑ **Hebrew Volute** of the Pacific, shown life-size in X-ray, takes its name from patterns resembling Hebrew letters. Aristocrats among shells, the volutes are cherished by collectors for elaborate markings and graceful lines.

↓ → **Atlantic Deer Cowrie,** largest of the world's highly polished and elegant cowries, attains a 6-inch length. This X-ray shows in life size a thin inner shell and a strengthened, toothed lip.





← ↓ **Giant Marginella** of Brazil, though only 3 inches long, is a Goliath in a pygmy family. Some species measure 10 to the inch. Marginella's cream-colored porcellaneous exterior hides a surprising wealth of internal sculpture.

C. E. Lane

X-rays Reveal Delicate and Sinuous Beauty Hiding Within a Shell's Hard Walls

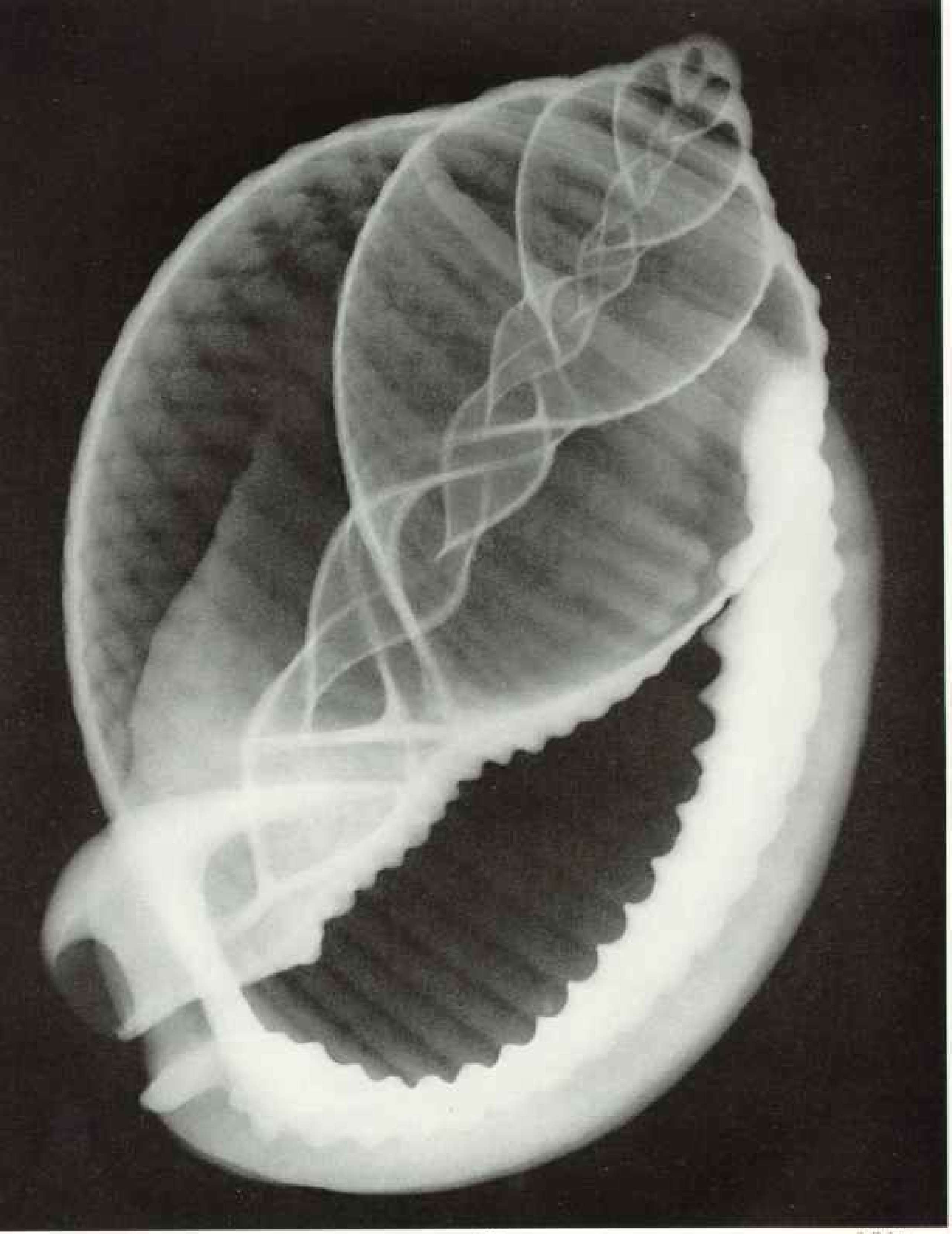
Since ancient times man has gathered seashells to eat the mollusks living within and to use the outer skeletons as tools, ornaments, and money. Costly dye from the murex shell supported the Phoenicians' commercial empire. Today business in shells for jewelers, button manufacturers, and collectors runs into several million dollars. Meanwhile molluscan shipworms wreak tremendous damage to wooden vessels and wharfs. X-ray study of shipworm damage led Dr. C. E. Lane to photography of shells. The pictures disclose rare loveliness; they also help explain the wonderful manner in which mollusks enlarge their homes.

