VOL. 133, NO. 5 MAY, 1968

NATIONAL GEOGRAPHIC

FINLAND
PLUCKY NEIGHBOR OF SOVIET RUSSIA
WILLIAM GRAVES 587
GEORGE F. MOBLEY

TOOL-USING BIRD: EGYPTIAN VULTURE OPENS OSTRICH EGGS
BARONESS JANE VAN LAWICK-GOODALL
BARON HUGO VAN LAWICK 631

NEVADA'S MOUNTAIN OF INVISIBLE GOLD
SAMUEL W. MATTHEWS 668
DAVID F. CUPP

ÎLE DE LA CITÉ BIRTHPLACE OF PARIS
KENNETH MacLEISH 680
BRUCE DALE

GARDENING'S COLOR MERCHANTS
ROBERT DE ROOS 720
JACK FIELDS

NEW NATIONAL PARK PROPOSED: THE SPECTACULAR NORTH CASCADES
NATHANIEL T. KENNEY, JAMES P. BLAIR 642

OFFICIAL JOURNAL OF THE NATIONAL GEOGRAPHIC SOCIETY WASHINGTON, D. C.

NATIONAL GEOGRAPHIC SOCIETY

WASHINGTON, D. C.

Organized "for the increase and diffusion of geographic knowledge"

GILBERT HOVEY GROSVENOR
President, 1920-1954; Editor, 1899-1954
Chairman of the Board, 1954-1966

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. Since 1890 the Society has supported 476 explorations and research projects, adding immeasurably to man's knowledge of earth, sea, and sky. It diffuses this knowledge through its monthly journal, NATIONAL GEOGRAPHIC, more than 20 bulletin maps distributed each year, its books, globes, and atlases; 30 School Bulletins a year in color; information services to press, radio, and television; technical monographs, mainly exhibits from around the world in Explorers Hall, and a nationwide series of programs on television. Articles and photographs of travel, natural history, and expeditions to far places are desired. For material used, generous remuneration is made.

MELVIN M. PAYNE, *President*
FREDERICK G. VOSBURGH, *Vice President and Editor*
LEONARD CARMICHAEL, *Vice President for Research and Exploration*
ROBERT E. DOYLE, *Vice President and Secretary*
THOMAS M. BEERS, *Vice President and Associate Secretary*
GILBERT M. GROSVENOR, *Vice President and Associate Editor*
OWEN R. ANDERSON, HERMAN J. A. C. ARENS, WILLIAM T. BELL, HERBERT T. HENDERSON, W. EDWARD ROSCHER, C. VERNON SANDERS, *Associate Secretaries*
HILLEARY F. HOSKINSON, *Deputy Treasurer and Assistant Secretary*

BOARD OF TRUSTEES

MELVILLE BELL GROSVENOR
Chairman of the Board and Editor-in-Chief

THOMAS W. MCKNEW, *Advisory Chairman of the Board*

LEONARD CARMICHAEL, *Former Secretary, Smithsonian Institution*
LEO OTIS COLBERT, *Rear Admiral, U. S. Coast and Geodetic Survey (Ret.)*
CRAWFORD H. GREENEWALT, *Chairman, Finance Committee, E. I. du Pont de Nemours & Company*
GILBERT M. GROSVENOR, *Associate Editor, National Geographic*
ARTHUR B. HANSON, *General Counsel, National Geographic Society*
CARYL P. HASKINS, *President, Carnegie Institution of Washington*
EMORY S. LAND, *Vice Admiral, U. S. Navy (Ret.), Former President, Air Transport Association*
CURTIS E. LEMAY, *Former Chief of Staff, U. S. Air Force*
H. RANDOLPH MADDOX, *Vice President, American Telephone & Telegraph Company (Ret.)*
WM. MCCHESNEY MARTIN, JR., *Chairman, Board of Governors, Federal Reserve System*
BENJAMIN M. MCKELWAY, *Editorial Chairman, Washington Star*
MELVIN M. PAYNE, *President, National Geographic Society*
LAURANCE S. ROCKEFELLER, *President, Rockefeller Brothers Fund*
JUAN T. TRIPPE, *Chairman of the Board, Pan American World Airways*
FREDERICK G. VOSBURGH, *Editor, National Geographic*
JAMES H. WAKELIN, JR., *Former Assistant Secretary of the Navy*
EARL WARREN, *Chief Justice of the United States*
JAMES E. WEBB, *Administrator, National Aeronautics and Space Administration*
ALEXANDER WETMORE, *Research Associate, Smithsonian Institution*
LLOYD B. WILSON, *(Emeritus) Honorary Board Chairman, Chesapeake & Potomac Telephone Company*
CONRAD L. WIRTH, *Former Director, National Park Service*
LOUIS B. WRIGHT, *Director, Folger Shakespeare Library*

COMMITTEE FOR RESEARCH AND EXPLORATION

LEONARD CARMICHAEL, *Chairman*
ALEXANDER WETMORE and MELVIN M. PAYNE, *Vice Chairmen*

LEO OTIS COLBERT, CARYL P. HASKINS, A. REMINGTON KELLOGG, *Research Associate, Smithsonian Institution*, EMORY S. LAND, T. DALE STEWART, *Senior Scientist, Office of Anthropology, Smithsonian Institution*, MATTHEW W. STIRLING, *Research Associate, Smithsonian Institution*, JAMES H. WAKELIN, JR., CONRAD L. WIRTH, PAUL A. ZAHL, and the senior officers of the Society, BARRY C. BISHOP, *Secretary (on leave)*; EDWIN W. SNIDER, *Acting Secretary*

Assistant Secretaries: CHARLES P. BIXEL, FRANK S. DELK, JOSEPH B. HOGAN, RAYMOND T. MCELLIGOTT, JR.
Assistant Treasurer: WILLIAM H. MCCAULEY

Leonard J. Grant, *Editorial Assistant to the President*; Edwin W. Snider, Richard E. Pearson, *Administrative Assistants to the President*; Judith N. Dixon, *Administrative Assistant to the Chairman and Editor-in-Chief*; Louise W. Kinsolving, *Secretary to the Advisory Chairman of the Board*

SECRETARY'S STAFF: *Administrative:* Paul Cutlos, Jr., Ward S. Phelps. *Accounting:* Jay H. Givans, George F. Fogle, Alfred J. Hayre, William G. McGhee, Martha Allen Baggett. *Statistical:* Everett C. Brown, Thomas M. Kent. *Retirement:* Mary L. Wilmarth (*Assistant Supervisor*). *Payroll:* Dorothy L. Dunham (*Assistant Supervisor*). *Procurement:* J. P. M. Johnston, Robert G. Corey, Robert C. Ellis, Jr., Sheila H. Immel, Margaret A. Shearer. *Membership Research:* Charles T. Kneeland. *Membership Fulfillment:* Roy J. Klockenbrink. *Member Relations:* Paul F. Mintz. *Computer Center:* John Goedel. *Secretary's Files:* Mozelle L. Downs. *Promotion:* Sian Jennings, E. M. Pusey, Jr., Gordon Young, Robert J. Warfel. *Personnel:* James R. Mahon, Adrian L. Loftin, Jr., Nellie E. Sinclair. *Medical:* Thomas L. Hartman, M. D. *Translation:* Zbigniew Jan Lasyk

COVER: Diadem of peaks in Washington's North Cascades frames a turquoise jewel—1,165-foot-high Trapper Lake (page 642)

PUBLISHED BY THE SOCIETY IN THE NATIONAL INTEREST

NATIONAL GEOGRAPHIC MAGAZINE

MELVILLE BELL GROSVENOR
Editor-in-Chief and Board Chairman

MELVIN M. PAYNE
President of the Society

FREDERICK G. VOSBURGH, *Editor*

GILBERT M. GROSVENOR, FRANC SHOR, *Associate Editors*

Senior Assistant Editors: Allen C. Fisher, Jr., John Scofield

Assistant Editors: Andrew H. Brown, James Cerruti, Robert L. Conly, W. E. Garrett, Edward J. Linehan, Kenneth MacLeish (*Foreign Staff*), Carolyn Bennett Patterson, Howell Walker, Kenneth F. Weaver

Senior Editorial Staff: Lonnelle Aikman, Jules B. Billard, Rowe Findley, William Graves, Stuart E. Jones, Robert P. Jordan, Joseph Judge, Nathaniel T. Kenney, Howard La Fay, Samuel W. Matthews, Bart McDowell, Senior Natural Scientist: Paul A. Zahl

Foreign Editorial Staff: Lisa Morden (*Chief*); Thomas J. Abercrombie, David S. Boyer, Helen and Frank Schreider, Volkmar Wentzel

Editorial Staff: Wayne Barrett, Thomas Y. Canby, Louis de la Haba, Alice J. Hall, Werner Janney, Jay Johnston, Elizabeth A. Moize, Ethel A. Starbird, Peter T. White

Editorial Layout: Howard E. Paine (*Chief*); Charles C. Uhl, John M. Lavery

Geographic Art: William N. Palmstrom (*Chief*); Gilbert H. Emerson (*Asst. Chief*). *Artists:* Lisa Biganzoli, William H. Bond, John W. Lothers, Robert C. Magis, Robert W. Nicholson, Ned M. Seidler. *Cartographic Artists:* Victor J. Kelley, Snezhana Stefanoff. *Research:* Walter Q. Crowe (*Supervisor*), George W. Beatty, John D. Garst, Jean B. McConville, Dorothy A. Nicholson, Eugene M. Scherr, John F. Wood. Isaac Ortiz (*Production*). Marie L. Barnes (*Administrative Assistant*)

Editorial Research: Margaret G. Bledsoe (*Chief*); Ann K. Wendt (*Assistant Chief*), Edith C. Berg, Elizabeth J. Chappell, Lesley L. Dinsmore, Margery G. Dunn, Jan Holderness, Levenia Loder, Frances H. Parker, Patricia Rosenberg, Elizabeth C. Wagner

Geographic Research: George Crossette (*Chief*); Newton V. Blakeslee (*Assistant Chief*), Leon J. Canova, Margaret Ladd, Virginia A. LeVasseur, John A. Weeks

Photojournalism: John McConnell (*Chief*)

Library: Virginia Cotter Hills (*Librarian*); Margery K. Barkdull (*Assistant Librarian*), Melba Barnes, Vera Cassilly, Katherine P. O'Donnell, Louise A. Robinson, Esther Ann Manion (*Librarian Emeritus*)

Administration: Betty T. Seaborne, *Administrative Assistant to the Editor*; Hazlett Casey, Virginia H. Finnegan, Winifred M. Myers, Shirley Neff (*Editorial Assistants*); Dorothy M. Corson (*Indexes*); Ronald S. Milford, Jeanne S. Duiker (*Files*); Evelyn Fox (*Transportation*)

ILLUSTRATIONS STAFF: *Illustrations Editor:* Herbert S. Wilburn, Jr. *Associate Illustrations Editor:* Thomas R. Smith. *Art Editor:* Andrew Poggenpohl. *Assistant Illustrations Editors:* Mary S. Griswold, O. Louis Mazzatenta, Charles Allmon (*Becoming Photographer*). *Layout and Production:* Arthur A. Terry. *Senior Picture Editors:* Charlene Murphy, Robert S. Patton. *Picture Editors:* Manuel L. Lopez, Jon Schneeberger. *Librarian:* Alan J. Lessig, Barbara A. Shattuck (*Assistant*)

Artists: Walter A. Weber (*Naturalist*), Peter V. Bianchi

Engraving and Printing: Dee J. Andalis (*Chief*); Joe M. Barker, Frank S. Oliverio, William W. Smith, James R. Whitney

PHOTOGRAPHIC STAFF: *Director of Photography:* Robert E. Gilka. *Assistant Directors:* B. Anthony Stewart, Dean Conger. *Film Review:* Albert Moldvay (*Chief*); Guy W. Starling (*Assistant Chief*). *Special Research:* Walter Meayers Edwards (*Chief*). *Photographers:* James P. Blair, Bruce Dale, John E. Fletcher, Otis Imboden, Emory Kristof, Bates Littlehales, George F. Mobley, Robert S. Oakes, Winfield Parks, Joseph J. Scherschel, Robert F. Sisson, James L. Stanfield

Photographic Laboratory: Edwin L. Wisherd (*Chief*); Milton A. Ford, Donald McBain, Claude E. Petrone, Carl M. Shrader

RELATED EDUCATIONAL SERVICES OF THE SOCIETY

Cartography—Maps, atlases, and globes: Chief Cartographer: Wellman Chamberlin. *Associate Chief Cartographer:* Athos D. Graziani. *Assistant Chief:* William T. Peele. *Data Compilation:* Charles L. Stern (*Supervisor*), James W. Killion. *Name Compilation:* Donald A. Jaeger (*Supervisor*), Manfred G. Kammowitz, George E. Stuart. *Map Drawing:* Douglas A. Strobel (*Supervisor*), Robert W. Northrop, Thomas A. Wall. *Map Editing:* Ted Dachtera (*Supervisor*), Russell G. Fritz, Richard K. Rogers, Thomas A. Walsh. *Projection:* David W. Cook. *Layout and Design:* John P. Dorr, Harry C. Siddeley. *Revisions:* Richard J. Darley. *Administrative Assistant:* Catherine M. Hart

Books: Merle Severy (*Chief*), Edwards Park (*Associate Chief*), Seymour L. Fishbein (*Assistant Chief*), Thomas B. Allen, Ross Bennett, Charles O. Hyman, James P. Kelly, Anne Dirkes Kobor, John J. Putman, Berry L. Reece, Jr., David F. Robinson

Special Publications: Robert L. Breeden (*Chief*); Donald J. Crump (*Assistant Chief*), Josephine B. Bolt, Bruce Brander, David R. Bridge, Johanna G. Farren, Ronald M. Fisher, Mary Ann Harrell, Bryan Hodgson, Geraldine Linder, Michael E. Long, Philip B. Silcott, Joseph A. Taney

School Service: Ralph Gray (*Chief*), Arthur P. Miller, Jr. (*Assistant Chief*), Richard M. Crum, Phyllis Greene, Charles H. Sloan, Jan(e) Knudsen Wheat

News Service: Windsor P. Booth (*Chief*); Matt C. McDade (*Assistant Chief*), Edward Cornish, Donald J. Frederick, Sabra Ribbens, Paul Sampson, Isabel Clarke (*Assistant*)

Television: Robert C. Doyle (*Chief*); Dennis B. Kane (*Assistant Chief*), David Cooper, Patricia F. Northrop (*Administrative Assistant*)

Lectures: Joanne M. Hess (*Chief*), Robert G. Fleegal, Mary W. McKinney, Gerald L. Wiley

Explorers Hall: T. Keator Bentley (*Curator-Director*)

EUROPEAN OFFICES: W. Edward Roscher (*Associate Secretary and Director*), 11 Stanhope Gate, Mayfair, London, W. 1, England; Jacques Ozier, 6 rue des Petits-Pères, 75-Paris 2e, France

ADVERTISING: *Director:* Harley L. McDevitt, 630 Fifth Ave., New York, N.Y. 10020. *Managers—National:* William A. Boeger, Jr.; *Eastern:* Joseph T. Feeney, New York. *Midwestern:* William Turgeon, Chicago. *Los Angeles:* Jack V. Sheehan. *San Francisco:* Thomas Martz. *Automotive:* John F. Grant, New York. *Travel:* Robert W. Horan, New York

There is silence as he moves into position. Parry. Thrust. Counter thrust. Then touche. The bout is done. And he is still the uncontested winner. For this man there is only one watch. The Hamilton Thin-O-Matic. Pure time expressed in the sabre-thin case of brush finish stainless steel. This is simplicity in design. Extremely thin, handsome and precise. Shock-resistant, waterproof* and self-winding, of course. This man lives with excitement. For him, the gift of a Hamilton Thin-O-Matic is a complement to his way of life.

If you want to give more than time, give

HAMILTON

*Waterproof—dustproof with seals intact
Shown: Thin-O-Matic watch: TM-580W, $65.50.
Hamilton Watches are available in Canada
and more than 60 other countries.
Hamilton Watch Co., Lancaster, Pa. 17604 U. S. A.

The cuisine is Continental, but you may enjoy trying chopsticks for the Japanese delicacies served first.

London. Hong Kong. Tokyo. Paris. Singapore. Wherever you're going around the world, we go, too. And we take you there in the nicest way. Come aboard one of our Jet Couriers in New York, San Francisco or Los Angeles and let us introduce you to a way of life you may have missed last time. Your kimono-clad hostess has been trained since childhood in the art of pleasing guests. She greets you with a refreshing *o-shibori* hot towel. A fragile cup of warmed *sake* is offered. And all the while you're relaxing in a brocaded lounge chair—surrounded by the subtle delights of Japan.

Whether you're rushing to a business appointment—or traveling for pleasure, Japan Air Lines brings a special bit of serenity to your trip. Ask your travel agent about us. Why be a passenger on some other airline when you can be our guest?

JAPAN AIR LINES
the worldwide airline of Japan

He lives with lions

EQUIPPED WITH RIFLE AND CAMERA, DR. SCHALLER APPROACHES AN ADULT MALE

IN THE VIBRATING HEAT of an African afternoon, an amber-eyed lion glowers across the Serengeti grasslands. Working alone and unarmed as he records the animal's behavior, Dr. George B. Schaller (above) relies on caution and respect to avoid sudden, deadly attack. Observing and photographing dangerous beasts in action is all in a day's work for this New York Zoological Society scientist. After living among tigers in India and gorillas in the Congo, the noted zoologist and author now tackles the king of beasts in Tanzania.

Here, in a study of migration habits, Dr. Schaller notes the number of an eartag just attached to a tranquilized lioness. When he completes his long-term project, the first thorough report on lion life in the wild, his findings and photographs will appear in NATIONAL GEOGRAPHIC.

Photographic trophies from around the world pack the pages of the GEOGRAPHIC. Your friends, too, can enjoy the magazine's monthly visits if you nominate them for membership on the form below.

NATIONAL GEOGRAPHIC SOCIETY MEMBERSHIP CHECK ONE

$6.50 **CALENDAR YEAR 1968 MEMBERSHIP DUES INCLUDE SUBSCRIPTION TO THE NATIONAL GEOGRAPHIC.**

Annual dues in the United States and throughout the world are $6.50 U.S. funds or equivalent. To compensate for international postage and exchange differentials, please remit: for Canada, $7.60 Canadian funds ($7 U.S. acceptable); for all other countries, $8 U.S. funds or equivalent. 90% of dues is designated for subscription to magazine.

18-MONTH MEMBERSHIP: Applicants who prefer delivery of their NATIONAL GEOGRAPHIC to start with the July, 1968, instead of the January, 1968, issue, may *elect* to become members and receive the magazine for 18 months from July 1, 1968, through December, 1969. Upon expiration, such memberships will be renewable annually on a calendar-year basis. For 18-month membership check here ☐ and remit: for U.S. and its outlying areas, $9.75 U.S. funds or equivalent; for Canada, $11.40 Canadian funds ($10.50 U.S. acceptable); for all other countries, $12 U.S. funds or equivalent. *This is the most economical plan.*

Life membership for U.S. and its outlying areas, $300 U.S. funds or equivalent; for Canada, $216 Canadian funds ($200 U.S. acceptable); for all other countries, $250 U.S. funds or equivalent.

NEW MEMBER

PRINT NAME IN AN INDIVIDUAL ONLY (MR., MRS., MISS)

STREET

CITY, STATE, ZIP CODE

Mail to:
The Secretary, National Geographic Society
Washington, D. C. 20036

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 signed: ☐

.....

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

MY NAME

PLEASE PRINT (MR., MRS., MISS)

STREET

CITY, STATE, ZIP CODE

A travel agency

If you're taking a trip in your car or boat or even your own plane, see Gulf. Our Tourgide® Service can give you map, motel, sightseeing and other travel information. And our Gulf Travel Card lets you charge Holiday Inn rooms and meals and even Avis car rentals.

Just look for the big orange disc. We have 35,000 easy-to-find dealers coast to coast.

You still haven't seen the Grand Canyon? Or Yellowstone? Or San Francisco? Or New Orleans?

It's time you discovered America.

Our Gulf Tourgide® Service can help you plan your entire trip and have more time for fun along the way. We'll send you maps and travel folders showing the scenic way to get where you're going, or the fastest way. Where to stay. And what sights to take in along the way. We'll also include the latest Holiday Inn Directory. Just ask your Gulf dealer for a Gulf Tourgide Service request card. No charge, of course.

Your Gulf dealer can also handle your application for a Gulf Travel Card. With that handy piece of plastic in your pocket, you can stay at any of the more than 900 Holiday Inns coast to coast. You can dine comfortably at the always-good Holiday Inn restaurants and charge everything, rooms and meals, on your Travel Card.

As for your car needs, you'll find Gulf stations in every state (plus 5,000 British-American stations in Canada). You can charge not only gasoline and oil, but those unexpected expenses like a tire, battery or repairs. For your needs we hope you'll use Gulf restrooms. You'll find them neat and clean because Gulf girls called Tourguards make "inspection tours" to make sure of it.

This year, take a vacation from vacation troubles and get more for your travel dollar.

Visit your nearest Gulf dealer's station before you go, and find out why we call it "The Travel Agency with Pumps."

Gulf Oil Corporation

with pumps?

Gulf

IMAGINATIVE DESIGN AND SUPERB CRAFTSMANSHIP together create the classic beauty of fine Krementz Jewelry. A heavy OVERLAY OF 14KT. GOLD gives these pieces much of the permanence and all of the rich beauty of solid Karat gold.

You will always take special pride in giving this finer jewelry — for Mother's Day . . . Graduation . . . Birthdays . . . Weddings — or to yourself.

Illustrated at left, reading down: Forget-me-not Necklace $18 Earrings $15 Earrings $12* Brooch $21 Grape motif Earrings $18.50 Brooch $31.50
Center: Heart Necklace $11.50 Pink Rose motif Bracelet $22.50 Earrings $12.50 Earrings $10.50* Brooch $13.50
Right: Ivory Rose Necklace $10.50 Large Brooch $21 Sautoir Brooch $16 Ivory Clover Earrings $15 Brooch $21

*14Kt. gold for pierced ears

Each article in fine leatherette gift case . . . Wherever fine jewelry is sold

Cuff Links $8.50 to $35
Tie Holders $5.50 to $16.50
Tie Tacks $4 to $27.50

Write for free illustrated booklet
Krementz & Co.
47 Chestnut Street
Newark, New Jersey 07101

Krementz

1969 • MORE THAN A CENTURY OF FINE JEWELRY • 1969

If you're in a camel crash in Karachi,

Continental's got you covered.

When people travel, they expect the unexpected. That's half the fun of it.

But sometimes the unexpected turns out to be less than fun. Like when a speeding camel knocks you down. Or you fall out of a howdah. Or a dizzy llama drops its pack on you.

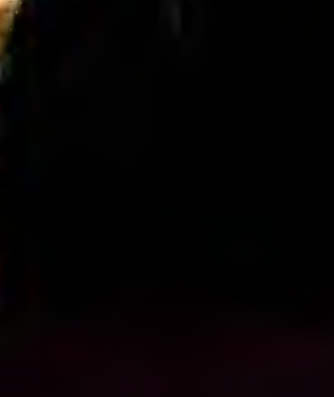
Things like that can happen.

And because they can, Continental offers a variety of policies which cover almost every kind of happening you can think of. And some you can't.

So that in case the unthinkable happens, Continental will help you back to health and peace of mind. With hard cash.

Oh yes, Continental also has policies to protect all the things you left at home. Plus the home.

Which means we've got you covered coming and going.



The Continental Insurance Companies

Lifers!

WHEEL HORSE OWNERS ONCE—WHEEL HORSE OWNERS FOR LIFE
...Wheel Horse Lifers know they bought right and can trade right.

NEW 2-year warranty—first in the Lawn and Garden Tractor Industry.
NEW Charger Electro 12—finest Homechore tractor built; with NEW super-safe electromagnetic clutch, standard equipment and NEW finger-touch hydraulic attachment lift, standard equipment. NEW automotive "won't scuff" finish.
Let your Wheel Horse dealer show you these exciting new features today.

WHEEL HORSE LIFER BONUS PROMOTION—APRIL 1 - MAY 31

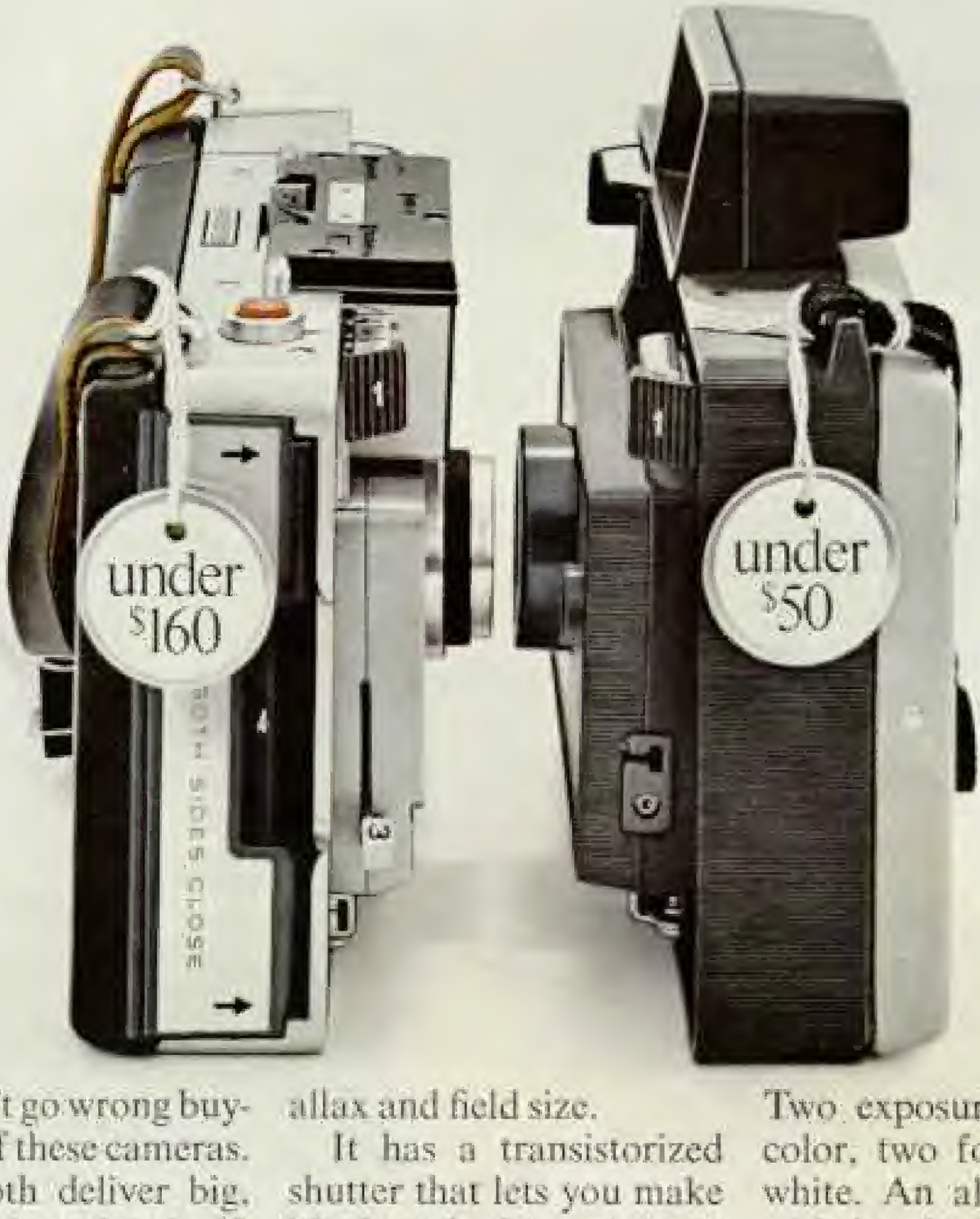
Visit your participating Wheel Horse dealer for the "deal of your life"—and ask for your FREE copy of our NEW Grass Grooming Guide.

Get a Horse! Wheel Horse, of course!

WHEEL HORSE PRODUCTS, INC., 515 W. Ireland Rd., South Bend, Ind. 46614

See the full Wheel Horse line including the famous Reo riding and power mowers.

What will $160 buy you that $50 won't?



You can't go wrong buying either of these cameras.

They both deliver big, beautiful color prints in 60 seconds.

So why pay all that extra money for the one on the left?

Why? Sit back and listen.

It has a superb Zeiss Ikon single-window range- and viewfinder that automatically corrects for parallax and field size.

It has a transistorized shutter that lets you make black-and-white pictures indoors *without flash*, and even make perfect time exposures up to 10 seconds, automatically.

If you add special Polaroid camera accessories, you can create beautiful portraits and close-ups.

The expensive model has a sharp triplet lens.

Two exposure ranges for color, two for black-and-white. An all-metal body with brushed chrome finish. And a flashgun.

All in all, it's the finest automatic camera Polaroid has ever produced.

$160 model? $50 model? As we said, you can't go wrong.

Not buying either one—*that's* where you could go wrong.

POLAROID®

*as long as crown, crystal and case remain intact.

The Electric Timex. No winding. Electric accuracy. $39.95.

The facts speak for themselves.

With the Electric Timex, instead of a mainspring in your watch, you have a tiny replaceable energy cell that gives off steady electric accuracy for a year.

Instead of a watch you have to wind, this is a watch you never wind.

Instead of the high price you'd expect to pay for an electric watch, the Electric Timex starts at $39.95. (The calendar model is $45.00.)

Instead of a watch you have to pamper, Timex gives you rugged dependability.

And add to all this the fact that the Timex is waterproof,* dustproof,* shock-resistant.

Should you get an Electric Timex?

As we said, the facts speak for themselves.

More people buy TIMEX®
than any other watch in the world.

Once you drive it, you won't want to give it back. After only a short time at the wheel of a Cadillac, you'll discover a completely new kind of motoring pleasure and satisfaction. For Cadillac's performance is spirited and responsive, yet beautifully smooth and quiet. Its exceptional maneuverability imparts a feeling of confidence, and the interiors are truly inspiring in the richness of their fabrics and appointments. You'll find that once you've enjoyed driving a Cadillac, you won't want to return to ordinary motoring . . . especially after your authorized Cadillac dealer explains how easy it can be to own the Standard of the World.

Cadillac
STANDARD OF THE WORLD

Original Crush-Proof Pack

Back in 1950 we came up with a great idea for a suitcase.

Shipping cases. For mortar shells.

A combination of materials strong enough to carry (and, obviously, protect) many pounds of high explosives.

We added fiber glass reinforcement. (All over, not just on the corners.) Non-spring locks that wouldn't spring open on impact. And a strong stainless steel frame.

And there we had the American Tourister, the world's first molded suitcase.

The rest is history.

In 1954, a 3800 lb. car overturned, pinning an American Tourister for 10 hours. There were two small broken places on one side, and nothing in the bag got hurt.

In 1961, an American Tourister fell from a car going 70 mph, hit the concrete highway, and skidded 100 feet. There were only a few minor surface scratches.

In 1964, an American Tourister blew off a car going 60 mph and another car ran over it. Some of the outer covering got scuffed.

Maybe awful things like this won't happen to your American Tourister.

Maybe getting thrown into the baggage hold of a plane is all that will happen.

But for a lot of other suitcases, that's more than enough. **American Tourister**

The Continental Mark III.

The most authoritatively styled, decisively individual motorcar of this generation.
From the Lincoln-Mercury Division of Ford Motor Company.

Ford

Caprice

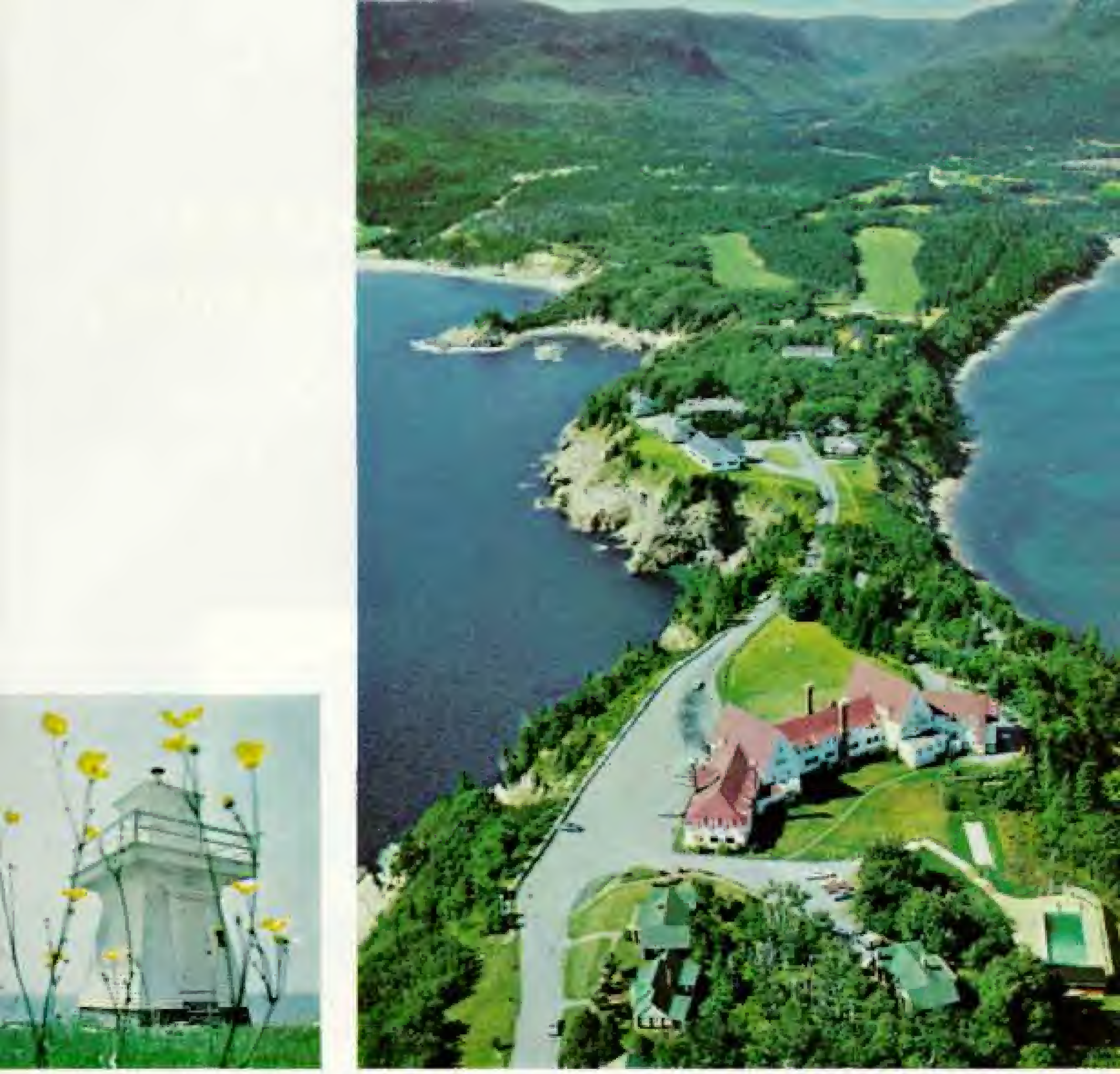
The Grand Chevrolet

It can make you feel richer

1968 Caprice Sedan

It's the very top of Chevrolet's big car line—looks, feels and behaves it, too. Park it next to an expensive limousine—it comes off looking great! Compares just as well inside, with special Caprice Sedan touches like luxurious fabrics, fold-down center armrest, extra sound insulation, the look of hand-rubbed walnut and more. You can add concealed headlights, stereo tape system and other nice touches. Go ahead. Get into that limousine class at Chevrolet cost with Caprice. The best of two worlds. Be smart. Be sure. Buy now at your Chevrolet dealer's.

CHEVROLET



Up in the Cape Breton Highlands, one of many beautiful areas in Nova Scotia, you'll find a superb resort area, tucked in the midst of a gloriously scenic National Park. Spectacular golf. Superb beaches. Salt-water fishing. And more, much more, in this beautiful Canadian Province by the sea. For our colourful 32-page brochure, write or visit the Nova Scotia Information Office nearest you.

A way out vacation...in a nearby place

NOVA SCOTIA

Canada's Ocean Playground

NOVA SCOTIA TRAVEL BUREAU:
P.O. Box 130, Halifax, Nova Scotia, Canada

Information offices at:

NEW YORK: 30 West 54th Street, New York, N.Y. 10019, Tel: 212-581-2420

BOSTON: 607 Boylston Street, Boston, Mass. 02116, Tel: 617-267-3483

MONTREAL: P.O. Box 3500, Station "B", Montreal, Que., Tel: 514-878-9745

TORONTO: 45 Eglinton Avenue East, Toronto 12, Ont., Tel: 416-487-3445

Name _____

NS-5-69

Address _____

City _____

State _____ Zip Code _____

Remember when movie cameras were big, expensive, and mysterious?

Kodak

Kodak has changed all that.

We made it palm-size.

The only thing that stayed the same is that it's still called a movie camera.

Otherwise, the Kodak Instamatic M12 movie camera comes from a whole new breed.

It's small. Fits right in your palm. Never needs winding. It's less than $30. In its outfit with Kodachrome film, wrist strap and batteries, less than $35.

And there's nothing mysterious about dropping in a film cartridge and shooting until your 50 feet are used up. And the movies are super 8, which means a sharper, brighter picture on your screen than with regular 8mm.

It loads instantly.

There's a wide range of Kodak movie cameras and super 8 projectors (which you need for super 8 movies). Drop in at your Kodak dealer's and see what's happened to movie cameras. We think you'll like what you see.

Prices subject to change without notice.

Kodak Instamatic® movie cameras. From less than $30.

The Garden Primer

or

How to Reason with Bugs and Weeds

Be on the alert! Bugs, weeds and plant diseases are all set to attack your lawn and garden.

What to watch out for

The suckers. Insects like aphids, leafhoppers, scale. They suck out the life juices of a plant. Some infect it with disease.

At times you can spot whole colonies on a plant. But often they hide under leaves.

Hidden or not, wipe them out. Spray or dust plants and shrubs with a recommended insecticide. And apply it right. Use a sprayer or duster that puts the bug-killer exactly where it's needed. That's what Hudson sprayers and dusters do. With their long extensions and adjustable nozzles, you can reach into plant foliage. Get under leaves. Cover plants thoroughly—but without overdose or waste.

The leaf chewers. Insects like beetles, caterpillars. They munch on leaves, destroy a plant's food-making system.

Get even with them. They can't hide from an insecticide properly applied with a Hudson sprayer or duster.

The freeloaders. Plant diseases like blackspot, other fungi. They live off plants. Destroy chlorophyll. Weaken plants.

A fungicide—spray or dust—will prevent or stop these troublemakers. If it's applied in a fine spray mist or dust cloud that covers all the plant—the kind you get with a Hudson sprayer or duster.

The lawn weeds. You know the ones—dandelions, plantain, crabgrass, chickweed. They make a lawn look ugly fast.

Clear them out. Apply a weed-killer with a Hudson sprayer. It's fast, easy. One application usually does the job. But keep spray away from flowers and shrubs. Use the sprayer at low pressure to prevent drift.

The aerialists. Blood-suckers like mosquitoes. Disease-carriers like flies. Both spoil your outdoor fun. Fight back. First, eliminate breeding places. For mosquitoes: stagnant water in rain gutters, old containers, bird baths. For flies: uncovered refuse cans, compost piles.

Next, spray or dust their daytime resting places: nearby shrubs, garden, breezeway ceiling.

That's another job for Hudson sprayers and dusters. They give you the right pattern to quickly cover any surface.

Help from Hudson

It comes in many shapes and sizes for any job, large or small. Just a few plants? Pick a Hydra-Gun® sprayer or Admiral® duster. Average-size yard? A Hudson compression sprayer with a 2 to 4-gallon tank is ideal.

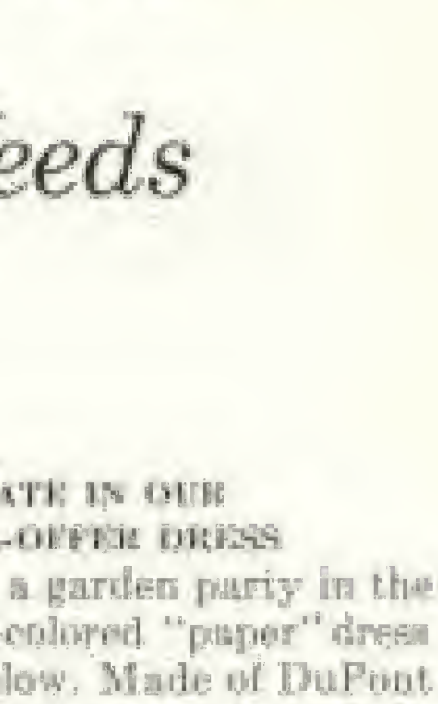
For larger gardens and yards, move up to power—Hudson power sprayers. Choose the 10-gallon Spra-Boy®, 12½-gallon Suburban® or 15, 30 or even 50-gallon Matador®.

You'll find Hudson sprayers and dusters where garden supplies are sold throughout the United States and Canada. Get yours now.

Celebrate in our special-offer dress

Have a garden party in the gaily-colored "paper" dress shown below. Made of DuPont Reemay® polyester fabric. Only $1.25 ($1.50 in Canada) with coupon from your Hudson dealer. Or send direct to: H. D. Hudson Dress Offer, P.O. Box P2, Dept. 101, Burlington, N.C. 27215. Specify size: S(6-8), M(9-12), L(13-16).

Congratulations, proud gardener. From Hudson—the name bugs and weeds fear. And gardeners love.



*Trademark

(Allow 2 to 4 weeks delivery. Offer expires December 31, 1968. Void where prohibited, taxed or otherwise restricted. Good only in U.S.A. and Canada.

