

NATIONAL GEOGRAPHIC

Cape Cod

Where Sea Holds Sway
Over Man and Land 149

NATHANIEL T. KENNEY
DEAN CONGER

The Old Boston

Post Roads 189

DONALD BARR CHIDSEY

Along the Post Road Today 206

A COLOR PORTFOLIO BY
B. ANTHONY STEWART

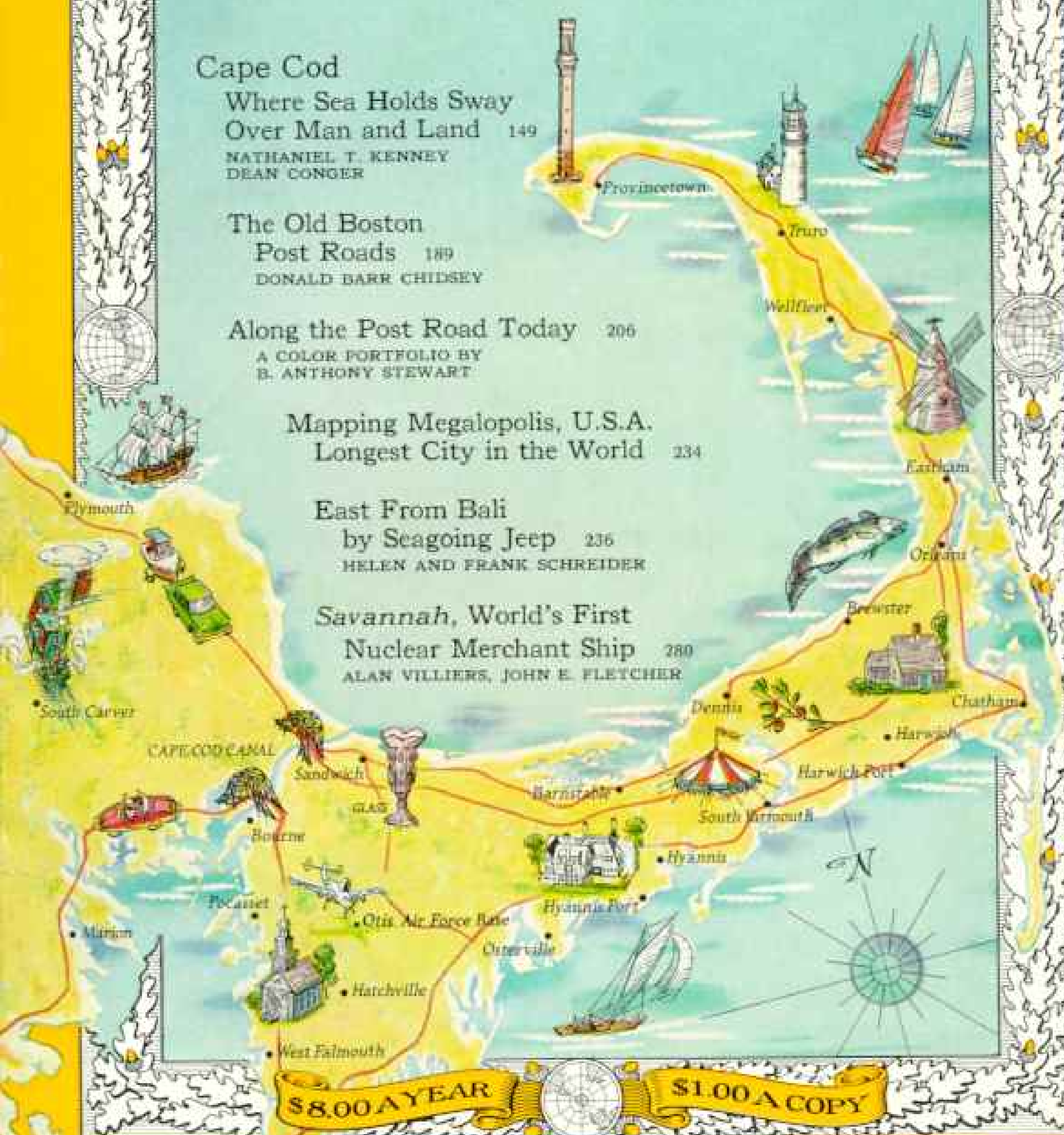
Mapping Megalopolis, U.S.A. Longest City in the World 234

East From Bali by Seagoing Jeep 236

HELEN AND FRANK SCHREIDER

Savannah, World's First Nuclear Merchant Ship 280

ALAN VILLIERS, JOHN E. FLETCHER



\$8.00 A YEAR

\$1.00 A COPY

NATIONAL GEOGRAPHIC

Society

16th & M Streets N.W.

Washington 6, D. C.



National Geographic Magazine

ORGANIZED IN 1888 "FOR THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

The National Geographic Society is chartered in Washington, D. C., in accordance with the laws of the United States, as a nonprofit scientific and educational organization for increasing and diffusing geographic knowledge and promoting research and exploration.

The Society has conducted more than 180 expeditions and scientific projects. It disseminates knowledge to millions through its world-famous *National Geographic*, its 71 million color maps a year, its books, monographs, bulletins for schools, its information service for press, radio, and television.

Articles and photographs of travel, natural history, and expeditions to far places are desired. For material used, generous remuneration is made.

MELVILLE BELL GROSVENOR, President and Editor
MELVIN M. PAYNE, Executive Vice President and Secretary
ROBERT V. FLEMING, Vice President and Treasurer
FREDERICK G. VOSBURGH, Vice President and Associate Editor
ROBERT L. DOYLE, Vice President and Associate Secretary
THOMAS M. BEERS, Vice President and Associate Secretary
VERNON H. BREWSTER, **WM. T. BELL**, **HERBERT T. HENDERSON**, **C. VERNON SANDERS**, Associate Secretaries

Committee for Research and Exploration

LEONARD CARMICHAEL, Chairman
LYMAN J. BRIGGS, Chairman Emeritus
Rear Adm. L. O. COLBERT
HUGH L. DRYDEN
A. REMINGTON KELLOGG, Director, U. S. National Museum
ALEXANDER WETMORE, Vice Chairman
Vice Adm. EMORY S. LAND
MATTHEW W. STIRLING, Research Associate, Smithsonian Institution
WILLIAM E. WEATHER

and the Senior Officers of the Society

Board of Trustees

GILBERT GROSVENOR, Chairman of the Board, formerly President, National Geographic Society, and Editor of its magazine (1899-1934)
THOMAS W. MCKNEW, Vice Chairman of the Board, formerly Executive Vice President and Secretary (1932-1962)
ROBERT B. ANDERSON, Secretary of the Treasury, 1957-61
LYMAN J. BRIGGS, Director Emeritus, National Bureau of Standards
LEONARD CARMICHAEL, Secretary, Smithsonian Institution
L. O. COLBERT, Rear Admiral, U. S. Coast and Geodetic Survey, Retired
HUGH L. DRYDEN, Deputy Administrator, National Aeronautics & Space Administration
ROBERT V. FLEMING, Chairman of the Board, Riggs National Bank
CRAWFORD H. GREENIOWALT, President, E. I. du Pont de Nemours & Company
MELVILLE BELL GROSVENOR, Editor, National Geographic
ELISHA HANSON, General Counsel, National Geographic Society
EMORY S. LAND, Vice Admiral, U. S. Navy, Retired, formerly President, Air Transport Association
CLURTIS E. LEMAY, Chief of Staff, U. S. Air Force
Asst. Secretaries: **CHARLES P. BIXEL**, **OWEN B. ANDERSON**, Asst. Secretary and Asst. Treasurer; **HILLARY F. HOSKINSON**, Asst. Treasurer; **WM. H. MCCAULEY**, Assoc. Counsel; **ARTHUR B. HANSON**, Herman J. A. C. Arons, Executive Assistant, Leonard J. Grant, Editorial Assistant, and Gail H. Carroll, Secretary to the President and Editor; **Sibyl Peck**, Assistant to the Chairman of the Board; **Lenore Williams**, Secretary to the Vice Chairman of the Board.

H. RANDOLPH MADDON, Vice President, American Telephone & Telegraph Company (Ret.)
BENJAMIN M. MCKELWAY, Editor, the Washington Star President, Associated Press
WALTER K. MYERS, M.D., Physician
MELVIN M. PAYNE, Executive Vice President, National Geographic Society
LAURANCE S. ROCKEFELLER, Chairman of the Board, Rockefeller Brothers, Inc., and President, Jackson Hole Preserve
JUAN T. TRIPPE, President, Pan American World Airways
EARL WARREN, Chief Justice of the United States
ALEXANDER WETMORE, Research Associate, Smithsonian Institution
LLOYD B. WILSON, Honorary Board Chairman, Chesapeake & Potomac Telephone Co.
CONRAD L. WIRTH, Director, National Park Service, U. S. Department of the Interior
WILLIAM E. WRATHER, Director, U. S. Geological Survey, Retired

MELVILLE BELL GROSVENOR, Editor
MELVIN M. PAYNE, Executive Vice President
FREDERICK G. VOSBURGH, Associate Editor
FRANC SHOR, Senior Assistant Editor

EDITORIAL STAFF

Assistant Editors: Robert L. Conly, Allan C. Fisher, Jr., John Scofield, Mason Sutherland
Line Editor: Samuel W. Matthews
Senior Staff: Andrew H. Brown, Nathaniel T. Kenney, Luis Marden, Howell Walker, Kenneth F. Weaver, Paul A. Zahl (Natural Sciences)
Foreign Staff: W. Robert Moore (Chief); Thomas J. Abercrombie, David S. Boyer, Walter Meyers Edwards, Kip Ross, Volkmar Wentzel
Editorial Staff: Jules B. Billard, Edward Cornish, Rowe Finley, William P. E. Graves, Gilbert M. Grosvenor, John R. Hoopes, Werner Jannay, Jay Johnston, Stuart I. Jones, Howard La Fay, Edward J. Lanthan, Barr McDowell, Carolyn Bennett Patterson, James A. Reynolds, Frank Sartwell, Peter T. White, Rose T. MacBryde, Winifred M. Myers (Asst.); Dorothy M. Coeson (Indexes); Rosalie K. Millett (Files)
Editorial Layout: Howard E. Payne
Book Service: Merle Severy (Chief); Wayne Barrett, Mary Swain Hoover, Edwards Park, John J. Putman
School Service: Ralph Gray (Chief); Lisa Baker, Arthur F. Miller, Jr.
News Service: Windvor P. Booth (Chief); Lorraine Aikman, Matt C. McDade, Paul G. Sampson
Telephone Service: Robert C. Doyle (Chief)
Photography: Robert C. Ellis, Jr.
Editorial Research: Margaret G. Blodau (Chief); Ann K. Wendt (Asst.); Nancy Gruch, Irvonia Luder, Patricia Madlemas, Patricia Rosenberg
Geographic Research: George Crassette (Chief); Newton V. Blakester (Asst.); Leon J. Casova, Edward C. Schultz, Joan C. Wells
Library: Esther Ann Manion (Librarian); Virginia Carter Hills (Asst.); Katharine P. O'Donnell

ILLUSTRATIONS STAFF

Illustrations Editor: Herbert S. Wilburn, Jr.
Art Editor: Andrew Poggenpohl
Art. Illus. Editors: Robert L. Breiden, W. E. Garrett, Robert E. Gilks, Mary S. Griswold, Thomas F. Smith, Charles Allison (Incoming Photographs); *Illustrations Staff:* Lee E. Battaglia, Donald J. Crump, Charlene L. Murphy, Robert S. Patton, James R. Root, Arthur A. Terry. *Pictorial Research:* Geraldine Luder, Cate Stillwell (Librarian)
Artist: Walter A. Weber (Naturalist); Peter V. Bianchi
Director of Photography: James M. Goodbold. *Art Director:* Joseph Bayliss Roberts. *Photographers:* B. Anthony Stewart (Chief); Dean Conger, John E. Fletcher, Robert B. Goodman, Otis Imboden, Bates Littlehales, Albert Moldvay, Thomas Nebbia, Winfield Parks, Robert F. Simon
Photo Lab: Edwin L. Washard (Chief); Richard H. Stewart (Asst.); Milton A. Ford, Donald McBain, Robert S. Oakes, Carl M. Strader, Guy W. Starling
Engraving & Printing: Doc J. Andella, Joe M. Barlett, Frank S. Oliverio, William W. Smith

CARTOGRAPHIC STAFF

Chief Cartographer: James M. Darley. *Assistant Chief Cartographers:* Newman Bumstead, Ralph E. McAleer. *Cartographers:* John J. Brecht, Wellman Chamberlin, Richard Darley, Russel G. Fritz, Athos D. Grazum, Apphia Holdstock, Donald A. Jaeger, Robert W. Northrup, William T. Peck, Charles L. Seta, Douglas A. Strobel, Catherine Hart (Asst.)
Geographic Art: Newman Bumstead (Chief). *Artists:* Irvin F. Aleman, Joseph E. Barrett, Gilbert H. Emerson, Victor J. Kelley, John W. Lothers, Robert C. Magis, Robert W. Nicholson, William Palmstrom

SECRETARY'S STAFF

Administrative: Raymond T. McElligott, Jr. *Accounting:* F. Charles Brown, George F. Fogle, Martha K. Allen. *Clerical:* Frank S. Delle. *Statistics:* Everett C. Bowen. *Canteen:* Sergeant C. Elliott. *Procurement:* J. P. M. Johnston. *Payroll:* Esther M. Lohrer, Marie S. Edwards. *Membership Fulfillment:* Roy J. Klockenbrink. *Promotion:* Sean Jennings, E. M. Pusey, Jr., Gordon Young. *Accounts Receivable:* Della M. Hart. *Printing:* J. B. Mahon. *Medical:* Thomas L. Hartman, M.D.

EUROPEAN OFFICE

W. E. Roscher (Director)
161-166 Fleet Street, London E.C. 4, England

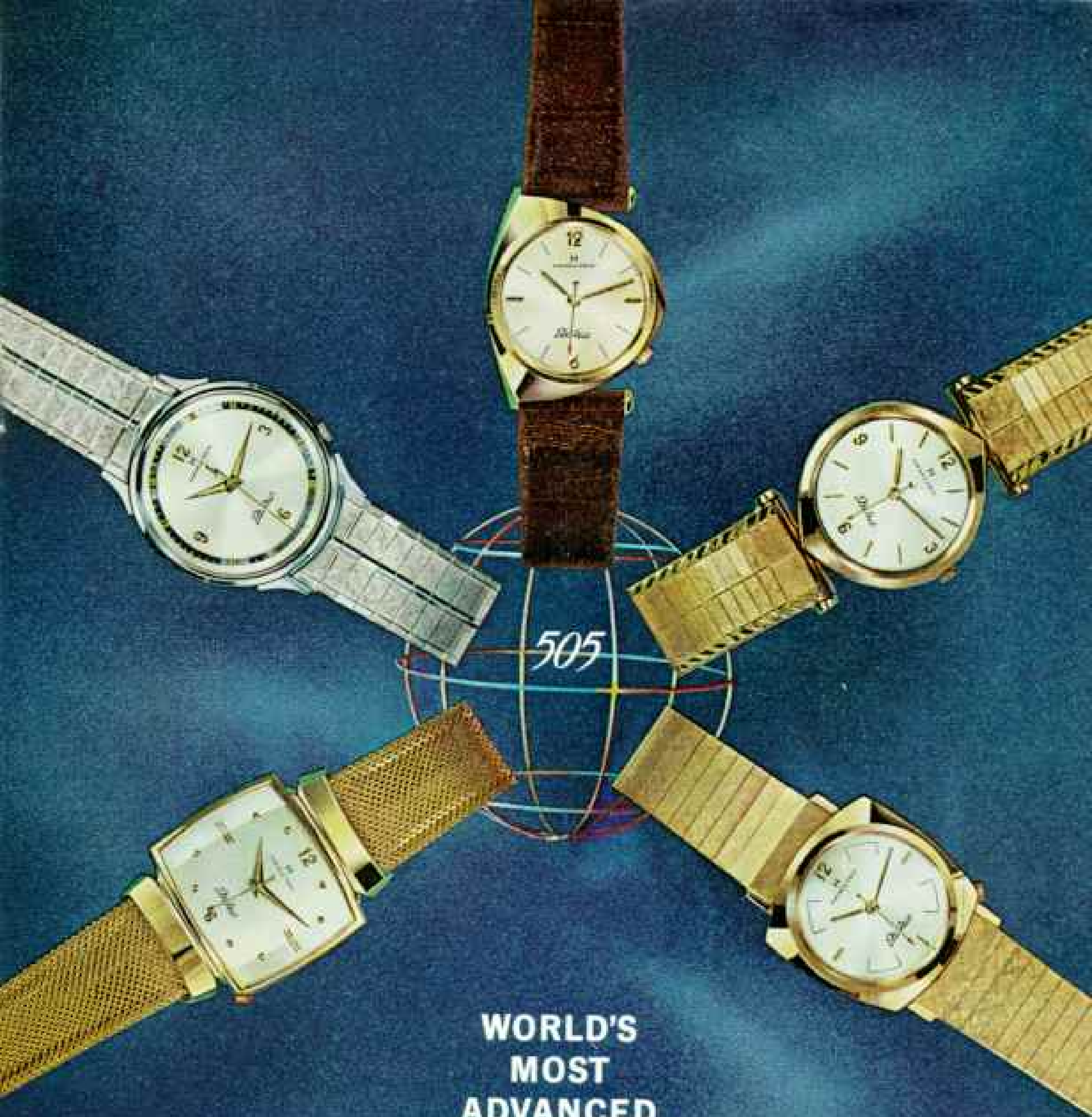
ADVERTISING

Director: John F. Connery. *Advertising Manager:* Harley L. McDevitt, New York
Chicago: William Turgeon. *San Francisco:* Donald F. Miklitsen. *Los Angeles:* Jack V. Shelton

Copyright © 1982 National Geographic Society. All rights reserved. Reproduction or use of the whole or any part of the contents without written permission is prohibited. Printed in U. S. A. Periodicals postage paid at Washington, D. C., and at additional mailing offices. Cover design and title protected by International trademark.

COVER: Salt, sand, and a seafaring history flavor Cape Cod, New England's popular playground (page 149).

PRINTED BY NATIONAL GEOGRAPHIC ARTIST JOHN W. COYMERS



**WORLD'S
MOST
ADVANCED
WATCH**

Clockwise from top: Savitar, \$160; Titan II, \$125; Taurus, \$110; Vantage, \$110; Skip Jack, \$79.50 (\$75 with strap). Prices plus tax.

In the sphere of Electric watches, the new Hamilton 505 is a world apart.

More styles, more prices, more experience than any other Electric.

Remarkably accurate, it runs up to two years on a replaceable energy cell.

And the 505 electrical system is so simple, it never needs adjusting.

Prices start at \$75. At Hamilton Jewelers in the U.S. and Canada.

HAMILTON 505





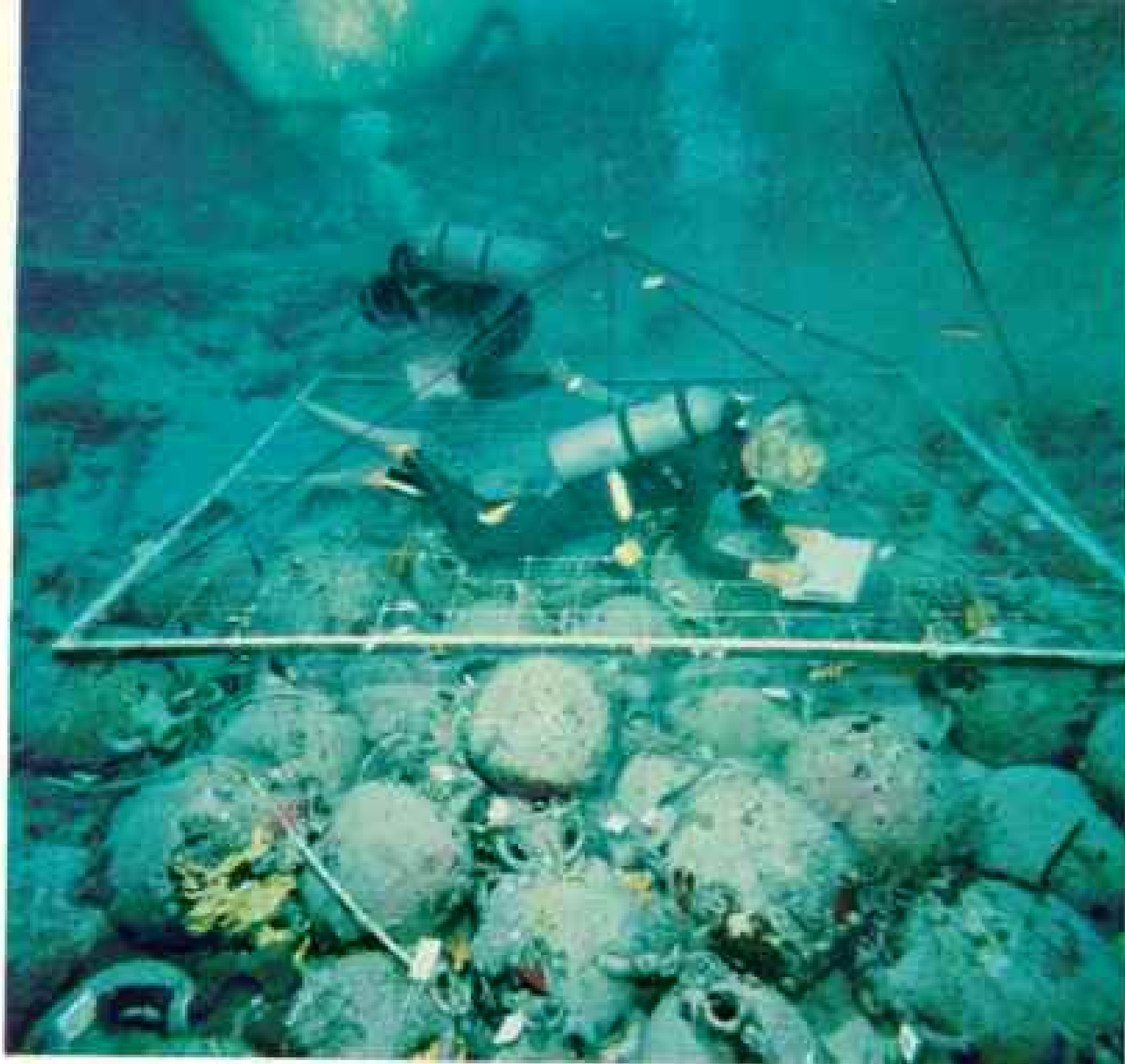
**THE TIRE THAT GIVES YOU A SECOND CHANCE
(THERE'S A SECOND TIRE INSIDE)**

Captive-Air Double Eagle doesn't go flat. Goodyear makes doubly sure. First, with Double Eagle—our finest and most famous tire. Giant cords make it 70% stronger than ordinary tires. You probably couldn't damage it if you tried. Yet, we put a second tire inside, to give you a second chance against "freak" accidents. This tough nylon and steel cord "inner spare"

would carry the load for up to 100 miles until you, or your wife, could stop for service. So a blowout would barely slow you down. Flats? Forget them. Just don't forget this: Captive-Air Double Eagle is the safest tire man can make and money can buy. Not an awful lot of money, at that. No more than for many other premium tires. Ask your Goodyear man.

GOOD YEAR
MORE PEOPLE RIDE ON GOODYEAR TIRES THAN ON ANY OTHER KIND

Double Eagle, Captive-Air, T.M.'s, The Goodyear Tire & Rubber Company, Akron 16, Ohio.



Archeology 130 feet under the sea

DOWN TO a marine graveyard off Turkey's reef-rimmed coast go underwater archeologists, drawn to a ship that sank some 13 centuries ago.

Divers have plucked the world's largest trove of Byzantine pottery from the wreck, dated it on the evidence of four gold coins from the reign of Heraclius (A.D. 610-641), and even learned the name of the vessel's master: George, senior sea captain.

Expedition director George F. Bass (right), specialist in underwater archeology at the University of Pennsylvania, found it easier to train scientists to be divers than

to teach divers to be archeologists. Before his Aqua-Lungers move the tiniest artifact, they carefully plot its position in relation to a wire grid. Here blond Susan Womer, drawing on sheets of frosted plastic, sketches the wreck's cargo of wine jars.

To explore wreck-rich Turkish waters, the National Geographic Society co-sponsored this 1961-62 expedition with the University Museum, Philadelphia. You will read about its discoveries in a future issue.

You can share such exciting adventures with your friends. Use the form below to nominate them for membership.

NATIONAL GEOGRAPHIC SOCIETY MEMBERSHIP

mail to: **THE SECRETARY**
NATIONAL GEOGRAPHIC SOCIETY
WASHINGTON 6, D. C.

\$6.50 MEMBERSHIP DUES: for calendar year 1962 include subscription to NATIONAL GEOGRAPHIC. Allowing for postage differentials, remit \$6.50 for United States and its outlying areas, \$7.00 for Canada, \$8.00 elsewhere. . . . Life Membership, \$150. Allowing for postage differentials, remit in U.S. funds \$150 for U.S. and its outlying areas, and Canada, \$200 elsewhere. . . . Make remittances payable to and send direct to National Geographic Society. 6-48

NEW MEMBER'S NAME

(PLEASE PRINT)

STREET

CITY, ZONE, STATE

I NOMINATE for Society membership the person named at left. (Use separate sheet for additional nominations.)

(GIFT MEMBERSHIP) I nominate and enclose \$_____ for dues of the person named at left. Send gift card

I DESIRE INFORMATION concerning membership and the NATIONAL GEOGRAPHIC. (Fill in at left.)

MY NAME

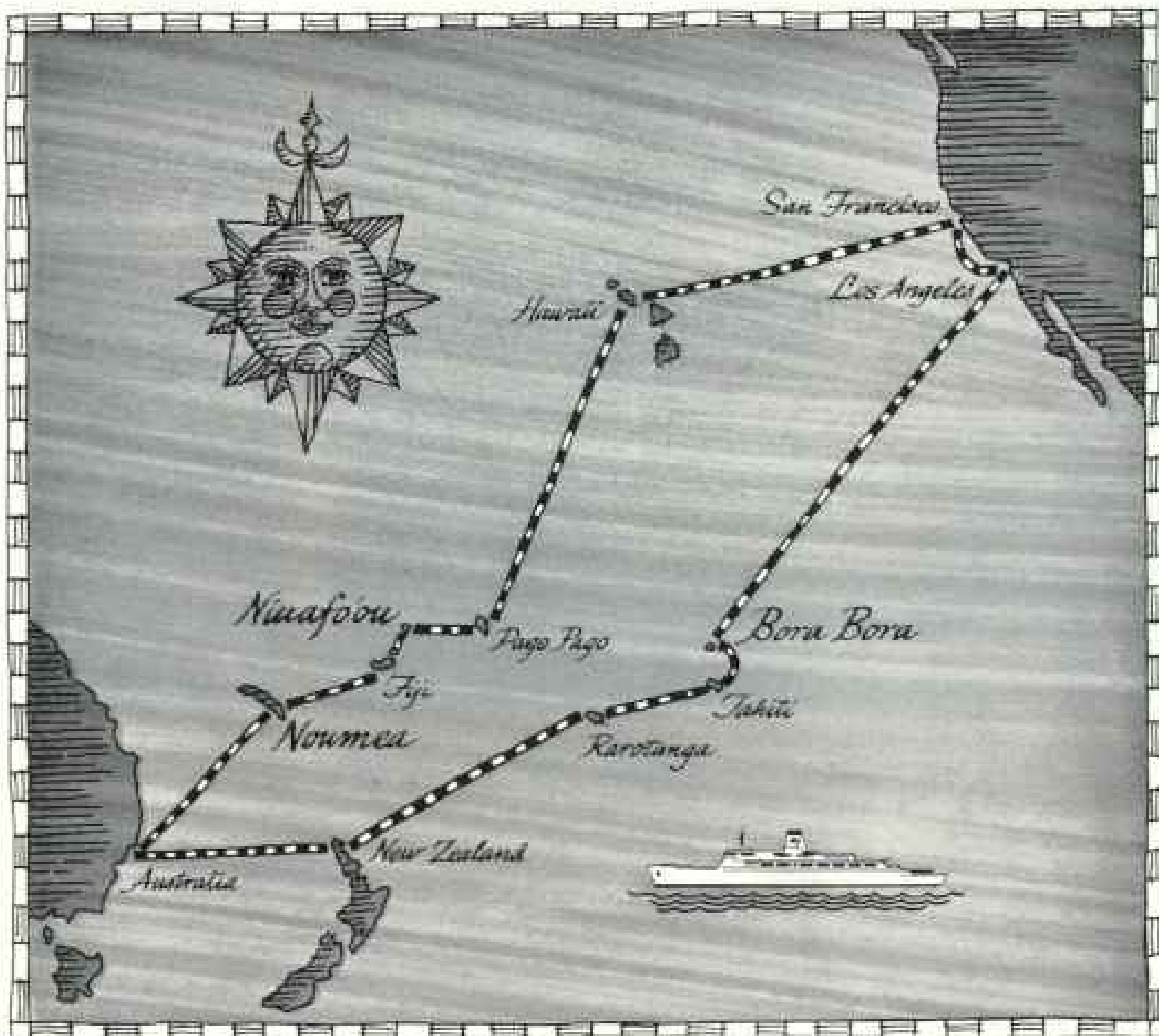
(PLEASE PRINT)

STREET

CITY, ZONE, STATE

CHECK ONE





Welcome to Matson's new South Seas Cruises
 Now, 3 more enchanted islands have been added
BORA BORA * NOUMEA * NIUAFO'OU

PLUS TAHITI, RAROTONGA, NEW ZEALAND, AUSTRALIA, FIJI, PAGO PAGO, HAWAII

BORA BORA, considered by many "the most beautiful" of all the beautiful South Seas Islands. **NOUMEA**, captivating capital of New Caledonia, with its frankly Gallic air and merry Melanesian hospitality. **NIUAFO'OU** ("Tin Can" Islands), where SS Mariposa and SS Monterey await the native postman who carries tin cans of mail between ship and shore in a fragile canoe. Plus **TAHITI, RAROTONGA, NEW ZEALAND, AUSTRALIA, FIJI, PAGO PAGO** and **HAWAII**.

Matson alone takes you to so many captivating South Seas' ports of call. And Matson alone brings to your voyage an 80-year tradition of luxury at sea. For 42 days you travel in peerless, all first class comfort on an air-conditioned, gyro-stabilized resort liner. You enjoy impeccable service 24 hours a day; dine superbly at every meal and have every facility for recreation and relaxation at your fingertips. All far from the troubles of the world - in Matson's peaceful, peaceful South Pacific.

Special cruises for 1962

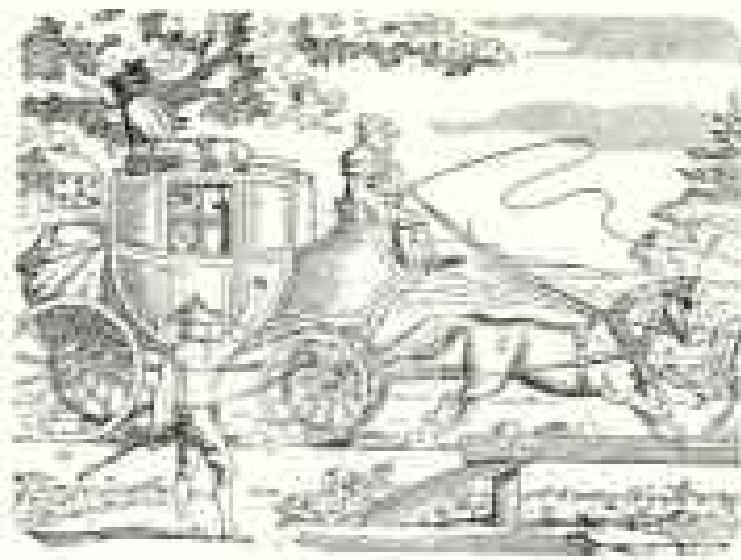
Photography Cruise	SS Mariposa - August 25
Golf Cruise	SS Monterey - September 16
Art Cruise	SS Mariposa - October 11
Navigation/Seamanship Cruise	SS Monterey - November 1

Sailings are from San Francisco - following day from Los Angeles. Arrange now for Matson's Holiday Cruises: November 25, SS Mariposa; December 16, SS Monterey.

You can enjoy a fabulous Matson South Seas cruise for as little as \$1125 per person round trip. For complete details, see your travel agent soon. Or write us: Matson Lines, Dept. X, 215 Market Street, San Francisco, Calif.



Yesterday . . .
the Old Boston Post Road



First Boston-to-New York highway was the Boston Post Road, now U. S. Route 1. Post riders began carrying the mail over this route in 1673. Regular stagecoach service was inaugurated in the late 1700's.

Today..a fabulous network of superhighways



Today, the great turnpikes and thruways of the six New England states beckon the traveler, promise you more time to enjoy your favorite haunts, less time getting there and back. And there's more of the same to come — much more. Boston alone is slated for three new expressways in addition to the present four.

Come see for yourself, and if there's any way we can help make your trip more enjoyable, just call on us. We've been building and growing with New England for 178 years—and if we don't know all the answers, we know where to get them!



MEMBER F.D.I.C.



Trucklines are America's lifelines

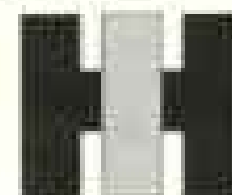


Trucks carry on where others leave off

One of the most valuable services that trucks perform is service to *other* forms of transportation — water, rail and air. Trucks pick up at dockside, depot or terminal . . . deliver to factory, store or door. As a result, *everything* we eat, use or wear comes to us part of the way, more often *all* of the way, by truck.

INTERNATIONAL HARVESTER COMPANY

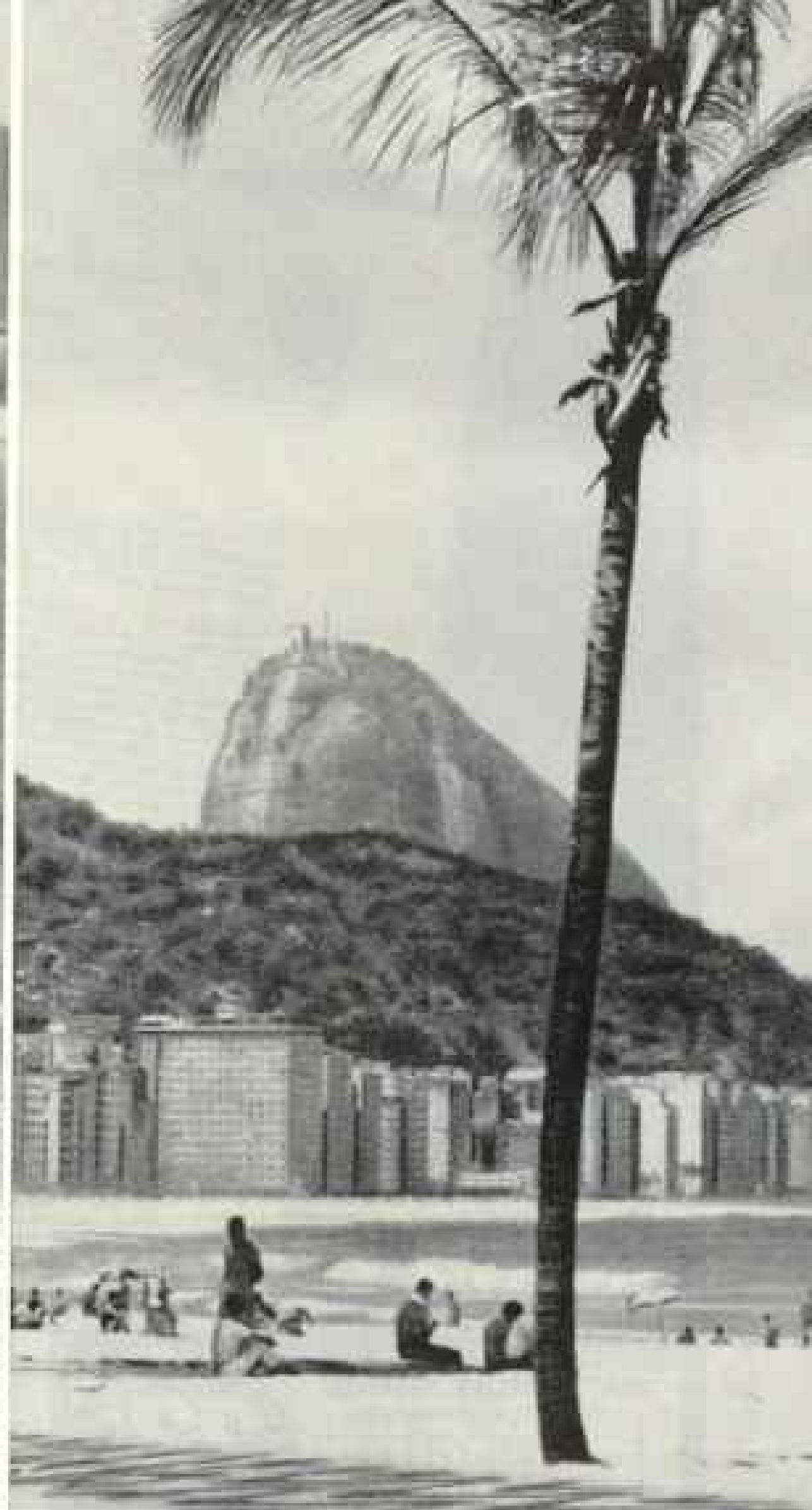
The People Who Build TRUCKS



MEMBER



AMERICAN
TRUCKING
INDUSTRY
Washington & D.C.



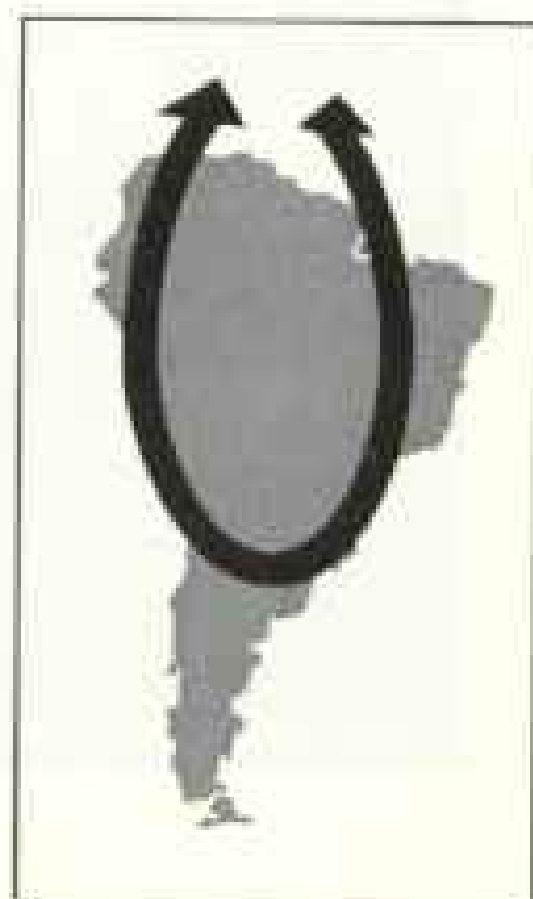
Pre-Inca ruins of Peru

Famed Sugar Loaf watches over Rio

SEE BOTH COASTS OF SOUTH AMERICA FOR THE PRICE OF ONE!

A round trip to South America really means *round* when you fly the Jets of Pan Am® and Panagra. It's the *only* airline system that can fly you down one coast to Buenos Aires and back the other. You see the *whole* continent for the price of a round trip to Buenos Aires! From Copacabana Beach to the high Andes . . . every day is a new adventure! South America abounds with breath-taking scenery and deluxe hotels. You find gracious service everywhere. Enjoy all-year Jet Economy fares: for example, New York to Buenos Aires, as low as \$599 round trip. Start on either coast . . . see the West Coast of South America by Panagra Jets, the East Coast by Pan Am Jets. Leave the U.S. from any of 7 gateway cities. Call your Travel Agent or Pan American.

PANAGRA • PAN AM
PAN AMERICAN-GRADE AIRWAYS PAN AMERICAN AIRWAYS





The Commonwealth of Massachusetts
 Department of Commerce
 150 Causeway Street, Boston 14
 MA 02114

Within the covers of this internationally esteemed publication is an elaborate showing of full color photographs of Cape Cod, America's oldest and best known summer seashore resort area.

When you visit our illustrious Commonwealth, you will want to see the vistas of incomparable beauty of the Berkshires. In Central Massachusetts you will discover a veritable treasure trove of history. Storybook islands of Martha's Vineyard and Nantucket lie enchantingly off the shore in romantic seclusion. The North Shore's art colonies lure connoisseurs and painters alike. No vacation in Massachusetts is complete without a call at Plymouth, "America's Home Town" with its famous ship, clambakes and replica of the Mayflower.

Boston, an indelible blend of old world charm and modern urbanity is one of the great educational and medical centers of the universe.

You are in America's heart's part the moment you step foot into Massachusetts. We do hope you will come this summer.

John A. White
 John A. White
 Governor

John T. Suran
 John T. Suran
 Commissioner

MASSACHUSETTS DEPARTMENT OF COMMERCE
 150 Causeway Street, Boston 14

COLOR PRINTS

FROM YOUR COLOR SLIDES

WRITE FOR FREE CATALOG & MAILERS

FAST QUALITY SERVICE
 SATISFACTION GUARANTEED

2 1/2 x 3 1/2	3 1/2 x 7	8 x 10
29c	95c	\$2.25

KODACOLOR 12 exp. develop & print \$3.20
 with new KODACOLOR 800-6259

FILM PROCESSING

\$1.25

ALL KODACHROME, EKTACHROME, SAFETY FILMS
 100-100, 117, 120, 135, mixed

DUPLICATE SLIDES 20¢ ea.—day 22—77¢ each

23¢
 2 1/2 x 3 1/2
 with 2000 film
 \$1.20 with
 new 800

Colorfax
 LABORATORIES, INC.

1140-G BOMFANT ST.
 SILVER SPRING
 MARYLAND
 TEL. 891-000-8414

FREE! 53 ORIENTALS



Send today for this Spectacular Oriental Collection! More than 50 fabulous genuine postage stamps from Taiwan, Korea, Viet Nam, Japan, Singapore, Burma, Pakistan, Indonesia, Thailand, Hong Kong, Laos, many other strange, remote lands of the mysterious Far East. Sensational stamps picturing weird beasts, birds, ancient ships, queens, kings, beautiful women. Extra! Big Bargain Catalog, exciting offers and other thrilling stamps for your free examination. Send 10c for mailing expense — Double your money back if not delighted! ADULTS ONLY! Jamestown Stamp Co., Dept. C82NG, Jamestown, New York



KONICA 'FS'

Some choose Konica to show off. Most like to show off its results. Pro's are intrigued by the unique Hi-Synchro shutter. Dealers enjoy demonstrating its quality. \$189.95 with Hexanon 50mm f2 lens, plus case.

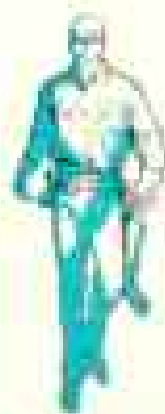
For details see KONICA CAMERA CORP.
 404 PARK AVE. SOUTH, NEW YORK 14

"the lens alone is worth the price"



Making new neighbors feel at home

Today, Gen Tel puts out the welcome mat to an ever-increasing number of new friends. 📞 For the areas we serve in 32 states are beyond the big cities, where there's room to spare and new opportunity to grow. New homes and businesses are springing up every day. 📞 And as this "new America" grows, we are working round the clock to meet its communications needs with bigger and better facilities.

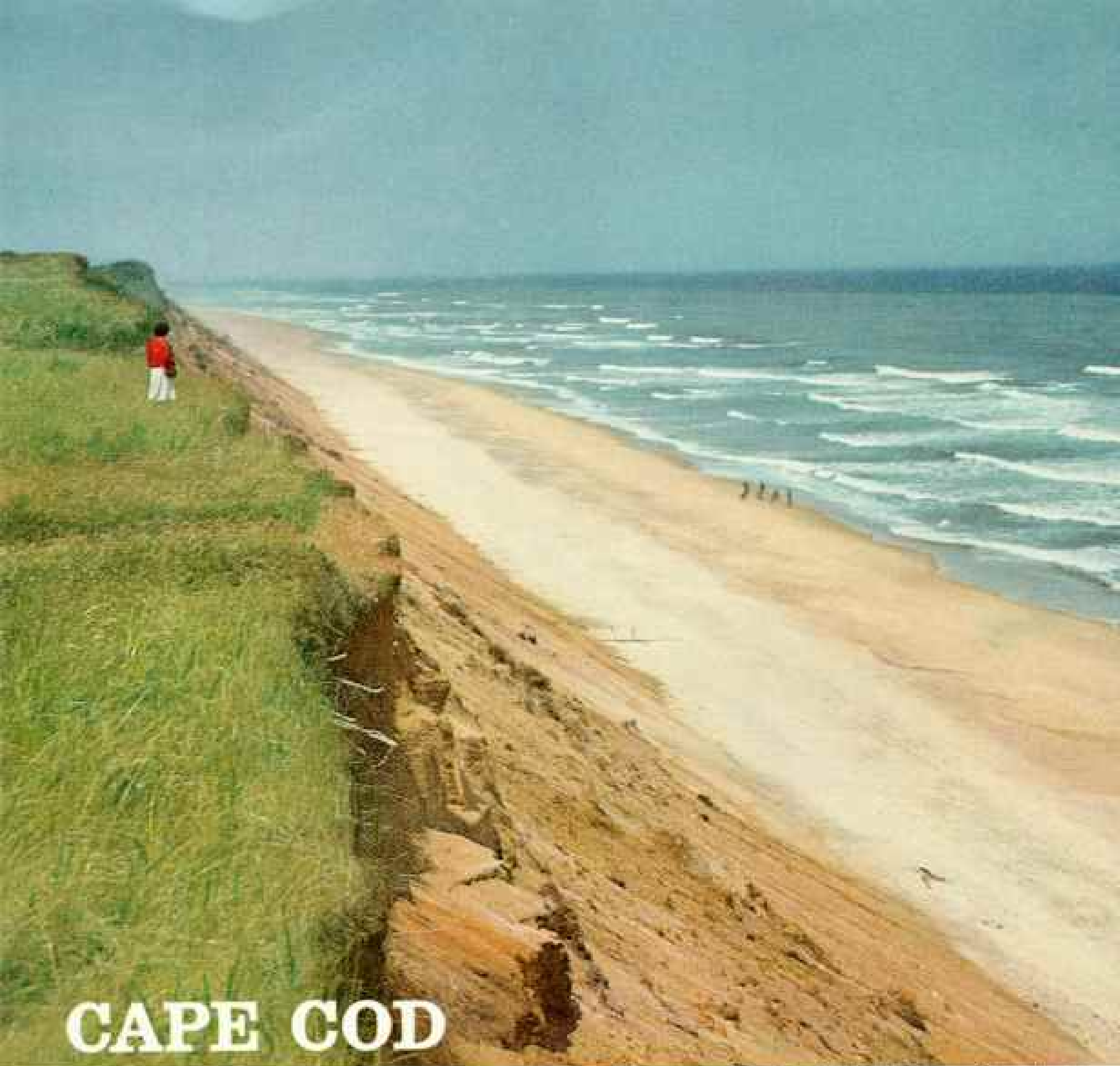


GENERAL TELEPHONE & ELECTRONICS



730 Third Avenue, New York 17

GT&E SUBSIDIARIES: General Telephone Operating Companies in 32 states • General Telephone & Electronics Laboratories • General Telephone & Electronics International • General Telephone Directory Company • Automatic Electric • Litch Electric Company • Lenox Electric Co. • Electronic Secretary Industries • Sylvania Electric Products



CAPE COD

Dunes at Nauset Beach, Cape Cod National Seashore, Massachusetts

to know its magic beauty, hold a seashell to your ear

Henry David Thoreau thought Cape Cod so beautiful he wrote a book about it. Because he wanted readers to know the music of the waves on this lovely beach, he invented the "talking-book"—by asking his readers to hold a conch-shell with its "sea-sounds" to their ears.

The loveliness he saw is now forever yours to enjoy. *Through farsighted conservation*, Cape Cod's outer beach is being made into your newest National Seashore, a unit of the National Park System. Here, you'll enjoy a vaca-

tion that literally goes down in history. You'll see the original Cape Cod houses, and miles of beach whose every grain of sand is the tide-milled kernel of a glacial boulder.

