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THE NATIONAL GEOGRAPHIC MAGAZINE

West Virginia: Treasure Chest of Industry

BY ENRIQUE C. CANOVA

With Illustrations from Photographs by Volkmar Wentzel and B. Anthony Stewart

A MAP of West Virginia turned so that Williamson is directly at the bottom looks like an old-time leather pouch such as prospectors used to carry gold dust.

The two panhandles are the drawstrings to close it. And the simile is not too farfetched, for within the confines of this geographic "pouch" lies tremendous wealth in natural resources—coal, oil, gas, farms, orchards—and scenery.

Look at the map again in its normal position with relation to the rest of the United States (pages 144-5). Chester is farther north than Pittsburgh; Bluefield farther south than Richmond; Kenova considerably *west* of the Panama Canal; while in the east, if you were to go due south from Harpers Ferry to the latitude of Savannah, Georgia, you would be 200 miles out in the Atlantic Ocean!

Spark-spitting, wood-burning "iron horses" of the Baltimore and Ohio Railroad puffed into West Virginia at Harpers Ferry for the first time in 1836 (page 148).

Standing on Jefferson's Rock overlooking the rowdy rapids of the Shenandoah and Potomac Rivers, I watched a sleek modern flyer of that same line burst from a tunnel in Maryland, spring across the bridge with a deep-throated roar, and disappear around the West Virginia mountainside.

How the spirits of pioneer railroaders must smile as they recall their struggle to build this line, and the objections raised by those who feared the inroads of this "newfangled contraption"—particularly the freight-hauling teamsters! Some 4,000 miles of steam railroads—about the mileage of all Turkey—now serve the State within its boundaries.

Here, at Harpers Ferry, John Brown made his famous raid in 1859. Up to the Civil War the history of West Virginia was the history of Virginia. The new State was formed in 1863. The stirrings of industrial life and development really began about 30 years ago and have already attained amazing strength.

The Birth of the R. F. D.

The seed of the Nation's 1,390,000 miles of rural delivery routes was planted in Charles Town when, on October 1, 1896, the first experimental "R. F. D." service was begun.

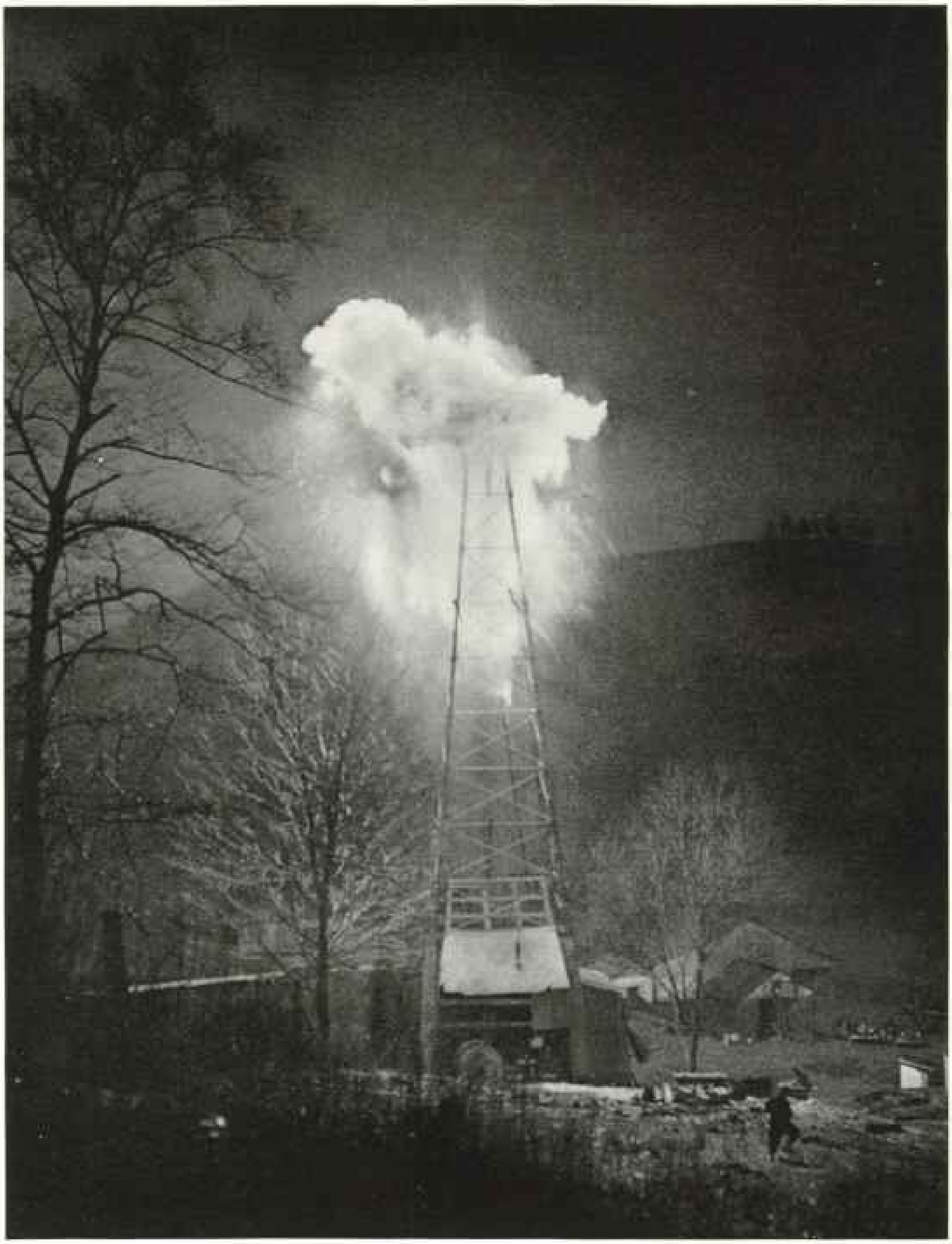
Orchards were everywhere as we drove along toward Martinsburg. At a large packing plant we saw spots before our eyes—millions of red, green, and yellow spots: apples being scrubbed, sorted, and packed by deft feminine fingers, before being shipped throughout the eastern United States and to many parts of the world (Plate I).

Two blocks away in another plant the smaller apples go through a dizzy sequence until they emerge as shiny, tightly sealed cans ready for cooling, labeling, and shipping.

"Applesauce—it goes almost everywhere," said the manager. "You have probably eaten it under different labels in many places. During the season, when operating at full capacity we produce 240,000 pounds of applesauce each day, sweetened with some 20 tons of sugar."

Two popular varieties of apples, the Grimes Golden and Golden Delicious, originated in West Virginia.

Years ago the northern panhandle country was also a heavy apple producer. Then the crop was floated downstream, sometimes as far



Natural Gas, Roaring from Its Mile-deep Prison, Mushrooms into Flame

At dusk this well near Sissonville was "shot" to increase the gas flow by exploding 60 quarts of nitroglycerin at a depth of 4,876 feet. Flying gravel, forced out of the well at terrific speed, struck the top of the metal rig, causing sparks which ignited the gas. A moment later another blast of sand extinguished the flames (pages 147 and 156). "You see that only once in ten years," said the foreman. Natural gas is stored by Nature in vast pockets deep within the earth. Tapped by drilling, it flows steadily from the wells and through pipes to home and factory.

"Pull Over," Said This State Trooper near Fairmont, "and I'll Change Your Tire"

as New Orleans, in flatboats and sold—apples, boat, and all—for there was no way to get these "flats" home profitably.

"In the stockyards they say that 'every part of the hog is used except the grunt,'" remarked a Martinsburg man. "Well, with apples we could use everything, if such uses should become economically feasible—apple, seeds, stem, skin, and even the wax on the peel!"

"What for?" I asked. "I know apple pie, apple butter, applesauce, apple pectin for jams and jellies, apple vinegar, and, of course, apple cider. What else could you make?"

"Hand lotion, furniture polish, wax paper stencils, and fertilizer, to mention a few," he replied.

Festivals of Fertility

Total production of apples in the State for ten years has averaged between five and six million bushels a year. About two-thirds of the large commercial orchards are located in the eastern panhandle. Each year Martinsburg stages an Apple Harvest Festival.

These festivals are colorful, but King Apple isn't the only ruler. The list includes the Strawberry Festival at Buckhannon; the Rhododendron (State flower) Festival at Webster Springs; the Tomato Festival at Berkeley Springs; the Forest Festival at Elkins; the Buckwheat Festival at Kingwood; and the Tobacco Festival at Huntington.

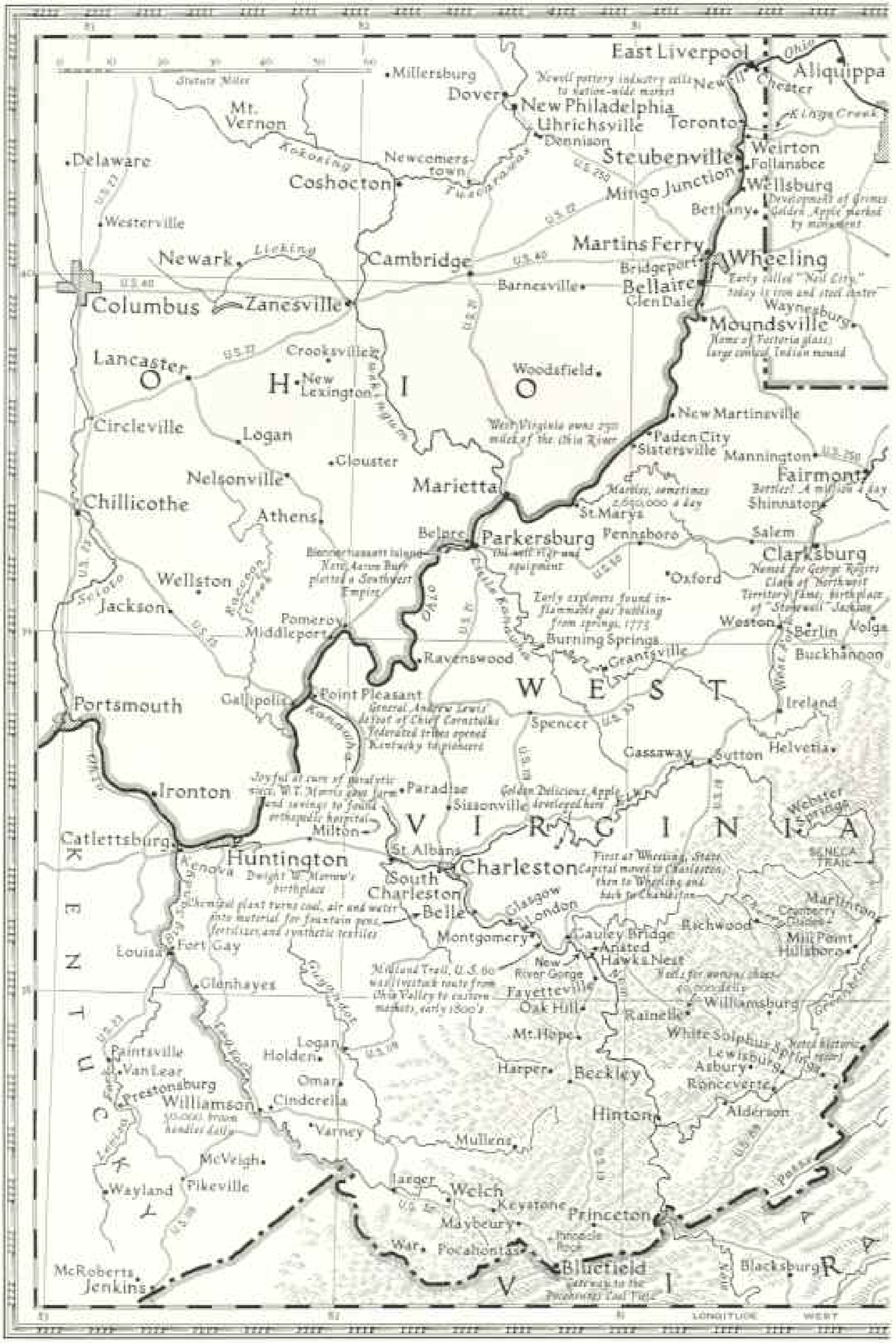
Then there is the Spud and Splinter Festival at Richwood, a unique celebration in honor of the potato and lumber industry, at which time the "Admirals of the Cherry River Navy" parade with cocked hats, crossed clotheslines, and a huge wooden clothespin in lieu of a sword.