HUDSON®

HUDSON®

SPRAYERS AND DUSTERS

Good Housekeeping

You can't rent a car in Bermuda. But you wouldn't want it any other way.

Bermuda believes in taking things slow and easy. We're here to unwind you.

We won't even let you drive a car on our twisting roads, with our left-hand right of way and our 20 mph speed limit.

We think bikes or motorbikes are more fun anyway for our kind of stop-and-go driving. You'll slow down to look at gardens where jasmine and lilies grow. Bougainvillea 90 minutes from New York!! Ride through oleander-shaded lanes, right to the rim of the sea. Stop for a swim at one of many South Shore beaches with the softest, cleanest, pinkest sand you ever dug your toes into.

Bermuda is the one place in the world where you can ride to a black-tie dinner in shorts. On a motorbike.

If you prefer, we will drive you in a taxi through a 17th century world—the old Town of St. George. If your taxi flies a blue flag, your driver is a qualified tour guide. In a pink bus to caves that glow with stalactites and stalagmites. In a horse-drawn carriage to a cricket match.

Or one of our ferries may take you across the Great Sound past green islands large and small to the quiet village of Somerset.

Golf, fishing, sailing, tennis, scuba diving, international shopping. Colourful ceremonies, continental cuisine, night life. It's all here.

Come soon. Bring the children. Babysitters are always available. That way, Bermuda can refresh the whole family.

No other island does it quite so well.

For details, see your travel agent or write: Bermuda, 610 Fifth Ave., N.Y. 10022. 6 N. Michigan Ave., Chicago 60602.

There is only one BERMUDA

fun machine

Come see the great new GRAVELY-424

Love that power! You'll get real satisfaction when you take command of the finest compact tractor that ever mowed a lawn or plowed a furrow! It's Gravely . . . so you know it's a real working machine. Uphill. Sidehill. Over the rough spots. 10 HP engine in the rear gives you full power, ground-hugging traction that lets you have the fun while the tractor does the work.

Love that all-gear drive! The Gravely 424 drive is all-gear-and-steel shaft . . . puts the power where the action is; into the attachments doing the job. There are no belts to slip or break . . . it's gear and steel all the way.

Love those attachments! Easy on. Easy off. Attachments mount quickly down under, up front, or behind. You're in command of any job . . . mowing, snow clearing, gardening and dozens more!

Fun to use, easy to buy! See the Gravely 424 at your Gravely dealer. Talk terms. He'll talk your language. Or, write for a free, full-color catalog: Gravely, 5605 Gravely Lane, Dunbar, West Virginia 25064.

GRAVELY®
A Division of Studebaker Corporation

The compact tractor you'll love at first sight!

You'll never guess who was here.

L. Eiriksson, J. Cabot, J. Cartier, G. Marconi, J. Alcock, A. Brown, F. D. Roosevelt, W. S. Churchill.

Not all at once, mind. In 1001, they say, Leif Eriksson landed here with his band of Vikings. John Cabot didn't get over to see us till 1497, when he gave us our name. As for Jacques Cartier, well, he visited St. John's many times.

Up on Signal Hill, Guglielmo Marconi received the first trans-Atlantic wireless message 1901 that was. And in 1919, Alcock and Brown flew out of St. John's and into history on the first non-stop flight from North America to Europe. And of course, it was in Placentia Bay in 1941, that Roosevelt and Churchill drafted the terms of the Atlantic Charter.

You might say we're historic, what with being the first British colony in the world. Matter of fact, when the Pilgrims landed at Plymouth, they were greeted in English by an Indian named Squantum who had learned to speak it in Newfoundland.

There's one visitor who could make Newfoundland even more historic, as far as you're concerned. And that's you. Come and see us soon. We'd love to have you.

NEWFOUNDLAND AND LABRADOR

Write us for free vacation kit. 1-2-8

Newfoundland and Labrador Tourist Development Office,
Confederation Building,
St. John's, Newfoundland, Canada.

Please send me information on: Cruises ☐ Camping ☐ Fishing ☐
Hunting ☐ General Vacation Package ☐

Name _____
(Please Print)

Address _____

City or Town _____ Postal Zone or Zip Code _____

Province or State _____

The Faces of Virginia

Colonial Williamsburg echoes to the clop-clop of horses' hooves, songs of the 18th century, the roar of a Revolutionary musket. You stroll through antique-filled rooms, boxwood gardens, quaint craft shops. Dine at favorite taverns of the colonial inn crowd. Take side trips to historic Jamestown, fateful Yorktown, timeless James River plantations. In Patrick Henry's words, "I know of no way of judging the future but by the past." Judge America's future in Virginia!

Send For Free 100-Page Picture Guide and Illustrated highway map, ask about Virginia film catalog. Learn about things to do, places to stay, in Virginia. Visit, telephone or write the office nearest you for complete travel service.

VIRGINIA STATE TRAVEL SERVICE
911 E. Broad St., Richmond, Virginia 23219

WASHINGTON
1716 H Street, N.W., Washington, D.C. 20006 • Phone 298-7171

NEW YORK
11 Rockefeller Plaza, New York, N.Y. 10020 • Phone 246-3060

The Commonwealth of Virginia's complete, free travel service.

See America's first

Photograph the youngsters at the first landing place of the you-know-who. And America's first rock. At the hometown of America's first holiday: Thanksgiving.

Motor along the route Paul Revere took on that first historic horseback ride. (Yell "the British are coming!" if you're so inclined, through "every Middlesex village and farm".)

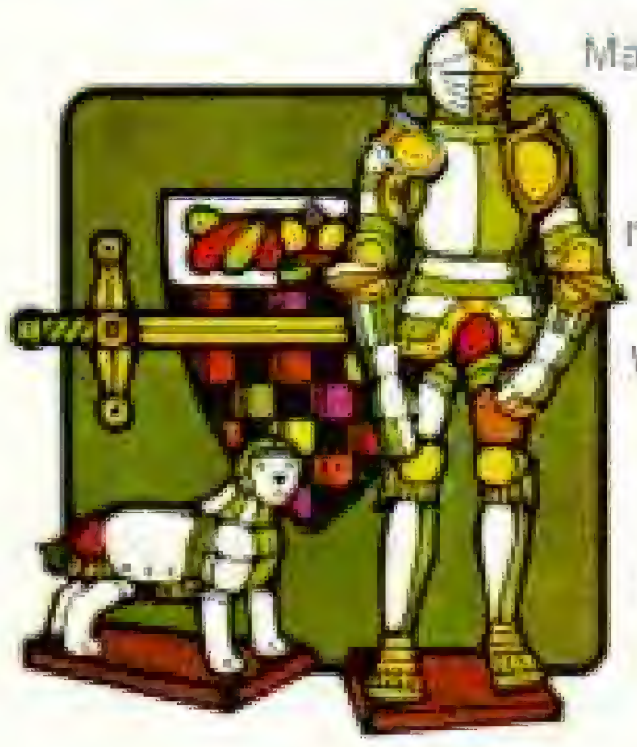
Lunch on the lawn at Tanglewood, America's first summer music festival. (But shhh, don't rattle your paper bag while the Boston Symphony's playing.)

Swing the family down to America's first National Seashore Park on Old Cape Cod. Sun, swim, surf cast, deep sea fish, dig for clams, sail, antique (and sand-in-your-shoes) all along the Cape. Out on the storybook islands of Martha's Vineyard and Nantucket, too!

Poke through the first witch house (it's in Salem, 30 minutes by broom from Boston) where Judge Jonathan Corwin was chief inquisitioner.

Custodian of America's Heritage

Massachusetts!



Medieval armor in Massachusetts? Sure! In Worcester's Higgins Armory, America's first museum of its kind. Trek through Pioneer Valley in Western Massachusetts — scene of Shay's Rebellion, setting of lovely Old Deerfield. More things to look forward to when you're seeing America's first.

Massachusetts Department of Commerce & Development
Division of Tourism, Dept. ST-G
State Office Building, Boston, Massachusetts 02202

I want to see America's first! Discover America! Begin at the beginning! Send free color brochure.

Name _____

Street _____

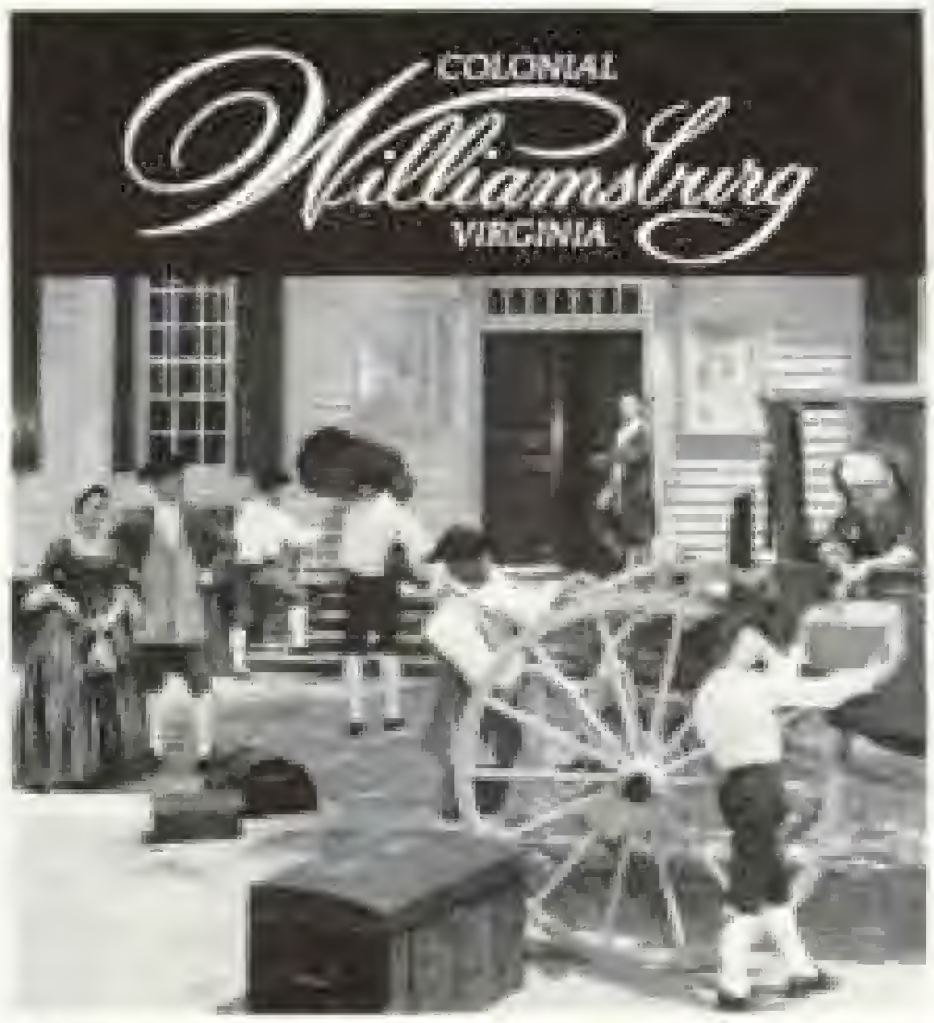
City _____ *State* _____ *Zip* _____

Under this hat there is more than a half century of scientific tree care

A lot goes on under the Bartlett hat—expert diagnosis and pace-setting techniques that others follow years later. Take the research laboratory for instance. For years our scientists have been providing the solution to shade tree problems. In addition, our fieldmen are trained technicians familiar with the latest methods and how to apply them to local conditions. And only Bartlett can give you the benefit of 60 years' experience in scientific tree care. More experience, more knowledge, and more service are the reasons why we deliver what others can't even promise. If you want it done right the first time, get under the Bartlett hat. Call your local representative today for positive results.

BARTLETT TREE EXPERTS

Home Office, 2770 Summer Street, Stamford, Conn.
Research Laboratories and Experimental Grounds.
Local Offices from Maine to Florida and
west to Illinois and Alabama.



Plan ahead for a vacation in the past. Let us send you this beautifully illustrated booklet on what to see and enjoy in historic Williamsburg. The Governor's Palace by candlelight. Old colonial homes which have survived all change of fashion. Bustling taverns and quiet gardens. And little craft shops along the way. Williamsburg is an experience you'll never forget, not in 200 years. Write Mr. J. G. Wright, Box C, Williamsburg, Virginia 23185.

Cut out for New Hampshire this summer

The Atlantic Ocean. Over 1300 different lakes. (Including magnificent Lake Winnipesaukee.)

The White Mountains. The Presidential Range. Mt. Washington, the highest mountain in the East. Beautiful to look at, thrilling to climb or drive up.

Plus outstanding lodging facilities and innumerable camping sites.

And the cleanest air in the country.

Bountiless vacation fun, all packed into a surprisingly compact, easy-to-get-around-in area.

Beautiful New Hampshire.

To:
New Hampshire Vacation Center
Room 704
State House Annex
Concord, New Hampshire 03301

Please send me your free Vacation Planning Kit containing full-color tourist map, calendar of events, and complete guide on where to go, what to do, and where to stay in New Hampshire.

NAME_____
ADDRESS_____
CITY_____ STATE_____ ZIP_____

Another in Sinclair's American Conservation Series

A little town put up a big fight, and now this natural beauty is yours to enjoy.

Okefenokee is a paradise of flowering waters and floating islands that tremble as you walk. It has gators, bears, great fishing and birds once thought extinct. You tour it with a pole boat and a guide. The virgin beauty is still there, but it took a battle to save it.

Outsiders tried to drain Georgia's Okefenokee, unaware that the waters are really sweet and pure. Others slaughtered game. Some built railroads on stilts to haul out giant cypresses. Then the folks in nearby Waycross got sore and put things right.

They organized, campaigned and hustled. They enlisted the help of Cornell University, the National Audubon Society, the American Museum of Natural History, and other naturalists. They got after the State and finally succeeded in getting Uncle Sam to protect Okefenokee by making it a National Wildlife Refuge.

Then local newspaper editor Liston Elkins and his friends in the Waycross Chamber of Commerce decided that conservation isn't just for animals and trees, it's for *people*, too. In that one little town, they raised one hundred thousand dollars, got the State to lease back some of the land, made it into a magnificent wilderness park where you can go to enjoy Okefenokee's unique treasures.

Sinclair believes that everyone has a stake in preserving our scenic beauty and natural environment. We publish the true stories of private citizens—such as those of Waycross—in the hope that *other* Americans in *their* communities will be inspired to action. Visit Okefenokee and enjoy what the people there saved for you. Let us help you plan this trip, one to other National Wildlife refuges, or to any place in the U.S.A. Write Sinclair Tour Bureau, 600 Fifth Avenue, New York, N.Y. 10020.

Discover America by Car—It's Worth Seeing And Saving

Sinclair

This is a gearshift, a clutch, and a throttle.

(It's the all-in-one lever that lets you go forward and back, fast or slow . . . without clutching!)

The 12 hp MF 12 with Hydra Speed Drive is the no-clutch, no-shift garden tractor. A touch of the Hydra Speed Lever and you do what you want instantly. Maneuvering a garden tractor was never as simple, easier, or more fun. What's more, the big 42-in. mower can be attached in minutes.

Mow close to walls and trees with your MF 12. And with MF Hydra Speed Control you can inch in and out of tight spots, then move away at full speed. There are dozens of easy-to-handle attachments for every gardening need.

If you prefer a low-cost standard transmission garden tractor, check out the 10 hp MF 10. MF Variable Speed Drive gives you five speeds in each of four forward gears and one reverse. For snow removal, use the 36-in. blower or the 42-in. dozer blade. Both fit the MF 12.

Choose the MF Garden Tractor that suits your fancy—the MF 10 or MF 12

MASSEY-FERGUSON
Massey Ferguson Inc., Des Moines, Iowa

Your little girl just swallowed a mouthful of paint thinner. Should you make her vomit, or not?

Vomiting is usually the answer when someone swallows poison. But not always.

So make sure you know exactly what that little girl took. Then call your doctor. Tell him what she swallowed. And how much. In this case, he'd tell you absolutely not to make her vomit. Because paint thinner and gasoline, as well as lye and other caustics, could do as much damage coming up as going down.

He might tell you to get your child to the hospital fast and get her stomach pumped. Or he might advise some other treatment. Whatever, follow his advice promptly. If you move fast, your child will probably be as good as new in no time at all.

Parents sometimes forget that a young child will swallow just about anything, no matter how awful it tastes to us.

So here are a few simple precautions you ought to remember:

1. Keep insecticides, barbecue lighter fluids, weed killers, paint and thinner off the ground and up on very high shelves where the kids can't get at them.

2. Be sure to keep such things in their original containers. Mistaken identity is a common cause of poisoning. Also, you'll usually find first aid directions on the label—along with the chemical ingredients—which the doctor will need to know for proper treatment.

3. Make sure the children understand that they are not to eat any berries, seeds or mushrooms they find outside.

4. Keep a little syrup of ipecac handy to induce vomiting when the doctor advises it.

5. When getting rid of medicines, cleaners or any other potential poisons, pour them down the drain. Then wash out the container. And, if you can, smash it so it can't hold even one drop.

6. Be prepared for emergencies. Keep your doctor's phone number handy. And have another's ready just in case you can't get your own doctor immediately.

You may be near one of more than 500 Poison Control Centers in the U.S. Keep that number handy, too. You may need to call it if you can't reach a doctor at once.

Metropolitan has published a booklet—*Panic or Plan*—that covers a lot of potential threats to your family's health and safety. It tells you how to prevent them, how to cope with them . . . even how to save a life if you have to.

For a free copy, write to Metropolitan Life Insurance Company, Dept. N-58, One Madison Avenue, New York, N.Y. 10010.

This little thing you do today may someday be the most important thing you've ever done.

Metropolitan Life

Vitamin A is the plus in carrots. Polyunsaturates are the plus in Mazola.

Eat carrots and you get more than just good taste. You get the "plus" of Vitamin A.

Use Mazola Corn Oil and Mazola Margarine and you get more than good taste. You get the "plus" of polyunsaturates.

Mazola 100% Corn Oil does more than make light, crispy fried foods and tangy salad dressings. Mazola Margarine, whose major ingredient is liquid Mazola Corn Oil, does more than make toast, vegetables or lobster taste better.

Mazola, used in place of the more saturated fats, is a simply delicious way to help balance the fats in your diet with polyunsaturates.

Mazola makes good eating good sense!

May, 1968

NATIONAL GEOGRAPHIC

THE NATIONAL GEOGRAPHIC MAGAZINE VOL. 133, NO. 5 COPYRIGHT © 1968 BY NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON, D. C. INTERNATIONAL COPYRIGHT SECURED

Finland

PLUCKY NEIGHBOR OF SOVIET RUSSIA

By WILLIAM GRAVES
National Geographic Senior Staff

Illustrations by National Geographic Photographer GEORGE F. MOBLEY

A FINNISH lumberjack, so the story goes, was chased by a large and hungry bear. Coming to a river, the lumberjack jumped in and swam halfway across, when he noticed a second bear waiting for him on the other bank. Then, say the Finns, the lumberjack began to laugh—because he had heard that laughter prolongs a man's life.

Finland has much in common with the lumberjack; it is a country often caught between bears. Through centuries of precarious history, the Finns have been threatened, fought over, invaded, and exchanged among powerful neighbors. With Russia alone, they have fought dozens of wars—and lost nearly all of them.

Finland's coat of arms, dating from 1581, depicts a rampant lion clutching a silver sword in his armored paw. His hind feet trample the scimitar of the East. Silver roses may represent the country's nine original provinces.

Like the lumberjack, Finns are proverbial for their *sisu*—a word that means, among many things, hardiness. Like the lumberjack, too, the Finns have a gift for laughter, even in the darkest of moments. In 1939, when the Soviet Army invaded Finland, outnumbering the defenders by astronomical proportions, the Finns joked grimly among themselves: "So many Russians! Where will we bury them all?"

During the famous Winter War that followed, Finland inflicted heavy losses on the invaders before signing a peace treaty, and inspired the world with her courage. In a speech at the time, Winston Churchill declared:

"Finland alone—in danger of death, superb, sublime Finland—shows what free men can do."

Finland today shows what free men can do in peace as well as in war. Last December, 4,675,000 Finns celebrated their nation's 50th anniversary of independence from Russia. During half a century of freedom, Finland has scored international triumphs in countless fields, from architecture and Arctic exploration to forest research and Olympic sports.

Finland's major triumph, however, remains her independence in an era when all other

Spotlighted by a fickle sun, a freighter threads its way through the Turku Archipelago on the coast of Finland, a land of lakes, islands, and forests that shares an 816-mile border with the Soviet Union. To the west lie Sweden and Norway.

Daughter of the Baltic. Helsinki houses half a million Finns, about a tenth of the country's population. Green dome of the Lutheran Cathedral dominates the skyline of a capital set amid azure arms of the Gulf of Finland. A pleasing body of water sparkles at virtually every turn, and the harbor brims with merchant ships. Clock tower of the railroad station designed by famed architect Eliel Saarinen rises at lower right.

Though Helsinki lies at the same latitude as southern Greenland, winds warmed by Gulf Stream waters blow across the Scandinavian Peninsula and temper the climate. The city has an average winter temperature milder than that of Duluth, Minnesota. But winters are long, for one-third of the year, residents go to work and come home in the dark.

Founded in 1550, Finland's capital is its cultural as well as its commercial center. A dozen theaters cater to a drama-loving people, and shops compare favorably with those of London and New York. Here, as in much of the nation, street signs carry both Finnish and Swedish names.

prewar European neighbors of the Soviet Union have fallen under Communist rule. Recently, I asked a Finnish newspaper friend why the Russians hadn't simply seized his country outright in 1944, when their victorious armies were sweeping across Europe.

"Perhaps," he answered mildly, "they recalled their experience in 1939, and thought it would not be, as we say, *mukava*"—he searched for the English word—"comfortable."

Finland, in many respects, is not a comfortable land, but rather—like the Finns themselves—rugged, and often strikingly beautiful. Europe's northernmost concentration of humanity, Finland accounts for more than a third of the world's inhabitants living above the 60th parallel.

Water Covers a Tenth of the Country

Geographically separate from Scandinavia, Finland occupies 130,119 virtually mountainless square miles, largely between Sweden and Russia (map, page 596). A third of Finnish territory, the portion known as Lapland, lies almost entirely above the Arctic Circle.* A tenth of the country, thanks to 55,000 lakes, lies under water.

I caught my first glimpse of Finland's famous lakes from a height of 30,000 feet, aboard a Finnair jet from London to Helsinki, the Finnish capital. Far below, among the somber forests, patches of water glittered in the sun like fragments of a gigantic mirror shattered and strewn across the land. As our jet swung lower, the forests took on detail, separating into the luminous greens of birch and the darker shades of spruce and pine, like deeps and shallows in a tropical sea.

To our right stretched Finland's island-dotted southern coast, a vast hem of land left in shreds by prehistoric glaciers that reached into central Europe. Tucked in a fold of the hem lies Helsinki, Finland's capital, major port, and largest city, with 528,000 inhabitants. As befits a seafaring town, Helsinki lives surrounded on three sides by water—or by ice, depending on the time of year.

"Our seas are not ordinary ones," the captain of an icebreaker assigned to winter patrol in the Gulf of Finland explained to me one day in Helsinki. "Because of the narrows between Denmark and Sweden, our Baltic is almost landlocked!"—he made a circle with his hands—"a big inland sea, and always many rivers pouring in.

"With so much fresh water," he continued,

*Associate Editor Franc Shor described life among Finland's Lapps in the August, 1954, GEOGRAPHIC.

They've Got *Sisu*

FINNS "act as if they have always been free," reports one observer. They have a word for it, sisu, which translates as a mixture of courage, perseverance, and stamina—with a touch of stubbornness. Here is a nation that has maintained its identity through six and a half centuries of Swedish domination and a century under the Russian tsars, that suffered staggering losses in World War II and paid huge reparations. Yet Finland, free only since 1917, hums with prosperity and enjoys one of the world's highest living standards.

Finnish faces generally are broader than those of Scandinavian neighbors. Silver pigment freckles the bronzed features of painter Eino Mattila at the Wärtsilä shipyards in Turku. Bemedaled fiddler Oiva Finér tunes up for a summer folk-dance festival. Hair aswirl, Elina Vlivakeri models a fashion from Finn-Flare, a Helsinki house that specializes in rainbow-hued mix-and-match ensembles. Square face and ruddy complexion mark a Lapp woman of Lisma, a village in northern Finland. She hurries from storage shed to house with bread, flour, and mushrooms.

"the Baltic freezes very fast, especially its two arms, the Gulfs of Finland and Bothnia. In a strong winter, one can drive an automobile across ice on the Gulf of Bothnia more than 50 miles, all the way from Finland to Sweden."

The ice had vanished when I arrived in Helsinki, for it was May, the time of *pitkiä päiviä*—the long days. Late spring and deep summer fill the northern skies with light, bringing 18- and 20-hour days to southern Finland and four months without darkness to northern Lapland.

With Aatos Erkko, the able young publisher of *Helsingin Sanomat*, Finland's great newspaper, I spent many hours exploring Helsinki. My first impression was of a city with a dual personality—part Finnish, part Swedish. Helsinki's second name, Helsingfors, is Swedish, referring to a series of rapids nearby. Nearly every street name, traffic sign, and advertisement in the city appears in both Finnish and Swedish.

"It's hardly surprising," Aatos said. "You see, Finland was part of the Swedish empire for some 650 years, from about the middle of the 12th century until 1809, when we fell under the control of the Russian tsars. Even today, roughly 7 percent of all Finns consider Swedish their mother tongue, although many more than that, of course, speak both languages fluently.

"As for Finnish itself, no one really knows where it came from, or even who brought it to Finland. Historians tell us that our ancestors most likely originated in central Russia, and later mixed with the Germanic and Slavic tribes before settling in northern Europe. Linguistically, we Finns have few relatives—Estonians, several tribes in northern Russia, and, very distantly, Hungarians."

Bustling Quays Link Helsinki to the World

"The Daughter of the Baltic," as Helsinki calls itself, is no fragile young beauty but a robust matron, full of energy and years. Founded in 1550 by the Swedish King Gustaf Vasa to compete with other Baltic ports in the trade with central Europe, Helsinki has long since broadened its commercial ties to include the entire world.

The ties begin with Helsinki's waterfront, an endlessly busy and thriving tradesman's entrance to Finland. I walked one morning along the great stone quays that berth ships from seemingly every country and continent. To the rolling thunder of mobile cranes and the shriek of cable against winch, they unloaded what Finland buys abroad—compact automobiles from western Europe, fruits and vegetables from the Mediterranean, machinery from the United States, Japanese optical goods, Australian wool. Back aboard went Finnish specialties—above all, newsprint, but also lumber, copper ingots, hand-blocked textiles, and elaborate glassware.

Other Finnish specialties are capable of delivering themselves. Beyond the quays lay thunderous shipyards hard at work on immense freighters, sleek cruise ships, and the famous icebreakers of Finland, the latter destined for service in the Baltic and in polar seas (page 608).

Except for its great forests and for a scattering of mineral ores, such as copper, Finland has few ready-to-export resources. Instead, as with England and Japan, the country must balance its trade ledgers by

Food gives way to fun in Helsinki's Market Square on the eve of May Day. Instead of carrots, cabbages, and cauliflowers, vendors display balloons, toys, and noisemakers for the holiday. Here the sun warms shoppers, but the following day blustery winds pelted revelers with snow (next page). Modern office building contrasts with onion-topped Uspenski Orthodox Cathedral, built in 1868, when Finland was a grand duchy of Russia.

Like wind-whipped flames, Communist banners fly above party members on an unlikely perch—the steps of Helsinki's Lutheran Cathedral. Finland's Communists, like Russia's, celebrate May Day with speeches and parades. Calling themselves the People's Democratic League, they hold about a fifth of the 200 seats in the Eduskunta, or national parliament. Not "hard liners," the majority of the party consider themselves Finns first, Communists second

Student rally on May Day carries no political overtones; it merely marks the end of the harsh winter and the advent of warmer days. Wearing cherished student caps, these young people join a traditional march through Helsinki

Welcome spring! But winter refuses to yield on May 1, buffeting merrymakers with wet snow as they stroll amid the birches in Kaivopuisto Park.

means of those two human resources, skill and energy. "In other words," says an American friend, "Finland exports good taste—quite a rare and salable item in this world."

Nowhere is that taste more dramatically revealed than in the work of Timo Sarpaneva, an internationally famous young designer of glassware and fabrics. I asked him one day how it happened that the Finns, so few in number, have produced so many world leaders in architecture and design.

"Perhaps," he said thoughtfully, "the answer lies in our lack of tradition: Until recently, we Finns were so busy producing the bare necessities that we could not afford to spend time on grace and artistry. Now we have the time, and we are not fettered by the past—by the way things are traditionally done.

"As a result," he added, smiling, "some of our creations are nightmares, but what comes out well has a certain freshness and freedom to it."

For what they buy abroad the Finns often pay a heavy price, owing to special taxes on certain imports, particularly luxury goods. A pound of fine coffee—that item dear to Finnish hearts—sells for $1.75, and U. S. cigarettes for 60 cents a pack. An American automobile priced at $3,000 in New York City may cost the Helsinki businessman (or more likely his firm) twice that figure. With gasoline selling at 80 cents a gallon, the Finns favor smaller, less powerful European models over the American giants.

NORWEGIAN SEA

BARENTS SEA

Nordkapp (North Cape)

Hammerfest

Kistrand

Hjemmel

Hammingberg

Vardø

Lyngfjorden

Båtsfjord

Nyborg

Tromsø

Andenes

Andselv

Narvik

Elvebakken

Ostrov

Petsamo

Kirkenes

Pechenga

Nikel

Polyarnyy

Severomorsk

Murmansk

Kautokeino

Kaamanen

Ivalo

Inari

Salla

Kemijärvi

Rovaniemi

Kuusamo

Oulu (Uleåborg)

Kajaani

Kandalaksha

Kirovsk

Apatity

Monchegorsk

Kemi

Tornio (Torneå)

Haparanda

Luleå

Skellefteå

Umeå

Örnsköldsvik

Hudiksvall

Gävle

Sundsvall

Hernösand

Härnösand

Hotling

Uppsala

Stockholm

Mariehamn

Turku (Åbo)

Pori

Rauma

Tampere (Tammerfors)

Jyväskylä

Lahti

Helsinki (Helsingfors)

Hanko (Hangö)

Ekenäs

Kotka

Vyborg (Viipuri)

Lappeenranta

Imatra

Leningrad

Lomonosov

Pushkin

GULF OF FINLAND

GULF OF BOTHNIA

KARELIA

ARCTIC CIRCLE

Geographical Terms

Järvi	lake
Joki	river
Pää	headland
Saari	island
Selkä	ridge
Tunturi-t	hill-s, mt-s
Vesi	lake

Norwegian Sea

Baltic Sea

SWEDEN

FINLAND

U.S.S.R.

Oslo

Stockholm

Helsinki

Moscow

DENMARK

Copenhagen

GERMANY

POLAND

0 50 100

STATUTE MILES

Roads — Ferries — Railroads

Places with Scheduled Air Service

1938 Finnish-U.S.S.R. Boundary

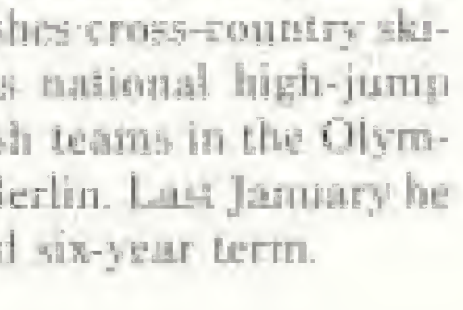
Elevations in Feet

CARTOGRAPHIC DIVISION
NATIONAL GEOGRAPHIC SOCIETY

Finland's athletic President. 67-year-old Urho Kekkonen still relishes cross-country skiing. In his youth he was national high-jump champion and led Finnish teams in the Olympics at Los Angeles and Berlin. Last January he won re-election to a third six-year term.

FINLAND

Finns call their homeland *Suomi*. Time has veiled the origin of the name, but it resembles *suo*—marsh—an apt word for low-lying, lake-spattered Finland. For millenniums Suomi has been the land of the Finns, a people from central Russia with touches of Teuton and Slav. Although geographically apart from Scandinavia, Finns consider themselves Scandinavian culturally and spiritually.



GOVERNMENT: Republic. **AREA:** 130,119 sq. mi. **POPULATION:** 4,675,000. **LANGUAGE:** Finnish (related to Estonian and Hungarian), Swedish. **RELIGION:** Lutheran. **ECONOMY:** 29% of the working population in agriculture and forestry, 15% in industry; important products include pulp, plywood, paper, furniture, metals, textiles, glass. **MAJOR CITIES:** Helsinki (pop. 528,000, capital, port, industry; Tampere, textiles, leather; Turku, shipbuilding.

Surprisingly, the United States ranks quite low among Finland's sources of trade, accounting for only about one-twentieth of the total. England leads the list, with some 20 percent, followed by West Germany with 18 percent, and Russia with 15 percent.

To meet the high cost of living, most Finns make a fair but scarcely bountiful wage. Unskilled labor averages slightly more than $1 an hour, and skilled labor roughly $2.50. Secretaries earn approximately $150 a month, university professors $900.

Hair Grows Long, Skirts Short

Back of the waterfront Helsinki wears a staid and conventional air, with rank on rank of 19th-century row houses that give way in the business district to massive banks and department stores. There is nothing staid, however, about young Helsinki. Everywhere I saw fashionably long haircuts among the boys and among the girls many a miniskirt scarcely longer than a ballerina's tutu.

Nor is the face of modern Finnish architecture staid, as a visit to Tapiola reveals (page 600). The graceful garden-city complex just west of Helsinki has long since been rivaled by even more daring designs. But it still ranks as an international landmark in municipal planning and imagination, an achievement worthy of the land that produced the late Eliel Saarinen, a giant of modern architecture and father of Eero Saarinen, the great Finnish-American architect, who died in 1961.

I had a revealing talk with one of the principal designers of Tapiola, Aarne Ervi, a delightful man in his late 50's. I mentioned that what impressed me most about Tapiola were its beautiful stands of trees, left untouched among the apartment buildings. For a people whose lives depended on toppling rather than sparing forests, that seemed almost out of character.

"What you soon learn about Finns," Mr. Ervi said in slightly hesitant English, "is they are loving nature more even than each other: a rock; the tree; lake; anything. If you must have it to live, all right, take away. But if not" —he held up a finger—"leave for all Finns.

"When we start a building, I always say to the construction chief: 'If these trees still have life when we finish, I like to give you a bottle of good French wine.'

"So," he added, with a wink, "in my life I buy many bottles of wine, and I get back something better, the trees that live."

One day through friends in the government, I spent an hour in conversation with Urho

Beaded bird takes shape on a steel frame at the Arabia china factory on the outskirts of Helsinki. Ceramics artist Birger Kaipiainen displayed his creations in the Finland Pavilion at Montreal's Expo 67. Earlier, his sculptures captured a Grand Prix at a showing in Milan, Italy. The Arabia firm allows Kaipiainen a free hand in concocting whatever decorative works he wishes.

Backstage breather: Between acts of the ballet *Romeo and Juliet*, ballerina Tertiu Hintsanen relaxes amid wigs, wardrobe, and hair drier at the Helsinki Opera House. The Finnish National Ballet has toured Europe, Canada, and the United States, and received wild acclaim for performances at Russia's famed Bolshoi in Moscow. Helsinki audiences in turn have given enthusiastic welcomes to such eminent dancers as Britain's Margot Fonteyn and Bolshoi ballerinas Ulanova and Plisetskaja.

Kekkonen, Finland's widely respected President (page 597), who recently won re-election for his third six-year term with 65 percent of the popular vote. Owing in large part to President Kekkonen's courage and understanding of Soviet affairs—and to the same traits in his famous predecessor, President Juho Kusti Paasikivi—Finland has steadfastly maintained its postwar independence, despite occasional threats and rumblings from across the eastern border.

At the same time, Finland carefully avoids ties that might provoke Russian interference. Despite historic bonds with the West, the Finns take no part in such military agreements as the North Atlantic Treaty Organization. On the other hand, they pointedly ignore the Communist-controlled Warsaw Pact alliance. Like its Scandinavian neighbors, Finland has representative government, but it is a republic rather than a constitutional monarchy. Also, like Sweden, it is basically socialist.

I found President Kekkonen unusually tall for a Finn, and muscular. In the 1920's he was high-jump champion of Finland; in the 1930's he led his country's track and field teams to the Olympic Games in Los Angeles and Berlin. Three decades later, at 67, Urho Kekkonen still enjoys skiing 15 or 20 miles cross-country on a winter afternoon.

In the presidential residence overlooking an arm of Helsinki's harbor, we talked of Finland's independence and of relations between our two countries. I remarked that the Finns seemed genuinely fond of Americans, despite the fact that our nations had finished World War II on opposing sides—Finland as a co-belligerent of Germany against Russia.

Historic Debt Faithfully Repaid

"Of course, there are many Finns living in the United States," President Kekkonen replied, "but that is only one factor." He paused. "Perhaps we like you for a less obvious reason: We never asked you for anything we could not pay back, and thus we never lost our dignity to you. Experience has taught us that gifts make poor friends, and we prefer to borrow, or better still, to learn from you.

"Everyone," he continued, "remembers America's loan to Finland after World War I, to keep our people from starving. It may surprise you to know that we are still repaying that debt—we will be finished in 15 more years. Today, the payments go into educational exchange grants between our two countries, so that both sides, in a sense, enjoy interest on the loan."

Our talk turned to Finland's policy of strict neutrality.


KALEVI
kalev

Lit up for a spring night, the heart of Helsinki welcomes after-work shoppers. On broad Mannerheimintie, the capital's main thoroughfare, twin neon streaks and rooftop tower identify Stockmann's Department Store.

Bright and busy, inhabited by a talented, sophisticated people, this free-world city shines in the shadow of the Communist-ruled Baltic states. "Like a modern supermarket perched at the edge of a tired old neighborhood," commented one visiting journalist.

Garden city of Tapiola, four miles west of Helsinki, has won acclaim as one of the world's finest planned communities. Twelve Finnish architects pooled talents for this city of 20,000, which welcomed its first residents only 15 years ago. Fountains spurt in a pool mirroring Tapiontorni, the town hall.

"At first," the President said, "that policy aroused suspicion. But gradually, the world has come to recognize a simple fact—Finland is hiding nothing and seeks only to cooperate with everyone.

"Independence," he added, "has its limits, even for a big country. We in Finland respect our own limits, and the world has learned to respect them, too."

Logic Deserts a Communist Argument

Not every Finn shares President Kekkonen's sentiments, as I learned afterward at the Eduskunta, Finland's parliament. I spoke with one of the leaders among the Communist deputies, a heavy-set, somber man.

Finland's Communists today represent the country's third largest party, with 42 of the Eduskunta's 200 seats. Political polls, however, suggest trouble ahead for the party. Among young Finns soon to reach voting age, only 5 percent appear to favor Communism. I asked the deputy why.

"Those are only samplings," he said, with a certain logic. "It is votes in the ballot box that count. Many young Finns support our domestic policies, and in fact"—his voice took on an aggrieved note—"some of the other parties have stolen our best ideas. No wonder they have been successful."

Turning to foreign policy, I asked if it was true that the Finnish Communists favored closer ties with the Soviet Union. The deputy nodded emphatically. "We have urged that all along."

But, I said, in view of Finland's historic troubles with Russia—both tsarist and Soviet—wasn't there some risk of domination by Moscow? Logic abruptly vanished from the conversation.

"The question of domination does not arise," he said sternly. "Those who fear such a thing are not reasonable people, they are merely stubborn—and above all, prejudiced."

In Communist eyes, Armi Ratia is prejudiced; in almost any others, she is a genius. Armi is the founder and inspiration behind Marimekko, an internationally known Finnish house of textile and fashion design. Wherever one sees Finnish women, or women familiar with Finland, the view is apt to be enlivened by Marimekko design, with its explosions of color.

I met Armi in her studio above Marimekko's printing lofts in downtown Helsinki. According to her friends, Armi is not a person, but a *myrsky*—a storm. I remarked that some of her designs struck me the same way.

Men and boats challenge wind and sea in the Gulf of Finland. On a hard beat to windward, Star-class sloops fight for position in the annual Helsinki Regatta. Plastic windows in the sails help reduce the risk of collision. In this land of

"That is good," she said, smiling. "I like to create storms of color—full of sun, with the wind rippling through. I have seen enough of other kinds of storms."

One storm, in a sense, that Armi vividly recalls occurred nearly 30 years ago in her native Karelia, in Finland's former southeastern region. The storm, in the shape of massive Russian invasion during the Winter War, drove more than 425,000 people from their homes and rich farmlands, and ultimately cost Finland one-tenth of its territory (map, page 596).

Armi recalls the sight of her family's home in flames, not through Russian action, but by the hand of her own people, to deny cover or refuge to the invaders.

"It was a terrible time," she told me, "but a noble one, too. We Finns are famous for being individuals, and in the past we have not always acted together. But in those days in Karelia—and in fact, all of Finland—we were one. Some of our land is gone, but not the spirit."

In the weeks that followed I was to catch many glimpses of that spirit, and of the warmth underlying it, as I traveled beyond Helsinki and across Finland. Often, toward me, the spirit took memorable forms: in moments of laughter shared with a stranger

scalloped seacoast and thousands of "blue eyes," as Finns call their lakes, sailing is a favorite summer pastime

Like a ship's prow, the roof of the student-union building at the Technological Institute near Helsinki cleaves the sky.

among Finns, in kindnesses offered beyond return; in words of rough affection spoken for a country and a people never seen—my own. Beneath it all lay the dignity and strength of the Finnish people, and that particular gift for welcoming a guest as readily as resisting an enemy.

"Seal Finger" Brands a Hunter

Driving eastward from Helsinki, I followed the notched and weathered coastline along the Gulf of Finland to the timber port of Kotka, and took a boat for Kaunissaari, or Beautiful Island, some 11 miles offshore.