When Bartholomew Gosnold explored Cape Cod in 1602, he wrote, "*We stood like men ravished by the beautie and delicaste of this sweet soil.*" He sensed what wise men now know: that men need communion with nature, that in her far-horizoned temples there is good medicine for the soul. It is this spaciousness

which has formed the face and character of our people. As our population grows, it is good to know that *more* of our wonderful natural, scenic and historic heritage is being set aside for the benefit and enjoyment of all, as an investment in America's future.

FREE TOUR INFORMATION: Let Sinclair help plan your trip to Cape Cod or other scenic and historic areas in the U.S. Write: Tour Bureau, Sinclair Oil Building, 600 Fifth Avenue, New York 20, N. Y.

Sinclair
A GREAT NAME IN OIL

A Sinclair public service message on America's need for more outdoor recreational opportunities.



THE NATIONAL
GEOGRAPHIC
MAGAZINE



COPYRIGHT © 1962 BY NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON, D.C. INTERNATIONAL COPYRIGHT SECURED

VOL. 122, No. 2 AUGUST, 1962

Cape Cod

WHERE SEA HOLDS SWAY OVER MAN AND LAND

By NATHANIEL T. KENNEY

National Geographic Senior Staff

Illustrations by National Geographic photographer DEAN CONGER

WHALES CRUISED past the Great Beach near Nauset Harbor that first day of our first trip to Cape Cod. They were hard by, so that children were encouraged to throw stones their way; they were in a guzzle, which is what Cape people call the little channels between the sand bars off their gleaming beaches.

Above the whales, shrieking terns rode the wind of the sea, and sand launces, the tiny silvery fishes slim as eels, frizzled the green water in frantic flight from the terrors aloft and aloft. There were three of the whales, moving calmly despite the running children, and making many spouts, which are explosive exhalations of breath.

Whales Spout a Fireboat Welcome

"They are welcoming us to Cape Cod," said my daughter Janice, who was eight years old then, "like the fireboats that squirt welcome to the big boats in New York."

"Heavens!" said Fran, my wife. "Is that where we swim?"

"Happens they're humpbacks, which don't bite people," said Charlie Rollins, owner of the cottage we had taken for the summer atop the Nauset bluffs in East Orleans.

"They are kings of the ocean," I said.

"Aye-uh," said Charlie, "and that makes them lords of Cape Cod, for you will find that the Cape is only an accident of land in the domain of the sea, and everything here lives or does not live at the whim of the sea."

Charlie must get on with the sea; he was 97 last August 2.

Cape Cod, then, is a part of Massachusetts that trespasses eastward into the oceandom of the North Atlantic for 35 miles from the Cape Cod Canal to Chatham. There it curves north and west another 35 miles to Provincetown, first landing place of the Pilgrims in the New World, these days a brash and friendly town of artists and actors, fishermen and tourists (next page and map, page 158).

In the whole 70 miles of the Cape you can never get more than six miles from salt water. Even when a low hill hides the sea, you always feel its nearness—in the cool, briny moistness of the summer breeze, by the mewling of gulls above the inland lakes, in the smell of marsh and kelp and clam flats at low tide, in the sheen of tough meadow grass that must drink salt mist.

As it does the land, the sea marks the people of Cape Cod, those who live there all the year and those whom the old-time Capers call "summer boarders."



Sun-dappled dunes and broad beaches bait New England's fishhook in the Atlantic—Cape Cod. Wind and wave constantly reshape Great Beach, the bold and lonely ocean side of the Massachusetts peninsula. Here the end of the Cape crooks a protective arm around Provincetown (center). Ships seeking sassafras, a folk medicine, visited these shores soon after 1600.



KODACHROME BY LUIS MARDEN

*MAYFLOWER II, a copy of the Pilgrim ship,
arrives off Provincetown on June 12, 1957.*

"Bear to starboard at the next crossroad." The village constable, whose father traded to China in the days of sail, unconsciously speaks the language of the sea.

There is sand in the sun-bleached hair of the summer children, even after their baths; and sand dollars, which are a kind of sea urchin and the treasure trove of the beaches, in their pockets.

For the parents of the summer children there is nostalgia; the sea, even in gayest mood, is the mother of sadness. You took your children to Cape Cod when they were little, for summer happiness, and there they left their littleness forever, in the wind that drove the catboat you taught them to sail and in the bone-chilling water where they learned to swim.

Now the children have grown up, and every year Cape Cod changes. One of the children, by the way, is now the President of the United States; his daddy summured Mr. Kennedy at Hyannis Port, and he has taken his own family there (pages 184-7).



Pilgrim Monument in Provincetown commemorates the arrival of the *Mayflower* on November 11, 1620, a month before it reached Plymouth. The 255-foot granite shaft copies the Torre del Mangia in Siena, Italy.

Whaling, once the town's bread-and-butter industry, has vanished. Art colony, summer theater, and symphony orchestra flourish in its stead.

Where 75 wharves bristled along the waterfront in early days, only a few remain. Here commercial fishermen unload their hauls, and rod-and-reel sportsmen weigh in horse mackerel, or tuna, that sometimes top 700 pounds.

In Pilgrim dress, Provincetown's leather-lunged town crier broadcasts the news—"Hear ye! Hear ye!"—as he makes his rounds. Ever obliging, he poses for photographers as many as 35,000 times each summer.



EDUCATION BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JOHN GUNLER © N.G.S.

But no matter what the passing years bring, Cape Cod is still the place of the children's golden days, and it will always be somehow sacred to their parents.

Tide's Out and the Beach Is Right!

Janice says the beach days were the best of the golden days. And the best of the beach days started, say, early one sunny morning, when the quail were whistling in the fields and John Anthony, retired postmaster of Orleans, blew his beach-buggy horn outside our cottage.

"Tide's out and the beach is right!" he shouted. "Let's go!"

And out we piled, Janice and small Barbara Hamer, her house guest, and Pete, the tiny poodle, leaving Mom a rare morning of peace and quiet and an opportunity to find what had died in the children's room. It turned

out to be periwinkles and starfish in a forgotten beach bucket.

John took the track lined with beach plum and thorn apple that led to the dunes below the bluff, and when we hit the soft sand, he put the beach buggy into four-wheel drive. Barbara and Pete fell off the tail gate when the soft, fat tires bit in. We retrieved them. We came to the hard, wet sand the tide had abandoned, and we moved beside the surf through the world of the Great Beach.

Besides the sand and sea and salt and shells and fishes and special creatures that all ocean beaches have, the Great Beach of Cape Cod has a geographical quirk. Henry David Thoreau noted it long ago; it is a gentle curve always landward, so that you cannot see as far up and down the sands as you can on most beaches. To me this imparts a strong sense of isolation, even though I know a thousand



people are bathing at a public beach a mile or two away.

John Anthony's beach buggy, following the rim of the crescent, moved carefully past picnics, lest we sand the hot dogs. We came upon a veritable encampment of beach buggies, some of them large vans with kitchens and bedrooms and side awnings. They belonged to a Massachusetts beach-buggy club.

"I'm Lou Schadwald of Rockland," said the only man with the crowd of women and children. "We spend weekends camping out on good beaches. We like this one best.

"No men are around because they're all off fishing in the surf. It's my turn to be the fishing-bus driver. I dropped the others off along the beach at sunup and will pick them up again at suppertime."

Dean Conger, my NATIONAL GEOGRAPHIC photographer colleague, spent an evening with the club later. He ate with them and said it was as much fun as nights in the range country of his native Wyoming.

The beach buggy left the encampment behind, and soon we found a solitary fisherman casting from a tide-bared sand island in the ocean beyond a guzzle. Janice and Barbara and Pete sloshed out to see how he was faring.

They came back soaked, but poodle fur and T-shirts labeled "Cape Cod, Mass." dry quickly.

"He's caught three skates and a little sand shark," the girls reported. "Pete bit the shark and ran away. The fisherman is in a bad mood. He says he never catches anything but sharks and skates."

Like me, I see huge striped bass—30, 40 pounds apiece—weighed in at the Goose Hummock tackle shop in Orleans, and, with my Boston friend Willis Pattison, set out immediately for the surf in Willis's beach buggy. We never catch a striper but wind up fishing for fluke in Chatham Harbor.

Shoals Detoured Pilgrims to Plymouth

The Pilgrim Fathers stood on the brink of disaster hereabouts, and so did I. They got mixed up in the sand shoals of Pollock Rip off Monomoy Point and almost didn't get the *Mayflower* out again. That is why they turned north and settled at Plymouth instead of coasting on south to the Hudson River, where they were headed.*

*Resailing the Pilgrims' voyage in 1957, Capt. Alan Villiers recounted the adventure in NATIONAL GEOGRAPHIC: "We're Coming Over on the *Mayflower*," May, 1957, and "How We Sailed the New *Mayflower* to America," November, 1957.

Not radio antennas but casting rods whistle in the breeze as a beach buggy carries fishermen to try for striped bass off Nauset Beach. Oversize, low-pressure tires give the 30-year-old Model-A Ford traction on soft sand. Cape Cod attracts buggy owners by the hundreds. They drive with care and courtesy under a self-imposed code.

Fresh-water pump, pounded deep into shore sands, supplies a beach camp on Nauset. Here the author met members of the Traveling Twenty Club, some of whom slept in their beach buggies.







Me, I lost the innards of Willis's favorite fishing reel in the sand. I bought him a new one and put the initialed handle of the old one on it.

"I cleaned your reel up a little," I said, handing it to him.

"Glory be," he said. "The best tackle shops in Boston and New York could never make that thing work right. How about taking a look at my power mower and well pump and the beach-buggy clutch?"

Storm and Shoal Waters Doom a Schooner

Rambling along beside the jolly surf, the Anthony beach buggy pulled up by the gaunt timbers of a sailing vessel sticking out of the sand (left). College youngsters, working for the summer as waitresses and camp counselors, sat in the lee of the stark bones, singing and romancing.

Life and death walk hand in hand where sea meets land. I knew of this ship, only one of thousands that have died in the breakers off Cape Cod, carrying many a crew to eternity. She was, I think, the last windjammer to founder here, and I have her story from eyewitnesses.

A northeaster was scouring the North Atlantic at dawn

Crumbling skeleton of the schooner *Montclair*, driven aground in 1927 with the loss of six lives, saddles a barrier dune on Nauset Beach. Nearly 4,000 ships have perished in shallows, tides, fogs, and gales off the Cape.

Combers pound the *Margaret Rose*, a 70-foot dragger beached last winter near Wood End Light. Coast Guard men sped to the wreck in the amphibious DUKW at right and rescued seven crewmen by lifeline and breeches buoy.



PHOTOGRAPHS BY SEAN CONNER © N.E.S., RICHARD CHRISTOPHER FOR U.S. COAST GUARD

on March 4, 1927. The three-masted schooner *Montclair* out of Parrsboro, Nova Scotia, scudded for Pollock Rip Lightship with sails close reefed, but shoals were in her way, and she fetched up off Nauset Beach. Six men died, one survived.

John Anthony drove a little farther along Nauset Beach and introduced me to one of the town park commissioners, Alvin H. Wright.

"The year of the wreck I was bosun's mate in charge of the Old Harbor Coast Guard Station, now closed," Mr. Wright told me. "After our tower lookout spotted the schooner in trouble, we started up the beach.

"I tell you it was a terrible sight. She lay on a bar just offshore, but there was a deep gully between her and the beach, and the crew could only huddle on deck with the seas breaking over them. They washed off one by one. We finally got a line to them and brought the last two in, but one died later."

Wrecks Provide Beachcombers' Bounty

Albert E. Snow of Weeset went down to the wreck the same morning. His forebears settled Eastham in 1644. He handles a key at the marine wireless station at Chatham, and he writes Cape Cod lore for Malcolm Hobbs's delightful weekly newspaper, the *Cape Codder* of Orleans.

"I was wrecking, along with most of my neighbors," said Al. "Maybe I shouldn't say so, but your real Cape Codder is a born wrecker—he's such a thrifty Yankee he can't stand to see good stuff lying on the beach going to rot. Anyway, there's one of *Montclair's* quarter boards above my garage door now; there are quarter boards from wrecks nailed on barns all over the Cape.

"Along toward evening a couple of us brought the end of a good piece of line ashore and started faking it down. We worked an hour, and the coil wasn't getting any bigger. We watched. By cracky, it was crawling back through the dune grass like a snake.

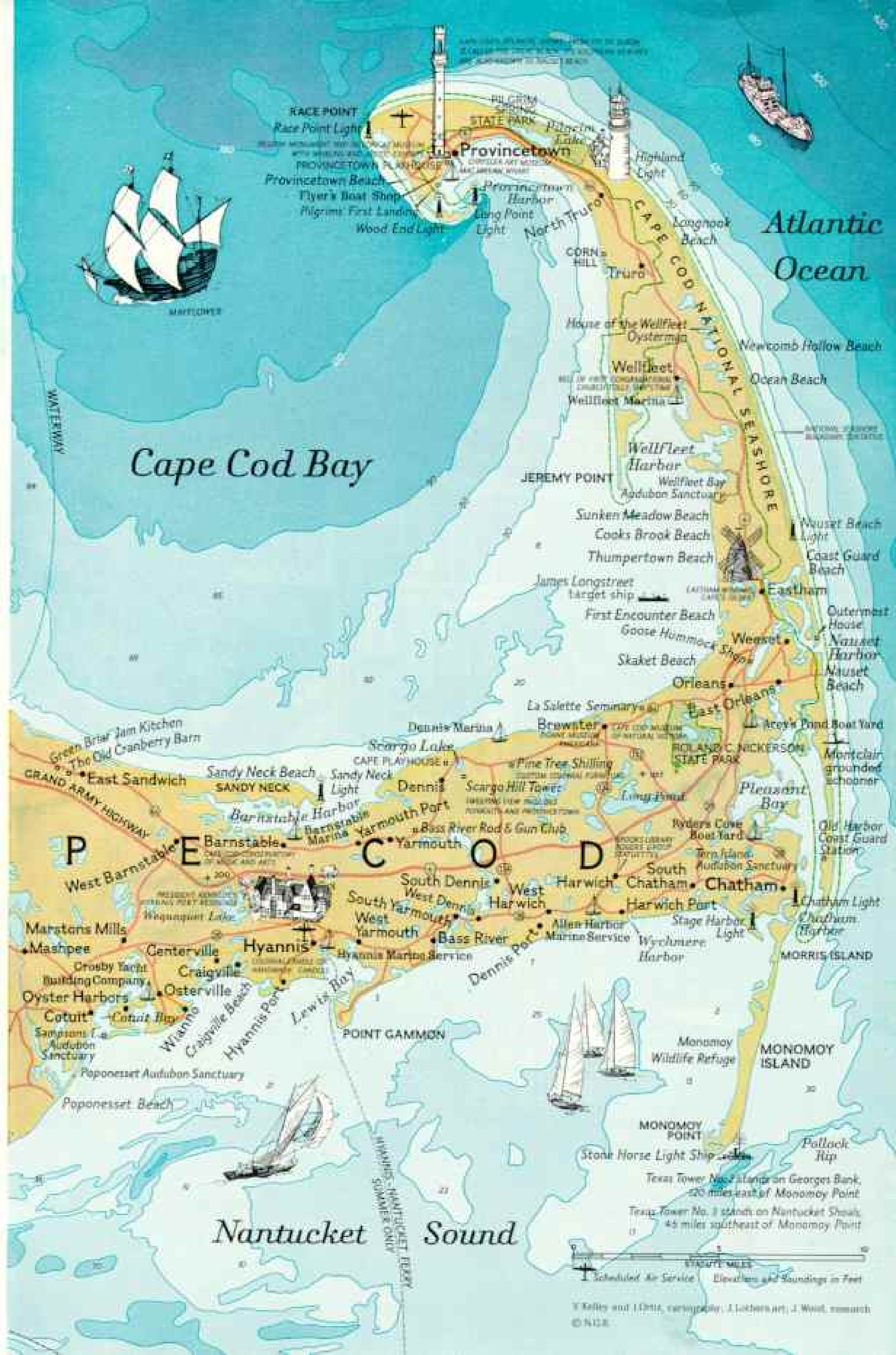
Cape Cod's Elbow Appears to Rest on Monomoy Island, a Wildlife Refuge

From Chatham to Provincetown, new national parklands preserve almost 27,000 acres of moor and marsh, cliff and dune.

Cape Cod Canal severs the peninsula from the Massachusetts mainland and spares shipping 70 hazardous miles of open sea.

In summer the Cape's population soars to a quarter of a million, almost four times the number of year-round residents.





Atlantic Ocean

Cape Cod Bay

Nantucket Sound



⚓ Scheduled Air Service Elevations and Soundings in Feet

T Tally and Lights, cartography: J. Lotters, art: J. Wood, research: © NGS

RACE POINT

Race Point Light

Provincetown

Provincetown Harbor

Lang Point Light

North Truro

Truro

Wellfleet

Wellfleet Harbor

Wellfleet Marina

Eastham

Orleans

Chatham

Hyannis

West Yarmouth

South Yarmouth

Dennis

Sandy Neck

Barnstable

West Barnstable

Marstons Mills

Mashpee

Centerville

Craigville

Osterville

Cotuit

Wenham

Hyannis Port

Lawley Bay

POINT GAMMON

Dennis Port

South Dennis

West Dennis

Harwich

West Harwich

Harwich Port

Chatham

Chatham Light

Chatham Harbor

MORRIS ISLAND

MONOMOY ISLAND

MONOMOY POINT

Stone Horse Light Ship

Pollack Rip

Texas Tower No. 2 stands on Georges Bank, 20 miles east of Monomoy Point

Texas Tower No. 1 stands on Nantucket Shoals, 45 miles southeast of Monomoy Point

Wenham Harbor

Allen Harbor

Marina Service

Wolcott Harbor

Stage Harbor Light

Wolcott Harbor

Wolcott Harbor

Wolcott Harbor

Wolcott Harbor

Wolcott Harbor

Wolcott Harbor

Wolcott Harbor

Wolcott Harbor

Wolcott Harbor

Wolcott Harbor

Wolcott Harbor

WATERWAY

MAFFLOWER

INTERNAL SHIPWRECK BEACHES INDICATED

P

E

C

O

D

HYANNIS-NANTUCKET EXPRESS
SUMMER ONLY

⚓ Scheduled Air Service Elevations and Soundings in Feet

T Tally and Lights, cartography: J. Lotters, art: J. Wood, research: © NGS



THE OLD CRANBERRY BARN

"Feller'd snuck out in the dark and got the bitter end and was loading it into his wagon, fast as we could haul it ashore. We let him keep it—he was a preacher."

I like the Great Beach at night. It is rarely twice the same. Sometimes the fog rolls in from the east, clammy as the breath of an iceberg, redolent of distant barnacled rocks at low tide. Sometimes the northeaster spits sand and scud and rain; sometimes the land breeze brings the perfume of bayberry and hayfield.

When half a moon lights the Great Beach,



REPRODUCED BY NATIONAL GEOGRAPHIC SOCIETY

Sparkling glassware, made a century ago, brought renown to Sandwich. Sunshine fires rare amber and cranberry pieces in the Sandwich Glass Museum. True Sandwich glass has no identifying marks, inviting imitations.

Old Cranberry Barn, in East Sandwich, exercises a magnetic attraction. Visitors cull antiques and oddities. Plaster mannequin in a poke bonnet appears to consider a purchase.

small night creatures think they cannot be seen and move out of their hiding places.

"Let this gentleman by," I tell Fran, assisting her out of the path. The skunk passes in serenity. Lucky for all that Pete the poodle rests beside the cottage fireplace, tired from a day's digging for fiddler crabs.

A yellowlegs whistles high in the sky. He wants company. I whistle back. He dives and circles our heads, a darting blur in the moonlight. I have done him a favor: a new whistle pipes from the salt marsh nearby, and the yellowlegs flies to his kind.

I walked the Great Beach alone one night in a belated snowstorm of spring, and thought of Henry Beston spending the winter here. In *Outermost House*, one of the best of the Cape Cod books, Beston writes of the Coast Guard night patrols stopping at his little frame cottage for coffee and telling yarns of the beach, while the glowing stove melted the snow from their woolen watch caps.

Outermost House Still Stands Alone

When daylight came next morning, I made a cold pilgrimage to Outermost House, where it huddles in the dunes north of Nauset Harbor's shifting mouth. Someone had dragged it back out of reach of an ever-encroaching sea, but there compassion had ceased; it was empty and forlorn, and drifting sand leaned against its sides. Since then, however, the Massachusetts Audubon Society has taken over care of Outermost House, and naturalists summer there.

A happier literary pilgrimage was one Janice and I made in high summer to the House of the Wellfleet Oysterman in the woody hinterland back of the Great Beach.

If you have read *Cape Cod* by Thoreau, you will recall that in 1849 the naturalist of Walden Pond and a poet companion walked the beach all the way from Nauset Beach Lights—there were three then instead of today's one—to Provincetown. Just past the boundary stone between Wellfleet and Truro, the pair turned inland. Across rolling, barren country, they came upon the Oysterman's House and spent the night.

Pitch pines have come in thickly since 1849. When I tried the same walk in from the beach, it was so difficult I gave it up and left the woods to the numerous deer that kept crashing away at my approach.

Janice and I went in by car. We recognized the old house immediately from Thoreau's description of it and other Cape houses: "The ends of the houses had thus as many muzzles as a revolver, and, if the inhabitants have





Savory Clouds of Steam Whet Appetites at a Cape Clambake

Caterers at the Bass River Rod & Gun Club uncover the bake pits and reveal the tempting first course, succulent long-neck clams still in their shells. Removal of the clams will expose flaming-red lobsters, golden ears of corn, and plump potatoes simmering over hot rocks in nests of well-washed seaweed. Diners dip them all in melted butter.

The feast concludes, for those who can crowd in anything else, with a wedge of ice-cold watermelon.

No cutlery needed. A guest pops a tender clam into her mouth. Even as an appetizer, individual portions may vary from a pint to a peck; true Cape Codders scorn small servings.





© NATIONAL GEOGRAPHIC SOCIETY

the same habit of staring out the windows that some of our neighbors have, a traveler must stand a small chance with them."

Children looked out of most of the random-size windows as we drove up. Paolo Contini, an attorney with the United Nations, had the place for the summer, and these were the Contini children and their house guests.

They took Janice off to see their white riding horse. Mr. Contini showed me around. Thoreau would remember the great fireplace. The wide-boarded floor he had walked was still in place, although softly polished now, and there were gay curtains and hundreds of books and Beethoven on the hi-fi.

I remember a passage from Thoreau in which the fireplace figured. While his old wife cooked breakfast on the hearth, the Wellfleet Oysterman laid a steady barrage of tobacco juice upon the flames.

"I ate of the apple-sauce and the doughnuts, which I thought had sustained the least detriment from the old man's shots," wrote Thoreau, "but my companion refused the apple-sauce, and ate of the hot cake and green beans, which had appeared to him to occupy the safest part of the hearth."

"Stay for snacks," Mrs. Contini invited. "None of us chews tobacco." We stayed and had a wonderful time.

Were he around today, Thoreau, the lover of nature, would approve the newly authorized Cape Cod National Seashore, of which the Great Beach is an important part. The National Park Service says that this is the only extensive area on the Atlantic seaboard (excepting the Cape Hatteras National Seashore Recreational Area, North Carolina) which is not already so built up that its pristine values have been submerged.*

Many Cape Codders opposed the national seashore—whose enabling legislation was signed into law by President Kennedy on August 7, 1961—for the usual reasons: they would lose properties, or their business would be harmed. I have friends among them, and I sympathize with them.

On the other hand, I remember the day Dean Conger and I visited Corn Hill, where the Pilgrims "borrowed" their first winter's supply of the strange new grain, and First Encounter Beach, where Myles Standish

*See "October Holiday on the Outer Banks," by Nike Anderson, NATIONAL GEOGRAPHIC, October, 1955.

Boys paint saucer-size clamshells and smaller scallop shells to sell as ashtrays at a roadside stand in Wellfleet.

Swiss-born Arnold Geissbuhler shapes plaster into sculpture in his studio on Scargo Lake in Dennis. Bird life and landscapes just outside the window inspire many of his creations. Although he and his wife Elisabeth often work and study abroad, their Cape Cod home keeps calling them back.

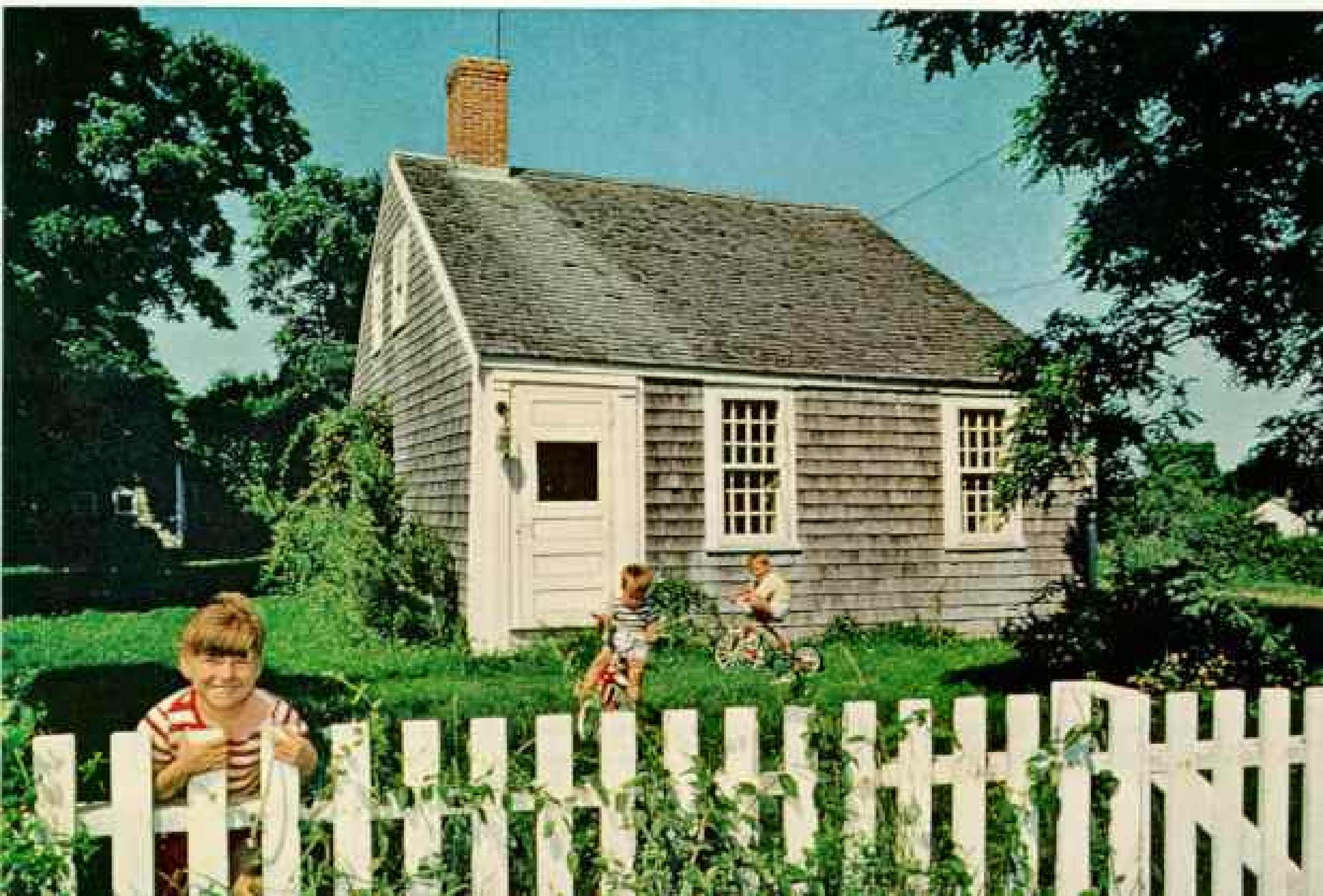
The Cape lures artists and men of letters. Poet Conrad Aiken lives in Brewster, Cape Cod historian Henry C. Kittredge in Barnstable. John Dos Passos, among many other writers, has summured here, as did playwright Eugene O'Neill. His works were first staged by the young Provincetown Players.

Salt Air Silvers a Cape Cod Cottage in Sagamore

Early Cape couples often began married life in a modest half-house. As the family increased, they added a balancing section and perhaps an ell. Such expanding houses gained renown as Cape Cod cottages, and the design spread across the United States.



PHOTOGRAPHS BY NATIONAL GEOGRAPHIC PHOTOGRAPHER OCAR EDGER. © N.G.S.





Yeasty surf tugs the line of a solitary fisherman casting into the ocean from Nauset Beach.



Bathers and gay umbrellas dot a Nantucket Sound beach at West Dennis in midafternoon.



PHOTOGRAPH BY NATIONAL GEOGRAPHIC SOCIETY

Sunset's gold envelops the military target ship *James Longstreet*, purposely grounded off Orleans.

and his men returned musket fire against Indian arrows.

To read the inscription on the modest Corn Hill marker, I had to dig away drifted sand. No trouble finding a digging tool: there were plenty of paper picnic plates around.

Not far off stood gaudy summer cottages and rows of clotheslines gay with summer beach togs. As for First Encounter Beach, it had fewer close-by summer cottages but more picnic plates.

Cape Cod National Seashore will go into operation, the National Park Service says, when enough land has been acquired "to permit establishment of an efficiently administrable unit." Land acquisition has begun.

The seashore will run some 42 miles from Long Point Light, the entrance to Provincetown Harbor, to the southernmost tip of Nauset Beach. It includes all of the Great Beach. It will also cross the Cape in Truro and Wellfleet Townships and pick up ten miles of beach on Cape Cod Bay, favored by many for bathing because it is warmer and calmer than the Atlantic side.

All told, it will add almost 27,000 acres to the country's recreational domain—9 or so percent of the total area of Cape Cod. It will not include Monomoy Island, a wild sand spit jutting south from the elbow of Cape Cod. The United States Fish and Wildlife Service now guards Monomoy as a refuge for thousands of geese, ducks, and shore birds, and a thriving herd of deer.

Cape Hatteras is the country's first national seashore; Cape Cod will be the second.

Summer Traffic Crawls Through Hyannis

You could hardly make a national park on the Cape between the canal and the elbow at Chatham, however, so heavily is the land developed. Hyannis, inland from Hyannis Port and President John F. Kennedy's summer home, gets so much traffic that the main street has been made one way. Nonetheless, cars move through at a crawl.

Motels, filling stations, and shopping centers line the highway on the Nantucket Sound side from Hyannis to Chatham. There is an edifice along this highway called the Leaning Tower of Pizza. It is not a very good copy of the original in Italy, but the pizza served beneath it is not bad.

Chatham has a well-groomed look and so does Falmouth. Bourne, beside the canal, is urban and modern. Oyster Harbors, Wianno, and Osterville are exclusive, with big summer homes and formal gardens.





For the quaint, old-fashioned New England atmosphere, I will take Route 6A, which runs along the Cape Cod Bay side of the peninsula, through Sandwich, where the glass factory once stood, and Dennis with its shade elms, and staid Brewster, in which the sea captains built their big, foursquare houses.

If you have a wife and girl children, this can be a costly road. Along its southern reaches live people who make fascinating things in the old way, with their hands and simple tools. My womenfolk buy these things with budget-breaking fervor.

Elegance From Simple Things

Nina Sutton, for example, makes jewelry of Sandwich glass. She has been responsible more than once for frankfurters instead of steak in my house. Nina prowls the site of the old factory with a shovel and collects broken bits of colored glass which she cuts, polishes, and sells to my wife.

Her things are so good that the Sandwich Glass Museum exhibits them along with its priceless collection of bottles, glasses, and bowls made here in the long ago. Most Sandwich glass sold cheaply and was for everyday use. Today collectors pay high prices for even the lowliest items (page 161).

One of my favorite Route 6A craftsmen is Peter Peltz, of East Sandwich. He carves birds and mounts them on driftwood. For models he has only to look out the windows of his small gray-shingled shop. Hawks, gulls, and red-winged blackbirds haunt the marsh on one side of the road, birds of the pines and scrub oaks, the other.

Harry Holl of Scargo Lake makes beautiful pottery. In a nearby studio, sculptor Arnold Geissbuhler works to the music of the summer breeze in the

Low Tide Exposes Almost a Mile of the Floor of Cape Cod Bay

Here, on the Orleans flats, an occasional tiny geyser erupting in the mud betrays a clam or quahog. Diggers, booted or barefoot, stalk them far from the water line. In this view from a blimp, tracks of a beach buggy scar the foreground and fish weirs stand like fences in the distance.



Heeling to a spanking breeze, a Sailfish out of Hyannis skims waves like the surfboard it resembles. Cape Cod youngsters, surrounded by sunny seas and more than 300 ponds, often sail before they learn to cycle.

Carefree children slide down a steep sand slope at Longnook Beach in Truro Township. Here, where the lower Cape bends its wrist westward, bluffs tower 150 feet above the Atlantic. Each year restless winds and water nibble away at this tilted terrain.



piny woods. Two decades of Wellesley College students remember his classes in sculpture. The Metropolitan Museum of Art in New York and the Salon des Tuileries in Paris have exhibited his works (page 164).

At the Green Briar Jam Kitchen, a score of talented ladies cook jams and jellies, including one made from the wild beach plums of Cape Cod. Marise Fawsett and Yvonne Rousseau have a tiny roadside shop specializing in Christmas cards.

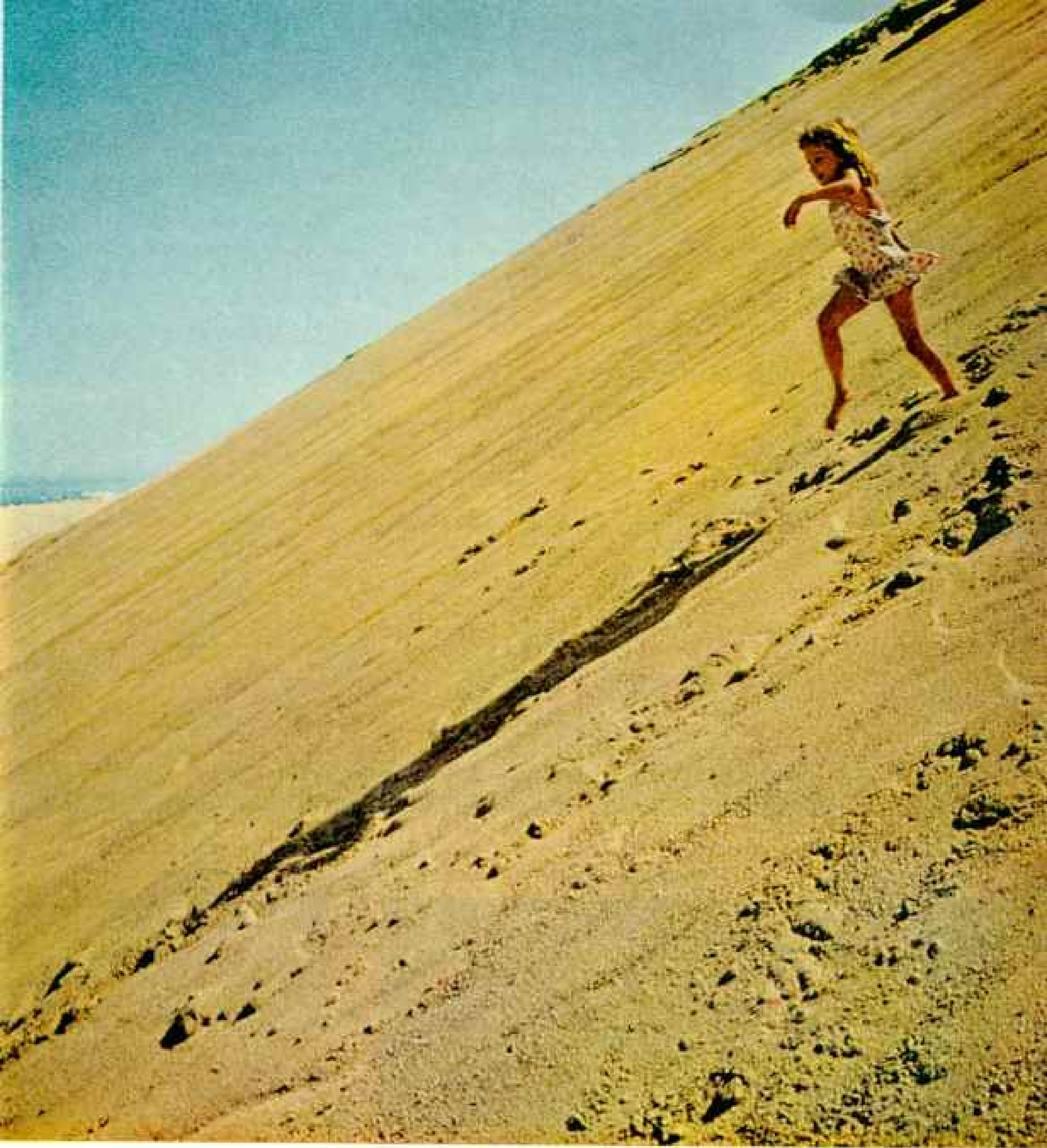
Myself, I can resist wrought-iron weather

vanes and hooked rugs. But Louise Black found a chink in my armor one day. The Black family weaves soft woolen cloth on hand looms. Louise made me a necktie while I talked to her dad. I still wear it.

The Place Where Up Is Down

Follow 6A seaward and you come eventually to Provincetown. One travels "down-Cape" to "P'town," though the way is north. Head south, and you are going "up-Cape."

Dean Conger and I drove down-Cape of a



PHOTOGRAPHS BY NATIONAL GEOGRAPHIC SOCIETY

Saturday afternoon, following 6A until it merged with the central expressway, the Grand Army Highway, for the last twenty-odd miles to Provincetown. In bumper-to-bumper traffic we rolled into town.

Thoreau knew it as a simple village of people who fished for cod and sun-dried them on racks in fenced squares of sand that passed for front yards. We found it jam-packed with vacationists. Many were weekenders come by excursion boat.

We crammed the car into a parking lot and

went on afoot, following the sound of a bell. Near the waterfront we encountered the bell ringer, a man in Pilgrim costume (page 152).

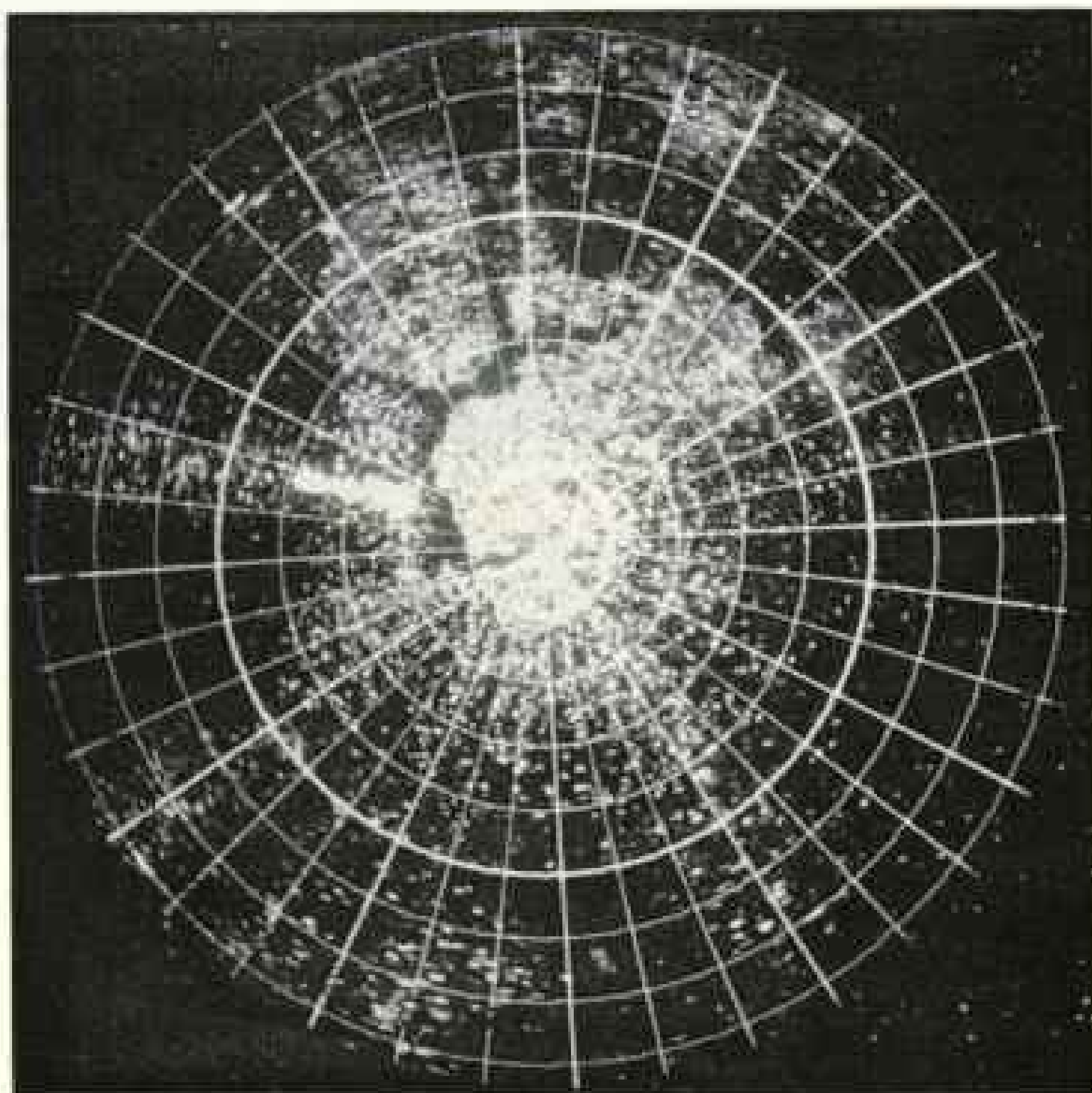
"He's Arthur Snader, the town crier," a traffic policeman told me. "He has a voice like a foghorn. Best crier we've had in years."

A man dressed like Popeye the Sailor hove into view. The town crier indignantly ordered him away.

"This is my territory," said the crier. "Besides, he only looks like Popeye when he takes out his false teeth."



REDACTED © NATIONAL GEOGRAPHIC SOCIETY



U. S. DEPARTMENT OF DEFENSE, WITRE CORP.

Texas Tower in the Atlantic Tracks Planes and Birds

Standing on 178-foot steel stilts above Georges Bank, 115 miles east of Chatham, Tower No. 2 scans the skies for signs of an enemy. A similar tower off New Jersey toppled in a wild storm in January, 1961.

United States airmen, who operate the radar screens, see great flocks of migrant birds crossing the Cape after dark. As the flocks pass in the night, a camera automatically records their images on the scopes. Films go ashore for study by Massachusetts Audubon Society men.

Billiard-ball plastic domes house the radar antennas.

Common terns clutter a radar screen. On some nights the tower's electronic eye sights as many as six million migrants.

But no one could say that the strains of a Mozart symphony coming from the white-frame, green-spired town hall were anything but real. The musicians were playing uncommonly well. I slipped inside through an open side door.

This was the Provincetown Symphony, composed of musicians who play in the best-known orchestras of the East in winter months. The conductor spotted me.

"No rehearsal kibitzers," he said firmly. "Buy a ticket for tonight's concert."

"Well, now," I said, "I think I will tell your orchestra that you played glockenspiel in the Princeton band. How've you been since June, 1930, Jo?"

So I stayed through rehearsal with my college classmate Joseph Hawthorne, summertime conductor of the Provincetown Symphony, regular conductor of the Toledo Orchestra in winter, and never a glockenspiel player in the Princeton band.

Jo's father, Charles W. Hawthorne, a noted figure painter, helped found the Provincetown art colony. These days most of the artists paint abstracts. Hans Hofmann is considered dean of the colony.

Seong Moy, who has an art school, often takes his classes into the huge sand dunes near Race Point for inspiration. Australian-born Mary Cecil Allen, who died last spring, chose to paint streets and wharves and boats. She had told me that not only are these things exceptionally gay and lovely, but the light around Provincetown has a peculiarly inspiring quality.

P'town's Portuguese Know the Sea

Provincetown's real heart is the waterfront. Here the yachts tie up, and the fishing boats—the draggers, the scallopers, the trawlers, the party boats that take sport fishermen out at so much a head—come in to MacMillan Wharf, named for Provincetown's famed Arctic explorer, Donald B. MacMillan.

The Portuguese-descended fishermen mend their nets on the piers and patiently answer the questions of the milling tourists. Their sun-browned sons dive for coins in the clear water and, in the evening, fish for squid from the wharf stringers. They live in a quiet quarter of town that could be a bit of Portugal. They go to mass before morning light, before they leave for the fishing, and on feast days their religious processions wind colorfully to church.

They have lovely names—Codinha, Costa, Rodrigues. I know many of them. Elmer Costa is one. His dad went off to the Grand Banks in a schooner, but young Costa has a modern cabin cruiser in which he takes fishermen out for the huge tuna that migrate past Cape Cod.

Two things tell me that Elmer is the sort of born seafaring man who will come back from the sea in the evenings, if anyone does: There is never a bit of loose gear in *Columbia*, his boat, and beside his powerful radiotelephone is framed the old prayer of the sailorman, the one that says, "Oh God, Thy sea is so great and my boat is so small. . . ."

Bird in hand, Wallace Bailey of the Massachusetts Audubon Society hands an arctic tern, one of about 100 that nest on Tern Island off Chatham. A champion traveler, the species winters as far south as the Antarctic and usually summers north of Nova Scotia. The author's daughter Janice holds shells of channeled whelks, which feed on clams and oysters.







The fishermen of Cape Cod have not always come back. A stone monument stands in an old burial ground at Truro, bearing the weathered inscription:

SACRED
to the memory of
57 citizens of Truro,
who were lost in seven
vessels, which
foundered at sea in
the memorable gale
of Oct. 3, 1841.
*"Then shall the dust
return to the earth as
it was; and the spirit
shall return unto God
who gave it."*

I read the names. Many were related; eight were Snows. Al Snow of Weeset, who had the *Montclair's* quarter board, later told me the story.

The Truro vessels lay to their anchors on Georges Bank, 115 miles east of the Cape, the night the gale struck, unwilling to go home while the schooners of Boston and Gloucester and other ports still filled their holds with fat cod. Soon it was too late to go. Schooners to windward dragged anchor and staggered through the helpless fleet, carrying all in their paths to the depths.

The able men of Truro chopped their anchor lines and clawed off, somehow making sail. Two Truro crews came home. Capt. Matthias Rich drove *Water Witch* to safety behind Race Point. *Garnet* was knocked down and dismasted, but Capt. Joshua Knowles, in an epic feat of seamanship, set her back on her feet and kept her afloat until a Liverpool packet picked up the crew.

You might say that a third ship came home, too. After the storm, *Pomona* came in on a chance tide to Nauset, her keel in the air and three drowned boys in her cabin.

But seven schooners of Truro, standing for home in the smother, could not weather the sands of Nantucket Shoals and perished there in the breakers.

I went out to the shoals where they struck, riding in a helicopter from Otis Air Force Base, a major link in the chain of military installations guarding the Atlantic coast. The chopper took us to the so-called Texas Tower No. 3, standing on spidery steel legs planted in sea bottom far from shore.

I landed on the radar-domed tower on Nantucket Shoals, and from its windy deck saw their fangs of sand beneath the shallow water. I remember I had a good din-

Keyhole of the Cape, Wychmere Harbor Safeguards Boats From the Swells of Nantucket Sound

When the anchorage was still a fresh-water pond, captains of schooners enclosed it with a track on which they raced fillies brought home from abroad. Lobstermen who moor here set their traps as far as 15 miles at sea. Pleasure craft share the cove.



REARSCENES BY NATURAL GEOGRAPHIC PHOTOGRAPHER DEAN CONGER © N.C.S.

ner, in a comfortable dining room, with ice cream for dessert, and could have seen a movie had I wished.

I talked with the young airmen on the tower and told them about the Truro schooners, and they said it was a shame, of course, but these days people had tamed the Atlantic with things like this Texas Tower, which could withstand any gale.

A year later, I think it was, Texas Tower No. 4, 76 miles off the coast of New Jersey, crumpled and sank before the fury of gale winds and buffeting seas, and all 28 men in it were lost. Man may tame the ocean one day, but the day is not yet.

Radars Tracks Bird Migrants

With me in the helicopter rode Wallace Bailey of the Massachusetts Audubon Society. Wally runs the Wellfleet Bay Wildlife Sanctuary, and he was going out to the tower on business, to change the film in cameras that watch birds by radar (page 172). Wally told me the fascinating story as we winged out to sea.