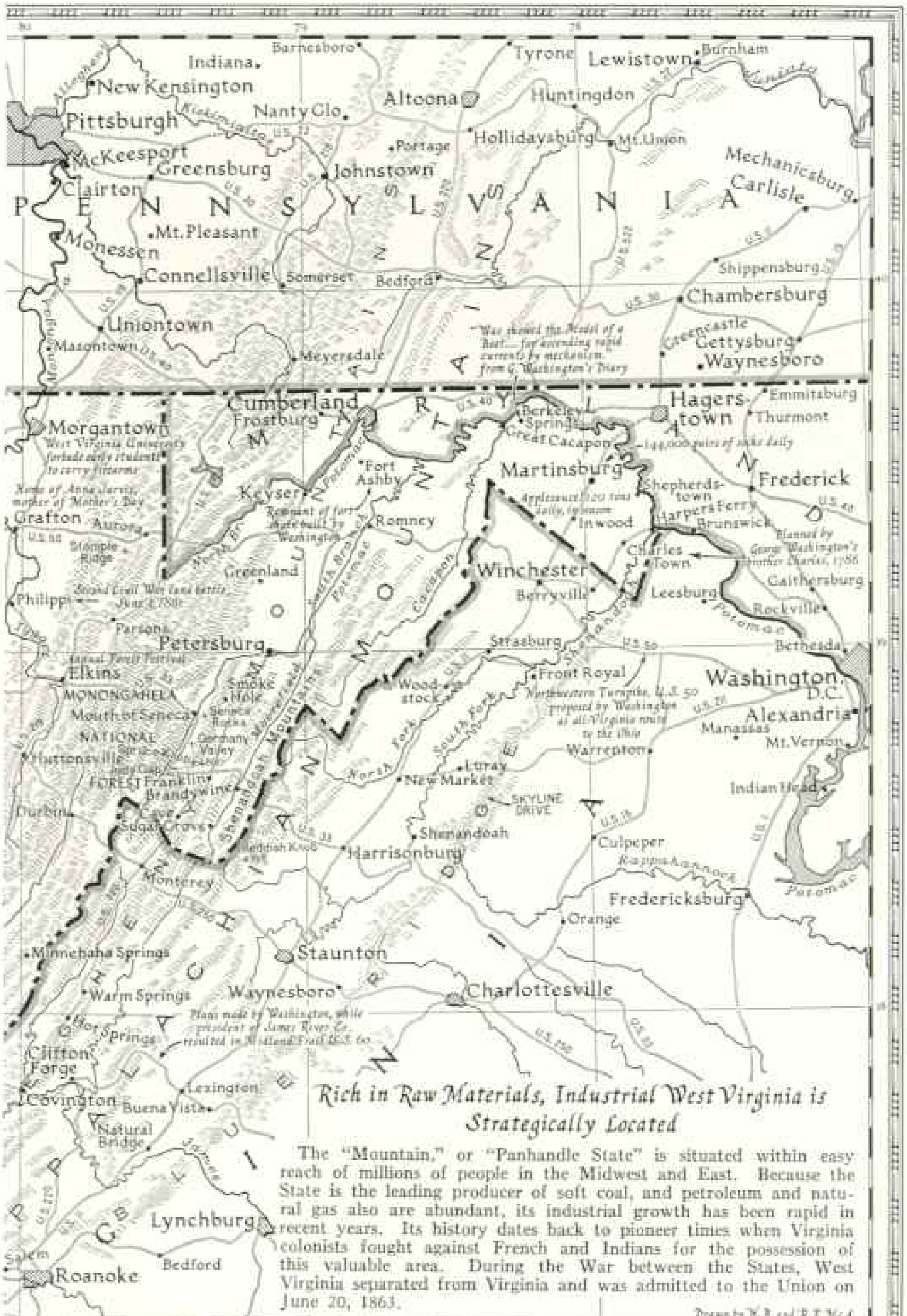
In one eastern panhandle plant we saw women's dollar-dresses being made by the thousands to be sold through chain stores, and in Martinsburg, also, is one of the large mills of the Interwoven Stocking Company, which makes men's socks.

There silk from the Orient, lisle yarn from France, Mississippi Delta cotton spun in the Carolinas and processed in Massachusetts and Pennsylvania, wool from Texas and Australia—all go through 108 different operations before a sock is complete (page 149).

"We turn out 12,000 dozen pairs a day, or some 2,500,000 dozen pairs a year—enough to load a train of 150 cars. And they go to every civilized country in the world," the superintendent said.

What caught my fancy most was a dyeing process wherein a sock knitted from all-white thread is thrown into a dye vat and comes out in several different colors, as a result of chemical reaction!


East Liverpool
Ohio
Aliquippa
Newell pottery industry sells to nation-wide market
Newell
Chester
Millersburg
Dover
New Philadelphia
Mt. Vernon
Kokosing
Uhrichsville
Dennison
Toronto
Kings Creek
Weirton
Steubenville
Follansbee
Wellsburg
Development of Grimes Golden Apple marked by monument
Delaware
Newcomers-town
Tuscarawas
Coshocton
Mingo Junction
Bethany
Westerville
Martins Ferry
Wheeling
Early called "Nail City." Today is iron and steel center
Newark
Licking
Cambridge
Bridgeport
Barnesville
Bellaire
Glen Dale
Columbus
Zanesville
Waynesburg
Moundsville
Home of Fostoria glass; large conical Indian mound
Lancaster
Crooksville
New Lexington
Woodsfield
Circleville
Logan
West Virginia owns 230 miles of the Ohio River
New Martinsville
Paden City
Sistersville
Clouster
Nelsonville
Marietta
Mannington
Fairmont
Bottled! A million a day
Chillicothe
Athens
Marble, sometimes $20,000 a day
St. Marys
Shinnston
Belpre
Parkersburg
Pennsboro
Salem
Clarksburg
Named for George Rogers Clark of Northwest Territory fame; birthplace of "Stonewall" Jackson
Wellston
Jackson
Blennerhassett Island
Aaron Burr plotted a Southwest Empire
Oxford
Early explorers found inflammable gas bubbling from springs, 1775
Pomeroy
Middleport
Ravenswood
Burning Springs
Grantsville
Weston
Berlin
Volga
Buckhannon
Portsmouth
Gallipolis
Point Pleasant
General Andrew Lewis defeat of Chief Cornstalks Federated tribes opened Kentucky to pioneers
Spencer
Ireland
Gassaway
Sutton
Helvetia
Webster Springs
Ironton
Joyful at cure of paralytic sister, W. T. Morris gives farm and savings to found orthopedic hospital
Paradise
Sissonville
Golden Delicious Apple developed here
Milton
Catlettsburg
Huntington
Dwight W. Morrow's birthplace
St. Albans
Charleston
First at Wheeling, State Capital moved to Charleston, then to Wheeling and back to Charleston
South Charleston
Belle
Glasgow
London
Richwood
Marlinton
Chemical plant turns coal, air and water into material for fountain pens, fertilizer, and synthetic textiles
Montgomery
Gauley Bridge
Anated
Hawks Nest
Mill Point
Hillsboro
Louisa
Fort Gay
Midland Trail, U.S. 60 was Kentucky route from Ohio Valley to eastern markets, early 1800's
New River Gorge
Fayetteville
Oak Hill
Raleigh
Williamsburg
Glenhayes
Logan
Holden
Omar
Mt. Hope
Harper
Beckley
White Sulphur Springs
Lewisburg
Asbury
Ronceverte
Paintsville
Van Lear
Prestonsburg
Williamson
Coal from Kendall fields
Cinderella
Varney
Mullens
Hinton
Alderson
McVeigh
Wayland
Pikeville
Jenkins
McRoberts
Iaeger
Welch
Keystone
Maybeury
Princeton
Pocahontas
War
Bluefield
Gateway to the Pocahontas Coal Field
Blacksburg
Miles
Statute Miles
LONGITUDE WEST



Rich in Raw Materials, Industrial West Virginia is Strategically Located

The "Mountain," or "Panhandle State" is situated within easy reach of millions of people in the Midwest and East. Because the State is the leading producer of soft coal, and petroleum and natural gas also are abundant, its industrial growth has been rapid in recent years. Its history dates back to pioneer times when Virginia colonists fought against French and Indians for the possession of this valuable area. During the War between the States, West Virginia separated from Virginia and was admitted to the Union on June 20, 1863.

Scaling Pinnacle Rock Is Like Climbing the Skeleton of a Big Dinosaur

This imposing ridge of sawtooth rocks near Bluefield is part of a geological "fence" that roughly divides West Virginia from Keyser to Bluefield. To the east (left) of this line the country is mainly agricultural; to the west lie coal, oil, and gas fields (page 171). The road curving to the right leads to Welch.