The men of Kaunissaari are known among Finns for their skill in hunting the ringed seal and for an equal talent in times past in the art of smuggling. Today the latter trade has died out, and instead Kaunissaari follows the seal in winter and the small Baltic herring, called *silakka*, in summer.

To an outsider, the name Kaunissaari seems somewhat farfetched, for the island is merely another seaward outpost of sand, thatched with pines and a few birches, with a year-round population of some 50 souls, increasing to 500 in summer.

Finland has islands much more rugged than Kaunissaari. Far to the west, in the main body of the Baltic, lie outposts so wind-

SUN ROUGES GLACIER-GOUGED LAKES *in southeastern Finland. Twisting bits of land near Punkaharju, linked by bridges, bear road and rail traffic. On the southwest coast near Turku (right), farmers plow every tillable acre for grain and potatoes.*

Sunup to sundown chores of farm wife Aino Immonen include pitching hay for the dairy cattle. She and her husband Vilho also tend a small truck garden near Sulkava in southeastern Finland. The nation today claims agricultural self-sufficiency, a minor miracle considering the paucity of arable land and the short growing season.

scourged and desolate that the Finns refer to them by such forbidding nicknames as "the naked islands." Here the winter gales that sweep the broad reaches of the Baltic howl mercilessly across the barren rocks. The few fishermen's houses have doors on all four sides, so that the occupants can leave home on the leeward side, whatever the direction of the wind.

On Kaunissaari I talked with Niilo Kajander, the island's grizzled, 71-year-old dean of sealers and fishermen. Usually, he explained, the islanders hunt seals on foot with a rifle, searching for telltale air holes in the thick winter sea ice. Today the hunt represents more sport than livelihood, although islanders still sell sealskins to summer visitors.

"The seals, in their way, pay the hunters back," Niilo Kajander said. He held up a badly scarred and misshapen forefinger.

"We call it *hyljesormi*, meaning 'seal finger,'" he explained. "Most veteran hunters have at least one such souvenir. Bacteria in the seal's system act like a poison in the human body, if they get into the smallest scratch. In dressing a seal, that is hard to avoid, and then deep infection sets in. Afterward, the finger is never the same."

Children Hitchhike on a Raft

Returning by boat to Kotka on the mainland, I drove northward on roads that roughly paralleled the Soviet border.

Southeastern Finland is an endless maze of lakes, the long bright highways of a nation born to move by water. For centuries the lakes have served Finland's major industry, the production of paper, lumber, and other wood products. The lakes furnish not only a means of transport but often a cheap source of hydroelectric power to run today's giant mills.

During winter, while the lakes lie paved beneath many feet of ice, logging crews invade the forests, gathering Finland's vast and pungent harvest of pine, spruce, and birch, to be hauled over the soft carpet of snow to huge storage areas beside the lakes and rivers.

Spring, with its thaw, sends a rolling cannonade of thunder among the lakes, as men with bulldozers tumble the winter's harvest into the water for floating or towing to mills often more than 100 miles away (page 609).

Rafting logs is familiar work to any country with abundant timber and the water system to move it. Finland, however, is the only country I know where children regularly turn the work to their own advantage. One morn-

Youth lends a hand for the potato harvest near Tampere. This high-school girl, working on a farm during summer vacation, culls damaged and undersize potatoes as the crop moves past her on a conveyor. Finns must clear forests or drain bogs to gain new fields. Most farmers market timber for added income.

ing near Savonlinna, a town in Finland's Savo district, I caught sight of a lake tug slowly hauling a half-mile-long ribbon of logs tied in huge bundles and strung out in the manner of railroad freight cars. On the aftermost bundle, corresponding to the caboose, a small knot of children sat enjoying the spring sunshine and the passing scene.

"The tug captain's children?" I asked a Finnish friend. He shook his head, grinning.

"Hitchhikers. The tug captain may not even know about it, though it wouldn't surprise him. Most likely those children packed a picnic lunch early this morning and then waited on one of the bridges across the narrows between two lakes.

"After the tug passed through, they got aboard. Now they'll ride for hours, hop off at some bridge miles away from here, and catch a ride back home with a friendly truck driver."

The people of Savo, or Savolaiset, as Finns call them, are like that—independent, and not above a little mischief. One of their favorite stories concerns the arrival of the first prehistoric tribes in what is now Finland. According to the Savolaiset, a large sign stood at the border, with an arrow and the words underneath, "To Savo."

Then, say the Savolaiset, everyone who could read went to Savo, while all the rest went to other parts of Finland.

Refugee Mourns a Captive Homeland

Northeast of Savonlinna lies the farm of Einar Hasunen, a gentle man of 75 with many grandchildren. The farm is a good one, and represents a gift of sorts to Mr. Hasunen from the Finnish people.

The Hasunen family are Karjalainen, natives of the conquered district of Karelia. In 1939 the Soviet Army overran their village, called Ruskeala, and announced plans to "resettle" the inhabitants. With a heavy heart, Einar Hasunen abandoned his beloved farm and fled westward to freedom with his wife and children.

As my friend Armi Ratia says, the Finns in that hour became one. With scarcely a dissenting voice, they levied a special tax on themselves to provide for their more than 425,000 dispossessed countrymen. The result, for the Hasunens, was a subsidy to help buy a new farm 12 miles from today's Soviet border and 25 miles—a world away—from Ruskeala.

One bright May morning I called on the Hasunen family—the parents, a daughter,

REPRODUCTIONS © NATIONAL GEOGRAPHIC SOCIETY

Ice two feet thick, buckled here and there into deck-high jumbles, sheathes the Gulf of Bothnia between Finland and Sweden. Finland's biggest icebreaker, *Tarmo*, opens a lane for the first freighter of spring into the port of Vaasa.

Rafts of pine and birch, destined to be tomorrow's newspapers and furniture, veneer a lake near Savonlinna. Although forests blanket two-thirds of the nation, Finland sometimes imports wood from Russia and Sweden to feed its multitude of sawmills and paper plants. It annually ships more than a million tons of newsprint to countries around the world.

one of several sons and his wife and children —in the comfortable parlor of their farmhouse. The son's wife served tall glasses of chilled sour milk and a platter of freshly baked *Karjalan piirakka*, the delicious Karelian hot rolls with centers of cooked rice or mashed potatoes.

We talked awhile of commonplace things, of spring planting and of farming methods in the United States. Inevitably, conversation turned to the lost area of Karelia and the differences in life on the two farms. Mr. Hasunen smiled in a kindly way but remained silent, and his son spoke instead.

"My sister and I are old enough to remember Ruskeala well," he said. "The farm there was good, but this one is better; we have more cleared land for crops and livestock. Our children are happy here, for it is truly their home." He glanced at his wife. "One can scarcely ask for more."

At the mention of Ruskeala, the older Mrs. Hasunen frowned. "I wish not to see it again," she said, sadly. "The Russians have made it their own; we would have no place there. Better to live here, and to forget.

"But my husband," she added, affectionately, turning to him and taking his hand,

"cannot agree. If they would let him go back tomorrow. . . ."

I saw then that tears had begun to glisten in Einar Hasunen's eyes, although the kindly smile remained for his family and his guest. He seemed unaware of them, and after a while his wife reached quietly over and brushed them away.

"Iron Trees" Mark a Battlefield

Love of the land takes many forms; at Oinassalmi, near the Russian border, it took the form of savage resistance. I toured the great battlefield with Reino Penttinen, a former artillery captain who saw heavy action there in the winter of 1939.

Oinassalmi marks an early stage in the seesaw struggle between Finns and Russians during World War II. In November of 1939 the Soviet Army invaded Finland and seized Karelia and other parts of the country during three months of war before a peace was signed. In 1941, with German assistance, the Finns pushed the Russians out of the occupied zones and back into Soviet territory.

Finally, in 1944, the tide turned once more, and the Soviets recaptured their original prize. As a further blow to Finland, they demanded that the Finnish Army drive the Germans out of the country. Moving northward across Lapland, the Germans in a bitter rearguard action destroyed virtually every structure in Finnish Lapland's 38,328 square miles.

During more than five years of war, Finland suffered 305,000 dead and wounded, roughly 7 percent of the population, as the penalty for defending herself.

The Russians, too, paid a price—no one knows exactly how high—at Oinassalmi and other battlefields of the Winter War. Temperatures in eastern Finland that winter of 1939–40 often dropped to 40 degrees below zero, a point at which shock from even a minor wound can prove fatal.

The outnumbered Finnish troops, long familiar with the frightful cold, had fewer weapons than the Russians and one enormous advantage—field tents and the wood stoves to heat them.

"The Russian expected little resistance from us," Reino Penttinen said, as we walked among the old Finnish positions at Oinassalmi. "He thought he would live in our towns and villages as he went along. There was only one trouble—he did not go along."

Instead, he often froze to death, or fell in the effort to crack Finland's "invisible wall" of white-clad ski troops, a ghostly barrier that rose up before him one minute and faded the next into the featureless landscape of drifting snow.

Proud member of a family team, 11-year-old Keijo Parviainen helps his father and uncle haul in their homemade net on Kallavesi, a forest-locked lake. They will fish through the twilit night seeking *muikku*, a small fish similar to smelt. Housewives serve bread with pork and muikku cooked inside, a Finnish favorite.

Where the wall stood firm, as at Oinassalmi, both sides suffered heavily, and the land suffered with them. After the war had ended, logging teams moved into the forests west of Oinassalmi and began felling timber. Within a day or so they stopped: The trees were so riddled with shell fragments that not one was fit for lumber.

From Oinassalmi I turned westward toward central Finland, passing through the cities of Joensuu and Kuopio. Between the two communities lies one of Finland's hopes for the future, the copper mine at Outokumpu, largest in the nation. In a country still heavily dependent on paper and wood products for two-thirds of its exports, the growing metallurgical industry has become a vital form of economic insurance (pages 618-19).

National Delicacies: Crayfish and Vodka

In Kuopio I stopped long enough to tour the city with a certain Mr. Lappalainen in his *vossikka*. The vossikka corresponds to the Russian droshky—the old-fashioned horse-drawn carriage—and is a favorite not only of tourists but of any Finn with a little time on his hands.

As we clopped at a leisurely pace through Kuopio's streets, driver Vilho Lappalainen doffed his threadbare cap grandly to passers-by and to an occasional automobile impatiently blaring to get around us.

Finally we neared the shore of Kallavesi, one of Kuopio's magnificent neighboring lakes.

"It is a pity you cannot stay in Kuopio until July, the season of *rapu*," Mr. Lappalainen observed. "Rapu is our fresh-water crayfish, a national delicacy among Finns—especially when enjoyed with that other national delicacy, vodka."

Turning from the lake, we passed a row of elegant houses; Mr. Lappalainen indicated two of them.

"They are the homes of our bishop and of our district governor," he said. "And there"—he pointed around the corner to a group of considerably less distinguished houses—"stands the home of Lappalainen." He paused dramatically.

"What a coincidence that Kuopio's three leading citizens should live in the very same neighborhood!"

Among Finland's acknowledged leading citizens in modern times, at least three are widely known to foreigners: Sibelius, the composer; Mannerheim, the soldier-statesman; and Nurmi, the human lightning bolt.

Jean Sibelius (1865-1957) brought lasting

As if riding a carrousel, the audience revolves from one scene to another at the Pyynikki Summer Theatre in Tampere, Finland's second largest city. Built in the form of a tilted bowl, the 800-seat auditorium rests on a turntable that swivels it from set to set. In this time exposure, patrons seated toward the edges move further than those in the center, creating blurred images. Forest, rocks, lake, and beach provide a variety of natural backdrops for productions, keeping man-made scenery to a minimum.

In a mock sauna, complete with birch switches used by bathers to increase circulation, Pyynikki performers present a skit, one gestures with a scrub brush. The invigorating heat bath, Finland's gift to the world, has gained international popularity. President Kekkonen made headlines when he conferred in a sauna with Nikita Khrushchev, then Russia's Premier.

"Hey, hey, hippies!" Another scene in the outdoor show depicts the invasion of a village by big-city longhairs, who find themselves quickly shorn of their locks by the local teen-agers.

Lingering twilight spreads a golden sheen on the waters of Hangö, Finland's southernmost town. A rafted cone of lumber, soon to be towed from shore and set ablaze,

KODACHROME BY GEORGE F. MOBLEY © N.G.S.

will signal the celebration of Midsummer Eve, a Saturday in late June, when the seaside resort erupts with singing and dancing to welcome the nation's brief summer.

Making the most of summer, a bather preens at Yyteri Beach near Pori. Emerging wan and expectant from the long tunnel of winter, city families migrate to sea and lake shores each June. Bustling Pori, a coastal town when founded four centuries ago, today lies five miles up the Kokemäen River, the result of rising land and shallow coastal seas. All Finland has been rising since the Ice Age ended, but the rate around Pori, 2.8 feet a century, far exceeds the average.

Mellow guardians from the past, salt-shaker towers of Olavinlinna Castle watch over isles abloom with lilies, daisies, and pansies. A boat from the encircling town of Savonlinna brings visitors to the 15th-century fortress built to oppose Russian incursions. In summer the castle is a stage for an opera festival.

Beset by raging waters, youthful daredevils shoot the Kukkolan Rapids on the Tornio River. Steersman watches for rocks. Cascading into the Gulf of Bothnia, the frothy Tornio forms Finland's boundary with Sweden (background).

fame to Finland in the late 19th and early 20th centuries with his stirring compositions, among them the triumphant *Finlandia*. Marshal Carl Gustaf Mannerheim, who died in 1951, brought Finland a different kind of fame in his roles of President and of Finnish commander in chief during three conflicts, including the Winter War. As for Paavo Nurmi, he etched his country's name forever in the history of Olympic sports.*

Paavo Nurmi, at 70, lives quietly in Helsinki. He steadfastly shuns publicity and I never met him. For an account of his Olympic triumphs, I turned to his long-time acquaintance, Erik Serlachius.

Erik is something of a phenomenon in Finland's heavily controlled economy: A former cabinet minister, he directs his own company, without government participation. The company, a highly successful paper mill known as G. A. Serlachius Oy, lies in the town of Mänttä, northeast of the industrial center of Tampere. With an introduction from a mutual friend, I called on Erik and spent a morning with him inspecting the mill.

Over the din of high-speed rollers and enormous paper machines, I learned that Finland in a single year cuts 21,200,000,000 board feet of timber from its forests. While the United States wood-and-paper industry markets 90 percent of its output at home and exports the remaining 10 percent, Finland's industry does just the opposite.

*See "Again—The Olympic Challenge," by Alan J. Gould, NATIONAL GEOGRAPHIC, October, 1964.

With wary respect, artisans shape red-hot glass at the Notsjoe Glass factory in Urjala. As the man below steadies a semimolten vase, a second glass blower enfolds it in a layer of a different hue. After further working and a final polishing to produce a multicolor effect, the vase will join a profusion of artistic wares from Finland's famed glassworks.

Molten puddles of slag glow outside the Outokumpu copper smelter at Harjavalta. The earth molds assure slow cooling, allowing copper sulfide particles remaining in the slag to coalesce. Next step: retreatment for a further recovery of copper before dumping the slag.

This plant near the west coast processes copper concentrate brought by train from the rich Outokumpu Mine. Finland's largest. Finns energetically exploit their underground wealth in copper, iron, and zinc to feed the metals industry, the nation's most important after forest products.

Serlachius Oy turns its share of the vast harvest into specialized types of paper: greaseproof wrapper; paperboard; various tissues; high-grade vegetable parchment; and International Business Machines punch cards.

Afterward, during lunch with Erik and Mrs. Serlachius, the subject of Paavo Nurmi arose. It developed that Erik had been a young student at the Sorbonne in Paris in 1924, and was asked to take on the job of interpreter for the Finnish Olympic team.

"They were an independent bunch," he recalled, smiling. "The Olympic officials had quartered us about 18 miles outside Paris, and of course the whole team wanted to see the sights. One evening we lost one of our members in the city, and had to leave without him. He had no money, and he didn't speak a word of French. But he had a map, so he did what he thought any normal Finn would do under the circumstances—he ran the 18 miles back to camp."

Nurmi, of course, stunned the world with his performance in the games, winning gold medals in four running events: the 1,500-meter race; the 5,000-meter; the 10,000-meter cross-country; and the 3,000-meter team effort.

"I remember the excitement as he finished the 1,500-meter race," Erik said. "He had outdistanced the field, and he kept looking over his shoulder to see how far behind the others were. Finally, he seemed satisfied, because he walked the last 50 meters."

Contemporary newspaper accounts differ with Erik on the point of Nurmi's actually walking, but all agree that he slowed down at the finish line. In either case, I thought it sounded faintly like exhibitionism.

"Not at all," Erik corrected me. "Nurmi was only saving his strength. You see, he was scheduled to run the 5,000-meter race soon afterward. Some of the men from the first race were still resting on the grass when he took off on the next one, and won that, too."

To the Finns, Paavo Nurmi's feat is an example of sisu, the Finnish term that has no exact English translation but that combines elements of perseverance, stamina, and a bit of bullheadedness. "If nothing else works," say the Finns, "try more sisu."

Certainly, sisu has played a large part in Finnish exploits the world over. More than once, for example, it carried Gunnar Boman around the Horn.

Finnish Wind Ships Braved Dread Seas

Gunnar Boman is hardly the romantic image of a sea captain, for he is relatively short and wears a cherubic expression. Only when he begins to speak of the great era of windjammer voyages between Europe and Australia does the listener sense an iron quality underneath.

I met Captain Boman at Mariehamn, the capital of Åland (pronounced oh-aland), Finland's group of some 6,500 islands at the entrance to the Gulf of Bothnia. To reach Mariehamn, I had driven southwest from Mänttä to the coastal city of Turku, the historic gateway through which Christianity and Swedish culture began to pour into Finland more than eight centuries ago. Half an hour's flight carried me from there to Åland.

Although ceded to Russia as part of Finland in 1809, the Åland Islands retain strong ties with Sweden, originally their mother country. Some 21,500 islanders speak Swedish almost to a man, rarely using the Finnish name for their home, Ahvenanmaa, meaning "Land of Perch." By agreement with the Finnish Government, the Ålanders also fly their own flag —Sweden's colors, with the addition of a red cross inside the yellow one.

Stronger than all other ties are Åland's bonds with the sea. As late as the 1940's, half a century after power overtook sail along the world's trade routes, the men of Åland still drove their great steel-hulled square-riggers

from Europe to Australia and back, and made them pay.

"It was known as 'the grain race,'" Captain Boman told me, when I called on him at Mariehamn's Maritime Museum. "The usual cargoes were Finnish or Scandinavian lumber on the outward-bound trip, and Australian wheat for Europe on the return."

Museum Enshrines the Age of Sail

Åland today follows the sea in modern steam or diesel ships, and only *Pommern*, among her great windjammers, remains. She lies retired in an estuary beside the Maritime Museum, where Captain Boman has been the director for 12 years.

We walked for an hour amid the museum's priceless collection of huge figureheads, of beautifully joined and varnished ships' wheels, and hundreds of other mementos of Åland's seafaring past. Later we stood at a window facing out on *Pommern*, her 310 graceful feet of steel hull tipped by four soaring masts, with yards forever squared.

"She was built much like the rest," Captain Boman said fondly, "the old *Pamir*, the *Grace Harwar*, *Moshulu*, and *Herzogin Cecilie*—not only for speed but for economy. She carried special rigging that required a crew of less than 30. That was the whole point, you see, low operating costs. We always sailed out via the Cape of Good Hope and home by way of Cape Horn, not for adventure, but to avoid the Suez and Panama Canal tolls."

On an early voyage some 50 years ago Gunnar Boman shipped from Europe with a young Australian, Alan Villiers, who was later to become a brilliant master mariner and one of the world's foremost authorities on sail. I said I had read Captain Villiers' dramatic accounts of rounding the Horn.*

"He knows such things well," Captain Boman said, nodding. "During winter gales, the waters of Cape Horn are difficult for a

*Alan Villiers has written of this era of sailing in many books, including the Society's *Men, Ships, and the Sea*. His GEOGRAPHIC articles on the subject include: "Last of the Cape Horners," May, 1948; "Where the Sailing Ship Survives" (Åland Islands), January, 1933; "The Cape Horn Grain-Ship Race," January, 1933; and "Rounding the Horn in a Windjammer," February, 1931.

Fireworks flower above a 90-meter ski jump during the Ounasvaara International Winter Games in Rovaniemi, administrative center of Finnish Lapland. German forces destroyed the city during their retreat to Nazi-occupied Norway in 1944. Today an all-new planned metropolis springs out of the wilderness near the Arctic Circle.

Toppled by gusty winds, this jumper escaped serious injury when he crash-landed at the Puijo International Winter Games near Kuopio. Skiing is Finland's national pastime. A Lapland border guard, Eero Mäntyranta, won two gold medals in the Winter Olympics of 1964 and a silver medal and two bronzes in 1968. But the country's most famous athlete, Paavo Nurmi, the "Flying Finn" of the 1920's, was a track star; he once held 24 world records.

Robed in summer green, Lapland could double for the Emerald Isle. Rail fences ring the weathered log houses of Lisma, a hamlet so remote that it escaped destruction when

landsman to imagine, with freezing cold that turns rigging into iron rods, and with seas that turn men into the world's finest sailors."

Equally dreaded by mariners before the days of radar were low clouds that suddenly sank down to the very surface of the sea, blindfolding a ship's crew in the midst of drifting icebergs. Several times during his later voyages, as master of *Grace Harwar* and then of *Moshulu*, Captain Boman encountered the hazard.

"Many captains slowed down at such times," he told me, "but I could not agree. With an iceberg, it mattered very little whether you struck fast or slow; your ship was finished, in any case. So we crowded on all the canvas we could and drove ahead. Luckily, the icebergs always let us through."

Sea Water Sweet Enough to Drink

Back on the mainland I traveled northward from Turku along Finland's west coast, through the district of Pohjanmaa and its major city, the port of Vaasa. Here the land is flat and relatively free of lakes, providing Finland with some of its finest farmland. Even the Gulf of Bothnia favors farmers in a manner rare for the sea: Its waters contain so little salt that dairymen can, if necessary, water their herds in it.

withdrawing German troops devastated this region toward the end of World War II. To reach it, visitors must travel for half a day by boat up rivers churning with rapids

In contrast to the gentle land, the people of Pohjanmaa have a reputation among Finns for fiery temper and for rugged independence, qualities that distinguished the Pohjalainen as excellent troops during the Winter War. One classic story concerns an elderly Pohjanmaa farmer who had feuded with his next-door neighbor for years. Finally, the farmer lay on his deathbed and the local minister arranged a reconciliation.

"But remember," the farmer warned his former enemy, "if I get well, the whole agreement's off!"

Near the Swedish border, I turned inland and came at last to the city of Rovaniemi, to the Arctic Circle, and to Lapland (map, page 596).

Despite its modern buildings and its recovery from wartime demolition, Lapland's capital still has a touch of the frontier town. Hundreds of its 36,000 inhabitants are only part-time residents, disappearing northward for months in winter to fell timber or herd reindeer and, more rarely now, to fish for salmon or pan for gold in summer. Even Rovaniemi's efficient airport has its occasional wilderness aspects: Before incoming flights, reindeer herders now and then scramble to clear the runway of four-footed intruders.

The *poro*, as Finns call the reindeer, no longer dominates Lapland's economy as in

centuries past; timbering, farming, and tourism earn a joint income many times greater. Moreover, Lapland's gradual settlement has reduced available range, resulting in restrictions on herds.

"Today a man must be 21 to own poro," a veteran herder told me. "If he is single, he may run as many as 150 head; if married, up to 300. With the larger number, a good herder may make as much as 25,000 Finnmarks [roughly $5,000] a year. Even so, some herders augment their income with a second job."

Like reindeer, the Lapps—or *Same*, as they call themselves, pronouncing it SAH-meh—no longer dominate Finland's far north. Some 2,500 Same represent less than 2 percent of Lapland's population. Norway, by comparison, has an estimated 20,000 Lapps and Sweden roughly 10,000. The common ancestors of all three peoples remain largely a mystery, although anthropologists now believe they may have roamed as nomads across Russia, Finland, and Scandinavia as far back as the last Ice Age, ten millenniums ago.

The Same of Finland roam no more, but lead settled lives, usually in isolated communities. The men travel only sporadically, to count herds or to conduct roundups during the marking and slaughtering seasons (pages 626–7).*

Few but the herder himself can recognize his property at a glance, for the Laplanders, both Finns and Same, use a system of ear-notches as identifying marks.

"There are more than 20,000 different registered marks in Finland—an average of nearly one for every ten animals," Vrjö Alaruikka, the director of Lapland's Reindeer Raisers' Association, told me in Rovaniemi.

He leafed through a thick official register, pointing to endless combinations of V-shaped notches, crescents, small perforations, and deep slices. Each group of marks was indicated separately on silhouettes of a pair of reindeer ear tips thus:

I asked if herders had a problem with doctoring of marks, and Mr. Alaruikka shook his head.

"Only rarely," he answered. "The marking is done when the animal is very young; any later scars show up in a different growth pattern. A good herder knows most of his animals anyway, just as you know your own dog from another of the same breed. The herder knows his reindeer

*Göran Algård and William J. Stolz photographed "Lapland's Reindeer Roundup," for the July, 1949, NATIONAL GEOGRAPHIC.

Portrait of a day without darkness. Summer in Finland is the season of light—in Lapland, a time of no night at all. For this multiple exposure of the never-setting sun, photographer George Mobley waded into icy Lake Inari and set his camera on a tripod beneath a dead tree. Every two hours he walked into the water to click the shutter. Fisheye lens records the sun at 2 a.m. (raved image nearest bottom) and then counterclockwise to 8 p.m. Mobley did not open the lens at 10 p.m. because a storm was raging. The midnight exposure (sun at bottom) registered a second image of the tree, revealing that winds had moved its branches. Dark appearance results from fast shutter speeds and small apertures, essential to keep the sun's brightness from overwhelming the sky.

Dragging a hay-heaped sled, Martta Mänty heads out to feed the reindeer on her ranch near Rovaniemi. Unlike most Lapps, she wears this costume often, not merely on festive occasions.

Reindeer roundup: Lapp counterparts of the American cowboy, herdsmen rope young animals running with adults near the Miessi River. They will notch the ears of each fawn

with one of the 20,000-odd brands that identify the stock of individual herders. Released from the corral, reindeer find their way home to ranches 30 to 40 miles away.

Pint-size captor clamps a firm hold on a squirming fawn. The sun still lights the corral at midnight. Lapps prefer the late roundup, when summer's fierce mosquitoes are less active.

even better, because they aren't pets, they are his life."

North of Rovaniemi and beyond the Arctic Circle, night vanished entirely, for it was the time of Juhannus, Finland's Midsummer Festival. The celebration takes place on a Saturday in late June. In southern Finland on Juhannus the sun dips below the horizon for only five hours, while tens of thousands of earthly suns—Finland's traditional Juhannus bonfires—take its place. Above the Arctic Circle the sun gives Finns no such excuse, for it merely wheels in a great ellipse about the sky (pages 624-5).

Finnish Sauna: Trial by Oven

No true Finn, be he northerner or southerner, considers Juhannus complete without an hour or two in the sauna. The age-old Finnish custom of "bathing" in extreme dry heat goes on the year around, but Juhannus adds a festive touch to the practice.

An American friend long-familiar with Finland had warned me about country saunas. "Don't think after you've had one of those things they call sauna in a Helsinki hotel that you're an old hand at the business," he had said. "When they get you in the country, they'll make pot roast of you, at 230 degrees Fahrenheit. After that, they'll tenderize you for a while with birch twigs, and then baste you in a nice cool lake." He smiled. "And you'll love it."

My friend was right, all except for the lake: It turned out to be the Lemmenjoki instead, and it wasn't cool; it was freezing. The Lemmenjoki is a river in northern Lapland, where Juhani Jomppanen lives with his wife and three small daughters.

Juhani, to use his people's term, is Same, and his wife is of Finnish blood. At their invitation I joined them for Midsummer Eve at their small travelers' lodge by the river.

The week before, I had driven to the northern edge of Finland, as far as Utsjoki, a village beside the border with Norway. During the last hundred miles the evergreen and birch had gradually thinned and vanished. Beyond, the land lay vast and bleak, without features, except for *tunturi*, or rolling fells,

Zest for life lights the face of a Lapp grandfather, 70-year-old Jouni Katti of Lismn. Like most Lapp men, he is short but strong, his wiry body toughened by a hard life. He speaks one of the 50 dialects of the Lapp language, a tongue unsurpassed in its rich and specialized terminology on reindeer, the Lapps' favorite animal.

Shy child seeks security in a friendly hand. Embroidered bonnet is traditional for Lapp girls; boys wear a pompon. The northern people favor red homes as well as dress

that stand like low barriers against the Arctic wind. Back beside the Lemmenjoki, I was delighted once more with the crisp sound of rushing water and the scent of pine trees, warm in the sun.

After dinner, Juhani and I made for the sauna, a small unpainted cabin. A wood fire had long since converted the interior pile of stones into a fearful radiator. After we had stripped, Juhani poured several dippers of water over the stones, and we were suddenly enveloped in a blinding, almost unendurable cloud of steam.

Automatically, I sucked in my breath and instantly wished I hadn't, as raw steam poured down into my lungs. After a moment, however, the unfinished pine walls began to absorb the moisture, and the heat became dry and less agonizing. In time I actually came to enjoy the sensation, but I learned nonetheless to take a deep breath and hold it whenever Juhani reached for the dipper.

Spirits Precede an Approaching Visitor

Later we flicked each other across the backs and shoulders with soft-leaved birch branches to increase circulation, and then completed the ritual with a plunge in the still-icy Lemmenjoki. I had steeled myself for the ordeal, and was surprised to find that the immense body heat built up in the sauna served as insulation, producing a pleasant tingling sensation rather than pain.

After Juhani's wife and daughters had taken a turn in the sauna, the parents and I sat up to watch sun-drenched night slip serenely into sun-drenched day.

My thoughts suddenly turned to the opposite side of the year, when northernmost Lapland endures 40 days without a glimpse of the sun, when merciless winter ice enamels the land, and the northern lights lick eerily across the darkened rim of the world.

At such times the Laplanders' belief in the supernatural awakens, and they speak of the *Etiäinen*—"The Ones Who Go Before."

"The Etiäinen are spirits," Mrs. Jomppanen told me, "not of gods but of human beings—live human beings. Often they run before to announce the real ones' coming, or to tell what they are doing."

I couldn't hide a skeptical look.

"It is true," she said, patiently. "Have you not sometimes felt that a particular friend would come to see you, or that a certain thing would happen, and later find it so?" I had to admit that on occasion I had.

"That is the Etiäinen, telling you," she said. "With many Laplanders the Etiäinen appear, or make sounds. Often in winter, I have looked out on the river and seen my husband or a neighbor coming across the ice. Sometimes it is the person himself and sometimes the Etiäinen, but I always put the coffee on, for I know someone is coming."

On other occasions, Juhani assured me, his wife had visualized him as he hunted many miles from home, and sometimes even knew what he would bring back.

"I jokingly tell her, 'Picture me something fine and good to eat,'" he said, "but she laughs, for she only sees and cannot choose."

We shook hands at the door, and I said that I hoped one day I might come back to Finland. When I did I would surely return to Lapland and to the house beside the Lemmenjoki. Mrs. Jomppanen gave me an impish smile.

"The coffee will be ready when you arrive," she said.

THE END

Tool-using Bird: The Egyptian Vulture

Unique photographs show how it throws stones to open ostrich eggs

By Baroness JANE VAN LAWICK-GOODALL, Ph.D.
Photographs by Baron HUGO VAN LAWICK

THE MIDDAY HEAT seemed intensified by the blackened ground and smell of smoke, aftermath of one of the periodic grass fires that sweep east Africa's plains.

As my husband Hugo and I bounced along in our Land-Rover, we saw few signs of life, though grass would soon appear and the herds of antelopes would move back to feast on the succulent shoots. We were on a wildlife photographic safari, with National Geographic Society support, in the Serengeti National Park of northern Tanzania (map, page 633), and we were headed for country we had never seen before.

Suddenly Hugo noticed vultures plummeting down in the far distance, and we swerved to see what had attracted them. How well Hugo's sharp eyesight would be rewarded!

At first we saw only a confusion of vultures gathered round about 20 ostrich eggs, squabbling over the contents of some that were broken. The nesting ostriches apparently had fled the grass fire as it swept near them.

But our attention was abruptly riveted by an extraordinary action among the vultures.

"He's using a tool!" Hugo and I exclaimed almost with one voice.

Amazed, we watched an Egyptian vulture, a white, yellow-cheeked bird about the size of a raven, pick up in his beak the stone he had

Assault on an egg's stubborn armor: With stones in their beaks, Egyptian vultures prepare to bombard an ostrich egg (opposite); downward snaps of the neck will propel the missiles. An assailant with beak still open (above) misses the target. After a dozen rounds and a few hits, a crack appears (above, right). As the yolk spills, the greedy pair bar would-be guests (right)—another Egyptian vulture and a darker hooded vulture.

This use of stones to secure food adds the Egyptian vulture to the few known animals that, like man, manipulate objects as tools. The van Lawicks observed the phenomenon on a National Geographic Society expedition in Tanzania.

just thrown down. The bird raised his head and once more threw the stone at the ostrich egg lying on the ground before him.

It was true! We were watching that seldom-recorded phenomenon—the use of a tool by an animal. And we were, as far as we know, the first scientifically qualified witnesses to this extraordinary talent of the Egyptian vulture.

Gradually we sorted out the different vultures. The company included the usual gathering of white-backed vultures and Rüppell's griffons, some hooded vultures, a few huge lappet-faced vultures, and just two of the small white Egyptian vultures.

As we watched, the second Egyptian vulture picked up a stone in his beak and moved toward an egg. With excellent aim the bird threw the stone with a forceful downward movement of head and neck. He pecked at the shell, as though feeling for a crack, then picked up the stone again and flung it. This time he missed the egg, but the third time he scored another hit. Three minutes later a direct hit cracked the shell, and after a few more throws, the vulture buried his beak in the rich, nutritious yolk as it spilled onto the ground.

Three of the larger vultures immediately rushed in and drove the stone-thrower away. Others joined them, and soon the egg was lost beneath a mass of feathers. In a few moments there was nothing left save the broken shell and a damp patch on the earth.

As for the provider of the feast, he was walking toward another egg, head in air, stone in beak. "Crack!"—the sound told us of the success of his first throw.

No Other Species Seen Cracking Eggs

We soon noted that only the Egyptian vultures were able to fracture the ostrich eggs. Even the lappet-faced vultures, despite repeated efforts with their strong beaks, failed to crack the shells, which are a sixteenth of an inch thick and extremely tough.

The two stone-throwers eventually opened all the eggs, though they never got more than a couple of beakfuls of food before their larger cousins chased them away.

Intent on an egg, Egyptian vultures ignore the van Lawicks, taking pictures from their Land-Rover.

Scavenger of three continents, the Egyptian vulture, *Neophron percnopterus*, frequents Tanzania's Serengeti National Park and Ngorongoro Crater, principal sites of the van Lawicks' research. To the west lies Gombe Stream Game Reserve, where the author, with Geographic support, studies wild chimpanzees. In 1960 she discovered that they fashion and use crude tools.

Dutiful male ostrich appears to neglect eggs lying at random about his nest. Recent studies indicate that parents make no effort to retrieve eggs kicked out of the nest during laying and incubation.

PAINTINGS BY BARON HUGO VAN LAWICK (ABOVE) AND ALICE HORTH © N. G. S.

When the vultures dispersed, we drove back to our camp at Seronera. We were greeted by Hugo's brother Michael, who was visiting with us.

"See anything interesting today?" he asked.

Our words tumbled over each other as we told of our discovery.

"Surely someone else must have seen that," said Michael.

While agreeing that the local Masai tribesmen might have, we expressed confidence that we were the first trained observers of the astounding event. Such a notable occurrence could not have escaped the spotlight of publicity if it had been scientifically observed.

We got into a discussion of the use of tools by animals in general. Michael knew about the chimpanzees we had studied at the Gombe Stream Game Reserve—how they use sticks and bits of grass to fish for termites and ants, and how they clean themselves with leaves, as humans use toilet tissue.

"They also crumple leaves in their mouths," I told him, "making a sort of sponge to sop up water from hollows in trees, when they can't reach it with their lips." *

We knew that chimps in the west African country of Cameroon had been observed poking sticks into an underground bees' nest. Another, in Liberia, had been seen using a rock to pound open a palm-nut kernel.

Hugo and I told Michael of other mammals that occasionally use tools—a report of a gorilla using a crooked stick to pull fruit within reach, an Indian elephant seen scratching itself with a stick. But except for the chimp, the only mammal habitually using tools is the California sea otter. It lies on its back at the surface of the water, puts a flat rock on its chest, and breaks shellfish by beating them on the "anvil" with its paws.

"Isn't that like a thrush cracking snails on a rock?" asked Michael.

"Not exactly," I replied, and explained that

*The author described her pioneering studies in "My Life Among Wild Chimpanzees," in the August, 1963, GEOGRAPHIC, and "New Discoveries Among Africa's Chimpanzees," in the December, 1965, issue.

Dashing one against the other, a vulture attacks fake hen eggs in one of the van Lawicks' experiments to test the birds' reactions to size, shape, and color. The vultures apparently resort to stone throwing only if an egg is too big for their beaks.

Right shape, wrong color, a painted ostrich egg confuses a hungry vulture. Nervously throwing stones at the ground and edging nearer, the timid bird—nicknamed Spot—lost out to two other vultures that swooped in and commandeered the prize.

to a scientist an object is classified as a tool only if it is picked up or otherwise manipulated by the animal—if, in fact, it is used as an extension of hand, trunk, paw, or mouth.

"When a gull or crow flies up and drops a shellfish onto the ground, when the lammergeier cracks bones by dropping them onto rocks, or when a shrike impales food on a thorn to prevent its falling to the ground—none of these actions can be called tool-using either," I added.

There are, however, other birds that do use tools. The Galapagos woodpecker finch probes grubs from their holes with a small twig or cactus spine held in the beak.* The satin bowerbird of Australia is reported to use a wad of bark when painting the inside of its bower.

And now, among the ranks of the vultures, we had found yet another tool-wielding bird. Vultures, so commonly regarded with disgust and loathing, in fact are intelligent birds, and those I have known in captivity have been full of charm and character. As scavengers they perform a vital job, not only in the wilderness but also by tidying up around human dwellings. The vulture's bare or down-covered head and neck is its adaptation to a carrion

*Roger Tory Peterson wrote a fascinating account of the islands' extraordinary wildlife, "The Galapagos: Eerie Cradle of New Species," in the April, 1967, NATIONAL GEOGRAPHIC.

Super-egg (below), a fiberglass fake with the volume of six ostrich eggs, resists a double-barreled attack. The vultures pelted the giant egg for 1½ hours, until the author removed it. She concluded that vulture interest may increase with the size of the egg.

Airlifting ammunition, an Egyptian vulture wings toward an egg. The birds range as far as 50 yards from their target searching for stones in the 13-mile-wide Ngorongoro Crater, a mile-high grassland cupped in the rim of an ancient volcano.

diet, for often it pushes its beak deep inside a dead animal. Feathers would become caked with blood and viscera.

The Egyptian vulture, with the hooded vulture the smallest of the African species, is the least vulturelike, for though its yellow cheeks are bare, white feathers start on the crown of its head and continue down its neck. The adult, essentially a white bird, has brown or black edges on its wings (page 630). The youngsters, very dark when they leave the nest, become paler with each successive molt.

Birds' Feat Raises Many Questions

Hugo and I, as students of animal behavior, needed to learn more about the stone throwing of the Egyptian vulture. Two of these birds had shown us how cleverly they could open ostrich eggs. Now we wanted answers to a whole series of questions. Do all Egyptian vultures respond thus to the challenge of an ostrich egg? What triggers the throwing response—size of the egg? Shape? Color? And what about the tools? Will any stone do? How far will the birds rove away from an egg to find a suitable tool?

On our next visit to Nairobi, Hugo and I gathered an assortment of eggs. We bought eggs laid by a tame ostrich, most of which we emptied by blowing—and so discovered the excellence of scrambled ostrich egg! We lined the blown shells with plaster of Paris until each approximated the weight of a fresh egg, about three pounds. We asked a friend at the National Museum in Nairobi to make us a number of small plaster-of-Paris eggs—and one giant egg. The latter, made of fiberglass, had a bulk equal to about six ostrich eggs.

As yet we have had no opportunity to test Egyptian vultures in distant parts of their range, which extends across northern Africa into southern Europe, and in Asia as far as India (map, page 633). So we have not yet learned whether stone throwing is a local custom or common to the species as a whole.

We quickly found, however, that what we had witnessed was not a freak performance on the part of the two original birds, for we soon saw stone throwing by Egyptian vultures in three other localities—Ngorongoro Crater, nearby Olduvai Gorge, and Masai Amboseli Game Reserve in neighboring Kenya.

Seeking answers to our questions, we spent two months in Ngorongoro Crater, where there is quite a large concentration of Egyptian vultures. We settled into a rustic cabin built by a previous researcher with a National Geographic Society grant (opposite).

What a place to live! The magnificent view reaches across the plains to the walls of the crater, which curve along the horizon, rising dark and forested, with clouds very often shrouding the rim. Close at hand graze many animals—wildebeests, zebras, Thomson's and Grant's gazelles, and an occasional rhino. The little wooden cabin nestles beneath an enormous fig tree beside a cool stream. Rustling leaves and murmuring water form a soothing background to the songs and calls of birds and grunts of animals.

All the common species of east African vultures inhabit the crater. Each has its place. White-backed vultures normally make up the greatest percentage of the gathering around a

Evidence of a feast, the shell of an ostrich egg found in the Serengeti National Park still holds a vulture's stone tools.