"Otis airbase phoned me one fall day," he said. "Seems the radars were picking up unusual low-flying clouds on good nights, and the only clue was a few dead or dazed birds on the decks next morning. We went out and took a look, and ob-

Woods Hole Scientists Unlock Secrets of the Sea

Specialists from research centers at Woods Hole explore many aspects of a little-known frontier that covers nearly three-quarters of the globe and may produce food and fuel for millions yet unborn. Here an aide at the Oceanographic Institution examines marine plankton and records her findings. Her laboratory window offers a view of the research vessel *Crawford* and distant Martha's Vineyard.

Class on a cruise. Students of the Children's School of Science watch Jan Hahn, editor of *Oceanus* magazine, explain the working of a deep-sea thermometer. They attend a summer course offered to Woods Hole youngsters.



viously the clouds were migrating birds.

"The Air Force lent us cameras and set them up in front of the radar screens. On spring and fall nights they trigger them to run automatically. I'm going out now to pick up some film.

"We worked out methods to count the birds in the flocks, and we find out pretty well what kinds they are by identifying the ones that show up on the refuge in daylight in the same period.

"Let's say we develop some film that shows loose-knit flocks of birds, and next day the refuge fields are covered with robins. Or we get some pictures of birds flying regular straight formations, and next day we have geese in our ponds. This is fairly simple.

"But we couldn't believe our eyes when we started counting. On some fine nights, six million birds will come by the Cape. Obviously, we're on a major migration flyway here, and the birds must be well protected in our territory lest the bird life of the entire east coast be affected."

The Audubon Society's reputation as the organization to solve bird problems spread fast. Starlings on a Boston airfield caused a bad crash one day by clogging jet engine intakes. Audubon researchers were sent for to see if they could keep the starlings off the field.

"Nothing to it," Wally told me. "The starlings liked some reedy marsh grass that grew by the airport. We suggested

Fish Fly as a Sun-bronzed Cape-ender Culls His Catch

Wading in small fry that canners buy for cat food, Provincetown fisherman Antone Costa shoots for a basket with a two-foot haddock.

Like many others who harvest these waters, the boatman's seafaring ancestors migrated from the Azores more than a century ago to man New England ships. Late each June he participates in a colorful religious rite, the Blessing of the Fleet, which signals the start of another season at sea.

Fishing, which produced the peninsula's early prosperity, remains a major industry. Offshore waters abound in tuna, pollock, herring, mackerel, and the cod for which Capt. Bartholomew Gosnold named the Cape in 1602.



removing it. The starlings left. The same thing can be done for island airports where sea birds are a problem—change sand dunes around or remove them entirely, for example, to alter air currents.”

Wally has identified many Cape Cod “firsts”—usually some European bird blown across the ocean by freak storms—and has taken any number of people in the sanctuary’s beach buggy to see tern rookeries and the fascinating feathered inhabitants of the Cape’s salt marshes and outer beaches (page 173).

Janice and I have been on many of these trips with Wally, but I suspect he is quite happy when we stay behind at the refuge so that Janice can ride his saddle horse. Truth is that, although Janice and I like birds very

much, we annoy the serious ornithologists who ride the buggy. A red fox or a colony of fiddler crabs can distract us and hold up the whole party, and we do not care whether a bird is a piping plover or a willet so long as it is beautiful and graceful and runs on tiny, pattering feet along the line of foam the waves leave on the beach.

Wally’s worst day was the one on which he gave Janice some tern eggs his practiced eye told him would never amount to terns. Janice sat squarely on them in the buggy.

Oceanography Flourishes in Woods Hole

If you think of Cape Cod only as a place of summer fun, you have not been to Woods Hole. For all its quaintness, this tiny port is

Dying whale on a Provincetown beach yields long-sought data for science. Stranded in December, 1959, the 40-ton male finback resisted five attempts to tow him back to sea. Researchers from

Woods Hole then successfully recorded his heart-beat at 25 per minute (humans average 72), from a heart estimated at 500 pounds versus man’s at some 9 ounces. The whale’s body temperature



home to three important scientific establishments that try in many ways to learn more about the ocean.

The Woods Hole Oceanographic Institution is best known of the three. Its research vessels prowl the oceans, charting depths, testing salinity and temperature, measuring currents. The summer visitors see the scientists coming ashore from cruises, sunburned and bearded and carrying faded sea bags laden with exotic souvenirs.

From oceanography, a science now undergoing tremendous expansion, can come new knowledge vital to the very existence of mankind. What will we all eat, for example, in the 21st century, when there will be six billion of us?

was 92° F., its fins and tail 50°. In 1956 and 1957, in a Baja California lagoon, Dr. Paul Dudley White with National Geographic Society aid tried to record the heart of a free-swimming large gray whale.

EXTRACTS BY DAN BERNSTEIN © NATIONAL GEOGRAPHIC SOCIETY



Will the sea someday be farmed as efficiently as the land?

"This is doubtful," said Jan Hahn, editor of the institution's magazine, *Oceanus*, as he showed me through the labs, "although there is no question that we can increase the ocean harvest by more efficient methods."

Scientists Explore Sea Movements

How much long-lived radioactive waste could safely be dumped into deep parts of the oceans? Institution experts have been studying this problem for several years.

From deepest sea bottom to surface there is intercommunication of creatures and currents. One example is the nightly migration of fish and plankton from deep water upward



PHOTOGRAPH BY DEAN LINGER

Spinning a tale of sailing ships, Bertha Boyce of West Falmouth tells of 90 years ago when, as a five-year-old girl, she accompanied her captain-father to whaling waters halfway around the world. She holds a piece of old scrimshaw, an engraved whale's tooth.

—and if this plankton should ever become radioactive, it might poison the fish that eat it, and the fish might then poison man.

Work done at Woods Hole helps other scientists decide where to drill through the sea floor to reach earth's inner crust; this is the Mohole project so frequently in the news.*

Oceans Send Up Triggers for Rain

"What makes some clouds rain and others not?" ask Woods Hole scientists, as they look into the relationships between the oceans and the atmosphere.

They have found that breaking seas toss tiny droplets into the air. Minute specks of salt somehow rise into the clouds, where they become nuclei for drops of water that come back to earth as rain.

"This is only one of many important basic

*See "Scientists Drill at Sea to Pierce Earth's Crust," by Samuel W. Matthews, NATIONAL GEOGRAPHIC, November, 1961.

phenomena under study here," said Jan, "and since we keep on patiently inquiring, one day we may discover much that will be of enormous benefit to man."

The institution does considerable work for the Navy, some of it secret. It has furnished last-minute information on the meandering Gulf Stream for yachtsmen racing to Bermuda. Staff members help make oceanography fascinating to children on small-scale expeditions around the harbor (page 176).

Not long back the institution rediscovered the right whale in New England waters. Prime target of the old-time whale fishery, this beast had disappeared from the North Atlantic coast. Then, about six years ago, Woods Hole people spotted right whales playing in Vineyard Sound and Cape Cod Bay.

There is a Woods Hole scientist who keeps a tankful of scallops in his lab. I peered over into the tank, he tapped the glass sides, and the jet-propelled mollusks sprayed me as they took off in fright.

"What do you do with these impolite things?" I asked the scientist.

"Just sic 'em on visitors," he said.

Across the street from the institution, the Marine Biological Laboratory has been attracting scientists and advanced students in biology and medicine to its research facilities since 1888.

The laboratory came to Woods Hole because two Atlantic currents meet off Cape Cod, one the cold Labrador Current, the other the warm Gulf Stream. Thus this sea holds a greater variety of creatures than an ordinary sea, and creatures of the sea are vital re-

Heaping baskets of home-grown raspberries await the kettle at the Green Briar Jam Kitchen in East Sandwich. The Cape's mild climate, tempered by the Gulf Stream, produces abundant crops of blueberries, strawberries, cranberries, and beach plums.

Curving Cape Cod Canal links Buzzards Bay in foreground with distant Cape Cod Bay. Variations in tide times and levels between the bays cause a swift current to sluice back and forth in the eight-mile trough.

Humpbacked Bourne Bridge and the elevated railroad span serve as gateways to the Cape. *Bay State*, training ship of the Massachusetts Maritime Academy, moors beside the school's athletic field.







Warm, gentle waters at Craigville Beach lure holidayers on the Fourth of July. Shallows and surf to suit every swimmer's taste fringe the Cape's 300-mile shore.

Harmony and hot dogs. Students at Sandy Neck Beach relax from their summer jobs.

search material for investigators of the life sciences.

The nerve fibers of a squid, for example, are like those of a human, and the squid's nerve fibers are so large that they are fairly easy to study. Again, from experiments with sea urchin eggs might come aid toward the long-sought victory over human cancer; chemicals that inhibit the growth of sea urchin eggs might have use in the treatment of cancer, which is generally regarded as an uncontrolled multiplication of tissue cells.

The researchers at the lab come from a hundred institutions all over the world. For them the lab's collecting boats gather squids and sea urchins and the like, and upon special request, a young whale or a manta ray. It is not unusual to find several Nobel Prize winners in summer residence.

They work in freedom at the lab. Researchers mostly engage in basic research, meaning that a project need not have any specific application so long as it adds to the fund of human knowledge.

The third Woods Hole scientific establishment, a biological laboratory run by the United States Fish and Wildlife Service, applies its research to the improvement of the North Atlantic's commercial fisheries.



It studies the cod and haddock of Georges Bank and recommends regulations to preserve their numbers. It devises rafts for suspending oysters out of reach of bottom-dwelling enemies. It tags all sorts of food fishes to learn their travel habits.

To find out what fishes do when a trawler drags his net through them, Fish and Wildlife scientists lower a television camera into the depths. Cod and haddock, they can now report, generally must be overhauled from behind. Silver hake, on the other hand, dive headlong into the trap.

Obviously, this sort of thing helps a fisherman design a better net and tells him how fast to drag it through the sea.

The laboratory has a new aquarium, re-

placing one wrecked in a hurricane some years ago. Like its predecessor, this place is popular with tourists.

"It's a funny thing," said Herbert W. Graham, the lab director, "how few people, even New Englanders, have ever seen a live cod or redfish. They've seen sharks and porpoises and barracuda and other strange creatures in the big exhibition aquariums, but never the fish they eat each week."

On Cape Cod, You Never Look Back

Now the west wind blows more often. In fireplaces the green-tinged fires of driftwood crackle in the lengthening evenings. There are crickets in the house at Nauset for Pete to hunt. The golden days grow shorter.

KODACHROMES BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JEAN CORLEY © N.G.S.



"School!" groans Janice.

Before we start for Maryland, we make a little trip to West Falmouth to say goodbye to Bertha Boyce, who has seen 95 years of golden days and who has made more days golden for others than almost anyone I know (page 179).

Bertha's father was John C. Hamblin, a whaling captain. His wife went to sea with him. In 1871, when Bertha was about five years old, she went along too, out across the Atlantic Ocean, through the Mozambique Channel, deep into the Indian Ocean. She remembers some of the voyage.

"The strong things," she told me, "like the

terrifying shadows the men made on the sails when the try-pots were flaming on the decks at night, and the thumping of the dead whales against the *Islander's* hull when the wind was still.

"I remember, too, the wives of the sultan on Johanna Island. They had the reddest mouths I ever saw, and I've always wondered why that was. You travel a lot—maybe some day you can find out and quieten a body's curiosity."

Well, I found out, and I have told Bertha. Six months later, you see, I was in Dar es Salaam on the east coast of Africa, and I met a man who had just come in from Anjouan,

Summer homes of the Kennedy family stand near the beach at Hyannis Port. The house of President John F. Kennedy (1) adjoins a property (2) belonging to his brother Robert. Tennis court and romping children mark the seaside estate (3) of the President's parents, Mr. and Mrs. Joseph P. Kennedy. Brother Edward vacations a mile away on a causeway-connected island. Grover Cleveland, another Chief Executive and part-time Cape Codder, owned Gray Gables, now an inn, near Bourne.





Victory smiles proclaim a new President as the Kennedys and their relatives by marriage gather at Hyannis Port, November 9, 1960, to share a family triumph. From left (standing): Mrs. Robert F. Kennedy, Stephen E. Smith and his wife Jean, the President, Robert F. Kennedy, Mrs. Peter Lawford, R. Sargent Shriver, Mrs. Edward Kennedy, and Peter Lawford. Seated: Mrs. Sargent Shriver, Mr. and Mrs. Joseph P. Kennedy, Mrs. John F. Kennedy, and Edward Kennedy.

RODCHROME BY HERR CONNER (BELOW) AND EXTRACTS BY JACQUES LERE © N.Y.S.





which is the right name for the place the Yankee whalers called Johanna. I asked why the women of Anjouan had such red mouths.

"They chew betel nut," he said.

Bertha "swallowed the anchor," as she put it, and married a landsman and stayed quietly on the Cape. She lives alone now in her rambling old frame house under big, friendly trees. In the parlor's cool corners, in glass-doored cabinets of another era, rest her treasures from far places.

Fragile flowers of feathers speak of women's patient hands, women of the Cape Verde Islands, where Yankee whalers, outward bound, called for crews. There is marvelous scrimshaw—her mother's sewing box of rosewood and ivory, a beautiful swift for the winding of yarn, jaggings wheels for crimping pies—made by the whalers during long passages down the hurrying trade winds.

Bertha had a bad spell in a hospital bed last winter, but when spring rolled around, she told the doctors she was going home to take care of her house—and she did.

The children of West Falmouth come to hear Bertha's stories of distant oceans and to eat the cookies she makes by the dozens. Watching them through the parlor window, playing on the lawn, I spoke to her of nostalgia and the golden days of childhood.

"Pshaw," she said, "you don't live on Cape Cod, so you're getting old the wrong way. Life is so good here you never look astern, you're that busy waiting for tomorrow." THE END

Skilled hand at the helm: Skipper John F. Kennedy tends the tiller as his 25-foot knockabout *Victoria* cleaves the chop off Hyannis Port. The President's wife Jacqueline, his brother Edward, and assorted small fry make up the crew. The Wianno Senior class boat, designed by the century-old Crosby firm of Osterville, meets special sailing conditions of Nantucket Sound.

First Family frolics on the Kennedy beach at Hyannis Port. The President swings Caroline aloft as Mrs. Kennedy basks in the sun.



MARK DYER

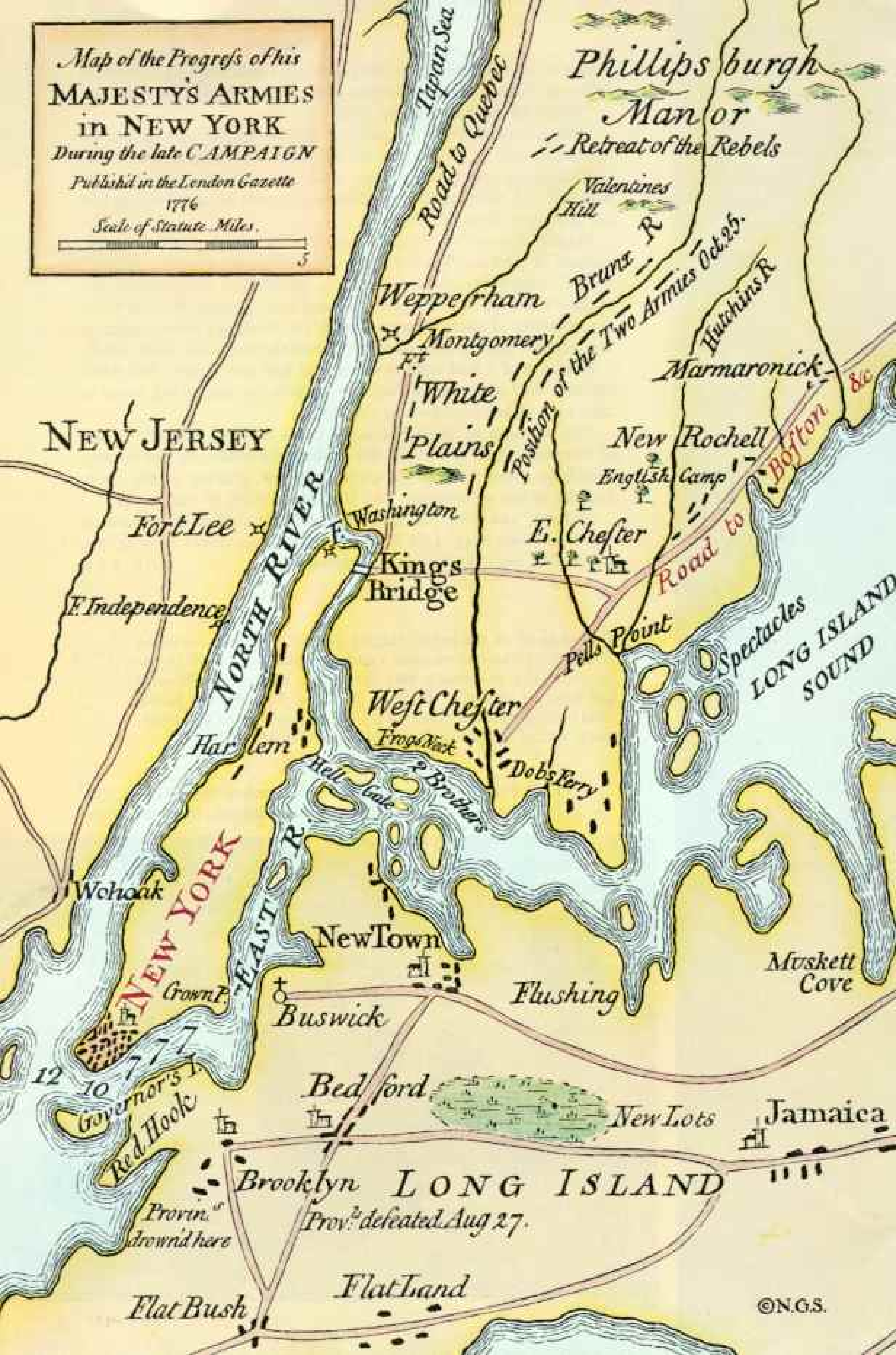
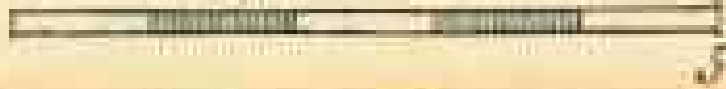
Map of the Progress of his
MAJESTY'S ARMIES
in **NEW YORK**

During the late **CAMPAIGN**

Published in the London Gazette

1776

Scale of Statute Miles.



Phillips burgh
Manor

Retreat of the Rebels

Valentines Hill

Brunce R

Hutchins R

Weppestrham

Montgomery

White Plains

Position of the Two Armies Oct. 25.

Marmaronick

New Rochell

English Camp

E. Chester

Road to

LONG ISLAND SOUND

NEW JERSEY

Fort Lee

E. Independence

Washington

Kings Bridge

Pelle Point

West Chester

Frog Neck

Dobs Ferry

Harlem

Hell Gate

Brothers

Wchoak

NEW YORK

EAST R.

New Town

Flushing

Muskett Cove

Buswick

Bedford

New Lots

Jamaica

Brooklyn LONG ISLAND

Provin. drowid here

Prov. defeated Aug 27.

Flatland

Flat Bush

The Old Boston Post Roads

By DONALD BARR CHIDSEY

IN JANUARY, 1673, Francis Lovelace, Governor of New York, dispatched the first postrider to Boston. There should be a statue of this horseman, but we do not know what he looked like. We don't even know his name.

He rode by an inland route, from New Haven north to the Connecticut River settlements, thence east to Boston. He must have had a rough time, for inns were few and far between, there were icy streams to cross, and snowy forests through which, ax in hand, he literally had to blaze a trail in order to find his way back. But he got there. It took him two weeks.

He was the first overland postman in the American Colonies, and he established the first post road.

In those earliest days the Colonies had little urge or need to speak to one another. They were islands on the edge of an ocean of wilderness. They faced the sea, hugged it rather, for it was their natural means of communication, the land being little more than trees, rocks, and Indians.

If it seems astonishing that two big cities like Boston and New York should have no direct communication, consider that Boston numbered fewer than 4,000 souls, and New York, which until 1664 had been the Dutch settlement of Nieuw Amsterdam, had only some 300 houses. To Bostonians, London was as near as Philadelphia, the West Indies not much farther than Virginia. What mail passed between them went by ship, most of it by way of London.

The Crown encouraged this, to be sure. British colonial policy dictated that the American plantations be kept dependent upon the mother country. If ever they fell to talking to one another, these colonists, they might learn one another's problems, might even build up a trade; and that would be bad for business in London.

Laws or no laws, it was inevitable that the Colonies should get together. And in 1672 England was fighting the Dutch again; it was well that the colonists should enter into correspondence with one another.

Governor Lovelace himself went to Hartford to confer with Governor John Winthrop



"STAGE-COACH AND TAVERN DAYS"

Hear ye! Newspaper ad of 1799 informs a postrider's "Publick" of a route change.

Capture of New York City by British troops ushered in the darkest days of the Revolution. This map defined the battle lines of October 25, 1776. The Post Road to Boston began at lower Manhattan and ran up the island to Kings Bridge. National Geographic artists added color to the original map, which was published in London.

of Connecticut. While he was there, a Dutch fleet sailed through The Narrows, and New York became Nieuw Amsterdam again. Lovelace returned to England, and the Boston Post Road lost its first friend.

THERE WAS NOT just one Boston Post Road; there were three of them, and branches of those, all existing at the same time. They followed separate and sometimes roundabout routes. The object was not to speed from New York to Boston, but to pick up and drop off mail at towns along the way.

Compare the historical map on pages 192-3 with the modern Atlas Map issued separately with this month's NATIONAL GEOGRAPHIC; you can see where the first Post Roads ran, and where equivalent roads run today. The northernmost or upper Post Road went by way of Springfield and Worcester, Massachusetts. The middle Post Road slanted across northeastern Connecticut from Hartford straight to Boston. The Shore Path, or lower Post Road, followed the coast to Rhode Island, thence to Boston.

They are all still there. They are not always easy to find.

"Let no pseudo-purist tell me just where the Boston Post Road made its way," warns Stewart Holbrook in his new book on this subject.* "Far too much has happened to towns and roads since 1700."

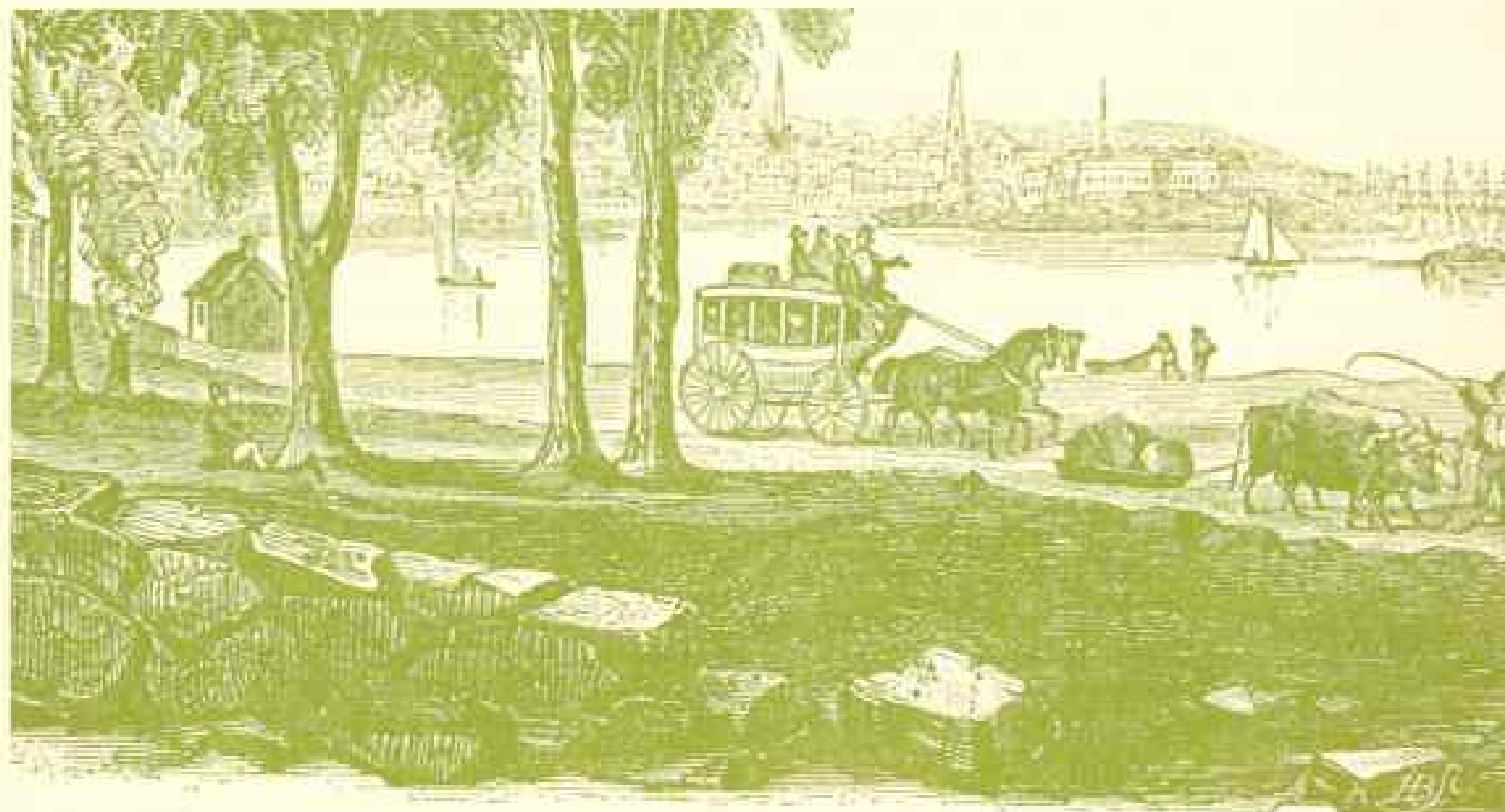
But the search is worth it. Get off that superhighway long enough to look around, as I did, and you will be amazed to learn how much of the old New England charm remains. Sooner or later, you'll come to Old Lyme, Connecticut.

Not long ago I stood in admiration of an elm in The Street of Old Lyme. The Street—it is never known, locally, as anything else—used to be part of the lower Boston Post Road when the Saybrook-Lyme ferry operated across the Connecticut River; but when a bridge was built upstream from the ferry, the Post Road swerved to meet this, leaving The Street to its arching trees, its trim white houses, and its memories.

"Handsome thing, isn't it?"

* *The Old Post Road*, McGraw-Hill Book Company, Inc., New York, 1962.

The Author: Donald Barr Chidsey writes of the Nation's early years as if he had lived them. In the National Geographic Society's new book, *America's Historylands—Landmarks of Liberty*, Mr. Chidsey describes the beginnings of the American Revolution. He has written many books of fiction, biography, and history, most recently *Victory at Yorktown*, *The Battle of New Orleans*, and a novel, *The Wickedest Pilgrim*. At 60 he lives near Old Lyme, Connecticut, not far from the lower Post Road.



This was a Mr. Griswold, a grim old gentleman, nasal, acerb. His friendliness jolted me. There had been Griswolds in these parts for three centuries, but I had moved in only about sixteen years before, so that I might well be thought a Johnny-come-lately. But apparently not.

"It is," I replied. "One of my favorite trees."

Immediately around us lay the silence of an old New England town. The new Connecticut Turnpike crossed above The Street several hundred yards to our left, but the whine of its traffic was faint. Any one of those motorists, had he but turned his head, might have seen the steeple of the First Congregational Church of Old Lyme, surely one of the loveliest buildings in the land (page 211). But you don't turn your head when you are driving on the Connecticut Turnpike. You don't dare.

"Just think," pursued Mr. Griswold, "Bissel himself must have ridden right under this tree, nearly two hundred years ago."

That Mr. Griswold had burst into history was not startling, for to men like him—and there are thousands left, tucked away in unlikely corners of the countryside—the past is at least as alive as the present. But the name was strange to me.

"Bissel?"

"Haven't you heard of Israel Bissel?"

"I'm afraid not."

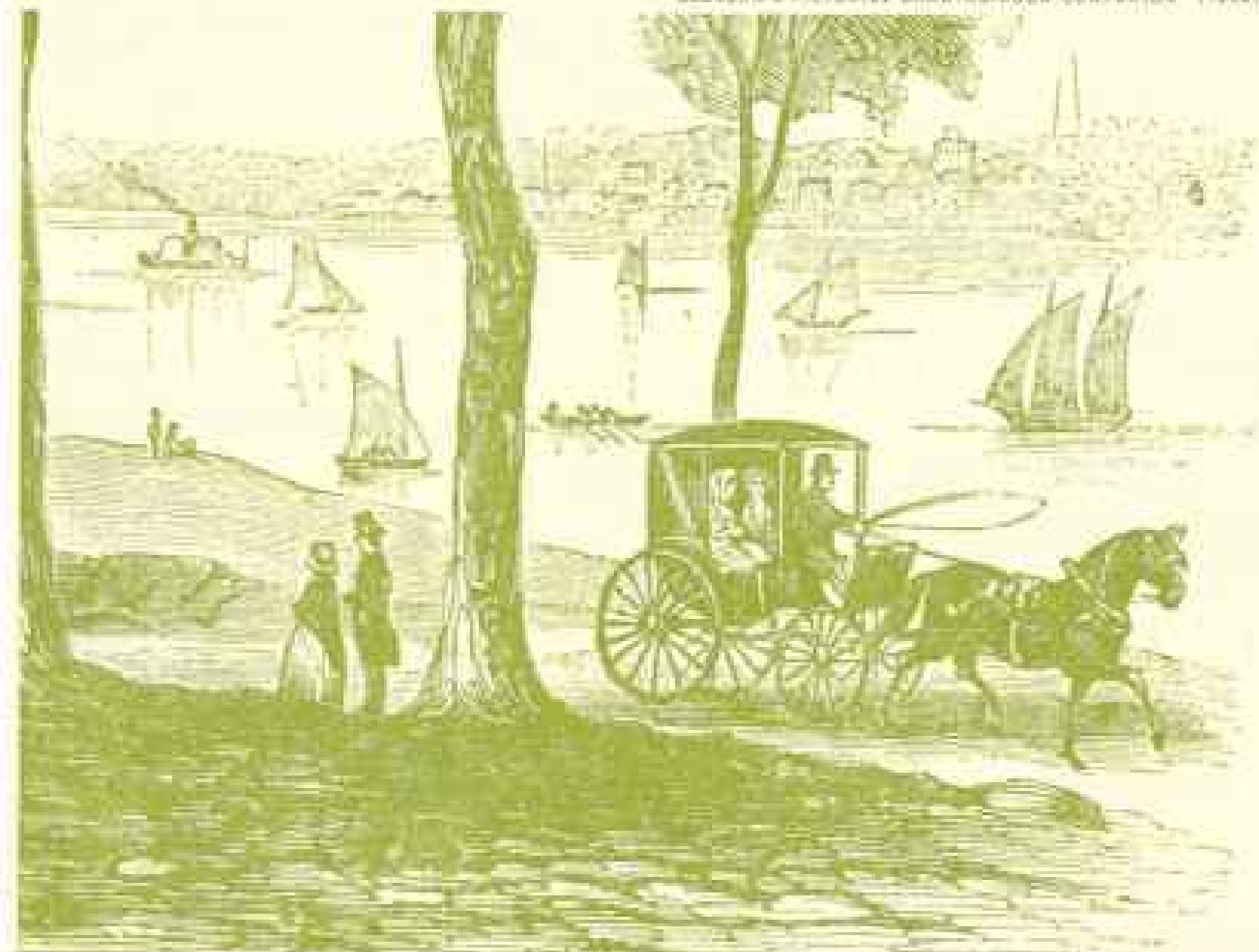
So he told me.

ON THE MORNING when minutemen at Concord fired the shot heard round the world, one Col. Joseph Palmer of Braintree, on his way to the scene of hostilities, hailed a courier and scribbled this message from Watertown, Massachusetts:

Wednesday Morn^e near 10 of the Clock

To all friends of American Liberty, be it known that this Morning before break of day a Brigade consisting of about 1000, or 1200 Men . . . found a Company of our Colony Militia in arms . . . and killed 6 Men and wounded 4 Others. . . . The bearer Israil Bissel is charged to alarm the Country . . . and all persons are desired to furnish him with fresh Horses, as they may be needed. . . .

"ELLESMERE'S PICTORIAL DRAWING-ROOM COMPANION" (1834)



Spanking carriages, promenaders, and a yoke of plodding oxen share the shore road beside the Thames River below New London, Connecticut. Steamboat and sailing craft ply the estuary on a summer's day. Today nuclear-powered submarines put to sea from Groton at far right (page 219).

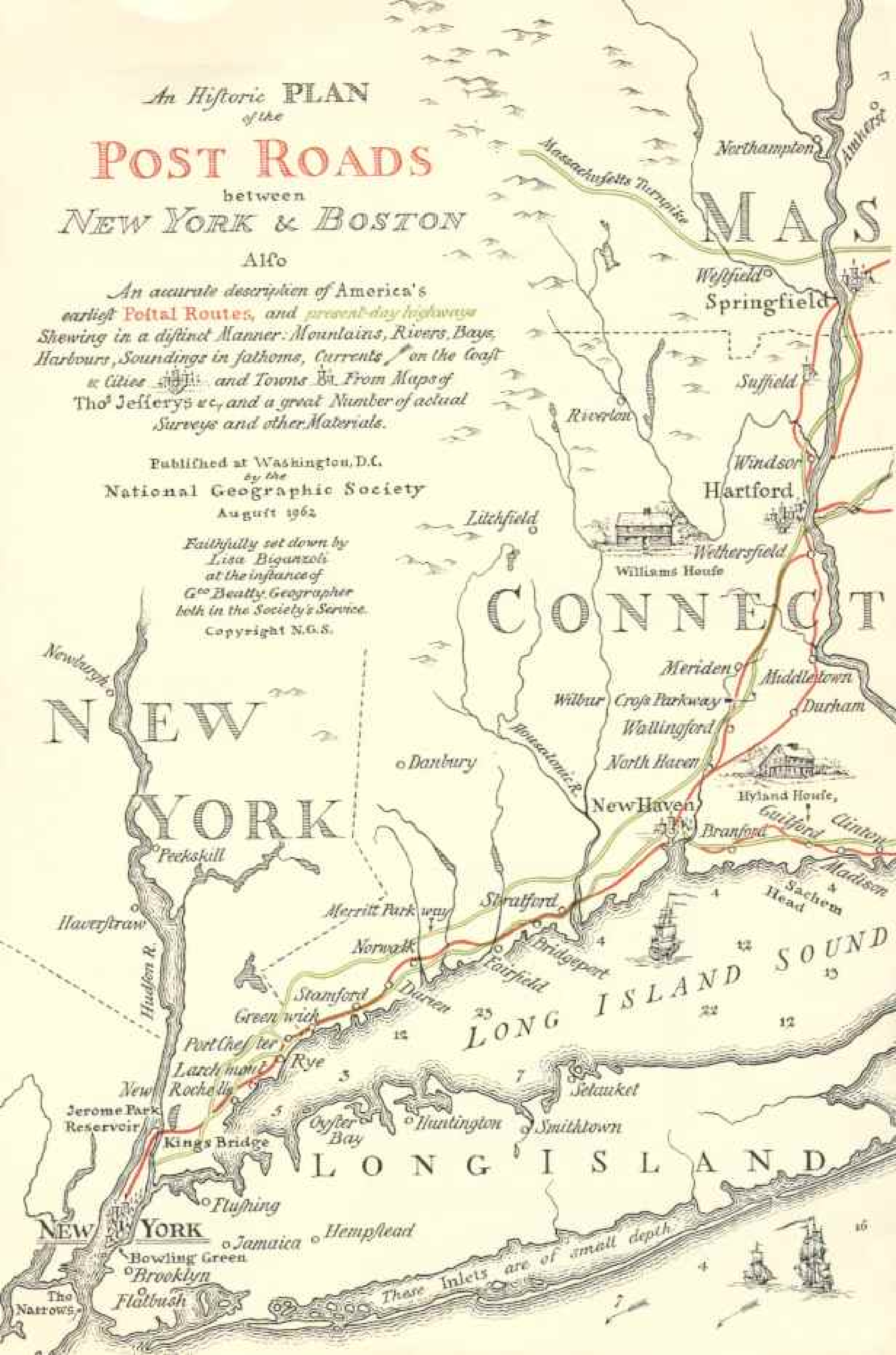
New London has had a stormy past: Traitor Benedict Arnold burned the port town in 1781, and British ships blockaded it for 21 months in the War of 1812.

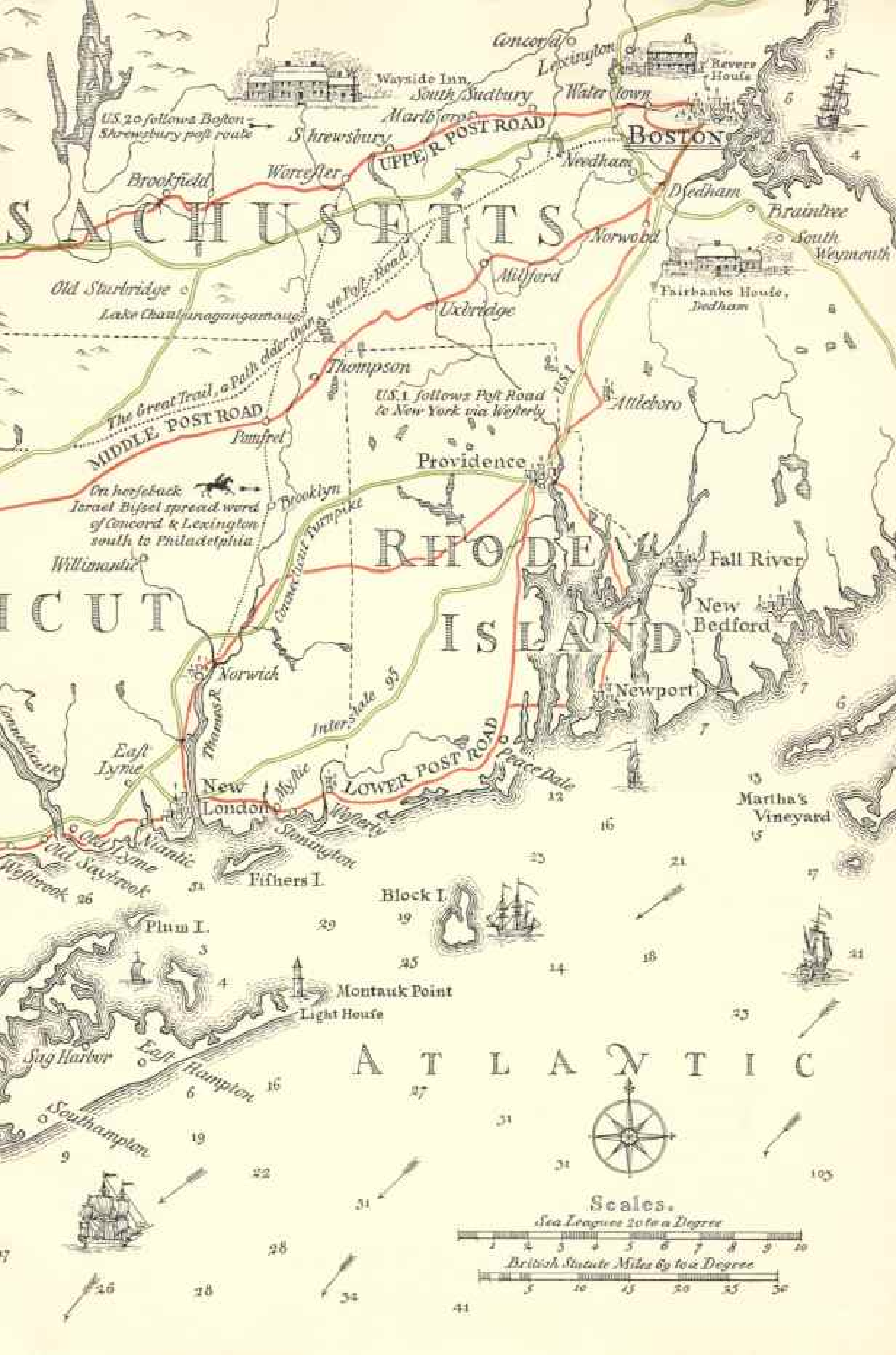
An Historic PLAN
of the
POST ROADS
between
NEW YORK & BOSTON

Also
*An accurate description of America's
earliest Postal Routes, and present-day highways
Showing in a distinct Manner: Mountains, Rivers, Bays,
Harbours, Soundings in fathoms, Currents, on the Coast
& Cities and Towns. From Maps of
The^s Jefferys &c, and a great Number of actual
Surveys and other Materials.*

Published at Washington, D.C.
by the
National Geographic Society
August 1962

*Faithfully set down by
Lisa Biganzoli
at the instance of
G^o Beatty, Geographer
both in the Society's Service.
Copyright N.G.S.*





U.S. 20 follows Boston - Shrewsbury post route

Wayside Inn, South Sudbury

BOSTON

MASSACHUSETTS

The Great Trail, a Path older than the Post Road

MIDDLE POST ROAD

U.S. 1 follows Post Road to New York via Westerly

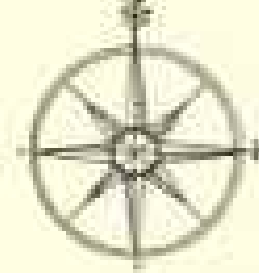
RHODE ISLAND

CONNECTICUT

On horseback Israel Bissel spread word of Concord & Lexington south to Philadelphia

LOWER POST ROAD

ATLANTIC



Scales.

Sea Leagues 20 to a Degree



British Statute Miles 69 to a Degree



The colonists were edgy, and there had been false alarms. But this was *war!* "I have spoken with Several who have seen the dead and wounded," Palmer added. Bissel rode from Watertown to Worcester in something like two hours (the distance is 36 miles by the upper Post Road, as I clocked it the other day). Tradition has it that his horse collapsed before the meetinghouse there. Anyway, he did not start from Worcester until early next morning, striking south toward New London. He crossed the middle road at Pomfret.

At Brooklyn, Connecticut, he notified Col. Israel ("Old Put") Putnam, who, as a mural in the State Capitol at Hartford attests, left his plow in the middle of a furrow, alarmed the local militia, and started for Cambridge.

Bissel reached New London by seven o'clock that night, and slept a few hours. At one the next morning he was in Lyme, at four o'clock in Saybrook, at seven in Killingworth (now Clinton), at ten in Guilford, and by noon he had reached Branford.

"We know this from the endorsements on his message," Mr. Griswold explained.

Bissel reached New Haven after dark, and slept a little. Sunday morning, April 23, he was in New York, where his news brought wild excitement. Early on the morning of the 24th he rode on—New Brunswick, Princeton, Trenton, Philadelphia. He had made the whole trip in five days and a few hours.



GEORGE W. HOWARD

Ornate stone by the U. S. Arsenal at Springfield, Massachusetts, was erected by a blizzard-blinded traveler in gratitude for having found the Post Road again.

YEARS AGO, so a story goes, a New York board was about to pass sentence of death on one of the few remaining portions of the road in that city, near today's Jerome Park Reservoir. A prominent citizen, William Ogden Giles, pleading for its life, tried a bluff.

"Gentlemen, you may destroy many historic landmarks in this city, and nothing will be said; but if you destroy this one, this ancient, historic road, be sure that the public shall hear of it; and though that public may stand for many things, it will *not* stand for the abolition of the road made famous by the ride of Paul Revere!"

It worked. What politician would buck Henry Wadsworth Longfellow? If this was the first time they had heard that Paul Revere made his ride somewhere up near Jerome Park, why, they didn't have time to check, and they could not take a chance. The section of the road remained.

In fact, Revere *had* ridden the Boston Post Road, and more than once. The most notable time was just after the Boston Tea Party of December 16, 1773. Revere, carrying letters to the Sons of Liberty, made it to Philadelphia and back, some 700 miles, in 11 days, an average of more than 60 miles a day. This was much better time than the first postrider had made—but that had been a hundred years before.

THE YEAR AFTER they recalled Governor Lovelace, back in 1673, the town at the mouth of the Hudson became once again what it has remained ever since—New York.

In a few months' time, however, an Indian war broke out, King Philip's War in New England. For a year and a half it was not safe to ride alone in that part of the world.

After that the postal service was resumed, but only in a spasmodic, half-hearted fashion. Then, in 1691, William and Mary of England granted one Thomas Neale a patent, or monopoly, to run the postal service in the American Colonies.

Neale never came to America, but he did appoint as his deputy an astute and energetic Scot, Andrew Hamilton, of New Jersey. Even Hamilton could not make the patent pay, but he did restore the Boston-New York postriders on a regular schedule.

They were stout fellows, those early riders, tough, adaptable, imaginative, expected to do much more than just carry the mail. They must learn the best inns and stables and taverns, the best fords and ferries, and all other pertinent information for travelers; and this they must report to the postmasters at each end, keeping them up to date.

Travelers themselves, and especially women, frequently rode in the company of a postrider, who might scaldingly refer to them as his harem. One such lady was Madam Sarah Kemble Knight, a Boston widow near 40 in age, who in 1704 traveled the lower Post Road to New York and back in winter. Her diary remains one of the earliest accounts of that route.

She writes of having "riss" at three or four in the morning, trying to keep up with a succession of postriders, fording a river "so very firce a hors could sometimes hardly stem it," braving stretches "Incumbered wth Rocks and mountainos passages, wth were very disagreeable to my tired carcass."

Having ferried over one river by canoe, she noted: "The Cannoo was very small and shallow, so that when we were in she seem'd redy to take in water, which greatly terrified mee, and caused me to be very circumspect, sitting with my hands fast on each side, my eyes stedy, not daring so much as to lodg my tongue a hair's breadth more on one side of my mouth than t'other, nor so much as think on Lott's wife, for a wry thought would have oversett our wherey."

With stopovers in New Haven and New York, it took Madam Knight five months to get back to Boston.

Though they were forbidden to, the postriders carried many private messages and commissions. Previously, when a man wished to communicate with somebody out in the country or in another town, he hired his own messenger, who more often than not might be an Indian; but the postriders in time took over this business.

If he could read, the postrider amused himself by going over the contents of his saddlebags, for sealing wax was not always used, and there were no envelopes then.

The postriders were not fast. There is a record of one who contracted to deliver a yoke of oxen to a farm some twenty

Fighting in a ditch, landowner and public official entertain a mob during Shays' Rebellion, which rocked Massachusetts in 1786. Angered by high taxes and low prices, insurgent farmers broke up court sessions and attacked the Springfield arsenal. Daniel Shays, a Revolutionary War captain, led the short-lived uprising.

DISTRICT OF COLUMBIA PUBLIC LIBRARY



miles on. Another habitually knitted as he rode, explaining that it gave him something to do. Here was no Pony Express.

IN 1737 BENJAMIN FRANKLIN became postmaster of Philadelphia. He liked the work so well that in 1751 he sought the deputy postmaster-generalship for America. Two years later he was appointed, jointly with William Hunter of Virginia.

That very year Franklin had spent ten weeks visiting the post offices of New England. Local tradition has it that when he took the tour, Franklin fastened to the wheel of his chaise an odometer (a device for measuring distance by the turns of a wheel) of his own invention, and every mile he would stop and place a milestone.

There are scores of these markers, long since dubbed Franklinstones, scattered along the Post Roads. Each community is proud of its own, often believing it unique.

There is such a stone in Old Lyme, at the foot of Johnny-cake Hill. It is a simple slab, half sunk in the earth, bearing the legend: "NL XIV M"—New London 14 miles (page 226). One day while I was contemplating this stone, a woman stopped her car, unslung a camera, and snapped a series of pictures of it.

"You know what that is?" she asked. "A Franklinstone!"

"Oh?" I nodded.

"Ben Franklin put it there himself, with his own hands."

Now while I conceive it the historian's duty to make the truth available to his public, I do not take it that he is obliged to cram it down the public's throat. So I simply replied, "He did?"

"He did," she said, climbed into her car, and drove away.

Now, Ben Franklin scattering granite road markers all across New England makes a pretty picture. But he was 47 at the time and already overweight. Carrying heavy milestones with him in his chaise, or even in a following wagon, would have been extremely cumbersome. It is not likely, under the circumstances, that Franklin himself stopped to plant many milestones.



SILVER PICTURES

Pillion rider gave a horse a double burden—a familiar sight on the early Post Roads.

THREE SEPARATE ROADS today lead past the Wayside Inn near South Sudbury, Massachusetts. It might be well to contemplate these.

One, unpaved, scarcely more than a path, skirts the very doorstep (page 226). A second, a few yards off, is macadamized, though narrow and with a high crown, a distinctly old-fashioned highway.

"Is that the old Boston Post Road?" I asked a workman outside.