A short drive brought us to Shepherdstown, founded in 1727, oldest town in the State.

"Mechanism" Speeds 4 Miles an Hour!

Here James Rumsey demonstrated his steamboat in 1787. The tablet on the monument to him says the vessel made four miles an hour on its trial run. Three years earlier, in the vicinity of Berkeley Springs, he had demonstrated a model of his boat for George Washington, who wrote in his diary on September 6, 1784: "Was showed the Model of a Boat constructed by the ingenious Mr. Rumsey, for ascending rapid currents by mechanism."

Around Berkeley Springs, tonic waters, tomatoes, and high-grade silica sand used in glassmaking, take the spotlight.

Clarksburg, birthplace of "Stonewall" Jackson, has no level spots. Most of the places we visited in West Virginia are built on the hillsides, and the streets and homes scramble up and down the rugged surface.

A short walk up an almost vertical street brought us to a point where we could look down on the city as though from an airplane, while we panted for breath and wished for an oxygen tank.

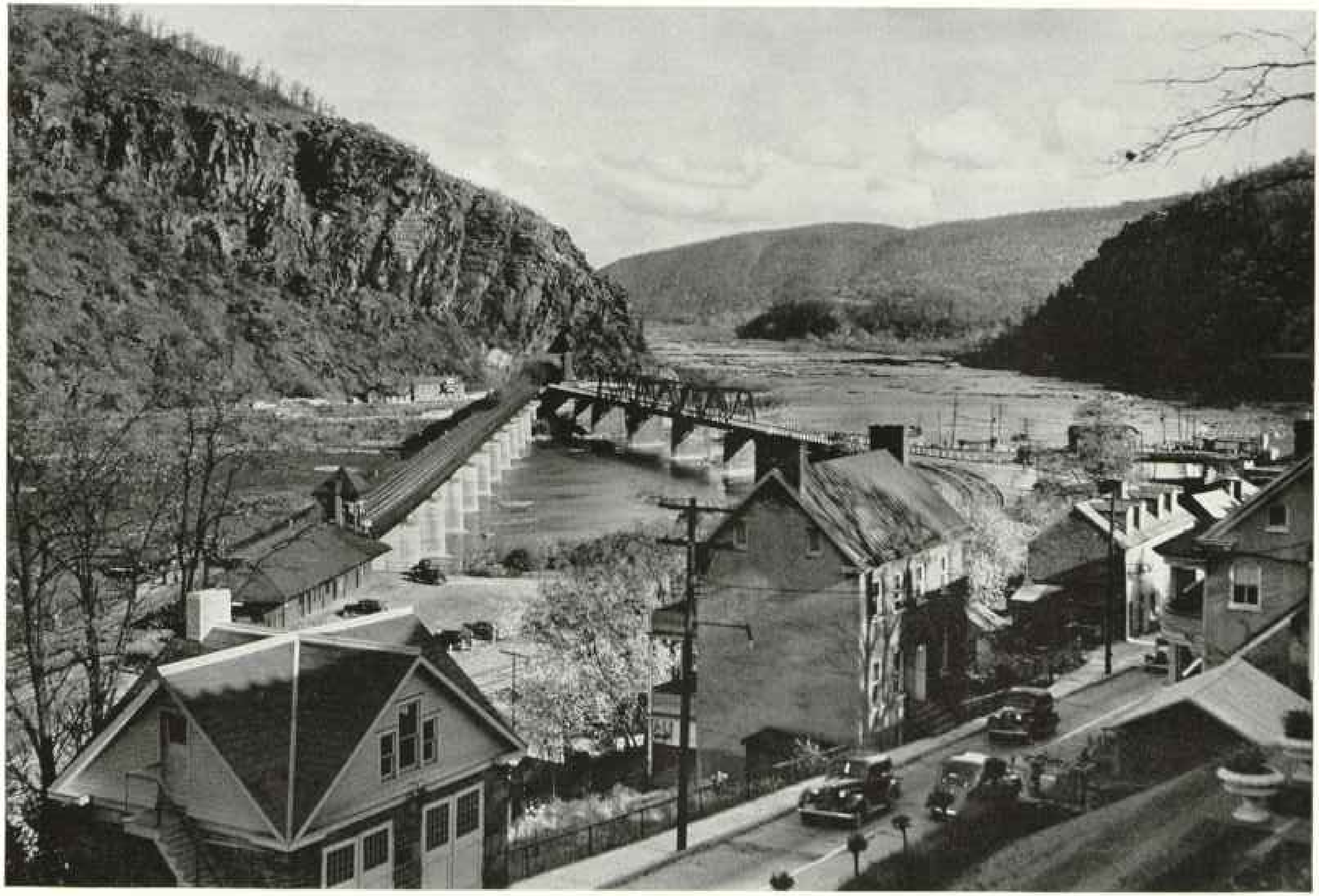
Factories making glass tableware and fruit jars; carbon electrodes; window and picture glass; hotel and restaurant chinaware, and millions of marbles—all are located here. Numerous coal, natural gas, and petroleum companies operate in and around Clarksburg.

Lamp Chimneys for New York City

Thousands of chimneys for old-fashioned kerosene lamps are shipped annually to the

Keeping Tab by Wireless and Telephone on 9,000 Miles of Gas Pipe

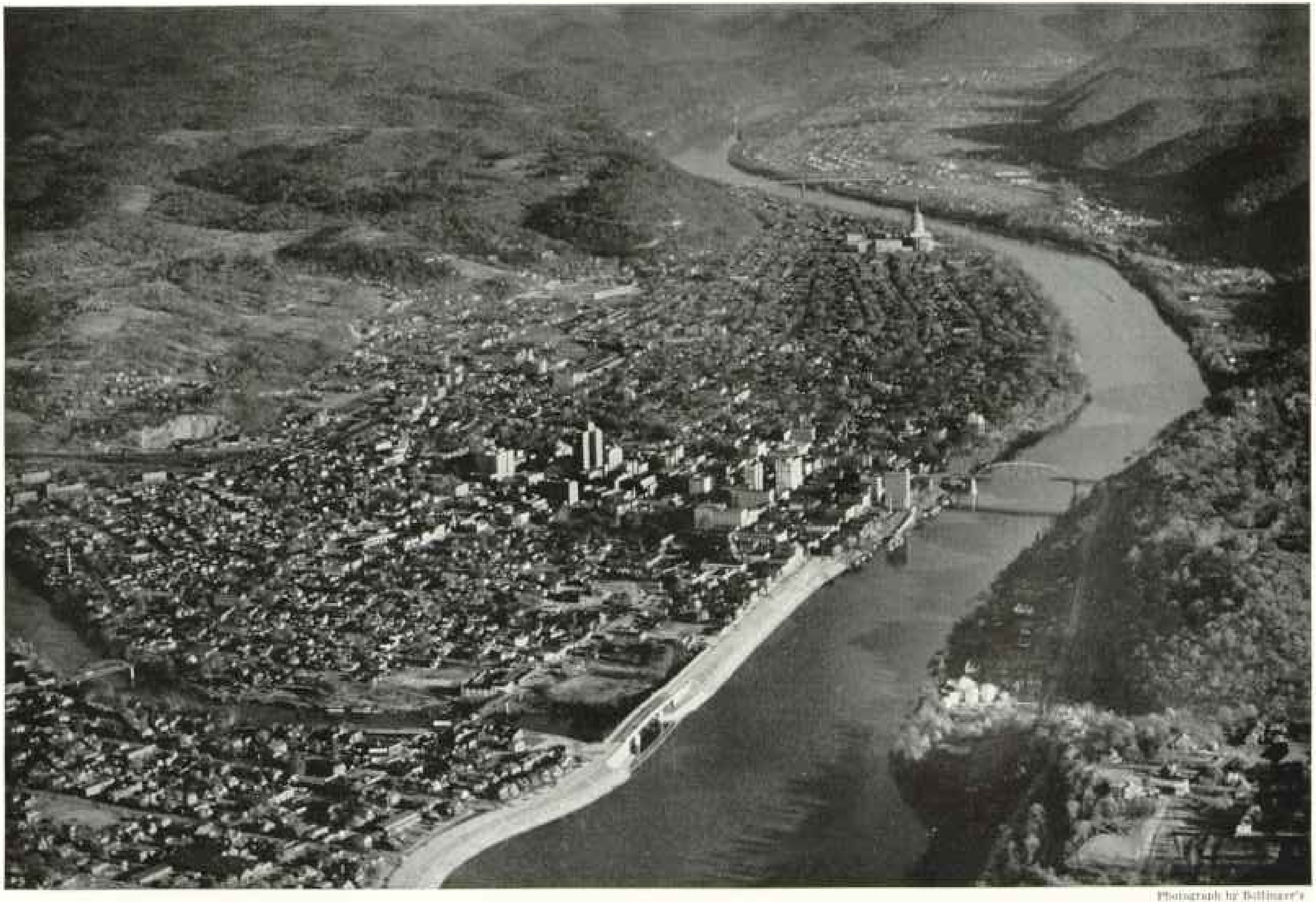
Hourly messages from 49 West Virginia counties and two other States come to this dispatcher's office in Clarksburg, where the flow is controlled. Gas mains are represented by black lines; pins show pump stations and gates, or valves. An explorer about 1750 relates his discovery of natural gas in what is now West Virginia: "In the middle of a small stream there was a constant bubbling of waters as if a blowpipe was at work at the bottom. The wind came up with a smell similar to that of stone-coal fire. The guide waded in, held the lock of his rifle near the bubbling part of the surface, and pulled the trigger. It flashed, and that instant a fire was blazing on the surface of the water as large as a yard square and two feet high."



Where the Potomac Breaks Through Blue Ridge Ramparts Nestles Harpers Ferry, Scene of John Brown's Raid

Electric Clippers with Suction Attachments Shave Thousands of Socks Daily

Here loose ends of threads left in the knitting process are trimmed swiftly and drawn through vacuum tubes into bins below. Such work was formerly done with scissors amid a pile of thread ends and occasionally damaged socks at Interwoven's plant (page 143).



Photograph by Bellmore's

Charleston, City of Industry and Capital of West Virginia, Sprawls Along the Kanawha Where It Meets the Elk (Page 153 and Plate II)

From Coal, Air, and Water at Belle, du Pont Makes Material for Stockings, Toothbrush Handles, and Light-bending Glass (Page 165)

"Run Out in the Backyard, Son, and Get a Scuttle of Coal"

The "coal bin" of this family at Varney is the hill just behind the house. Coal is found in 49 of the 55 counties of West Virginia (page 171).

last place in the world you would guess—New York City! There is a volume sale for them on the East Side.