Rustic research center in Ngorongoro Crater houses the van Lawick party. Jane marks vulture-thrown stones for weighing, right. Hugo paints a test egg. Amid assorted decoy eggs, assistant researcher Alice Sorem hands a toy duck to the van Lawicks' six-month-old son Hugo. Cube-shaped "egg" at left failed to interest the vultures, indicating that shape may trigger the birds' throwing response.

carcass. Squabbling with them, on a more or less equal footing, are the Rüppell's griffons, with their ivory-colored beaks.

Hooded vultures hang around the outskirts, nipping in and out to seize small scraps (page 631); the grayish skin of their heads sometimes blushes deep red when they are thwarted by larger relatives.

Several sinister-looking lappet-faced vultures, with purplish heads and huge beaks, invariably gather at the feast. An occasional participant in such carrion parties is the white-headed vulture, with red beak and crest of white down atop its head.

Sight of Egg Triggers Stone Throwing

Finally, there are the Egyptian vultures. These lurk on the fringes of the group, subservient to all other species—except that they occasionally face down the hooded vultures. With their slender beaks, the Egyptians can do little in the way of tearing and pulling, but must wait in hopes of gleaning the very last scraps.

In Ngorongoro we never found more than five Egyptian vultures together by day. More often we saw them singly. It was one of these solitary birds that we first tested with an ostrich egg blown and lined with plaster of Paris. We placed the egg 30 yards from him and drove off to await developments.

The bird saw the egg immediately, preened, then moved toward it, picking up a stone on the way. Every few steps he paused, threw the stone at the ground, and picked it up again. Finally he scored his first hit.

This was a pattern we would see many times. The sight of an egg seemed so stimulating that the birds could not wait to reach the target before they started throwing.

The solitary vulture attacked the egg several times with one stone, then used another. After seven minutes he cracked the shell of the dummy egg. Removing a section of it, he peered into the hollow interior (opposite page).

"I don't suppose he'll throw any more now," I said.

How wrong I was! The vulture continued to bombard the shell for another 30 minutes—long after it was shattered into fragments. During this time, he frequently moved several yards away in search of another and yet another stone—as though he felt he would strike yolk if only he could find the right tool!

In other tests with plaster-lined eggs, we observed that the vultures would search for stones at distances up to 50 yards from the egg. One bird tried to pick up impossibly large stones, and finally gave up.

The vultures hit the target about 50 percent of the time when throwing at an ostrich egg. When we made tests with the giant fake egg, the birds, not surprisingly, hit it more frequently.

The birds we watched normally used the stones that were most conveniently placed. If a stone of reasonable size and weight bounced out of reach or out of sight after throwing, the bird frequently picked up another—often one almost too large to hold. Only three times, however, did we see a bird use a stone too small to be effective.

Collecting the tools used in each test, we found that they weighed from half an ounce

to one pound two ounces; they averaged five ounces. Our six-month-old son Hugo found them excellent for teething!

"I feel sorry for those birds," a friend commented, hearing about our tests. "They get all excited by the sight of eggs—and then are disappointed."

We reassured him that we were not so heartless. After each test we rewarded the vultures with hen eggs. An Egyptian vulture will pick up such eggs in its beak and throw them at the ground. Usually the egg cracks after a few throws and the vulture enjoys its deserved reward.

Birds Try in Vain to Crack Fake Eggs

One day we put four imitation hen eggs near a vulture. He threw each one to the ground several times, and then took one over to a rock and threw it at that! When this, too, failed, the bird spent some 20 minutes throwing the eggs at each other—until we relented and gave him a couple of real ones.

Testing these vultures revealed how aggressive they were. The highest-ranking usually drove the others away, even when fragments were all that remained of an egg. The other birds, frustrated, threw stone after stone at the ground.

Two of the Egyptian vultures proved inseparable mates. The male, when we first saw him, had a gimpy leg and became known as Lame; the female we called Number Two.

We chose this pair as subjects for our first test with the giant egg (pages 634-5). Its size did not deter them. Lame at once picked up a stone and hurried toward the monster. Number Two followed and threw so eagerly that she actually hit Lame with two of her stones.

"They don't seem to realize that the egg is bigger than it should be," said Hugo.

"No," I said. "Size doesn't appear to bother them. They're like the gulls that try to incubate large imitation eggs substituted for their own."

Lame and Number Two threw stones at the super-egg until, after an hour and a half, we replaced it with six well-earned hen eggs.

Loaded and cocked, a vulture prepares to let fly at an ostrich egg emptied by blowing and weighted with a lining of plaster of Paris. Despite their fondness for eggs, Egyptian vultures feed largely on carrion. The sexes, alike in color and size, can be distinguished by behavior.

Glancing blow fails to fracture the egg, already nicked by earlier onslaughts. Flinging stones that average 5 ounces, the birds score only half the time, with 6 to 12 direct hits normally required to break an ostrich egg's tough shell.

Hollow victory greets the forager as his fusillade opens a window to an empty interior. The bird bombarded fragments for another 30 minutes, often changing stones as if his ammunition were at fault.

Scramble for an egg! In an airborne clash, an Egyptian vulture hurls himself against an intruding hooded vulture; two other Egyptians huddle beside a prospective feast. The defending vulture won no gratitude from his colleagues: the pair cracked open the ostrich egg with stones and devoured every scrap themselves. The author found cooperation between even two birds exceptional. Usually a dominant individual drives away all others, who skulk nearby, throwing stones at the ground in frustration.

This battle between vultures defies the usual peck order, which finds Egyptian vultures generally giving way to the more aggressive hooded species. Egyptian vultures appeared to be the only tool-users: the author saw no evidence of other species throwing stones.

The van Lawicks this year hope to raise an Egyptian vulture away from its kind to determine whether it inherits the stone-throwing impulse or learns from other birds.

It was during this test that a tourist car drove up.

"Oh, look!" a woman said. "That bird's throwing stones."

"So it is," replied her companion in a completely uninterested tone. Then he spoke to Hugo: "Can you tell us where the lions are?" Hugo directed him, and the couple drove off without a backward glance.

"What a contrast to the old Masai!" Hugo commented. "Do you recall how fascinated he was?"

How well I remembered. We were observing a pair of Egyptian vultures breaking eggs at Olduvai Gorge. We had found them near a Masai *manyatta*, or village, and for more than an hour the old headman sat so quietly beside us that we forgot he was there.

When the birds had left, the chief joined us as we went to collect the stone tools. With an expression of wonder that I shall never forget, he picked up a stone, gazed at it, and then, with a faithful imitation of the vulture's forceful movement, flung it down onto the broken shell again and again.

"*Ey! . . . ey! . . . ey!*" he kept exclaiming in amazement.

Spot Loses Out on a Scarlet Egg

Perhaps the tourists would have shown more interest had they arrived when one of our vultures, Spot, was trying to muster courage to approach an ostrich egg that we had painted brilliant scarlet. After staring at the bizarre object and repeatedly preening in an agitated manner, Spot finally picked up a stone and flew to within six feet of the egg. He walked toward and away from it, circling it and repeatedly throwing stones at the ground (pages 634-5). When he was almost close enough to hit the egg, two birds suddenly swooped down and landed nearly on top of it—Lame and Number Two.

They quickly cracked the egg with stones

and drained it. And poor Spot, the victim of his own procrastination, got no share even of the reward set out as a consolation prize for him, for when we exchanged the red fragments for hen eggs, Lame and Number Two chased him away.

By the time we left Ngorongoro Crater, we felt that our research was off to a good start. We knew that stone throwing was the normal response of many Egyptian vultures to egg-shaped objects that could not be picked up. This was manifestly true even when such an object was larger than any living bird's egg, and even when it was red or green.

We had seen, too, that none of the vultures paid the slightest attention to a white cube about the size of an ostrich egg—which suggests that shape may be the major factor that stimulates stone throwing (page 637).

Much work, however, remains to be done, and we plan to return to the crater later this year. We hope to rear an Egyptian vulture ourselves, away from its own kind, to find out if the impulse to throw stones is inborn—an inherited characteristic. We feel quite sure it is not, for once we saw a young Egyptian vulture try for 30 minutes to peck open an ostrich egg. When he gave up, an even younger bird moved in, picked up a stone, and broke the egg in six minutes.

This suggests, of course, that each bird must learn the skill for itself. But maybe the method of breaking small eggs by throwing them is innate—and this we may also learn from a tame bird.

I must end with a confession. It is not simply to further scientific knowledge that I enjoy sharing parts of the Egyptian vulture's life. I have become a vulture lover! Not of all vultures, but certainly of the white bird with the yellow face and dark beak, the aloof bearing, and the overwhelming passion for eggs that has made it one of the few animals known to use tools.

THE END

NEW NATIONAL PARK PROPOSED

The Spectacular North Cascades

By NATHANIEL T. KENNEY *Photographs by JAMES P. BLAIR*
Both National Geographic Staff

SHARP AS A COUGAR'S FANGS, *the Picket Range spikes a summer sky in the wilderness empire of the North Cascades.*

OUT IN THE NORTHWEST CORNER of the country, up against the Canadian border, lies a sparsely peopled land of snowy mountains and forest solitudes —the North Cascades wilderness, in Washington State. If Congress this session completes action on a bill already passed by the Senate, the choicest part of it will become our newest national park.

What is it like? Last summer I went to see, and now I can report that it is like nothing else—unique in itself—though at times it seemed composed of about equal parts of Alps, virgin forest, and the easy informality of the old West.

As we roamed this peak-studded wilderness, National

Park Service planner Neal Butterfield and I felt as if we were peeling back generations to a time when the West was new. We felt in touch with our pioneer heritage as we trekked the high trails of the Cascades with old-time packers and their horses. We sensed it in the scent of saddle leather and campfire, in the clang of metal-shod shoe on rock—and in every one of our saddle-weary bones at night.

Stehekin: Wilderness Portal

For the trappers and prospectors of old, the most popular jumping-off point into the area now proposed as the southern section of the national park was the head of Lake Chelan. Here came into existence the isolated village of Stehekin, which still outfits hunters and hikers as it did the pioneers. Its name is a Skagit Indian word meaning "way" or "pass," and it became my first doorway into Cascades country. I frequently used it as a base for forays by plane, helicopter, and horse (map, page 651).

The passing years have not greatly changed Stehekin's way of life. Its families still see mountain lions and mountain goats from their kitchen porches. It has no doctor or dentist. No road, no telephone line links it to the outside world. The people like it this way.

There are but 30 year-round Stehekinites. Most descend from homesteaders. Among these, Harry Buckner is postmaster, keeps a general store, and runs a radio transmitter used for emergency calls (page 648). Ray Courtney (page 665) and Guy Imus pack horseback parties into the wild lands. Ray's brother

From the lip of a living glacier, a hiker surveys Mount Challenger's snowfields on a sun-washed August day. A proposed new national park in this spectacular alpine region of Washington State would encompass more than 150 glaciers.

"Greatest concentration of natural beauty in the United States," one naturalist terms the wilderness. To keep it unspoiled and accessible only by trail, the National Park Service plans no automobile roads into the core of the new preserve; motorists would leave their cars on the perimeter and be carried to view points on the ridge by aerial trams, the first ever built in a U. S. national park.

Riding a log raft on Thunder Lake, a Seattle family soaks up sunshine in a Cascades valley. But they stay atop the water, so icy that only the most courageous dare swim in it.

Curt is the leading contractor and builder.

Others work for the United States Forest Service or the local electric cooperative. Nearly everyone owes part of his livelihood to an ever-increasing flood of vacationists.

I first went to Stehekin in July, when the back country was still impassable under a blanket of snow. I flew in from Chelan, at the toe of the lake of the same name, in a float plane with veteran bush pilot Ernie Gibson.

Settlement Cherishes Its Isolation

Most visitors take the boat that makes the 50-mile lake trip daily in summer, three times a week in winter (right). Some go off into the wilds, some vacation in Stehekin's resorts and lodges, others stay only for lunch and go back to Chelan with the boat.

In my plane was Neal Butterfield, whose home base is the Park Service's Seattle office. His mission was to assure the worried Stehekinites that the Park Service didn't plan to build a road in from the outside.

"If we get a North Cascades park," he said, "it will be one of the few in the country you can't enter by car. The only way in will be as now—by air, horse, or afoot."

Stehekin does have a motor road, but it goes no place in particular. About 20 miles long, it is simply a local link between the village wharf and the widely scattered homes and resorts in the Stehekin Valley. The elderly vehicles that use it came in by barge and will never travel another thoroughfare.

Hiring one of the captive cars, we drove into the valley. A ten-minute run brought us to the one-room schoolhouse. It was closed for the summer, but Mrs. Ed Strange, the teacher, was inside fixing the big chunk stove, and we stopped for a chat.

"I had six students last year," she told us. "The only girl was a beautiful little Alaskan Indian, adopted daughter of a lady who helped look after one of the resorts. The others were all sons of Ray and Esther Courtney."

Packer Ray Courtney, who was later to guide us on the most enjoyable horseback trip I have ever taken, is an unusual man. An expert skier and a wizard with horses, he is a true mountain man who loves the wilderness deeply and counts the day lost on which he must visit a city.

Ray designed and built his own house in the valley. It is a beautiful thing of peeled logs, along the lines of a Swiss chalet. From a giant fir he felled with his own hands, he hewed a solid staircase that is a masterpiece of craftsmanship.

Oil lamps light the home.

"Matter of principle," he explained. "I opposed the power plant when they put it in because it spoiled one of my favorite parts of

Trim *Lady of the Lake* glides across snow-fed Lake Chelan. Passengers on the stern decks watch the banks for glimpses of white-coated, black-horned mountain goats. Every summer day the ferry churns 50 miles from Chelan, at the lake's southeastern tip, to Stehekin, at the head, and returns.

Wapato Indians named the 1,500-foot-deep lake—Chelan means "deep water"—that cuts its fordlike way into the heart of the North Cascades. The bottom of the lake, a trough carved by an Ice Age glacier, lies 400 feet below sea level.

the valley. It wouldn't be honest for me to use the electricity it makes."

From the Courtney place we drove on to visit Harry Buckner at his homestead carved out of deep forest. He was in his apple orchard inspecting trees scarred by powerful claws.

"Bears," he complained. "They've killed this tree. When the apples ripen, so many come to steal the fruit I have to sit up nights chasing them off."

Back on the road, we rounded a sharp bend and met two bears headed in the general direction of Harry's orchard. We sent them back up the valley with a blast of the horn.

Still far from road's end, a snowbank blocked us, and we turned around. Neal got down to guide me as I backed the car.

"I saw a moose track in the snow," he said as we started back for the village. A Stehekinite we picked up a while later said he'd seen the animal, a young bull. Moose are rare in the Stehekin Valley, but sometimes they stray in from Canada, 50 miles north.

"A small herd of elk wintered in the valley last year," said our passenger. "We have deer by the thousands."

Fresh-water Lake Yields "Salty" Catch

Later, on the wharf at Stehekin, I saw an angler proudly displaying a fish he had just caught, a 10-pounder that he called a "ling cod." More correctly, he had landed a burbot, which is a member of the codfish family, true enough—the only fresh-water cousin of all that salt-water clan. You can catch them, as well as large trout, in quarter-mile-deep Lake

Famed for her cooking, Mrs. Beryl Courtney bakes four dozen apple and walnut pies a day in her Stehekin restaurant.

Only by radio can residents of phoneless Stehekin talk with the outside world. Postmaster Harry Buckner calls the sheriff in Wenatchee.

Breakfast never tasted better! Harold Olson (left), a cowboy turned packer, and Neal Butterfield of the National Park Service savor piping-hot pancakes and coffee brewed with brook water on a pack trip to Whatcom Pass.

Giving his horse full head, author Kenney fords a stream en route to Park Creek Pass. He keeps one hand ready to grab the pommel should his mount stumble on a stone in the swift water.

Chelan, and, during summer months, satisfying numbers of small landlocked sockeye salmon, known as kokanee.

The lakeside village of Stehekin is one of but three hamlets in all the wild lands proposed for the park and its associated recreation areas. The other two are Newhalem and Diablo, in a neck of land between sections of the two-part park. All three settlements lie in the proposed recreation areas (map, page 651).

Newhalem and Diablo are company towns owned by Seattle City Light, which created Gorge, Diablo, and Ross Lakes by building power dams across the Skagit River between 1930 and 1961. Its workers live happily in the neat communities, and City Light's hospitality to vacationists is one of the heartwarming marvels of the Northwest.

You can visit the company's sizable wilderness holdings in your own car, or for a fee

City Light will transport you by bus from Seattle. It will take you sightseeing on Diablo Lake (page 663), show you its power plants, and feed you to stupefaction in a vast dining room patterned after a lumberjacks' mess hall, complete with a sign asking you not to scar the floor with "calk boots."

Giants Created by Volcanic Eruptions

On a map of the Pacific Northwest, Diablo Lake is hardly more than a dot in the northernmost part of a mountain chain 700 miles long. Starting in California as an extension of the Sierra Nevada, the Cascade Range curves north through Oregon and Washington and ends at the Fraser River in British Columbia.*

The highest peaks are volcanoes: Rainier (at 14,410 feet the tallest), Shasta, Adams, Hood, Baker, Glacier, Jefferson, and Lassen, the only one still belching steam. Rains from moisture in the prevailing Pacific winds copiously bathe the range's western slopes. Eastward, the foothills taper into semidesert.

In the North Cascades, springlike temperatures last all summer, and you can expect the first breath of winter by October. Snow, in consequence, never melts entirely and piles up in layers until it forms the glaciers, which incidentally number twice as many in Washington as in all the other states combined, excluding Alaska.†

Since only 65 miles, as the golden eagle flies, separate the populous city of Seattle from 10,568-foot Glacier Peak, one would expect the North Cascades to be well explored

*See, in the NATIONAL GEOGRAPHIC: "Washington Wilderness, the North Cascades," by Edwards Park, March, 1961, and "Northwest Wonderland: Washington State," by Merle Severy, April, 1960.

†See "Climbing Our Northwest Glaciers," by Bob and Ira Spring, NATIONAL GEOGRAPHIC, July, 1953.

and fully described in print. Not so: they are not even completely mapped.

My visit to this high, wild country fulfilled an ambition dating back several years to a talk I'd had with George B. Hartzog, Jr., Director of the National Park Service. He described the area as a wilderness of rare beauty, hardly marked by the hand of man.

"As early as the 1930's," said Mr. Hartzog, "conservationists were worried about the disappearance of the American wilderness and urged the Park Service to establish a North Cascades National Park.

"After careful studies, the service made this statement in 1937: 'Such a park will outrank in its scenic, recreational, and wildlife values any existing park and any other possibility for such a park within the United States.'

"Except for Alaska, which has become a state since that time, the words still hold true. It is one of my fondest wishes that one day, before it is too late, we will have a North Cascades National Park in this unique community of ancient forest, alpine meadows, snowy peaks, and plentiful glaciers."

A look at the accompanying photographs, especially of the needle-sharp complex called the Picket Range (pages 642-3), will explain why this wilderness has survived. Even the Indians avoided these savage mountains. Fur trappers, both American and British, kept to the low valleys where the beaver lived.

Harder Route "Never Fell to Man's Lot"

A journal kept by Alexander Ross, a Scottish fur trapper who pushed into the Cascades in 1814, helped me understand man's slowness in settling the area. Ross was probably the first non-Indian ever to enter the northern part of the range, and I was particularly interested in his impression. Here's what he had to say about the wilderness that lay to the west of Cascade Pass:

"Country gloomy, forest almost impervious with fallen as well as standing timber. A more difficult route to travel never fell to man's lot. . . . And the rocks and yawning chasms gave to the whole an air of solemn gloom and undisturbed silence. My companions began to flag during the day."

For "gloomy" I would substitute "inspiring," although I realize that 154 years ago these wilds sheltered grizzlies, wolves, and a few Indians, all of them deterrents to travel that no longer exist here. Otherwise I agree with Ross, and I can testify that some of my companions too began to flag—as I myself did—on more than one arduous day's trek.

After the trappers, however, came an influx of men whose energies were fired by the scent of gold, the result of a strike in 1858 in the Fraser River Valley. The first prospectors found scant reward, but later searchers discovered gold, silver, and copper, and have removed about 80 million dollars' worth since the turn of the century.

Take any trail, and the chances are that the early prospectors originally hacked it out for their pack trains. Everywhere you run across the mouths of old prospect holes, and occasionally there is an abandoned mine.

Old Claims a Threat to Wilderness

These diggings depress me. In the dark depths of the mines rusty ore cars yet stand on rusty rails. Picks and shovels lie where men dropped them as hope died. It is a sad thing to think of so much backbreaking labor gone, in most cases, for nothing.

Scores of the old claims are still valid, nevertheless, and lovers of the wilderness fear them, for heirs still have the legal right to return and work them anew. In one instance, at least, this has already happened.

On the logging road that now goes from Marblemount to the west side of Cascade Pass, I ran out of gasoline and was rescued by a carload of men in lumberjack shirts and hard hats. Thinking them loggers, I asked where they were cutting.

"No place," one of them replied. "We're reopening an old silver mine up near the top of the pass. Some job, too. Nobody's worked it since the 1890's. But the price of silver has gone up, and the owners now think they might make some money."

Copper is another money-maker these days, and its discovery in quantity could cause the death of almost any wilderness area. A case in point is the 452,000-acre Glacier Peak Wilderness, west of Lake Chelan. Primitive and beautiful, it is one of the best parts of the North Cascades.

The area is now national forest, under the skilled and devoted management of the U. S. Forest Service. The parks bill passed by the Senate not only keeps it that way but would enlarge it by 10,000 acres. Without the "wilderness" label, the Forest Service under law would have to open it to a number of uses—lumbering, for example—although permits are issued only if proposals fit long-range

Nicknamed "American Alps," the North Cascades are a labyrinth of high, ragged peaks amid deep valleys. Under a bill introduced in Congress by Senator Henry M. Jackson of Washington State, a proposed national park would preserve half a million acres of this majestic beauty; two adjoining recreation areas, embracing another 167,000 acres, would allow hunting as well as a greater range of other pursuits than park rules permit. The bill would also add 10,000 acres to the U. S. Forest Service-administered Glacier Peak Wilderness and create 320,000-acre Pasayten Wilderness. Already passed by the Senate, the measure awaits House action. North Cross State Highway, scheduled for completion in five years, would serve the area.

North Cascades

PROPOSED NATIONAL PARK AND RECREATION AREAS

Roads — Trail
Proposed aerial tramway
Ski lifts in area — National forest boundary

651

Camped above a sea of clouds, a trail party at Cascade Pass can gaze across treetops toward snow-splotched peaks seemingly afloat. Indians and early settlers threaded this

pass, perhaps the easiest of all trails through the North Cascades. The campers breakfast by a blazing fire before striking tents, packing up gear, and hiking deeper into the wilds.

plans. Other legal uses of national forest include mining, grazing, and hunting. One may apply for a permit to build a ski lodge or summer cabin, or ride a "tote goat"—a cross-country motorcycle.

The official "wilderness" status therefore closes Glacier Peak to most of these pursuits. Campers may not enter it with any sort of motor-driven vehicle, nor may an aircraft land within its boundaries.

Ray Courtney tells me that as a youth he used to wander the area for days without ever seeing another human being. But after World War II, hikers, mountaineers, and other outdoorsmen "discovered" it in increasing numbers. Now it is a favorite haunt of conservationist organizations, many of which favor its becoming part of the national park.

A year and a half ago, a threat to the area became known. It was learned that Kennecott Copper Corporation was studying the feasibility of mining copper on lands it owns near Glacier Peak itself, third in height after Rainier and Baker in the North Cascades. To reach its property, the company must cross wilderness sections of national forest. Access can be granted, however, under provisions of the Wilderness Act.

Relatively shallow deposits would dictate open-pit mining, which calls for removal of vegetation and topsoil to reach the ore. The operation would require roads, housing, and perhaps some processing plants nearby.

It is not fair, of course, to view the corporation as an ogre bent upon destruction of wilderness. It is operating within existing laws

His "sled" a plastic bag, a youngster streaks down a steep snow-packed slope in Cascade Pass.

to produce a metal vital to our civilization.

Copper mining does change the face of nature, however. Anyone who doubts this should go to Holden, adjacent to the Glacier Peak Wilderness, 17 miles northeast of the namesake mountain itself (map, page 651). Here an underground mine, not nearly as destructive to the landscape as an open pit, operated from the 1930's until 1957.

I have seen Holden from the air. A broad yellow scar, waste from a processing plant, persists after 10 years. No grass, not even a blueberry bush, covers the poisoned tailings. Foresters tell me it may take nature a century to heal the wound.

After it ceased operations, the mining firm deeded its buildings to a church group, and Holden is now a useful summer camp.

To scout the high country I would visit later in the summer, I arranged an air tour with bush pilot Ernie Gibson. We took off from Stehekin in flurries of cold rain and snow.

"No guarantees today," said Ernie. "In a float plane you don't try to fly over 9,000-foot mountains. You detour through the passes—and if clouds suddenly close them behind you, you look for an ice-free lake big enough to land on until the passes clear up."

Peaks Look Down on Climbing Plane

We winged north and west up the Stehekin Valley. As we climbed, so did the peaks among which we threaded. I glanced at the altimeter. It read 8,000 feet, yet the summits still looked down upon us—Sentinel and Spider on our left, Buckner, Booker, and hoary Sahale,

Blades cleaving thin air, a Bell helicopter circles Neve Glacier south of Colonial Peak. Copters lift campers, fishermen, rangers, fire fighters, and mining surveyors to heights otherwise reachable only by three or four days of hard climbing.

with its gigantic glacial apron, over the aircraft's nose ahead.

We passed over Trapper Lake, in which dwell some of the biggest trout in the Cascades. Ernie flies fishing parties to the lake in the summer, but when we circled it, we found it clogged with baby icebergs.

I was wondering whether any human beings were in the wilds beneath us, when Ernie banked steeply and dropped to within a hundred feet of a sharp ridge. Big round tracks ascended one snowy side of the spine, held the crest briefly, then dropped off down the other slope to vanish into heavy forest.

"Snow shoes," said Ernie. "A Forest Service snow ranger must be measuring depths so they'll know how much runoff to expect at Lake Chelan when the snow melts."

National Geographic photographer Jim Blair had an even more unexpected human encounter in the high country. Coming around the flank of Sahale in a helicopter, he found himself suddenly face to face with two mountain climbers no more than 50 feet from him.

"I poked my camera out the door," said Jim. "As anyone would, they began waving and striking noble poses.

"'Quit hamming!' I yelled. 'Look away from the camera.' But the engine was so loud it was 10 minutes and five gallons of gas later before they caught on to what I wanted."

Jim turned frequently to helicopters for photo trips into the high country, and sometimes I went with him. One day I joined him on what he described as a "glacier-hopping expedition."

For the first hop of the trip he picked one of the most heavily crevassed and jumbled rivers of ice in the North Cascades, Colonial Glacier, lying on the flank of Colonial Peak.

Dangling above half a mile of nothing, Byron Ward rappels down 7,440-foot Mix-up Peak. Last summer he and other students took part in a University of Washington climbing workshop in the rugged Cascades.

Icebergs sprinkle Glacier Lake, a cup of cobalt at the foot of 8,976-foot Glacier Peak.

left, northernmost of two mountains of the same name in the Cascades. This panorama looks west toward snow-smothered Mount Baker, upper left, and the Canadian Cascades, right.

Although small, it is steep, plunging nearly vertically into the valley it has carved in the mountainside over the centuries.

Our pilot was Bill Wells, who lifts fire fighters, the Geological Survey's mineral scouts, and other hardy folk into the mountains. He picked a flat-topped, house-size boulder on the glacier bank for a landing pad.

Icequakes Make Glacier a Scary Perch

Gusts of icy wind blew us away from the target the first few times we tried settling in. We made it finally with scarcely a jar, landing in the lee of an ice cliff 30 feet away.

Jim jumped to the ground with his cameras and started for a natural ramp leading to the top of the mass. I was about to follow when something deep inside the icy immensity let go with a sharp crack, followed by a roar like summer thunder.

The earth trembled. So did my knees.

"Can't we find a quieter glacier?" I asked, turning to Bill. But he was already on top of the mass with Jim.

I scrambled up and joined them, and there we stayed for an hour, jolted every now and then by icequakes as the great glacier ground on down from the heights. The steeper a glacier, I take it, the more lively it is.

Unexpected patches of color marked Colonial's snowy breast. Blue streaks were narrow crevasses of frightening depth. An opening in a wall of ice led into an azure cave. The lofty roof looked solid, so I went inside a few feet. Again the glacier moved, and a shower of ice chips fell on my head.

Popping from a snowbank, an avalanche lily defies the cold. In the high meadows its pristine white counterpoints blue lupine, flaming Indian paintbrush, and lavender mountain daisy.

Startled young buck, surprised at a salt lick near Battalion Creek, focuses wary eyes on an intruder. Black-tailed deer, a subspecies of mule deer, frequent the Cascades, as do black bears and cougars. Grizzlies and wolves vanished long ago.

Tawny flanks aproned with glaciers, Mount Shuksan casts a shimmering image in Picture Lake. The massive pinnacle, one of the Cascades' most accessible, rises to 9,127 feet.

I backed out of the cave, and also from the remainder of the expedition.

"Put me down on some sunny, ice-free mountain while you finish glacier-hopping," I said when we were safely back in the air again.

Ruby Mountain was handy, and there Bill left me. It was a happy choice. Not only does this round-topped, heather-covered peak afford one of the best views in the North Cascades, but it may become the site of an interesting experiment in wilderness transportation—the first of three tramways proposed for the area. Neal Butterfield had explained the idea to me:

"We'd like to build an aerial tramway to the top, like those in the Alps. The necessary towers and cable would go almost straight up, and would be a lot easier to hide in woods or a ravine than a zigzagging motor road.

"When the new Cross State Highway is finished [map, page 651], visitors will be able to park their cars near the foot of Ruby Mountain and step onto the tramway. From the top, if they want, they can hike on into the back country."

Jagged Picket Range Tests Climbers

One of the great views from Ruby Mountain is the Picket Range, containing the sharpest peaks in the entire Cascades. Resembling the fangs of some gigantic beast, the Pickets rank among the world's most difficult mountains, highly dangerous for any but skilled climbers. Even helicopters find no landing space on their heights.

There is, however, a horse trail skirting the range to the north. It cuts through mile-high Whatcom Pass. On our first mounted foray into the high country, Neal, Jim Blair, and I rode to Whatcom in mid-August. This, it happens, is the height of the wild-flower season, when the wilderness is in its gayest dress.

Normally, you can head into the Pickets from either end of the trail. If you go west, you start on the shore of Ross Lake—but winter storms, we were told, had washed out this route. So we went east instead, riding our horses up Ruth Creek from trailhead in a forest of Douglas fir, giant red cedar, and hemlock.

To our south lay oft-climbed Mount Shuksan (preceding pages). This peak is a near neighbor of Mount Baker, a skiers' paradise. Visiting Baker's slopes as late as mid-July, I have found them thronged with skiers—at least half from Vancouver in British Columbia—still enjoying good snow.

Succumbing after only five miles to first-day, saddle-bestowed aches and pains, we camped for the night under the crest of Hannegan Pass (page 664). Neal went off with his fly rod to look for a likely stream, promising us trout for breakfast.

Blue cheeks, blue lips, and blue hands spell blueberries, sweet and sun-ripened. On the shores of Picture Lake they hang heavy on the bush, as if begging to be picked. Two youngsters happily oblige. There may be a few left for the folks back at camp, but the prospect appears unlikely.

Next morning we saddled up at first light and pushed for Whatcom. Breakfast, I am compelled to say, consisted not of trout but of pancakes topped with sun-sweetened blueberries and thimbleberries Jim gathered in dewy meadows.

Trail traffic, for wilderness, was heavy. First we overtook a Forest Service crew carrying tools and camping gear on pack mules. They were bound over Whatcom to open the trail to Ross Lake, a job that might keep the men in the open for a week or two.

Next appeared a man on horseback, flanked by a pair of huge hounds. These beasts unnerved our horses, which started kicking in every direction. The only casualty was a saddle box splintered by a flying hoof.

Before we topped Whatcom at twilight, we had chatted with a dozen hikers. Two bronzed youths wearing backpacks filled with climbing gear said they were off to scale one of the many unclimbed, unnamed Picket peaks. Another pair had hiked in from the lake, and reported the Big Beaver Creek Trail in poor shape indeed.

Hornets Pose a Hazard

"Not only is the going bad, but the country fairly swarms with hornets," one of them said.

Often Cascades hornets build nests beneath rocks, likely as not in the middle of a trail. You can imagine what happens when your mount steps on a nest. The horse puts its trust in speedy departure from the scene. Personally, I prefer angry hornets to a frenzied gallop down a mountain, but I have yet to ride a horse that saw it my way, and I have more than once charged willy-nilly into the wilderness like a Light Brigade cavalryman at Balaklava.

We spent a day on Whatcom Pass, feasting our eyes on the jagged Pickets we had ridden so far to see. To the south rose Mount Challenger, and in a cirque on its flank, Challenger Glacier, glory of the Pickets. Easy Peak frowned down upon us from the west; I wondered what humorist had given this steep mountain its name!

Wild flowers bloomed in all the high meadows. I recognized white avalanche and yellow glacier lilies, closely following the snow as it receded up the slopes.

Two kinds of heather, bearing white and red flowers, shared the meadows with lupine, Indian paintbrush, and harebells, which are the bluebells of Scotland. Everywhere the wild phlox tinted the landscape with lavender and white.

When finally we tore ourselves away, it was to ride back to our starting point in one strenuous day, for both Neal and Jim had temporary commitments elsewhere. In their absence I made a foreign voyage—

Time out for tired feet: Hikers on Magic Mountain revive sore soles in cold spring water. The North Cascades offer more peaks than a climber could scale in several lifetimes—all of them "new" mountains not yet rounded by erosion, their knife-sharp ridges still being chiseled by ice.

to Canada, by boat on Ross Lake. If one day you duplicate the trip, you will find it a complicated business, but the reward of a day on the lovely trout-filled lake, with perhaps a short hike or two into the unpeopled wilderness beyond either shore, is worth the trouble.

You drive to Diablo Lake Resort. Either the resort boat or the City Light workboat will take you upstream to near the foot of 540-foot-high Ross Dam, which makes the Skagit River a deep waterway reaching a mile into Canadian territory.

At the dam you will be met by Wayne Dameron's bus, which takes you to his blazingly fast motor catamaran, which speeds you to Wayne's Ross Lake Resort. This unusual place consists of offices, housekeeping cabins, and boat sheds built on huge rafts.

Renting one of Wayne's small, fast outboards, I shoved off with a near-gale at my back. I made Canada in less than two hours, seeing not another soul the whole way. Had I not been told that a log boom marked the border, I would never have known when I crossed it.

I went on through the opening in the boom, lunched on Canadian soil, and started back. Now I had wind and sea over the bow, and it was a wild, exhilarating passage.

Visitor Sips as Camper Sleeps

Although made prisoner and forced to do man's work, the Skagit is anything but a tame river. Powerful hidden currents struggle ceaselessly in the depths, and when they surface above rocky shallows, they form whirlpools that toss a small boat about like a chip.

Soon soaked, I landed several times to build warming fires in sheltered coves. Seeing smoke rising from the Forest Service campground at the mouth of Little Beaver Creek, I went ashore in hopes of finding a wilderness wanderer with a coffeepot bubbling on the fire.

Waffle-faced Ross Dam, key structure of the Skagit Hydroelectric Project, is 1,300 feet long and has a roadway along its crest. Its impounded waters form a lake 22 miles long, extending a mile into Canada. One of the dam's engineers inspects the huge concrete blocks for cracks.

Ribbon of white, new North Cross State Highway edges the foot of Ruby Mountain, right, and bridges an arm of Diablo Lake. When completed, the road will run 77 miles through the Skagit River Valley and serve as the primary route to the proposed national park.

One of the Nation's highest, 540-foot Ross Dam may later rise another 125 feet, far surpassing the Washington Monument.

I found both wanderer and coffeepot. The wanderer was sound asleep under a shelter. I poured myself a cup of hot coffee and drank it, as one has a right to do in the wild lands. Gently snoring, the unknown camper slept on.

Resisting the temptation to leave him a minor mystery in the form of his trousers hanging from a tree branch, I started the outboard, cast off, and buzzed on back to Ross Lake Resort.

Horseback, though, is my favorite mode of travel in wild lands, and of many glorious rides I've had, I remember especially one we took in the southern part of the proposed park.

Thirteen miles northwest of the head of Lake Chelan, the Park Creek horse trail leaves the primitive Stehekin-to-no-place-in-particular motor road and corkscrews up to where the vault of the sky begins. The country through which it passes is a microcosm of this entire wonderland of mountains.

One horse wide and not yet overburdened with traffic, the trail begins in primeval forest. Crossing foaming streams, clinging to scree slopes fabricated by winter's great avalanches, it leads in ascending order to alpine meadows, living glaciers, and majestic peaks crowned with everlasting snow.

It tops out on Park Creek Pass, one of the few saddles over which anything but a mountain goat can cross the mountain barrier (map, page 651). Below the crest, in a heather-clad bowl beside a crystal stream, we pitched our tents and built our cooking fire.

While the steaks sizzled in the fry pan and night's first stars winked on in a purpling sky, we six weary humans stretched out in the heather—Ray Courtney; his wife Esther; their son Jimmy; Ann Davis, who with her husband David runs a resort hotel near Chelan; Jim Blair, and myself.

Camp robbers—gray jays—screamed in the stunted, storm-tortured trees that dwell at the very top of timberline. A water ouzel sang its evensong from a lichened boulder beside the stream. Marmots whistled as they scurried about the rocks.

Beyond the tumbling stream a bush moved—and became a bear combing a brushy slope for blueberries. Black-tailed deer drifted from lengthening shadows to greet our horses, loosed in the meadows.

Peril of Forest Fires Routs Campers

Ray revealed his feeling for this lofty, wild country as he watched the Park Creek Pass deer share the meadows with his horses.

"I won't bring hunters here," he said. "Those deer trust us. Maybe you'll see for yourself before the night's over."

I did. Snug in a sleeping bag under a small tent, I was awakened about midnight by stampings and snufflings just outside.

"Fool horses," I said to myself. "They ought to be up on the grass." Thinking to drive them away, I beamed a flashlight at the sounds. Half a dozen deer, not horses, raised their heads and regarded me calmly, then went back to their feeding.

One frosty morning we awoke to find the

Summer, the glory season, carpets the heights with ankle-deep greenery and a wealth of wild flowers. Cloud-plumed Ruth Mountain rises above the timberline of Hannegan Pass, where a lone rider pauses to listen to the wind and to the music of birds winging in and out of the dark forest.

Master of the packing art, Ray Courtney loads a trail horse for the steep climb to Park Creek Pass. Expertly, he lashes one of two side packs onto a saddletree; a third will ride atop the others. As rugged as the country he roams, Mr. Courtney hewed massive logs for the home he built in the Stehekin Valley. A ski trooper in World War II, he hopes one day to lead cross-country ski trips for vacationists in the North Cascades.

Giving wide berth to a crevasse, roped climbers approach the summit of Mount Challenger. A major barrier to moist Pacific winds, the Cascades lift and cool ocean clouds and then wring them dry. As much as 50 feet of snow falls here in a year, creating avalanche hazards and making climbing as challenging as it is in the high Himalayas.

valley at our feet shrouded in pale-blue mist.

"That's smoke," said Ray. "There must be forest fires somewhere."

A helicopter flew over and dropped a note that confirmed the guess. Fires indeed raged in many parts of the Northwest, which was suffering from record drought. The authorities had closed every wilderness trail in the state as a precaution. We were asked to come out of the mountains.

There are strict conservationists who argue that fire is a natural part of the wilderness

life cycle, that it is nature's way of clearing land to renew itself. But for man, whose life span is short, that is going too far. The benefits of renewal by fire do not become visible in a lifetime.

So we came out of the wild lands, and even though we had lost precious days in the outdoors, we were content to cooperate in a good cause. We were content, that is, until we saw the newspapers at Stehekin.

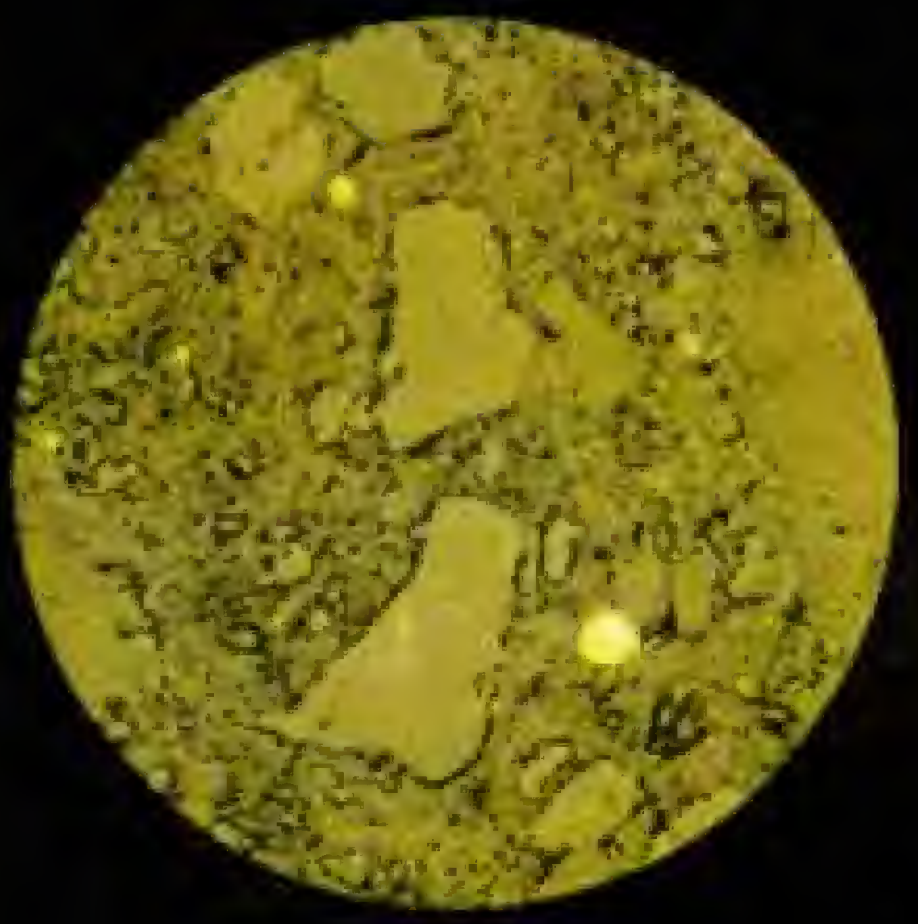
An editorial noted that the western slopes of the North Cascades, much of it logged years ago, would soon be reopened to logging. Kennecott, it continued, still considered working its Glacier Peak lands, and Seattle City Light was weighing plans for a dam on Thunder Creek that would inundate a mile-long stretch of prime wilderness.