"No, *that's* the old Post Road," he replied, pointing to the path. "When the state widened it and paved it, they moved it a little farther away, but when Henry Ford bought this place in 1923, he thought the road was still too close; so he built another over there, a couple of hundred yards away, and he sold it to the state for one dollar. That's the Post Road now—U. S. 20."

He pointed to a four-laner, along which an unceasing flow of cars and trucks whirred—a sound, however, muted here at the threshold of the inn.

The Wayside Inn is not the oldest hostelry in continuous operation in this country, as some enthusiasts have claimed for it. But beyond doubt it was very old when, on a bitterly cold night in late December, 1955, it burned to a shell. Luckily, some of its furniture was saved from the fire; the building itself was meticulously and intelligently rebuilt, so that today it can scarcely be told from the earlier structure.

Heavy wagons like the famed Conestoga of Pennsylvania carried freight on the early roads. Their descendants, the prairie schooners, rumbled westward in the next hundred years as pioneers pushed back the frontier.



Like most of the Post Road inns, the Wayside was not built as such. About 1700 it was a simple two-story, two-room house. The Howe family obtained a license to operate it as an "ordinary," or tavern, in 1716. Adding to it from time to time, the same family ran it for more than 150 years. It was named the Red Horse, though locally it was referred to as Howe's.

One guest was a poet named Longfellow, a professor from Harvard University in Cambridge. That was in the 1850's. When in later years he came to write about it, Longfellow, for private reasons of his own, called it the Wayside Inn.

It is an inn again today, a working hostelry, as well as a museum. Its ten rentable rooms are furnished with antiques—and with air conditioning.

"We keep up not just the building itself," innkeeper Francis J. Koppeis told me. "There's the grist mill out there, the chapel, the old coach house, and all the rest. We're surrounded by lovely rolling countryside, and lots of folks just like to go walking. Others make it their headquarters when they want to do some sightseeing."

He had a point. Old Sturbridge Village, a sort of New England Williamsburg, lies not far to the west by way of the modern Massachusetts Turnpike (page 224). Concord and the breathtaking green at Lexington are scarcely out of sight to the northeast.

BUT LET US go back to those three thoroughfares that pass before the Wayside. Let's stand in the front doorway and regard them.

The farthest need not detain us. It is too familiar. Such highways are needed in this automobile age, but only an engineer could think of them as things of beauty, and we are interested here in the past.

These nearer ones, these earlier Post Roads, the narrow humped one, the dirt path—what kind of traffic did they bear?

Farmers, to be sure, used the Post Roads for short distances, but most of the travelers must have been merchants or peddlers. As the indenture system died, there would have been many artisans—"mechanics," they were called then—who in their new-found freedom sought a change of scene. Except in wartime, there would have been no soldiers. Wealthy townsmen in their glittering turnouts would seldom get so far from the city. There were no priests or nuns or mendicant friars, only an occasional clergyman; yet neither were there many beggars, vagrants, highwaymen, tramps, for the country was busy and idleness was unthinkable.

The earliest whites would be on foot, though not in the style of their predecessors, a march that even now we call Indian file.

Later, horsemen predominated, though there would be a few ox carts, and now and then a pair might be seen riding-and-tying.

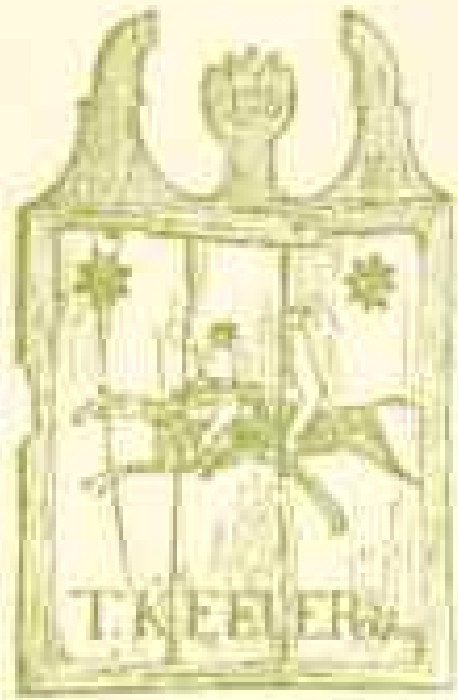
To ride-and-tie was advisable when two men had but one horse. Ridden double, the mount soon would tire. Instead, one man rode an agreed-upon distance, say three miles, while the other walked. The rider dismounted, hobbled or tethered the horse, and then either walked on ahead or lay down for a rest. When his partner came up to the horse,

he mounted and rode ahead the prescribed distance. They could keep this up all day, each, including the horse, getting some rest.

Thus, even the earliest Post Roads had hitchhikers.

AFTER THE REVOLUTION, the young Federal Government began to give mail contracts to coach lines. Once again the nature of the traffic before the Wayside Inn changed, for the stagecoach era had begun.

They were called stagecoaches—stage wagons, the earliest ones—because they advanced by stages, covering a set number of miles a day, regardless of weather. The first ones were springless. They could take nine passengers in addition to the driver, who was always called captain, and who was frequently drunk. Though there were leather side curtains, there was no back or side door, so that to get to your seat you had to climb over the driver's. The seats themselves were mere planks without back rests. There was no space for baggage, which had to be stowed somehow between the feet. And of course at steep hills the passengers were expected to get out and walk, while at mudholes they might be called upon to push. The earliest of these wagons were sometimes called "flying machines."



Standing on this doorstep, we would have seen many other conveyances come down the Post Road in the early 19th century. There was the

chaise, or "one-hoss shay," light and fast; the chair (pronounced "cheer"), padded and personal; the pleasure wagon, which could hardly have given much pleasure, having at best only crude springs; the phaeton, a fast four-wheeler, very sporty; the landau, a coach with an openable top somewhat like the top of a modern convertible; the whiskey, a very light two-wheeler; and others.

However, I doubt that many of these were seen on the open roads, except fairly close to some large town. The open country called for something much more rugged, such as the oxcart, the heavy farm wagon, or possibly an occasional Conestoga wagon.

The Conestoga, heavy, slow, and exceedingly strong, drawn by four or six horses, could carry as much as five tons of freight; but it carried *only* freight, never passengers. It

first was made in the Conestoga Valley of Lancaster County, Pennsylvania, the valley in turn being named for the Conestoga Indians. In a later, lighter, less boatlike form, this wagon came to be known as the prairie schooner, and as such was associated with the opening of the West; but at one time it was much more common in the East.

New coaches began to take on odd shapes. One resembled a huge pumpkin, and there was a fashionable line of egg-shaped coaches. These were more elegant than useful. The Concord soon put them all in the shade.

Like the clipper ship, the Concord, even while doomed, attained an early perfection.



"STAGE-COACH AND TAVERN DAYS" (UPPER) AND FOOD AND RESTORATION

Huddling around a fire, travelers relax in a tavern's assembly room. Most Post Road hostelries resembled English inns. Carved, painted signboards hung outside.

It was often imitated, but it could hardly be improved. For its purpose, it was the ultimate in horse-drawn vehicles.

It was built in Concord, New Hampshire—hence the name—by the firm that became the world-famed Abbot-Downing & Co. Not all stagecoaches came from there, but Concord did remain for many years the leading stagecoach-building city of the United States. In a museum there you can see a real Concord coach.

But there is no need to go that far. Just turn on your television set.

For the Concord was *the* stagecoach. It was the Wells-Fargo coach, the Deadwood coach of Buffalo Bill's Wild West, the coach from which steps that pulchritudinous schoolmarm from the East to the flabbergastment of gawping cowpokes.

Though the railroad soon came along in the East, the Concord coach lasted a long while. There are men alive today who can remember riding in a Concord. And even the coming of the steam engine did not remove its familiar shape from the countryside, since the original trains were simply made up of stagecoaches set on rails. Large numbers of Concord, in addition, were used to carry passengers on feeder lines or to and from the stations.

The driver of the Concord still was called captain, but he was not as likely to be drunk. It was a position of dignity. He would sound his horn when the coach approached a tavern or town, and the blast would set the whole place astir.

OF ALL THE STAGECOACH captain-drivers to come down the Post Roads, the one most readily remembered is Levi Pease. One day I went to see his grave, by the upper road in Shrewsbury, Massachusetts.

"Yes, I can show you where it is," said Ernest Tosi, town clerk of Shrewsbury. "Not many folks go there any more."

We crossed the town green and climbed the slope to the First Congregational Church, went around it and into the public burial ground behind.

"Here we are." Mr. Tosi pushed back a thick hemlock, revealing a simple uncut stone bearing a bronze plaque:

1739 - 1814
CAPT. LEVI PEASE
1775 SOLDIER - GOVERNMENT FORAGER - DISPATCH BEARER
1783 ORGANIZER AND PROPRIETOR OF FIRST STAGE COACH
LINES IN THE UNITED STATES
1786 FIRST CONTRACTOR FOR CARRYING U. S. MAIL
SHREWSBURY HISTORICAL SOCIETY 1900

There was the "Capt.," not a military rank but the customary, honored title of the coach driver. For Levi Pease did the driving himself, at first. His was not, in fact, the first stage line in this country, for there were several before the Revolution; but he became known as Father of New England Stagecoaching.

Pease had been a blacksmith and a postrider. After the Revolution, he started a wagon service between Boston and Hartford. He and his partner, Reuben Sykes, had a hard time at first, but soon were successful and much imitated. They extended their line to New York, after winning the first stagecoach mail contract; shortly they were sending their coaches along all three of the Post Road routes.

Pease took care of the Boston end of the business. Each weekday before dawn, Pease coaches rumbled away from the Boston Inn opposite the Common, where St. Paul's Church stands now on Tremont Street. Those headed west to Worcester and Springfield would reach Shrewsbury by noon. There they paused at Farrar's Tavern, a handsome, square, two-story building at the edge of town.

This was a famous place on the upper Post Road, and it was a favorite of Pease him-

self. A gregarious man, fond of company and a good time, he bought Farrar's when he got too old for the work in Boston, and there he lived as a boniface and noted citizen of Shrewsbury until his death.

Farrar's Tavern, Pease's Tavern, still stands, though the stables and other outbuildings have long since been torn down. It is a private home, and no longer even on the Post Road, which years ago was straightened at this point. The date 1751 is cut into the lintel over the front door, but there is no plaque or sign.

Just up the road you pass the trim gray-and-white home of Maj. Gen. Artemas Ward, who commanded the Massachusetts Militia in the siege of Boston. Harvard University maintains the Ward House as a public museum (page 227). Across the Post Road is a well-weathered stone on which, though faint, may still be read: Boston 35, Springfield 65.

Does Pease, in his grave, hear the rumble of coach wheels still passing? The town clerk, Mr. Tosi, does, though they turn out to be trucks.

Mr. Tosi is a man torn between loyalties. He likes the fact that Shrewsbury, a suburb of Worcester, has more than doubled in its population in two decades. But he deplores the noise and bustle, together with the fading of old families and old buildings. Only recently, indeed, one of the finest structures on any of the Post Roads, a tavern where the Shrewsbury Militia met before marching toward Boston, was torn down—to make room for a supermarket.



"OLD POST MARK"
AND SCOTT STAMP &
COOK COMPANY



Hand stamp issued by postmaster in 1845 (left) and home-made postmark preceded adoption of national stamps and a modern system of cancellation.

He was deferred to, his advice sought. Town meetings sometimes were held in the tavern, and even court. Business deals were made there, and more often than not it was the post office as well. It was also, of course, the town's social center, the scene of dances and banquets. More, it was the town's contact point with the outside world. It represented romance and news.

"So you come from New England," a friend once said to me. "That's the place where George Washington slept in every house he could find, isn't it? I can't understand how he ever won that war, he slept so much."

This jocularly has been labored nigh to death. The fact is, Washington for many years kept a careful and conscientious diary. When, as President, he paid New England a prolonged state visit, he jotted down the names of innkeepers and taverns he visited. Moreover, he took it to be his duty on this trip to stop at public hostels rather than dine or spend the night in private homes. That would smack of kingship, and a President ought to pay his own way.

In New England, then, the sign "George Washington Slept Here" is often no publicity stunt at all but the simple recorded truth.

He did not stop at Howe's Red Horse Inn in South Sudbury, unless perhaps just for a drink or a bite, though he must have passed the place on his way to take command of the Continental Army before Boston, for we know that he took the upper Post Road. He did, however, stop at the widow Haviland's in Rye, New York. "A very neat and decent Inn," he adjudged it in his journal.

Haviland's, too, is still there, a handsome white building spang on the Post Road in Rye. It is called the Square House, and it serves today as the city hall. Trim, prim, unpretentious, yet distinguished in a quiet way, it catches the eye there at the corner

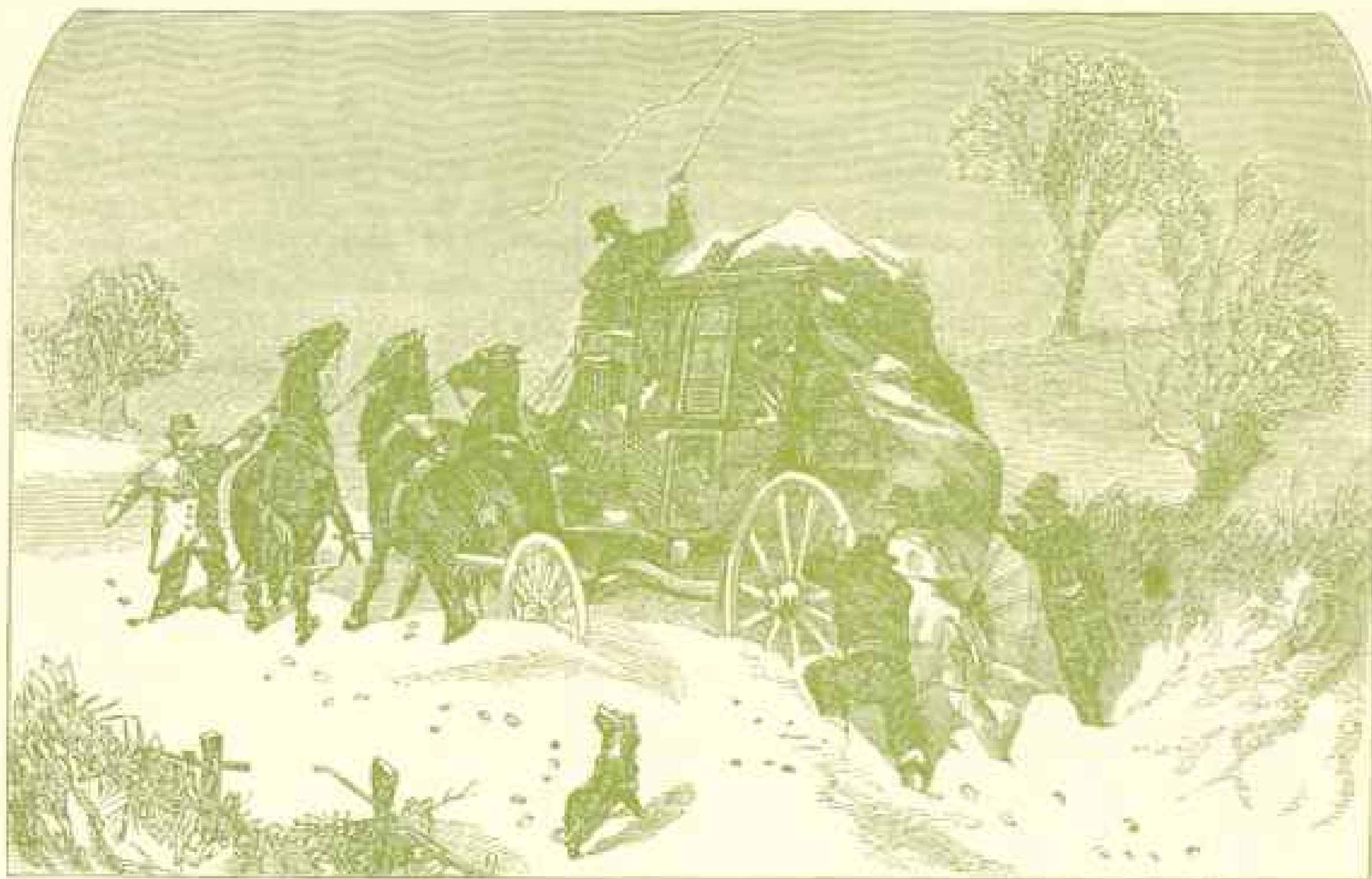
"THERE IS A TAVERN in the town,
And there my true love sits him down..."

In stagecoach days the tavern, it could be said, *was* the town. Its door was the municipal bulletin board. The host almost invariably was prominent in local politics.

of Purchase Street (page 210). Many a passer-by turns back for a better look, and not infrequently he comes inside.

"We're not a museum, but we might as well be," R. Fred Talento, the city clerk, told me. "We have no plush-covered ropes and no glass display cases, and we don't charge an admission fee, but you'd be surprised how many people drop in. Sometimes a whole school class will pay us a visit, with their teacher, but ones like that always give us advance notice. The casual ones just want to browse around, and somebody who isn't too busy always shows them the place. They get a big kick out of it—especially the old fireplaces and the original wooden beams.

"Those looked as if they had been chipped out with tomahawks," Mr. Talento said.



Drifting snow stalls a coach, a misadventure familiar in New England winters. While passengers push, the driver cracks his whip over the tired team. In good weather, coaches averaged four to six miles an hour.

"I guess they didn't use planes on house timbers in those days."

He was right—they didn't. Standing on it, or astride of it, they dressed their timber with an adz, a short, sharp, hoe-shaped tool. You don't see many beams like that nowadays. There is one that survived the fire at the Wayside Inn, and several in the old Thomas Lee House, a public museum now, on the Shore Road (State Highway 156) in East Lyme, Connecticut; but you have to search for them.

"Let me take you upstairs," said Mr. Talento. "Here: This was the ballroom."

The place where fiddles used to play the minuet, while candlelight gleamed on the powdered heads of dancers, has been subdivided into offices for the city planning commission, the assessors, and the city engineering department.

"We may have to move soon," said Mr. Talento, sadly. "We're getting too big for the Square House."

THE OTHER DAY, coming east along the Connecticut Turnpike between New Haven and Old Saybrook, I was startled when five cars directly before mine peeled off for an exit as neatly as so many dive bombers, so that all of a sudden the road before me was clear—for a few hundred yards. I was startled only for a moment, however. If I had thought fast enough, I might have followed them and saved myself 25 cents.

Sure enough, very soon I came to a toll station; and a few miles beyond that, all five of those cars, still driving in perfect formation, filed back onto the Turnpike.

They had been following the Boston Post Road, in the form of the main street of Branford. There, as in so many other places, the Post Road parallels the Turnpike.

With the rash of pay-as-you-go turnpikes and thruways and parkways and super-highways all over the Nation, this practice has become common among the knowing, the regulars. Some call it station-hopping, some toll-skipping, others just cheating. All, presumably, think that it is something new. It isn't. A hundred and fifty years ago it was called shunpiking.

By the end of the 18th century it became evident that better roads were needed. A mere clearing away of trees and the larger rocks no longer was enough. Stumps must be removed, and potholes constantly filled. The roads had to be better graded, or they turned to quagmires with every storm. Who would pay? The states could not, or thought that they could not; and the same applied to the counties. The towns might improve such parts of the Post Roads as passed through them, but they could hardly be expected to do more than that. The obvious solution was the turnpike, or privately owned and

operated toll road.

In the United States a public turnpike began operating in 1786 on a road west from Alexandria, Virginia. The second, early in 1792, was on the Mohegan Road between New London and Norwich, Connecticut, an alternate route of the lower Post Road. The third toll section to appear was on the Post Road proper at Greenwich, Connecticut, halfway up a rise that is called Toll Gate Hill to this day.

After that, the turnpike took over. The traveler was made to pay . . . and pay . . . and pay.

Private turnpikes soon controlled much of all three Boston Post Roads. Starting from New York, the traveler fell into the hands of the Westchester Turn-

COLLIER PICTURES



Tollgate lightens a traveler's pocket by four cents. Early turnpikes were simple poles, or pikes, that could be swung aside. Often they were set up at ten-mile intervals.

pike Company only a few miles beyond the town, and this lasted until Saw Pits (the present Port Chester), beyond which the Connecticut Turnpike Company took over. On the lower Post Road the only considerable stretch that was free was between New Haven and Saybrook, and, on the upper road, between Hartford and Springfield.

The turnpike companies had an arrogant way of cutting straight for an objective, tearing up even cemeteries. They were given the right of eminent domain, so they got what they wanted. In the cities, they were regarded with respect, and there was a great deal of money in them, rather like a public utility; but in the country they were hated and feared.

Eventually a graver charge could be brought against these companies: They did not pay. One of the earliest, the pike between Philadelphia and Lancaster, was sensationally successful, inspiring many others; but this was an exception. What with their highhanded methods in condemning property, they were beset with lawsuits.

The charter usually read that when the company had made 12 percent of its total investment, it could sell out to the state. Except in the case of the Lancaster Pike, this never did happen. Company after company, including all those operating along the Boston Post Roads, petitioned for relief. This relief, if granted, took the form of permission to establish an additional tollhouse or two, rather than permission to raise the rates much. It got so that a traveler had his hand in his pocket half the time.

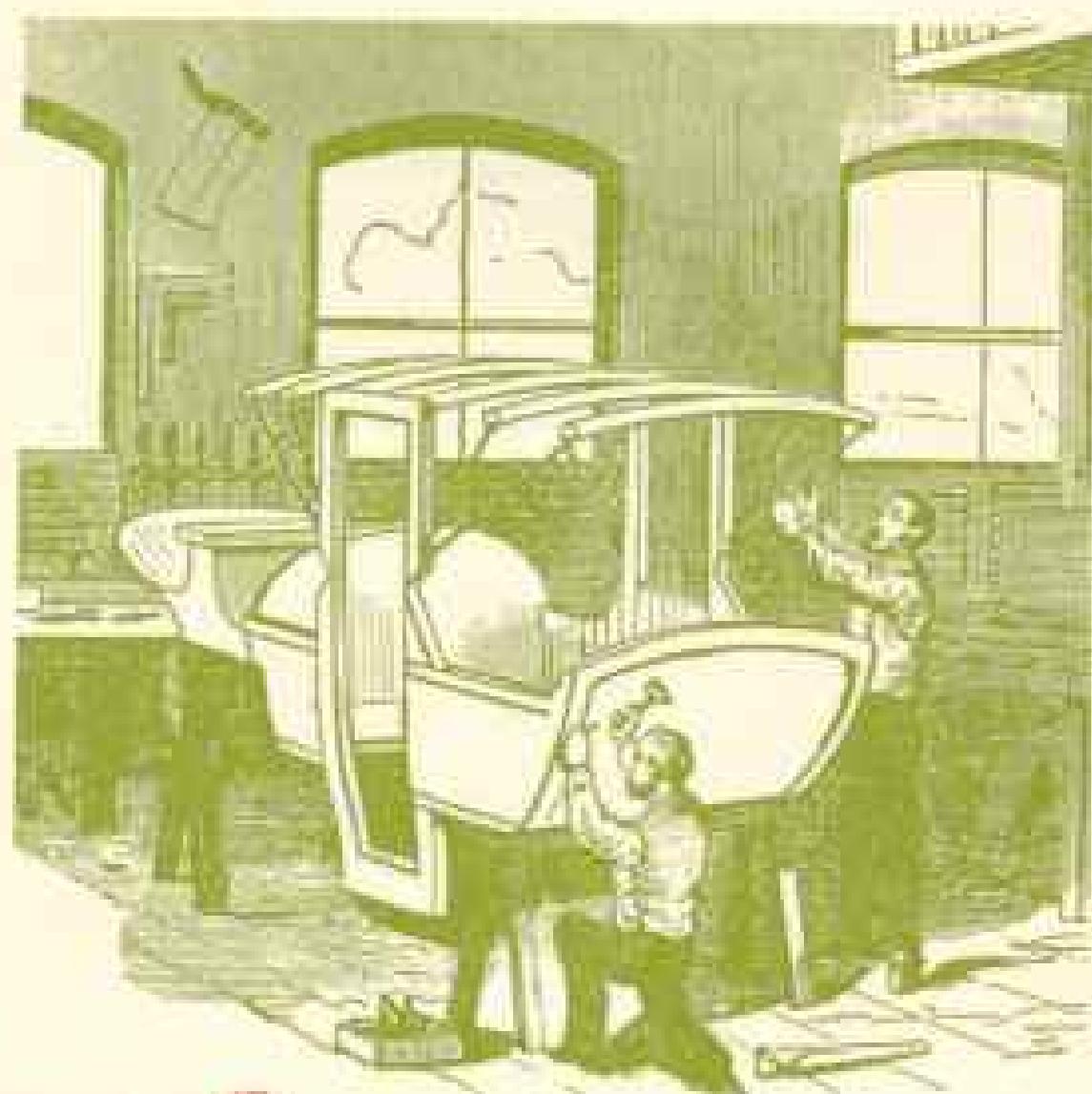
Yet they failed—and not only because of shunpiking. A few struggled on, but only in remote places. Long before the 1800's were half over, most of the turnpike companies either had surrendered their franchises or were pleading for permission to do so.

There was another development at about mid-century for which similar high hopes were held—plank roads. These were called “farmers’ railroads,” and they sometimes cost only \$1,200 to \$1,500 a mile to build. They were, literally, made of planks. But wood didn't last long, and relatively few miles of plank roads were built in New England.

JUST AS THE SUCCESS of the 62-mile Lancaster Pike stimulated investment in many other turnpikes, so the success of the Erie Canal, opened in 1825, caused a rush of money to canal projects all over the land. New England and Westchester County, New York, for various reasons, were not much affected by this canal craze.

That the railroad was the coming means of transportation was not clear in the early days. Railroads were expensive to build. They were dirty, dangerous, noisy. They were forever breaking down. The big money stayed away from railroads, at first.

Nonetheless, the Boston and Worcester Railroad was completed in 1835. The Western from Worcester to Springfield, as well as the Hartford and New Haven Railroad, opened in 1839. Five years later, rails linked Hartford and Springfield, and the New York and New Haven was chartered. The stagecoach was doomed.



“WHEELS ACROSS AMERICA”



“WHEELING OF CARRIAGES”

Carriagemakers of 1879 fashion a landau at Brewster & Company in New York, a firm that later built custom auto bodies. Wheelwright at left drills holes for pins to strengthen the rims.

Some of the early restrictions on railroads were harsh—Connecticut, for instance, forbade the operation of any train during church service time on the Sabbath. But the handwriting was on the wall, the thing was done, and money poured into rails.

The towns along the Boston Post Roads were stilled as though by a spell; they lay congealed. Inn after inn, tavern after tavern, closed its doors. In physical appearance this made little immediate difference—the sign was taken down, that's all—but in the life of the town it made a profound difference.

Hundreds of coaches fell into disuse and disrepair. Work had to be found for horses, in the fields; yet the farmers could no longer sell all their hay, not to mention their vegetables, hogs, and beef. The waste was appalling. Not only stables but hay barns, huge magazines for fodder, unused, simply came apart. The stagecoach companies staggered under this stroke; and one by one they died.

IN TIME, as we all know, the iron horse itself was to become spavined, stumbling through deficits; the motorcar and the truck have appeared by the millions. This has meant more roads, better roads, straighter ones, which have been built.

Yet perhaps the car did not make such a change as many like to think. Rural Post Road country has not yet been smothered in hot dogs, billboards, and concrete.

"Your New England towns aren't towns at all," I have been told. "They're only exit numbers."

Oh? Travel the way most of our visitors do, the fast way, and this is true. But there are other places. There is, for one, Wethersfield, Connecticut.

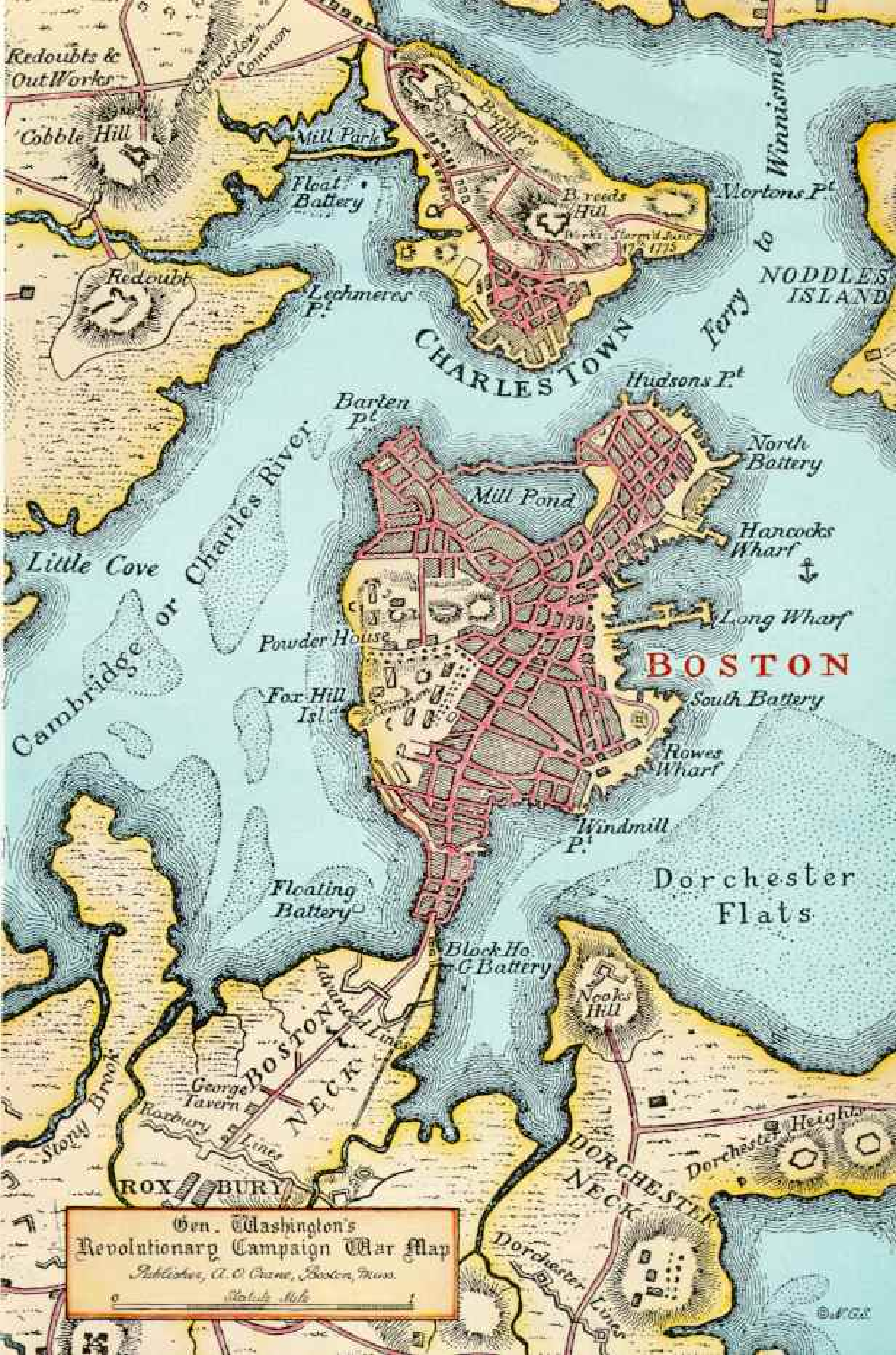
Once here was a bustling river port on the northern and middle Post Roads. Wethersfield is old. It was the only community to send militiamen to Cambridge *in uniform*, John Chester's smart volunteers. It was at Wethersfield that Washington conferred with Rochambeau, commander of the French army, to lay preliminary plans for the campaign that was to end at Yorktown (page 226).

Today all you will see of Wethersfield if you drive there in the ordinary way, simply following signs, is a flat, unshaded, concrete highway, as hard on the eyes as on the nose, running north and south with a no-nonsense rigidity, and lined with gas stations, laundromats, and supermarkets. This is called the Silas Deane Highway, and it is always crowded. You would not know, and could never guess, that just to the east, nearer the river, is the main street of old Wethersfield itself, the original village, the Post Road.

These two thoroughfares, so near to each other, might be in different worlds. Main Street is quiet, shaded, clean-smelling. It is bordered by trim green lawns, trim colonial houses. It exudes neighborliness. It is the epitome of the sort of New England village that thrilled Henry James, the place where "the great elm-gallery happens to be garnished with old houses, and the old houses happen to show style and form and proportion, and the hand of time, further, has been so good as to rest on them all the pressure of protection and none of that of interference. . . ."

Wethersfields abound along the Boston Post Roads. The superhighways have bypassed them. They are peaceful places, and glad of it. Romanticists need not weep. The good old days will never come back, but many of the good old villages remain, as lovely, as serene as ever. The town-meeting country, the rocking-chair country, still exists. You just have to know where to look. * * *

George Washington's Revolutionary map of Boston shows fortifications and gun batteries from Charlestown to Dorchester Heights. Since 1775 the city has changed shape dramatically. Today it spreads on filled land across old Back Bay above Boston Neck, the Mill Pond, and most of Dorchester Flats (photograph, page 230).



Redoubts & Out Works

Cobble Hill

Redoubt

Little Cove

Cambridge or

ROXBURY

Charles Town Common

Mill Park

Float Battery

Lechmeres P^t

Charles River

Powder House

Fox Hill Isl^d

Floating Battery

George Tavern

Roxbury Lines

CHARLES TOWN

Barten P^t

Mill Pond

Block Ho^{se}

Block Ho^{se} G Battery

BOSTON NECK

BOSTON NECK

Bunker's Hill

Breads Hill

Works, Star Mill, Jan^y 17th 1775

Hudsons P^t

Windmill P^t

Nooks Hill

DORCHESTER NECK

Dorchester Lines

Winnismet

Mortons P^t

Ferry to

NODDLES ISLAND

North Battery

Harcoccks Wharf

Long Wharf

BOSTON

South Battery

Rowes Wharf

Dorchester Flats

Dorchester Heights

Gen. Washington's Revolutionary Campaign War Map
Publisher, A. O. Currier, Boston, Mass.
Statute Mile

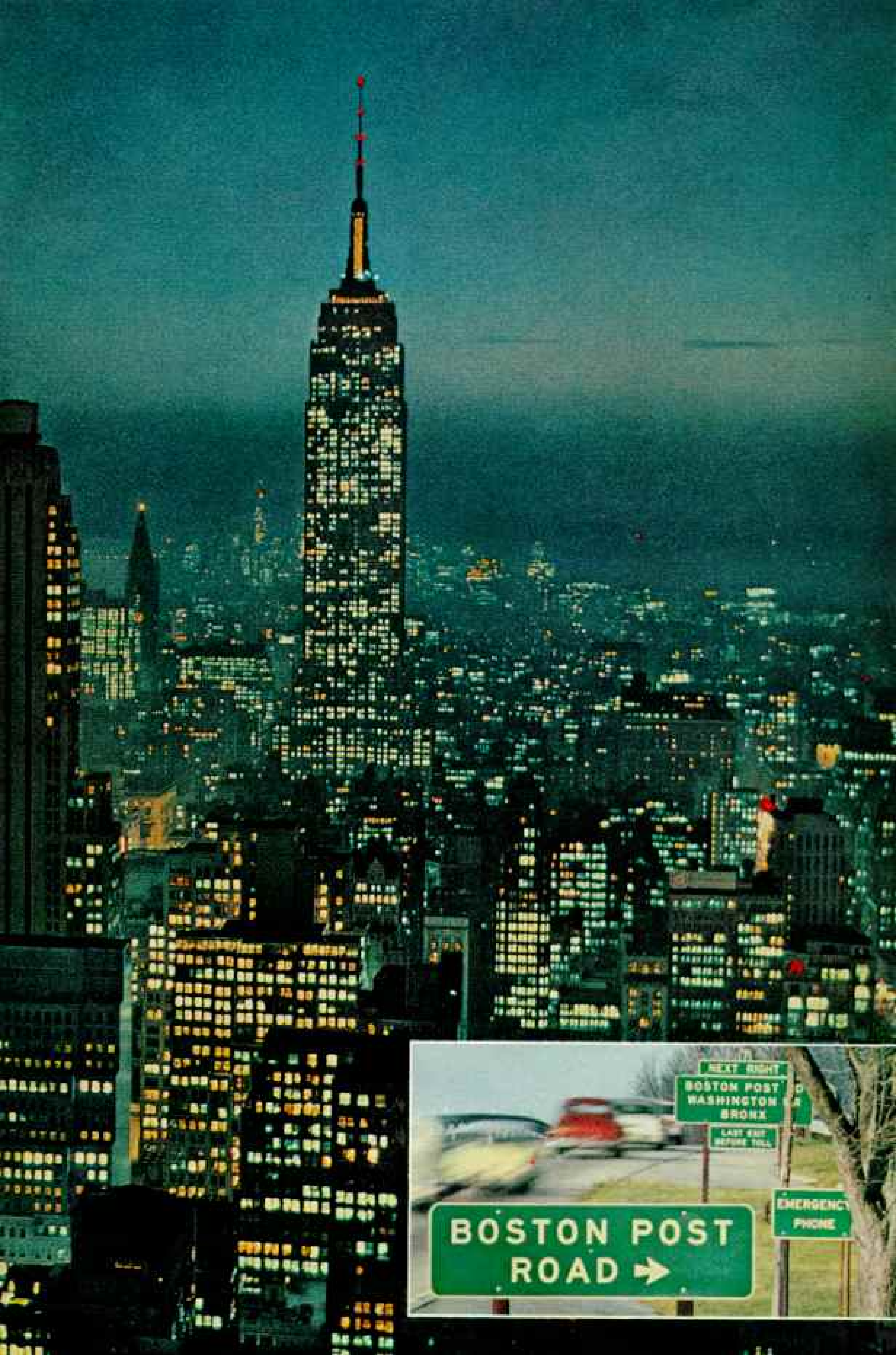
*A lantern must hang outside every seventh house
in New York, the city council decreed in 1697.
Manhattan's skyline, ablaze with light in the
November dusk, epitomizes the countless changes
wrought by time and man, as seen along . . .*

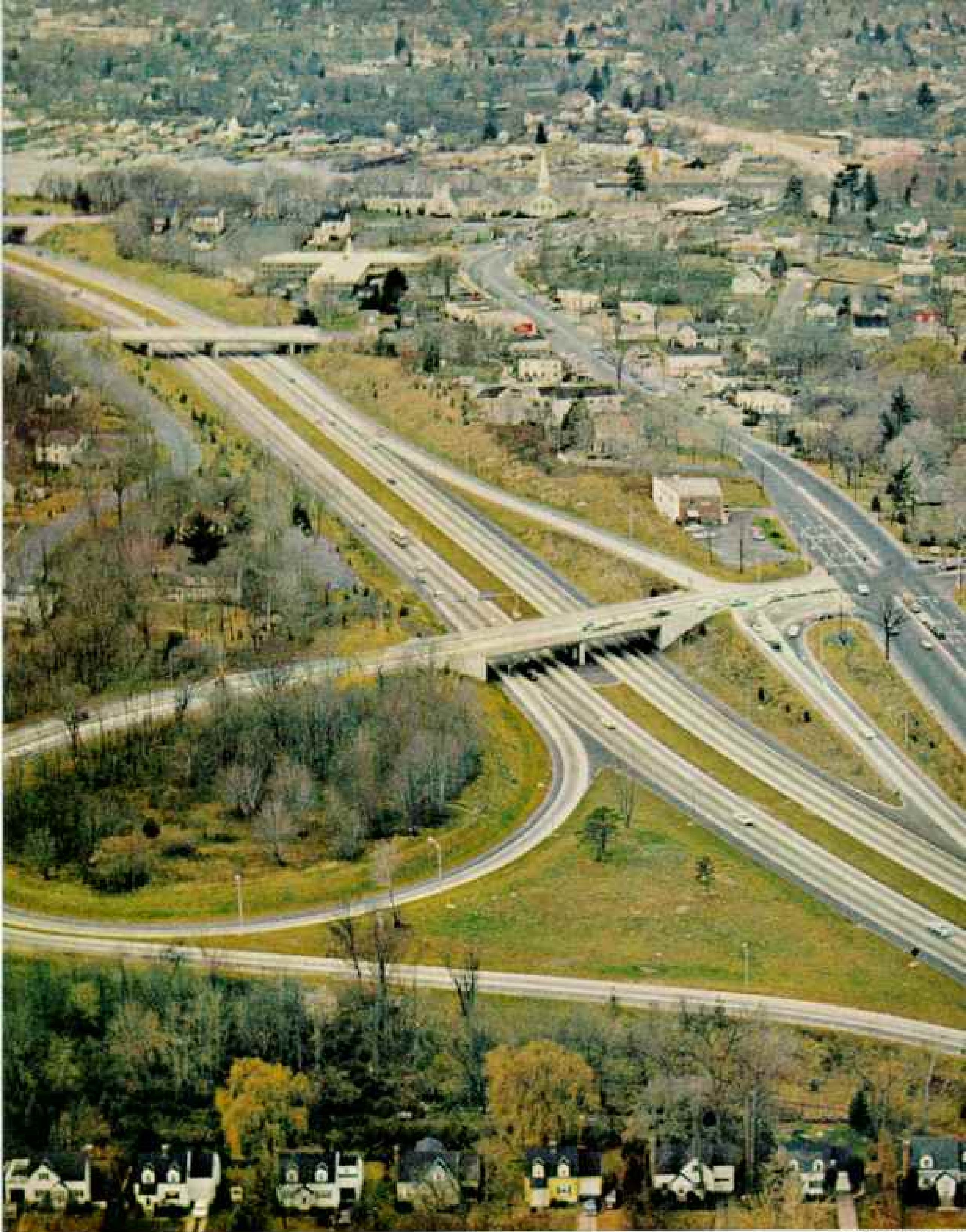
THE POST ROAD TODAY

*A portfolio in color
by National Geographic Chief Photographer*

B. ANTHONY STEWART







KODACHROME BY NATHAN

History passed this way when the first post-rider carried mail from Manhattan Island to Massachusetts Bay 289 years ago. Aerial view above Riverside, Connecticut, looks west to the Mianus River and Cos Cob. New Connecticut Turnpike

(left) and U. S. 1, the venerable Post Road, march side by side for 97 miles from the New York State line to New London, often within sight of Long Island Sound. Cloverleafed highway bypasses towns; the Post Road plods straight through con-



SCENERY PHOTOGRAPHER S. ARTHUR STEWART © N.S.P.

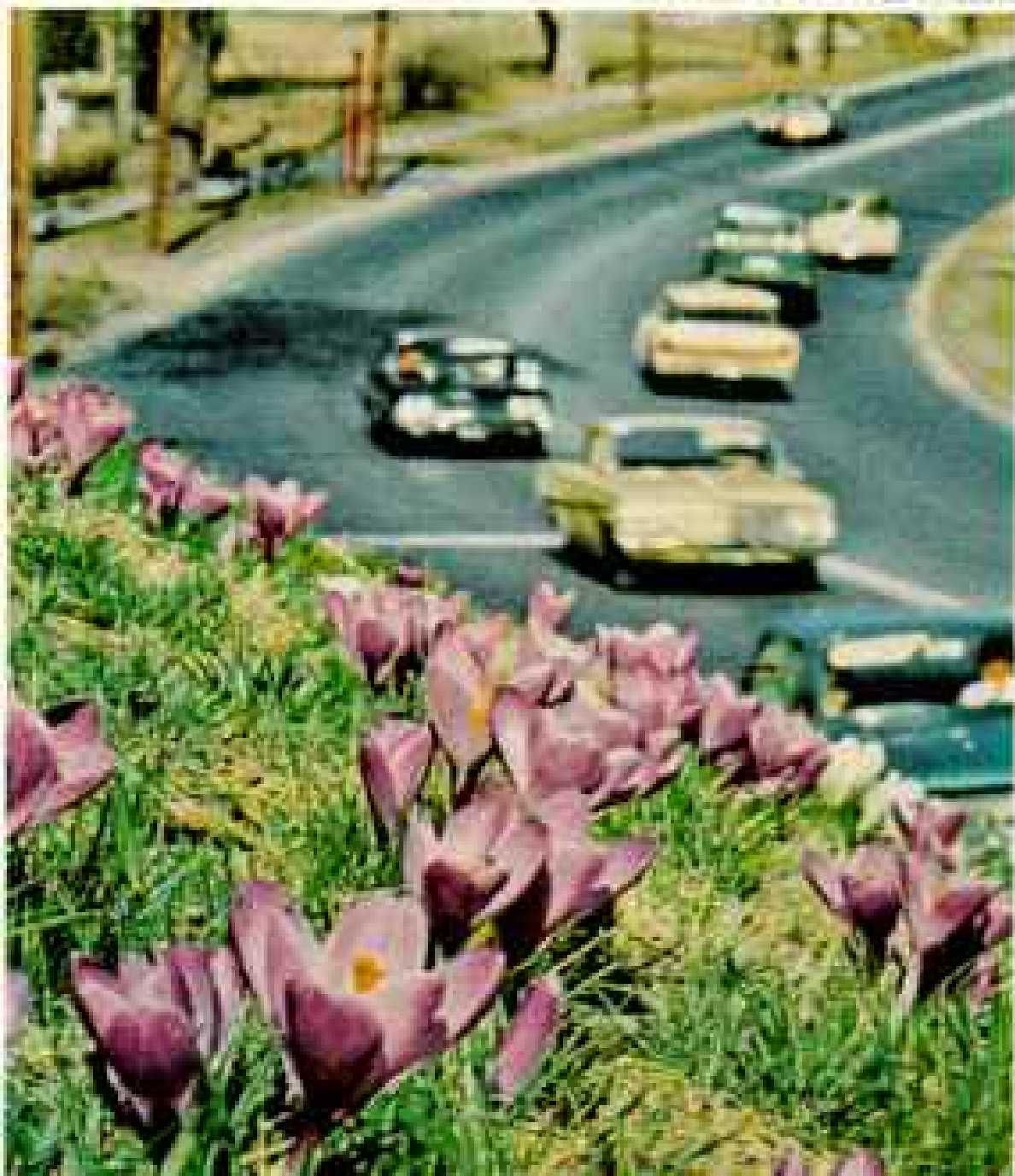
gested business districts. And everywhere "Post Road" motels, cafes, and service stations remind one that this was the first and long the only thoroughfare between New York City and seaboard New England.



Visitors relive stagecoach days in Freedomland, 205 acres of colorful Americana flanking the original Post Road in the Bronx.

Harbingers of spring, crocuses brighten the highway near Greenwich, Connecticut.

PHOTOGRAPHER BY JAMES P. SLICK





Decorative eagle perched on bolts of lightning hangs in a Greenwich, Connecticut, shop

George Washington Slept Here:

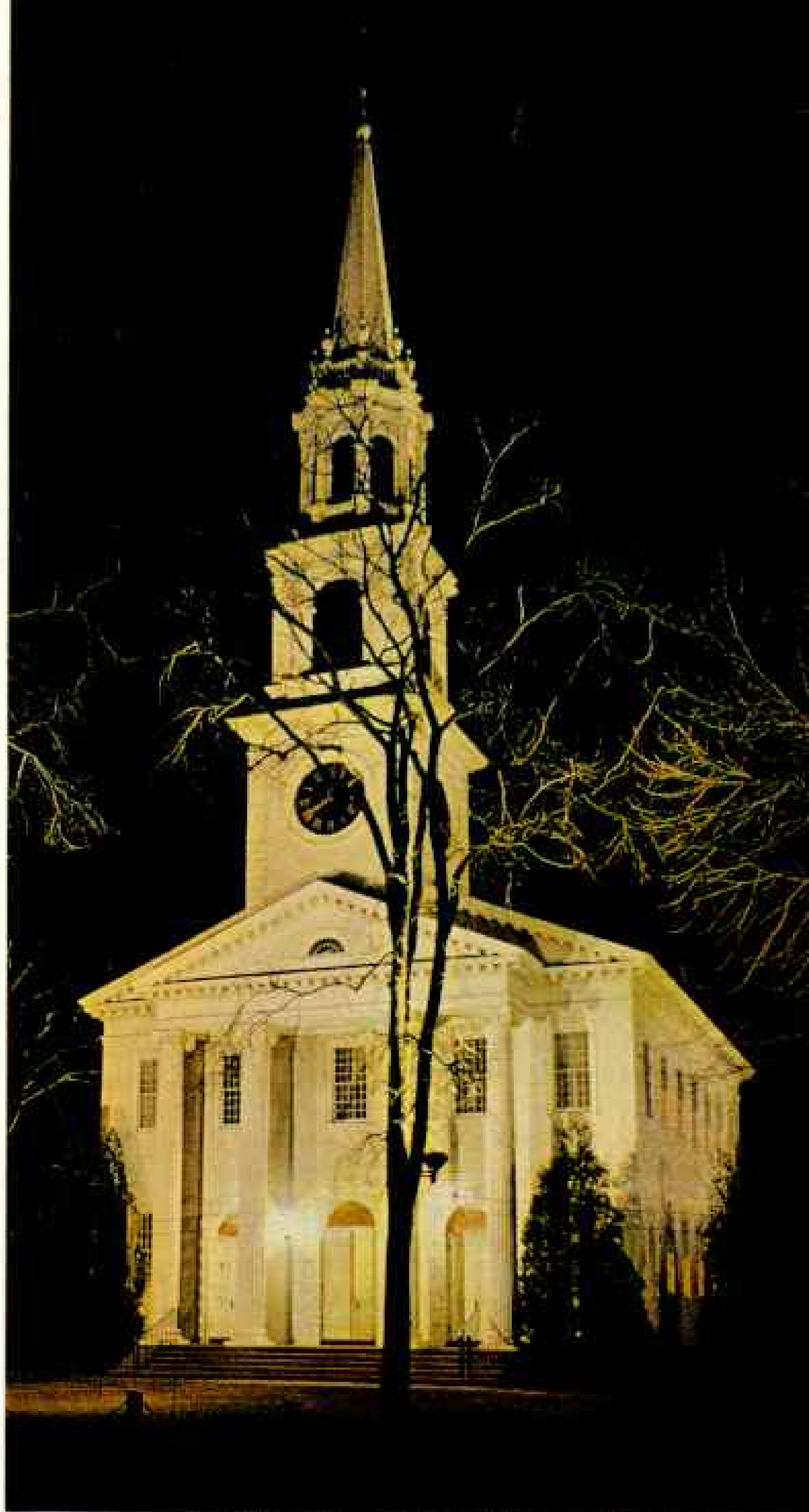
This New York suburb turned its historic Square House, once a popular stagecoach stop, into a city hall. Built in 1730, the tavern was known as the widow Haviland's after the Revolutionary War. "A very neat and decent Inn," wrote Washington,



above vases, figurines, silver service, and other cherished relics rescued from dusty attics.