We headed south over excellent roads. Considering the up-and-down surface of the State, the improved highways—more than 4,500 miles of them—are a comfort. Even back roads through the mountains were not as rough and dusty as we feared.

At times town names suggested an exciting foreign trip. We passed London, Glasgow, Berlin, Oxford, Volga, Greenland, and Ireland. There is even a Cinderella and Paradise—as well as War!

These names give a clue to the settlers of the State, for the first white inhabitants were mostly of Scotch-Irish, Dutch, English, and German stock, coming largely from Virginia, Pennsylvania, and New York. However, the true "first inhabitants" were the mound builders. Throughout the State numerous mounds have been found, the largest of which is at Moundsville. It is 69 feet high and 900 feet around the base.

A short block to the east of the mound rise the iron-barred, castellated, gray walls of the State Penitentiary. The State seal over the center door reads, ironically: *Montani Semper Liberi*—Mountaineers Always Free!

Skyscraper Farms

"What do you grow here?" I asked the girl who waited on us at a roadside stand. "All I've seen is cornfields, coal tipples, and gas valves."

"Oh, you don't see the farms, mister," she laughed. "They're back up in the hills. Our farm is up on top of this mountain," and she jerked her thumb backward over her shoulder.

I couldn't see a farm, or any place for one; in fact, it made my legs tired just to look at that steep incline!

This incident helps explain why the State is generally thought of as only a mining commonwealth. While coal brings in greater wealth, more people are engaged in agriculture and related activities than in any other occupation.

Livestock and livestock products yield nearly three-fourths of the total farm income. Busy West Virginia hens lay more than seven million dollars' worth of eggs a year; cows produce 19½ million dollars' worth of milk. To sweeten their beloved cornbakes West Vir-

ginians have more than 90,000 hives of bees worth about half a million dollars.

At Sutton the road forked, so I stopped and asked a grizzled old fellow the way into Charleston.

"Take th' fork that goes to th' right; it's shorter and purtier that-away," he directed, smiling at us and pointing a lean finger.

We did, and it was.

We followed the Elk River into Charleston, and if you can imagine a snake with colic you'll have a good idea of how the road twists and turns; yet there are stretches along here that seem almost identical with sections of Rock Creek Park in Washington, D. C.

All through the countryside were the knob-like, aluminum-painted valves from innumerable gas wells, and in many fields were small, similarly painted gasoline tanks. The gas in the area as you approach Charleston is derived from what are known as the Oriskany Sands and is mixed with "natural," or casing-head gasoline.

If Daniel Boone Saw Charleston Now!

Charleston is capital of the State, and also a thriving business city of some 67,000 people. Water, rail, and road arteries nourish it, and in turn carry away axes, chemicals, and glass.

Along its narrow, busy streets, we had difficulty realizing that scarcely 150 years ago Daniel Boone trod this same ground, settlers battled Indians, and life was about as precarious as it is today, the difference being that between tomahawk and traffic.

The golden dome of the new State Capitol, 300 feet high, is an impressive sight (Plate II and page 150).

Equally impressive is the huge crystal-ball chandelier in the interior of the dome, 180 feet above the rotunda.

"It weighs two tons and takes two men five days to clean it," our guide informed us.

"How do they clean it? From a scaffold?"

"They lower it to the floor and it takes three and a half hours to do so," was the reply. "It can't be lowered faster because it would start swinging and twisting and would crash."

"How big is it?" my companion asked.

"Eight feet in diameter."

"Why, that's within a foot of the size of the gondola used in the National Geographic Society's stratosphere flights!" I exclaimed.

In an ax plant we walked blocks while following the various processes of axes, hatchets, sickles, and scythes through to the finished product, and I learned there are as many styles in axes as there are in women's hats!

That night from the bridge across the Kanawha the view of the Carbide and Carbon Chemicals Corporation's plant was like a scene out of some fairyland. Thousands of lights twinkled amid the grotesque structures, while we heard distant throbs of chemical pumps, the hiss of high-pressures, and saw the jets of white vapor like so many exclamation points as a long row of stacks alternately ejected their exhaust plumes.

For a better view we climbed the high ground back of the railroad tracks and stood fascinated for an hour, despite the bitter cold following a February rain.

"Fairyland is right," murmured my photographer companion, as he adjusted his camera and calculated exposure time.

"Especially when you remember what they told us about the things they make, from Prestone antifreeze to dental plates; and raw materials that go into the manufacture of products from aspirin to perfume; and from dry ice to photographic film—all from mixtures of gas, air, and water!"

A few miles southeast of Charleston, in Kanawha City, we approached the buildings of the Libbey-Owens-Ford Glass Company. Fittingly, the outer walls are of the comparatively new glass-faced, load-bearing masonry units which permit lightweight construction of glass.

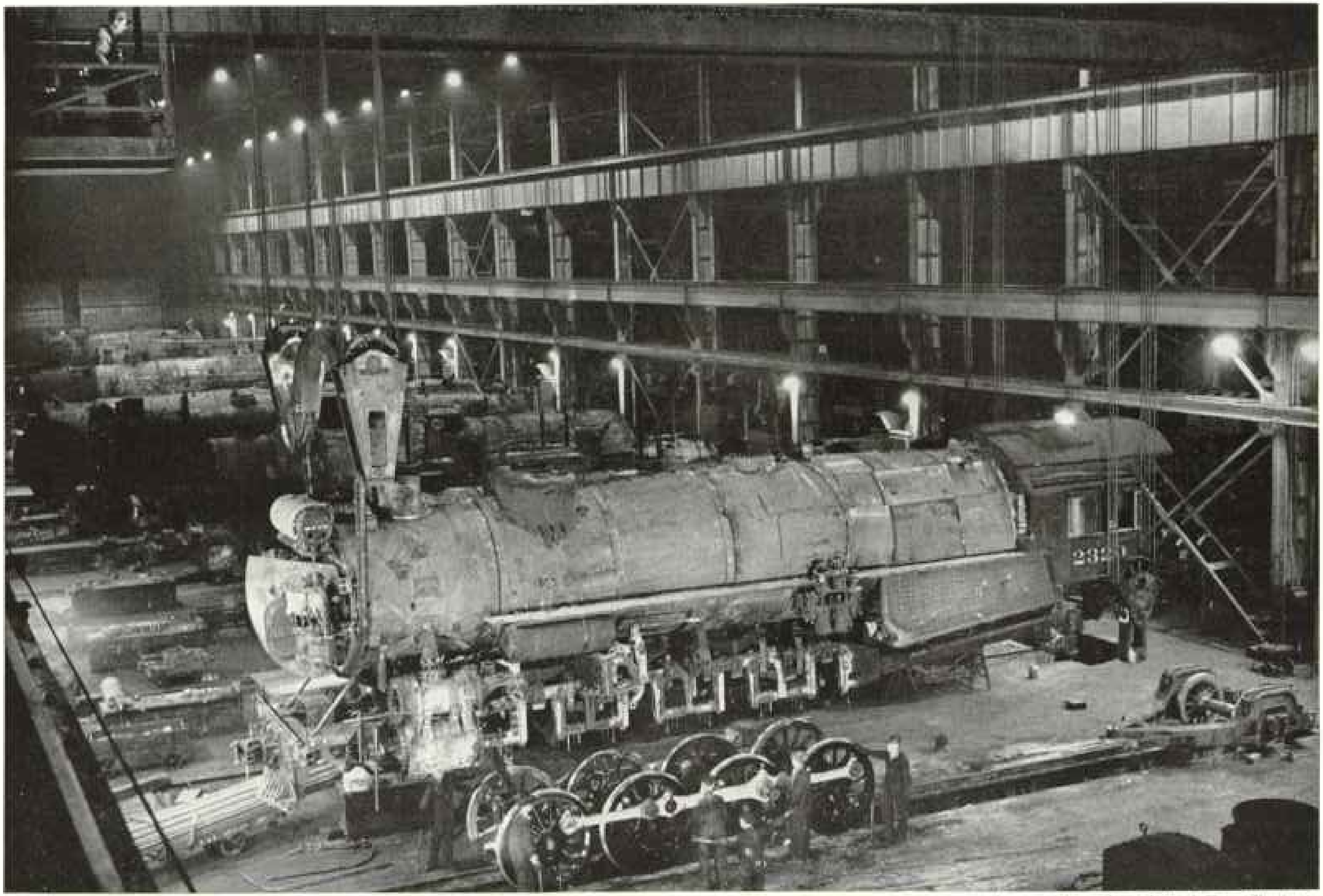
In the reception room the walls, the desk, and the telephone switchboard were all of lustrous Vitrolite structural opaque colored glass (first made in the plant at Parkersburg, West Virginia) trimmed with chromium, so that everything gleamed as in an operating room.

Silica sand and other ingredients are mixed and fed into one end of a long, flat, gas-fired furnace which, once started, operates continuously for months at a time. The molten mass is lifted up and over a series of rollers that seem to be pulling taffy upside down, and becomes a ribbon of glass 90 inches wide moving at the rate of 90 inches a minute, 24 hours a day.

That is a strip of glass 7½ feet wide and 14⅛ miles long a week! Multiply that by the twelve such furnaces making window glass, as well as by six other machines making plate glass for mirrors and automobile safety glass, and you have a veritable small crystal glacier pouring from this one plant.