The lost wilderness days suddenly appeared in a new light. Were they gone forever, not to be regained in the years ahead? Will there be a wilderness in the North Cascades tomorrow? I, for one, hope and pray there will be.

THE END

Nevada's Mountain of Invisible Gold

By SAMUEL W. MATTHEWS
Photographs by DAVID F. CUPP
Both National Geographic Staff



MICRO-NUGGETS GLITTER *in Nevada gold ore, magnified 1,500 times. Countless smaller flecks elude the eye—but modern mining techniques find them.*

THE GRIZZLED old prospector and the burly mine boss stood on the rim of a huge, step-sided pit gouged into the mountain.

"I had a claim right about there," said the old man, pointing. "But it didn't show any color, so I sold out to a fellow for $2,000."

"No one can see the gold, except under a microscope," replied the younger miner. "But we're standing on seventy-five million dollars of it."

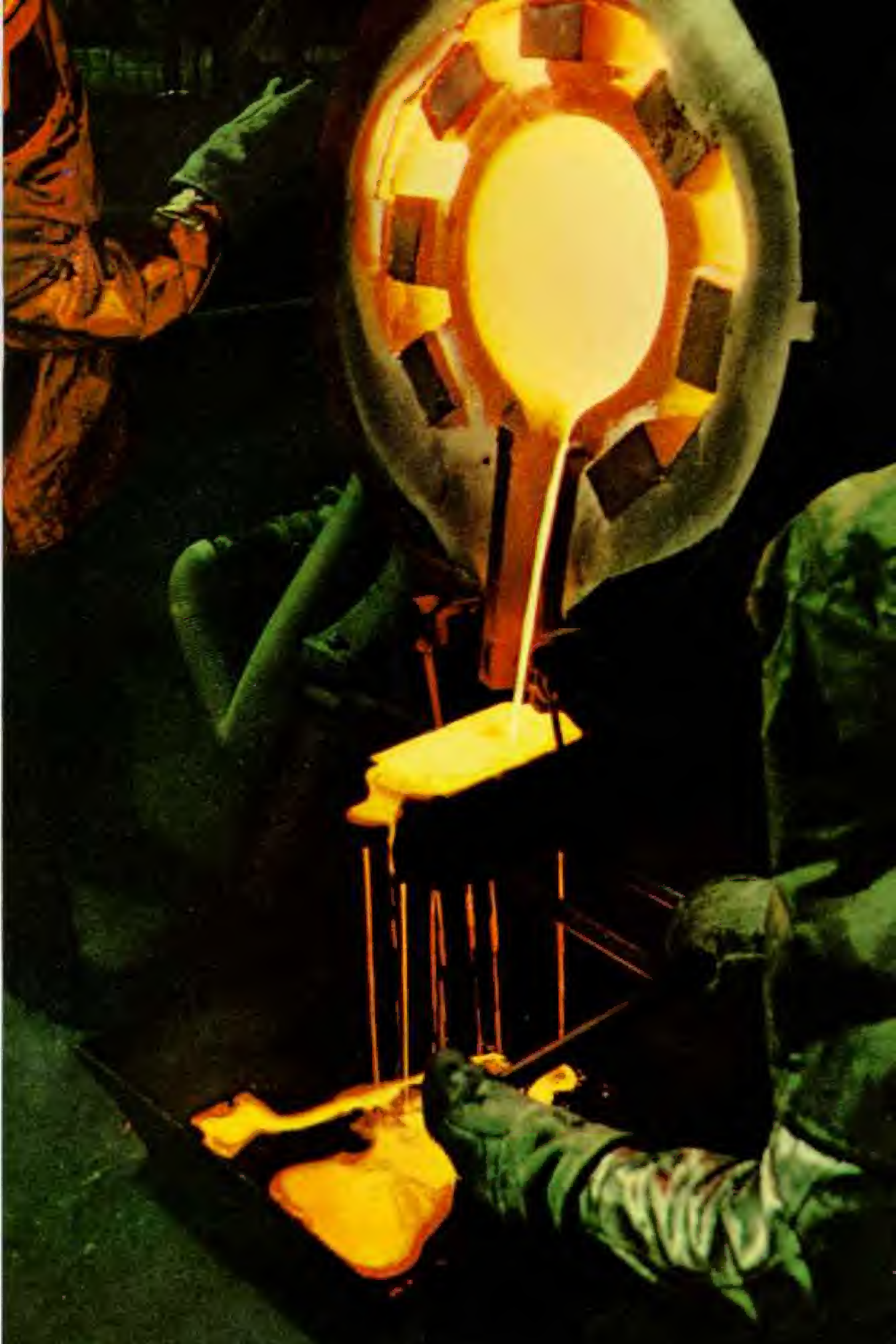
"Still looks like country rock to me—worthless," the old-timer said sadly.

From that "worthless" rock of a sagebrush-studded mountainside in northern Nevada, men and machines are blasting and gnawing out a modern-day bonanza. They are working a new sort of gold strike—"invisible gold," as it has been called by William T. Pecora, Director of the U. S. Geological Survey. Above the mine a highly sophisticated mill, run more by instruments and automatic controls than by men, turns the rock to mud, the mud to a glass-clear liquid, and the liquid to shining, totally visible bars of solid gold.

The new mine, about 20 miles northwest of the small railroad town of Carlin, Nevada, has proved the largest gold strike in the United States since the discovery of pay dirt at Goldfield, Nevada, in 1902. It is already the second richest gold mine in North America, after the 90-year-old Homestake Mine in South Dakota.

Unlike Homestake, whose shafts now reach a mile and a quarter deep, the Carlin Mine digs its ore from the surface. It moves as much as 30 tons of

IN FIERY TRIUMPH *at the end of a complex milling process, molten gold streams from a furnace at Nevada's Carlin Mine. Slag overflows the mold; asbestos suits shield smeltermen, who have poured 29 tons of bullion in three years in the Nation's biggest gold strike since 1902.*



Blasting the lid from a bonanza: Clouds of debris billow as charges of ammonium nitrate shatter worthless rock that covers the ore. After power shovels and trucks clear the rubble, fresh blasts will attack the pay dirt beneath. Earlier, geologists mapped the ore body by test drillings and assays. Then explosives peeled off three million tons of overburden to reach the first truckload of ore.

rock to obtain one troy ounce of gold, worth $35. (Gold is weighed in troy ounces, which run 14.58 to the standard pound.) In other words, up to nine tons of waste rock must be dug for each ton of ore, and that one yields, on the average, about one-third of an ounce of gold.

In its first three years, Carlin moved 20 million tons of rock and earth—enough to build 3½ Great Pyramids of Cheops—to get $30,000,000 in gold. If cast in one cube, the block would measure 3¾ feet on a side and weigh 29 tons.

So efficient is this automated operation that Carlin Gold Mining Company will return to its owner, the worldwide Newmont Mining Corporation, its $10,000,000 initial investment by mid-1969, four years from the start of the mine. After that its output, as the saying goes, will be pure gold.

In contrast to ores at mines like Homestake, in which a four- to six-power hand magnifier reveals the smaller flakes of gold, the Carlin ore's largest particles must be magnified 1,000 times or more to be seen. Ninety percent of the particles measure less than a micron across —1/25,000 of an inch—and remain invisible even when magnified 1,500 times.

Carlin was discovered in 1961 by Newmont geologists, following up a Geological Survey report on an unusual fault structure in Nevada. The strike set off a modern-day rush of gold exploration across the West.

"Uncle Sam badly needs new sources of gold," Dr. Pecora told me in his Washington office. "Not only is the dollar still officially supported by gold—our reserves at Fort Knox —but other demands far outstrip our production: for new industrial uses, for jewelry, even

Little dreaming of hidden wealth, old-time prospector Bill Hansen accepted $2,000 for his claims, which Carlin later acquired. Near his former diggings, he peers into the yawning mine.

Tons shrink to ounces in the laborious milling of Carlin's finely dispersed gold. This matchbox-size chunk—3.7 troy ounces, worth $35 an ounce—represents the final product from 12 tons of ore, one-fifth of the load of the giant dump truck in the background. The mill feeds on a deposit that originally contained some 11 million tons of ore worth $100,000,000, less than a third has been mined

for spacecraft we're sending to the moon.

"The Federal Government is spending 12½ million dollars this year," he went on, "in searching for new sources of heavy metals—meaning gold, particularly. Already we've come up with some potential sites."

One such find lies 60 miles southwest of Carlin, near Cortez, Nevada, where another deposit of invisible-gold ore may result in a similar open-pit mine (map, following page).

Near Jackson Hole, Wyoming, 50 cubic miles of gold-bearing rocks have been mapped. Deposits now known to exist just east of the Tetons exceed all the gold ever mined in the United States—some 300 million ounces.

Before going west to see the newest way in which gold is being wrenched from the earth, I dug a bit more into today's needs for this soft, heavy metal, which forms the central

girder of the world's monetary structure.

In the United States, gold remains far more than a memory of the thin coins that were in circulation until 1933. It is the stuff of wedding rings, and thus of dreams; of other jewelry, from gold-washed to 24-carat, meaning 100 percent pure; of watchcases and dental work, gold-leaf lettering, china and crystal decoration, and gilded art objects.

It is in modern industry, however, that gold grows increasingly important. The dense, ductile metal, which will not corrode or dissolve in any of the commonly known acids, is more and more used in the contacts, conductors, and circuit boards of computers and other Atomic Age electronic devices.

In the Gemini space flights, the astronauts' visors and umbilical tethers were coated with gold. Its almost perfect reflectivity adds protection against radiation and extreme temperature changes. The "black boxes" that take delicate measurements on the moon's surface wear skins of gold.

In 1967 the United States, which trails the Republic of South Africa, the U.S.S.R., and Canada in gold output, produced only 1½ million ounces. It used, for nonmonetary purposes alone, about six million ounces.

In addition, from 1965 through 1967 the U. S. paid out in international exchange for dollars more than 85 million ounces from its gold stockpile, which at the beginning of this year stood at less than 450 million ounces.

Yet, despite the need, only three large gold mines operate in the United States today. Others, with millions of ounces still in the

Gold rush of the sixties flares in the West with recent discoveries in Wyoming and Nevada. A deposit of invisible gold at Cortez, Nevada, could become another Carlin. Today Carlin, the Homestake in South Dakota, and Knob Hill in Washington are the Nation's leading gold mines. The U. S. Geological Survey spurs the search for "color," reflecting the national concern for dwindling gold reserves at Fort Knox and industry's soaring demands for the gleaming, noncorrodible metal.

As if scored by a giant finger, convolutions of the Carlin Mine mold Nevada slopes. The shelves coil down hundreds of feet into two pits, lower center and left. Truck roads link the pits to the mill, with its array of settling tanks for separating gold from waste. Butterfly-wing lake traps the tanks' runoff

ground, cannot afford to extract it at the fixed $35-an-ounce price.

Homestake, opened in 1877 at Lead, South Dakota, and now the single most productive mine in the Western Hemisphere, yields about 600,000 ounces a year; Carlin, in 1967, produced 337,000 ounces; Knob Hill, in Washington, mines less than 90,000 ounces a year. Most of the rest of U. S. gold comes as a by-product of copper and other base-metal ores.

Where Westbound Wagon Trains Rolled

To reach Carlin, I flew west by jetliner, leaping at 30,000 feet the plains and desert distances that tortured California-bound prairie schooners little more than 100 years ago.

From Elko, Nevada, a center of ranchers, miners, and Basque sheepherders, U. S. 40 leads west along the shallow, meandering Humboldt River—route of the first California wagon train in 1841 and of the tracks of the first transcontinental railroad.

I turned north at Carlin into the rolling emptiness of the Tuscarora Mountains (map, opposite). For 20 miles I saw not a house, and scarcely a tree. Then the new macadam road twisted into a ravine. Here stood a tumbledown wooden shack, a lonely monument to pick-and-shovel gold miners who worked this region 50 years ago and more.

One last bend and at road's end, on a shelf high above me, appeared a scene from Brobdingnag. A cluster of enormous silver-hued buildings stood haloed by dust billowing against the sun. The dust rose from a mountaintop sculptured by giants, cut away in

curving terraces and ledges on which yellow trucks moved like Tinkertoys. A sign read "Carlin Gold Mine—No Trespassing."

The gold strike that made this scene a reality, General Manager Arthur C. Hilander was shortly explaining, rests below a peculiar geologic formation known as the Roberts Mountain thrust fault. Along a belt hundreds of miles long, rock layers of different ages slid one above the other, like shingles on a roof, during a shift in the earth's crust.

Humped into ridges later, the upper fault layer here and there contains "windows," where upper rocks have eroded away to expose the lower layer. It was these windows, and the possibility that the lower fault layer might contain minerals, that the U. S. Geological Survey noted in a brief report in 1960.

In great secrecy, intrigued by the report, Newmont Mining sent geologists to take a look. John S. Livermore and Robert B. Fulton began prowling and sampling the worn ridges of the Tuscaroras. They said as little as possible about their work. Their samples were assayed in an old shack 50 miles away. Harry Treweek, a veteran of 30 years of Nevada gold mining, ran the assays. Today he is chief assayer at the Carlin Mine.

"My wife and I ran hundreds of tests," he told me. "Even we didn't know where the samples came from. But they held gold, too fine-grained to be seen by eye" (page 668).

Crews Drill for Invisible Wealth

Encouraged, Newmont filed claims on six square miles of public land in the Lynn Creek district. In mid-1962 the company sent in drill crews. Peter N. Loncar, now mine boss at Carlin, headed one of them.

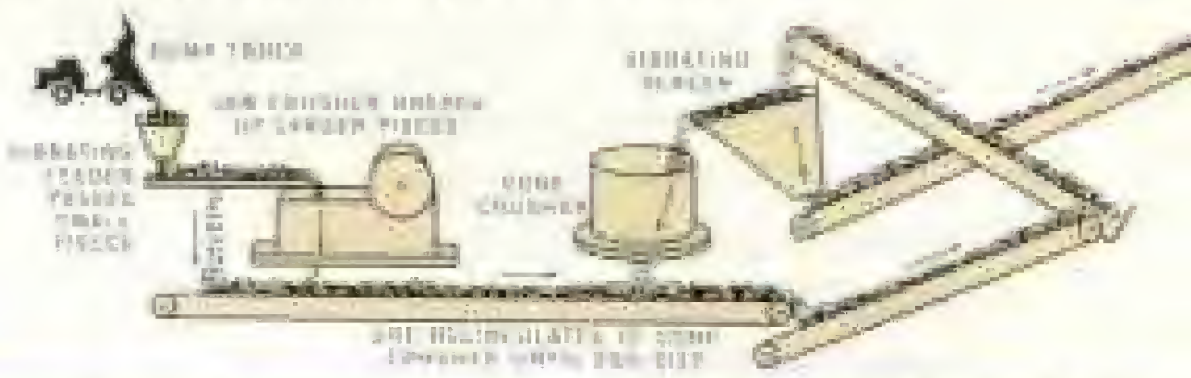
"We put down two test holes and hit nothing," Pete told me. "The third time, we drilled into a large ore body of invisible gold."

Newmont contracted for a multimillion-dollar extraction plant designed by one of its vice presidents, F. W. McQuiston, who gained his experience in the historic Mother Lode and Grass Valley gold fields of California. Then 500 construction workers poured into Carlin. In ten months they built the mill, stripped three million tons of overburden from the mountain of gold, drilled wells, and raised a dam to catch waste slurry from the plant.

In May, 1965, the Carlin Mine was dedicated and the first gold brick poured. Newmont President Plato Malozemoff called it "a miner's dream." And so it still seems.

Pete Loncar took me out into the vast pit, a mile and a half long and hundreds of feet

Ore moves by truck from pit to crushers.



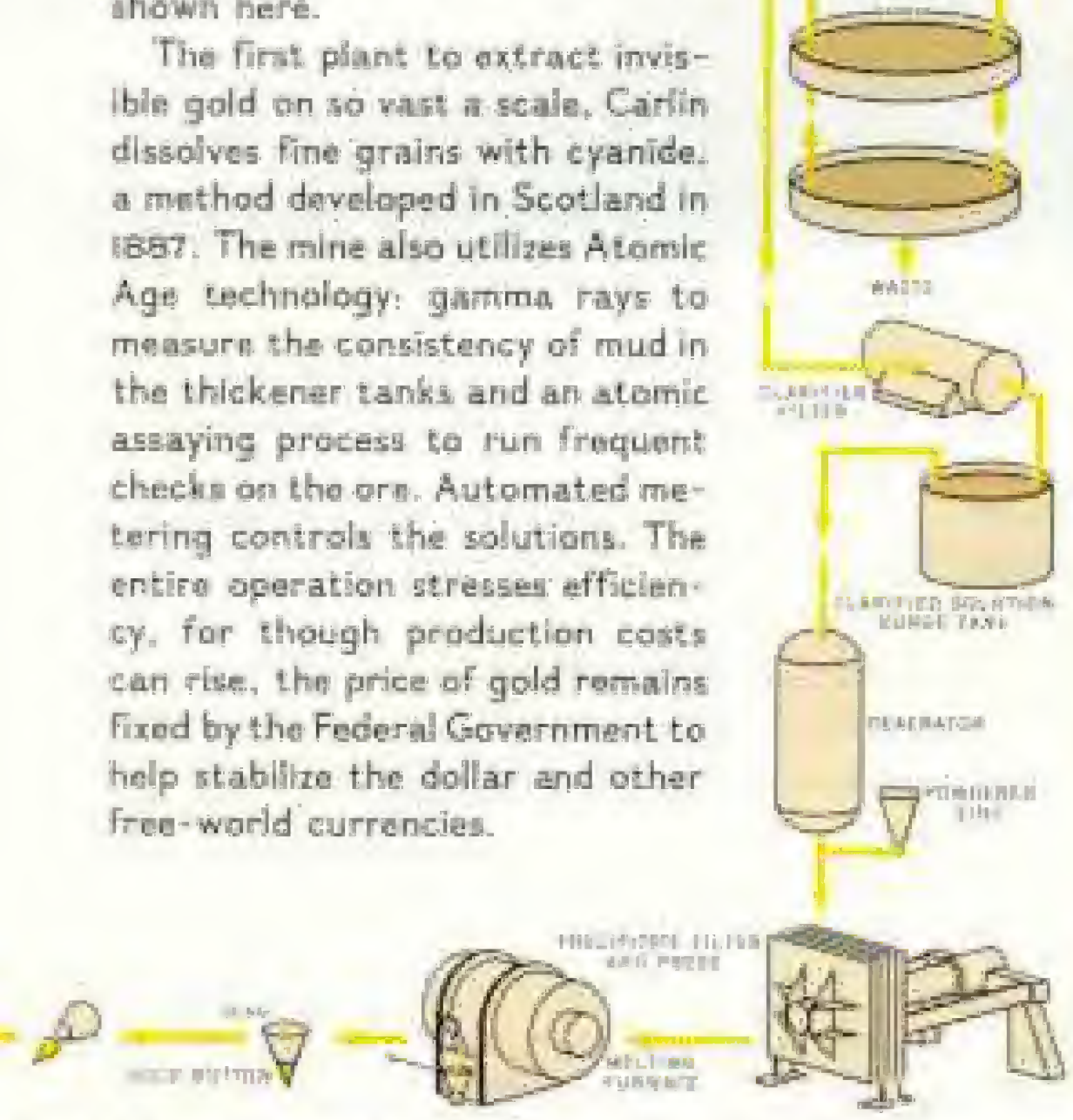
Electronic control panel monitors milling process.

End of the line: A bar of bullion joins others in the safe.

Rotating grinder reduces crushed ore to sand.

DEVOURING 2,500 TONS of earth's crust a day, the mill works around the clock, digesting every morsel for gold. Each particle goes through days of grinding, soaking, filtering, and smelting in the boulder-to-bullion process shown here.

The first plant to extract invisible gold on so vast a scale, Carlin dissolves fine grains with cyanide, a method developed in Scotland in 1887. The mine also utilizes Atomic Age technology: gamma rays to measure the consistency of mud in the thickener tanks and an atomic assaying process to run frequent checks on the ore. Automated metering controls the solutions. The entire operation stresses efficiency, for though production costs can rise, the price of gold remains fixed by the Federal Government to help stabilize the dollar and other free-world currencies.



Glowing furnace smelts a gold "button," about 95 pounds.

Agitator tank concocts a soup of finely ground ore and powerful cyanide solution used to dissolve gold.

Thickener tanks settle out waste while gold-bearing cyanide, called pregnant solution, flows off the top.

Clear solution (above), mixed with zinc dust, flows into filter presses (below). Zinc-gold compound emerges (above right).

deep. Three power shovels, their booms dipping and swinging like herons feeding, dropped 10-ton bites of blast-broken rock into 30- and 65-ton trucks as big as houses.

Red and yellow ribbons fluttered from stakes along the pit wall. "Those tell us whether we're digging ore or waste," Pete said. "It's impossible to know which is which just by looking at it. Every foot of the dig has to be assayed as we mine."

I rode in one of the 65-ton diesel giants from the pit up to the mill. The driver dumped his load by a big front-end loader that shoveled the ore into a crusher. Then he roared away for another load.

Mill Superintendent Earl M. Craig took over my layman's tour. "You won't see many people," he warned. "The whole place is monitored by just three men."

The hangarlike building seemed indeed deserted. In successive crushers, grinders, and vats the ore is broken and milled to the consistency of fine sand, Earl explained as we went along; then it is mixed with a cyanide solution that dissolves the gold.

From five huge settling tanks outside, the resulting pregnant solution is led through a maze of pipes, pumps, and clarifiers until it is clear; mixed with zinc dust that causes instant fallout of the gold in solution; and finally forced through filters. The whole process is run by automatic controls, which measure the consistency of the mud by gamma rays, scale readings, and flow meters. The mill growls on, as if by itself (pages 674-5).

Golden Bottom to a Bucket of Slag

I watched the last stage behind a heavy steel-mesh wall with electrically operated gates. Two smeltermen removed the sludge caught by the filters, shoveled it into a furnace, and stood by in asbestos suits as roaring oil flames raised the temperature above 2,500° F.

The furnace rocked and belched fire. Then it tipped on its mounts, and from its mouth an orange-yellow stream splashed into four conical molds on wheeled dollies. Three of the pots contained slag, Earl Craig told me, he directed my attention to the fourth.

"Watch closely," he said. The smelter operators cooled the mold with hoses and then upended it, dumping out what at first appeared to be a chunk of slag.

One of the men swung a sledge hammer,

Gnawing by night into earth's vitals, a power shovel fills dump trucks in the glare of floodlights. When loaded, trucks roar up winding roads to the plant, above, where crushers shatter piano-size boulders in the first stage of milling. Two crews work the pits 16 hours a day, with time between shifts for blasting.

Fresh from the furnace, glowing slag cools. refinery superintendent John Vecchies logs this first of two smeltings that isolate the gold. Slag from zinc-gold compound and from fluxes that capture impurities fills the three molds seen here and half of a fourth. A final tipping of the furnace pours the gold into the fourth mold, where it sinks to the bottom to form a "button."

PHOTOGRAPHED BY WILLIAM L. LAUBER (ABOVE) AND DAVID F. CLYDE © N.G.S.

Sledge hammer blows free a gold button from slag that has cooled to brittle glass; a visor shields refinery foreman Edward Walker from flying fragments. After remelting the button to remove the last impurities, he will painstakingly sweep up every sliver of slag, to be reprocessed for traces of gold.

the slag shattered, and a cone of shining gold, 8 inches across and 8 inches long, lay on the concrete floor (above).

"It's a good pour—close to 100 pounds," Earl said. "Later we'll remelt that button, to bring it above 99.5 percent pure, and pour it into bars for shipment. But it's cool enough now to handle. Try picking it up."

I staggered as I hefted the little chunk of yellow metal. It weighed as much as my 13-year-old son, but was only the size of his hat.

"Worth close to $50,000," Earl said. I put it down with a thud.

I wondered how this transformation of rocks into riches might strike a prospector of the old days. Pete Loncar drove me down Maggie Creek Canyon to find the Hansen brothers, who live in an old trailer at the foot of the Tuscaroras.

"They've worked all through this district," Pete said. "They were prospecting up on Lynn Creek when I brought my drill crew in."

"We came into this country in 1929 in a Model T," said 74-year-old Bill Hansen. "Been here, off and on, ever since [page 671].

"Lynn Creek used to be worked regular," he said. "During the Depression there wasn't much else doing. A man could take a day's

Fortune in hand: A smelterman hefts an 82-pound bar of bullion, worth $42,000. The mill makes sure that its gold tests out 99.5 percent pure to avoid refining charges at U.S. mints in Denver and San Francisco, where Carlin delivers its gleaming wares.

Preliminary weigh-in at the furnace room records an 83-pounder. Finer scales will determine its weight to 1/10,000th of a gram. Lest any of the precious metal escape, the men smelt their gloves every two days; after two weeks they dump even their coveralls into the furnace.

pay—five or six dollars—out of that gravel. It was hardly enough to keep going, but then nobody else was doing much either.

"We'd gouge up the streambed with a couple of horses and a spring-tooth harrow, load up a sluice box, and open a dam we'd built to hold back the creek. We could wash her right down to bedrock. The gold was mostly fine, with mebbe a few flakes in it."

Bill Hansen led Pete and me up Lynn Creek that afternoon, past his old diggings, and over a rise into the Sheep Creek draw. Above the wide, cracked expanse of yellow mud waste of the Carlin Mine, he showed us an old wooden hut, leaning askew.

"That's where we worked a claim," Bill said. "Didn't make beans, so we sold out."

He waved at the yawning pit on the hillside above. "Who would have known . . ."

Bill gazed at the slurry impounded by Carlin's dam, and was told it still holds traces of the highly poisonous cyanide used to extract the gold. Fences enclose the waste pond to keep out wildlife and wandering cattle.

Pete Loncar and Carlin's General Superintendent J. D. McBeth took Bill Hansen, in his floppy old miner's hat and faded denims, through the new mine and mill. He had not been inside before—"That sign, you know . . ."

When Pete spoke of moving thousands of tons of ore a day up to the mill, Bill's eyes widened. "That's a sight of rock. Couldn't do that in a year, the old ways."

At the end, when he saw four shining bullion bars stacked by the melting furnace, and picked up one of them himself, the old man was nearly beyond words.

"That's gold, right enough," he muttered. "That's the most gold I ever saw." THE END

Île de la Cité, Birthplace of Paris

By KENNETH MacLEISH, Assistant Editor

Illustrations by National Geographic photographer BRUCE DALE

"SUBLIME AND MAJESTIC EDIFICE," *wrote author Victor Hugo of the Cathedral of Notre Dame. The medieval masterpiece, its flying buttresses and sculptures gleaming in floodlight, rises beside the Seine from the island heart of the French capital.*

IN THE HEART OF PARIS, which is the heart of France, which some consider the heart of Europe, there is an island in the river Seine called La Cité. In the heart of La Cité is an expanse of pavement inappropriately called the Parvis (Old French for Paradise), and in the heart of the Parvis there is a large hole in the ground. I had an appointment there on a rain-cleansed, sunlit morning—an appointment with the first century at the bottom of a hole in Paradise.

My guide to ages past would not arrive for an hour. Therefore I waited, not at the raw edge of the excavation, but 230 feet above it on the loveliest lookout Paris can provide, the south tower of Notre Dame de Paris.

Tourists of every nation climb to this vantage point. More than two million people come to Paris every year, and more of them visit the world-famous Cité than anything else in the City of Light.

From the south tower the entire island can be seen in a single circular glance, with the gracious, orderly Île St. Louis attached by bridge to its eastern end like a barge to a tug. Indeed, the Cité has often been likened to a ship, its bridges resembling gangways linking it to the Seine's banks, its sharp western tip a prow pointing downstream toward the sea (pages 718-19).

Limited in its three spatial dimensions, the Cité is gigantic in its fourth, the dimension of time. The workers scrabbling in the exposed soil below stood in the 1,800-year-old ruins of Lutetia, the Roman town that became Paris. The structure on which I perched epitomized the soul of medieval society. All around me was the story in stone of what had happened since then to this island, the kernel of French culture, the seed from which sprang France's capital and France itself (foldout map, pages 689-91).

THE CITÉ is the gem of France, because of what remains upon it. But it is a gem flawed by what has happened to it. The center of the island was cruelly denatured by the heavy hand of the Baron Georges Haussmann, a 19th-century urban planner who favored efficiency over antiquity. Here cold neoclassical buildings supplanted some of the crowding, twisting, stinking, living streets of the medieval town.

Yet the continuity of human experience that is characteristic of Paris remains. The cumbersome Hôtel Dieu, for instance, is the present embodiment of a great public hospital which has existed on the Cité for centuries. The Préfecture de Police—Police Headquarters—stands upon the approximate site of the gracious Forum, where Roman forces of order were based before our era began. The Palais de Justice—once the Palace of the Kings—rests on the stones of a still-earlier palace. From it Julian Caesar—soon to be acclaimed the Emperor Julian—administered the laws of Rome to the island city and the dark forests of central France.

But the perfect expression of that continuity was the cathedral beneath my feet. This lovingly fashioned masterwork rests on a spot at the Cité's upstream end where the old gods of the native Parisii were worshiped before the Romans came. A Roman temple stood there in its time. Christian

Rank of copper saints stands below the central spire of Notre Dame, all but one gazing over Paris. The Apostle Thomas, patron of architects, looks up at the 150-foot lead-and-wood tower. The statue bears the face of Eugène-Emmanuel Viollet-le-Duc, 19th-century French architect who rebuilt the steeple and restored the time-ravaged cathedral. He had his own name inscribed on the apostle's ruler.

For more than 2,000 years men have worshiped on this site. A Celtic tribe called the Parisii revered forest gods; at the time of Christ, Roman legionaries bowed to Jupiter. Seventh-century Christians raised a basilica to Mary.

In 1163, as a fever for cathedral building surged across France, Bishop of Paris Maurice de Sully began a vast shrine dedicated to Notre Dame—Our Lady. Collecting tithes and taxes, borrowing from lenders along the nearby Street of the Jews, the Church demanded the best materials and workmanship. Quarries on the Left Bank, background, provided fine limestone. Gifts from nobility, bourgeoisie, and workers enriched the decor.

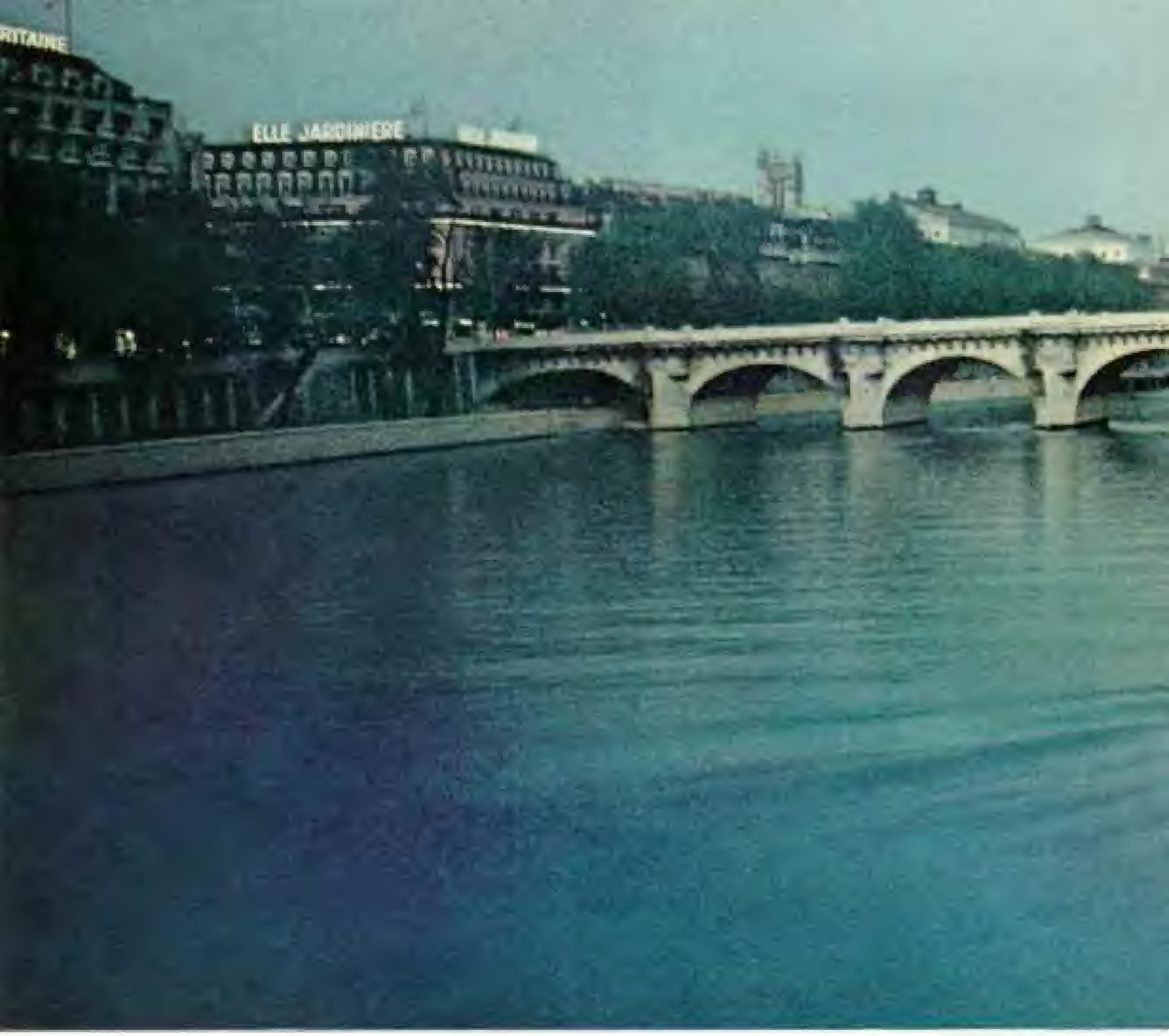
In the next centuries architects substituted white panes for some of the stained glass to admit more light, and revolutionaries tore down statues of kings and saints. Then in 1845 Viollet-le-Duc began his restoration, following early drawings and records of the cathedral.

This year experts will begin gently to wash the grime-encrusted walls for the first time since their construction.

Young and old savor quiet pleasures on the Seine's timeless islands. Henri Thomas walks with his cat Nicolas from his Left Bank home to play cards in a Cité park. The sidewalk her salon, a *concierge* greets passers-by on the Île St. Louis, the Cité's sister island. Beside Notre Dame, a strolling couple steal a kiss in a rain-washed garden, once the site of the archbishop's palace. Beads, beard, and an earring adorn a young Frenchman. His black button reads *Pax*—peace. And beauty comes to a candlelight ball on the Île St. Louis (page 7131.

In contrast, medieval days saw great noisy crowds filling the Île de la Cité's narrow streets with a mélange of sights and smells—apothecaries crying their salves, shepherds driving herds to market, buffoons tumbling in a farce, penitent pilgrims walking barefoot, and criminals screaming from the pillory.

INTAGLIOGRAVURE (ABOVE AND BELOW) AND POLYCHROMES © R.S.V.P.



Spring night descends softly on the Seine, whose arms clasp the Île de la Cité's downriver tip. Spanning both channels of the river, the Pont Neuf—New Bridge—is actually the city's oldest. Built in 1604, it long served as a fashionable promenade and marketplace. A *bateau-mouche*, or sightseeing boat, approaches the Left Bank arches.

churches rose upon the site and were demolished. Then, as if to celebrate the death of the Dark Ages, the church of Our Lady of Paris came into being, product of the minds, hands, purses—but particularly of the hearts—of her people.

That was 800 years ago. Since then the Parisians have adored it, neglected it, damaged and desecrated it, restored and venerated it, depending on the social passions and fashions of the times. Notre Dame lives on, as a church, as a joyful place, as a work of art.

I stood awhile, staring down into all the ages of Paris. Then I started down to begin my exploration of the Cité in the only spot where its origins were in sight: at the bottom of the hole in Paradise.

A trumpetlike voice sounded from the pit. M. Michel Fleury, Director of Antiquities for the Paris region, was addressing his staff. Sighting me, he clambered out, a huge and agile man as impressive in form as in speech. He steered me around the brink of his dig, explaining it with a reckless generosity of decibels that allowed all within the crowded Parvis to listen and learn.

"We are digging because there are too many automobiles in Paris. A subterranean parking lot is planned for this spot. But first we must see what ruins are here and whether they may be sacrificed. Come, we'll take a closer look."

He led the way down into the dig, across crumbling walltops and single-plank bridges.

"This hole is a cross section of our early

history. Observe, here, the cellar of a 16th-century house. This house and hundreds like it were razed by the good Baron Haussmann to provide open space in which the troops of Napoleon III could mow down the troublesome populace. It's a good thing the bulldozer had not been invented, or he'd have demolished all the houses on the island. But God intervened! Haussmann died.

"Now—come along, mind you don't fall—over here there are Roman remains. Second or third century. Here stood a public building, tile floored, you see. And it had central, radiant heating. There is its furnace; there are the ducts that carried hot air under the floors. Our 'Lutèce'—Lutetia, as the Romans called it—was a well-planned city then.

"During the first century, Lutèce spread from the island to the Left Bank as well. Then came the German barbarians. They burned the Left Bank suburb. The city withdrew again to its walled island."

We made our way to a place where part of that wall stood exposed. "It didn't keep them out," said M. Fleury. "As the Dark Ages descended, these German Franks mixed with the Romanized Gauls and the Romans themselves. Then the Roman Empire collapsed. The war lords of the Franks became kings of Lutèce. They reigned for 500 years."

He glanced up out of the dig and loosed a sudden, splendid oath. "Excuse me. Some idiot is blocking my car." And he galloped off in full voice, headed for the 20th century.

The Dark Ages came like numbing winter to Lutèce. Progress hibernated among the fallen cornices of the vanished empire. But the new religion called Christianity grew, and it glowed in this somber time like a fire in a frozen night. It found expression in a building, the sixth-century church of St. Étienne (St. Stephen). Part of that building stood at the east end of the excavation.

Michel Fleury rejoined me as I examined

these remains, so different from the cut-stone construction of Roman times.

"We don't know much about it except that it was the largest church in Gaul. But its masonry was crude and it had no arches—people had forgotten how to build them. During the ninth century, when the Vikings burned the city, St. Étienne was saved."

Some historians believe that a little church nearby, dedicated to Mary, was destroyed at this time. But the Parisians—the town was called Paris by then—must have decided they'd been honoring the wrong patron. They let St. Étienne fall in ruins, and built a new church of Our Lady. It was partly wooden, even more crude than its predecessor. Nothing is left of it. It stood until the 12th century, when the present Notre Dame was begun.

M. Fleury looked up at the serene towers above us. "There is the culmination of this long sequence, marking the end of darkness, the return of civilization. You'll find the 12th century in the apse, the 13th in the façade. They are the great centuries."

To traverse a millennium in a morning is to develop an epic appetite. I hurried off to satisfy it at a restaurant named Quasimodo, after Victor Hugo's Hunchback of Notre Dame. It offers a fine view of the hunchback's home, the cathedral, next stop on my progression through time.