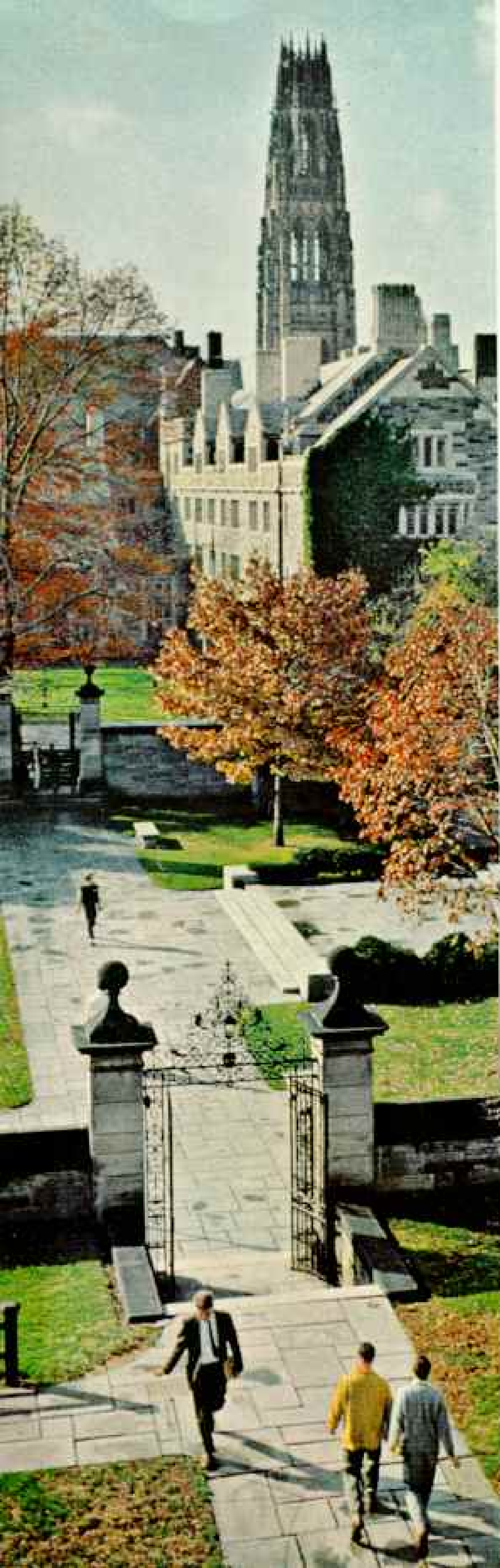
Haviland's Tavern in Rye

a guest during the first year of his presidency, John Adams and Lafayette likewise stopped here. Dancers in powdered wigs and swirling gowns stepped out in Virginia reels in the second-floor ballroom. Original hand-hewn beams remain in place.



ILLUSTRATED BY JAMES F. BLAIR AND B. ANTHONY STEWART (LEFT) © N.E.S.

Tall and stately, the First Congregational Church at Old Lyme, Connecticut, typifies the steepled white churches that dominate so many New England villages. Erected in 1819, it burned to the ground 90 years later but was rebuilt to the original design. Towering above wide streets canopied with arching elms, the meetinghouse assures travelers that many old northeastern towns still wear the face of yesteryear. Pillared portico and graceful spire shine softly in the night.



*"Bright college years,
with pleasure rife,
The shortest, gladdest
years of life"* YALE ANTHUR

In 1701 ten Congregational clergymen met in Branford, Connecticut, a few miles east of New Haven. Each brought a gift of books for "founding a College in this colony." The first student, to quote his own words, was "all the College the first half-year."

Grown to a national university, Yale today counts 8,000 students, 2,000 faculty members, and more than 70,000 living alumni. Its classrooms, laboratories, libraries, and dormitories spread across 150 acres in New Haven.

This view looks west from Berkeley College, one of ten residential colleges patterned after those of Oxford and Cambridge, toward Harkness Tower.

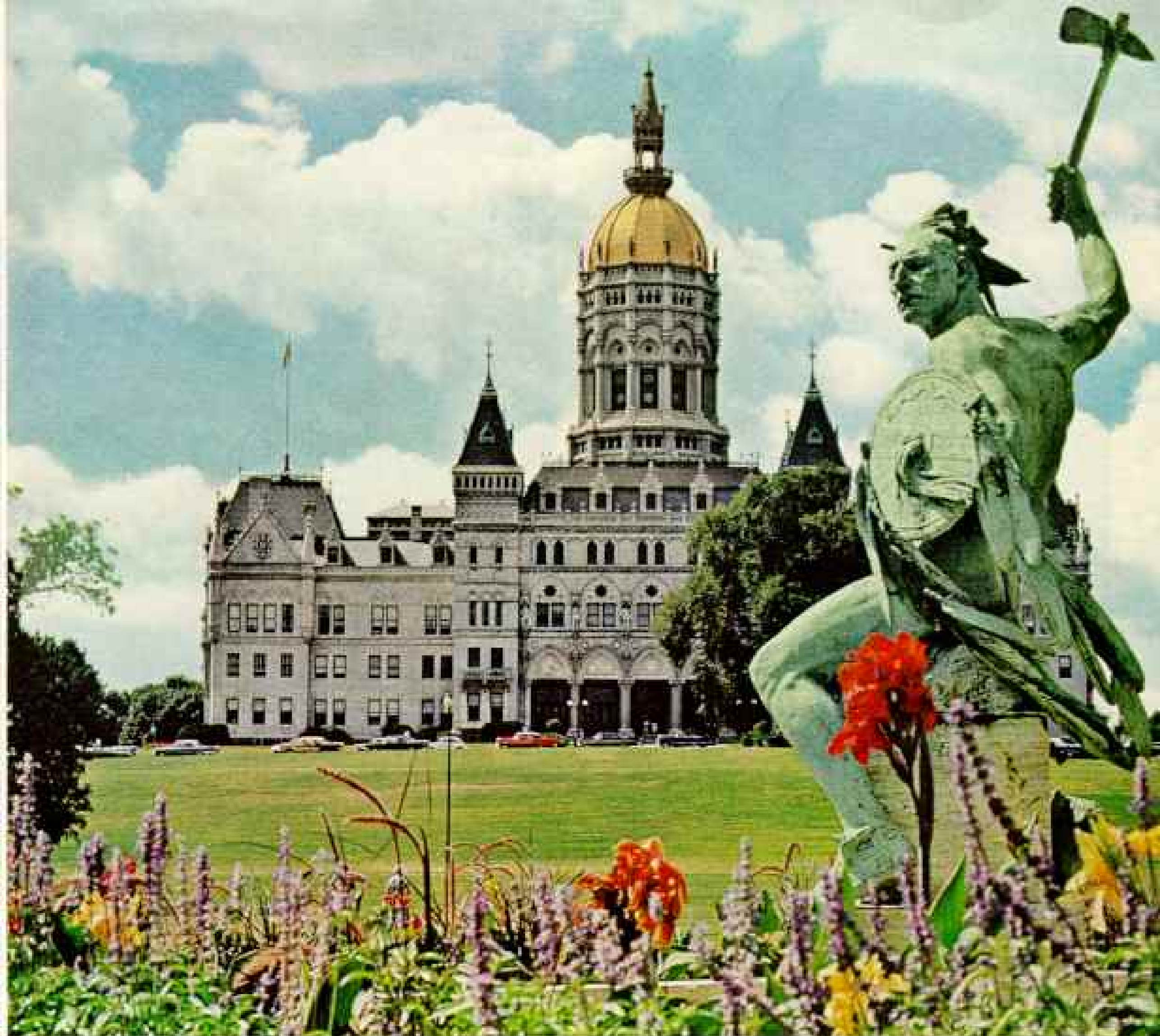
One of America's most distinguished privately-endowed universities, Yale numbers among its graduates Revolutionary War hero Nathan Hale, southern statesman John C. Calhoun, President William Howard Taft, and poet Stephen Vincent Benét. During World War II the university trained 22,000 men for service in the Armed Forces.

*"Bulldog, bulldog, bow-wow-wow,
Eli Yale"* YALE FOOTBALL SONG

Handsome Dan, Yale's mascot, keeps a lookout for Brown University's bear in the Yale Bowl.



© NATIONAL GEOGRAPHIC SOCIETY



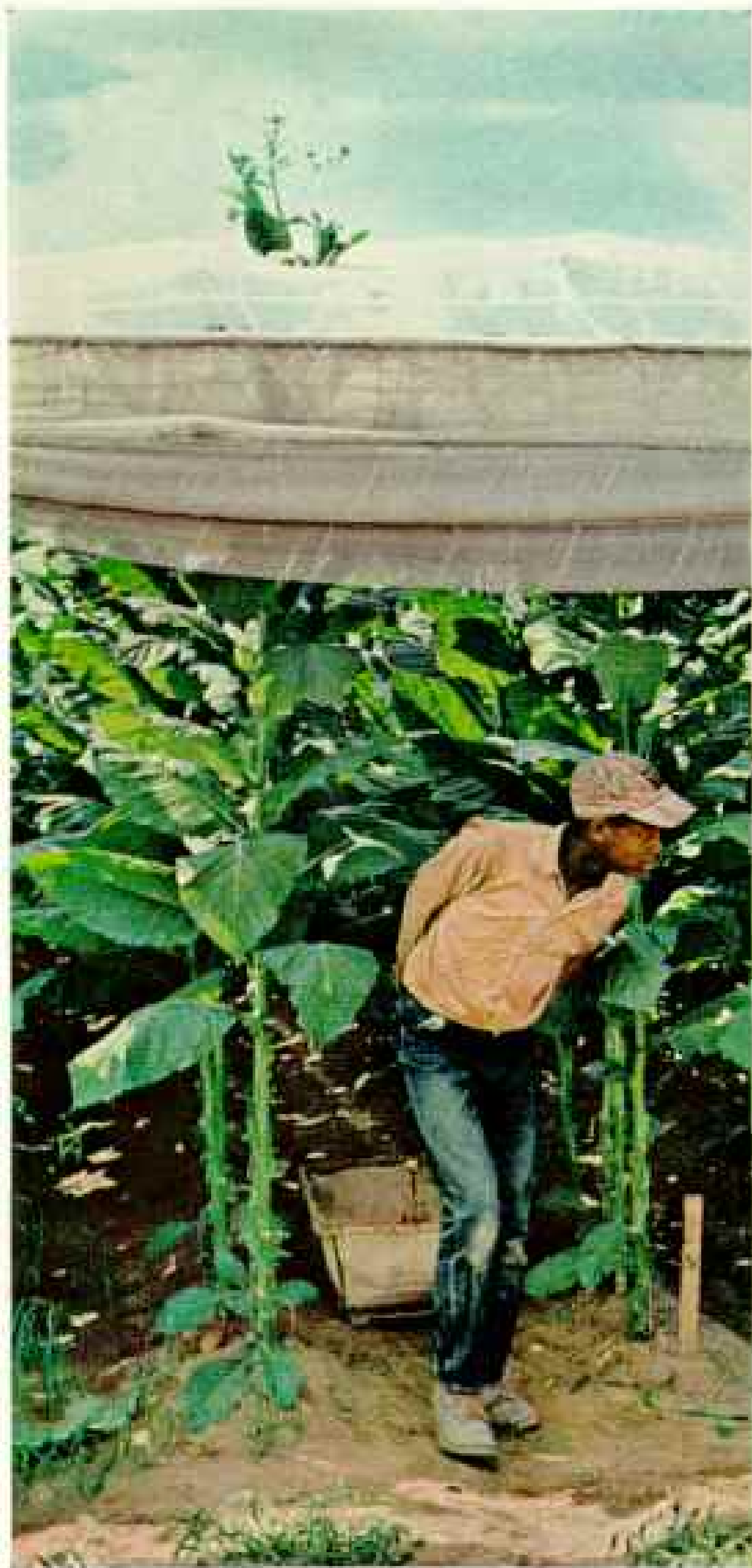
SCOTCHCROCKED BY NATIONAL GEOGRAPHIC PHOTOGRAPHER D. ANTHONY STERBY © N. G. E.

Tomahawk upraised, a bronze Indian guards Connecticut's State Capitol in Hartford. Rising amid the manicured lawns of Bushnell Park, the marble-and-granite structure houses a collection of battle flags and war relics.

Mid-point of the upper and middle Post Roads that linked Boston and New York (map, pages 192-3), Hartford today bustles with industry. Plants turn out guns, airplane engines, typewriters, and parking meters. Thirty-six insurance firms in the city employ 26,000 and underwrite every known form of coverage.

Veteran silversmith solders the finial on a gleaming reproduction of an early Georgian coffeepot in the shops of Wallace Silversmiths, Inc., Wallingford, Connecticut. Like generations of New England artisans before him, Stanley Pashkevich strives for perfection.





PHOTOGRAPH BY R. ANTHONY STEWART © NICK

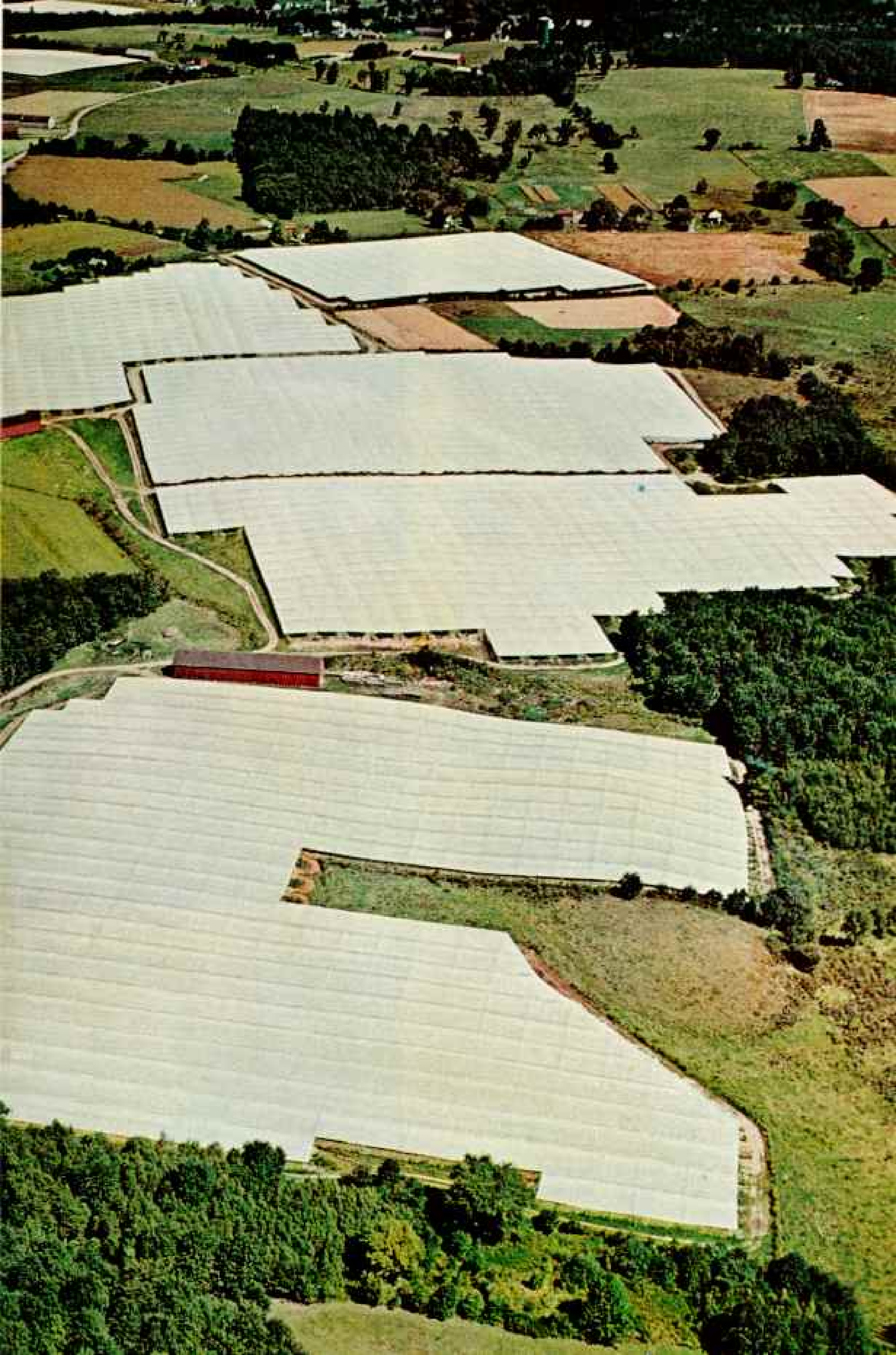
Dragged in a basket, tobacco leaves go to a curing shed. Air-curing requires about eight weeks.

Acres of Thin Cotton Cloth Shade New England's Tobacco Valley

On a narrow strip embracing only 61 square miles, Connecticut Valley farmers have grown tobacco for three hundred years. Shade-grown leaf from this region provides some 60 percent of all wrapper tobacco used by American cigar manufacturers. In summer, 20,000 harvesters pick the silk-thin leaves by hand. Migrant workers from southern states and Caribbean islands comprise a quarter of the labor force.

PHOTOGRAPH BY LAWRENCE LORRY







Autumn foliage overhanging the Connecticut River near Old Lyme heralds the end of the sailing season. Weekend sailors, many from New York, cruise these waters in spring and summer.

After a Lifetime at Sea, the Joseph Conrad Stows Sails Away at Mystic Seaport

Launched at Copenhagen in 1882 as *Georg Stage*, the three-master trained generations of Danish seamen. Alan Villiers, sea captain and writer, bought the iron-hulled vessel in 1934 and rechristened her for his favorite seaman-author. He sailed the square-rigger safely around the world, after she had been blown ashore in New York Harbor and nearly wrecked. Captain Villiers has written 17 NATIONAL GEOGRAPHIC articles over the past 31 years, from windjamming to testing the first atomic merchantman (page 280).

Today the *Joseph Conrad* serves as a wharfside classroom for Boy Scout Sea Explorers and Girl Scout Mariners who live aboard in summer to learn seamanship.

Dipping with her net, a woman dredges succulent bay scallops from the Niantic River.





ESSENCHROMES BY NATIONAL GEOGRAPHIC PHOTOGRAPHER B. BRIDGEMAN STEWART © N.A.E.



White muscle that closes the fluted shell forms the only edible portion of the bay scallop. This delicacy from coastal shallows is smaller than the familiar deep-sea scallop.





PHOTOGRAPHS BY NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT F. ZIMMER (LEFT) AND GENERAL DYNAMICS CORPORATION © N.G.P.

From windjammers to nuclear submarines

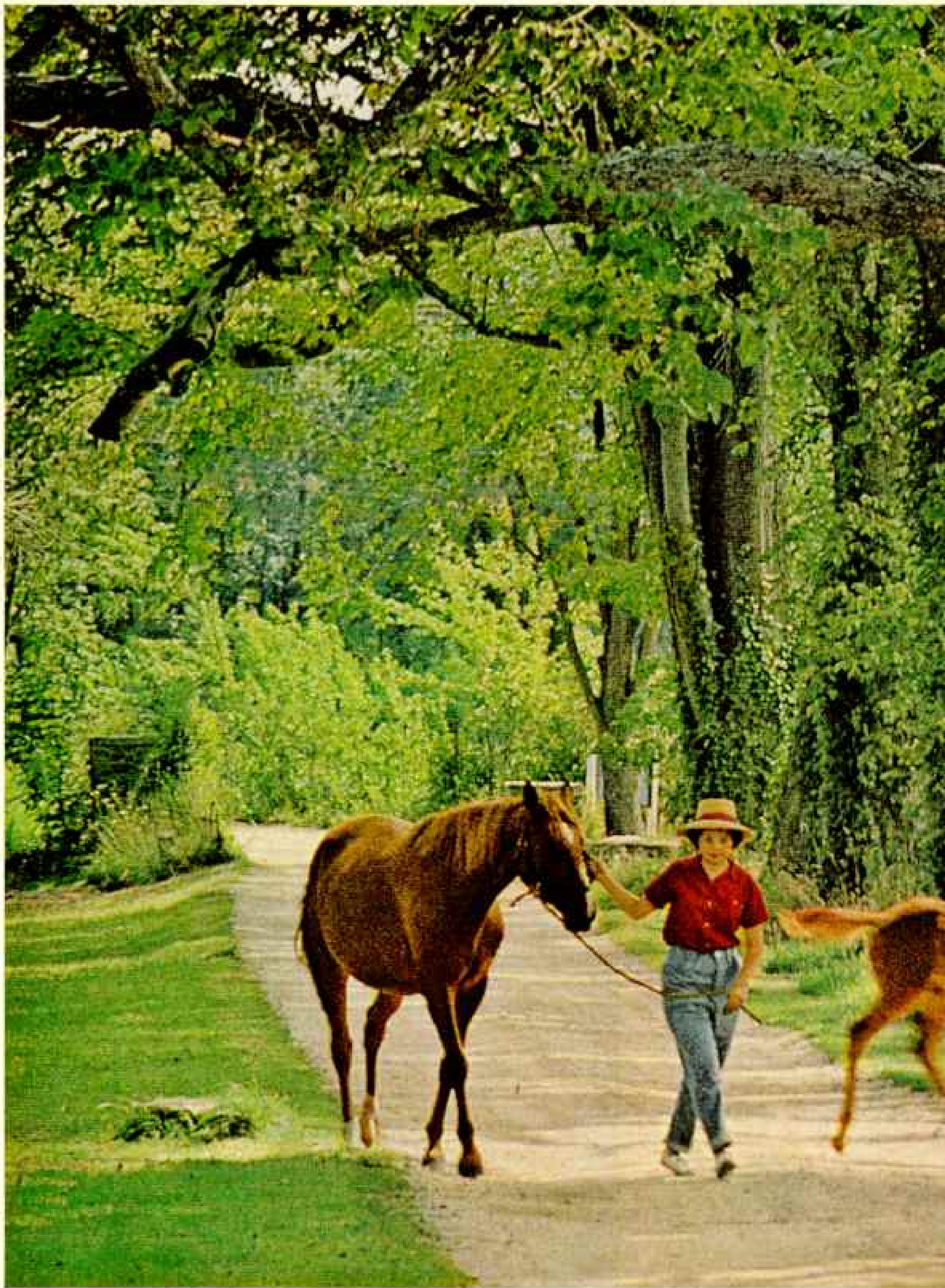
Ethan Allen, new Polaris-type submarine built at Groton near the Post Road, noses through a frothy turn off the Connecticut coast.

Wire rigging of the bark *Eagle* sings a song of the wind as cadets from the U. S. Coast Guard Academy at New London, Connecticut, bring their training ship about. The handsome square-rigger conjures up the great days of sail when New England clippers blazed record passages across the oceans. Long Island Sound teemed with such craft.

Seasoned submariners take a refresher course at the U. S. Naval Submarine Base near Groton. Their trainer simulates diving operations.



PHOTOGRAPH BY B. ANTHONY STEWART



Frisky Foul Quits Mother's Side
to Go Adventuring in the Woods

Elm trees vault the entrance to Meadowbrook in
Peace Dale, Rhode Island. Founded by Rowland



EDUCRHOME BY NATIONAL GEOGRAPHIC PHOTOGRAPHER B. BRIDGON TIERNEY © N.G.P.

Hazard in 1800 and named for his wife Mary Peace, the village wove textiles from 1814 to 1949.

Looms and spindles now silent, Peace Dale has become the idyllic retreat implied by its name.



Square Dancers on Storowton Green Promenade Hand in Hand

One of the Nation's biggest fairs, the Eastern States Exposition at West Springfield, Massachusetts, serves each September as a showcase for New England's agriculture and industry. Storowton Village, in the exposition's 175-acre park, reproduces an authentic segment of an old-time New England town. Old Storowton Tavern faces the elm-shaded green.



Federal eagle-back chair with "pillow" top rail and rush seat is crafted from native hardwoods by the Hitchcock Chair Company in Riverton, Connecticut.

When Lambert Hitchcock founded the factory in 1826, water power turned the lathes. Today the plant uses electricity, but chairmakers like Edmund Pfeffer still do much work by hand.



PHOTOGRAPH BY S. ANTHONY STEWART © N.I.C.



Pre-show shampooing beautifies a Hereford heifer for the judging ring at the exposition. Bluing washes out, leaving silky locks snow-white.

Hoofs clawing earth, draft oxen pull a sled weighted with concrete blocks in a contest of strength at the fair.





WEDGWOODS LABORED BY WILLIAM H. STEWART

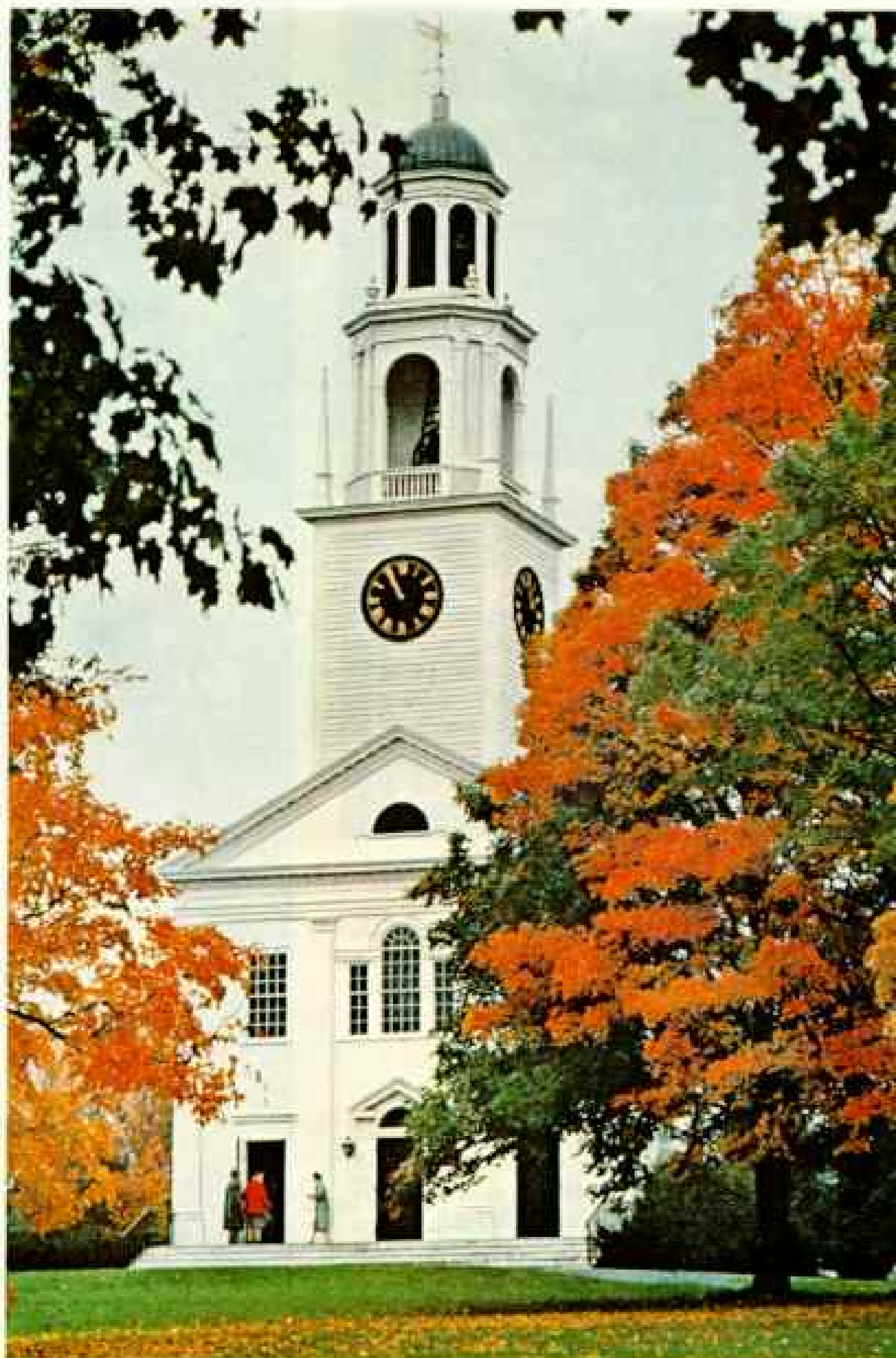
Fresh-baked cookies disappear as if by magic at Old Sturbridge Village, Massachusetts. Its bakery produces 57,000 dozen cookies in an eight-month season.

Covered bridge, or "kissing bridge," is one of some 30 structures moved from other parts of New England and reconstructed at Sturbridge. Tradition says courting couples always stopped under its roof to make a wish.



Historic bellfry of the First Congregational Unitarian Church in Northboro, Massachusetts, for 136 years held a bell cast by Paul Revere and his son. When fire destroyed the structure in December, 1945, the bell cracked in its fall. It had tolled the death of every United States President.

Revere bell and its charred beam rest on a slate slab in front of the new church.



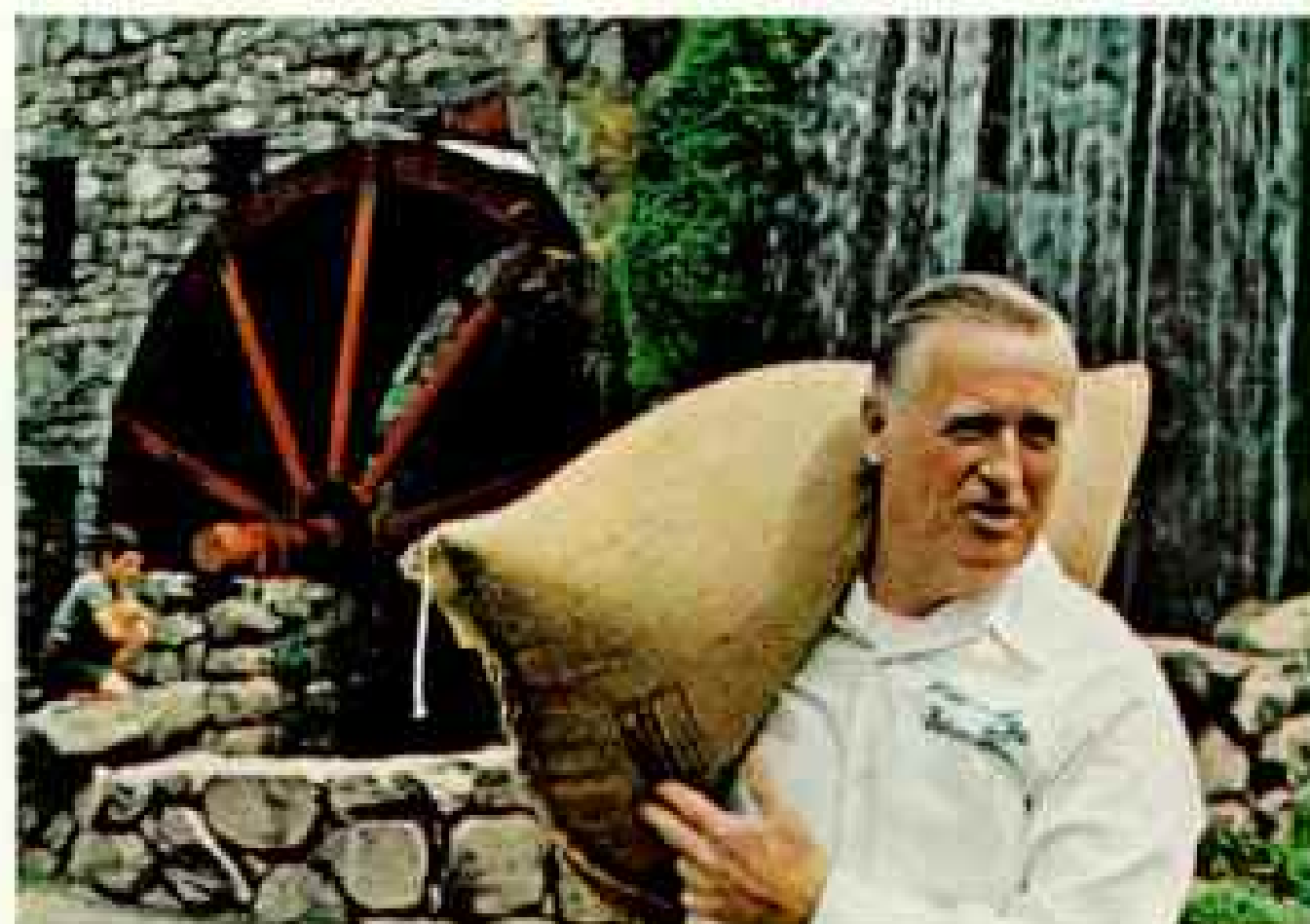


"Hospitality Hall," colonial dignitaries dubbed the Webb House in Wethersfield, Connecticut. Founded in 1634, Wethersfield has a hundred-odd homes built before 1800; all still stand on their original foundations.

"New London, 14 miles," reads a weathered marker at Johnnycake Hill in Old Lyme. Such slabs, dotting the Post Roads, are called Franklinstones in honor of Benjamin Franklin, who, as comptroller of the colonial post office, toured New England in 1753.



RESEARCHED BY B. ANTHONY STEWART



Wayside Inn grist mill, operated by a national baking company, grinds grain with millstones powered by water.

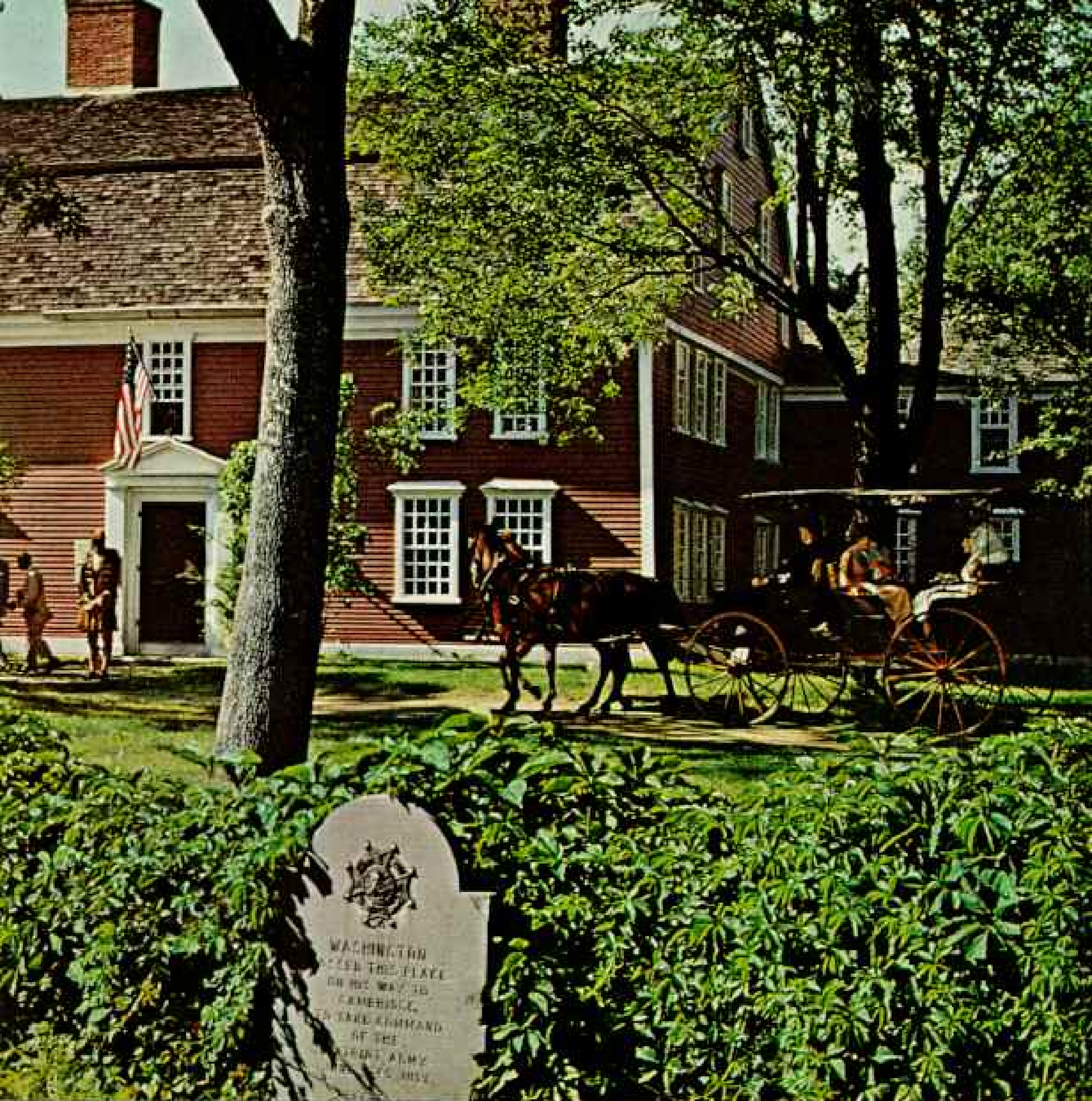


PHOTO: JAMES D. SCHEER (BELOW) © N.S.L.



Bridal Party Arrives at Wayside Inn, Most Celebrated Post Road Tavern

"As ancient is this hostelry/As any in the land may be," wrote Longfellow of the South Sudbury, Massachusetts, house that inspired his *Tales of a Wayside Inn*.

Martha-Mary Chapel on the Wayside estate, reproduction of a classic New England church, witnesses many weddings.

A carriage delivers these newlyweds to the reception at the inn.

Artemas Ward's home faces a Franklinstone on the Post Road in Shrewsbury, Massachusetts. Ward, a major general under Washington in 1775, died here in 1800. Descendants bequeathed the house, now a museum, to Harvard University.



Harvard Senior Meets Radcliffe Sophomore in the Elm-shaded Yard

Oldest college in the United States, Harvard was founded in 1636, sixteen years after the Pilgrims landed at Plymouth. Its ivied buildings in the city of Cambridge, just across the Charles River from Boston, wear their cloak of age with grace and dignity.

Harvard has graduated more United States Presidents than any other college: John Adams, John Quincy Adams, Theodore Roosevelt, Franklin D. Roosevelt, and John F. Kennedy. Rutherford B. Hayes received a Harvard Law School degree.

Girls at Radcliffe, a sister college in Cambridge, have attended Harvard classes since 1943. These students chat outside the Widener Memorial Library, which houses the central collection of Harvard's seven million books—the world's largest university library.

Oldest section of the campus, the inner compound known as the Yard lies just off Harvard Square in Cambridge.

Light Dances on Gilded Metal in M.I.T.'s Chapel

Internationally known in the world of science by its initials alone, the Massachusetts Institute of Technology this year enters its second century.

"A place for men to work, not for boys to play," said one M.I.T. president, and his words still ring true. From its Cambridge campus have come many of the Nation's ablest scientists and engineers, and from its research laboratories many important scientific advances.

Designed by the late Eero Saarinen, M.I.T.'s cylindrical brick chapel stands in a water-filled moat. Wires strung from floor to skylight behind the altar are laced with bits of metal to catch light. Here an Episcopal chaplain holds services in the nondenominational chapel.





Boston Undergoes a Face-lifting; Buildings Spread Far Beyond Paul Revere's Town

Filling-in of marshes and shallows gave growing room for the city. Hotels, offices, wharves, and warehouses stand on land once covered by water. Red line shows Boston's size in the Revolution



(map, page 205), as retraced by National Geographic cartographers with the aid of the Boston Athenaeum. The Mill Pond once sparkled in the circle at left, just above a 48-acre swath being lev-

eled for a housing development. Key-shaped Long Wharf, jutting into the old harbor, points to Logan International Airport. Once-narrow Boston Neck (far right) has broadened beyond all recognition.

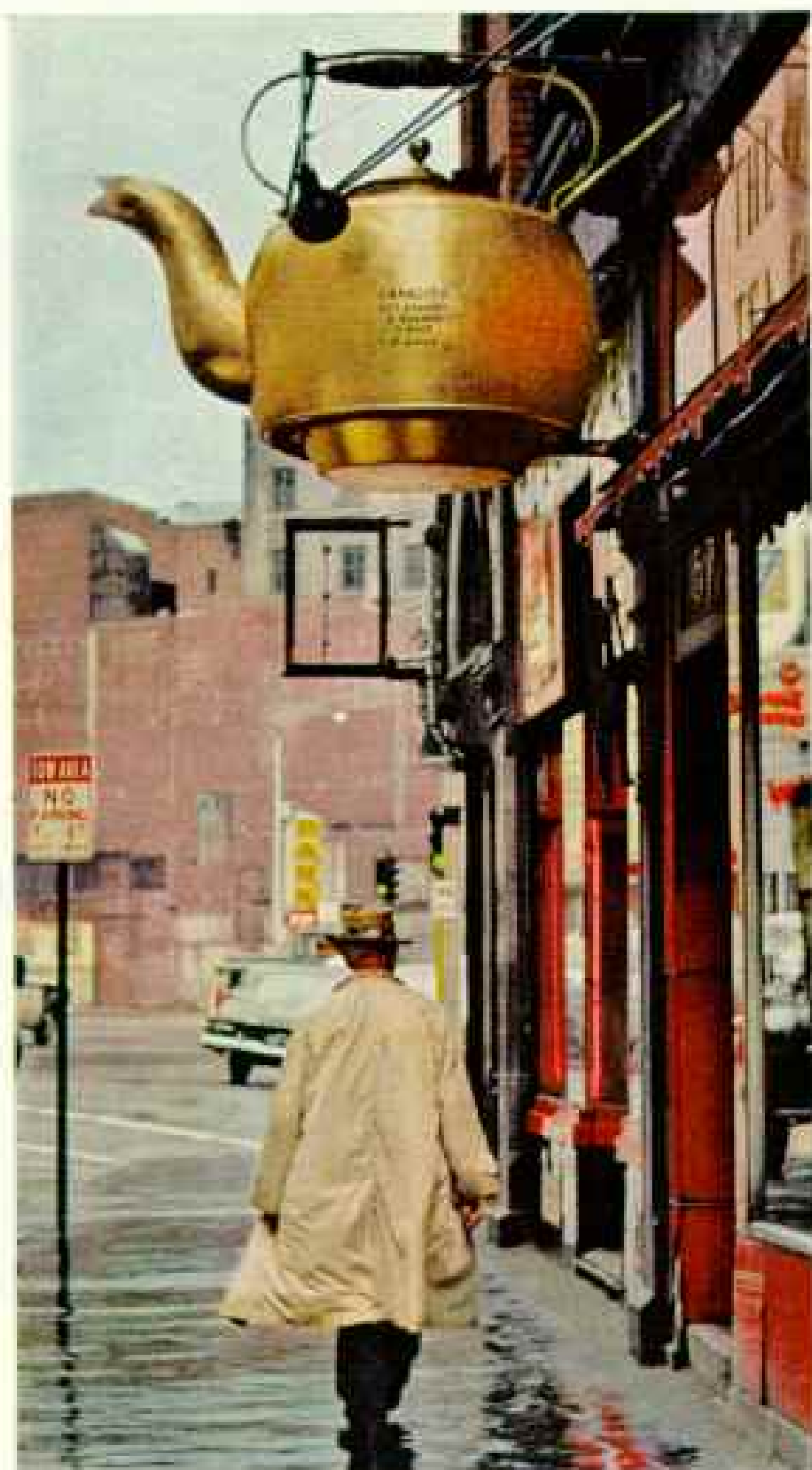


Swan boat plies the pond on a Sunday in Boston's Public Garden. Neighbor to the larger but plainer Common, the 24-acre Garden serves as a gate to the Back Bay district. Birdhouse copies a Bavarian castle.

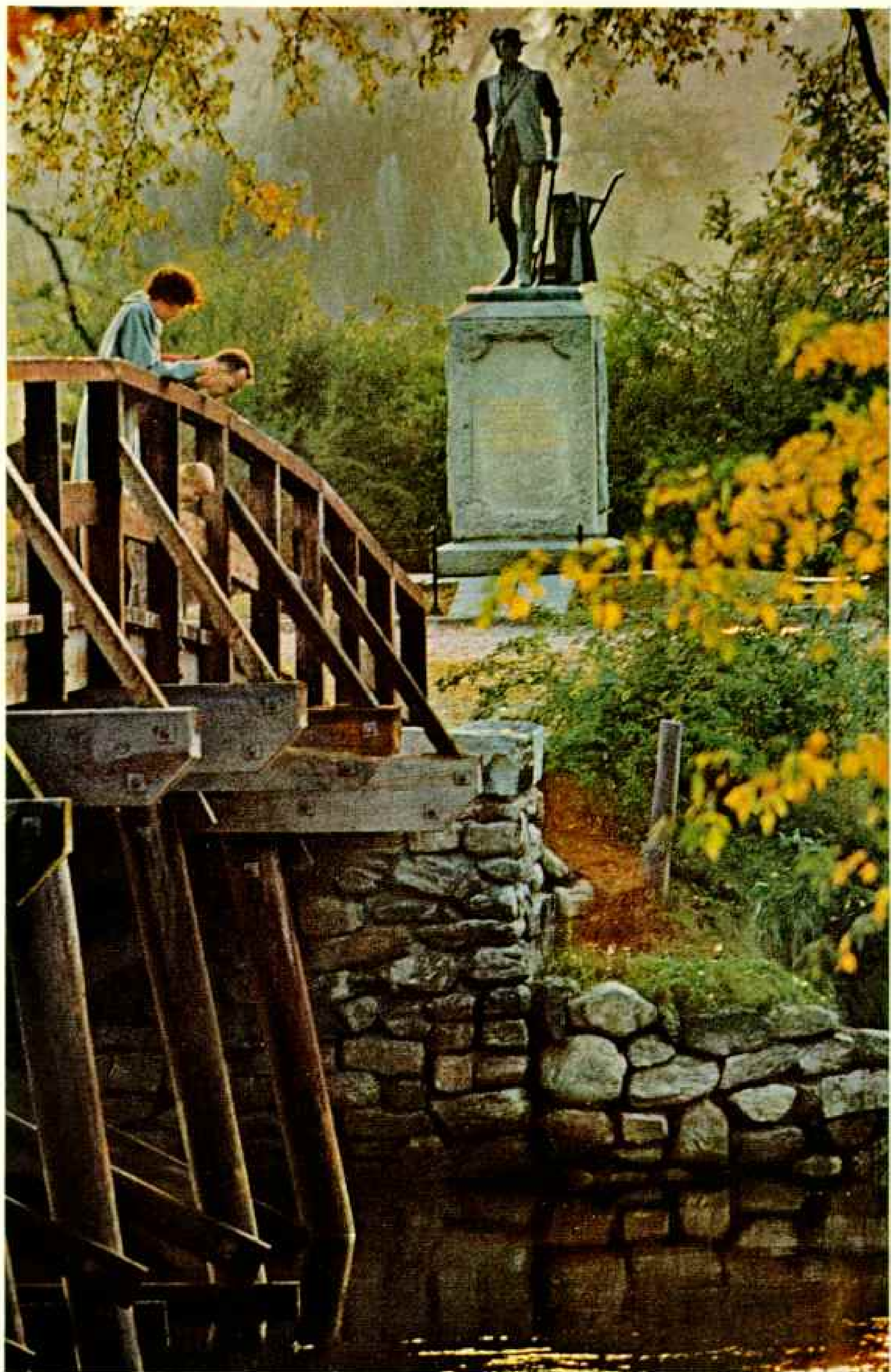
*"Here once the embattled
farmers stood
And fired the shot heard
round the world"*

EXCERPT BY W. W.