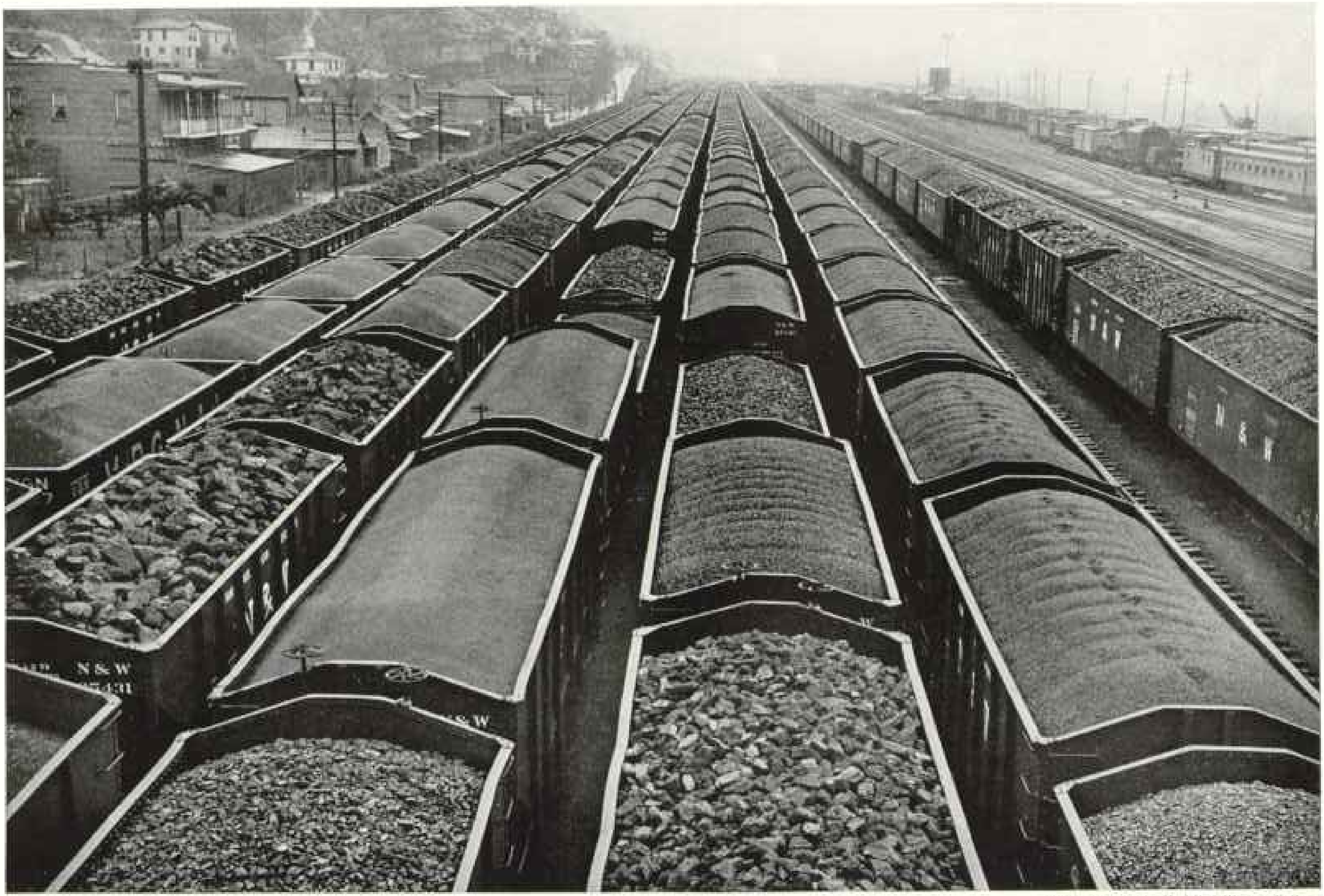
A Glass-making Wizard

Michael J. Owens, son of a West Virginia coal miner, who himself became a master glass blower, perfected the machine which made this possible, after having invented the completely automatic bottle-making machine. In



Photograph in the C. and O. Repair Shop at Huntington

From His Cab (Upper Left) the Craneman Sets a Big Engine on Its Wheels as Easily as a Boy Assembles a Toy Train



Photograph courtesy Norfolk & Western Railway

Williamson's Yard Can Assemble 46 Miles of Coal Cars at One Time

the plant of the Owens-Illinois Glass Company just across the street, we watched long rows of machines whirling madly around and around like infuriated octopuses and turning out torrents of red-hot bottles from their tentaclelike arms.

In this one bottle plant are combined three industries: the manufacture of bottles, the making of corrugated cardboard for cartons, and a printing establishment for labeling them. Thirty-six railroad cars may be run in on tracks under its roof and loaded simultaneously!

Colonial glassware reproductions in the homes and inns of restored Williamsburg, Virginia, came from the Blenko Glass Company at Milton, West Virginia (Plate XIII). Here I watched a white-haired worker make a vase. He used ordinary shears to cut off the excess molten glass and manipulated plain hardwood sticks and boards to groove and shape the fluted top.

"How long have you been doing this sort of work?" I asked him.

"Ever since I was twelve years old," he replied. "I'm 65 now. I learned my trade from my father in Sweden. He was a fine glass blower himself, and maybe when I have had more experience I can equal his work!"

More than 450 different shades of stained glass are made here. You find them in such places as the Memorial Chapel in the Meuse Battlefield in France; the Chapel at Duke University; the Cathedral of SS. Peter and Paul in Washington, and St. John's Cathedral, and Riverside Church, both in New York.

"Shooting" a Gas Well

In Charleston we heard that a well near Sissonville, in the heart of the natural gas country, was to be shot. It was down nearly 5,000 feet and had already begun to blow gas at the rate of two million cubic feet a day. By shooting it they hoped to increase the flow.

Meanwhile it had been closed with a valve. When this was opened shortly after our arrival, the pent-up gases burst forth in an enormous plume of white vapor that reached far above the 94-foot rig, roaring and hissing like a giant safety valve popping off.

"How long do you let it blow before you shoot it?" I asked.

"Hard to tell," was the shouted answer. "Have to wait for the pressure to ease off so we can work on it. Maybe a couple of hours; maybe five or six."

In the early days the salt operators considered oil a nuisance, because it flavored the salt unpleasantly, and the gas was a constant fire hazard, even though wells were drilled only to comparatively shallow depths.

In 1815 a salt operator was sinking a salt brine well on the banks of the Kanawha, in what is now Charleston. At the usual depths the brine was not as strong as he wished. Despite remonstrances from some of his men, he ordered them to continue drilling, remarking, "I'm agonna drill till I git salt, or bust plumb through to Hell!"

Soon the drillers struck gas, which roared from the well with the shriek of high pressures and burst into flame from a near-by open grate, burning fiercely for several days before it was extinguished.

"You shore do make brash promises, Jim," said one of the drillers later, "but durn ef you don' keep 'em!"

The well we were watching was still blowing hard when the "shooter" arrived with his assistants and truckload of equipment and nitroglycerin. At one o'clock it was still blowing, so we were all called in to dinner.

"Get me four million feet a day, boys, an' I'll buy you each a new Stetson hat!" our host promised the crew.

While we ate, the sky darkened and a light drizzle began to fall. The workers shook their heads.

"That's bad. Makes the air heavy so that the gas settles."

All fires were ordered put out. The pilot on the gas cookstove was turned off. Even the electric icebox was disconnected to avoid possible sparks.

The truckload of nitroglycerin was driven jouncingly up the rough road to the well with a nonchalance that sent my heart to my throat. The light, amber-colored fluid, something like thick tea, was poured into slender metal cylinders, like lengths of rainspout, and lowered into the well. Each of the 20-quart containers had to be let down slowly and measurements taken afterwards to make sure it was all the way to the bottom and not resting on a cushion of gas, or perhaps being blown back up, as sometimes happens.

As the last of the 60 quarts of glycerin was lowered into place, I noticed that the sky had darkened even more, and snow was falling.

The drop jack, with its charge of dynamite and sputtering fuse, disappeared down the well. We waited tensely for a terrific roar and explosion. But so deep was the charge that not a sound or quiver did we get until the shrieking gases, mixed with smoke from the explosion and fragments of rock and sand, burst from the mouth of the well in a black cloud that shot high into the air.

My companion stood with finger on shutter

An Apple for Teacher? Take Your Pick

West Virginia trees bore four million bushels of eating apples in 1939. At the height of the season, 240,000 pounds of applesauce a day are produced at one plant.

 Kodachrome by B. Anthony Stewart

"Push It to the Bottom, Bud, Then Bite"

They try "bobbing" at the Martinsburg Apple Harvest Festival. Apples still go into pies, but science has also used them in making hand lotion, furniture polish, wax paper stencils, and fertilizer.

Kodachrome by B. Anthony Stewart

The Golden Dome of West Virginia's Capitol Overlooks the Kanawha River at Charleston

Native hardwoods decorate the interior of the spacious limestone and marble edifice, designed by Cass Gilbert. Suspended beneath the dome is a Czechoslovak crystal chandelier, so big that when it is gingerly lowered to ground level for cleaning, two men must take five days to restore its sparkle.

Kodachrome by B. Anthony Stewart

Prospect Peak, near Berkeley Springs, Commands a View of Three States

Here the B. & O. Railroad on the West Virginia bank sweeps around a bend of the Potomac past the town of Great Cacapon in the distance. Across the river, in Maryland, is the dry bed of the old Chesapeake & Ohio Canal, first advocated by George Washington, which connected Cumberland's coal mines with Washington, D. C., until recent years. The Western Maryland Railway also follows the opposite bank. Pennsylvania may be seen from this point, but is out of the photograph to the right.

Kodachrome by Volkmar Wentzel

Like a Minstrel, He Charms with Bow and Smile at a Roosevelt Contest

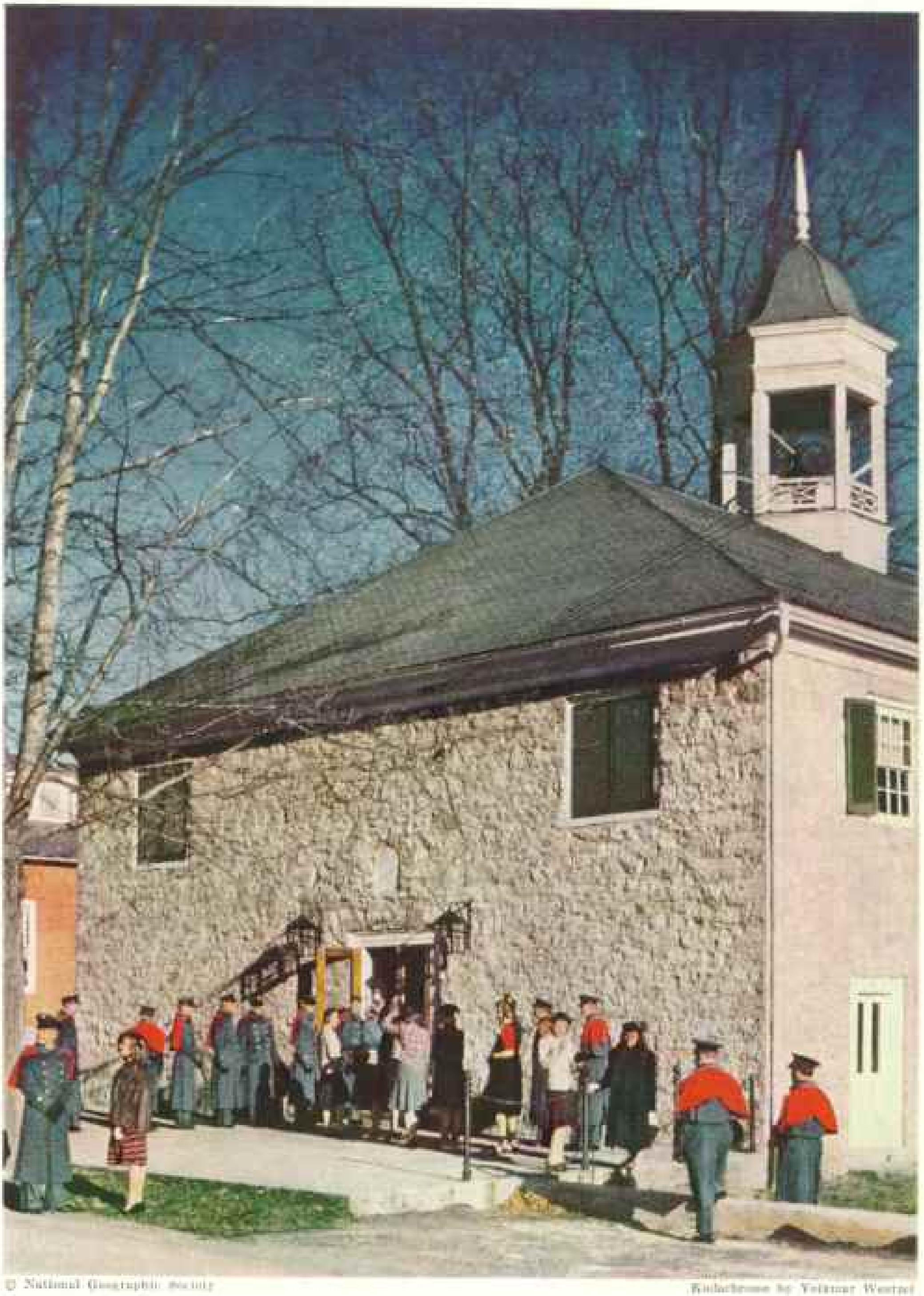
Strains of *Washington's March* or *Jimmy Johnson Brings His Jug Round the Hill* fill the air.