431 National Geographic Photographer Robert F. Sisson

The Author Uses Complex Formulas to Calculate How Fast a Shell Has Grown

The beauty of shells lies not only in their graceful curves and whorls, but also in the efficiency and economy with which they use building materials and in the constancy of their mathematical designs. Dr. Moore sometimes measures a shell, files notches, and returns it to the sea. When the mollusk is recaptured, its scars indicate the new growth. By applying the formula for each type of shell, the scientist determines the rate of growth.

A long cowrie shell in X-ray and a natural bailer shell lie on the desk. X-rays on the wall show bailer shell, telescope shell, and spindle shell.



432

C. E. Lane

Scotch Bonnet: an Artist's Daydream in Blown Glass

This snail is found in the western Atlantic from Cape Hatteras to the West Indies. **Scotch Bonnet** is well known to collectors, who easily identify it by a regular plaidlike arrangement of light-brown squarish spots on a pale-yellow or pinkish background, and by deeply sculptured grooves. The shell's wide mouth harbors an energetic animal that crawls in the mud seeking bivalve dinners.

This miniature helmet shell, shown three times life size, has a lip heavily thickened and corrugated for strength. Its twisted geometry casts an interweaving pattern of X-ray shadows.

433 National Geographic Photographer Robert F. Wiese

Pacific's Fanciful Shells Suggest Queen's Scepter and Castle's Turret

↑ **Spotted Augur Shell** belongs to a type once used by South Sea warriors to tip their spears.

← ***Fusinus turricula,*** one of the spindle shells, grows a long, narrow neck to protect its breathing tube, or snorkel, as it plows along the bottom.

C. R. Lane

434 National Geographic Photographer Robert F. Elsom

Clench's Helmet Shell Calls to Mind a Conquistador's Armored Hat

Several varieties of the helmets are valued for cameo cutting. **Clench's Helmet Shell** weighs about 7 pounds. If filled with the live animal, it would scale about 20. The meat is often used in chowder. This large shell is found off the Florida Keys.

this column, the animal pulls back into the house when danger threatens. To give the muscle a better grip, the surface of the pillar is thrown into folds. These also grow as does the shell, and the intertwining curves and screw threads, seen by X-ray, add greatly to the beauty.

For efficient design as well as beauty, I think the mollusk shell is unexcelled. Look at the wrinkles spiraling around the Scotch bonnet, like the corrugations of steel roofing or a cardboard carton. Consider also the ridges on a scallop or whelk, another beautiful example of engineering design. They add little weight but greatly increase strength.

Some mollusks grow spines along the lip for defense. When the animal grows new spirals, it obviously cannot leave the spines sticking into the cavity which will house its tender body.

But the creature, which has parts of its mantle specially equipped to secrete new shell, can also dissolve shell. It removes spines as soon as they get in the way, perhaps using the lime for new deposits elsewhere. In addition the animal secretes a porcelaneous or pearly layer inside.

Some mollusks economize on weight by thinning partitions within the shell, as in the giant marginella (page 430). Others, like Florida's bleeding-tooth shell, dissolve away almost all the inside.

Diving on the Florida reefs, I have taken young cowries with the growing lips almost paper-thin. Rarely have I brought one home undamaged. But the fully grown cowrie has thickened and rolled the lip for strength, until it resembles the edge of a pewter plate (page 430).

If you turn over rocks on the outer reefs, you will often find cowries alive—beautiful fleshy objects with bushy or feathery projections. Pick them up, and the mantle draws back to uncover the mottled shell, as perfect as a piece of fine porcelain.

Just as the mantle hides the shell, so the shell hides those spiraling inner chambers that delight both artist and scientist.