Ralph Waldo Emerson's lines immortalize that April day in 1775 when the minutemen clashed with George III's troops at Old North Bridge in Concord, beginning the Revolution. Daniel Chester French's statue of the citizen ready to defend his country at a moment's notice stands facing the reconstructed bridge in Concord's Minute Man Park.



Giant teakettle identifies the Oriental Tea Company on Scollay Square, eastern terminus of the Post Roads in the heyday of the stagecoach. In the 1830's more than 2,000 mail and passenger coaches rolled in and out of Boston weekly. Most of them set out from Scollay Square. Today Boston's modernization program is razing the square's old buildings.



Mapping Megalopolis U. S. A.

LONGEST CITY IN THE WORLD

MEGALOPOLIS—the “Great City.” Thus geographers and scholars describe today a 500-mile seaboard strip of the United States from southern New Hampshire to northern Virginia.

Where tiny settlements stood against wilderness 300 years ago (Boston, the largest, had scarcely 3,000 people in 1662), an incredible urban complex has risen: the most populous, richest, busiest, most heavily traveled region of modern America.

This is the area encompassed by the National Geographic Society's latest map, **United States—Washington to Boston**. Drawn to close detail at 16 miles to the inch, it reaches from the Potomac River to the Maine border, from storm-scalloped Atlantic beaches deep into the Appalachian Mountains.*

Drive from Washington to Boston on U. S. Route 1, and you pass through an almost solidly built-up area. Cities and towns flow together so densely it is hard to separate one from another. More urban development, indicated by gray shading, appears on this map than would be found on any equal area on earth.

More concrete and asphalt, by all estimates, paves this landscape as well. Boston's Circumferential Highway (opposite) typifies a new hallmark of Megalopolis: the ring road, or beltway, encircling a major city. Baltimore and Washington also show this distinctive circlet of new bypass expressways.

Twelve states, among them ten of the Thirteen Original Colonies, are included or touched by the new map, which covers 74,000 square miles. Here, on one-fiftieth of the Nation's land area, live more than one-fifth of its citizens—some 40,000,000 in 1962.

This is one of the world's most productive

industrial areas. Its factories provide one-quarter of U. S. manufactures. Half of U. S. imports by sea enter its harbors. The country's financial and managerial centers lie in the cities of Megalopolis; here are the publishing and broadcasting headquarters, the largest libraries, museums, and art collections, the seat of Federal Government.

Think of the climactic moments of early American history; you will find most of them on this map. Pilgrims landed on Cape Cod (pages 150 and 152), then at Plymouth; minutemen fought at Concord (preceding page); the Liberty Bell rang in Philadelphia; Washington wintered at Valley Forge.

Networks of roads, rails, and airlines crisscross the region like a cat's cradle. Historian Donald Barr Chidsey tells of the earliest Boston Post Roads in the article starting on page 189. What began as foot trails became, in many places, routes of modern superhighways: the Massachusetts and Connecticut Turnpikes, the New York State Thruway.

Forests Remain, the Seacoast Changes

Yet much near-wilderness remains on this map. In the heart of New Jersey, most densely peopled of the 50 states, lie lonely pine barrens, and in them, ghost towns such as Ong's Hat, near Mount Holly, and Batsto to the south, where iron furnaces once flared.

With the map, a hiker can follow 500 miles of the red-dashed Appalachian Trail through unspoiled forest, and go on if he wishes to Maine or Georgia. Vacationists can explore the cities, using the map's insets of Washington, Baltimore, Philadelphia, New York, and Boston, plus special close-ups of Tourist Washington and Boston. They can head for New York State's lovely Finger Lakes or for ocean beaches, many of which were dramatically reshaped by storms last March.

North of Atlantic City, for example, the map shows new islets by Little Egg Inlet. Elsewhere beaches have moved back about the width of a pen stroke, as nature, matching man, also changes the face of Megalopolis.

* **Washington to Boston** is the 32d uniform-sized map issued by the Society in the past five years; it becomes Plate 7 in the Atlas Series. A convenient Folio is available to bind the maps; it may be ordered from the National Geographic Society, Dept. 30, Washington 6, D.C., at \$4.85. Single maps of the series are 50 cents each; a packet of the 28 maps issued from 1958 through 1961, \$8.80; a combination of the 28 maps and Folio, \$12.25.

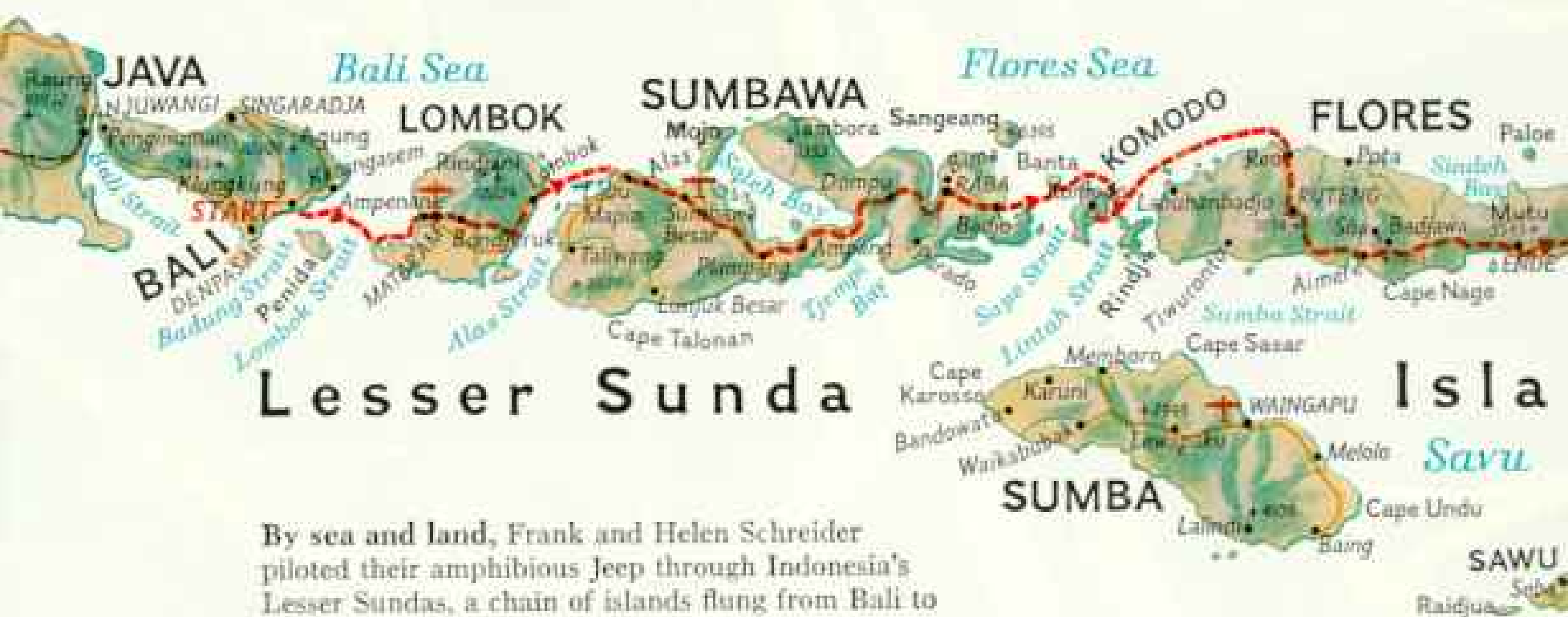
Ribbons of concrete belt Greater Boston from South Weymouth to Gloucester, carrying traffic in a great arc around the city's heart. Residents call Massachusetts Route 128 “Electronics Row” because of its many research laboratories and plants.



East From

Article and photographs by

HELEN and FRANK SCHREIDER



By sea and land, Frank and Helen Schreider piloted their amphibious Jeep through Indonesia's Lesser Sundas, a chain of islands flung from Bali to Timor. Here they run from Komodo to Flores.

WE LEFT BALI shortly after dawn, when the sun glared garishly from the east and the shacks of the salt-makers stood golden on the black sand beach.

Tortuga II, our amphibious Jeep, slipped easily into the long, gentle swells. Around us the outrigger canoes of Balinese fishermen skated across the sea like water spiders.

"Go back, *tuan*," one old man called. "Go

The Authors: World wanderers Helen and Frank Schreider spent more than a year piloting an amphibious Jeep along the 3,000-mile span of islands that form the Republic of Indonesia. They told of Java, Sumatra, and Bali in a NATIONAL GEOGRAPHIC article in May, 1961: "Indonesia, the Young and Troubled Island Nation."

back. The stars are wrong. Your journey will be ill-fated."

But our spirits could not be dampened by the Balinese dread of the sea—to them the abode of demons. It took the waters of Lombok Strait to do that.

Our bow was pointed eastward, to the first in a chain of little-known islands that stretches from Bali more than 700 miles (above). Our goal was Timor, at the end of the Lesser Sunda Islands, the outriders of the Republic of Indonesia.

A hundred years earlier the great English naturalist Alfred Russel Wallace had crossed this same channel. He was searching for data to confirm his theory that Lombok Strait was

Bali

BY SEAGOING JEEP TO TIMOR



BOOKCOVER © NATIONAL GEOGRAPHIC SOCIETY



the dividing line between the Asian and Australian worlds of plants and animals. From Bali westward, he believed, were the tropical vegetation, the elephants, tigers, wild cattle, and monkeys of Asia. But east of Bali were the thorny, arid plants, the cockatoos, parrots, and giant lizards typical of Australia.

Although scientists today question his theory, Wallace added much to the world's knowledge of Southeast Asia.

Beyond this we knew little of what we would find in Nusa Tenggara (meaning Southeast Islands), as the Lesser Sundas are called by the people of Indonesia. In our long stay on Java, we had met only three Indonesians who had ever been east of Bali. This

was almost terra incognita; the Dutch, in their 350-year rule, did not pacify the wild tribesmen of these islands until the early 1900's. Even today, except for a few officials and soldiers (who consider themselves exiled), the eastern islands are only frugally served by the Indonesian Government.

Islands Divide Two Oceans

Perhaps one reason the Lesser Sundas remained isolated so long is the strength of the currents in the straits separating them. Stretching some 3,000 miles all told, from the Asian mainland south and east toward Australia and New Guinea, the Indonesian archipelago forms a massive dike between the Pacific and



Indian Oceans. Like floodgates, the channels between the islands equalize the pressures as the seas rise and fall with the tides; the currents sweep from sea to sea at speeds sometimes up to ten knots.

Yet we felt confident. *Tortuga II* and her predecessor, *Tortuga I*, had safely carried us hundreds of miles along the coasts of Central America, down the Ganges River of India, and across the swift strait between Java and Bali.*

Especially designed for our Indonesian voyage, 15-foot *Tortuga II* incorporated all the experience of our previous journeys. She had a more powerful engine, a dual cooling system for sea travel, a calibrated compass, and a chart table for navigation. Her galley included an alcohol stove and a tiny sink with water piped from a ten-gallon tank in the bow. Her cabinets held canned food enough for two months, her fuel tanks enough gasoline for 150 miles at sea or 750 miles on land.

Through the help of Standard-Vacuum Oil Company in Java, additional fuel had been sent ahead by native sailing proas to strategic points along our route.

Now we faced the longest nonstop crossing we had ever made. Barely visible some 50 miles eastward rose the mist-shrouded mountains of Lombok. Somewhere at their feet was the small port of Ampenan, our destination for the day.

Tortuga churned ahead at a steady four

*The authors told of their adventures on the Ganges in "From the Hair of Siva," NATIONAL GEOGRAPHIC, October, 1960. Their book *20,000 Miles South*, Doubleday and Company, 1957, describes their earlier trip from Alaska to Tierra del Fuego by amphibious Jeep.

knots, alone on the sea. Her flag flapped idly in the light breeze of the east monsoon, and a white wake bubbled behind her. Lulled by the warmth and gentle rocking, Dinah, our well-traveled German shepherd, dozed on her seat.

Once an hour we took bearings on the peaks of Bali and plotted our position. Except for those tiny dots on the chart, we had no sense of movement.

Race Against Tide and Trouble

By noon our course line extended smoothly to the center of the strait. But our one o'clock position put us radically to the south. The current had changed direction with the tide. We were being swept with the ebb toward the Indian Ocean.

I increased our speed to six knots, close to *Tortuga's* maximum, and changed course. Far to the north, Ampenan was already out of reach. Hoping for help from the current, we headed for a sheltered cove to the south.

Toward midafternoon the current grew stronger still, and when the wind swung toward the north, a heavy chop built up. *Tortuga* plunged her bow in the troughs and reared crazily on the crests. Spray shot high and whipped aft with the wind, until we were drenched.

The clack of the windshield wiper and the thud of waves drowned the rumble of our propeller. Helen first noticed that something was wrong—a discordant grating. Beneath an inspection plate in the floorboard, a propeller-shaft bearing felt hot to my hand.

An injection of fresh lubricant pushed out

Curiosity seekers mill around the Jeep in Bondjeruk, Lombok. Men as well as women wear typical Malay sarongs. Two-wheeled *dokar* (from the English "dog cart") obscures the horse that draws it.

Tortuga II crawled ashore on this island's western side after a difficult passage through the currents of Lombok Strait.

Waking aboard the Jeep, Frank Schreider awaits an eye-opening cup of coffee poured by his wife Helen. They rise early to catch a tide that will float them over a coral reef.



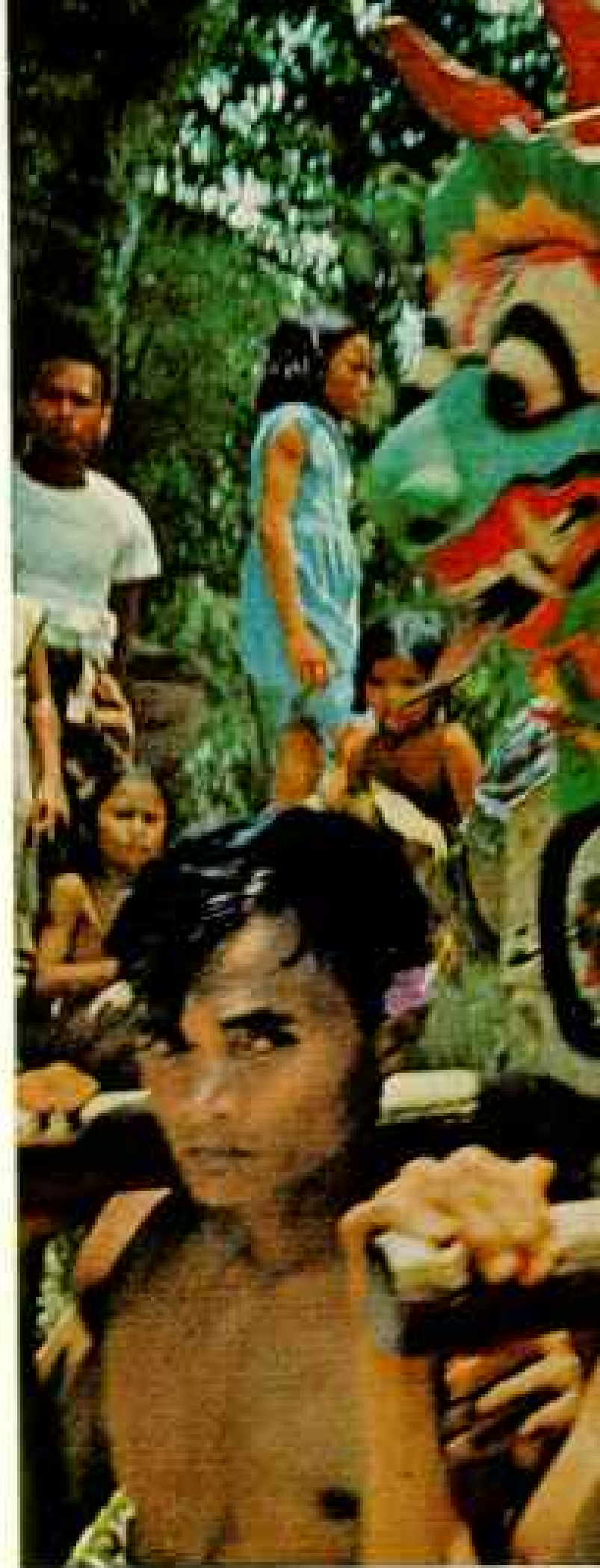
STYLING BY HELEN AND FRANK SCHREIDER © S. C. S.

a blob of grit-filled grease, but the damage was already done. It would be only a matter of time before the bearing gave out entirely. We changed course again, this time toward a narrow peninsula jutting into the strait. If the bearing held out another two hours, we would make it. If not, we would be adrift on the open ocean by nightfall.

Shortly before dusk, engine laboring, we pulled up on a coral beach near a small village. The current had pushed us 18 miles south of Ampenan.

Dry and brambly, the area appeared sparsely populated, but within minutes we collected a throng of visitors. Amiably they crowded around the Jeep as Helen prepared supper, exclaiming at the wonders of our stove and the water that flowed from a pipe.

All through Java and Bali we had practiced our Bahasa Indonesia, the new national language of the sprawling island republic. But when we greeted the villagers, we received only blank stares. With less assurance I repeated my words, adding that we didn't speak the language well.



Popeyed lion with palm-frond tail bears a Lombok boy to a circumcision ceremony. Borrowed from Hindu Bali, the mythical beast attests Moslem Lombok's cultural ties to her neighbor on the west. Older boys shoulder the litter.

Sunlight dappled by a lattice dots Lombok men grating coconuts for the circumcision feast, an occasion for pageantry and courting. Man in center wears Indonesia's black "liberation cap."



EDDIE HOBBS © NATIONAL GEOGRAPHIC SOCIETY

At the words "Bahasa Indonesia," a boy in his teens spoke up: "*Saya juga, tuan*"—"We don't either." The people of Lombok had their own tongue, Bahasa Sasak.

One old lady, wrinkled and gray but slender and straight as a girl, cried, "*Minta lihat*"—"Let me see." But it was dark, and we promised to show her the inside of the Jeep in the morning. Before dawn she was back—with a handful of precious eggs as a present.

Customs Officer Takes Visitors Home

In six sun-drenched hours, interrupted by frequent cooling dips in the sea, we replaced the bearing from our stock of spares. Next morning we headed up the coast again, and by afternoon we were in Ampenan.

At the police station—we were required to report to police, army, and customs officials on each island—we presented our credentials. I was asking where we could find the customs officer, when a Jeep pulled up outside. The customs officer had found us. Such enterprise, I feared, could only mean trouble. I was wrong.

A smooth-faced young man in crisp, sun-tan uniform spoke in excellent English: "I'm Tjipto Soemirat. Where are you staying?"

I confessed that we didn't know.

Chip, as he insisted we call him, broke into a quick smile. "Then you must stay with us." He indicated his attractive Javanese wife accompanying him. "There are no hotels on Lombok, and we like to entertain foreign guests. We don't have many."

We were scarcely settled in Chip's new, tile-roofed home when a thin, scholarly man, Mr. Laludjaja, relayed an invitation from the chief of a neighboring village:

"There's to be a circumcision festival. The chief asked that you bring your Jeep."

It seemed that the boys who were to take part in the ceremony were not too enthusiastic. The chief wanted a bit of diversion.

On the way Mr. Laludjaja pointed out Lombok's few historic remains: At Mataram, seat of the Hindu principality that once ruled Bali and Lombok, the grounds of the palace are now a public park. At another princely



Double bamboo flute played by a Florinese boy shows kinship to pipes in the Balkans, according to some authorities. A man-size sarong billows over the child's waist. Ears of corn in the husk dangle from a drying rack in the distance.

Wooden Bells a Yard Wide Make Music as Oxen Harrow a Lombok Rice Field

Hollow claps of the bells lighten the work of landowner and neighbors, who lend a hand. "I much prefer the note of cattle bells to the roar of tractors," says Helen.

estate, boys swam in the huge pool and dove from statues around the edge, while in the shade of walls carved in Balinese style, teenagers strummed guitars.

"Most of our buildings were destroyed in the Lombok War of 1894," Mr. Laludjaja explained, "when the Dutch defeated the Balinese princes and set up their own rule.

"Religion here on Lombok," he continued, "has followed the same pattern as in most other parts of Indonesia: first animism—the belief that all things have a spirit—then Hin-

duism, now Islam. But animism persists."

He pointed to an open shed where stones lay wrapped in white cloths. "Rocks are still revered as the source of the soul. Those are believed to come from Mount Rindjani here on Lombok, Indonesia's highest peak. Rindjani means 'place where the child is born.'"

In the village where the ceremony was to take place, thatch-and-cane houses were decked with palm leaves and streamers of colored paper. Under a bamboo shelter women in loose black blouses and black sarongs tended a line of blackened pots where rice steamed over wood coals. Men grated coconuts (page 240), and in one corner hung the wide-horned heads of sacrificed buffaloes.



Later the shelter grew crowded with young girls, who sat and chatted on the ground, indifferent to the gifts of fruit offered by the boys of the gathering.

"I should think she'd at least thank them," Helen commented, after watching one attractive girl ignore five gifts from five admirers.

"She can't marry them all," Mr. Laludjaja said with a smile. "The gift she accepts will be from the boy of her choice."

Celebrants Feast on Buffalo Curry

As much as a time for courting, the event was a time for eating—mounds of rice, eggs fried in coconut oil, tiny silver fish eaten whole, and a variety of sugared rice and coco-

nut molded into cones and diamonds and colored pink, green, or shiny black. Lombok is named for the old Javanese word for chili pepper, and I'm sure they used the season's crop in the main course—a scorchingly flavored buffalo-meat curry.

After the feast came the procession preceding the circumcision. Three boys and two girls, each about 12 years old, all elaborately costumed, were carried through the village atop carved and painted wooden horses, lions, and mythical birds (page 241).

"Do girls participate too?" Helen asked.

"Now they merely accompany the boys, a carry-over from a time when female circumcision was practiced," Mr. Laludjaja said.

243

PHOTOGRAPHS BY HELEN AND FRANK SCHREIBER © NATIONAL GEOGRAPHIC SOCIETY





"Visitors from space," excited islanders called the Schreiders. A wave of villagers escorts *Tortuga II* through the fishing community of Labu Mapin on Sumbawa. Jeep flies the United States yacht ensign; an island guide rides her hood. Thatched houses, which stand on piles, seldom need sweeping, for dust drops through cracks in bamboo floors.



Antique wedding finery, relic of the pomp of the 1700's, glitters on a cousin of the sultan at the old palace of Sumbawa. Frank studies a ceremonial kris.

Golden ornaments crust the horned headdress of a bridal costume modeled by a relative of the sultan. Gold bands weight her arms, and a golden thumbnail signifies royalty's exemption from labor. Rice powder whitens her face. Silver threads woven into silk star the blouses of both women. Sumbawa makes little silver brocade today, for duty on silver thread is prohibitive.



"Is there a road here?" I called in the Indonesian language. At their puzzled nods, I shifted *Tortuga* to wheels and rolled up the beach. And then a few score stilted bamboo houses erupted (left).

Tortuga became the center of a bobbing mass of *pitjis*, the black caps that are the symbol of Indonesian nationalism, as men crowded in. The women kept back, their stark, white-powdered faces staring, while wide-eyed children peeped through a forest of legs. It was a noisy but friendly welcome for the first Westerners to touch here since before World War II.

The "road," a twisting, jolting trail, followed Sumbawa's indented north coast. At Alas, the first town of any size that we came to, we made the official rounds of the mayor, the police, the army commander, the customs officer, and back to the mayor, who had invited us for lunch.

"It's the custom that no one visiting our town can leave hungry," he said. "But wouldn't you like to bathe first?"

We were led to the back of the house to the *mandi*, a big tub of cool water that is dipped and poured refreshingly over the body.

"But the operation must be painful for boys so old," I remarked.

"It is, and they receive no anesthetic here. Actually, to many people the significance of the ritual is lost. Ask them and they answer '*adat*'—'custom.' But the tradition remains strong: Each boy, as he becomes a youth, must be willing to suffer pain for Allah."

Wooden Bells Toll During Plowing

We drove on eastward across Lombok's green and fertile central plain, amply irrigated by streams from neighboring mountains. Terraced rice fields alternated with neat rows of tobacco and fields of ripening corn. Here were raised Lombok's many golden-brown, deerlike cattle, and here lived most of the million or so inhabitants.

In many places dozens of teams of oxen were plowing a single small field. The deep sonorous tolling of their immense wooden bells, many of them a yard across, played accompaniment to this *gotong-rojong*—an oft-heard Indonesian phrase meaning "community effort" (page 242).

It was an easy run across the 16-mile Alas Strait to Sumbawa. At the tiny village of Labu Mapin, a few men in dugouts paddled out to meet us.





© NATIONAL GEOGRAPHIC SOCIETY

As we rejoined the mayor, his wife whispered to Helen, "Here's some powder. You're very dark from the sun." She offered some ghostly-white rice powder. In vain Helen explained that Americans work hard to acquire the Indonesians' beautiful golden color.

Sultan Survives From a Past Era

Sumbawa Besar, our next stop, had a sultan. A small man of friendly dignity, he lived in a two-story, Norman-style house that contrasted strangely with the bamboo-and-thatch dwellings that crowded the town. His old palace, now deserted except for a few relatives, was a long barnlike structure that appeared about to collapse. Below the entrance lay a rusted cannon, a relic of the Dutch East Indies Company that once administered all of what is now Indonesia.

Only a few faded costumes recalled the extravagance of this lost era. Today the sultans are no longer in power. Instead, they serve as appointees of the government; eventually, elected officials will take their places.

Sumbawa is sparsely populated, and we often drove 15 or 20 miles between villages.

Sometimes we saw no one for hours on end, but always, when we made camp, the *kulkuls* would start their booming. These hollow log drums became a nightly punctuation to our sleep, and usually the message they carried was about us.

At Dompu, another ex-sultanate, we called at the "palace," indistinguishable from the other boxlike, tile-roofed houses except that it was a little larger.

We had heard of the fine, hand-loomed silver cloth of Dompu, and also of its unique dances. But when we mentioned these to the sultan, he smiled sadly and said:

"The government discourages the import of silver thread, to save foreign exchange. Machine-made cloth from Java is cheaper.

Warriors Orate While Dancing

"As for our dances," the sultan went on, "only a few old men remember most of them. We try to teach the young people, but they are more interested in your music. But you shall see some dances."

The following afternoon, to the accompaniment of drums and flutes that sounded like

Gold-and-enamel teeth of a Sumbawa girl flash a gem-like smile. They proclaim the status of her well-to-do farm family.

*Tortuga II Teeters
Above a 50-foot Abyss*

"Stop! A bridge is out," Helen shouted, but the brakes failed, and the Jeep bumped onto the broken span. Villagers helped Frank lever the vehicle back on the road. In one stretch of 80 miles, the authors found 40 bridges washed or rotted out.



Laughing girls of Sumbawa adjust the folds of Helen's sarong. As Moslems, Sumbawa women cover their faces, but these, distracted by Helen, exposed themselves to Frank's camera. Mrs. Schreider cultivated a suntan; friendly Indonesian women, who prefer a light skin, offered her rice powder to disguise it.





bagpipes, the dances were performed in an open area before the sultan's home. A hopping charge with sword held high, a piercing battle cry, and a long speech proclaimed the dancer's loyalty. A two-man mock duel simulated war. A slow pivoting with arms outstretched like a bird arrested in flight displayed the admired coordination of the warrior. Each dancer was in costume, a strangely Arabian dress with a rolled turban reminiscent of a Saracen soldier.

Bridge Out—and No Warning

The road east from Dompou was boulder-lined, chuck-holed, dust-smothered. It ran through parched country, a brown land of

stubbly growth and bamboo villages on stilts. Blue smoke rose from burning forests, a common method of clearing land for cultivation. And always the kulkuls presaged our coming.

Each bend in the road brought a surprise—a deer, a wild boar, a tree down. Then I heard Helen shout from her vantage point atop *Tortuga's* hatch: "Stop! A bridge is out."

There was no barricade, no sign to indicate danger. I stepped hard on the brake; the Jeep slowed, but the pedal went to the floor, and the sharp odor of brake fluid filled the cab. I snatched at the hand brake, but *Tortuga's* 5,000 pounds had too much momentum. Almost as in slow motion, I saw the ruined bridge creep toward us.



EDDACHROWER © NATIONAL GEOGRAPHIC SOCIETY

Thanksgiving dinner on Banta islet, beneath the flag of the Explorers Club, offers canned crab, plum pudding, and coconut milk. Life raft lies on coral sand. Portable short-wave radio beside Dinah, the German shepherd, picked up a Moscow report of "starvation in Detroit."

Using dividers and chart, Helen navigates a choppy sea. Elephant-headed Ganesha, Indian god of prosperity, retired after a bad crossing.

The front wheels dropped into a hole and bounced out; then the rear wheels went down. We gripped anything we could as the Jeep rocked on the edge of the next gap, then steadied, stopped, and hung there.

Trembling, we crawled from the cab to stare at rocks 50 feet below.

It took four hours in the blazing sun and a score of men from a nearby village to shore up *Tortuga's* dangling wheels. Using our small jack and timbers pried from the decrepit bridge, we levered the Jeep inch by inch back to solid ground (page 246).

Thanksgiving Dinner on a Desert Isle

At Bima, chief port of eastern Sumbawa, we stopped just long enough to take on water and refuel.

"Your gasoline has been here a month," said the Chinese storekeeper as the 15 five-gallon cans were carried out.

It was some 60 nautical miles from Sumbawa's east coast to Komodo, island of the dragon lizards—too long for one day's run. We set course for Banta, a small island at the halfway point. About dusk we glided into a secluded cove, a silver crescent of sand with high cliffs reflected in the jade water. We were the island's only occupants, other than giant turtles darting amid clumps of coral in the lagoon, and we spent the following day, Thanksgiving, in peaceful solitude (left).

At the village of Komodo, a double row of bamboo huts on stilts, the chief knew what we had come for. This tiny sunburned island's one distinction is its formidable dragon lizards. Carnivorous, dangerous—so we were warned—they grow to ten feet in length and a weight of 300 pounds.





Hailing an outrigger, Frank inquires the safest approach to Komodo, only village on the island of the same name.

The day's sailing was so calm that Helen washed clothes on the Jeep's bow and Frank read topside, occasionally touching the wheel with his toe. They journeyed to Komodo to see the world's largest lizards (right), which have been drawing expeditions to the island since their discovery in 1912.

Five-foot Komodo Dragons Cross a Gully; Tongues Lick Out Like Forked Lightning

Dragon lizards (*Varanus komodoensis*) show little change from their ancestors of the Eocene Epoch, some 60 million years ago. They exist only on the western tip of Flores and nearby Komodo and Rindja—lands much younger than this breed of monitor lizards. Attaining weights of 300 pounds and lengths of ten feet, they venture from their dens only by day to seek meat. Surprisingly speedy, keen of eye and nose, they are the fiercest lizards known. With their long yellow-orange tongues, they may have inspired the mythical Chinese dragon.



Experienced in such things, the chief had it all figured out. "You'll need eight men to guide you. The lizards are far from here. You can hire two boats from us."

We settled for one boat and four men.

From our sailing proa the following morning, Komodo seemed a far more fitting place for an antediluvian lizard than for the few hundred human inhabitants. Knobby coral embedded with shells gave the feeling of sea-scoured fossils, while in the distance the low saw-toothed mountains appeared like the scaly back of some larger monster.

Dragon Lizards Stay in Their Lair

The sun was merciless when we arrived at a bleak beach and a faint trail to the interior. As we pressed single file through head-high, rasping *alang-alang* grass, wild boar broke snorting from the tangle. Occasionally a white cockatoo would fan its yellow crest and caw hoarsely from some stunted tree.

It was midmorning and hot before we stopped. Suleiman, the leader, pointed to a dry wash overhung with branches.

"The lizards crawl along here in search

of food," he said. He ordered a piece of meat hung a few feet from the ground.

"Now we wait," he yawned, and stretching out on the ground, promptly went to sleep.

Disillusioned at this lack of concern for such allegedly dangerous animals, Helen and I sat tensely. After an hour we were half-dozing ourselves, feeling the biggest danger was the smell of the meat. Already black with buzzing, shiny flies, it gave off a fragrance that should have drawn lizards from all over the island's 200 square miles. By noon we were ready to believe that the dragon lizard of Komodo was as legendary as the holy dragon of the Chinese.*

"Suleiman," I said, shaking him awake, "are you sure this is the right place?"

"Ja, tuan," he muttered sleepily. "Be patient. Some people wait for weeks."

(Continued on page 257)

*Discovered by Western scientists just before World War I, Komodo lizards were brought back to zoos in America and Europe in the 1920's and 1930's. NATIONAL GEOGRAPHIC published "Stalking the Dragon Lizard on the Island of Komodo," by W. Douglas Burden, August, 1927, and "A Modern Dragon Hunt on Komodo," by Lady Broughton, September, 1936.







First car ride awes two wives of Komodo's chief. Assisted by Helen, they alight in their village, which had never before seen a motor vehicle. Dinah, larger than native dogs, caused a furor.

Only Barber Within Miles, Helen Trims Frank's Hair

Along the north coast of Flores the authors saved gas by sailing with the tide for four hours, then waiting for eight while the unbalanced current flowed in the other direction. Mangroves grow in salt shallows.

253

Tropical Fisherman Walks a Moonlit Path

A curious repugnance to the sea affects many islanders of the Lesser Sundas.

Balinese fear the ocean, and Timor tribesmen dislike seafaring. Florinese, on the other hand, catch and consume a fair amount of fish. Adonara and Alor men dive for pearls.

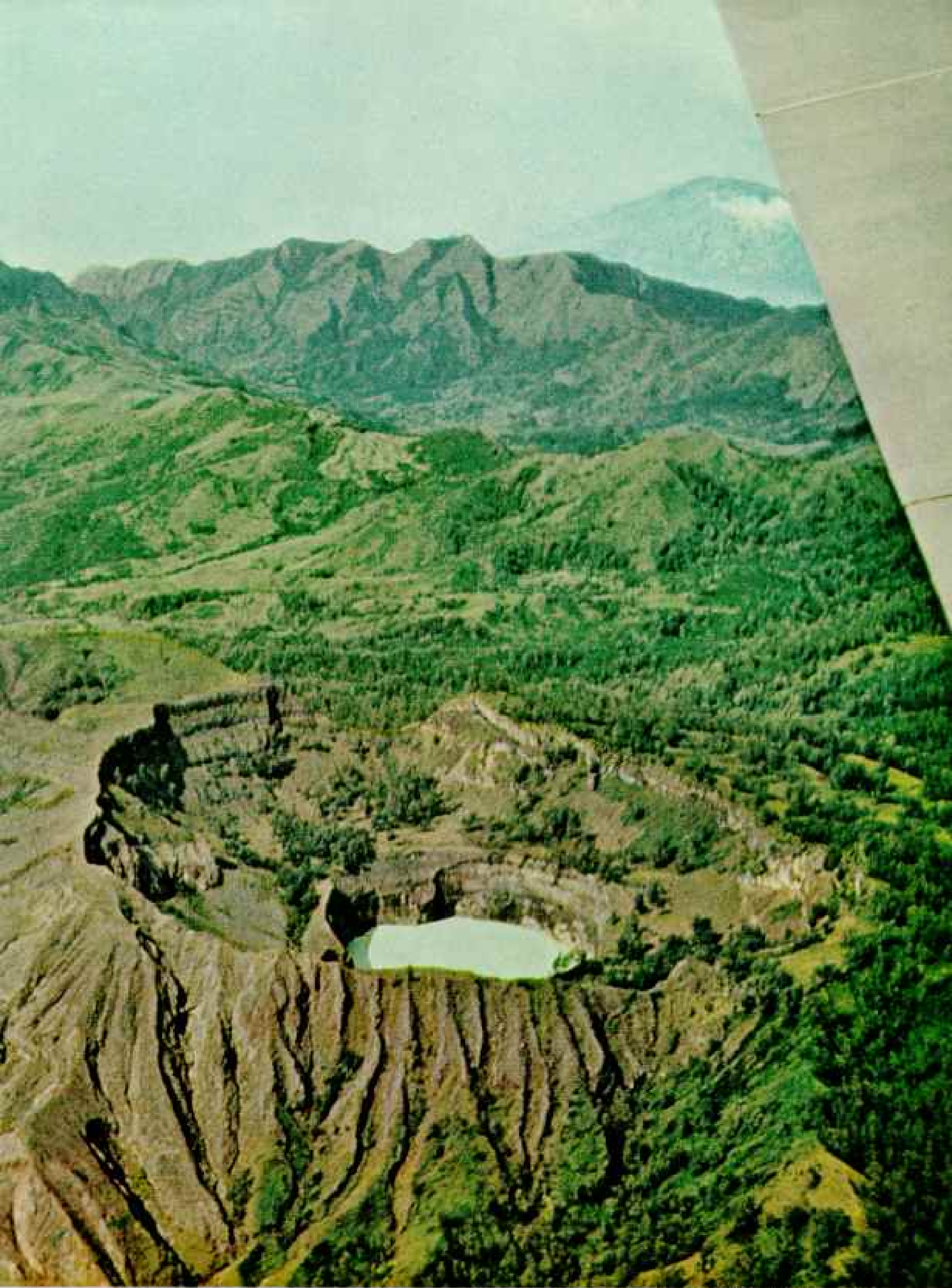
This Balinese hunts shellfish on a shallow reef after sundown.





Mineral-dyed Waters of Crater Lakes
Separate the Abodes of Departed Souls

Salts create three distinct hues in the waters atop
Mount Mutu in central Flores. Souls of sinners
dwell in the burgundy-red lake, tribesmen relate.



KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

Those of young men and virgins inhabit the pea-green pool, and older people the milky-blue one. A recent Indonesian ban stopped the Schreiders

from taking aerial photographs. NATIONAL GEOGRAPHIC photographer J. Baylor Roberts made this panorama in less troubled times.



About midafternoon we heard a rustling in dry leaves down the ravine. As our eyes adjusted to the shadows, we saw a python-size head swinging slowly, its yellow tongue flicking as it sniffed the air and listened.

Cautiously the lizard crawled into the light, moving on squat, powerful legs that held it half a foot from the ground. Sniffing, it looked up at the meat, stretched its snakelike head, then slithered off, confused. About five feet long, it was an awesome creature, but hardly the fierce dinosaur we had expected.

Somehow, the next morning we acquired another boat and four more men—probably to bring our party up to the chief's concept of a proper retinue for dragon-lizard chasing.

Two lizards were already there when we arrived at the gully (page 251). Bigger and more determined—the meat was far more aromatic now—they leaped at the bait, jostling and snapping at each other. I crept closer, but the preoccupied lizards paid no attention.

I signaled Suleiman to lower the bait a little. In an instant it was gone—a coconut-size chunk swallowed whole. Then it was easy to believe that larger lizards can down a deer, a goat, or a wild pig, ripping them apart with saw-edged teeth and devouring them, bones and all.

With more time, the chief told us, we might see some really big lizards, perhaps even see them fighting or stalking their own food. But we could sense the monsoon wind shifting daily, smell the threat of storm in the air; in the late afternoons the sky was dark, the sea turbulent. We had half a thousand miles to go to Timor. Disappointed, but unable to wait longer, we prepared to leave for Flores, the next large island to the east.

Fallen trees often blocked the main road across Flores. Villagers chopped off limbs and cut trunks; then Frank tugged logs from the path with *Tortuga's* power winch. The Schreiders took along mail for isolated missions. Here a slope has been burned off for planting corn. After a few years, forest will reclaim the exhausted land.

Golden helmet, golden necklace, jeweled sword, and two kris adorn the brother of the last Rajah of Maumere, Flores. Family tradition traces the heirlooms back to the days of Portuguese rule in the 1600's.

"But there's no road at Labuhanbadjo," the chief said, running a callused thumb over our map of Flores to the town just across the strait. The map clearly showed a road. We had counted on that road to reach our next fuel supply at Ende, chief port of Flores.

"There's no road," the chief insisted. "It starts here, at Reo."

Next Landfall Too Far Away

In dismay we studied the chart. It was 85 miles by sea to Reo, and *Tortuga's* fuel consumption at sea was five times what it was on land. Even with no current to buck, we couldn't reach Reo on our remaining fuel.

But there *was* a current—a strong one. It offered us one chance. If we traveled during the few hours each day when the current was with us, we might reach Reo before our tanks went dry. To cover 85 miles would take three or four days at least. Luckily there were numerous small, uninhabited islets along the strait where we could land when the tide turned against us—or when we needed sleep.

SEAGRAMMER © N.E.S.



Just after low tide the following morning, *Tortuga* slipped into the bay. With a three-knot northward current behind her, the engine turned over at a gas-saving quarter throttle. *Tortuga's* exhaust gave but a whisper, and the sea life, heretofore shy of an engine's foreign sound, grew bolder. Marlin threw up cascades from their mighty leaps, long chains of porpoises looped across the surface, and occasionally a whale shark surfaced, knifed through the water, and submerged.

More unnerving were the deadly sea snakes, their six-foot-long, wrist-thick bodies of dirty brown and banded yellow sliding through the clear water, their blunt heads just above the surface, until with a thrust of their flat tails they plummeted to the depths.

The route we chose was the shortest, but

not the safest; this area is infamous for unmarked reefs and shoals. But every mile saved was that much extra gasoline, and we steered a direct course over the shallows—until, swept by a whirling eddy, we saw a blue-green shoal of coral rushing under us. Quickly I swung *Tortuga* across current, but we were carried broadside. Like birds enchanted by a snake, we watched the reef rise toward us until a wheel rocked over a high point. Jarred, I floored the throttle until we were in safe water.

At high tide, with the current changing, we came ashore on a small, cone-shaped island rising steeply from the sea.

Next morning we charted our course northeast along the coast of Flores, an area known to be rich in pearls. Along this lonely coast



Eyes glaring and nostrils flaring, a whip dancer raises a leather shield and readies his lash for a stroke. Painted wooden helmet, decorated with horsehair, projects over his face like a welder's mask.

Dancers at Ruteng, Flores, Fight a Ritual Duel With Whips

Drums beat and villagers shout encouragement as whips deliver blows aimed to take out an eye or slice off the tip of the nose. Never acting out of hatred, the dancers test their skill in an ordeal of courage. Duelist at left wields a rawhide snapper at the end of a length of rattan and parries blows with a shield. His adversary's short whip moves too fast for the camera; wooden helmet and towel-protected arm ward off blows. At intervals the two men trade weapons.



there was little to see besides the dark rugged mountains masked in heavy clouds or the occasional clump of palms that marked the presence of a village. By checking landmarks, we plotted our progress on the charts.

Using the engine only to maintain minimum steerageway, in three hours we traveled 11 miles with the current, before poling our way over a reef to another island, a desolate, waterless, treeless mound.

Adventurers Pause to Do Chores

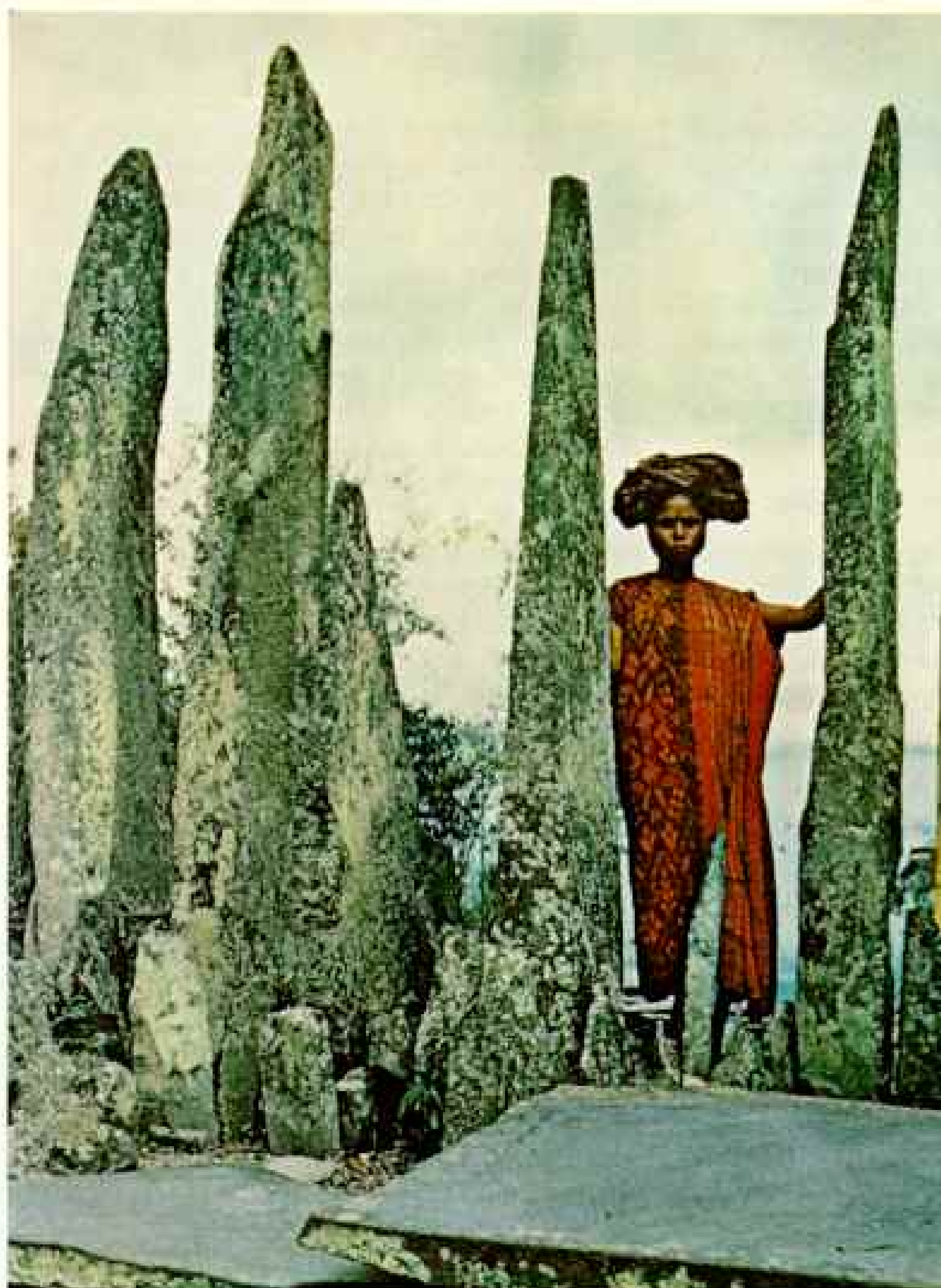
With the vibration of *Tortuga's* engine still humming in our ears and the ground still rocking under our feet, we passed the afternoon with mundane tasks: servicing the Jeep, washing clothes in the sea, and cutting each other's hair (page 253).

In an hour we explored the island to its farthest corner, apparently an overnight stop for some itinerant fisherman; a driftwood fire still smoldered near a rude shelter, and a hollowed log lay half-filled with putrid fish. It was an uninviting place—no romantic beach, no graceful palms, nothing but bushes and foot-scarring coral. We welcomed the cool of evening when we stretched atop *Tortuga* to sleep until morning.

At low tide the next day, our exit was blocked by a reef. The lovely branches of coral that had glowed violet under four feet of water were now gray on the dry shore. Starfish as blue as sky lay limp, orange sea slugs were shriveled and lifeless, and the black spines of sea urchins drooped as the water receded, leaving them stranded in some

FOORCHROMES BY HELEN AND FRANK SCHREIDER © NATIONAL GEOGRAPHIC SOCIETY





REDUCED FROM NATIONAL GEOGRAPHIC SOCIETY

Needlelike stones near Soa, Flores, have witnessed pagan rites for thousands of years. Introduced by Stone Age peoples, they are symbols of an animist faith that endows every natural object with a spirit. Flat stones served as altars, the authors believe. Despite the rise of Islam and Christianity, the spirit cult persists in the Lesser Sundas.



Star-pointed lamps

pool in the coral. Over everything hung the saline stench of exposed reef. By the time there was enough water to float *Tortuga*, we had only an hour to travel before the tide changed again.

Troops Meet an "Invasion" Threat

So the days passed, each one bringing us a few hours, a few miles closer to Reo, each day diminishing our fuel supply.