© National Geographic Society

Photo by R. Arthur Stewart

Flame and Fumes Spew From Beehive Coke Ovens

In these old-fashioned ovens between Charleston and Gauley Bridge, coal is converted into coke by burning. Newer methods conserve valuable by-products formerly lost in waste gases.



 Kodachrome by Volkmar Wentzel

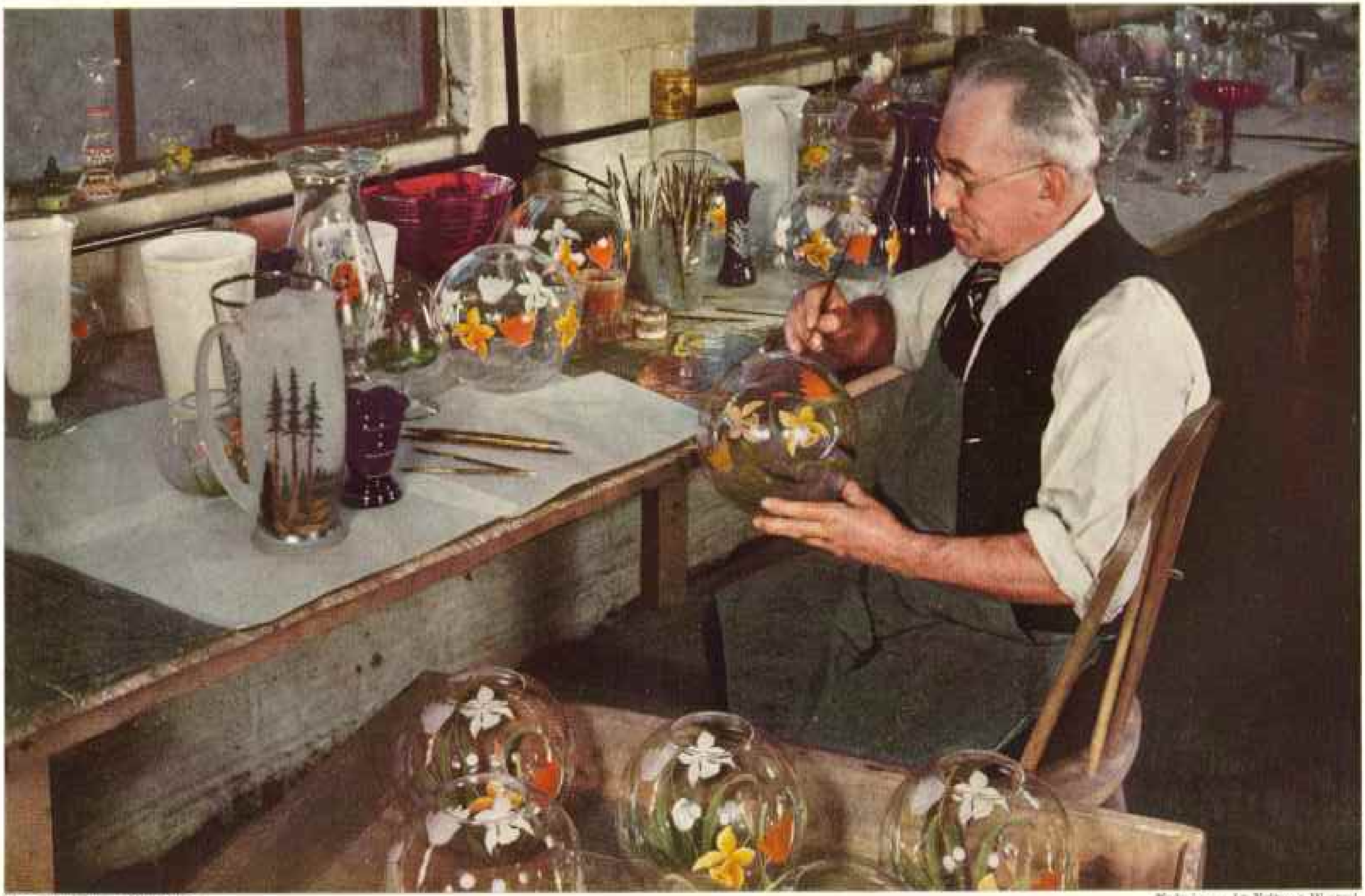
Scotch-Irish Pioneers Built the Old Stone Church at Lewisburg

Girls from Greenbrier College and townsfolk sit in the body of this Presbyterian Church. Cadets from Greenbrier Military School occupy wooden benches in the balcony. The carved flat stone over the doorway reads: "This building was erected in the year 1796 at the expence of a few of the first inhabitants of this land to commemorate their affection & esteem for the Holy Gospel of Jesus Christ. Reader, if you are inclined to applaud their virtues, give God the Glory."

Kodachrome by Volkmar Wentzel

She "Knuckles Down" to Work Packing Marbles By the Millions

Each time this operator presses the foot treadle, the same number of marbles of various colors drops into a red bag which she holds below the funnel outlet. Not all are for boys to "shoot for keeps." Many are used in road sign reflectors, oil filters, for graining lithographic plates, and as stoppers in nonrefillable bottles.



Kodachrome by Volkmar Wentzel

Freehand, He Paints Colorful Designs on Flower Bowls and Other Glassware

The artist learned his trade as a boy in Haida, Sudetenland (formerly Czechoslovakia). For 30 years he has been decorating glassware. He creates his own designs and applies them directly in this Weston glass specialty factory. Scores of different brushes may be used on one design; even drawing pens are required.

Kodachrome by National Geographic

High-Tension Electric Insulators—Not New Hat Styles!

Purest china clay is required for insulators in this Kenova plant. Slight impurities, harmless in a dinner plate, might cause leakage or a short circuit when used to safeguard a high-amperage, high-voltage line.

Kodachrome by B. Anthony Stewart

Winter Warmth from a Busy Needle

Bright pieces of cloth in the hands of this West Virginia quilter become artistic and useful patchwork. She displays a hexagonal design called "Mother's Flower Garden." Next to it is "Irish Chain" and, just beyond, the "Double Wedding Ring" pattern (Plate XV).

release, waiting. Sparks appeared where pieces of rock struck the metal top of the rig. An instant later there was a terrific, deep-throated *whoooosh* and the plume of gas and gasoline mushroomed into a gigantic pillar of flame (page 142).

Then another blast of sand and gravel snuffed out the flames. The well settled down to a steady cry like ten thousand peanut roasters all whistling at once.

"What's she blowin'?" was the big question when it was safe to measure the flow.

"Twelve and a half million feet!"

"Hey, Fisher, better throw in a suit with that hat!" shouted the men at the beaming owner.

At Belle the extensive works of the E. I. du Pont de Nemours & Company take coal, air, and water into the insatiable maws of huge furnaces, tanks, retorts, condensers, and miles of pipe. Thirty minutes later they come out as the basic material from which are made such diverse products as fountain pens; "Uramon" (fertilizer); "Zerone" anti-freeze; synthetic silk; "Lucite," a glasslike substance which conducts light around corners; and an ingredient put in bread to prevent its becoming moldy (page 151).

Each day at Belle enough water is pumped to supply the needs of a city the size of Washington, D. C., enough coal consumed to heat a large home for a hundred winters, and gas enough used to supply a city of some two million people.

During the last World War imports of certain dyestuffs and industrial chemicals from Germany were cut off.

A few chemical plants in the Kanawha valley boomed; others were established in this rich storehouse of coal, gas, and oil, available for coal tar by-products. Salt brine, pumped from wells, was converted into chlorine gas for war use.

Today American industry is largely independent of chemical imports. Life has been made more colorful and comfortable by innumerable plastics and other by-products* which originate in 32 plants in West Virginia, the majority within 20 miles of Charleston. Deadly chlorine, handled differently, purifies drinking water and swimming pools throughout the land and also enters into a number of manufacturing processes.

Climbing and twisting eastward through picturesque mountains, we reached Hawks Nest. Before the white man came, hawks made their nests on the rocky promontory which today serves as a scenic lookout 585 feet above the New River Gorge.

In spring and summer there is a restful greenness of the forest and growth at varying altitudes, with glimpses of New River spotting through at every turn. In the fall the reds and golds and yellows in variegated patterns reminded me of the kaleidoscope with bits of colored glass I used to cherish as a boy. In the winter I have crawled along at eight or ten miles an hour, tires partly deflated to give better traction on the icy road, and admired the stark roughness of the jagged rocks, velvety black against the white of snow-covered trees and slopes.

Twelve State parks and six State forests recall early days when West Virginia had fine stands of virgin hardwood timber and lumbering was a leading industry.