M. Meisch, the Quasimodo's owner for 30 years, regaled me with fine food and a rundown on restaurateurs' ethics.

"I never push extras on anyone," he told me, "particularly on a man who looks poor, more particularly on a man who comes in with a lady, *most* particularly on a man with a lady who is obviously not his wife. In the latter case it is too easy, too cruel to say, 'Which will you have, the oysters or the caviar?' I do not give him the wine list either, because his little friend will ruin

THIS PAGE FOLDS OUT

SEINE

ÎLE DE LA CITÉ

PALAIS DE JUSTICE

HÔTEL DE VILLE

PLACE DE L'HÔTEL DE VILLE

TOUR ST. JACQUES

SQUARE ST. JACQUES

PLACE DU PONT NEUF

PLACE DAUPHINE

PLACE DU PARVIS NOTRE DAME

NOTRE DAME

PLACE ST. MICHEL

PLACE ST. ANDRÉ DES ARTS

ST. SEVERIN

PLACE DU PETIT PONT

SQUARE RENÉ VIVIANI

SQUARE DE L'ARCHEVÊCHE

SQUARE DE L'ILE DE FRANCE

PLACE DU TERTRE

PLACE DES VOSGES

PLACE DE LA BASTILLE

PLACE DE LA CONCORDE

PLACE DE L'ETOILE

PLACE DE CLICHY

PLACE DE LA MADELEINE

PLACE DE L'OPÉRA

PLACE DE LA RÉPUBLIQUE

PLACE DE LA NATION

PLACE DES VICTOIRES

PLACE VENDÔME

PLACE DE LA BOURSE

PLACE DE LA TROCADÉRO

PLACE DU CHÂTELET

PLACE DU PANTHÉON

PLACE DE LA SORBONNE

PLACE DE L'ODÉON

PLACE DE L'ABBAYE

PLACE DE FURSTENBERG

PLACE DE LA CONCORDE

PLACE DE LA MADELEINE

PLACE DE L'OPÉRA

PLACE DE LA RÉPUBLIQUE

PLACE DE LA NATION

PLACE DES VICTOIRES

PLACE VENDÔME

PLACE DE LA BOURSE

PLACE DE LA TROCADÉRO

PLACE DU CHÂTELET

PLACE DU PANTHÉON

PLACE DE LA SORBONNE

PLACE DE L'ODÉON

PLACE DE L'ABBAYE

PLACE DE FURSTENBERG

PONT NEUF

PONT AU CHANGE

PONT NOTRE DAME

PONT D'ARCOLE

PONT DE SULLY

PONT MARIE

PONT LOUIS PHILIPPE

PONT DE LA TOURNELLE

PONT DE L'ARCHEVÊCHE

PONT DES ARTS

PONT ROYAL

PONT DU CARROUSEL

PONT ALEXANDRE III

PONT DE LA CONCORDE

PONT DE L'ALMA

PONT DE BIR-HAKEIM

PONT DE GRENELLE

PONT DE BIR-HAKEIM

PONT DE GRENELLE

QUAI DE LA MÉGISSERIE

QUAI DE L'HORLOGE

QUAI DES ORFÈVRES

QUAI DU MARCHÉ NEUF

QUAI DE MONTEBELLO

QUAI DE GESVRES

QUAI DE LA TOURNELLE

QUAI AUX FLEURS

QUAI DE LA MÉGISSERIE

QUAI DE L'HORLOGE

QUAI DES ORFÈVRES

QUAI DU MARCHÉ NEUF

QUAI DE MONTEBELLO

QUAI DE GESVRES

QUAI DE LA TOURNELLE

QUAI AUX FLEURS

RUE DE RIVOLI

RUE ST. MARTIN

RUE DU TEMPLE

RUE DE LOBEAU

RUE DU PONT NEUF

RUE DE HARLAY

RUE DE LA BARILLERIE

RUE DE LA CITÉ

RUE DU PETIT PONT

RUE LAGRANGE

RUE DE LA HUCHETTE

RUE DE LA VIEILLE LANTERNE

RUE DE LA BARILLERIE

RUE DE LA CITÉ

RUE DU PETIT PONT

RUE LAGRANGE

RUE DE LA HUCHETTE

RUE DE LA VIEILLE LANTERNE

BOULEVARD ST. MICHEL

BOULEVARD DU PALAIS

BOULEVARD ST. GERMAIN

BOULEVARD ST. MICHEL

BOULEVARD DU PALAIS

BOULEVARD ST. GERMAIN

HÔTEL DIEU

PRÉFECTURE DE POLICE

SEINE

PARIS

Right Bank

Left Bank

ÎLE DE LA CITÉ

ÎLE ST LOUIS

LATIN QUARTER

LOUVRE

OPÉRA

GARE DE L'EST

GARE DU NORD

GARE ST LAZARE

GARE DE LYON

GARE MONTPARNASSE

JARDIN DES TUILERIES

JARDIN DU LUXEMBOURG

JARDIN DES PLANTES

PARC MONCEAU

PARC DES BUTTES CHAUMONT

PARC MONTSOURIS

MUSÉE CARNAVALET

MUSÉE D'ORSAY

TOUR EIFFEL

PALAIS DE CHAILLOT

PALAIS DU LUXEMBOURG

PALAIS ROYAL

BASTILLE

SACRÉ COEUR

MONTMARTRE

CHAMPS-ELYSÉES

BOULOGNE

VINCENNES

ISLANDS OF PARIS

ÎLE DE LA CITÉ AND ÎLE ST. LOUIS

Key to Foldout Map

1 BUREAU DE LA NAVIGATION H6
2 CITÉ INTERNATIONALE DES ARTS (INTERNATIONAL PERFORMING AND VISUAL ARTS CENTER) E3
3 CONCIERGERIE G3
A. TOUR (TOWER) BONBEC G3
B. TOUR D'ARGENT G3
C. TOUR DE CÉSAR G2
D. TOUR DE L'HORLOGE G3
4 COUR D'ASSISES (LAW COURT) C3
5 COUR DE CASSATION (LAW COURT) C2
6 ÉCOLE DE MÉDECINE (SCHOOL OF MEDICINE) H6
7 EXCAVATION F4
8 FONTAINE DU PALMIER (FOUNTAIN OF THE PALM) E1
9 FONTAINE DE L'ARCHEVÊCHÉ (FOUNTAIN OF THE ARCHBISHOPRIC) G2
10 FONTAINE ET MICHEL C4
11 HÔTEL CHENIZOT J5
12 HÔTEL DE CHASSIGNY K3
13 HÔTEL DES MONNAIES (MINT) A3
14 HÔTEL DE LAUZUN L3
15 HÔTEL DE SENS L4
16 HÔTEL LAMBERT M6
17 LA COLOMBE (RESTAURANT) G3
18 MARCHÉ AUX FLEURS (FLOWER MARKET) E3
19 MÉMORIAL DE LA DÉPORTATION (DEPORTATION MEMORIAL) H4
20 MÉMORIAL DU MARTYR JUIF (MEMORIAL TO THE JEWISH MARTYR) K3
21 MUSÉE DE CLUNY C4
22 QUASIMODO (RESTAURANT) H5
23 SAINTE CHAPELLE D3
24 STATUE DE CHARLEMAGNE F4
25 STATUE D'ETIENNE MARCEL H3
26 STATUE DE HENRI IV B1
27 ST. JULIEN-LE PAUVRE E5
28 ST. PAUL - ST. LOUIS M3
29 TEMPLE DES BILLETTES (LUTHERAN TEMPLE) J1
30 THÉATRE SARAH BERNHARDT E1
31 THÉÂTRE DU CHÂTELET D1
32 TRIBUNAL DE COMMERCE F3

ST. GERVAIS ET ST. PROTAIS

PLACE RAOUL FOLLEREAU

SQUARE DE L'HÔTEL DE VILLE

QUAI DE L'HÔTEL DE VILLE

QUAI DE BOURBON

RUE DE BRETONVILLIERS

ÎLE ST. LOUIS

ST. LOUIS EN-L'ÎLE

PONT MARIE

PONT LOUIS PHILIPPE

PONT DE LA TOURNELLE

PONT SULLY

691

him with a bottle of the best Bordeaux. He'll pay, but he will never come back.

"Now, so that *you* will come back, I offer you a small cognac."

Thus fortified, I worked my way through the lunch-hour traffic to begin my travels through the Cité's second millennium with my friend Louis Armand, chief guardian of Notre Dame (below). This amiable official awaited me with clusters of keys, an earthly St. Peter ready to admit me to a realm as celestial as any this side of heaven.

By spiral stairs and hidden passageways, M. Armand led me to the top of the cathedral. Its highest point is a slim spire set at the center of the cruciform structure. This delicate finger of wood and lead is not the original, which was dismantled and sold during the Revolution, but a 19th-century replacement by the architect Eugène-Emmanuel Viollet-le-Duc, who devoted much of his life to restoring Notre Dame.

Grouped at the spire's base are the Twelve Apostles, giant figures in weathered copper. All but one gaze outward; that one, St. Thomas, has turned his face to look up at the spire. But it is the face of Viollet-le-Duc, looking back at his creation with pardonable pride (page 682).

Above the lofty stone vaults that top the interior of the cathedral, there is a forest of beams which support the building's lead-clad, protective roof. M. Armand led me into this antique attic.

"See," he said, "the wood is hard, after all those centuries! Notice how few cobwebs: no flies, no spiders. No spiders, no webs. Although why there are no flies I cannot say. I suppose there is nothing here to amuse them. But come; here is something that may amuse *you*."

He beckoned me down a wooden catwalk suspended above the dusty curves of the vaults to point out a little cross of lead.

"It is a memorial to some poor fellow who fell when the vaults were being built. Pshhhh! It is a long way down. You can see how far, if you like. Just step down onto those curving stone surfaces below us. They form the ceiling of the nave. That's it. Don't worry; it will hold you. The stone is six inches thick."

"Six inches?" I froze. "Six inches of old limestone unsupported by anything but an engineering principle which eludes me at the moment? Are you planning a lead cross for me too?"

"*Allez, allez*, go ahead," said M. Armand from the catwalk. "It has never collapsed before. Now, pull out one of those plugs—they block holes that were made for lowering drapes and candelabras."

I pulled the plug and stared straight down through a small hole at the checkerboard floor 115 feet below. Then I replaced the plug —gently—and eased back to safety.

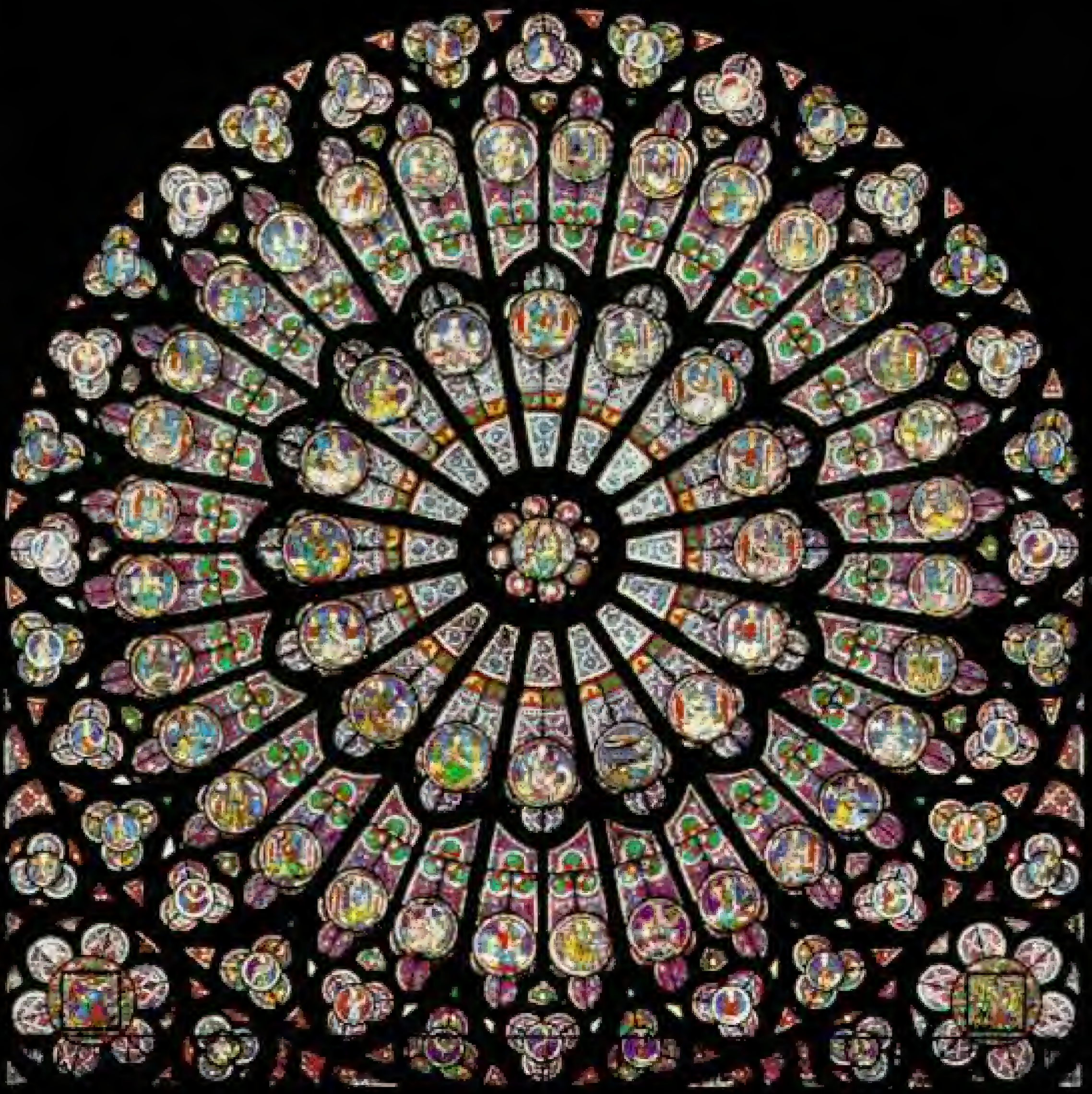
"That," I said, "is a terrible sight."

"I knew you'd enjoy it," said Louis Armand.

It is possible to make the entire external circuit of Notre Dame in a kind of balustraded gutter just above the lovely, leaping buttresses that soar unsupported in 50-foot spans. Even here, where few people ever go, there are

Keeper of the keys, guardian of Notre Dame Louis Armand knows its every hidden passageway and chamber. Here with but a few of his keys, he pauses outside the south tower beside a stone bird.

Flower of fiery light, the great north rose window of Notre Dame, 43 feet in diameter, survives virtually intact from 1255. Petals of stained glass picturing Biblical characters surround the Virgin enthroned with Jesus. Eighteen kings of Judah, ancestors of Mary, appear in a rank below. During the two world wars, the French dismantled Notre Dame's three rose windows and stored them in the cellar of a distant castle.



SOARING HEAVENWARD, *the vast nave of Notre Dame embraces worshipers at evening Mass. High over the distant altar hang the tasseled hats of cardinals (below), in memory of past prelates*

EKTACHROME (RIGHT) AND KODACHROME BY BRUCE DALE © N.G.S.

whose tombs lie underground.

Eight centuries ago unknown masons hoisted hand-hewn stone upon stone, raising walls higher than any others then in France. Crossed ribs in the 115-foot ceiling carry the thrust of the roof down to 75 great pillars and to the exterior flying buttresses. Witness to coronation and royal marriage, baptism and funeral, the very walls of Notre Dame seem to whisper of pageantry and grandeur.

Yawning gargoyle spits rain water clear of the cathedral walls. Hundreds of these grotesque waterspouts reach from high balustrades and towers. Not all churchmen approved such Gothic decorations. St. Bernard condemned them, saying that people might find it preferable "to spend the whole

finely wrought figures. The men who made them cared not at all that their work would remain unappreciated by humanity; these artists sought only to please God, and Mary, whose house this is.

Artfully hideous creatures perch on turrets and railings, contemplating the world with sardonic glance. Some stretch downward, jaws agape; these are gargoyles, who vomit out the runoff of the rain (above). A vampire crouches in readiness for flight. Composite creatures devour each other in frozen fury.

All of these represent evil spirits, driven by Mary from the church's holy interior to guard it from without. A supernatural stone citizenry watches over the cathedral with unwinking eyes.

"Let us go down into the interior," M. Armand suggested. "At least there are no evil spirits there. They have all been exorcised."

Notre Dame is a dark cathedral. Her side windows are neither large nor magnificent, nor, for that matter, original. The old panes were knocked out long ago to make way for plain glass that would admit more light. This white glass has been replaced recently with pleasantly colored panes. Only the great rose windows in the north and south transepts are as they were in medieval times.

The best place from which to see them is the juncture of nave and transept. The roses glow in the heavy gloom like vast, blazing flowers (page 693). As a child, Viollet-le-Duc was convinced that the music of the cathedral's organ came from these celestial windows.

I walked with M. Armand as he gently herded worshipers and visitors out into the cool evening, and helped him close the great

day in admiring these things, piece by piece, rather than in meditating on the Law Divine."

Set aglow by votive candles, an American visits Notre Dame, a goal for travelers and scholars, painters and pilgrims for the past 800 years.

ironbound doors. He gave me a grin and a handshake and went off to his dinner. Above me, the twin towers reached skyward to catch in this moment the last rays of day.

Dusk leaves the Cité empty except for the watchmen in the domains of God and the law, the temporary inhabitants at the hospital, and the residents of the two clusters of habitations at the two ends of the island. Place Dauphine, at the west end, sits comfortably in lamplight, a secure upper-class corner of Paris. Built in 1607, and much altered since then, it holds no echoes of medieval times.

The eastern community, on the other hand, occupies the area of the cathedral's original walled enclave, where dignitaries of the Church and a colorful collection of their lay associates once lived. Most of their homes have vanished, of course, but the newer buildings rest upon ancient foundations, and the streets still lie in antique curves.

In this place, alone and at night, a man might find a reflection of the profane side of the 12th- and 13th-century life whose sacred aspects are so beautifully stated by the cathedral itself.

The medieval Cité contained three- and four-story houses of wood and plaster, leaning inward over bustling alleys, their windows spewing occasional additions to the filth underfoot. Knights, serfs, monks, men-at-arms, artisans, and shopkeepers traveled these pungent ways, discoursing loudly in decayed Latin and foreign tongues ranging from English to Syrian.

This fertile ferment continued without much change for 700 years, presided over by the bishop, at one end of the island, and the

Parking problem solved! Crowded streets rarely deter an ingenious French driver. This one simply stops his lightweight Citroën and lifts it into a mini-space.

Appetites awakened, strollers study a menu posted beside a sidewalk cafe. La Colombe, the Dove, lies in what remains of the medieval quarter, a maze of streets beside Notre Dame. Baron Georges Haussmann, French city planner, cleared much of the island a hundred years ago to make room for broad avenues and government buildings. Midway up the narrow street two light stripes across the pavement mark the site of a third-century Roman wall.

king at the other. Then came Baron Haussmann. I headed for the portion of the island his wreckers had not reached.

The old cloister, as the walled domain of the Chapter of Canons was called, housed unusual and not invariably pious persons, as well as the worldly ecclesiastics themselves. It was also thought to contain evil spirits, driven by the odor of sanctity from the island's many holy places.

Among the most renowned of the cloister's early tenants was the young cleric Abélard, founder of a school to which the present-day University of Paris traces its origins. It was Abélard's misfortune to fall in love, around 1120, with a girl named Héloïse, niece of the irascible Canon Fulbert. The lovers had a child and a secret marriage, in that order, which so annoyed the old man that he had Abélard mutilated in a manner to prevent further indiscretions on his part.

But Abélard's behavior was purity exemplified compared to the doings of certain other denizens of the quarter. Two of these, a pie maker and a barber, were widely admired for their respective skills. The pieman made meat-filled pastries of uncommon delicacy. The reverend gentlemen of the cloister, gourmets to a fault, extolled his creations as good deeds shining in the usually rancid world of pastry cookery.

The barber wielded the sharpest razors in Paris. So deft was he that his client (a stranger, perhaps, come to his shop at the end of day) never felt the blade that shaped his beard until it slit his throat. The body dropped through a trapdoor into a cellar which connected with that of the pieman. You have guessed the rest.

Both men were burned after a dog dug up evidence pointing to the source of their meat supply. Legend insists that their spirits, together with those of their victims and of the holy men who ate their flesh (and so were presumably excommunicated), still hover about the neighborhood, emerging at night to spread malevolence, hideous sounds, and bad smells. The premises in question were near the Rue Chanoinesse. There I walked, ears, eyes, and nose cocked.

At first I heard only echoes of my own slow steps. A wisp of mist drifted in the street. Then a door—dark, heavy, nail-studded—swung open with a rusty squeal, only to shut again.

A little farther along, sobs sounded from behind a shuttered window. A radio melodrama, without question. Overhead, a scrabbling noise of claws on copper came from a rain gutter. Rats, probably. A sulphurous smell tinged the moist air. Undoubtedly the Seine.

Then, suddenly, a solid sound filled the curve of the street, a deep growl that became a roar. The spell was broken: Two *motards*—motorcycle policemen—emerged from a cellar garage that has become their base, and rolled away in a subsiding mutter of mechanical flatulence.

FROM THE CATHEDRAL that symbolizes the sacred splendor of the Middle Ages, and the foundations and fables that alone recall their profane life, history next directed me to the Palais at the Cité's other end (pages 702-3).

The palace's location and some of its functions remain unchanged after 1,700 years. Its earliest elements vanished long ago, destroyed by wars, weather, and human caprice. But in its existing form it incorporates the finest creations of

the later 13th and 14th centuries, hidden in a maze of masonry dating from then to now.

Within a somber court, flanked on one side by the offices of Paris's most redoubtable police investigators and on the other by courts of justice, stands an oasis of exquisite beauty, a little church known as the Sainte Chapelle. It has been called the masterpiece of the Gothic, that ill-named architecture which developed on this island and spread to all of western Europe. The Gothic style derived from the invention of the pointed, ribbed stone vault, so light that height could be achieved without mass, so strong that walls, relieved of their burden by buttresses, could be of glass rather than stone.

The Gothic grew from infancy to full flowering in the 90 years during which the basic structure of Notre Dame was a-building. The Sainte Chapelle was built in less than five years, and finished in 1248, just before the cathedral's towers were completed.

I have often sat in the Sainte Chapelle alone, simply to absorb a spectacle that is literally beyond description. No intellectual effort is needed to understand the magnificence of this small church, as it is to appreciate Notre Dame. The Sainte Chapelle appeals directly to the senses. Whoever enters is moved, either to smiles, to tears, or to astonishment (pages 706–7).

The visitor finds himself in a chamber aflame with color, in which stone has been used so weightlessly that columns appear as bars in an elegant cage of glass. Miraculously, much of its 6,800 square feet of glass is original. The chapel is, in a sense, an immense and fragile vessel: Louis IX (later St. Louis), that most pious of monarchs, built it as a container for relics of Christ's passion.

These sacred objects had come into the hands of Emperor Baldwin II of Constantinople. Baldwin needed money. Louis offered a vast sum for the Crown of Thorns and parts of the lance, the sponge, and the Cross. Priests brought home these treasures, which Louis himself, barefoot, carried the last few miles to Paris.

The chapel suffered little change under subsequent royal rulers. But it is miraculous that it survived the Revolution. By 1793 the oppressed people of Paris had come to hate king and clergy with equal cordiality. The Revolution abolished religion, and the state took over the properties of the Church.

Mobs destroyed all signs of royalty in the Sainte Chapelle and Notre Dame alike, and wrecked religious statuary while they were about it. The gold and silver cases for the holy relics were melted. The relics themselves, however, were transferred by priests to the cathedral, where they are today.

St. Louis's gift to France became a grain store, a clubhouse, a storage place. A sign hung on its door: "For Sale. Property of the State." But when the youthful Republic had gotten over its tantrums and recognized that its artistic patrimony was worth saving, the Sainte Chapelle was still fit to be restored.

The 14th century, the next level in my ascent through the ages, lay literally just around the corner on the north side of the palace.

Amid the elegance of an era past, guests enjoy a luncheon honoring the President of Turkey during his visit to France last June. Gilded walls, neoclassic paintings, and tall mirrors decorate the 17th-century Hôtel de Lauzun on the Île St. Louis, since 1978 the official reception hall for the city of Paris. Dignitaries often arrive by boat, mounting quayside steps to the sumptuous *hôtel*, or townhouse.

Choice creation of French cuisine, truffle-flavored *sauce Périgueux* comes to the table in a silver bowl. The sauce complements beef Wellington, the main course of the luncheon.

Conferring on a case. French lawyers review a thick dossier outside a courtroom in the Palais de Justice on the Cité. They wear the costume of their profession, long black gown and white cravat.

Patient tread of attorneys and clients awaiting their hearings echoes in the vast central gallery of the Palais de Justice. Sunshine pouring through a ceiling window spotlights a gentleman hurrying through the 240-foot-long hall. In the Palais, once the site of the royal residence, judges hear local criminal and civil cases; here also the Cour de Cassation, similar to the United States Supreme Court, reviews decisions from tribunals throughout France.

Here stand the remnants of the royal residence of Philippe le Bel, St. Louis's grandson, who made it the finest in medieval Europe. During the 18th century, fires destroyed everything but the Sainte Chapelle and the great ground-floor halls and towers beside the river.

These chambers, called the Conciergerie (because the royal major domo, or *concierge*, once had charge of them), are handsome, even beautiful; but they are the grimmest in Paris (page 716). So befouled were they by their later use as a revolutionary prison that there is no cheer left in them. They tell a terrible story. For the moment, however, that story would have to wait. It was twelve o'clock, the time when France's *monuments historiques* close so that guides and guards can lunch.

I did the same, then went down along the quay to commune with the Paris fishermen, those quintessential symbols of the triumph of faith over reason. It is widely believed that none of these relentless sportsmen has ever caught a fish. That is not true. I cannot claim ever to have seen one land a fish during the nine years I lived in Paris, but I know one or two sober, credible men who say they have.

In any case, nothing was doing along the quay today. The fishermen sat in Zen-like repose. The regular watchers stood behind them, watching. I eased up alongside one rod holder and ventured a *bonjour*!

He nodded, not angrily. A few hundred yards of river coursed by. "You have taken some fish?" Courtesy required the question.

"Possibly later I shall have caught something. This spot is not ideal, nor is the hour. But there *are* fish. Even trout! Yes! I heard of one being taken only a few miles upstream. Trout swim about, do they not?" I wished him good luck and left him to his dreams.

THE HOUR being now half past one, the doors of the Conciergerie would be creaking open. I turned from the river and the sun to the handsome, haunted caverns of the 14th century. Here, in a vaulted hall some 70 yards long, lived the palace staff. In an

Beauty and a bird get acquainted amid the twitter of the Sunday bird market on the Île de la Cité. This Senegal parrot, pet of a sailor, is not for sale, but dozens of canaries, lovebirds, parakeets, and finches await buyers. Their songs mingle with the good-natured bargaining of customers and sellers.

Silent spectacle replaces chattering birds on weekdays. Sidewalk flower stall offers a profusion of blooms—bouquets for the home or a single rose for a pretty girl. A cherished institution in Paris, *Le Marché aux Fleurs* is mentioned as early as the 13th century in a book of city regulations.

adjoining kitchen, meat was cooked in four monumental fireplaces. A spiral stairway wound upward to the chambers of the king on the floor above. It had been a gay place in its time, full of good smells and fat servants.

Yet all this cheerful clamor was stilled before the century was out. As England launched the Hundred Years' War in an attempt to seize the crown of France, the kings left the old palace to move downstream to their new fortified castle, the Louvre. They never returned. But the "men of the robe," judges and lawyers who had moved into the old palace as part of the royal court, now stayed on to make the palace their domain. It is theirs still.

A house of justice must have its prison, and one was soon established in the old royal quarters. Victims notorious and notable figured in the long history of the prison's use. But not until 1793 and the revolutionary Reign of Terror did the prison reach its hideous apogee as a scene of suffering. Some two thousand Parisians were tried and held in the Conciergerie before going out to feel the effect of a humane device advocated by a doctor named Guillotin, who claimed for it that it could "whisk off your head in the wink of an eye, without your ever being aware of it."

It seems to have stood the test of time, for it is in official, if infrequent, use today.

There are still sad little cells to be seen, one of them that of the Queen Marie Antoinette. But it is best to see them with a group of casual tourists, led by a guide whose memorized commentary is blessedly unevocative. If you go alone, as I once did, the fetid stench of terror may come to you on a damp draft, and a suggestion of sobbing.

ABOVE THE PRISON CELLS, now as then, are the law courts which replaced the burned-out chambers of the king. I proceeded, therefore, as had the prisoners of the Terror, from the Conciergerie to the courts, though with different expectations.

The present halls of justice were aswarm

with black-gowned, white-cravatted figures hurrying along corridors in whose smoky air beams of sunlight stood like glowing bars. I passed through court after court, watching trials of offenses ranging from drunken driving to murder. It struck me that French courtroom procedure is more personal and flexible than that prescribed by Anglo-Saxon law. Solemnity is not imposed as a warranty of seriousness. Neither anger nor humor is disdained.

As I rose to leave the highest criminal tribunal, the Court of Assizes, a young magistrate beside me pointed out a large gilt frame hanging on the wall behind the judges, containing no picture but only a rectangle of shadow.

"That was a painting of Christ," he whispered. "People took their oaths on it. But with the separation of Church and state after the Revolution . . ." he shrugged and pursed his lips. "Still, Christ is there, if invisible. One may still address oneself to Him."

I came out of the Palais and once again took up my trek through time. Logically, there should have been splendid structures to commemorate the 15th and 16th centuries. But there is nothing of note to be seen. Magnificence is for kings, and the kings had left the island. The Middle Ages died dismally, and the scapegrace poet François Villon sang their requiem in the wineshops of the Cité.

I left the island then for the Île St. Louis and the 17th century, in which Paris was born anew.

The bridge leading from the Cité to the Île St. Louis, a short metal span, is too small to support a car and too ugly to stand close inspection. But it does reflect a philosophy; The 6,000 Louisiens or Îliens, as the island's people are called, are not interested in bridges, although the island boasts several of these. They tend to stay at home, and would prefer that other people—particularly those with automobiles—did the same.

For 16 centuries, while the Cité grew in importance and splendor, the Île St. Louis

(Continued on page 710)

Private church for a king soars in Gothic glory on the Île de la Cité. Louis IX built the Sainte Chapelle in the courtyard of his royal palace to house the Crown of Thorns and other sacred relics. The pious king, who spent hours each day on his knees at prayer, conveniently located the towering upper chapel beside his own second-story apartments and placed the lower chapel opposite the rooms of his palace staff. Today France treasures the church as a national monument; the courtyard does duty as a parking lot for the Palais de Justice.

Blazing jewel box: Stained glass hangs like tapestry in the upper chapel of the Sainte Chapelle. Figures of apostles in medieval dress guard narrow pillars. The 1,134 scenes in glass tell Bible stories and relate the purchase of the Crown of Thorns from Emperor Baldwin II of Constantinople. The relic, now in Notre Dame, rested on the arched tribune reached by two small spiral stairs. During services, the royal family sat in niches at left and right. Restoration in the 19th century revived the early appearance of the chapel, which had become a shop and storehouse in times of little faith.

Inside a comfortable cocoon, a traveler with no francs to spare keeps warm in his temporary and free lodging—under a bridge of Paris.

ENTSCHEIDUNGSJAHRE UND PUBLIKATIONEN DES BRAUCH DALE © N.G.S.

Lean shadows of afternoon etch Quai des Orfèvres where it slides under the Pont Neuf. On such embankments all Paris once bathed, washed clothes, watched water tourneys, and shopped at merchants' boats and stalls, including those of the *orfèvres*, or goldsmiths. Today Parisians forsake auto-clogged streets for island quays to bask beside the Seine.

Grand lady of the Île St. Louis and patroness of its arts, Princess Bibesco treasures the tranquillity of the island. Stately homes line peaceful streets and quays, little changed from the 17th century, when Louis XIII transformed pasture lands into an ideal community. The isle escaped damage during the Revolution and two world wars.

lay fallow. Until 1614 it was a sylvan spot where cows browsed and Parisians came to fight duels, make love, and engage in other outdoor sports. Henri IV saw this real estate as the perfect setting for a radical experiment in urban living; his son, Louis XIII, commissioned it. He called for a clean, modern, efficient, and beautiful townlet with paved streets, stone-clad quays, and houses of high style.

In its quiet and seclusion, the Île St. Louis slept away the years. The Revolution, when it came, raged around the island rather than on it. The island's church dared celebrate Mass during the agnostic years when other churches, including Notre Dame, became "temples of reason." Even the German invaders of the 1940's left the place largely alone. Old men fished along its quays despite the rattle of German machine guns. A few died in quest of a fresh-caught perch.

The footbridge from the Cité leads into a single, central, commercial street down which I presently made my way in an atmosphere of provincial peace. Cars passed minutes apart. An old lady with a long loaf in her hand spoke to me, as no city person would have done. "It will rain," she remarked in a neighborly manner. "It will surely rain." As I tried the locked door of a bookshop, a passing workman called, "Try the restaurant next door; the girl goes there for coffee."

Where everyone knows everyone, courtesy becomes commonplace. In time, even the doors of the stately houses along the tree-lined quays began to open.

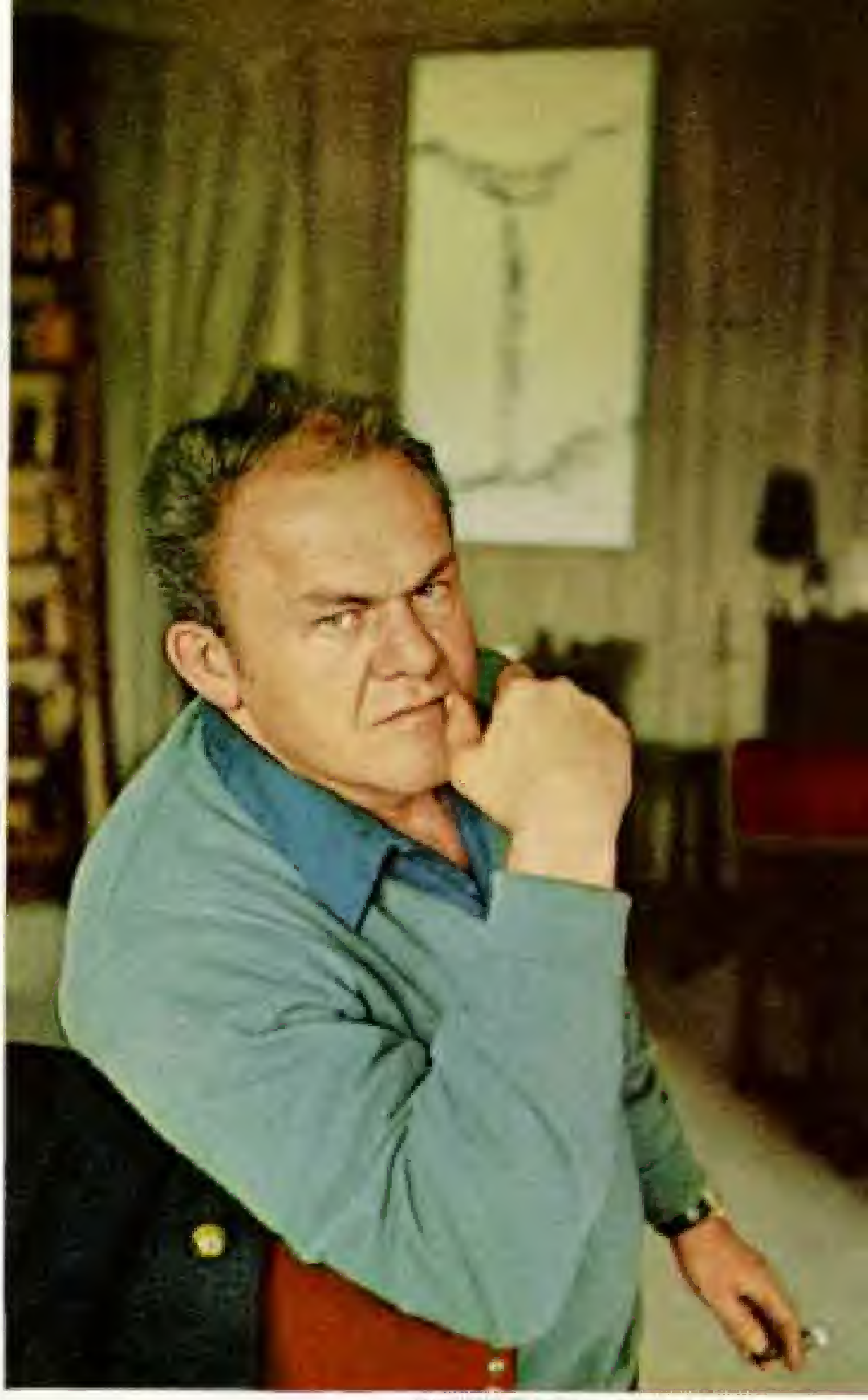
The first was that of the overwhelming Hôtel de Lauzun. (*Hôtel* meant "townhouse" in the 17th century.) Here Paris officialdom welcomes foreign dignitaries in a setting that is almost desperately gorgeous (page 700). The walls and ceilings of its reception rooms are covered to the last square inch with paintings, carvings, gilt paneling, and patterned fabrics. The only plain surfaces are those of the mirrors, which serve to reflect and redouble the rest.

Who had lived here? The question comes forcibly to mind, since it is hard to believe that any normal mortal could have acted out his life on so sumptuous a stage. A charming representative of Paris's Hôtel de Ville—the City Hall—explained:

"The first owner, Charles Gruyn, was of low degree and high presumption, but he had money. He also had his hand in the king's till, where it was discovered.

"Next came a fetching rogue, the Duke of Lauzun. He appealed to Louis XIV and to his

Best-selling novelist James Jones arrived in Paris ten years ago for a visit. He and his wife liked what they saw and settled in an apartment above a grocery on the Île de la Cité. Now homeowners, they renovated a four-story 17th-century house on the Île St. Louis. In a top-floor study, Jones works on his sixth novel.



homely cousin, La Grande Mademoiselle. Lauzun was too ambitious for his own good and got himself sent to prison. But when he got out—historians believe—he secretly married La Grande Mademoiselle. In any case, they lived here from time to time. She occasionally broke costly dishes on his head. He in turn spoke unkindly to her: "Take off my boots, granddaughter of Henri IV!"

"After the Revolution, the writers Théophile Gautier and Charles Baudelaire rented rooms here. These and other artists established on the premises a singular club, whose members met to eat green hashish jam and dream strange dreams."

Receptions today are less unusual, but they put this building to better use than ever did rascals, royalty, or new-rich.

At the upstream end of the Enchanted Isle, as the Île St. Louis is often called, there is a building nearly as spectacular as the Hôtel de Lauzun and in a sense even more interesting, for it is an inhabited home. This one, the Hôtel Lambert, was also originally the proud confection of a wealthy commoner, one Lambert the Rich. It entered its most romantic period in the 18th century, when the Marquise du Châtelet persuaded her accommodating husband to buy the place for her and her lover, the great Voltaire.

The hôtel's present occupant, who holds it on a long lease, is a young Liechtensteiner, the Baron Alexis de Redé. He has restored and furnished it with lavishness and taste (following pages).

"The place didn't look much like this when I took it, just after the war," he said. "Originally the walls and ceilings held paintings made especially to fit them by some of the greatest painters of the period—Le Brun and Le Sueur, for instance. Most were gone. I've bought one or two back and found appropriate replacements for others.

"The furniture is mostly my own, picked to suit this demanding setting. It's been an expensive job. But a house like this deserves to be maintained and lived in as the private palace it was built to be."

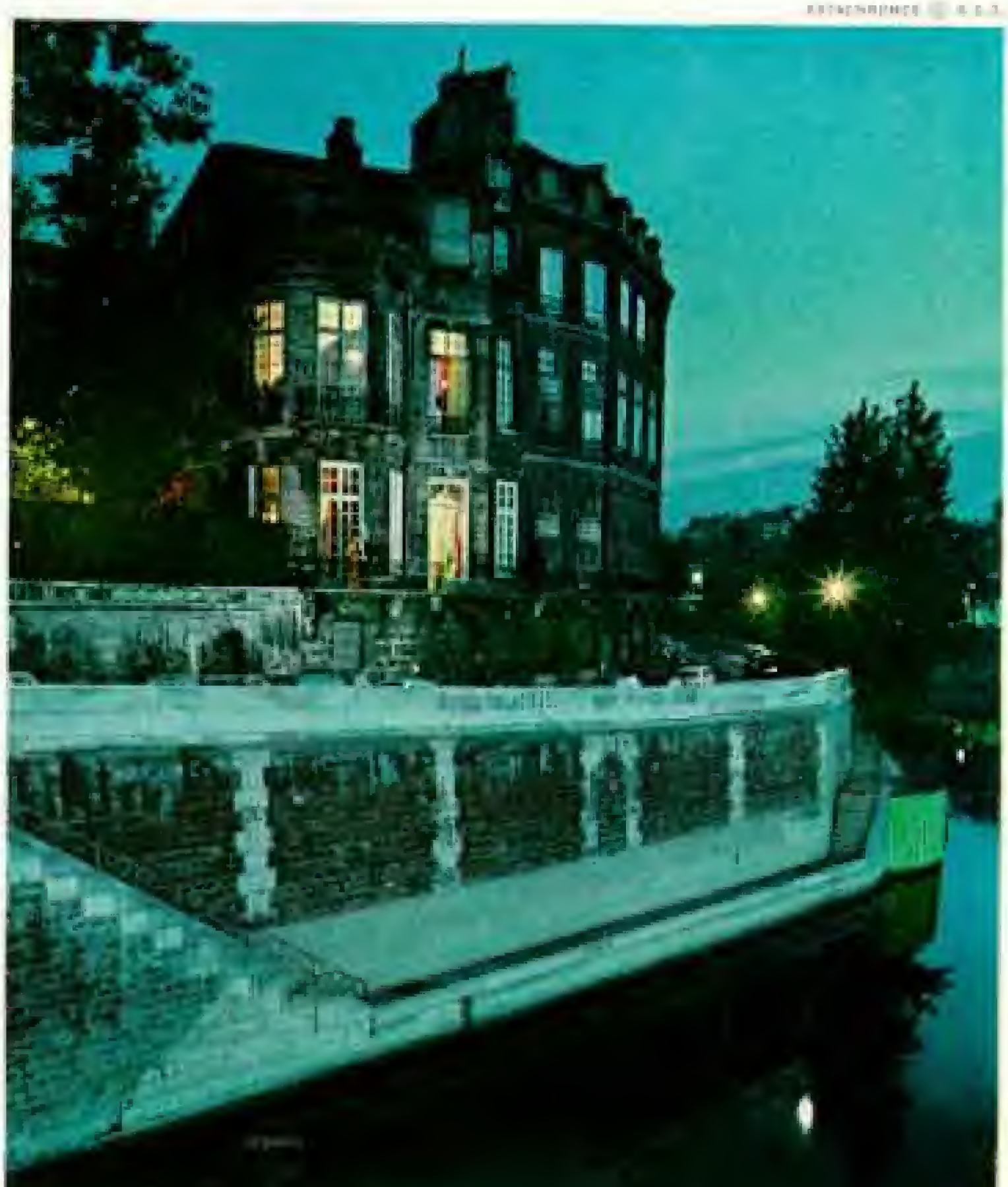
A LETTER to a distinguished Parisienne, Madame Georges Pompidou, wife of the Prime Minister of France, had brought a prompt and cordial invitation to visit her at their flat on the island's southern quay. I hurried now from antique flamboyance to modern luxury.