On the fifth day our drinking water was nearly gone. We decided to risk a final run, the last 35 miles to Reo. We found the band

of agitation on the surface of the sea that meant fast current, and with *Tortuga* at half-throttle we moved along at six knots. When we landed at Reo late in the afternoon, our tanks held fuel for only four more miles.

Within minutes of our arrival a truck raced down the road, careened over a small bridge, and stopped. Led by an Indonesian Army lieutenant, and bristling with Sten guns, automatic rifles, and bayonets, a platoon of helmeted soldiers engulfed us. Apparently they were expecting something far more menacing, for after one look at *Tortuga* and her bedrag-



light the New Year's Mass at Larantuka, Flores's first Indonesian priest instructs his flock.

gled crew, they sheepishly stacked their weapons.

"Sorry," the lieutenant said, "but we can't take chances. Reo has been a beachhead before for invasions of Flores." He indicated the rusted hulks of landing craft in the bay. "Those are Japanese, from World War II. And that beached proa is rebel. We've had two rebel attacks this year. When our lookout reported a strange craft in the bay—well," he smiled, "you *could* have been leading a new invasion."

There was no gasoline for sale at Reo. No

ship had arrived there in months, and even the Army had only what was in the truck. But somehow the next morning the quiet-spoken, friendly lieutenant found five gallons for us, and we set out for Ruteng, the next point on our course.

Young Florinese Learn New Skills

After months in the humid lowlands, the crisp air of 4,000-foot-high Ruteng was an invigorating change. An orderly little town, Ruteng was the west Flores headquarters of the Society of the Divine Word, a world-wide



Hands fly beside a surf-edged beach as a Florinese woman weaves an *ikat*-style work of art. First she tied fibers tightly around the warp threads. Then she dyed the warp and removed the wrappings, and the pattern showed up as light on dark.

Foraging sow on a Flores road carries a bar beneath her neck to prevent her pushing through fences and into homes. Villager balances a load on his head as he strides past irrigated rice fields.



Beads tell the story of trade with Flores even before the Portuguese came in the early 1500's. Ancient Rome made the two large beads; Egypt, the smaller one. Fourteenth-century Venice fashioned the opaque white string; modern Germany, the blue. Prized orange string from India might buy a wife.



RESEARCHER © NATIONAL GEOGRAPHIC SOCIETY

Catholic mission group of German origin. With young Father Robert Stiller of Pennsylvania, we wandered through the mission's well-kept buildings.

"Here we have more than a hundred Floresese girls studying home economics, hygiene, and child care, as well as mathematics, history, and English," he told us. "We also train carpenters, blacksmiths, machinists, sheet-metal workers, and masons."

We walked along a narrow, muddy path where dark-skinned, sarong-clad girls carried home giant bamboo tubes full of water. Father Stiller pointed to thriving gardens.

"Not many years ago our people were tilling the soil with pointed sticks. They still do

in some parts of Flores. We try to help them with better tools and seed."

We came to a circle of wooden huts on stilts, each roof crested with a pair of horns, symbol of the buffalo cult common to all Indonesia. Seated on straw mats, we waited as the chief's wife prepared the welcoming *sirih*. From her ceremonial headdress tiny silver fish dangled as she squatted gravely on the ground, smearing the dark-green leaves and red betel nut with lime before presenting it to us to chew.

Dancers Duel With Whips

Our "enjoyment" of the sharply bitter *sirih* was interrupted as two men danced into the open area in the center of the village. Each



© NATIONAL GEOGRAPHIC SOCIETY

Spear poised, face painted, an Adonara warrior launches a mock attack. Son of a head-hunter, now a Catholic priest's aide, he wears palm fronds as battle camouflage. Wristwatch is not rare.

Bronze kettledrums, some made by a Bronze Age people, serve as currency on Alor, in values from 50 cents to \$3,500. Warriors with stout four-foot bows show Helen one of their "coins."



carried a buffalo-hide shield and a wicked-looking rattan whip about a yard long. Behind brightly painted masks the contestants sang loudly of their bravery, while village girls beat accompaniment on gongs and goat-skin drums. This was to be the *tjatji*, a chilling game of physical prowess, a whip duel (pages 258-9).

Whistling and snapping, a whip struck a shield. *Whish*—a softer thwack, and a bloody welt appeared on the victim's back. Concealing his pain, he did a hopping jig in derision of his opponent.

Priests Contend With Spirit Worship

If the roads on Sumbawa were an endurance test, those on Flores were an obstacle course. Some 400 road miles from end to end, Flores is one rugged ridge of volcanic mountains. It had already been raining in the highlands for weeks; the hills were green and lush, the roads an abominable mire.

Barely a day passed without our clearing fallen trees, boulders, or slides, or winching across some swollen stream where a bridge

had been washed out years before (page 256).

At Soa, a village in central Flores, we waited while Father Mommersteeg, a veteran of 23 years there, treated some of his ailing parishioners. With only four doctors for the island's half-million-plus inhabitants, the Catholic priests double as medics.

"The Florinese," Father Mommersteeg explained as we walked toward the center of the village, "are animists. They believe in one supreme power, a belief that makes it easier for us. But they also believe that everything has a spirit, some evil, some good. And that's where we have trouble. We want them to associate the good spirits with the Lord, but they say that since the good spirits would never harm them anyway, why bother with them. Only the bad spirits must be appeased."

Soa is built around what looks like a large amphitheater. Tiers of huge rocks form walls at different levels, and in the center stands a *peo*, a kind of totem fetish in the shape of a wooden doll. Nearby is another pole topped with an image of the Virgin Mary.

"It's quiet now," Father Mommersteeg said.

Bearded Frank types *Tortuga's* log on the beach. His current-tossed Jeep took 11 hours to make the 20-mile crossing from Alor to Timor, verifying the observation—"a very strong Tide"—made 262 years earlier by English buccaneer William Dampier.





Rusting hulks of Japanese landing craft clutter the quiet harbor of Dili, capital of Portuguese Timor. Allied bombers, attacking in World War II, leveled every building but one. Partly rebuilt, the city of 6,000 trades with Netherlands New Guinea in coffee, copra, hides, and wild beeswax. Small boats rest overnight on the beach.

Hackles bristling, fighting cocks square off at Maubisse, Timor. Lacking metal spurs, the birds seldom inflict serious injury; Shoulder cloths double as turbans.

"But when the harvest is in, the Feast of the Carabao will be celebrated."

We pressed him for details, and reluctantly he continued: "The people want a scapegoat, something to suffer for their breaches of adat, or tribal custom, so that sickness or plagues of rats won't come to the village. They tie a buffalo in this open arena and throw spears and knives at it until it's wild with pain and fear, until it bleeds to death.

"It's a dreadful custom, discouraged by both the government and the church, but it will be a long time dying out. You see, there's another factor involved."

He led us to a hut where dozens of buffalo skulls hung on the walls. "The man who donates a buffalo for the feast gains face, and

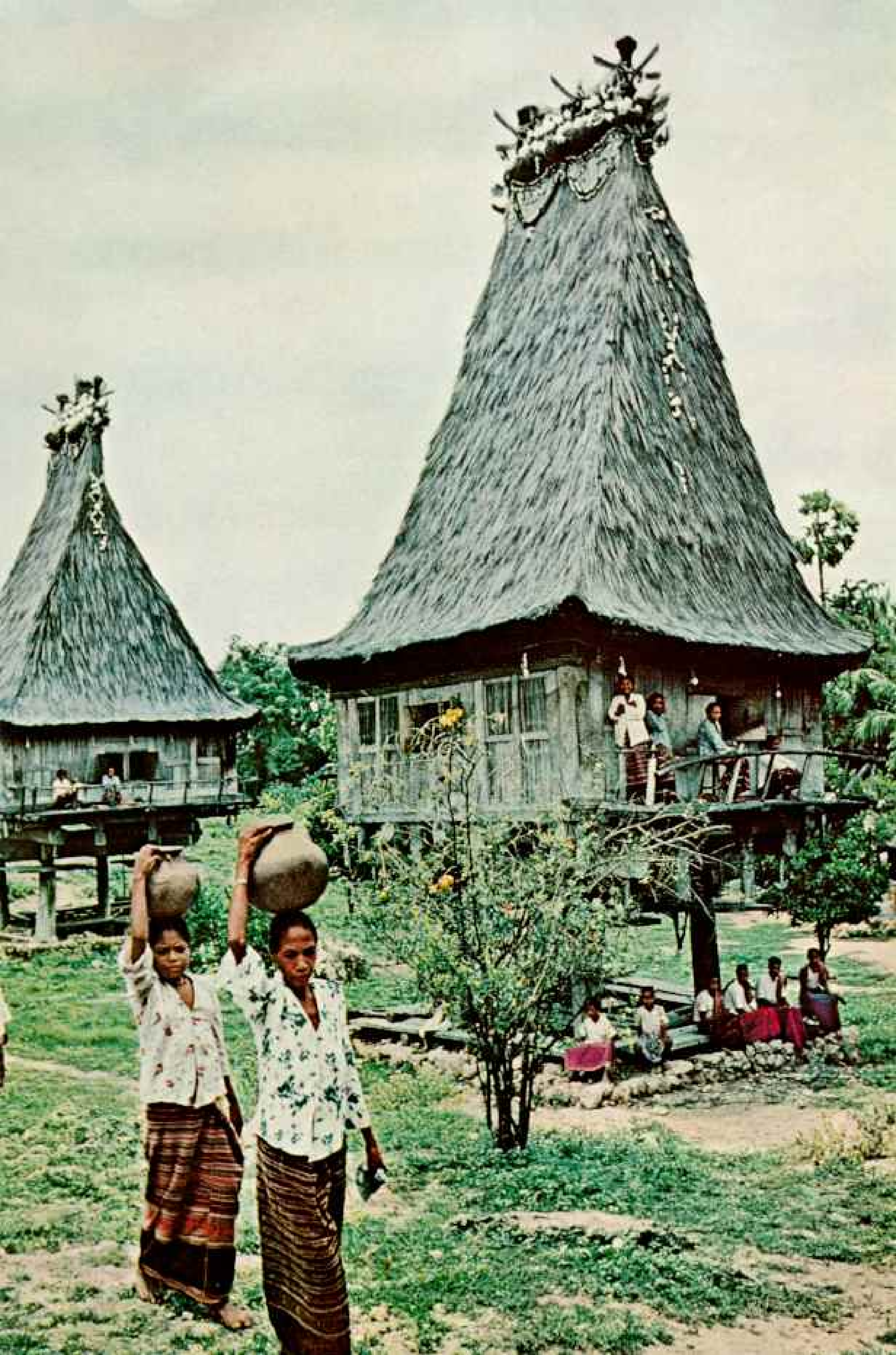
to a Florinese, prestige is all-important. This family used to be one of the wealthiest in the village—until it gave all its buffaloes. Now it has great prestige, but that's all."

Travelers From Afar Came to Flores

Many of the priests on Flores have taken a keen interest in the island's culture. Father Verhoeven studies prehistory and archeology. In his office, surrounded by fossils of elephant-like stegodons, giant rats and reptiles, implements of stone and bronze, and plaster casts of early man, we questioned him about the past of Flores.

"There are no records of the first peoples," he told us. "But from anthropological studies it is believed that many waves of migration





have influenced Flores. There are traces of people who might have come from India thousands of years ago.

"Some scientists connect Flores with the Balkans because of similarity between musical instruments [page 242]. Others intimate a relationship with Easter Island in the Pacific. There's much theory but little proven fact, yet one thing is quite certain: Hundreds of years ago Flores already had trade with the West. The Portuguese stopped here on voyages to and from the Spice Islands, the Moluccas, in the 16th century. They traded for sandalwood and set up several bases."

Father Verhoeven held up a string of opaque white beads. "These are Venetian, probably from the time of Marco Polo. And these five-sided amber and glass beads are Roman, while this serrated red and blue one is like those found in the tombs of Egypt, from before the time of Christ. They were all found on Flores [page 262]."

"The people place great value on them. With a string of these orange Indian beads, for example, you can buy several buffaloes—and possibly a wife."

At Ende, we picked up our next stock of gasoline. Larantuka, at the eastern end of the island, was our last stop.

On New Year's Day the shore was white

with Larantukans in their holiday best, shouting farewells as *Tortuga* plunged into Flores Strait on a 16-mile leg to the next island.

Four hours later we came ashore at the village of Waiwerang on Adonara, amid the relative quiet of popeyed stares. But the quiet did not last long. Like grass fire the news of our arrival spread. People descended upon us, filling the narrow ways so *Tortuga* barely crawled; they reached into the cabin, pinching and tweaking us, shouting and waving until we thought poor Dinah would go mad trying to defend us.

Then the noise stopped as if sliced by a knife. The people fell back, and we were encircled by a new group silently holding hands in a ring around us. Stunned, it was our turn to stare openmouthed as a burly European burst smiling through the mob and said:

"Welcome to the Island of Murderers."

"The name fits," Helen replied shakily. "We thought we were the next victims."

"Oh, these aren't the murderers," our rescuer said, indicating the now thoroughly cowed villagers of Waiwerang. "These boys guarding your craft are the wild ones. I'm Father Van der Hulst. Been here 26 years."

We followed his pickup truck along an overgrown trail to his mission station in the hills, still dumfounded at the way the hymn-

FOURCHURCHES © NATIONAL GEOGRAPHIC SOCIETY

Vertical Houses on Timor Wear Pointed Crowns

Prosperous families of Vila Nova de Malaca store corn in the peaks of their bamboo-and-timber homes. Symbolic buffalo horns jut out from rooftrees 50 feet high. Nautilus shells on tops and sides replace the skulls that once decked warriors' houses.

Awning-striped shopper sits beneath his umbrella hat in Maubisse market. Maubisse men show an influx of Papuan blood; they shave by plucking out hairs.



singing boys in the back of the truck had tamed those hundreds of villagers at Waiwerang. Later, when the boys exchanged neat Western shirts and trousers for war paint and spears, we understood (page 264).

"You see," Father Van der Hulst explained, "there are two rival clans in the hills of Adonara. Like the Hatfields and the McCoy's in your country, they've had a running feud for hundreds of years. No one remembers how it started, but the coastal people dread becoming involved. They become very quiet when the mountain folk are around."

Doctor Has 130,000 Malaria Patients

From Adonara east, despite the protection of the islands making up the Alor group, we could feel the winds strengthening. We were still 165 miles from Timor, and bad weather was predicted by local fishermen, weather prophets we had learned to respect.

We made the 100-odd miles to Alor in four six-hour runs amid rough seas and darkening skies. At Kalabahi we lunched with a young German doctor and his wife. With 130,000 patients, Dr. Harald Klevenhausen had reason to look tired. But there was more.

"Malaria," he explained. "I've had 27 attacks in three years. There's 100 percent incidence here, plus yaws, tuberculosis, dysentery, and leprosy. I came to study tropical medicine. I came to a good place."

The next morning the doctor called the old sailor who captained his proa, and together we studied the charts. The old man, a wrinkled, grayed Moslem, scratched his beard.

"This is a bad time," he said. "Soon the moon will change, perhaps three days more, then storms for perhaps two weeks."

Three days to reach Timor, 65 miles by sea in three days. It would be close.

"Before you go," Dr. Klevenhausen said, "you must see the *mokos* of Alor."

With the doctor and the police chief—who refused to leave town without a number of armed soldiers—we drove around the bay to a village on the far side. The doctor spoke a few words to the chief, and then, escorted by a group of warriors, the *mokos*, cast-bronze

kettledrums, were brought out (page 264).

"These are found buried in the ground," Dr. Klevenhausen said. "There are thousands of them on Alor, only a few in other parts of Indonesia. Probably they were brought here in trade; they're decorated with Hindu motifs, and similar drums have been found in central China. But the people have no memory of how they got here. They say the drums are gifts from the gods."

"But what are they used for?" we asked.

"They're a symbol of wealth. Everyone strives to obtain at least one *moko*. You can buy most anything with a *moko*—land, a wife, even a human head. Whole tribes will go to war over especially prized *mokos*."

The doctor stepped to one of the warriors standing nearby. From the fan of arrows in his belt he selected a particularly wicked-looking one.

"This is a war arrow. Look at the barbs."

The viciously pointed tip had eight backward-slanting blades.

"When they go to war," Dr. Klevenhausen said, "they sharpen dried, hollow chicken bones and press them over the arrowheads. When the arrow hits, the bones splinter."

The original dumdum bullet.

The doctor accompanied us to a bay on Alor's north coast. "Remember," he called after us, "the change in the moon. And don't stop near a village."

Tortuga Wallows Last Lap to Timor

From *Tortuga* that morning, Alor's mass of mountains looked like a crumpled wad of green crepe paper flung by a mighty hand on the surface of the darker sea. For almost 40 miles due east, the coast was broken by sharply rising cliffs. A west wind pushed us along briskly, and in two days we had reached Alor's northeast point. There, after almost four months of traveling east, we turned south toward the Portuguese half of Timor.

With wind and waves now hitting us squarely abeam, our progress slowed. I gave *Tortuga* more gas and moved closer to shore. The storms weren't due for another day, but already the sky was purple, and sudden gusts

Sultan's Ransom in Gold and Antique Beads Adorns Mustachioed Dom Antonio

A leading citizen in Vila de Ainaro, Portuguese Timor, Dom Antonio prepares for a head-hunting dance in which he slashes a melon instead of a skull. Part Portuguese, he draws an old Portuguese sword. Horsehair plumes sprout from his golden buffalo horns. "Moons" of gold, tied with knotted cords, cover his tattooed chest.





Timor Lancers Parade on Unshod Horses; Plumed Foot Soldiers Present Spears

Led by Dom Guilherme, the troops honor his father, who died before a Japanese firing squad. Called *movadores*, these volunteers near Nova Ourem form valuable second-line troops for the Portuguese. To stir martial spirit, two women beat small drums with fingers.





REPRODUCED BY HELEN AND FRANK SCHREIBER © NATIONAL GEOGRAPHIC SOCIETY

of wind were lashing the waves to foaming crests. Opposite Kolana, a village the doctor had warned against, a brief squall blotted the shore from view. Steering a compass course, we pushed *Tortuga* at full throttle through heavy chop to the shelter of a cove beyond.

The shingle beach looked steep. Shifting into four-wheel drive, we hit it fast. *Tortuga's* wheels bit into the gravel, clawed futilely, then shuddered and stalled. I started the engine for another try and found it had developed an alarming knock. While there was still light enough to see, we backed into deeper water to await the change of the tide.

Later, as *Tortuga* drifted about her anchor, the rising moon made the gray coral seem to grow beneath us. Ugly formations, like giant brains, seemed to rise through the clear water. Through the long night I kept recalling the

Horsehair anklets swish to the clang of gongs, and silver bangles thump bare chests. Warriors at Vila de Ainaro, waving handkerchiefs, dance a martial step hours after a predawn head-hunter jubilee.

Feathered militia at Nova Ourém stands at attention. Pirate Dampier complained of their ancestors: "They kill all they meet and bring away their Heads in Triumph."



prophecy of the old fisherman. Had we tempted fate once too often?

At 3 a.m., engine thumping ominously, we headed out of the cove and into the wind and current of Ombai Strait. The matchlike glimmer of the compass light cast a reddish glow over the chart table and Helen's worried face. Once clear of the island's lee, the full force of the heaving Indian Ocean swept down on us.

Seas Break Over Faltering Jeep

Traveling crosscurrent and crosswind, *Tortuga* fishtailed along the troughs, her flag stiff in the gale, her bow ramming through the crests. When dawn forced its way through the pall of clouds, Helen took a quick position. Our average speed for three hours was less than one knot. Reluctantly I gave *Tortuga* more gas; the gap between us and Alor increased, but so did the engine knock.

For a short period at midmorning the sea calmed somewhat, but when the wind swung counter to the current, the two forces met in foam-topped waves that broke over *Tortuga's* cabin, spilled across her deck, and poured into her hatches until we closed them



White cockatoo turns its back on a line of Timor girls snake-dancing through the shade at Viqueque. The dance, designed to incite the men to warlike deeds, lasted for hours. Fingers tapping on small tabors kept up a constant pulse. One tattooed forearm of the girl in the lead bears the name "Helena."

Silver-filigree combs of tortoise shell crown Viqueque girls, who drum on instruments carried high under the arms. Decorations are made of melted coins.

Helen, a graduate in fine arts of the University of California at Los Angeles, sketches the drummers. Man beside her makes images from buffalo horn.



KOHACHRUBEE © NATIONAL GEOGRAPHIC SOCIETY

and took cover below. From our low position in the seats we could see only the waves over our heads and the yawning troughs before us. Except when some swell carried *Tortuga* to its crest, both Alor and Timor were out of sight, and we relied on the bouncing card of the compass to keep us on course.

Timor Still Shows Scars of War

At the end of nine hours we were desperate to reach land. In spite of the ever-growing metallic cadence from the engine, I again increased our speed. Slowly details became distinct through the binoculars: first a lighthouse, then the red roof of a military post, finally the row of trees marking the road to Dili, capital of Portuguese Timor.*

When the last swell pushed *Tortuga* ashore, we knew how Captain Bligh must have felt when he ended his own small-boat journey on this same island 173 years ago.

Dili was still rebuilding from World War II. Despite Portugal's neutrality, Timor had been occupied by the Japanese and had suffered heavy bombardment (page 266). By the end of the war its sandalwood—long ago a lure for traders—was gone, its coffee plantations were overgrown, its cattle herds decimated, and most of its white Portuguese population dead of starvation, sickness, or reprisals. Only the newly rebuilt residential area, clinic, church, and government building

*See "Timor a Key to the Indies," by Stuart St. Clair, NATIONAL GEOGRAPHIC, September, 1943.

gave evidence of what Dili would become.

For two weeks we toured Timor with Portuguese officials, traveling as far as the eastern tip. There head-hunting had only recently been suppressed again, after people reverted to the practice during the war.

Near Vila Nova de Malaca the tall, ornate houses bore reminders of this custom in the bleached nautilus shells decorating the rooftops (page 268). With holes cut for eyes, they looked convincingly like skulls. And at Vila de Ainaro we had a more dramatic demonstration that the custom is only thinly veiled: the *loron sae*, a victory dance in which the warriors once played football with the heads of their victims.

Tribesmen Play Grisly Game by Night

"Wars used to be the main diversion of the men," the chief of post told us, "and taking heads was common. It's still not entirely out of their systems. When Governor Filipe Themudo Barata took office, the people wanted to welcome him with a *loron sae*, but we had to draw the line at using a real head. They said they had one all picked out—the owner was lazy and dishonest anyway.

"But don't think the *loron sae* is a joke," he added seriously. "It's supposed to start at sundown and continue all night. By morning the people are worked to a high pitch of excitement. To avoid any incidents, we've ordered them not to start this one until 4:30 a.m."

Early in the morning we woke to the cries of warriors and the gongs of women spurring them on. Golden headdresses in the shape of buffalo horns, arm bands, and breastplates of the men all glowed under flickering torches as the dancers moved in wild gyrations.

As dawn brightened, we could see them kicking something back and forth between groups, slashing at it with long, razor-sharp swords, each blow accompanied by a shriek of self-praise. Two women snatched up pieces of the object and held them triumphantly aloft, while the men danced around them. It was a frightening display, even after we could see it was only a melon.

Curious as to Timor's contribution to Portugal's economy, we questioned the Administrator of Dili.

Senhor Abílio da Paixão Monteiro, a suavely handsome man in his starched white uniform, explained: "To the contrary, Portugal contributes to Timor's economy. Timor earns a little foreign exchange—we export some 1,600 tons of coffee annually, plus hides, beeswax, and copra. But the home government



Beehive-like Hut of Grass Takes Shape on a Hillside Near Maubisse, Timor



KODACHROME © NATIONAL GEOGRAPHIC SOCIETY

Man on roof binds thatch to a framework of poles. A single door serves also as a window. Maubisse people grow corn; they burn off hillsides, punch

holes with pointed sticks, drop in a few grains, and close the holes with the big toe. Crops flourish despite an annual six-month drought.

provides medical aid, plus improved breeding stock for the animals of the Timorese. And we plant seedlings of coffee and coconuts so that the Timorese can start their own plantations. It costs Portugal a million and a half dollars a year to support Timor."

Though Portugal's administrators are highly trained men, experts in agriculture, irrigation, and law, with knowledge of engineering and economics, one question came again and again to our minds: How had Portugal, one of the world's last colonial powers, kept her far-flung possessions—the Azores, Madeira, Cape Verde Islands, São Tomé and Príncipe, Portuguese Guinea, Angola, Mozambique, Macau, and Timor—in an age when empires are crumbling overnight. Senhor Luiz Franco Ricardo, Administrator of Vila da Ermera in the coffee country, gave us this answer:

"You see, Portugal no longer has colonies. All overseas territories are now part of Portugal, provinces with their own government internally and a voice in the central government itself."

Though it was only a hundred miles to Atapupu in Indonesian Timor, where we planned to take a ship back to Java, it took more than a week to get there. The Be Bai River, swollen by weeks of rain, was an impassable flood. Each day we tried to cross, and each day another rain turned us back as the river rose in a fresh torrent. On the third day there was a respite, and though the chief of post thought it still unsafe, we felt we had to try.

A long rope was stretched from bank to bank at the shallowest point, and Helen started across on

foot to photograph the operation. Barely 30 feet from shore, she was knocked down by the current. Spluttering in the opaque water, desperately clinging to the rope with one hand, she held the cameras over her head with the other until I reached her. Still choking, she was carried across the silt-filled water by the river-wise Timorese.

Then, with 50 men on a bow line and another 50 astern to keep us from being washed by the current onto the rocks downstream, *Tortuga* was dragged across. At the deepest point I felt the Jeep slip sideways as the men lost their footing in the shoulder-deep water; they recovered, lurched on, and with a mighty



Hundred Men Tug the Jeep Against a Raging River

On their way out of Portuguese Timor, the authors waited three days for the rain-swollen Be Bai to subside, but the current remained so strong that it took gangs of men fore and aft to save them from being swept against hidden rocks. Helen stood hip-deep in mud to take the picture.

heave all hundred men pulled her up the muddy bank to solid ground (below).

For most of the next 20 miles to the border, the road was a rain-saturated nightmare of slides, washouts, and crumbling bridges. At the frontier there was no guard post on either side, and we probed through tall grass to find what was left of the swamp-lined road.

Tortuga Boards a Ship for Home

At Atapupu, after the familiar checking in with the authorities, we learned that no ship had called for three months. But the *Karawatu*, bound for Java, was due within the week.

Four days later we sailed past the reef to where the *Karawatu* was anchored a mile from shore. Like a mother cat lifting her kitten, the ship's crane plucked *Tortuga* from the sea and deposited her amid laughing soldiers, startled mothers, crying babies, cockatoos, parrots, and monkeys.

Safely aboard after months of storms, reefs, currents, swollen rivers, and broken bridges, *Tortuga's* crew suffered its only casualty. As Dinah, still dizzy from the loading, scrambled from the Jeep, she was attacked by a striped blur on a string. In disgust she shook a small pig from her tail and retreated to the security of our cabin.

THE END

KUDACHIRONE © NATURAL GEOGRAPHIC SOCIETY



WORLD'S FIRST NUCLEAR MERCHANTMAN

Aboard the *N.S. Savannah*

By ALAN VILLIERS

*Illustrations by National Geographic
photographer JOHN E. FLETCHER*



COMMODORE Gaston R. De Groot, in the wing of the bridge, spun the engine-room telegraph to half-speed ahead and looked aft over the streamlined, graceful ship to the flurry of white water astern as the propeller began to turn.

"No one will ever be able to do that again," he said with a wide smile. "This is history."

It was Friday, March 23, 1962, off Yorktown, Virginia. The sun shone; the York River flowed quietly past its

familiar landmarks, just as on any other morning. But with the swift response to that telegraphed order, for the first time anywhere a merchantman's propeller began to take her to sea on nuclear power.

This was a great moment in the long story of man and the sea.

The U.S. Navy has nuclear-powered submarines, a cruiser, and an enormous aircraft carrier, the new U.S.S. *Enterprise*. Russia has at least one nuclear icebreaker and claims

PHOTOGRAPH BY COL. CHARLES FOSTER, U. S. ARMY SIGNAL CORPS

281





PAINTING © NATIONAL GEOGRAPHIC SOCIETY

Submerged fins ensure smooth sailing. When a gyroscopic brain feels *Savannah* begin to roll, it cants one fin up, the other down. Working in opposition to each other, fins counteract roll and hold the ship on even keel. Designers gave *Savannah* fins to provide greater comfort for her passengers; no other cargo craft is so equipped.



High and dry in a Camden, New Jersey, graving dock, *Savannah* makes ready for sea trials. Floodlights bathe the ship for the night shift. World's first nuclear-powered merchant ship, *Savannah* cost the Federal Government almost \$47,000,000.

Starboard stabilizer gets an antifouling coating. When not in use, the fin folds back like a sailfish's fin or a knife blade folding into its handle.



PHOTOGRAPHER: JAMES H. HAYES; ART BY TECHNICIAN; NATIONAL GEOGRAPHIC PHOTOGRAPHER JOHN E. FLETCHER © H.G.S.

to have atom-powered submarines. But the N.S. *Savannah*—"N.S." means Nuclear Ship—is the world's only such merchantman.

Commodore De Groote's sleek command was already fueled for the following three and a half years. She could cruise 300,000 nautical miles across the oceans of the world at 20 knots, increasing to 23 knots when necessary, before needing more fuel—equal to steaming nearly 14 times around the earth.

At the end of that time, when any other ship of the same size would have used five times her own weight of ordinary fuels, the *Savannah* will have consumed 110 pounds of

uranium 235—less than a bantamweight boxer weighs. Even the burned-out residue of the *Savannah's* fuel will be worth its weight in gold, in the form of valuable radioisotopes.

The N.S. *Savannah* brings back to the sea the freedom and immense endurance of the sailing ship, with the fast modern freighter's speed and every convenience.²⁶

"One of the greatest living writers of the sea, Australian-born Capt. Alan Villiers flew from his home in England to report the historic maiden voyage of the world's first nuclear merchant ship for NATIONAL GEOGRAPHIC. Since his first contribution in 1931, "Rounding the Horn in a Windjammer," he has sailed in almost every type of ship and commanded a squadron of landing craft in World War II.



Shedding its sheath of protective plastic, a fuel element of steel tubes containing uranium pellets slides into the reactor.



Potent pellets of uranium oxide do the work of coal or oil. Loaded into steel tubes, 815,440 slugs pack enough power to drive the ship 300,000 miles. Until activated, they offer no radiation hazard.



Keeping their distance, technicians lower a neutron-emitting starter into the core. To lessen exposure, they practiced until they could do the job in ten seconds.



I thought of that other great American pioneering ship of 143 years before, the little P.S. (for Paddle Steamer) *Savannah* of 1819.

The ship-rigged paddler *Savannah* was the first vessel ever to cross the North Atlantic with the aid of steam. Built by Fickett & Crockett at New York City in 1818, she was only 100 feet long by 26 feet in beam, and drew 14 feet of water fully loaded.

She was smaller than the harbor tug that stood by the new *Savannah* as she left her dock. Her engine was minute—an auxiliary

steam job of 90 horsepower designed to drive paddles that could be taken down at sea and stowed inboard, so that bad weather could not damage them. She did not intend to waste the wind. Her paddles were for calms.

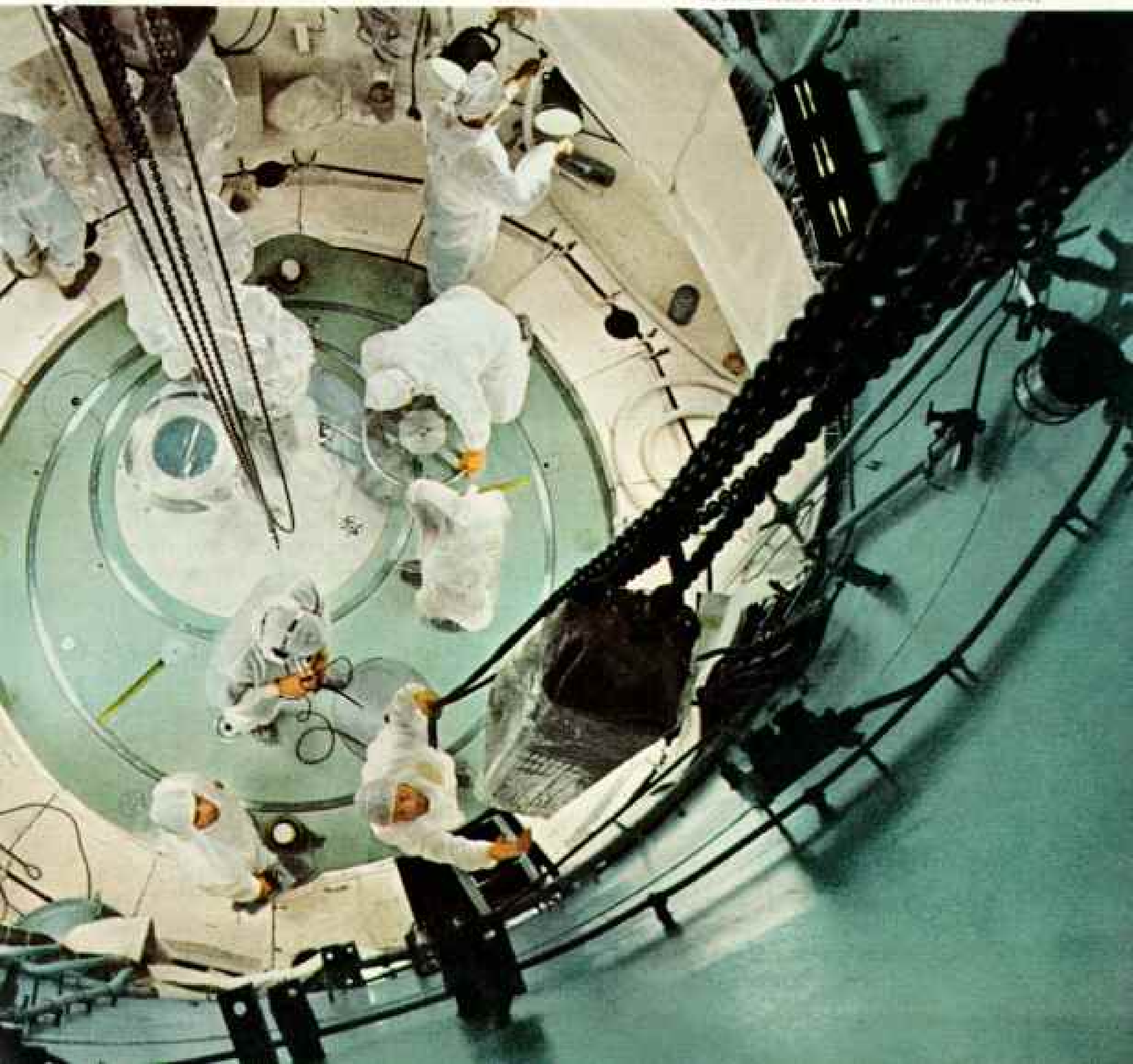
No one believed that she could cross the Atlantic. The odd little vessel with her twisted funnel (it could swivel to vent her smoke safely down wind) astonished the world and scared contemporary mariners. When she set out, people thought she was on fire because she gave off clouds of smoke. Off the Irish

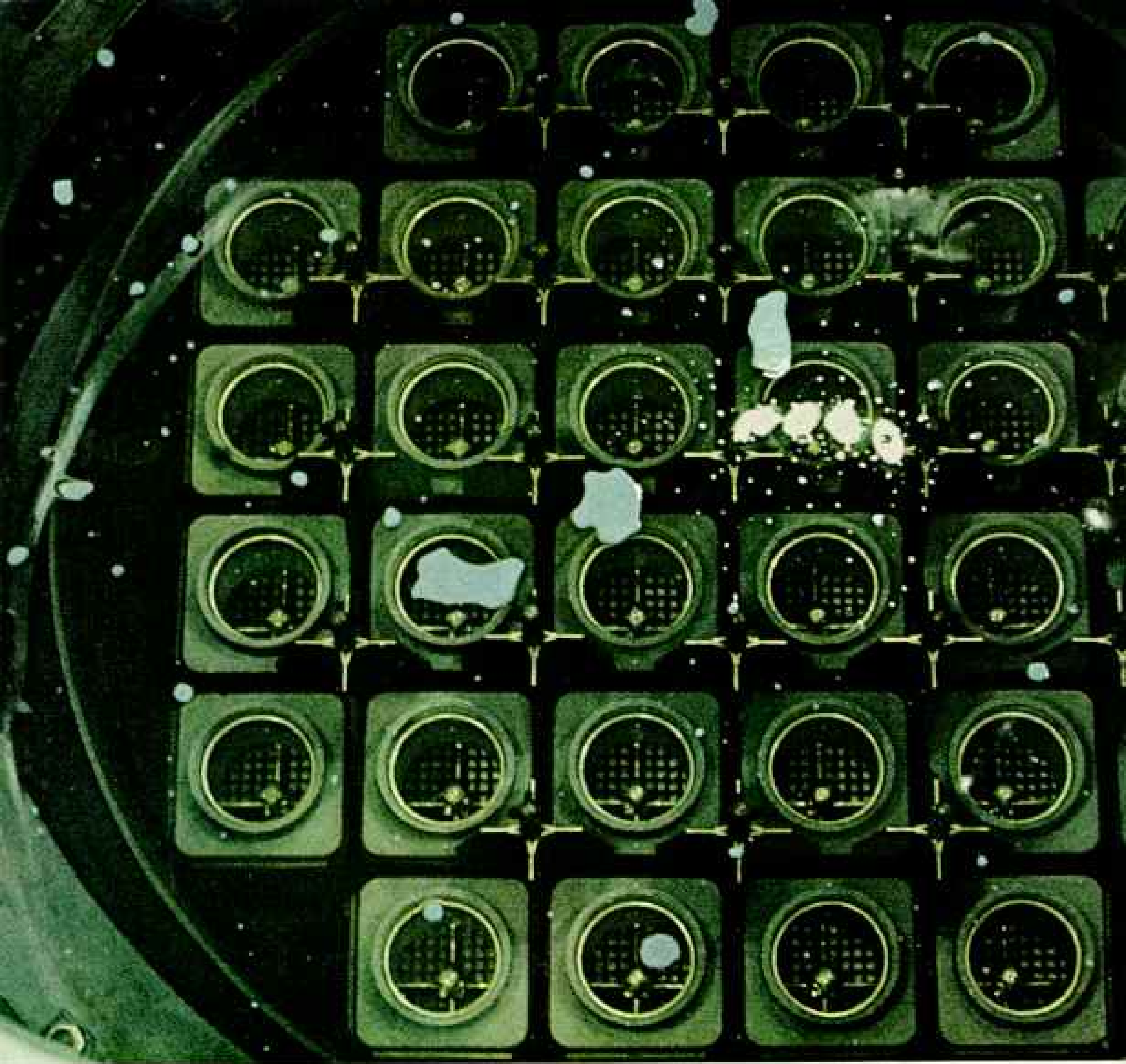
Surgically Garbed Fuel Loaders Add Kindling to the Nuclear Furnace

Down into the reactor chamber goes a fuel element, as a talker with earphones murmurs signals to a crane operator. Another technician bends to a wheel that rotates the reactor fueling cover. Because dirt or fingerprints can shorten a reactor's life, men wear rubber gloves, plastic shoe covers, and caps and coveralls of lint-free nylon. Their garb makes nuclear engineers a "white gang," succeeding the black gang of coal-fired ships.

285

HE EXCHROMER BY JOHN F. FLETCHER FOR LIFE MAGAZINE





coast, according to one account, the captain of the revenue cutter *Kite* first assumed the little *Savannah* was burning, then sent a shot across her bow when he found he couldn't overtake her in the light breeze.

Her best speed under power alone was five knots. Even with firewood and coal piled on deck and no cargo at all, she could carry fuel for less than four days' steaming. She carried no passengers. Passengers were afraid of those early boilers, thought they might blow up. Some did.

Nuclear Ship Has Elevators and Television

A century and a half later, I stood on the swept-back, smokeless, funnel-less superstructure of the modern *Savannah*. The big white ship moved effortlessly down the York

River, bound for the Gulf Stream to spend a few days there steaming up and down on builders' trials (pages 280, 292, and 296). I admired her grace of line and ease of motion. All 600 feet of her, she is an exciting ship.

She is the handsomest new freighter I know—ultramodern from her streamlined hull to her 30 comfortable passenger cabins and her rapid-handling cargo gear. She can accommodate 60 passengers and 124 crew, and stow 10,000 tons of cargo. Five elevators carry crew, passengers, and stores. She has everything from a hospital to a swimming pool to a promenade deck ringing her up-to-the-minute public rooms. Her ports are generous 30-inch windows; those on the promenade deck have polarized glass to admit more or less light when rotated with a finger tip.



The walk-around deck is tiled in ceramics in restful shades of blues and greens. The tables in the main lounge glow with electroluminescent tops. The passenger cabins are in striking modern decor, like the spacious two-berth, private-bath accommodation I shared with my colleague, NATIONAL GEOGRAPHIC photographer Jack Fletcher.

The *Savannah* carries color television, air conditioning, a dance floor, beauty salon, novelty shop, and library. All this, plus a sootless, exhaustless, practically vibrationless peace, such as has not been known since steamships ousted sail, adds up to something new and exciting in passenger seafaring.

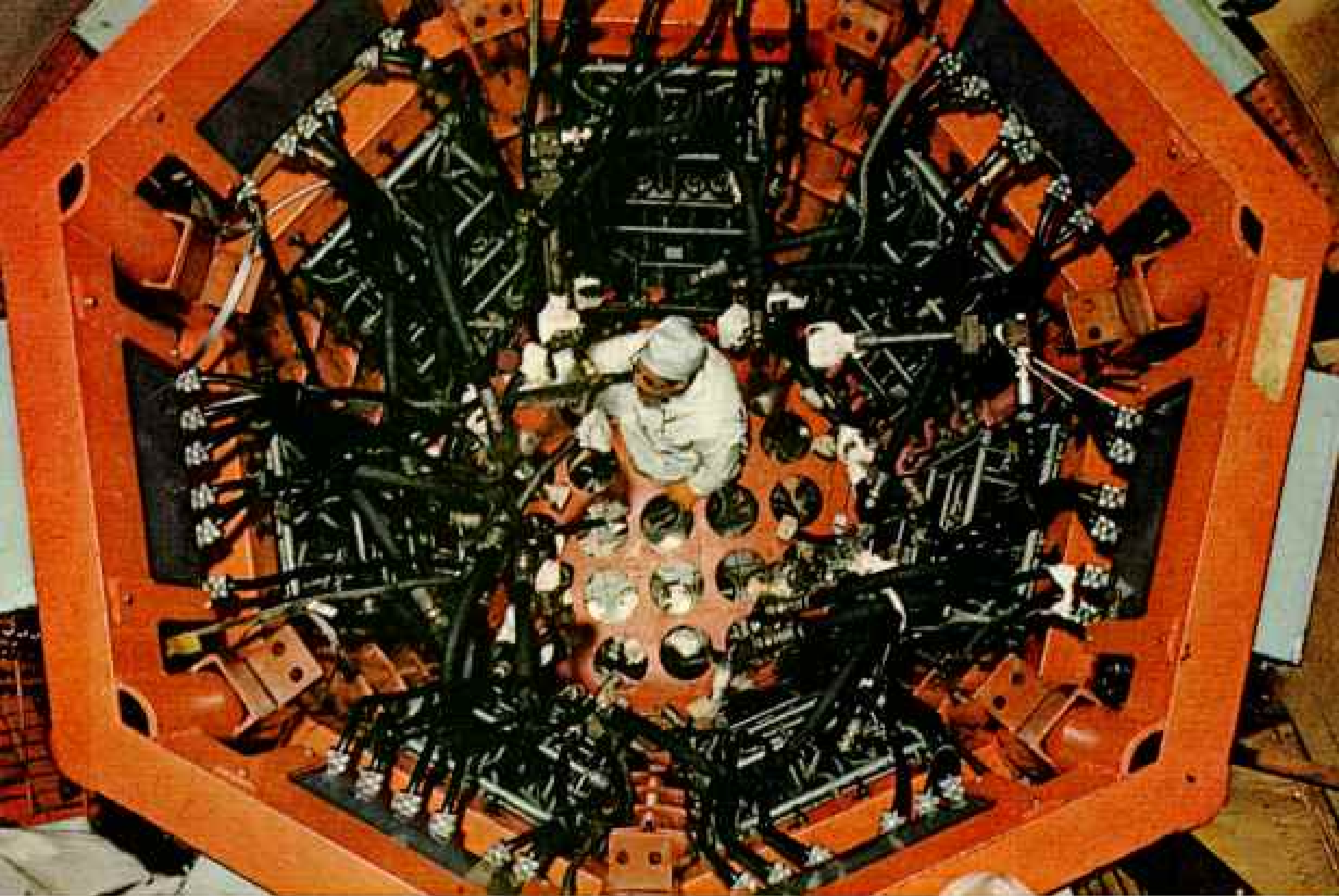
"At our ship company's office in New York, there's a filing cabinet full of applications from people who want to be passengers aboard," Commodore De Groot told me. "They don't know where she'll go, and they don't care. They just want to ride in a nuclear ship."

NO EXTRACTION BY JOHN C. FLETCHER FOR NATIONAL GEOGRAPHIC



Pattern of power: Thirty-two fuel elements generate heat by nuclear fission. Twenty-one cross-shaped control rods of boron steel keep the atomic fire banked. Light glints from bubbles on the pool that floods the chamber. Water not only absorbs heat from the core; it helps to sustain the chain reaction.

Dirt hunters vacuum stray particles from the water. They face no danger; the reactor has not begun to operate. When it does, radioactivity will prohibit anyone from getting this close.



Man-made rat's nest of pipes, tubing, and electric cables controls the reactor. To ensure trouble-free operation, workmen set up the system for tests, dismantled it for cleaning, and then rebuilt it. Here an inspector squeezes into the support structure.

Phalanx of shafts lifts or lowers control rods in the reactor chamber below. Pulling the cross-shaped rods out of the core steps up the chain reaction; pushing them in shuts it off. An electric motor and hydraulic unit drive each shaft.

SCRAM button shuts down the reactor in less than a second by ramming in the control rods. Operators push this switch only in an emergency. Scientists trace their use of the word to the early days of the atomic industry, when they had orders to clear out—scram—in case of a nuclear mishap.



RODOLPHINE JUPPANI AND AN (EXTRACTED) BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JOHN S. FLETCHER © N.G.S.

I had a quick look at this file. A retired colonel writes for a place on the first cruise "wherever she may be headed." A schoolgirl in San Francisco wants her name down, "so I can save my money for the trip." She got her name down, high on the list.

A lady in Washington, D. C., requests "two reservations on the 1966-67 winter cruise." An experienced sea wanderer from New Jersey writes: "A freighter without soot must be the ultimate in travel comfort."

It may not be long before these would-be passengers will get their chance. *Savannah* was to go on more seagoing tests first, when her passengers (as on this trial trip) would be atomic-power experts and nuclear or electronic bug chasers of various sorts. But this stage was expected to be over soon and the nuclear ship to be ready for service.

Ship Will Show Atom's Role in Peace

As we warmed ourselves in the spring sunshine and watched Cape Charles disappear rapidly astern, I chatted with John Robb, the 33-year-old chief of construction of the *Savannah* for Atomic Energy Commission and the Maritime Administration.

"The more passengers we carry, the quicker folks will appreciate there is much to gain and nothing to fear from the peaceable atom," he said. "The most important job of the *Savannah* is to break down political, legal, and psychological barriers to the use of nuclear energy. We want her to show the world that the atom can be put to work at sea like any other source of power." *

As the *Savannah* slipped quietly along, steady as a rock, it was hard to feel she had anything at all unusual about her. We all wore small film badges clipped to shirt, belt, or jacket to record radioactivity (page 296). But these were purely precautionary. Nobody's film showed anything.

The *Savannah's* cargo will at first be more symbolic than commercial, and it will have to go where the *Savannah's* future trips take her. After her trials, *Savannah* is scheduled to visit first several American cities, including Savannah, Georgia, her home port, Galveston, Texas, her servicing port, and Seattle, Washington, during the 1962 World's Fair.

I had seen something of the problems of the *Savannah's* construction when I visited the ship more than a year before, while she was being built by New York Shipbuilding Corporation (a subsidiary of Merritt-Chap-

man and Scott Corporation) at its Camden, New Jersey, yard.

There I had found it difficult even to see the ship at first, for she was afloat inside a huge covered dock. It was so high there was room for her masts, and so enormous that, though her high flared bows reared up like an aircraft carrier's, she did not look half her 20,000 tons. I had never before seen so large a ship in a covered dock.