We stopped at Rainelle to see the operations of one of the largest hardwood plants in the United States. The company still operates on virgin timber. This is a band-saw mill, holdover from early lumbering days when huge mills were erected and the timber brought to them. Today, with better roads, portable power, and easy access to an electrical supply, the mill is more often taken to the lumber.

The walnut from which your desk was made, or the dainty heels of your dance partner's slippers, may have come from here. Some 20,000 pairs of wooden shoe heels are turned out daily.

Trails' Crossing in 1940

At Lewisburg the east-west Midland Trail crosses the north-south Seneca Trail. Today both are broad, hard-surfaced highways over which motorists cover distances in an hour that took moccasined feet all day to traverse. You see bevies of young ladies from Greenbrier College, in modern "war paint," entering historic Old Stone Church, and brass buttons of full-dress uniforms of Greenbrier Military School cadets as they attend services (Plate V). Outside, headstone by headstone, the old churchyard is almost a genealogy of the families in that area.

Historic General Lewis Hotel abounds in handmade coffee mills, traps, tools, and other articles of frontier inventiveness. Homemade quilts adorn handmade beds.

The broad valleys and easy hills in this region resemble grazing areas of Pennsylvania, Maryland, and Virginia. The limestone formation encourages a luxuriant growth of fine bluegrass.

To the south is Ronceverte, once an important lumber center. Steep steps leading from some streets to others impart an Old

* See "Chemists Make a New World," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, November, 1939.

Photograph by Enrique C. Cantova

This Friendly Lumberman and His Family Welcomed the Author to Sunday Dinner

In the neat, simply furnished home he was served "termater" butter—preserves made by Grandma (in the doorway) from tomatoes and brown sugar (page 181).

World atmosphere. Periodically the town stages a fiddlers' contest which draws players and spectators from miles around (Plate IV).

Eight miles east of Lewisburg is White Sulphur Springs, with its sumptuous Greenbrier Hotel. The airport is as neat as a living-room rug that has just been vacuum-cleaned.

Here, long before Ponce de Leon sought the Fountain of Youth, came Indians to bathe in the waters of these springs. Today the extensive American spa, with three golf courses, is a far cry from the rude, hollowed-out log tub, with hot stones for heating the water, where a rheumatic pioneer woman bathed in 1778 and then went forth to advertise her wonderful cure!

Heading southwest, in a heavy rain, we passed through Alderson, Hinton, and Beckley, then up to Charleston, traversing a mountainous country where men in "hard hats," durable clothes, and safety lamps were notable for their air of alertness and self-sufficiency.

That night, tense and weary after hours of driving through the downpour, we rolled along wide, well-lighted, brick-paved streets of Huntington, largest city in the State.

From the bridge across the Ohio River we saw old-time river paddle boats nosing coal barges downstream (page 182). As we watched them, a multimotored airliner swooped down for a landing at the near-by airport. The era of Mark Twain overlapped that of Howard Hughes!

Marshall College, organized in 1837 and named for Chief Justice John Marshall, is located here. James Beauchamp (Champ) Clark and James E. Morrow, father of Dwight Morrow (who was born here), were among early presidents of the institution.

"Wheeling" a Locomotive

Varied industries center in Huntington—garment factories, glass-container plants, rails, paint pigments, etc., but probably the most important is the 90-acre plant of the International Nickel Company, which, among other things, makes Monel metal. This noncorrosive alloy you may find as a pot cleaner in your kitchen, as roofing nails, as gleaming cafeteria table tops or fixtures, or stiffening the tail of a mounted animal in a museum.

Part of the Chesapeake and Ohio Railroad's general offices, and its largest locomotive repair shops, are located here.

"Want to see them wheel a locomotive?" we were asked. "Then come back at nine tonight; we only do that work on the night shift."

That night we watched a crane bring the man-high drivers and set them down on a work track where they were aligned and made ready.

A ponderous, slow-moving, 250-ton crane groaned its way down the line and lowered two slings which were put under each end of a newly overhauled freight engine. With whines and growls of protest from gear train and motors, the entire engine was lifted high in the air, carried over the tops of half a dozen others, and set gently onto the wheels.

Controlling these operations was a mechanic who signaled the craneman with a wave of his arm, the twist of his wrist, or even the wiggle of a finger, never taking his eyes from the job but talking to "Charlie" constantly while signaling.

"Let her down just a leet-le bit, Charlie: that's it. Now about half an inch more; that's it. Now back towards me a couple of inches. Whoa, hold it!"

In the cab of his crane some fifty feet above the floor, with the din of riveters, the hiss of acetylene welders, and the general cacophony of such a shop, Charlie couldn't have heard a word that was said, but he kept his eyes glued on the signal man and moved his 658,000-pound load around with the skill and ease of a jeweler remounting a precious stone (p. 154).

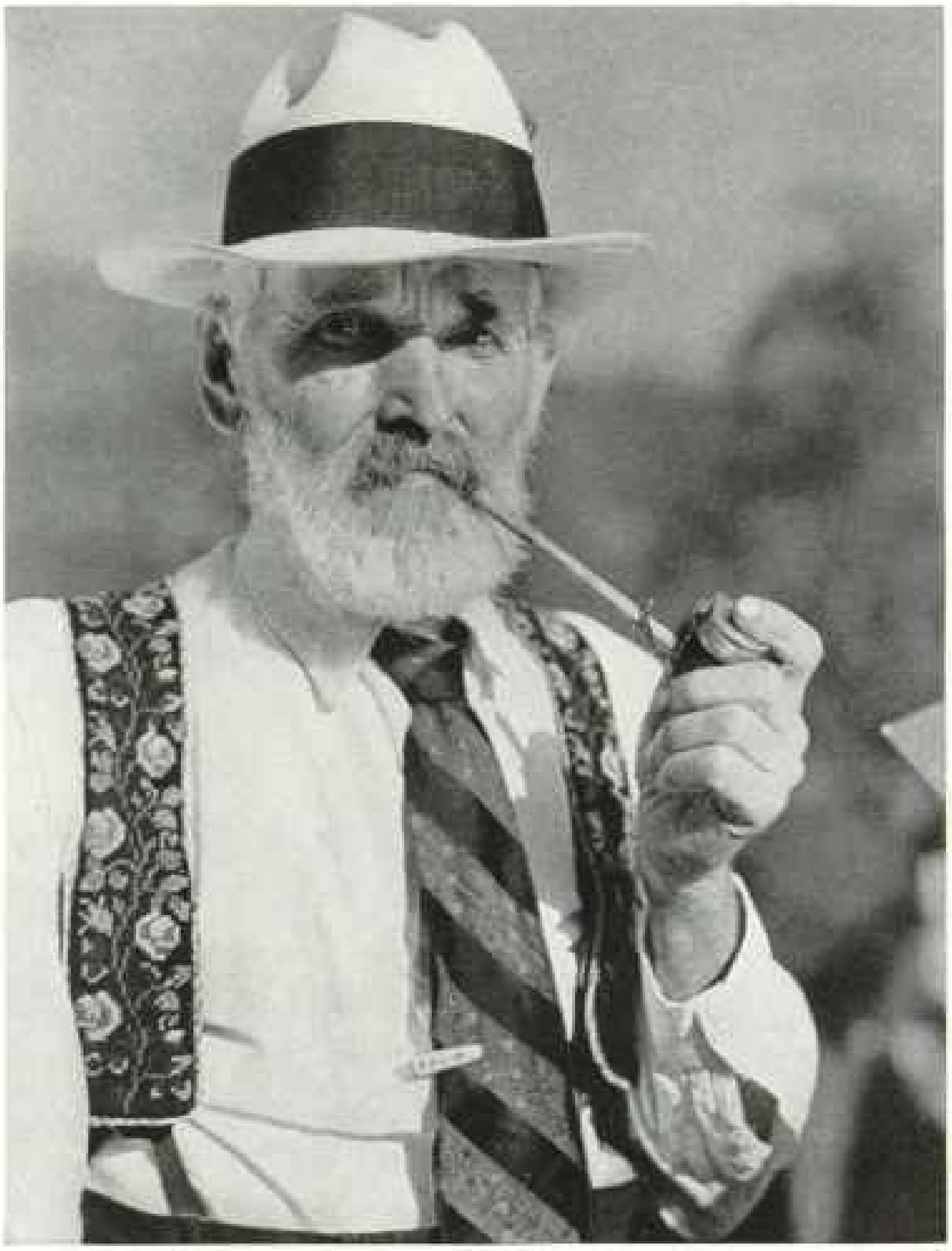
By way of contrast, our next visit was to a "home" factory where quarter-ounce individual communion glasses are made at the rate of 600 dozen a day, each one wrapped in a sheet of tissue and sent to churches and missions at home and abroad.

Where the Big Sandy River empties into the Ohio, the confluence is in the form of a broad Y and the town that sprang up here, in what was then Virginia, was given the name of the three abutting states—KEN-tucky, O-hio, and VA—and became Kenova.

Here an insulator company uses china clay from England, ball clay from Kentucky, feldspar from North Carolina and Tennessee, and flint from West Virginia and Ohio to make electric insulators that go into high-tension lines in all parts of the world (Plate VIII).