Madame Pompidou joined me in her sunny

High fashion graces a midnight ball given by Baron Alexis de Redé at his 17th-century home on the Île St. Louis. Some 400 guests dined and danced until dawn to the music of three orchestras.

Financier and collector, Baron de Redé restored spacious apartments in the Hôtel Lambert to their former grandeur with furnishings from the Louis XVI, Directoire, and Empire periods. The library ceiling, painted by Eustache Le Sueur, dates from the 1640's.

"**A house made for a sovereign** who would be a philosopher," wrote Voltaire, a short-time resident of the Hôtel Lambert. Candles lit for the fete shine on in the baron's apartment at daybreak.



salon, a tall, blond lady with a direct manner.

"We are not Parisians, my husband and I," she told me, "but we love this island. That is why we keep our place here, even though we live primarily in the official Prime Minister's residence in the center of the city."

"Is the island as isolated from the rest of Paris as people claim?" I asked.

"From the *rest* of Paris?" she laughed. "If you ask one of our shopkeepers for something he hasn't got, he'll tell you to try *in Paris*, as if we were not a part of the city at all! It's a charming attitude.

"Take my cook, for example. She will not leave the island to do our marketing. She says, 'Madame, consider; here everyone knows me; I am among friends. But in Paris people are rude and rush me. I can do well enough here.' And indeed she does."

We discussed the growing popularity of the island and its effect on the Iliens.

"The houses here are old, often in bad repair, and lack modern conveniences," she told me. "But they are in great demand. The wealthy are bidding up the prices. I'm afraid some of the less well to do may find it difficult to stay on."

From the moment of its creation, the shopkeepers, artisans, and artists of the Enchanted Isle have lived on its internal streets, leaving the quays to the rich. I looked up a member of this lively fraternity, the painter Fred Zeller, at Number 51, Rue St. Louis-en-l'Ile.

Number 51 presents perfectly the problem that faces Iliens of modest means. It is a slum, but a slum of great style.

Behind a spectacular entryway there is a large court whose walls sag attractively—in places, alarmingly. Patched panes wink from elegant windows. A handwritten placard in the entry warns tenants that water will be shut off on cold nights. A glance at the courtyard tells why: Such pipes as there are run unprotected up the outsides of the walls.

M. Zeller was in his cubbyhole of a ground-floor studio, hemmed in by big, bright canvases and hard at work on a new one.

"Come in," he said. "Sit down. Or squat or lean, since there's nothing to sit on."

As he painted, he talked about living conditions on the island.

"It is a fine place to live," he assured me. "I can think of none better. Such quiet! At night I hear nothing. Nothing! But the place is changing. Grand old buildings like this start to rot away because the landlord can't charge high enough rents to maintain them, and the

Leading the casual life, young people share a pan of scrambled eggs for Sunday brunch. Student Etienne Tembouret, second from right, rented and refurbished this quayside room on the Cité. Some of his friends attend colleges in the Latin Quarter, named for the common language of European scholars who lived there in the 13th century.

tenants couldn't afford to pay them if he did. So big builders come along and buy them, restore them, and sell beautiful apartments for 250,000 francs—about fifty thousand of your dollars. Well, the buildings are saved. But the poor people have to go. Hand me that rag, will you?"

He painted for a while in silence.

"Still, I can't complain. I can go to the end of the street and see Notre Dame through the leaves of the trees along the quay. At every hour of the day its colors are different. I can browse in the bookstalls along the river. I can sleep in silence. As long as I can afford this good life, I'll stay."

ON THE QUAY SIDE of the next block lives an artist of a different sort, recently become a firm friend of mine. I sighted him one morning, seated at an open

Forbidding fortress, the Conciergerie through the centuries imprisoned the accused in its towers and dungeons. The medieval building takes its name from its first housekeeper, the concierge of the royal household, who acted as jailer.

Waiting room for the guillotine: During the French Revolution, guards herded prisoners into a barred section of this medieval gallery in the Conciergerie. There and in fetid cells, they listened for the dread call to execution on the Right Bank.

Condemned queen, Marie Antoinette spent 11 weeks in the Conciergerie before her execution on October 16, 1793. Forgiving her foes, the 37-year-old aristocrat met her fate with dignity.

COURTESY MUSÉE CARNAVALET, PARIS

window, newspaper stretched wide, cigar angled alertly upward, long jaw jutting.

"Jim," I hollered. "You available?"

He grinned and beckoned. James Jones, at 46 one of the most successful of American novelists, has lived on the Paris islands for ten years (page 711).

As I moved toward his door he called, "Wait, I'm coming down. I feel like walking." We turned into a side street and crossed to the north branch of the Seine.

"I love this doggone island," he said (or words to that effect). "There's nothing like it. Quiet. Great people. The shopping street's like a village market. You ought to see the fish store after dark. It's like a painting."

On the quay he stopped suddenly and pointed. "See that crummy old launch by the shore? There's an old guy who lives there, sort of a bum. Sometimes he makes a pot of big-hearted stew and invites in all the other bums—the *clochards*, the French call them. Funny place to live, but not bad. No rent, and no one to bother him.

"That's kind of beautiful, you know? One kind of freedom. In summer the clochards like to live along the quay, sleep under the bridges. They keep pretty clean, too. Wash their underwear in the river. I was on the bum once, when I was a kid. You can learn a lot. . . ."

I HAD one more visit to make before returning to the Cité and the end of my two-thousand-year tour. Princess Bibesco, widow of Romanian industrialist Prince George Valentin Bibesco and dowager of the Enchanted Isle, had accorded me a rendezvous at her home on the western tip of the island. She received me in a little sitting room made comfortable with cushions and furs (page 710).

We stood at her windows, which frame one of the finest views in Paris.

"From this spot I can see the Cité, the Paris of our early kings, and the Right Bank, where their successors reigned. I see the oldest and the newest, and many things that are timeless. I see the symbols of each season, there below: just now, the new leaves, the lovers (see them walking, hand in hand?), the old clochard searching the gutter for something of value. And always I see the river running away to the sea."

She waved me to a seat, and for a while she spoke of the island's history and people.

"Our island is a melting pot," she declared. "It has always been so. The very rich rub shoulders with the very poor. My own family is both French and Romanian; we think of ourselves simply as Europeans. But the Île St. Louis is more than French, more than European; it is the natural home of the arts."

I left the Îliens locked in their riverine calm and crossed the trembling footbridge to the Cité. My travels through the ages now returned me, for better or worse, to my own epoch. As if to emphasize the transition, my eyes fixed on a strange structure at the eastern tip of the Cité, a moving memorial to the worst days of our 20th-century lives. There, in a brilliantly designed crypt which imparts a deliberately painful sense of prison, two hundred thousand glass spheres glimmer in symbolic representation of the two hundred thousand Jews, Gypsies, and other anti-Nazis exported from France and killed by the Germans during World War II.

I had visited the place, and been moved by it. But now I bypassed this coldly eloquent reminder of mass murder and headed for the life and warmth of the Flower Market.

I ROUNDED A CORNER into that cheerful spot and found it full of sound and flurry. I had forgotten that it was Sunday, the day when birds replace the flowers (pages 704-5). It was as if the blossoms had come alive and found voices. There were birds from all over the world, displayed in tiers of little cages.

But there was as much here for people-watchers as for bird-watchers. A small boy and his sister squatted to peek into a cage full of tiny Bengalis. "*Regarde, comme ils sont jolis!* See how pretty they are," said the girl. "If we had a bird like that. . . ."

"No!" said her father.

Two old ladies watched a little green parrot, entranced.

"He interests you?" asked the seller. "I tell you frankly, such birds are hard to find."

The ladies were tempted. "But will he bite?" asked one.

"Gentle as a kitten," said the seller, reaching for the bird. It bit him.

"*Quelle horreur!*" cried the old lady. "We will get a canary. They, at least, do not bite."

In the middle of the market, amateurs offered their pets from hand-held cages or perches. A crippled boy carried an immense red and blue macaw on his shoulder. Children crowded near, amazed. A man standing near me whispered, "The bird is not really for sale. It is the only wonderful thing he owns."

A dark-eyed girl had lovebirds in her hands. A stout lady hawked canaries, "Good singers, all good singers." A bewhiskered gentleman with a cageful of finches called, "Male and female! Male and female."

At the end of the square, a bit apart from the others, a small gray man in a long raincoat held a cage containing a single canary. He said nothing at all, but when anyone caught his eye, he smiled.

No one bought his canary. When evening came, he covered the cage and went down into the subway station. Buyers and lookers vanished with the sun.

I crossed the bridge to the Right Bank and leaned on the parapet, looking back. The four towers of the Conciergerie stood empty and unlit, recalling half-forgotten horror. But Notre Dame, drifting through the centuries on her island ship, marked with chiming bells the end of another hour. THE END

Like a great ship, the Île de la Cité rides the Seine with the Île St. Louis towed from its stern. Bridges appear as gangways, leading to shops and offices of

the Right Bank (left) and to cafes and colleges on the Left. In this aerial view, the metropolis stretches to the Vincennes forest five miles to the southeast. France measures road distances from a zero-mile marker in the square below Notre Dame's twin towers. In a gaping excavation in the square, archeologists labor to bare Roman ruins, tangible reminders of the capital's ancient past.

The Flower Seed Growers

Gardening's Color

By ROBERT DE ROOS *Photographs by JACK FIELDS*

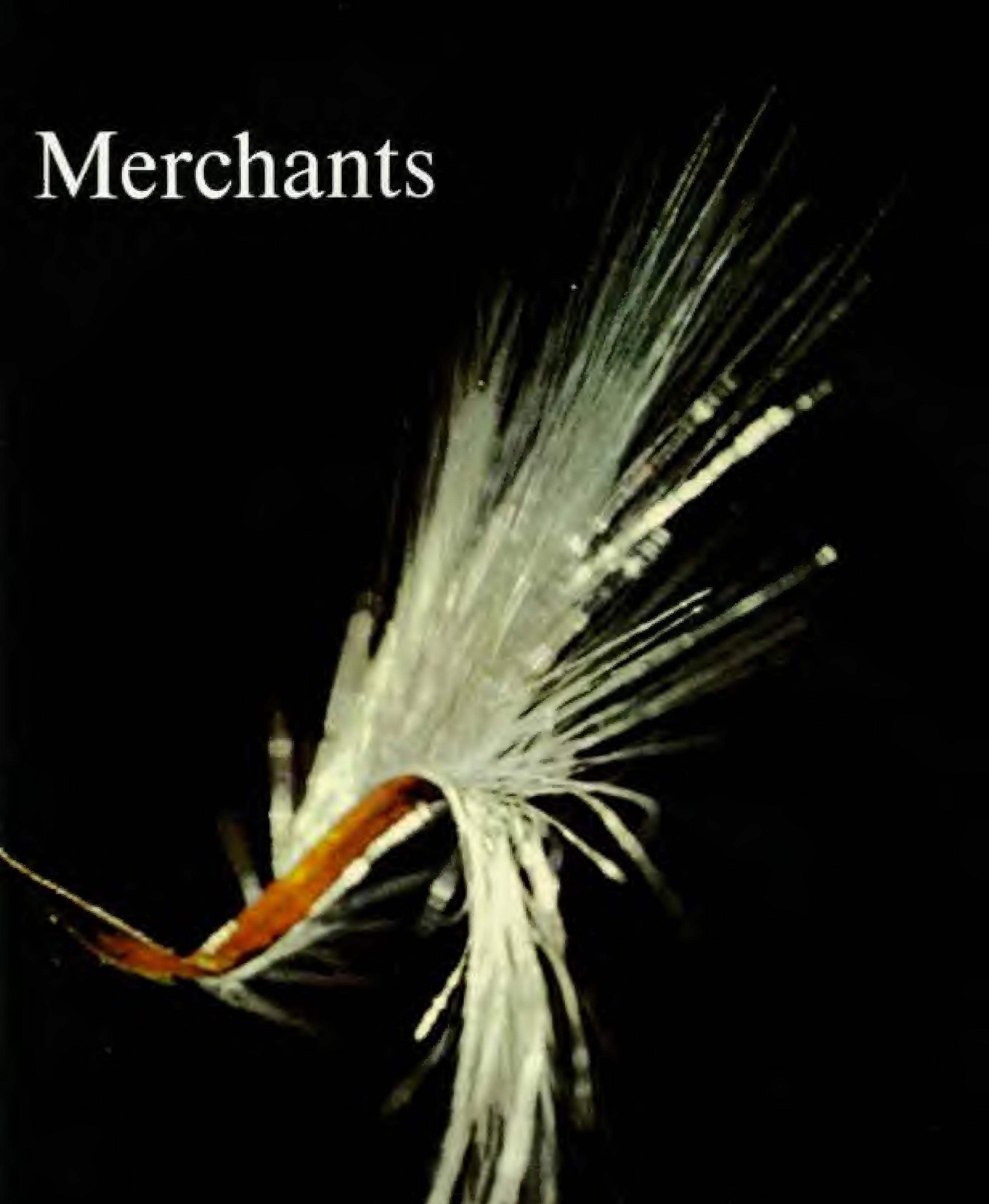
IN THE COURSE of a 7,500-mile odyssey through the fields, laboratories, and greenhouses of the American flower seed industry, I met most of the small packet of seedsmen who are responsible for the beauty and hardiness of today's flowers. They are a unique band, men in whom patience, persistence, and pride mingle in roughly equal proportions.

They are not really Big Business—the total retail value of their product is only about $30,000,000 a year. Nevertheless, it is hard to think of an industry that yields more beauty per ounce.

Behind the steady improvement of garden flowers lie thousands of test plantings, years of careful selection and crossing of varieties, and a determined search for mutants—plants with new characteristics. The work is endless and expensive. Most of it is done by the major flower companies that

EMBRYO OF BEAUTY, *a geranium seed, enlarged 12 times, will sprout and bloom in the spring. Before packaging, growers will scarify it to hasten germination and remove the wispy tail, a device of nature for scattering seeds in the wind. To create a new variety of petunia, Gloria Herrera (inset) vacuums pollen from a parent plant in a California seedsman's greenhouse.* KODACHROMES © N.G.S.

Merchants



Pastel ribbons of sweet peas stripe the floor of Lompoc Valley, California, the world's major growing area for flower seeds. Lompoc has an ideal climate: eight frost-free months a year, constant winds to aid pollination, and morning and evening fogs for moisture.

Racing the wind, harvesters gather feathery geranium seeds with a vacuum before a breeze can carry them away. They haul machines through a field near San Juan Bautista, in central California.

till the fertile soil of the Lompoc Valley, which lies near the California coast about 125 miles northwest of Los Angeles.

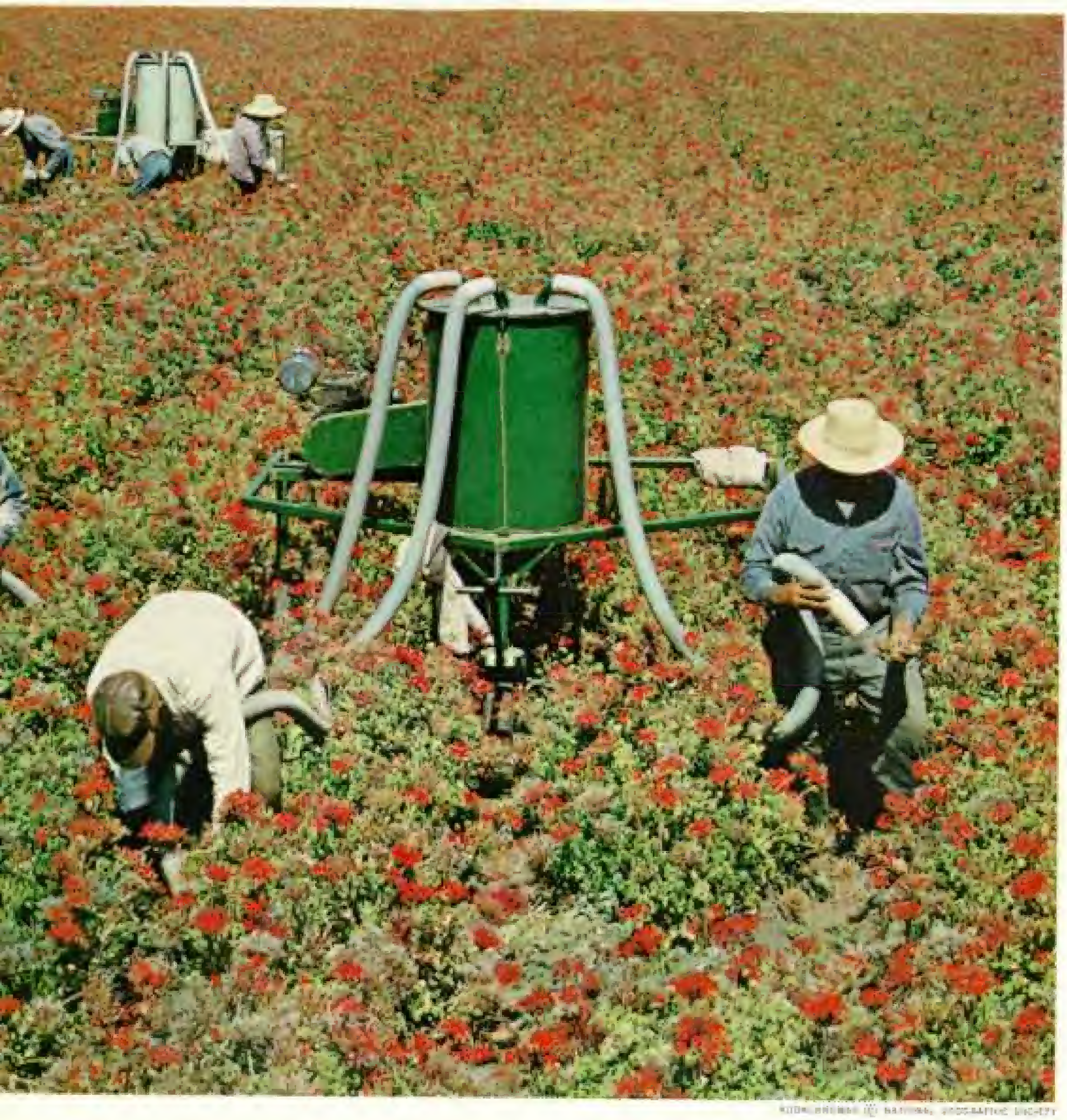
The first sudden view of the valley, ringed with chaparral hills, suggests a giant's palette. In summer, hundreds of acres of flowers pulse with color: vibrant blue lobelias, zinnias by the mile, great squares of pink alyssum, blocks of shining marigolds, a dozen colors of petunias, yellow calendulas, azure ageratum—more than 800 varieties in all.

This valley is as close to being a factory for the production of flower seeds as you can imagine. There's nothing like it anywhere else in the world. But even with conditions nearly perfect here, there is not a year when some crop doesn't fail.

At Lompoc, Jerome Kantor, director of flower research for W. Atlee Burpee Company, greeted me and suggested a walk around the ranch. On every side, fields of flowers stretched away. We passed a huge bed of golden marigolds, and Jerry said, "Now, if you know a way to make those white, we could put a pretty piece of change in your pocket."

I knew what he meant, for when I had visited David Burpee, dean of America's flower seedsmen, at his Fordhook Farms near Doylestown, Pennsylvania, he had said, "Since 1953 we've been offering $10,000 to anyone who can come up with a pure white marigold two and a half inches in diameter."

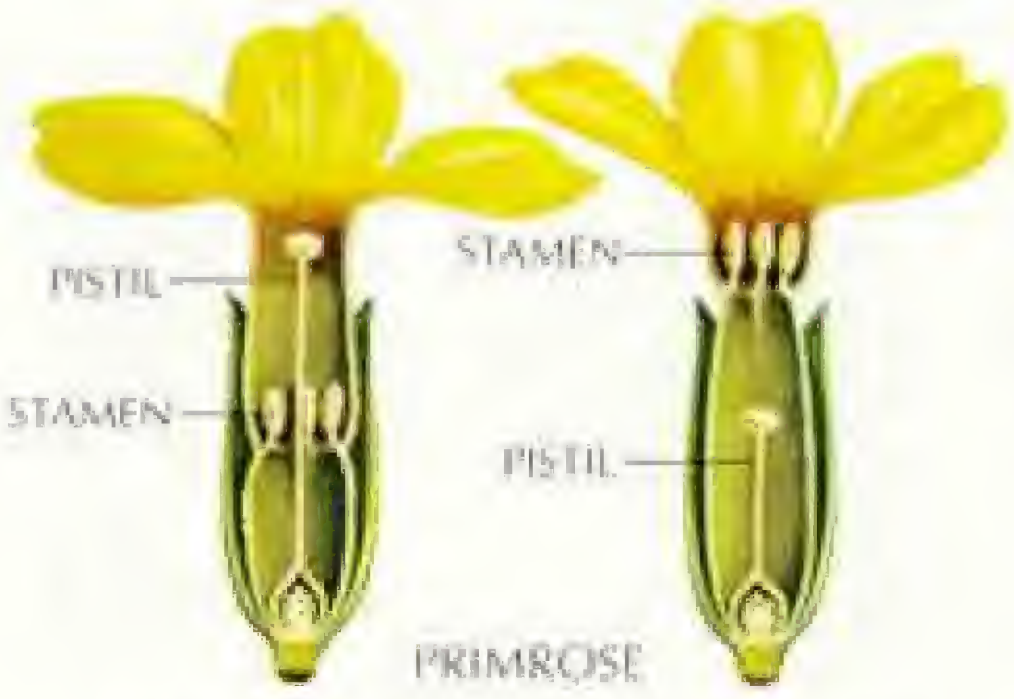
Jerry recalled a bit of excitement a year or so ago: "A lady called up to say she had a



Anatomy of a Flower

CRADLED BY PETALS and sepals—the covering of the opened bud—a typical flower holds all the elements vital to reproduction. The male parts, stamens consisting of supporting filaments and podlike anthers, produce pollen. When the pollen ripens, the anthers split open and the grains either fertilize the same blossom by dropping onto its female part, the pistil, or travel by wind or insects to other plants for cross-pollination. After the pollen is received on the stigma—the head of the pistil—its sprout travels to the ovary and unites with an egg cell to start the growth of a seed.

Many plants have developed ingenious ways to bring about cross-pollination, because inbreeding



PAINTINGS BY BEE W. STEVENS, GEOGRAPHIC ART DIVISION
© NATIONAL GEOGRAPHIC SOCIETY

often results in inferior offspring. In the female primrose (left) the bloom grows an elongated pistil and stunted stamens, making self-pollenation difficult. Bees, flying from predominantly male plants with prominent stamens (right), carry pollen to the female, which produces hardy seeds. Some of the pollen from a male bloom may be carried to its own pistil, but weak seed will usually result. Nature has other methods of encouraging cross-pollenation: In some varieties the pistil and stamens mature at different times.

pure white marigold and wondered if we would like to see it. Would we!

"She had a pure white flower, no doubt about that, but it had a serious flaw: It was a zinnia instead of a marigold. I would say her face was petunia pink when we told her."

As we walked on, I asked Jerry what the most popular flowers were these days.

"That depends on the man you talk to," Jerry replied. "At Burpee, marigolds are the biggest sellers, because David Burpee has always pushed them. Some say petunias are the number-one bedding plant. Certainly the five most popular flowers would be marigolds, petunias, snapdragons, asters, and zinnias—all bunched up pretty close."

We followed two men who walked slowly between rows of zinnias, occasionally pulling a plant out by the roots. "These are 'open pollenated' fields," Jerry explained. "The flowers are pollenated by the wind or by insects, just like the flowers you grow at home. But we have to be more careful than ordinary gardeners to make sure no rogues mature.

"That's what these men are doing. They pull out any plants that are offtype—rogues—plants that are too tall or too short or with flowers of the wrong color, size, or shape. This way we maintain the purity of the strain."

I pointed to several frames covered with cheesecloth. "What are they?"

"Those are plants we think have special promise," Jerry said. "When we find a plant that looks good, we isolate it so that it won't be pollenated by bees or by the wind. We want to make sure we know just what pollen it gets."

Ancient Favorites: Lotus and Rose

From such painstaking experimentation, the country's plant breeders annually produce a variety of innovations. For 1968 these include a new prize-winning hybrid zinnia, at least two new marigolds, hybrid geraniums in eight colors, improved verbenas, and petunias without number.

Such an array of new blooms would certainly have dazzled the gardeners of other centuries, for they had a narrow range of flowers. The Egyptians cherished the lotus and later the rose; Cleopatra, says a legend, greeted Mark Antony in a room strewn 18 inches deep with roses. In Rome they became the object of cultlike popularity. But few other cultivated flowers won such fame among the ancients.

Discovery of the New World resulted also in the discovery of many new flowers (foldout painting, pages 726-8). From South America

came petunias, nasturtiums, salpiglossis, portulaca, and fuchsia, from Mexico, ageratum, cosmos, marigolds, and zinnias, from California, clarkia, California poppies, and godetia; and from Texas, phlox and coreopsis.*

Despite these discoveries, European gardens had little variety until modern times. Even by the early 19th century many were monotonously planted with geraniums and a few petunias, pansies, anemones, and carnations. The great upsurge in flower propagation and breeding came with the 20th century, and now the home gardener can choose from thousands of varieties.

Seedsmen continue to prod nature for flowers they believe will dazzle tomorrow's gardeners: a red delphinium, a blue zinnia, a yellow sweet pea, to mention a few. Frank G. Cuthbertson, one of the world's greatest vegetable and flower breeders, the man who developed the famous Cuthbertson sweet pea, once thought he had found a true yellow sweet pea. His natural skepticism was quickly justified, however. The "yellow sweet pea" blooming so lustily on one bush turned out to be made of paper. A workman had fashioned it as a joke on the boss.

Tiny Zinnia Made to Order

At Lompoc I saw a prime example of a genuine tailor-made flower when I visited the farm of Bodger Seeds, Limited, a short pitch down the road from Burpee. With Howard Bodger and John Mondry, Bodger's plant breeder, I wandered through a field of little plants literally covered with bloom—zinnia Thumbelina. Bodger won a gold medal for this creation in the 1963 All-America Selections, a competition conducted by the seedsmen themselves.

"We made Thumbelina to order," Howard Bodger said. "We told John here we thought we could have a tremendous market for a dwarf zinnia. We laid down the specifications and John went to work.

"Four years and $20,000 later, we had Thumbelina, a vigorously blooming plant six inches high. It's quite unusual to get results that fast. Thumbelina was produced by selection and inbreeding, the standard procedure, but there was nothing standard about our crash program. We speeded up nature and did 12 years' work in four."

"How did you do it, John?" I asked.

(Continued on page 731)

*The fascinating lore of plant exploration was recounted by W. H. Camp in "The World in Your Garden," National Geographic, July, 1947.

Controlling nature in a Lompoc Valley greenhouse, Rose Castillo carefully brushes pollen on a nasturtium. By crossing plants with desired characteristics, breeders create healthy new hybrids.

Petunia surgery prepares a flower for crossbreeding. Tweezers snip the anthers to prevent self-pollination. When the stigma becomes sticky, pollen from another plant will be applied.

The World of Flowers

EMBLAZONED WITH BEAUTY, this floral map shows the origins of 117 of man's favorite flowers. As people began to move from one part of the world to another, they carried plants with them. Explorers, conquerors, and adventurers returned to their homelands with flowers from far-off places. Colonists carried seeds and bulbs to the New World. Some have done so well in their adopted regions that their beginnings are seldom remembered. Holland's tulip is a native of Turkey; the "French" marigold arrived in Europe with the return of the conquistadors from Mexico. To trace these blossoms to their source, GEOGRAPHIC artist Ned Seidler consulted Dr. Mildred E. Mathias, Professor of Botany at the University of California at Los Angeles.

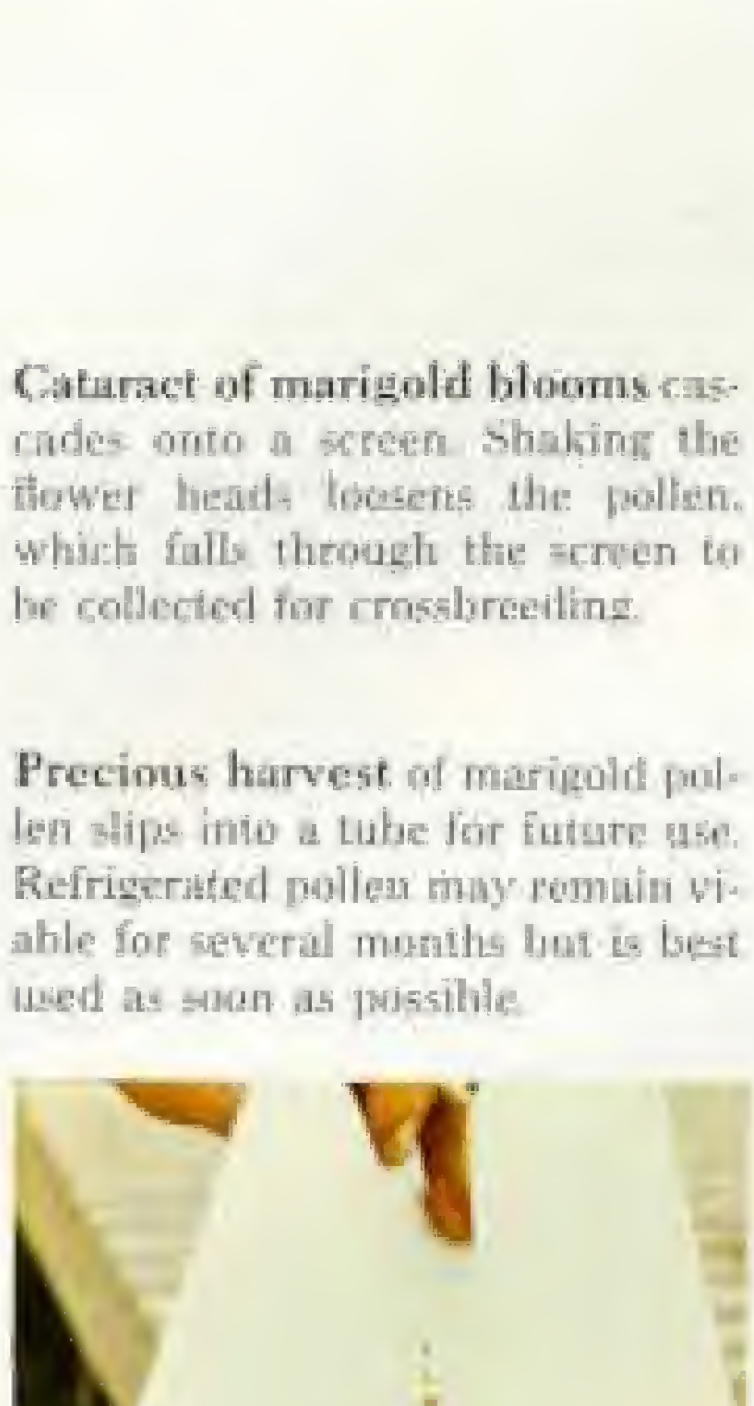
FOXGLOVE
STOCK
POT MARIGOLD
BELLFLOWER
SWEET SCABIOUS
WALLFLOWER
CHECKERED LILY
ENGLISH DAISY
FORGET-ME-NOT
POLYANTHUS
LILY OF THE VALLEY
PRIMROSE
ROSE
EUROPE
SHIRLEY POPPY
SPRING CROCUS
SNOWDROP
TULIP
PANSY
MEDITERRANEAN
TURKEY
SNAPDRAGON
OLEANDER
SWEET PEA
HYACINTH
GRAPE HYACINTH
STAR OF BETHLEHEM
SWEET ALYSSUM
CANDYTUFT
CARNATION
GLADIOLUS
POKER PLANT
BIRD-OF-PARADISE FLOWER
AFRICA
AFRICAN LILY
CALLA
GERBERA
FRINGED HIBISCUS
CASTOR-OIL PLANT
FREESIA
CAPE MARIGOLD
PLUMBAGO
PELARGONIUM "GERANIUM"
NEMESIA
LOBELIA
IMPATIENS
AFRICAN VIOLET
MADAGASCAR
ROYAL POINCIANA
CROWN OF THORNS
VICTORIA WATERLILY
FORSYTHIA
CROWN IMPERIAL
IRAN
ORIENTAL POPPY
CLEMATIS
REGAL LILY
ASTILBE
CHINA ASTER
CHRYSANTHEMUM
HOLLYHOCK
GARDENIA
HYDRANGEA
BLACKBERRY LILY
DAY LILY
PEONY
CAMELLIA
CHINA
ABELIA
BLEEDING HEART
JAPAN
JAPANESE WISTERIA
JAPANESE IRIS
KURUME AZALEA
EAST INDIAN LOTUS
HIBISCUS
SOUTHEAST ASIA
VANDA ORCHID
COCKSCOMB
CYMBIDIUM
BOTTLE BRUSH
AUSTRALIA
STRAWFLOWER
GREVILLEA
ACACIA
SWAN RIVER DAISY
WAXFLOWER
BLUE LACEFLOWER

PAINTED BY WALTER H. SIEGLER, COMPILED BY GEORGE W. BEATTY
GEOGRAPHIC ART DIVISION

Brilliant ranks of ladies and gentlemen march row upon row across a Lompoc Valley field of Bodger Seeds, Limited. Specially bred female marigolds of sparkling yellow alternate with orange males. Bees imported to the field effect more thorough cross-pollenation than is possible by wind. Resulting offspring will reflect the color dominance of the male—orange. Other marigolds must be planted at least a mile away to guard against unplanned crossings.

Cataract of marigold blooms cascades onto a screen. Shaking the flower heads loosens the pollen, which falls through the screen to be collected for crossbreeding.

Precious harvest of marigold pollen slips into a tube for future use. Refrigerated pollen may remain viable for several months but is best used as soon as possible.



EXPERIMENT (LEFT) AND DISCOVERY BY JACK DEMAIO © N.G.S.

John Mondry gave me a quiet smile and said not a word. "It's a bit of a secret," Howard Bodger said with a grin.

At the Lompoc office of the Denholm Seed Company, David S. Denholm showed me another custom-made flower—a nasturtium.

"Nasturtiums are making a comeback," said Mr. Denholm. "In the past they produced a lot of leaves that overgrew the flowers, and the plants were just big green blobs. We bred for small leaves on short stems. Now the plant makes plenty of flowers, good display, and our Jewel Mix, in six or seven colors, is the biggest-selling nasturtium in the world."

"And that will make you rich?"

Mr. Denholm laughed. "This is no business to be in if you expect to make a fortune. The creation is the reward—seeing a beautiful field of flowers or inventing a whole new avenue of colors for the gardener."

Sometimes the plant breeders do not know what treasures they have. Pan American Seed Company, with its greenhouses high in the Rockies at Paonia, Colorado, once entertained George Park, a mail-order seedsman. He pointed to a small reddish-lavender petunia with a purple throat.

"What's that?" he asked.

"Oh, that's a discard. We're going to throw it out."

"May I have it?" asked Mr. Park. "I think I can sell it."

Sell it he did, under the name of Sugar Plum, and sold it in such quantities that

"Nice business—nice people." Thus a seedsman describes his industry and those associated with it. Some of the top producers in the country gather in a Lompoc Valley greenhouse of the Denholm Seed Company. David S. Denholm, left, gave his guests their flowers—a hybrid marigold and three petunias. A verbena, one of his company's specialties, glows on Mr. Denholm's lapel.

David Burpee, front center, president of W. Atlee Burpee Company, is a staunch supporter of Senator Everett Dirksen's efforts to have the marigold proclaimed the national floral emblem. "It beguiles the senses and ennobles the spirit of man," contends the Senator. "It is the delight of the amateur gardener and a constant challenge to the professional." Seedsmen will attest to the latter as they continually search for new varieties. Mr. Burpee, who has already introduced an odorless marigold, offers $10,000 to anyone who sends him seeds that will produce one that is pure white.

Sweet peas have gained fame for Elmer Twedt of the Ferry-Morse Seed Company, right, and William Zvolanek, left rear, an independent breeder. Mr. Twedt developed the popular Knee-Hi sweet pea. Mr. Zvolanek's many-blossomed sweet peas are favorites with florists. Howard Bodger, right rear, is proud of his company's green zinnia and dwarf zinnia Thumbelina.

Pygmies and giants: Begonia seeds, left, total more than a million to the ounce, only four dozen castor beans equal the same weight. The minute seeds bring as much as $3,500 an ounce, one hundred times the price of a troy ounce of gold. Castor plants, prized for their foliage, quickly grow as high as 15 feet and provide the gardener with a leafy, almost tropical effect as a background for his blossoms. The beans produce castor oil.

rival seedsmen rushed other plum-colored petunias to market.

Seedsmen were slow to see the potential of Envy, a green zinnia introduced by Bodger (page 737). "It's a freak. Who wants a green flower?" Now Envy is a best seller, and seed houses advertise it heavily. They learned that women want a green zinnia for flower arrangements.

"Flowers grown from seed can't be patented, so when a good thing comes along we all get into the act by buying the other fellow's seed to produce our own," said Elmer Twedt (above, right). He is flower research director for Ferry-Morse Seed Company of Mountain View, California, one of the country's largest flower and vegetable seed houses. "When a new variety hits the market, we are all pirates."

Such piracy is avoided by the production of hybrid flowers. Hybrids result when growers cross two highly inbred plants—plants self-pollenated to set desired characteristics of color, flower size, or disease resistance. The seed produced by the cross is what the hybridizer sells. Mating the inbred parent plants produces offspring of extraordinary strength, a phenomenon known to horticulturists as "hybrid vigor." But this vigor can only be achieved by crossing inbred plants for every crop of hybrid seeds.

That is why a would-be pirate cannot simply buy successful hybrid seeds and grow from them his own hybrids for seed. The second-generation hybrid "breaks up"; only the first-generation seed breeds true. Not having the proper parents to combine, a pirate cannot steal a hybrid innovator's secret.

Hybrids are the most exciting things in today's flower industry. Petunias were among the first flowers artifically hybridized in

America, in 1946, by Charles Weddle, then with W. Atlee Burpee Company, and now head of the Weddle Plant Research Laboratories at Palisade, Colorado. Since then, such hybridization has improved many other flowers.

To control the purity of the "blood lines," seedsmen raise plants in greenhouses, and each flower to be pollenated is emasculated by the removal of its stamens (male organs). It is then pollenated by hand with pollen from the other parental variety (pages 724-5).

I tried out this tedious process in a Pan American greenhouse. Under the direction of one of the women pollenators, I carefully nipped off the stamens of a pink petunia and then dabbed pollen from the stamens of another plant—the male parent—on the flower's pistil (the female organ). I hung a little tag on the stem to record the cross. I worked for perhaps five minutes, and my only reward was very sticky fingers and a grin from my instructor for my clumsiness.

"For each ounce of petunia seed, we emasculate 2,000 flowers, pollenate 2,000 flowers, and pick 2,000 seed capsules," Charlie Weddle told me. "Six thousand hand operations for an ounce of seed—that's why hybrid petunia seed is so expensive."

I began to see why petunia seed wholesales for as much as $500 an ounce. But even at that price the buyer gets a bargain, because an ounce contains about 300,000 seeds.

Tiny Seeds Command High Prices

Later, in Capitola, California, at the begonia gardens of Vetterle & Reinelt, which produce 80 percent of all United States commercial begonia seed, I was even more astounded: Seed of the giant begonias hybridized by Frank Reinelt brings $3,500 an ounce.

"Begonia seeds run more than a million to the ounce," Mrs. Reinelt told me. "Nobody dares sneeze around them—they're too precious."

Every grower is pursuing hybrids—working in marigolds, zinnias, snapdragons, begonias, geraniums, and pansies.

"Before too many years, hybrids of virtually every flower will be available," says John Waller of the Waller Flowerseed Company at Guadalupe, California.

One of the most successful hybridizers is Glenn Goldsmith, whose company has its greenhouses and trial grounds near Gilroy, California. I found the lanky Glenn in a greenhouse where flats of tagged petunia plants looked as though a bargain sale were in progress. He stepped over to a white cabinet.

"This is new with us," he said. "It's a growth chamber with high-intensity light and controlled temperature that speeds up reproduction impressively. With this we can take petunias from seeds to flowers in 37 days. Ordinarily it would take up to three months."

Once a seedsman has a good flower, his next task is to think up a name. "A good name is just as important as a good flower—or so it seems," said Bill Scott, sales manager of the Ferry-Morse flower division. The Ferry-Morse people are proud of their dwarf sweet pea and equally proud of its name, Knee-Hi (page 736). But they were taken aback when a letter arrived from England. "Your Knee-Hi grows belly-high over here," the letter read. "May I respectfully suggest a new name —Bali Hai?"

Vacuum Harvests Geranium Seeds

When fall shortened the days, I revisited the Ferry-Morse fields to watch the harvest. Windrow machines trundled along, cutting the flowered plants and laying them in rows. Men forked them onto canvas squares for curing and later threshing. In other fields, women stooped to pick pansy seeds by hand. Geranium seeds, once very difficult to pick, were sucked from the plants by vacuum (pages 722-31).

"When we bag the seeds, they are mixed with chaff and dirt—about fifty-fifty seeds and waste," said Elmer Twedt. He took me through the plant where a battery of vibrators, screens, and "hill climbers" clean the seeds. The latter are canvas belts to which sticks and other debris cling while the seeds roll off.

Ferry-Morse sends its seeds to Fulton, Kentucky, for packeting by high-speed machines, which can each fill 30,000 packets a day. Figures for individual companies are trade secrets, but an educated guess is that in the whole United States flower seed industry 500,000,000 seed packets are filled every year. The industry supplies about two-thirds of the flower seeds planted in this country (the rest come chiefly from Europe and Japan) and more than a third of the seeds used elsewhere in the world.