In building his houses and furnishings, man is learning to choose simple, efficient designs. Shells show us how Nature was doing this long before the first man appeared on earth.*

* See, "Shells Take You Over World Horizons," by Rutherford Platt, National Geographic Magazine, July, 1949.

At last—the thrill of fine stereo
at a moderate price

New Kodak Stereo Camera only $84.50

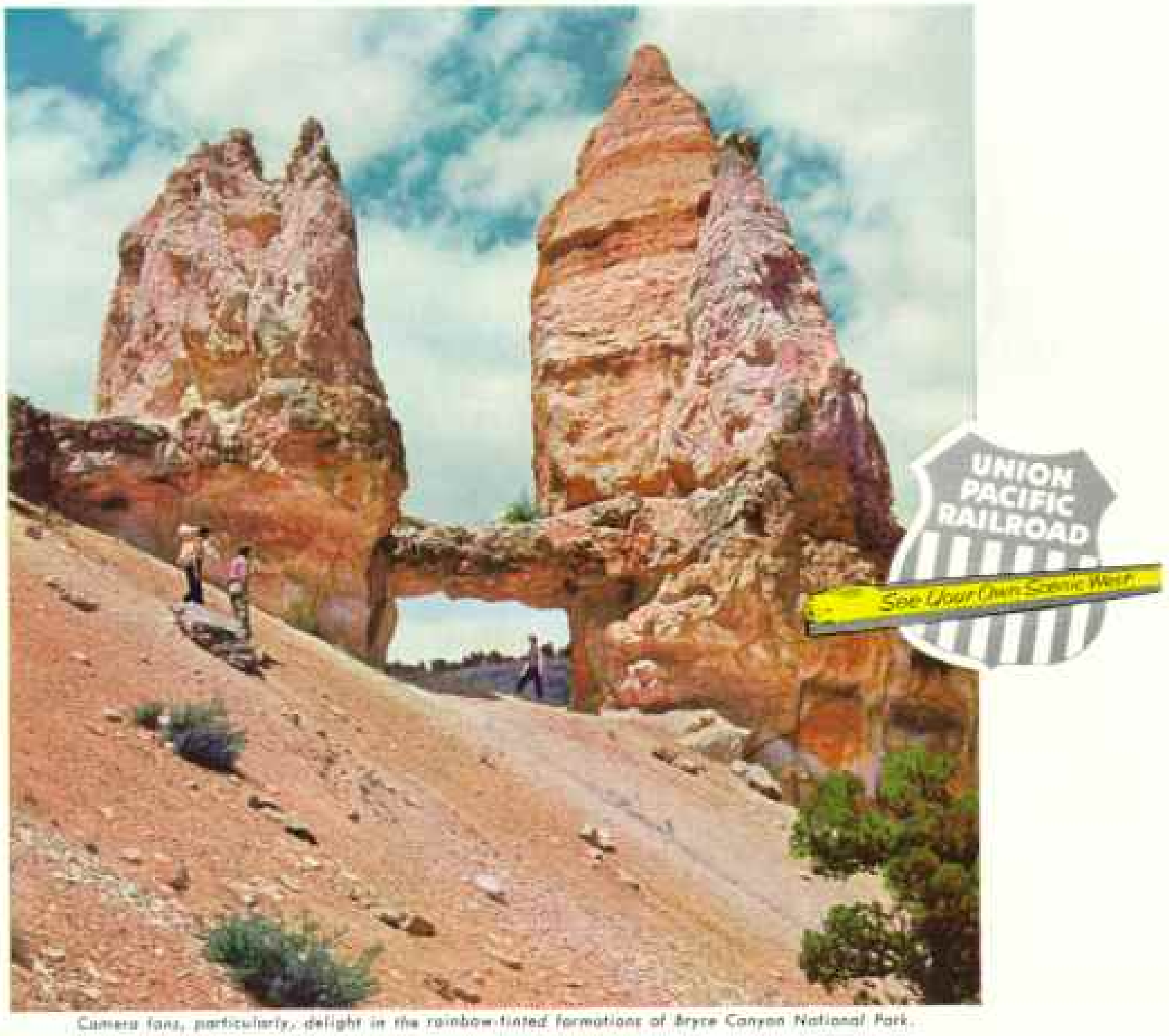
Kodak's new stereo camera is quality through and through, yet costs about half of what you'd expect to have to pay.