Aboard, all was seeming chaos, as it usually is in shipyards. Electric cables snaked everywhere. Men in steel helmets of various colors—electricians, welders, riggers, shipwrights, and joiners—were all over the ship. Water sprayed from fire-fighting equipment under test. Giant derricks were being raised and lowered, swung outboard and in again.

My guide that morning was U. S. Merchant Marine Academy graduate Ray Hirst, a tall gray-eyed youth in khaki uniform and steel hard hat, who obviously took tremendous pride in his temporary assignment to the *Savannah*. He clarified many things for me.

"There are special features about this nuclear ship," he said. "She has to point the way for economical ships to follow. She isn't just the first model off the production line; she's a trail blazer. So we have to grope along.

Builders Made Safety Paramount

"We know her reactor is safe, but it has to be *accepted* as safe in big ports everywhere or she cannot function properly as a merchant ship. Some ports and people may still be concerned about nuclear ships."

"Here's one," I said.

He looked me in the eye. "Forget it!" he said. "*Savannah* has the safest nuclear plant ever devised. It has to be. The ship must enter dense population centers. She must carry passengers and cargo safely. She must be able to take a bouncing about in storms at sea, and to stand up even under a direct collision without leaking radioactive materials.

"Even if every nuclear safety device went awry, it would make little difference because of the stability of the power plant. Tests have shown that it will not run away. And it has been made completely safe even in the event of the maximum credible accident."

"Maximum credible accident? What's that?" I asked.

*Science's progress in harnessing atomic energy for peaceful uses was reported in "You and the Obedient Atom," by Allan C. Fisher, Jr., NATIONAL GEOGRAPHIC, September, 1958.



ILLUSTRATIONS BY HILGER, WETZEL, AND DE KATZDORFF © NATIONAL GEOGRAPHIC SOCIETY

True-motion radar set (below) guides *Savannah* safely through fog or darkness, giving a chartlike picture of the ship's own motion in relation to land and nearby vessels. Ordinary radar requires triangulation to plot speed and course of oncoming craft. Sketch above and scopes at left show the new radar in use. Seeing the scene on the upper screen, *Savannah's* pilot grease-pencils a bearing line between the ships' blips. Moments later he draws another. Parallel lines on middle scope foretell a collision at X. Lower scope records *Savannah's* turn to avoid a crash. Shorelines, as traced by radar's line-of-sight view, give a true picture of the ship's surroundings.



"The worst thing, or combination of things, that could possibly happen to the ship, like the most powerful ship afloat running into her at full speed, bashing into the reactor hold. Even if that happened, there would be less danger aboard her than in any other ship.

"She could flood two of her 11 watertight compartments and stay afloat. The reactor can be shut down instantly. She can stand more serious collision or other mishaps than any other merchant ship in the world."

Ray Hirst explained that the whole nuclear setup aboard was sealed off in a massive steel containment vessel surrounded by layers of polyethylene and lead. This fantastically strong chamber is designed to contain the pressure and radioactivity of the entire contents of the ship's nuclear system in case of accident, even the "maximum credible" one.

Outside this huge superstrong container is a collision mat, built into the ship, made of layers of stout steel and redwood two feet through, with concrete outside that—more than a thousand tons of it. The whole protective system weighs about 2,000 tons.

To break into the reactor plant, a colliding ship would have to penetrate 17 feet of reinforced, thoroughly stiffened ship structure, designed not just for immense strength but for resilience as well. Chances are that any bows which took that on would be smashed to pieces before they got halfway.

Greece Offers First Welcome

World ports are anxious for the *Savannah* to visit them. But insurance remains a problem. There just is no generally accepted commercial marine insurance at present against the possibility of other ships and perhaps whole docks being put out of action by a nuclear accident.

The idea is too new. There are neither rules nor experience on which to base rates. The successful working of the *Savannah's* pressurized water reactor has to be demonstrated to the shipping world, even though a similar reactor has been driving the first U. S. nuclear submarine, U.S.S. *Nautilus*, since 1955.

As of June 1, 1962, although many foreign nations were negotiating to permit the nuclear merchantman into their ports, only Greece had formally agreed to allow her to come.

As John Robb explained, the United States must enter into bilateral agreements with countries into whose ports the *Savannah* goes. Among other things, such agreements would

permit the foreign governments to try, in their own courts and under their laws, any suit stemming from the *Savannah*. At the same time, this country guarantees to assume complete liability for the nuclear ship.

The United States Government is so sure of the *Savannah's* safety that it has pledged, by an Act of Congress, half a billion dollars as indemnity for any nuclear accident the ship might cause. Ordinary commercial insurance is not yet available in such amounts without prohibitive cost.

Special Tender Serves *Savannah*

To prevent any possibility of port contamination by radioactive waste, the ship stores such material for discharge in special facilities—even the tissues used for smear tests in spot-checking possible radioactivity throughout the ship.

Savannah's atomic power plant creates new maintenance problems. To solve them, the world's first "nuclear service vessel," the 129-foot *Atomic Servant*, was designed and especially built at a cost of more than a million dollars. The 630-ton tender is fitted with special waste-processing equipment to deal with high- and low-level radioactive liquids, plus a pit for storing spent fuel elements.

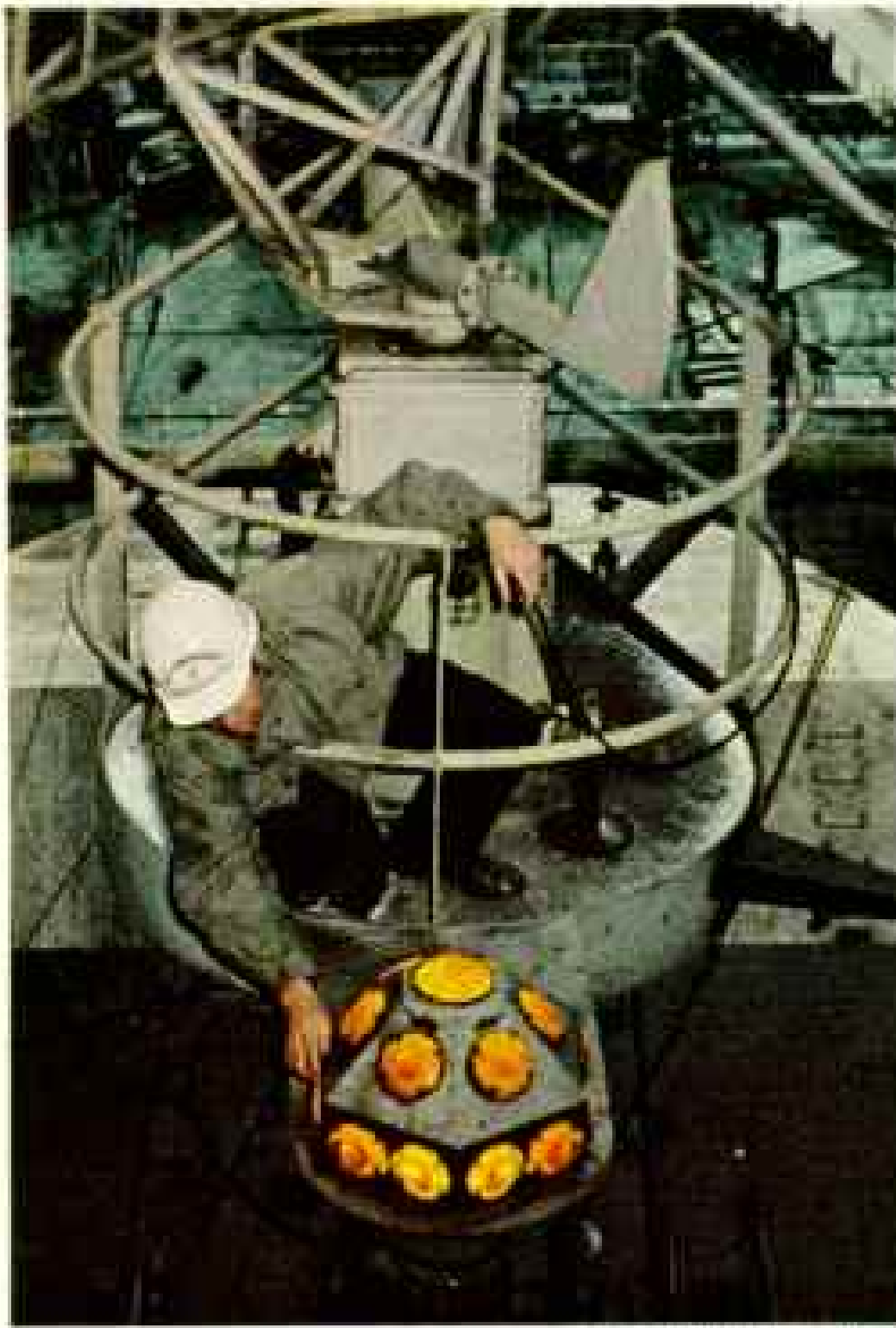
I saw the *Atomic Servant* at Yorktown—a squat, utilitarian little barge, utterly functional, well suited to her unusual work.

Later, on my first day at sea, I leaned against the rail with Commodore De Groote, watched the white wake, and felt the big ship's gentle heave and quiet roll. We were well out then, headed for the Gulf Stream.

I was just beginning to realize the full significance of this wonderful product of American ingenuity, built at a cost of \$18,600,000, plus another \$28,300,000 over-all for the nuclear plant and fuel. *Savannah's* construction was supervised by a Maritime Administration and AEC project group headed by Richard P. Godwin. Her reactor was designed and built by famed marine boilermakers, Babcock & Wilcox Company, at Lynchburg, Virginia.

If *Savannah* works, merchant shipping can be revolutionized. Ships will be able to go wherever there is enough water to float them, with no wayside stops for fuel, no waste of space for coal or oil.

This incredible ship was working, moving at an effortless 17 knots on only 60 percent power. On deck there was no noise save the swish of the water along the steel sides.



BY ENTERTAINMENT WEEKLY

"Visible whistle" lights up as *Savannah* sounds her voice, enabling mariners who encounter the ship at night to see her signals as well as hear them.

Streamlined superstructure gives *Savannah* a yachtlike look, but trim lines conceal a capacity for 10,000 tons of cargo. Five-bladed screw gives it top speed of 23 knots. An air-conditioning system cools all living spaces.

This view looks forward from the stern mast as *Savannah* undergoes sea trials off North Carolina.



To a man, the experts I talked with appeared delighted with the way *Savannah's* tests were progressing. But I needed to know just what they were talking about. I am—or was until then—a nuclear nitwit.

All those color-coded controls and indicators on the engine-room console are confusing to a fellow used to the open outlook from a sailing ship's poop, with God's wind in the sails the only power. But I finally did learn how the *Savannah* works.

Splitting Atoms Yield Vast Heat

Heat is what makes the *Savannah* go—just plain heat, lots of it. It comes from what I regard as a piece of the sun, man produced and man controlled, locked up in the reactor with its tremendous energy.



Old salts swap sea stories on the flying bridge. Author Villiers (left), veteran of windjammers from Cape Horners to *Mayflower II*, joins *Savannah's* skipper, Commodore Gaston De Groote.



REARRANGED BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JOHN E. FLITNER © N.G.S.

The heart of the plant is a core of uranium fuel—813,440 pellets of uranium oxide enriched with uranium 235 (page 284). Boron-steel control rods absorb excess neutrons when the nuclear fire is damped. Withdrawal of these rods by remote control allows more neutrons to flash through the reactor.

When a hurtling neutron collides with a uranium nucleus, the nucleus splits—"fissions," to use the technical term. The two parts weigh less than the whole did, and the lost fraction has become stupendous energy in the form of heat. This heat is absorbed by water under pressure—nearly 2,000 pounds to the square inch—inside a closed primary system, self-contained to let no water out.

Because it lies under so great a pressure, this water does not boil. Instead, it passes on

its heat to water in a secondary system, which boils to form tremendous amounts of steam. This secondary-system steam drives huge turbines that transfer their energy to the propeller through reduction gears. The pay-off is 22,000 shaft horsepower for an infinitesimal expenditure of fuel.

Sea Pioneers Run Nuclear Engines

I wanted to go down to the engine room to get the feel of things there, and began in the glassed-in gallery where future passengers will be able to see into the fantastic air-conditioned control room. On watch at the console (where the only word of the new nuclear language I readily understood was SCRAM, which means shut down the reactor in a hurry) sat three strong-faced young men in



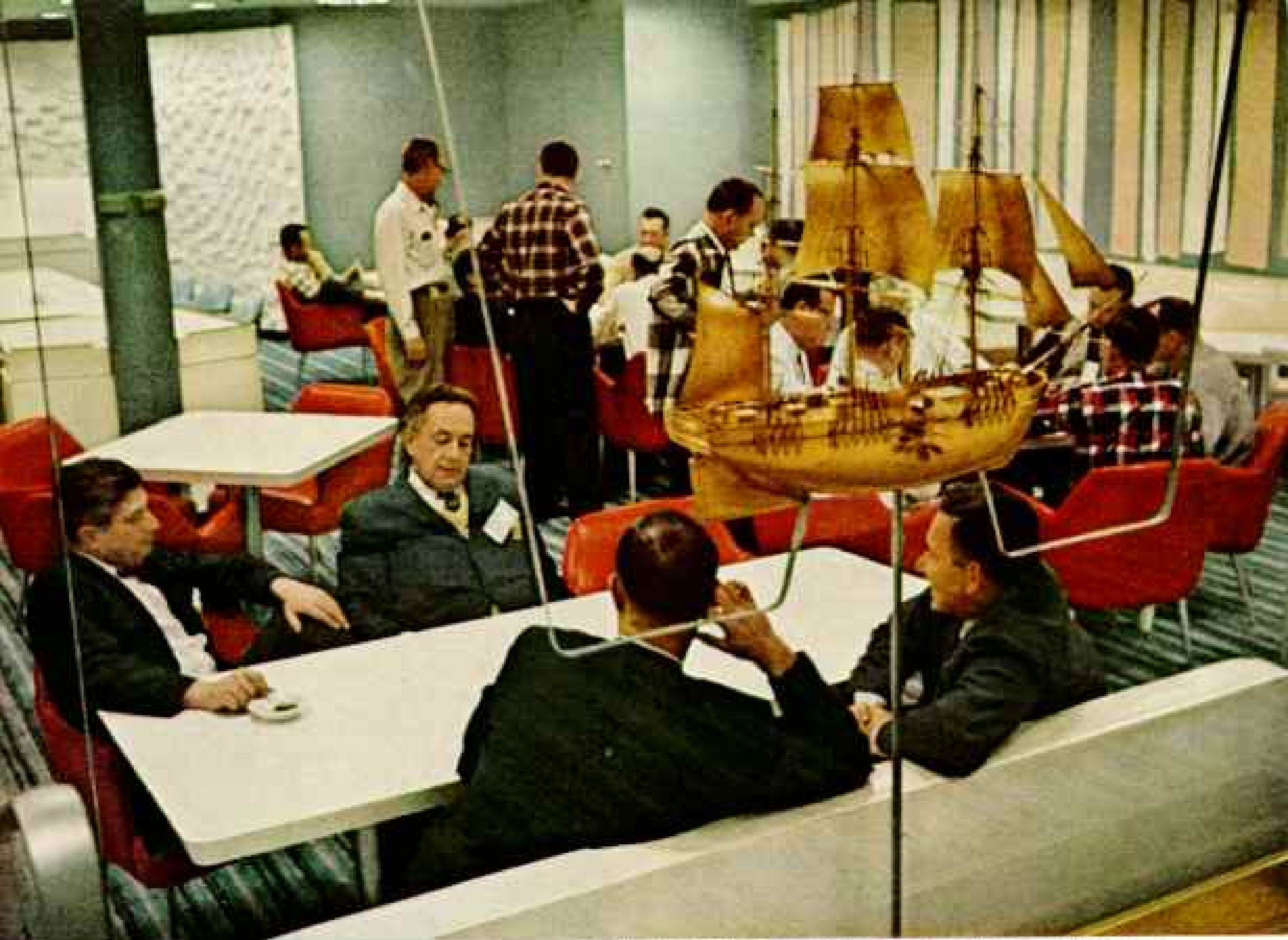
REARVIEW (BELOW) AND KE EXTRAVIEW © N.Y.C.

Testing for radiation continues without letup. Tweezers grip a paper disk that has been rubbed across a deck or bulkhead. Lead-lined counting device at right measures any contamination picked up by the paper. Automatic monitors check radioactivity at key locations, and alarms sound if readings exceed a permissible level.

Savannah's namesake spreads golden sails at the entrance to the main dining room. In 1819 she became the first vessel to use steam on a transatlantic crossing, carrying only enough fuel to turn her rudimentary paddle wheels for three and a half days. Just as one *Savannah* ushered in the Steam Age of ocean travel, her successor inaugurates the Atomic Age of merchant shipping.

Spacious stateroom wins the approval of three pretty visitors. *Savannah* can carry 60 passengers as well as cargo, but her roomy lounges and promenades are scaled for a grander job: the welcoming of guests in ports of call. The ship will serve as a showcase of American use of the atom for peace.





RE-ENTRANCE BY NATIONAL GEOGRAPHIC PHOTOGRAPHER JOHN E. FLETCHER © N.G.S.

khaki. Lights flashed. Dials shone white with flickering needles, tracing graphs. Whatever messages were coming through, the young men took the necessary action immediately.

What manner of men were these new seafarers of the Atomic Age?

John Bersen, one of the watch-standing control-room supervisors, was a merchant marine ship's engineer turned, like many others aboard, nuclear specialist. He was from Lake Shawnee, New Jersey; 34 years old; 17 years at sea; risen by his own efforts from ship's fireman to licensed chief engineer; married 14 years, with four children. He pointed out briefly to me what was going on.

The other two watchkeepers were a reactor operator and a steam-plant operator. They stayed with the console throughout their watch. A fourth engineer had a roving commission in the engine room proper, looking after the auxiliaries.

Just how had a young fellow like John Bersen, an ordinary ship's engineer, got into the nuclear business?

"I trained three and a half years for this," he told me. "The designers of the *Savannah's* reactor were my instructors at Lynchburg for a concentrated nine-months' course. I had another nine months of field trips to different

reactors. Then I did a run as observer in the nuclear submarine *Sargo*. I also trained with a full-scale mock-up of this console. It was connected to an electronic computer and problem board that simulated every sort of operating condition.

"I've been with this ship since construction began—and very happy to be here, too."

These men made me ashamed of my wind-jammer ignorance. Here were young fellows coping with a whole new concept of marine power. It seemed to me that they were in direct line from the American boys who used to ship out in the clippers. None but the best could serve those wonderful ships of a century ago. That was an exacting life, too.

Now the pioneering has gone below, and here were the new pioneers.

Engines Include a "Take-home" Spare

I left the control room and continued into the engine room, full of gray cylinders in which turbines and gears were hard at work, with no visible moving parts. I could, however, see the huge propeller shaft revolving deep in the ship's bowels, carrying power to the five-bladed screw.

In the engine room I noted a part of the plant seemingly not being used.

"That's our take-home motor—you know, like a girl's bus fare in the bottom of her bag," James Morrissey, the *Savannah's* chief engineer, told me. "If everything else fails, we start up a diesel generator, and that electric motor could get us back to port at easy speed. We could switch it on in a couple of minutes."

It remained unused. Everything went along like a fine old clock.

Radioactivity Is Spot-checked

Later, Ernest Resner, health physics supervisor aboard the *Savannah*, took me along while he was spot-checking for radioactivity. Ernie was with Adm. Hyman Rickover back in 1951. He has one of the early reactor-operator licenses, signed by the admiral.

"We do spot-checks everywhere. We don't just rely on the automatic monitoring instruments," he said, rubbing small paper disks

here and there as we went through long alleyways, up and down stairs and iron ladders.

Ernie led me through the crew's spacious quarters (two men to a room, sometimes one), the operating room in the ship's hospital (where a nurse will work as a signed-on member of the crew), the two-chair barber shop, the laundry. We saw the tasteful dining room with its metal model of the original *Savannah* at one end and a mural appropriately entitled "Fission" at the other.

We looked in the galley, then peered around steel doors at the top of the reactor containment vessel. Below us were the heavy layers of lead and plastic, steel and wood and concrete that would prevent radiation from escaping into other parts of the ship, even in case of an accident.

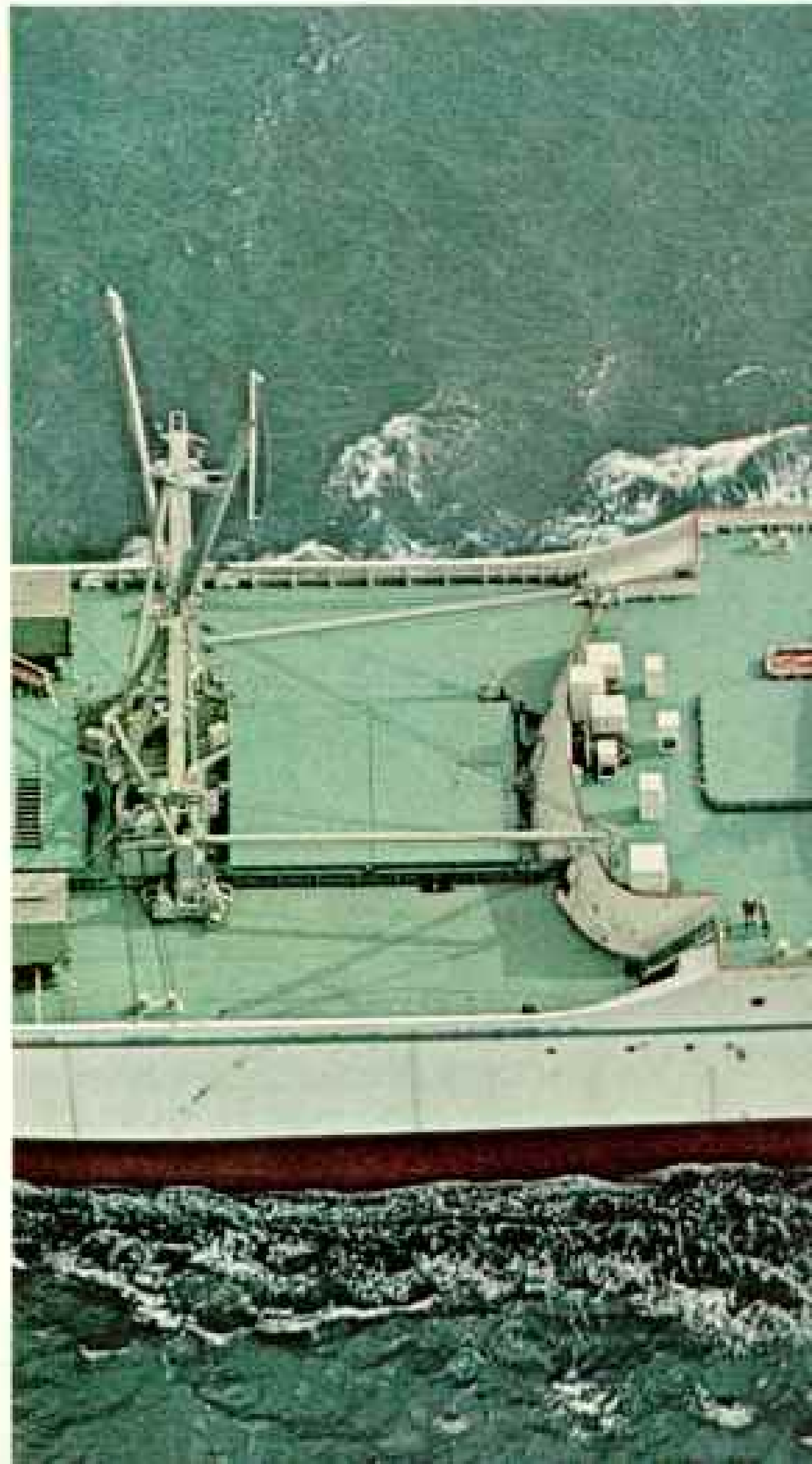
"We have to watch this radioactivity, of course," Ernie told me (page 294). "You can't



RESEARCHING BY JOHN E. FLETCHER © N.G.S.

Commodore De Groote wears new nuclear insignia and a radiation detection badge.

No funnel mars *Savannah's* swept-back lines. From her nuclear reactor flows soot-free power, symbolized by oval atomic emblem on her side (page 281). Layers of lead, polyethylene, redwood, steel, and concrete shield the nuclear furnace and protect it in case of a collision.



see it, taste it, smell it. But a very little might be there, and we want to know how much. Therefore we check it all the time. Because we feel our way along with full and constant precautions, this is the safest seafaring there is."

Five Captains Trained for Savannah

I spent four hours on the bridge, sharing the watch with Commodore De Groot and his staff—Capts. William Meyer, from Oakland, California, who acted as first mate on the trials; Theodore Blankenburg, the second mate; and James Gregory, spare master. A fifth captain, David McMichael, was ashore serving as the ship's operations officer.

These five are qualified and practiced shipmasters with long experience in command, chosen for special nuclear training. Commodore De Groot, after 15 years in command of the world-circling freighters of the

Savannah's operating company, States Marine Lines, trained three years to become the *Savannah's* master.

It was one more unique feature, having the watchkeepers *all* experienced captains—a measure of the degree of precaution taken with the pioneering ship.

"We're a hundred miles seaward from Cape Lookout, North Carolina," the commodore told me, taking his gray eyes off the sea for a moment. Gulf Stream weed drifted by in lines on the blue sea, which rose and fell easily in gentle, undulating swells.

Inside the big wheelhouse a temporary quartermaster stood idly by the wheel, for the ship was steering herself automatically and recording just how she was doing it. She was running at a comfortable 20 knots, with perfect stability, scarcely rolling at all.

"The fins do that," the commodore an-

PHOTOGRAPH BY COL. CHARLES PRESTON, U. S. ARMY SIGNAL CORPS



swered my question. "She is fitted with Sperry Gyrofins. Whales don't roll. They steady themselves with their flippers. The *Savannah* does the same."

The nuclear ship's stabilizing fins are fully automatic. They jut outward and slightly downward below the waterline, one on each side. The beginning of a roll is felt at once by the gyroscope sensing unit on the bridge, which immediately sets the angle of the fin on that side to counteract the roll before it can even get going. The fins, which work much like ailerons on an airplane's wing, eliminate 90 percent of rolling and make sea travel comfortable (page 282).

Electronic Brains Keep Lookout

Instruments on the bridge and in the adjacent chartroom work as the ship's seagoing electronic brains. The way, for instance, that they sense sea conditions to set the anti-roll stabilizers to work is uncanny.

Course and distance are electronically recorded; so is depth of water, by sound-wave recorder bouncing impulses off the bottom.

The meteorological data available make the ship a floating weather station. Sea-water temperature, atmospheric pressure, true wind direction and speed, humidity, and air temperature are shown at a glance.

The radio officer has a special facsimile receiver that can pull a complete weather map out of the air, as it is broadcast by the U. S. Weather Bureau.

To establish *Savannah's* position, deck officers have the electronic loran system. The instrument picks up beamed bearings showing precisely where the ship is in relation to the sending stations. In this way, by simply crossing two bearings, loran shows the ship's position at any time. Older methods of navigation, the star sights and sun sights familiar to mariners for centuries, are also used.

In fog or bad visibility, two different types of radar lookout are kept: one, the ordinary relative-position radar sweep; the other, the new true-motion type. The latter not only "sees" other ships in the vicinity but shows *Savannah's* motion in relation to them. It presents a complete true-motion plot, whatever changes of course the ships may make, better than even the trained eye of a master mariner could discern (page 290).

Off the bridge, in the radio shack, Jack Fletcher and I made a little history of our own by having Radio Operator James Mc-

Curdy send for us the first commercial radiogram from a nuclear merchantman. It went to Dr. Melville Bell Grosvenor, President and Editor of the National Geographic Society:

COMMODORE DE GROOTE JOINS US IN
WISHING YOU WERE HERE TO
SHARE THIS HISTORIC DAY ABOARD
THE WONDERFUL "SAVANNAH."

That evening I walked the bridge in the balmy Gulf Stream air, with the stars above and the big white ship's decks tapering off to her smart bow. Seagoing laboratory and demonstration ship they called her. Out there on the darkened sea I beheld in my mind's eye the shades of many ships, her forerunners down the centuries.

Here—right here—Queen Elizabeth's illustrious swashbuckler Sir Francis Drake had sailed his cockleshell, bound homeward to Plymouth from raids on the Spanish Main. Years before, Columbus passed this same way, homeward bound from history. The old *Savannah* herself came up from Savannah, Georgia, with the Gulf Stream, to stagger an unready world with the first use of steam on an ocean voyage.

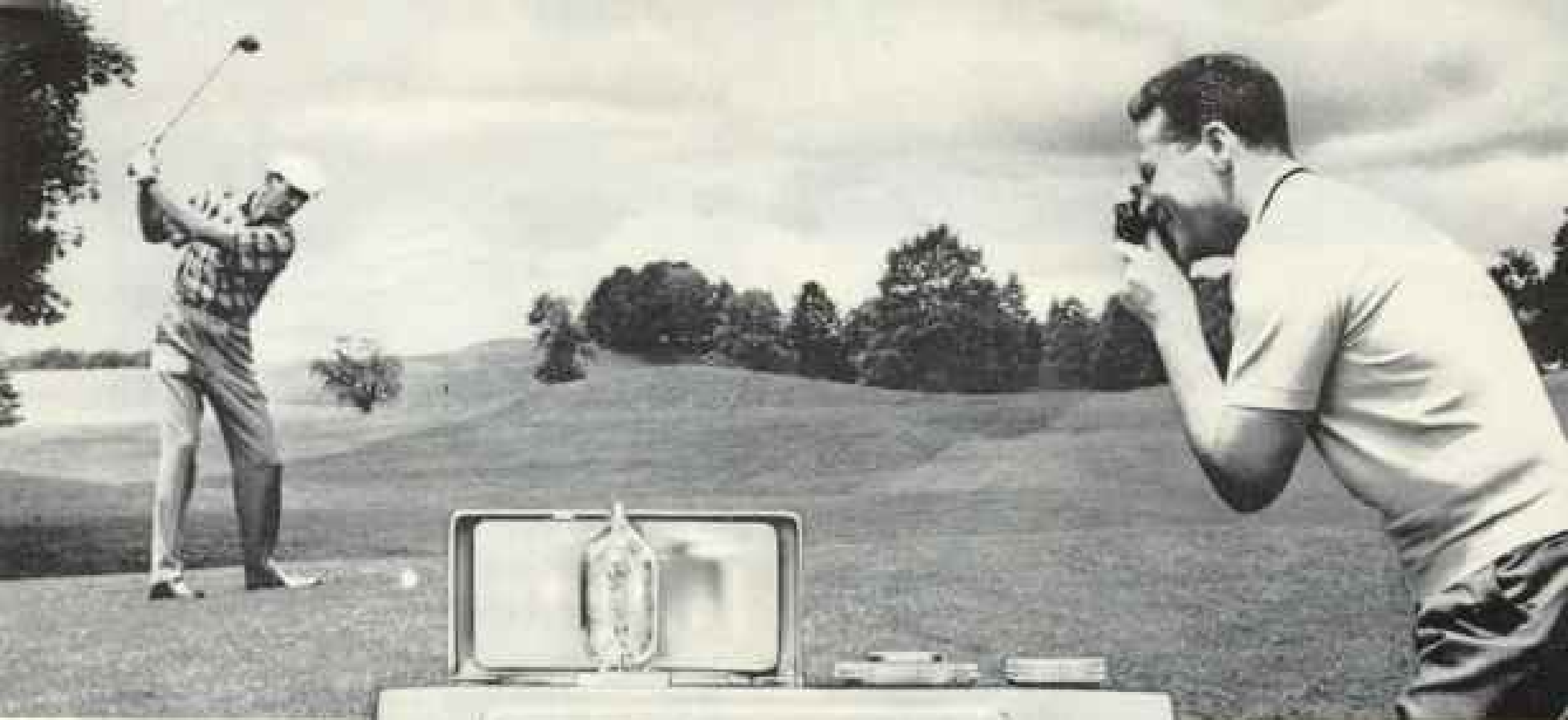
I thought of the infinite endeavor that had gone into all brave seafaring, the hardness of the sailors' lot of long ago, the human cost as man stumbled, sailed, rowed, and fought by Herculean efforts to achieve at last the peace and ease of this nuclear merchantman of 1962. From the dreadful servitude of oars and the uncertainties of sail to smooth and infinite power from a handful of nuclear elements—here was progress dramatized.

Three Days on a Teaspoon of Fuel

"She has performed practically flawlessly," declared John Robb when we got back to Yorktown after three busy days of trials. "Twenty knots on 80 percent power, 15,000 shaft horsepower, 100 revolutions per minute; better than 23 knots at full power. As a trial we emergency-stopped her from full speed ahead in 2,600 feet, and from full astern in 900 feet.

"As for radiation, you'd have absorbed more if you just sat out in the sunshine."

"Do you know how much uranium 235 we used in these three days?" asked Dr. Marvin M. Mann, nuclear-power manager for the *Savannah* for the New York Shipbuilding Corporation. "She burned little more than a teaspoonful." THE END



Winds film for you—has new built-in "pop-up" flash!
THE KODAK MOTORMATIC 35F CAMERA

Here's a power-driven electric-eye camera that gets pictures other 35mm cameras might miss!

The new KODAK MOTORMATIC 35F Camera lets you take as many as 10 shots in 10 seconds! A spring power drive advances the film—and you're set for the next shot right away. You don't miss

the unexpected better shots that so often come just *after* you've clicked the shutter.

The KODAK MOTORMATIC 35F Camera not only sets exposure for you; it also tells you when to use flash. Then you're ready instantly! The flash holder is built in...it pops up when you need it

...folds away when you don't.

Zone markings, in the viewfinder, remind you of proper focus. When you focus for flash, the lens opening adjusts *automatically* for correct exposure.

See the KODAK MOTORMATIC 35F Camera at your Kodak dealer's soon. Less than \$120.



Fine-camera precision... automatic ease! Coupled rangefinder, fast $f/2.8$ lens. KODAK RETINA Automatic III Camera... less than \$140.

Prices subject to change without notice.



Fully automatic exposure setting. Built-in "pop-up" flash. Fast $f/2.8$ lens. KODAK Automatic 35F Camera... less than \$100!

YOU CAN DEPEND
ON THE NAME
KODAK

EASTMAN KODAK COMPANY, Rochester 4, N.Y.
 ENJOY WALT DISNEY'S "WONDERFUL WORLD OF COLOR" SUNDAY EVENINGS, NBC-TV

Kodak
TRADEMARK

TRAVEL QUIZ



Soil turns fence posts to trees on the island of:

- Hispaniola Crete Majorca

The soil is so rich fence posts sprout branches and turn into trees on the green hillsides of Hispaniola. Only your signature, however, will turn First National Bank of Chicago Travelers Checks into ready cash. Be smart—carry them on all business and vacation trips.

The world's deepest lake is in:

- Mexico Russia Peru

Lake Baikal sinks 5,315 feet into Soviet soil, making it the world's deepest and Eurasia's largest body of fresh water. You'll keep your head safely above water when you travel by carrying First National Bank of Chicago Travelers Checks. That way, your money is protected. And each denomination (\$10, \$20, \$50, \$100) is a different color to prevent errors in cashing.

The sucre is a unit of currency in:

- Ecuador Canary Islands Ceylon

You'll have all the sucres you need when in Ecuador—just cash your First National Bank of Chicago Travelers Checks. They're known and accepted the world over. And we'll refund your money if they're lost or stolen.

The First National Bank of Chicago

Travelers Checks



For All Business and Vacation Travel

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION



America's yours and theirs to see—
(budget wise—and fancy-free!)
in your AVION Travel Trailer

Treat your family to the thrill of misty peaks . . . desert dawns . . . historic towns. You'll thrill too, when you go joyfully—in comfort—with a carefree Avion. A true travel trailer, it follows easily along bumpiest trails or broad highways.

At day's end, you'll relax—pampered by the deluxe kitchen, modern bath with hot water, luxurious beds and closets. Could anyone want more? Not if you get Avion's riveted all-aluminum coachwork—it's Lifetime Guaranteed! Plan now for fancy-free (and budget wise) travel fun . . .

AVION

COACH CORPORATION, Dept. G., Benton Harbor, Mich.

Write for
FREE Catalog
& Dealer's
Name.



LEAVE

PHOTO FRUSTRATIONS

Take along a Weston Exposure Meter—and make every shot count. No more picture disappointments, or lost photo opportunities. Take a tip from the experts: with any type of camera or film, rely on a Weston.

BEHIND!

See **WESTON**
the **MASTER IV**

at your photo dealer's TODAY!



BARGAIN! 3" ASTRONOMICAL TELESCOPE

See the stars, moons, planets close and far in 160 power! Features 30x Planar Eyepiece, 30x 1.25" eyepiece, 30x 1.25" eyepiece, 30x 1.25" eyepiece, 30x 1.25" eyepiece. Includes FREE "STAR CHART", 272-page "HANDBOOK OF HEAVENS" and "HOW TO USE YOUR TELESCOPE" book.

Stock No. 83,050-D \$29.95 (plus)

Send Check or M.O.— Satisfaction or Money Back!



War Surplus! American-Made 7x50 Binoculars

Big optical glass lens! Crystal-clear viewing—7 power! Every optical element is tested. All essential parts checked. Also guaranteed for lifetime viewing. Individual eye tests. Full pupil 7 mm. Approx. field of 1,000 yds. to 330 ft. Carrying case included. American 7 x 50 normally cost \$174.95. Our war surplus price saves you real money.

Stock No. 1544-D only \$74.95 (plus)

SEND FOR 160-PAGE FREE CATALOG—D

Large selection of astronomical telescopes, binoculars, microscopes, magnifiers, lenses, prisms, earth accessories, much learning with—
EDMUND SCIENTIFIC CO., Barrington, New Jersey



Photographed on the Sunlane Route by Tina Venti

Why just get there...when you can cruise there? This is the kind of life you enjoy aboard the Independence, Constitution or Atlantic on the Sunlane Route to Europe and the Mediterranean. Delightful! Come sail with us. See your Travel Agent or American Export Lines, 39 Broadway, New York 6, New York.

★ STAUNTON ★ ★ MILITARY ACADEMY ★

In beautiful Shenandoah Valley. Thorough college preparation. Fully accredited. Individual guidance. Band. All sports. 5 gym. Pool. Fine health center. Fire-proof buildings. Separate Junior School. Illus. Catalog write Dept. S.M.A. Box 108, Staunton, Va. **BASIC COURSE R.O.T.C. BY U. S. ARMY INSTRUCTORS.**



Founded 1880

V VALLEY FORGE MILITARY ACADEMY

"At the Nation's Shrine" Valley Forge shrine of our freedom, has named its name to this fully accredited, distinguished MIL. Acad. and Jr. Coll. Board classes, highest academic standards. Prep School grades 9 thru 12 & Jt. Coll. All Sports. Air Car., Infantry, Band, Senior Div. ROTC. Catalog. Box M, Wayne, Pa.

WENTWORTH MILITARY ACADEMY
Preparation for the rigors of business or higher education. Accred. 4-yr. High School, separate 2-yr. College. In ROTC, C.A.A. flying, sports, pool. Modern buildings, country club, Summer School. 3rd year. Catalog. Col. Sellers, 182 Wash. Place, Lexington, Mo.

WESTERN MILITARY ACADEMY
Emphasis on self-confidence, self-direction, home-study. Small classes, guidance. Grades 7-12. Career analysis. Jr.-Sr. ROTC. Athletics, riding, pool. 4th year. Near St. Louis. Catalog. Col. Ralph B. Jackson, Supt., Box N-3, Alton, Ill.

From March through August the School Directory appears in the Magazine to serve as a guide to NATIONAL GEOGRAPHIC families in selecting the ideal school, college, camp, or home study course to meet their special needs. The organizations listed in the Directory will be pleased to send catalogs and viewbooks on request. By mentioning the Geographic you will receive the best possible attention.

GET THIS VALUABLE COLLECTION

Big beautiful collection, all different postage stamps of Greenland (North Pole), St. Pierre, Newfoundland, Canada — featuring Eskimos, scarce 1867 Confederation, United Nations, Northern Territories, U. S. Stamps — ancient 19th Century, first Ship & Plane, rare Whooping Crane, Pony Express, etc. ALSO, full set Colonial & Civil War commemoratives PLUS 87 colorful foreign flag stamps. **EXTRA!** Big bargain catalog, How To Recognize Rare Stamps, other exciting stamp offers for free inspection. Send 10¢ for mailing.

FREE!

SENSATIONAL GET ACQUAINTED OFFER

Mary KENMORE STAMP COMPANY
dorel MILFORD CT-405, NEW HAMPSHIRE

**DON'T CLIMB STAIRS
RELAX... RIDE A
SEDGWICK "STAIR-CHAIR"**

Put an end to climbing stairs. Ride safely, effortlessly from floor to floor on a Sedgwick Stair-Chair®. Quickly, easily installed; electrically operated. Costs \$1400 or less (installed N.Y.C.) Nationwide service

Sedgwick
MACHINE WORKS

259 West 14th Street, New York 11
Other Sedgwick Products
Residence Elevators • Dumb Waiters
Sidewalk Elevators • Freight Waiters
Established 1893

THE FUN WAY TO TRAVEL



Want to explore exciting foreign towns and villages? Roam inviting mountain ranges with their crystal lakes, or just bask on some warm sunny beach? Or perhaps you know a road somewhere you'd like to follow to the end. It's all the same with an Airstream Land Yacht . . . good beds, bathroom, hot and cold water, refrigeration, heat and light independent of outside sources wherever you go. Road voyaging with an Airstream means real travel independence — no time-tables, tickets, packing. It's the exciting, better way to travel anywhere in the world.

write for free booklet "World At Your Doorstep"

AIRSTREAM INC.

10 CHURCH STREET, JACKSON CENTER, OHIO
12804 E. FIRESTONE, SANTA FE SPRINGS 10, CALIF.

SHERATON HOTELS

THE BIGGEST WELCOME IN
"THE WORLD'S LONGEST CITY"

BOSTON: SHERATON-PLAZA

PROVIDENCE: SHERATON-BILTMORE

NEW YORK: PARK-SHERATON

SHERATON-EAST • SHERATON-ATLANTIC

SHERATON-RUSSELL • SHERATON MOTOR INN

SHERATON-TENNEY INN AT LA GUARDIA AIRPORT

PHILADELPHIA: THE SHERATON

SHERATON MOTOR INN

BALTIMORE: SHERATON-BELVEDERE

SHERATON-BALTIMORE INN

WASHINGTON: SHERATON-CARLTON

SHERATON-PARK

For reservations call your nearest SHERATON HOTEL or Reservation Office. Coast to Coast U. S. A., Hawaii, Canada and Overseas





On the beach at Bar Harbor, Maine

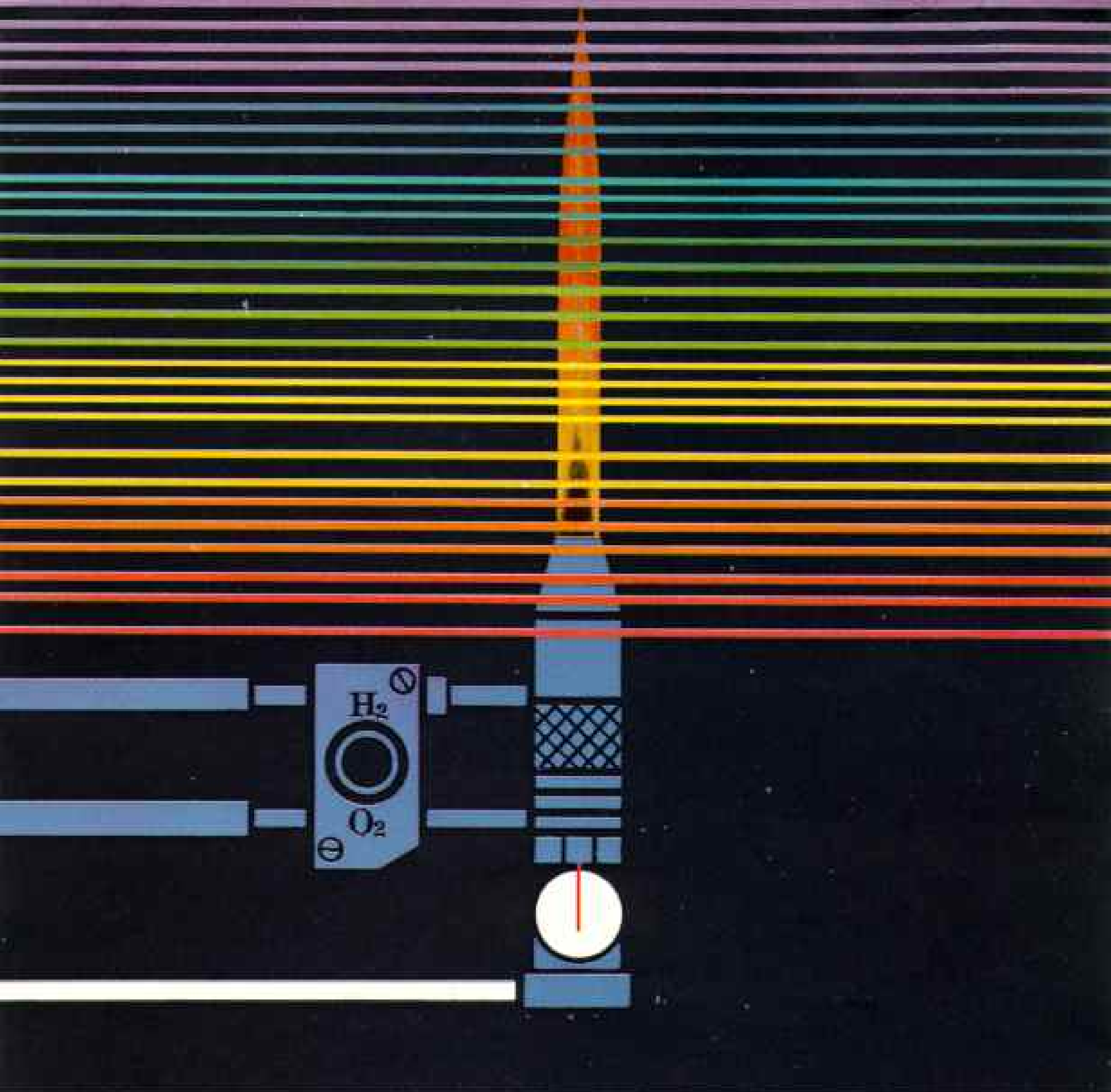
Wherever you go...go first by Long Distance

Call ahead for reservations...keep in touch with the folks back home.

And have a wonderful time.



BELL TELEPHONE SYSTEM



We're burning salt today—for customers coast-to-coast

A cherry red flame means strontium . . . white means magnesium . . . blue, cobalt. When Morton Salt scientists burn salt samples in the spectrophotometer symbolized above, they can determine the presence of otherwise imperceptible mineral traces. This flame photometry process is an important part of Morton's salt research procedure.

The Morton Salt Laboratory in Woodstock, Illinois—the largest and most complete salt laboratory in the country—serves customers

all across the nation. So do all other Morton facilities. With service from ten salt sources, channeled through thirty sales offices and warehouses, Morton is America's only nationwide salt company. Delivery is never a problem; you need never worry about "bottle-necks" endangering your plant's continuous operation, because Morton can guarantee two or more sources for any grade of salt you require. This coast-to-coast organization may save you thousands of dollars every year!

MORTON SALT
INDUSTRIAL DIVISION



COMPANY
110 NORTH WACKER DRIVE, CHICAGO 8, ILLINOIS
TELEPHONE: FINANCIAL 8-1300



Spring is just around the corner

Yes, springtime starts in September in South America. The old world-new world contrasts, the vitality of our good neighbor continent are especially exciting this time of year. If you can plan an autumn holiday, come unwind for a month of unsurpassed relaxation aboard one of America's two newest luxury liners, ss Argentina and ss Brasil. Moore-McCormack knows best how to cater to your every whim. They have devoted half a century's experience to anticipating the wishes and needs of worldly-wise voyagers. If you have only a week or so, come along on one of our autumn Caribbean cruises, a satisfying sample of our longer cruises. Your travel agent can give you details, or inquire from us directly at 2 Broadway, N. Y. 4, N. Y.

Fall Cruises to South America: From New York Sept. 20, Oct. 19, to ports in West Indies, Brazil, Uruguay and Argentina (31 days); Nov. 21, to Bermuda, West Indies and Brazil (27 days).

Fall Cruises to the Caribbean: From New York Oct. 2, Oct. 24, Nov. 9; from Florida Nov. 11, Nov. 28, Dec. 9.

YOU GET **MUCH MORE** WITH



MOORE-McCORMACK LINES