Germination laboratories spot-test every crop for seed viability, a matter of much concern to seedsmen (opposite). Ferry-Morse, for example, was quite upset when a woman called to complain that not a single petunia had grown from a packet she had planted.

Sorting for size and quality. Simon Rapanut checks sweet pea seeds at Ferry-Morse. Poured onto a vibrating table, heavy, fully developed seed moves to one end, smaller infertile seed to the other.

Good seed means good flowers. Each seedsman tests to make sure his seeds will sprout. At Ferry-Morse, Nancy Weems (left) samples a snapdragon crop. Using a suction plate drilled with 100 tiny holes, she picks up seeds from a bag. After checking to make sure there is only one to a hole, she will place them on a wet blotter. The blotter is then put in a controlled chamber where the seeds begin to sprout. Virtually every seed in a petunia test (below) shows life.

NEW GLORY FOR OLD FLOWERS: *Man and nature collaborate to produce spectacular blooms for today's gardeners. Burpee's Whirligig zinnias, below left, display frosted petals; hybrid Zenith zinnias, below right, reach six inches in diameter. Ferry-Morse's Knee-Hi sweet peas carry the names of California cities; the pink (inset, far left) honors San Francisco. Glenn Goldsmith perfected this "unsnapped" snapdragon, seen to the left of the familiar hooded variety. The green zinnia Envy was discovered by Bodger, who nursed its offspring into full production.*

KODACHROMES © NATIONAL GEOGRAPHIC SOCIETY

"We sent a man out immediately," an executive recalls. "The lady explained her planting methods and her long wait for the seedlings. While she was talking, her husband came into the room and listened with a funny look on his face. Finally he spoke up.

"'Mary didn't plant any petunia seed,' he said. 'She'd been bragging so much about her green thumb that I thought I'd take her down a peg. When that petunia packet came in, I steamed it open and substituted pipe tobacco for the seeds. She planted pipe tobacco, and it's no wonder it didn't come up.'"

Complaints about seeds are common, but Dr. Henry M. Cathey of the Crops Research Division of the Agricultural Research Service at Beltsville, Maryland, thinks most failures are the fault of gardeners—you and me, that is. "I have yet to get a poor lot of seeds," he told me. "Seedsmen are constantly improving them; our job here is to find ways to get the best results from the seeds they grow."

So the never-ending quest for better flowers goes on—in university laboratories, in the flower fields, in greenhouses where seedsmen make thousands of crosses every year in the hope a few will pay off. Frank Cuthbertson, now 80 and retired, summed up the plant breeder's role when he accepted the All-America Selections award for outstanding contributions to horticulture:

"The seedsman does not create," he said. "God is the creator. Researchers are simply looking for what is already present. Their job is to recognize the potential in a plant and try to make it usable in the gardens of the world."

Mediterranean Color Stereo Theatre—sliding doors, biggest picture in Color TV

Magnavox...finest Color TV, superb Stereo.

The magnificent Magnavox Color Stereo Theatre combines the finest Color TV with the most beautiful music in stereo.

Exclusive Magnavox Automatic Color tunes itself perfectly, automatically—every channel, every time. Chromatone adds vivid depth to color, high definition to black and white pictures.

Astro-Sonic Stereo flawlessly re-creates the full beauty of music from records, stereo FM/AM radio, and TV.

Select from many classic styles, sold direct through franchised Magnavox dealers (see Yellow Pages) to save you middleman costs.

Color TV from only $359.50. Stereo consoles from $159.50.

Color TV console in Contemporary styling

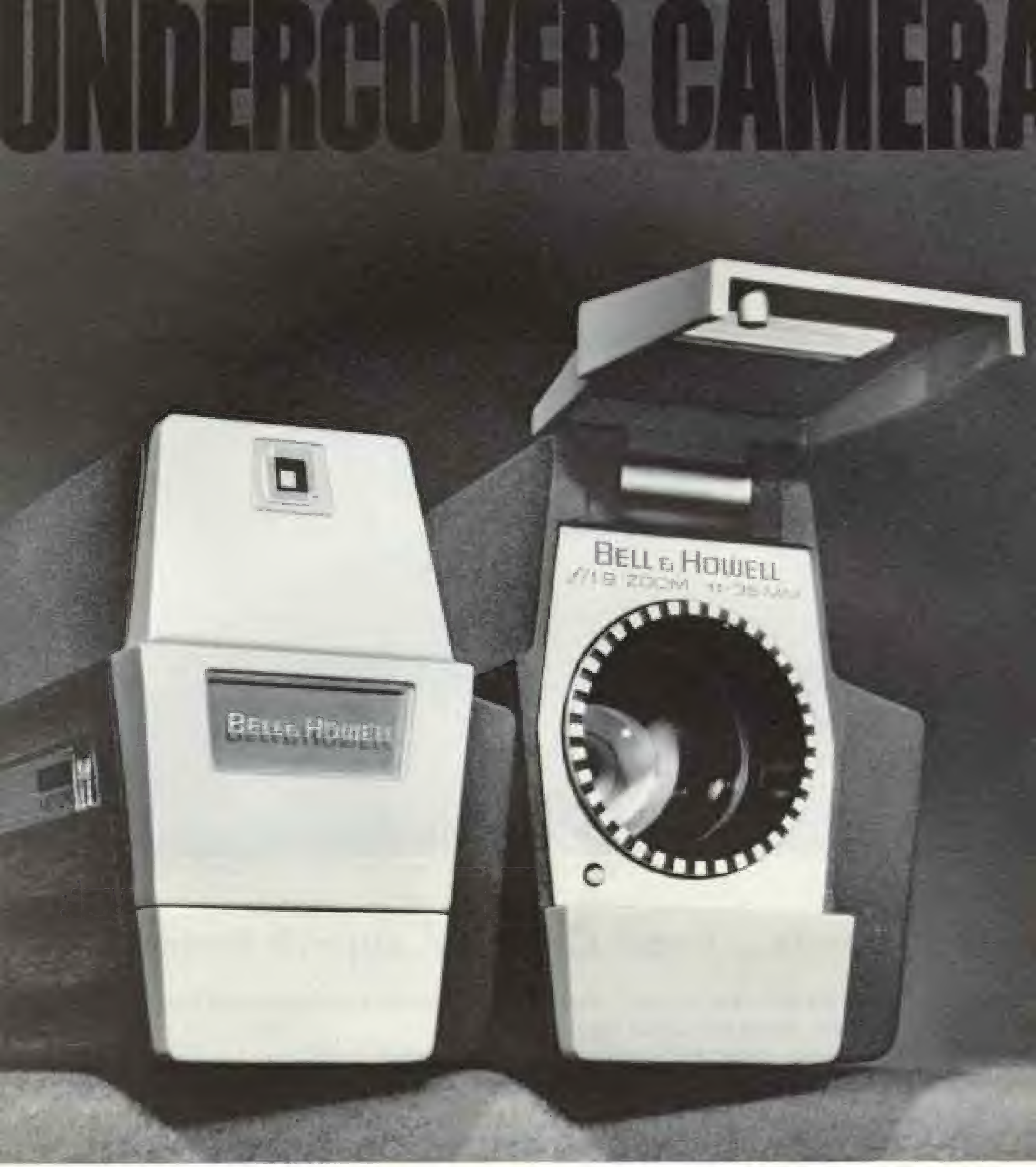
The magnificent

Magnavox

[illegible]

Astro-Sonic Stereo in Colonial styling

UNDERCOVER CAMERA



It's a different point of view. A different Super 8 movie camera that only Bell & Howell could create. A Bell & Howell breakthrough in optical miniaturization, developed through years of experience in space technology, made it all possible. The computer-designed zoom lens system in our new Super 8 is so compact, so precise, it's built-in. Sheltered. Undercover. Until the action starts. Then you'll get perfect pictures every time, because Bell & Howell's exclusive Optronic Eye® automatic exposure system is behind the lens. It sees only the light the film sees, so it can't make a mistake, even when you zoom from brightest sun to dimmest shade. Fingertip zoom control lets you zoom from wide angles to dramatic telephoto closeups. The crisp f1.9 lens system captures every move, every shade of color. And you can go into slow motion instantly. Even in the middle of shooting a scene. All you do is drop in a Super 8 cartridge and shoot. Electric film drive eliminates winding. And there's a fold-away grip for rock-steady movies. The new Bell & Howell Super 8. A new, undercover look in movie cameras. Only Bell & Howell could have created it, so there's only one place where you can find it. Where they carry Bell & Howell.

BELL & HOWELL

Is this the start of another dynasty?

Above is the newest member of the Beech Royal Family of Aircraft—the 7-10 place twin turboprop pressurized Beechcraft King Air B90. The King Air comes to the market place with a heritage of quality and longevity.

We built our first corporate twin in 1937. And now, some 30 years later, the famous twin-tail Beechcraft Model 18's are still rolling off the assembly line. It has been in continuous production longer than any airplane in history. Our first single engine commercial plane was the classic Staggerwing Model 17. It remained in production from 1932 until the end of World War II. At that time, we began production of the Beechcraft Bonanza. It is the world's most desired single engine airplane. Over 9000 have been sold and after 20 years, orders are at record levels.

The Beechcraft King Air is already living up to the Beech tradition of leadership. It is today's most popular airplane in its class with over 350 sold in the first three years of production. More than 200 of the world's leading companies now fly a King Air. Some fly as many as six.

We invite you to check into the advantages of King Air ownership by visiting your Beechcraft Dealer.

Beechcraft

Beech Aircraft Corporation
Wichita, Kansas 67201

2000 degrees in a glass factory is no sweat.

Our safety efforts are cold and calculating. Unusual hazards are the most obvious. And, of course, the first order of business. For the guy working around molten glass, it's an asbestos suit. For the men handling large sheet-glass, it's metal studded suits and gloves.

But ordinary problems can cause a little excitement on their own.

Poor lighting could make it difficult to see slippery steps. And slippery steps cause loud noises. Truly, the hum-drum problems deserve attention too.

Companies like the American Saint Gobain Corporation in Kingsport, Tennessee appreciate this attitude. So they ask for our advice. And they use it.

In fact, they not only involve us at working stages, but also when plans are being made. That's because insurance is an integrated part of their business. And decisions on insurance are as important as a new type of use for their glass.

In short, they supply the enthusiasm. We react with our best ideas. And so far, nobody has yawned at the results.

For example, American Saint Gobain just completed a million manhours of work without a disabling injury.

Fortunately, our advice is cheap. You simply ask for it. From the people who know business insurance like nobody else in the business.

Employers Insurance of Wausau

American Saint Gobain got the Wausau Story.

Get the Wausau Story for yourself.

Bolens Huskys have the only difference that makes a difference

You can spend weeks comparing engineering features—from engines to tires, from PTO to attachments, from controls to transmissions. But you still won't find the only difference that makes a difference: Does the compact tractor *perform* the way you want it to? Bolens Huskys have that difference. The design and engineering are based on what you *expect* from a compact tractor. You want performance, plain and simple. Huskys give you year 'round performance for every outdoor job. Arnold Palmer discovered the Bolens Husky difference. You can, too. At your Bolens dealer. Four Husky models from 7 to 12½ hp.

12-66

Difference | designed...with performance in mind!

BOLENS

BOLENS DIVISION, FMC CORPORATION
DEPT. C29-HE, PORT WASHINGTON, WIS.

COMPACT TRACTORS • RIDING AND WALKING POWER MOWERS • TILLERS • SNOW CASTERS

On your way to Europe, see the Old World.

Take the Empress and you're in Europe before you cross the Atlantic. From Montreal, you sail through 1000 miles of picturesque French Canadian countryside in the beautiful St. Lawrence Valley. Aboard the magnificent Empress of Canada or Empress of England, we pamper you with European gourmet cuisine and traditionally fine Canadian Pacific service. Dance band, parties, nightclub entertainment, and sports, too. Save on our one-way summer tourist fare $261.00. For reservations, contact your travel agent or Canadian Pacific.

SAFETY INFORMATION: The SS Empress of Canada and SS Empress of England, registered in Great Britain, meet international safety standards for new ships developed in 1960.

Canadian Pacific

A Mercury outboard has 12 fishing features.

1. **Mercury's tilted powerhead** prevents wet fuel from puddling in the cylinders and intake ports, keeps the engine firing smoothly from slowest idle to top speed.

2. **Fixed-jet carburetors** provide the precise air-fuel mixture for maximum power and fuel economy—never need resetting.

3. **System of Silence.** Sound-engineered cowl, sound-sealed remote control and fuel-line fittings, internal reed valves, exhaust relief silencing plus Jet-Prop exhaust.

4. **Low-level water intake** assures a continuous flow of cooling water to the engine, even when the prop isn't completely submerged. Location of water intake prevents clogging by weeds or debris.

5. **Shearproof drive** eliminates vulnerable shear or drive pins. Instead, a live-rubber safety clutch "gives" on impact, then resumes running.

6. **Jet-Prop** buries exhaust sound and fumes deep underwater behind your boat.

7. **Twist-grip throttle** gives you one-hand control of both speed and direction.

8. **Full forward-neutral-reverse gearshift** for instant maneuverability in the tightest spot.

9. **Remote fuel tank** with simple bayonet-mount plug obsoletes motor-mounted tanks. No more messy filling, no spilling—no slippery, reeking, flammable gas in your garage or in your car.

10. **Dual clamp brackets** are standard on all Mercs, make mounting easier, anchor the motor more securely.

11. **Smooth, angled leading edge** is designed to glide over submerged obstructions and through weeds safely and easily.

12. **Rugged gear case housing** has no nose to catch and hold weeds . . . is cast in one piece to assure permanent alignment of gears and bearings, no gaskets to leak—water stays out, lubricant stays in.

Just try to find another outboard with half as many.

KIEKHAEFER MERCURY

FIRST IN MARINE PROPULSION

MERCURY

Top: 1968 Thunderbird 2-door Hardtop. Bottom: 1968 Thunderbird 4-door Landau

Fly any way you like with the Bird. 2 doors or 4. Buckets or full-width front seats. Room for 4, 5, or 6. With beautiful standards only the Bird offers as standard. All this, and a hot new Thunder Jet 429 cu. in. V-8 to flash you from where you are to where you're going. What are you waiting for? Get your kind of thunder at your Ford Dealer's now!

'68 Thunderbird

unique in all the world.

CHANGE OF ADDRESS?

ATTACH YOUR NATIONAL GEOGRAPHIC LABEL HERE, print new address below, clip and mail to National Geographic Society, Washington, D.C. 20036. (Have a question about your magazine? Attach label to this form, and clip to your letter.)

NAME

NEW ADDRESS

CITY STATE ZIP CODE

Don't bring your fur coat to Canada this summer. Someone might shoot it.

Canadian animals wear a fur coat in the summertime because they can't get out of it. Canadian humans do not. Enough said? Bring at least a couple of bathing suits instead. Canada has some great beaches and more hours of summer sunshine than many tropical countries.

The Atlantic provinces offer two perfect examples of the kind of beach we mean. One is at Shediac, New Brunswick, a favourite resort with both Canadian "Maritimers" and American New Englanders. The other one is Cavendish on Prince Edward Island's northern shore. Here, long stretches of sun-baked sand take the New England chill off the Atlantic as it rolls in to you. When it reaches you, it's a comfy 70 degrees, the warmest it's been since Florida. You'll never run out of beautiful beaches no matter how far you travel in Canada. Besides two coasts to boast about, we also have more lakes than all the other countries in the world put together. In the six different vacation districts of Ontario alone, there are well over 40,000 lakes (after 40,000 we stopped counting). We count them as blessings when the hot weather comes, and the hot weather *does* come, believe it. Some days all you'll want to do is jump in the lake. In a fur coat, this isn't easy.

Canada

Canadian Government Travel Bureau, 0021-04-8
Ottawa, Canada.
Please send me the Family Fun Kit 14

Mr./Mrs./Miss _____

Address _____ Apt. _____

City _____

State _____ Zip Code _____

Camps

FARRAGUT NAVAL CAMPS

Adventure on Toms River for boys 9-16. Sailing instruction. Motor boats and 25 sailboats. Trips to Sea. Bunkhouses. Mess. 2 gyms, athletic fields. Pool. Appr. summer school. Cdg. **Farragut Naval Camps, Box LC, Toms River, N.J. 08753**

CAMP HIGHLANDER

Highlander camps in eastern U.S. 4, 5 or 9 weeks. Sailing, water sports, tennis. Private lake. Colonial Academic work opt. Owned, operated by Pine Crest School. Write **Larry N. Pedicord, Admissions, Pine Crest School, Ft. Lauderdale, Fla. 33338**

Come with us to NAUSAKWA in the Poconos • Girls 6-16 enjoy an active summer on a wooded mountain site. All new facilities. Lots of hiking and campcraft. 60-acre private lake with canoeing, sailing, water ballet. Arts and crafts. Sports, drama, and horseback riding. Write: Mrs. Wm. Gilbert, Camp Nausakwa, Box 101A, Mt. Pocono, Pa. 18344.

PINE CREST

SUMMER School in Fla. Developmental reading and special enrichment courses. Beautiful new campus. Air conditioned classrooms. June 17—Aug. 2. Co-educational. Boarding, grades 7-12. Pool; tennis; other sports. **Dir. of Admissions, Box NS, Pine Crest School, Fort Lauderdale, Florida 33338**

VALLEY FORGE
MILITARY ACADEMY SUMMER CAMPS

At America's renowned Military Academy. Ranger Camp (12-15). Pioneer Camp (9-12). Golf, polo, all sports. Individual guidance. Leadership and social courtesy training. Band Camp (13-18).
Catalog, Box NC, Wayne, Pa. 19087

TED WILLIAMS BASEBALL CAMP

Boys 8-16. Various Clinics & Programs Featuring Baseball & Basketball. Ted Williams in person. **BJ Cassidy—Dept. NG, Lakeville, Mass. 02346**

Coed Schools

Interlochen Arts Academy

ACADEMY, coed college prep. Grades 9-12. Equal emphasis on arts & academics. Music, Art, Drama, Dance, Stg. Arts. Academic affil. with Nat'l Music Camp. Catalog. **Dir. of Adm., Box 20, InterlochenArtsAcad., Interlochen, Mich. 49643**

JUDSON ARIZONA
BOARDING-COLLEGE PREP.-COED

Fully accredited. Informal Western life. Beautiful desert campus near Phoenix. Grades 5-12. Small Classes. Excellent Staff. All sports, horseback riding. Art, Music. Brochure. **David N. Wick, Hdm., Judson School, Scottsdale, Ariz. 85252**

WEST NOTTINGHAM ACAD.

PULLY accred. Coed College Prep, Grades 9-12. Postgrad. Adv. instr. English, science, history. Humanities Graduate sports, golf. Midway Philadelphia. Est. 1744. Camp & Summer School. Catalog. **N. C. Farmer, Box 31, Colora, Md. 21917**

Girls' Schools

CHAPEL HILL SCHOOL

Est. 1897. Boarding & Day, Gr. 9-12. Col. Prep. Gen. Courses. Worldwide enrollment of 140. "Home-to-Study." College Board Review classes. Country atmosphere. Boston 10 mi. Also, Summer Session. Catalog. **227-N Lexington St., Waltham, Mass. 02154**

KATHARINE GIBBS

Secretarial training for top jobs. National and state accreditation. Residence Centers. **Asst. Dean, 21 Marlborough St., Boston 02116; 200 Park Ave., New York 10017; 33 Plymouth St., Montclair, N.J. 07042; 33 S. Angell St., Providence 02906**

MIRAMAR

Secondary college preparation for girls, grades 9-12, post-graduate. Small classes, individual attention. Emphasis on study skills. Ocean-front estate. Swimming, tennis, riding, golf, sailing. Brochure. **Mr. & Mrs. Roy S. Penner, Miramar, Box L, Bellevue Avenue, Newport, Rhode Island 02840**

Home Study

CALVERT SCHOOL

If you plan to stay abroad, you can educate your child with approved Calvert home-study courses. Kindergarten—8th grade. Step-by-step teaching material. Used by tens of thousands. Ideal for superior child. Non-profit. 62nd year. Catalog. **3 Tuscany Rd., Baltimore, Md. 21210**

Junior College

VERNON COURT JR. COLLEGE

2 yr. women's college. A.A., A.F.A., A.S.S. Degrees. Excellent transfer record. Program planned to develop intellectual curiosity. Lib. arts, music, art, creative dance, sec'l, med. sec'l. Sports. **Pres. Sec'y., Bellevue Ave., Newport, R.I. 02840**

Boys' Schools

ADMIRAL FARRAGUT ACAD.

FULLY accredited. Grades 7—12. Prepares for all colleges, gov't acad. Testing, guidance for college, career. Naval Jr. ROTC. Pool, gyms, tennis, tracks. Summer camps, school. Catalog. **Adm. Farragut Academy, Box L, Toms River, N.J. 08753**

ARMY AND NAVY ACADEMY

One of the Nation's finest Preparatory Schools. Fully accredited. Located immediately on the ocean, 40 miles south of Los Angeles. **Camp Pendleton.** Summer Camp. Separate catalogues. **Box N, Carlsbad, California 92008**

AUGUSTA
Military Academy

Combines individual development in a country atmosphere. Fully accred. Grades 7-12. Developmental Reading. Study Skills. College Boards. Advanced Placement in English, Math & Biology. Guidance. Varsity and intramural sports for all. Year-round golf, tennis, sailing. Outdoor swimming pool. Catalog. **Director of Adm., 7498 San Jose Blvd., Jacksonville, Florida 32217**

THE BAYLOR SCHOOL

75th Year. Accredited scholastic, College prep. Boys boarding 14-18 day 12-18. Semi-military. Modern facilities. New science and library. Athletics all ages. Around own islands. Summer Camps, boys 6-16. Catalog. **183 Cherokee Road, Chattanooga, Tennessee 37411**

BERRY ACADEMY

college preparatory for young men

Distinctive classical preparatory academy with emphasis upon character development, scholarship and leadership. Fully accredited. Boarding grades 9-12. Day grades 8-12. Small classes, individual attention. Remedial reading program. Personal counseling. Supervised study. Interscholastic athletics for all. Modified military program. Situated on Berry campus.

Headmaster, Berry Academy, Mount Berry, Georgia 30149

BOLLES OF FLORIDA

FULLY accredited. Small home academic preparation. Grades 7-12. Developmental Reading. Study Skills. College Boards. Advanced Placement in English, Math & Biology. Guidance. Varsity and intramural sports for all. Year-round golf, tennis, sailing. Outdoor swimming pool. Catalog. **Director of Adm., 7400 San Jose Blvd., Jacksonville, Florida 32217**

BORDENTOWN MILITARY

FULLY accredited. Grades 7—12. Outstanding record of college entrance. ROTC. Boys enjoy how to study. Small classes. Summer session. Sports for all. 87th year. Catalog. **Bordentown Military Institute, Box 655, Bordentown, N.J. 08505**

Brandon Hall

EXCLUSIVELY INDIVIDUAL CLASSES

Complete High School Curriculum
Training for All Schools and Colleges
SPECIALIZING IN HIGH I.Q.
Continuous Sessions and Enrollments
3503 Spalding Drive Grades 8-12
Norcross, Ga. 30092 404•432-2663

CARSON LONG

Military School. Dedicated to the whole boy — physically, mentally, emotionally. How to learn, how to labor, how to live. Prepares for college and life. Grades 6—12. 152nd year of character building. Overall charges $1600. **Box 21, New Bloomfield, Pa.**

Camden
Military Academy

A fully accredited college preparatory school, grades 8-12, ideally located in Carolina's winter resort section. Strong academic environment, character, leadership. Jr. ROTC. Swimming pool. Rate $1575.00 plus uniforms. Write **Col. L. P. Risher, Hdm., Box N, Camden, S.C. 29020**

CASTLE HEIGHTS

Outstanding College Preparatory School

1962 graduates in 21 leading colleges and service academies. ROTC. Honor School in delightful Andy Jackson country. 300-acre campus. 30 buildings, golf course, radio station. Every cadet in athletics, taught to study and excel. Fully accredited. Founded 1918. Jr., Sr., Post-Graduate Schools. Summer Programs. Write Box 309N.
Castle Heights Military Academy, Lebanon, Tenn. 37087

COLUMBIA
MILITARY ACADEMY

Combines academic excellence with pride in character, leadership. Accredited prep for College, Gov't Academies. Beautiful modern U.S. Army ROTC. Supervised study, 24 hours in session. Band, orchestra, team sports. 640 acres. Jr. School, High School, P.G. Summer School. Bus Cos. and "If Parents." write
CMA, Dept. N, Columbia, Tenn.

CULVER

On Lake Maxinkuckee. Develops initiative, self-reliance, courtesy, poise. Grades 7-12. Thorough college preparation. Accredited. Exceptional facilities. Leadership training. Black Horse Troop, Artillery, Infantry, Band. ROTC. Sports. Scholarships available. Catalog. **35 Pershing Road, Culver, Ind. 46511**

ADMIRAL FARRAGUT ACADEMY

FULLY accred. Grades 7-12. Prepares for all colleges, gov't academies. Naval Jr. ROTC. Guidance. New Gold Coast location. Pool, gym, boats, band. Catalog. **Admiral Farragut Academy, Prin., Box 11448, St. Petersburg, Florida 33733**

FISHBURNE MILITARY

FULLY accred. Complete preparation for college—90% grads accepted. Purposeful reading, learning work. Grades 7—12. Small faculty-ratio 10-1. Honor ROTC. school. Summer school June 25-Aug. 10. Catalog. **Col. E. R. Young, Box N, Waynesboro, Va. 22980**

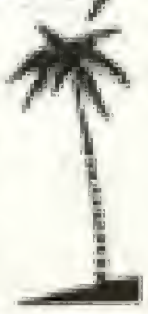
Florida Air Academy

United States Air Force ROTC

Color catalog details sound academic program. Developmental reading & study skills. Personal guidance. Accred. college prep grades 8-12 in Melbourne 1-9 in Ft. Lauderdale. All sports. Flight ops. Summer school. Write: **Florida Air Academy, Melbourne 1, Fla. 32901**

Florida Central Academy

Grades 7—12. Small classes. "In the land of the sun" 20 mi. north of Orlando. Fully Accredited College Prep. 30 acre campus. Outdoor Pool, Golf. Athletics for all. Expert coaching. Air conditioned sleeping rooms. Colorado Semmes School. Catalog, Dean, Box 38, Sorrento, Fla. 32776



FLORIDA MILITARY SCHOOL

Caters to study. Small classes. Fully accredited. Grades 7—12. Beautiful climate. College town. Remedial reading. Outstanding faculty. Honor rated. Varsity athl. Catalog. **Col. Carl N. Ward, Florida Military School, DeLand, Florida**

GEORGIA MILITARY COLLEGE

FULLY accredited Jr. College & Prep. grades. Modern equipment. Personal guidance. Varsity & intramural sports. Strong senior ROTC. Registration Sept., Jan., Mar. Write: **Col. R. A. Thorne, Box N, Milledgeville, Georgia 31061**

GORDON MILITARY COLLEGE

Est. 1852. Fully accredited. Prep. gr. 6-12 & Coed Jr. College. Sr. ROTC commissions granted. Dedicated faculty, sm. classes, supervised study. Sports. Reasonable rate. Summer School. Catalog. **Admissions, Dept. N, Barnesville, Ga. 30204**

FORK UNION MILITARY ACADEMY

Our ONE SUBJECT PLAN of study in Upper School (grades 9–12) has increased home mail & Developed communication. Fully accredited. 11 modern buildings. 2 wonderfully equipped gyms, 2 indoor pools. Beautiful environment, excellent health record. **Junior School (grades 5–8) has separate buildings, gym, pool. Bands. Housemothers.** 70th year. For ONE SUBJECT PLAN booklet and catalog, write: **Dr. J. C. Wicker, Box 305, Fork Union, Virginia 23055**

GREENBRIER MILITARY SCHOOL

156TH YR.

THE SCHOOL OF ACHIEVEMENT

A superior college preparatory school Grades 7-12 and P.G. Fully accredited. College Boards. Learning How to Study emphasized. Small classes. Responsibility & leadership developed. Business, Public Speaking. Band. Excellent Success records in College & Life. Athletics for all. Near White Sulphur Springs. Summer camp. Catalog write: **GMS Pres., Box M-83, Lewisburg, W. Va. 24901**

HARGRAVE MILITARY ACADEMY

MILITARY training. Fully accredited. College preparatory, general courses. Grades 8–12. Home-like family training, remedial and developmental reading. All sports. Summer School. 35th year. Catalog. **Col. J. M. Cosby, Box N, Chatham, Va. 24531**

HOWE MILITARY SCHOOL

Jr. & Sr. Schools, grades 8–9 & 9–12. Thorough academic training. Accredited prep for Basic ROTC. Jr. sports. Swim. Episcopal. Est. 1884. Summer Camp. Catalog **Col. R. R. Raffa, Supt., 958 Academy Pl., Howe, Ind. 46746**

KEMPER MILITARY SCHOOL AND COLLEGE

MILITARY school. Grades 8-12, 2-year college. Small classes. Fine faculty. Counseling. How To Study Program. Jr. Sr. ROTC. Sports. Social activities. Flying Club. Education for leadership since 1844. Catalog: **753 Third St., Boonville, Mo. 65233**

KENTUCKY MILITARY INSTITUTE

Louisville, Ky. in winter at Venice, Fla.

Preparation for college under ideal climatic conditions. Two complete school plants. Fully accredited. Grades 8-12. Small classes. Special reading course. ROTC. Sports for all. Oldest private military prep school in United States. Catalog

Director of Admissions
Box N, Louisville, Ky. 40222

MARINE Military Academy

College preparatory. Grades 8–12. Accredited. Naval Honor School. Aerospace science and FAA flight training. Marine Corps JROTC. High academic standards. Air-conditioned classrooms. 14-acre campus. Evening board on grads of U.S. Marine Corps. Write for catalog. **Director of Admissions, 135 Iwo Jima Blvd., Harlingen, Texas 78550**

MARION INSTITUTE

133rd YEAR. Fully accredited Junior College 4-year College Preparatory. Special preparation for Army, Navy, Air Force Academies. Senior R.O.T.C. Small classes. Honor System. Sports. Summer School. Catalog: **Dir. of Adm., Marion Institute, Box N, Marion, Ala. 36756**

MASSANUTTEN ACADEMY

In the Beautiful Shenandoah Valley
go Mi. S. W. of Wash., D. C.-U.S. Route 11

NATIONALLY ACCREDITED — ROTC
GRADES 8 TO 12 — SMALL CLASSES
Prof. Guidance — Reading Courses
Special College Entrance Program
Sports - Riding - Band - Pool - Gym

65TH YR. — PICTORIAL CATALOG
Write Col. H. N. Benchoff, Pres.
Box 15, Woodstock, Va. 22664

MIAMI MILITARY ACADEMY

Fully accredited. ROTC Honor School. College Prep & General. Grades 6–12 & Post Grad. Est. 1929. Guidance. How to study. Honors Courses. All sports. Modernize for Summer School & Camp. Catalog. **5960 S.W. Biscayne Blvd., Miami, Florida 33138**

MISSOURI MILITARY ACADEMY

Fully accredited. Grades 7–12. Jr. College. Small classes, excellent faculty, a record of higher quality graduates. R.O.T.C., sports and social activities. Write **Maj. Gen. John F. Smeltzer, U.M.A., Claremore, Okla. 74017**

ONARGA MILITARY SCHOOL

Leaders for character building study programs, homelike living. Accredited. College preparatory, business. Small classes, individual help. Grades 7-12. Music. Pool. Moderate fee. Color, 80 pp. brochure. **Col. L. W. Adams, Box W, Onarga, Ill. 60955 • 815-268-7721**

PEEKSKILL MILITARY ACAD.

Quality preparatory—with the resources to provide motivation for the individual student, preparation for the gifted. Grades 8-12. Jr. ROTC. **Write Dir. of Adm. for Catalogue N, Peekskill, New York 10566. Tel. 914-737-4330**

PERKIOMEN

Graduates attend leading colleges universities. Home-like atmosphere. Grades 9–12. Sports, activities for all. Near New York City and Philadelphia. 92nd year. Coed summer school. Write for catalog. **Director of Admissions, Box N, Perkiomen School, Pennsburg, Pennsylvania 18073**

RANDOLPH-MACON ACADEMY

AN outstanding College Preparatory School in beautiful Shenandoah Valley at Skyline Drive. Grades 8–12. Small classes. Interesting study methods. Separate facilities on 100 acre campus. Summer School. Write

Dr. Robert E. Parker, Pres., Front Royal, Va. 22630

RIVERSIDE MILITARY ACADEMY

A DISTINGUISHED MILITARY PREPARATORY SCHOOL

Nationally accredited college preparatory. Grades 8-12 and Post Graduate. **Weekly reports.** Two completely equipped campuses provide ideal change of climate for health, interest and year-round sports. Experienced association with selected teachers who live and eat with cadets.

College guidance. Honor ROTC unit developing self-discipline. Summer school in Blue Ridge Mts. 2nd new Gym & Activities Bldg. Boys 37 states. Reasonable all-inclusive School charge. Catalog. Write:

GEN. SANDY BEAVER, Pres. Box 385, Gainesville, Ga. 30501

WINTER IN FLORIDA
FALL & SPRING IN BLUE RIDGE MOUNTAINS

ROOSEVELT MILITARY ACAD.

"Builders of Men." Accredited. Grades 8-12. Prep general courses. Small classes. Emphasizes fundamentals, how to study. Guidance. ROTC. Sports. Aviation. Catalog. **Col. Glen G. Milliken, Box N, Aledo, Ill. 61231 Phone: 309-582-5306**

SEWANEE MILITARY ACADEMY

101ST YEAR

Fully accred. college preparatory. Grades 8-12. Small classes. Indiv. attention. Episcopal. ROTC highest rating. Sports, gym, pool. 10,000 acres U. of South. 6th Summer School-Camps. Catalog. **Dir. of Adm., Box N, Sewanee, Tenn. 37375**

SANFORD NAVAL ACADEMY

An Outstanding Florida Private School

Selective enrollment. Small classes. Annapolis and University personnel. Superior housing and academic facilities. Every midshipman taught to apply and succeed. All sports. Waterfront campus on beautiful Lake Monroe. Accredited Junior and Senior schools. Summer session. Write Box 1605N.

The SANFORD NAVAL ACADEMY, Sanford, Florida 32771

St. John's Military Academy

A Tradition of Excellence

Stressing scholarship, character, leadership. Accred. college prep. gr. 7-12. Tutorial, developmental reading programs. All sports. Riding, rifinery. Golf, stable, pool, lakes. ROTC. Band. Noninterdenominational. 73rd year. 100 mi. West of Chicago.

G. A. Pitt, Pres., Box 1358, Delafield, Wis. 53018

SHATTUCK SCHOOL

Boys, Grades 8-12. Balanced educational, religious, military. Accredited college prep. General courses. Small classes. Sr. Boys' ROTC. Sports. Gym, pool, golf. Episcopal. Est. 1858. Summer School. Catalog. **Dir. of Adm., 585 Shumway Hall, Faribault, Minn. 55021**

STAUNTON MILITARY ACADEMY

In Beautiful Shenandoah Valley. Thorough college preparation; fully accredited. Individual guidance. Rural. All sports. 2 gyms. Pool. Fine health record. Five great buildings. Separate Junior School. Write Catalog secretary, Box 12-S, Staunton, Va. 24401

BASIC COURSE R.O.T.C. BY U. S. ARMY INSTRUCTORS

Founded 1860

TMI TENNESSEE MILITARY INSTITUTE

Boys planning to attend leading colleges and technical schools need thorough preparation. Over 90% of graduates enter recognized colleges. Grades 8-12. Small classes, experienced teachers. Ample facilities. Beautiful 114-acre campus. Gymnasium. Athletics for all. Supervised School. Air-cooled mountain camps. 8–14. 85th year. Catalog:

Col. C. R. Endsley, Jr., President
Box 147, Sweetwater, Tennessee 37874

Here, education extends beyond the academic to build character, and develop leadership. Grades 9 through 12 and Jr. College. Beautiful campus. 35 modern buildings. Highest scholastic standards. Nationally accredited. Individualized guidance and tutoring. Social development. Reading and spelling clinics. All sports including horsemanship and polo. Renowned bands, and chorus. Jr.-Sr. ROTC. Summer camps.

Catalog, Box M,
Wayne, Pa. 19087

Valley Forge MILITARY ACADEMY and JUNIOR COLLEGE

WENTWORTH MILITARY ACADEMY

PREPARATION for the rigors of business or higher education. Accred. Jr. H. S. and 2-yr. College. Sr. ROTC. Now multimillion-dollar gold Junior Gear, F.A.A. flying, summer school, younger boys' camps. 85th year. Catalog: **Col. Wilkoff, 858 Wash. Place, Lexington, Mo. 64067**

WESTERN MILITARY ACADEMY

Emphasis on self-confidence, self-discipline, how-to-study. Small classes, guidance. Gr. 7-12. Career emphasis ROTC. Athletics; riding, pool, gym. Fully accredited. Near St. Louis. Catalog. **Col. Ralph B. Jackson, Supt., Box N-5, Alton, Ill. 62002**

CLARK
CORTEZ

Hernando's Rideaway

Ride away to new adventures in leisure in this luxurious motor home. Discover the new world of comfort and convenience in Clark Cortez. Easy to handle, ruggedly reliable, this self-contained traveller makes you into a modern-day conquistador. Front wheel drive, power steering and power brakes are all standard equipment. Go in a Clark Cortez . . . explore in a Clark Cortez . . . discover your own halls of Montezuma.

Write today for FREE color brochure showing decorative interiors; day and night interior arrangements; detailed specifications. We'll also send you names of dealers where you can see and try the Clark Cortez.

CLARK equipment

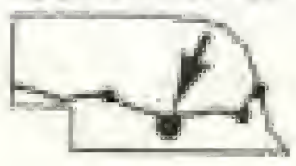
Write to: Dept. NS Clark Cortez Div.
Clark Equipment Co., Battle Creek, Michigan 49016

See How
America Grew
THE HAROLD WARP
PIONEER VILLAGE

12 Miles South of 80 at MINDEN, NEBR.

One of top 20 U.S. attractions...more than 30,000 historic items in 22 buildings, arranged in order of development. Antique autos; farm implements; locomotives; airplanes; fine china; hobby collections; paintings; much, much more. Buildings include Indian Stockade; Pony Express Station; Sod House, People's Store; Pioneer Railroad Depot. Everything that made America great. Adults $1.50; minors 6 to 16, 50 cents; little tots free. Motel, restaurant, campgrounds.

130 mi. w. of Lincoln on 6 34 30 and



Write for Free Folder
Zip Code 68959

Drifter's OREGON

Try this for a vacation idea. Drift down Oregon's McKenzie River while catching the trout below. Or become a vacation-time drifter elsewhere in Oregon. From the sea to the mountains to open sagebrush country, Oregon is big for drifters. You can rough it one day and relax in a resort the next. Mail coupon for more Oregon ideas.

TRAVEL INFORMATION, Room 128
Highway Dept., Salem, Oregon 97310

Please send me Oregon's free full color booklet.

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

Really great vacation idea: headquarter at Stone Mountain, see Atlanta, too. Stay at luxurious, 90-room inn or lakeside campsites. Explore 3,600-acre recreation park with tours, historic sites. Drive in to Atlanta for nightlife, big league sports. For free color brochure, write Historic Stone Mountain, Dept. N.G., P.O. Box 778, Stone Mountain, Georgia.

Really great in Atlanta

HISTORIC & STONE MOUNTAIN

Come down to the sea again...

Come to New Brunswick. Bathe in the warmest ocean currents north of the Virginia Capes. Hear the roar of the sea when the wind is high. Feel the fresh tingle of salt spray on your skin. This is Canada's Picture Province where you suddenly find you've lost your cares in some quiet hamlet splashed warm with summer color. For a change of pace visit the cities with their memories of early Canada and their modern shops and handicraft centres. Visit Saint John's museum and its models of famous sailing ships. Fredericton's Art Gallery and Playhouse and its fine examples of stately Georgian architecture. See the "Wonders of Nature"—the Magnetic Hill, the Tidal Bore, the Reversing Falls. Come down to the sea again in 1968 and make New Brunswick your complete vacation.

NEW BRUNSWICK

CANADA'S PICTURE PROVINCE

Send my New Road Map and Colorful "Where to Stay", "What to See" Books to:

Name _____

Address _____

City _____ State _____ Zip _____

MAIL TO: N.B. TRAVEL BUREAU, BOX NG-C, FREDERICTON, N.B., CANADA

De Beers Consolidated Mines, Ltd.

The diamond gift that celebrates
a special, joyous time
recaptures all the quiet joys
in which your love's been growing.

A diamond is forever.

Maybe your favorite chair should be in your car.

No two people are alike. That includes you. So we offer a variety of seats in our New Yorker.

The 3-in-1 divided front seat—a highly versatile piece of furniture. Armrest up, it's over five feet wide. Armrest down, you get the feel of real buckets. And the seats adjust individually. For additional comfort, the passenger's side reclines.

Contoured bucket seats are another way to go. They're anthropometrically designed. That means custom comfort. They're shaped to fit you. No matter what shape you're in.

Then, there's our standard New Yorker seat. Deep coil springs. Not one, but two layers of padding. And 9-inch-wide pull-down center armrests both front and rear.

If your favorite chair isn't in your car today, it can be—tomorrow. Make your move.

MOVE UP TO CHRYSLER

Twin Turbine 4-Door Hardtop

"Try this one...it's cut a little fuller."

Is it time for you to get back into things? Try Kellogg's Special K Breakfast.

When your helpful salesman starts helping you into a larger size, it's time to eat smarter—starting with breakfast, the most important meal in any diet. Like Kellogg's® Special K® Breakfast. Delicious Special K is loaded with the vitamins and protein you need when you're dieting. Add skim milk, sugar, juice, and black coffee. Altogether, only 240 calories. Altogether, smart eating.