What's more, you'll find yourself making excellent 3-dimensional shots with your very first roll. Kodak designers have simplified controls to an astonishing degree. Actually, stereo pictures with the Kodak Stereo Camera are as easy to take as ordinary snapshots. Brilliant *f*/3.5 lenses, shutter speeds to 1/200, many automatic features—all for a modest $84.50, including Federal Tax.

And 2 superb new viewers with handy focusing controls and adjustable eyepieces. Kodaslide Stereo Viewer I, battery-operated, $12.75. Kodaslide Stereo Viewer II plugs into house circuit, has exclusive brightness control—$23.75. Most Kodak dealers offer convenient terms.

Prices subject to change without notice

Eastman Kodak Company, Rochester 4, N. Y.



Camera fans, particularly, delight in the rainbow-tinted formations of Bryce Canyon National Park.

a Riot of Color

SOUTHERN UTAH • ARIZONA NATIONAL PARKS

One of the most spectacular, most colorful scenic regions in the world is right in our own West: Zion, Bryce and Grand Canyon National Parks. It's easy to get there—comfortably and enjoyably. Union Pacific takes you direct to Cedar City, Utah—gateway to the Parks—where you are met by modern motor coaches. There are comfortable accommodations and excellent meals at all three neighboring Parks.

Traveling by Union Pacific, to or from Los Angeles this summer, you can stop over at these National Parks at no additional rail fare. To know more about this wonderful region, mail coupon.

FAMILY TRAVEL PLAN . . . A family group can enjoy the many advantages of train travel at a big reduction in rail fares. On this plan you can check a total of 300 pounds of baggage free, in addition to personal hand luggage.

UNION PACIFIC RAILROAD
Room 723, Omaha 2, Nebr.

I am interested in a train trip to the Southern Utah-Arizona National Parks. Please send free booklet.

Name _____

Address _____

City _____ Zone _____ State _____

Phone _____

Also include Family Travel Plan Leaflet ☐

UNION PACIFIC RAILROAD

This is the kind of fun you have

Imagine, lunching on deck! In the southern waters, the sea's so blue and so smooth. And does that salt air give you an appetite!

Mooremack chefs treat you to the most amazing assortment of delicious food . . . including rare roast beef, back-home style—and a collection of exotic South American dishes.

This is one of the sights you see

You'll go up Sugarloaf by cable car, look down to see lovely Rio with red-roofed houses, dazzling white apartments nestling among green hills. The sea is dotted with island mountains. Far to the left, behind the crescent of Copacabana beach, is Corcovado Mountain and the famous 128-foot statue of Christ.

MOORE-McCORMACK *Lines*

Five Broadway, New York 4, N. Y.

On a Mooremack Cruise to South America

S.S. ARGENTINA . . . S.S. BRAZIL . . . *38-day cruises to* South America from $1,110. These 33,000-ton liners sail every 3 weeks from New York to Trinidad, Barbados, Bahia, Rio de Janeiro, Santos (Sao Paulo), Montevideo, Buenos Aires. See your travel agent.

ENVELOPE PACKAGE
200 ENVELOPES (3⅛ x 6¼—envelopes as in Standard Package only). They seal *easily*, quickly. Perfect for mailing checks, club notices, bulletins, etc. Printed.
$1.00

STANDARD PACKAGE
200 NOTE SHEETS (6 x 7) and 100 ENVELOPES. Ideal for informal notes and household business correspondence. All neatly printed.
$1.00

DELUXE PACKAGE
125 LETTER SHEETS (6¾ x 10½) and 125 MATCHING ENVELOPES, all in *heavier* paper. A distinctive correspondence stationery. All neatly printed.
$2.00

PRINTED ENVELOPES

Do you pay by check? You'll find American Stationery envelopes a *grand convenience*. Each envelope is neatly printed in rich blue ink with your name and address. A great time-saver. A perfect safeguard for your mail—it can't go astray!

In the big, generous Envelope Package you get enough for *months* of ordinary use — 200 quality rag content bond envelopes. (Same envelopes as in the Standard Package.) The price is an unbelievable $1.00!

Order in quantities as listed. No "split-package" orders accepted. Maximum printing — 4 lines, 30 characters per line, including punctuation and spacing. Remit with order. West of Denver, Colorado, and in U. S. possessions, add 20% to prices. (No foreign orders.) We pay the postage.

THE AMERICAN STATIONERY CO., 300 PARK AVE., PERU, IND.

THE FINE STATIONERY
IN THE PLAIN BOX

American Stationery

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.: *1955*

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, U. S. Possessions, and Canada, $5.50; countries in the Postal Union of the Americas and Spain, $6.00; British Isles, £2 2s. 0d. British sterling; elsewhere abroad, $6.75. Life Membership, $150.00 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.

4-55

The skid we won't forget

. . . and how Hartford Medical Payments Insurance helped us when we couldn't help ourselves

(Based on Company File #76KAL15532)

Rain kept me from telling that the road ahead had just been oiled.

When I stepped on the brake, we skidded crazily across the road, crashed through the fence. Both my wife and I were thrown out as the car overturned. Luckily, the police got us to a hospital fast.

From my Hartford Automobile Insurance Service Card they got the name of my agent back home and wired him. The very next morning a claim representative from the Hartford Accident and Indemnity Company was at my bedside.

What that man did for us! He saw that our every need was taken care of. More than once he went out of his way to do little, friendly things for us.

Kay was unconscious 36 hours. It was 10 days before she could be moved from the hospital. Meanwhile, the Hartford man had arranged for an ambulance and a registered nurse—to take us 460 miles back home!

Under our Automobile Medical Payments Insurance, the Hartford Accident and Indemnity Company not only paid our hospital and medical bills, but paid for the ambulance and nurse, too.

We got wonderful treatment from the Hartford. Take my word for it, their service can't be beat.

Look for the Stag—symbol of the Hartfords—on any policy you buy for your car, your home, your business or your farm.

It's the way to get fast, understanding help like this, no matter where you are. Hartford Accident has nearly 10,000 agents, and 193 well-placed claim offices. So a competent Hartford man—trained for service and pledged to look out for your welfare—is always within quick call. You can turn your troubles over to him!

Have your Hartford Accident and Indemnity Company Agent or your insurance broker check *your* insurance today.

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

Hartford

Hartford Fire Insurance Company • **Hartford Accident and Indemnity Company**
Hartford Live Stock Insurance Company • ***Hartford 15, Connecticut***

"It's all right...

there's a telephone right here, too"

The man who has a telephone at his elbow in the office appreciates the same convenience in his home.

He knows that running downstairs or from room to room to telephone is an unnecessary waste of time and energy . . . . when additional telephones, conveniently placed, cost so little.

Great thing for Mother, too. For telephones in the kitchen and bedroom will save her many steps. And give her greater peace of mind, especially at night when she is home alone.

All of this convenience—and safety too—can be yours at small cost for each additional telephone. Just call the business office of your local Bell telephone company.

Bell Telephone System

SERVICE THAT'S WORTH SO MUCH...COSTS SO LITTLE

Marvel at the mystery of Machu Picchu, one of the world's greatest archaeological wonders. This granite city clings to a cliff looking over scenery of indescribable grandeur. You can "overnight" at a near-by Inn to see the sunrise. You reach this Inca stronghold on a side trip from Lima, Peru.

You'll have a wonderful time in South America—overnight by PANAGRA

For alligator bags, you can't beat Buenos Aires! Prices are about ⅓ what you'd pay in the States. Juicy steaks cost under $1. Panagra offers 12 flights weekly by DC-6. Coming soon: DC-7B's equipped with radar!

Only 16¾ hours' flying time from Miami, Panagra lands you at Buenos Aires. Luxurious *El Inter Americano*, with its "Fiesta Lounge," is the fastest flight over the shortest route. You get Red Carpet service all the way when you fly with the *world's friendliest airline!*

Go now—Pay Later! Panagra tickets can be bought on "Pay-Later" Plan . . . 10% down . . . 12 monthly payments. Call your Travel Agent or Pan American, U. S. Sales Agent for Panagra.

Pan American-Grace Airways **PANAGRA**

Good Morning, darling . . .

You were so pretty sleeping this morning that I could not wake you. You looked as you must have when you were a child . . . warm, relaxed and dreaming about something quite wonderful. You had a little smile on your face and some of that blue-violet blanket against your cheek . . . and a lump came into my throat as I looked at you.

Beloved things are always beautiful . . . the woman for the wonder of her . . . the St. Marys Blanket for the color it casts across a cheek . . . for the sun-warmth it gives in darkness . . . for the years its soft strength comforts and contents.

ST. MARYS BLANKETS ST. MARYS, OHIO

Twin Bed, Double Bed and King Size Blankets • Automatic Blankets • Baby Blankets • St. Marys Fabrics