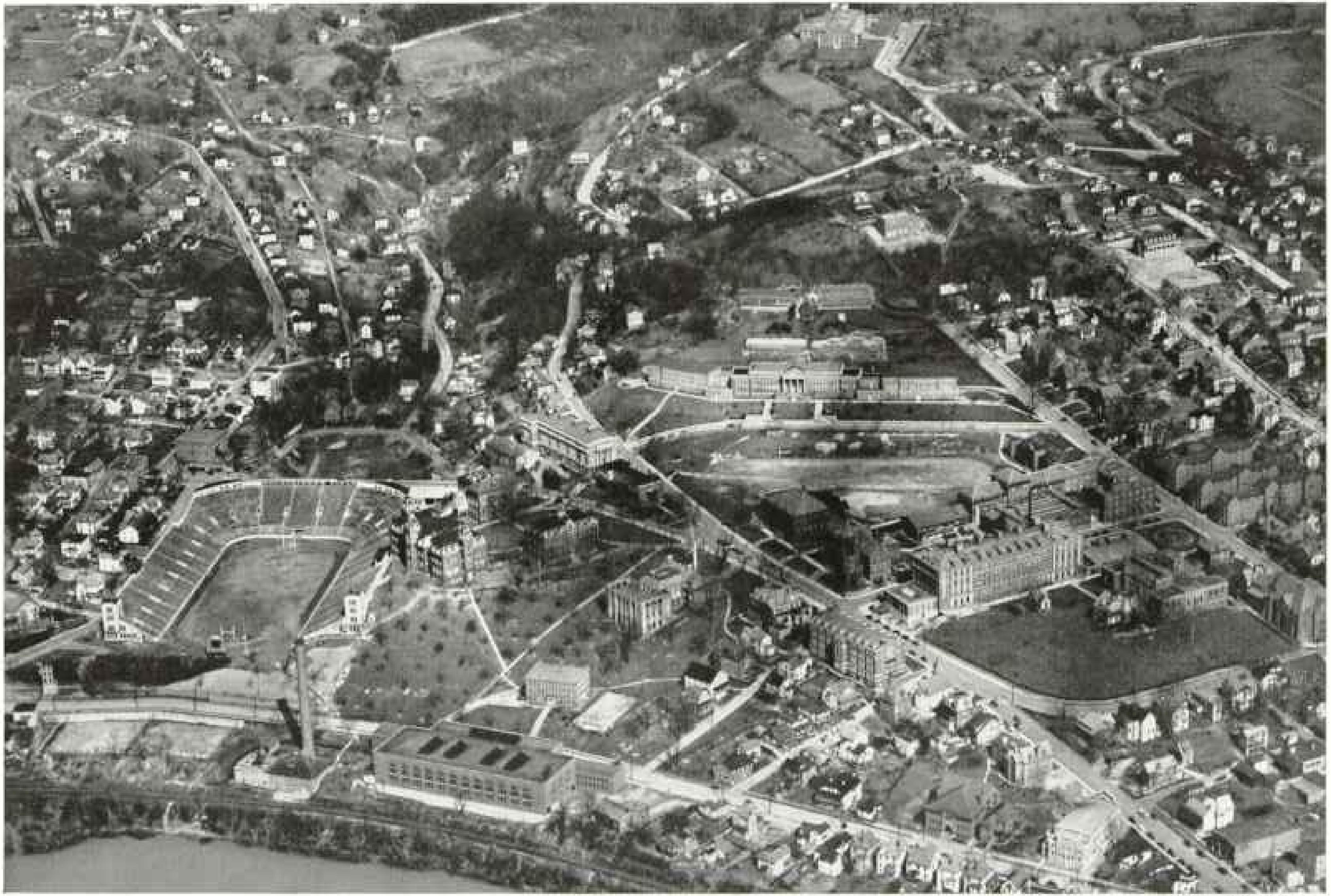
We drove down along the Kentucky border through rolling foothills country, and at Fort Gay stopped to look at the junction of the Levisa and Tug Forks, which form the Big Sandy.

"When I was a kid, the only way we had of getting in or out of our place was across the mountains, which was hard going, or on the



Old-World Dress Clings to the New in Helvetia

Dairying and cheese making from venerable recipes are the chief occupations of this village, settled in 1869 by Swiss who retain many Old World customs. This man, on his way to church, with his colorful suspenders might be in some Alpine village.



Photograph by Bollinger's

Older Than Its State Is West Virginia University, at Morgantown, Which Sprang from Monongalia Academy, Incorporated 1814

A Lively "Bull Session" at Morlunda Farms Near Lewisburg

Governor Homer A. Holt of West Virginia (center) stands beside Oscar Nelson, owner of this fine farm where pedigreed Hereford cattle are raised on bluegrass pastures. Auction markets have increased rapidly in the past few years throughout the State (page 181).

Photograph by Bellinger's

An Old Rock Quarry Makes a Big Swimmin' Hole for Charlestonians

river," said a Huntington business man who accompanied us.

"I can remember my dad coming down here in a flatboat to get a barrel of flour and other supplies. He had to pick his time, too, when the river wasn't too full and fast, or too dry and shallow. He made the trip twice a year."

A few miles farther along, we left the car and hiked to our destination and within five minutes after arrival felt that we were "home folks," among our volunteer guide's relatives.

We learned about herbs from our hostess, for simple remedies still play a part away from the bigger towns and cities. "Yaller root" *(Hydrastis canadensis)* is "good for stomach disorders"; snakeroot *(Aristolochia serpentaria)* is a strong physic; "white shoestring" *(Tephrosia virginiana)* is a "sure cure" for heart trouble; and a hot mullein leaf poultice will draw out pain.

Such time-honored remedies are disappearing. In modern medical science, well-equipped hospitals, and State health services, West Virginia ranks high.

A Boiler High as a 12-Story Building

In Logan is a large steam-generating plant of the Appalachian Electric Power Company, where a mammoth boiler converts a million pounds of water into steam each hour at 1,250 pounds' pressure and 925° Fahrenheit. It burns 45 tons of pulverized coal to do so. The boiler, as tall as a 12-story building, is 28 feet wide and 39 feet long.

This one boiler creates enough power to generate electrical current sufficient to supply a city of 320,000 people!

In the mines of the Island Creek Coal Company, at Holden, we went down a vertical shaft in a hoist, although most of the mines are entered by an inclined tunnel.

We observed the entire procedure from the time they undercut and "bug-dusted" the seam to the final clean-up.

A negro did the shooting to break down the coal. Before each shot he looked around to make sure everyone was clear, then gave a mournful cry: "F-i-r-e!" In the darkness of the mine all we could see was the single bright eye of the safety lamp on his hat and the gleam of his teeth when he opened his mouth to shout!

In one of the side cuts were several hanging boxes with plants growing in them.

"Some of the men bring bulbs down and leave 'em here during the winter so they won't freeze, and they grow pretty good," explained the foreman.

Later in his underground office we saw that he also had pots with geraniums, cactus, etc. Oddly enough, they seemed to be a much brighter green growing down here away from the sun than when on the surface.

Thousands of cars of coal from the various mines are made up into trains at the Williamson yards (page 155).

"Misses" Broom Handles

Here, too, are manufactured hardwood broom and mop handles. In eight operations beech and maple logs are converted into 42-inch handles at the rate of some 50,000 a day.

Broom handles, I learned, come in three styles: "Misses," "Parlor," and "Warehouse." The first, to be technical about the matter, is $^{15}/_{16}$" in diameter and the last mentioned is $1^{1}/_{16}$". Formerly the parlor handle was the principal seller, but with the advent and general use of vacuum cleaners the lighter "Misses" handle is more popular for domestic purposes.

Along a scenic, winding, but well-paved road we headed for Bluefield, stopping to climb Pinnacle Rock (page 146). From here we gazed east toward rolling farmlands with ant-size cattle grazing in the fields far below. We could barely hear the faint tinkle of their bells.

Facing westward, we looked toward West Virginia's coal country, in which more than a thousand mines produced over 107,000,000 tons of bituminous coal in 1939. Estimated reserves are so vast that at the present rate production could be maintained for more than 400 years!

Sink a drill almost anywhere in the State west of a zone extending roughly from Bluefield to Keyser and you will bring up a sample core of earth showing coal in some degree, ranging from thin sheets to rich seams 10 or 12 feet thick. Here the rock formation is more or less horizontal, and coal, oil, and gas occur, while the stream patterns are dendritic, or treelike.

East of this zone the formation is different and no coal is found. The rocks are compressed into strong folds and the large streams run in parallel patterns. Agriculture predominates here.

No glimpse of glass furnaces, no bustle of packing plants, no clamor of steel mills stirs the pulse of Bluefield, half a mile high. Instead, the subdued murmur of wholesale and supply houses and of the main offices of numerous coal mines a few miles distant fades away into attractive suburbs and scenic drives.

Cranberry Glades Suggest Tundra

We headed north on the Seneca Trail. In this area fine sheep and beef cattle are raised. We did not see big herds of cattle as one

does in the West, but those we did see were sleek and healthy-looking (page 169).

Turning west off the highway at Mill Point, we followed an uncompleted road to Cranberry Glades, some 300 acres of what looks like Arctic tundra tucked away high up here in a West Virginia mountain!

Here was solid land in process of formation —spongy, springy, and largely water—dotted with lichens, bog cranberry, and the tiny, round-leaved sundew, as well as other plants native to glacial bogs. If I jumped up and down several feet away from my companion, he, standing still, could feel himself bounced as if on sponge rubber.

Later I learned that you could stick a 20-foot pole through this crust and not strike bottom. Had I known that when we were there, I most certainly would not have been so eager to hop around: I would have worn snowshoes and stepped lightly!

The trees had the startling appearance of being draped with Spanish moss, something you see only in more southern States; yet, when examined closely, this pendent lichen was wiry, and shorter than real Spanish moss. It was more like festoons of fine steel wool.

Leaving the Glades, we drove through wild, uninhabited country over a hard-packed dirt road until we came to Richwood. The surrounding mountains and streams abound in trout and bass. Deer, bears, and wild turkeys are there, too. Once these were to be had for the taking by Indian or pioneer, but today game laws protect them except during the open season for hunting and fishing.

The botanically minded can search for favorites among some 4,000 species of plants, including 32 kinds of orchids!

In the bird realm about 270 species are recorded, ranging from grebes to chickadees, from eagles to grouse, and from flickers to gnatcatchers.

From Richwood with its clothespins (Plate XVI) and "Admirals" to Webster Springs and its Rhododendron Festival, we skirted the edge of the Monongahela National Forest in all its primitive beauty, yet traveled on a modern, well-paved road. Heavy mountain growth comes down to the edge of the road. Often we could hear cowbells close at hand, but we could see neither animal nor habitation.

Frequently I would slow down, take my eyes off the road for a moment, and when I looked back there would be an old woman in a poke bonnet trudging along, or three or four big-eyed children sitting on a rock watching us. Where they came from, or whence they disappeared, I could not tell, for they were as quick and silent as a cat. But their bright eyes, rosy cheeks, and inherent courtesy the few times I did manage to stop one long enough to ask questions, were charming.

Turning right off U. S. Route 220 at an obscure road beyond Cave, we headed across the mountains. This was probably the most isolated stretch we followed, although it could be duplicated in many parts of the State.

We came upon scattered cabins and an occasional tiny settlement along a rough, winding road which sent up clouds of red dust in protest at our passage this quiet Sunday morning.

We passed through Sugar Grove. The town seemed abandoned until we heard people singing in church. Twisting and turning, we struggled up a dizzy, narrow road, with sheer drops of hundreds of feet, to Reddish Knob, 4,398 feet above sea level, which straddles the State line and affords magnificent views of both West Virginia and Virginia. We descended the other side of the mountain to Harrisonburg, in Virginia.

Headed westward again on U. S. Route 33, we soon crossed the State line into West Virginia as we climbed the Shenandoah Mountains. A few hundred yards farther along, the view opened up with the beauty of a Corot. Far below was the little town of Brandywine, the silver ribbon of a creek, and the brown streak of the curving road cutting across fields or disappearing in clumps of trees—the whole scene softened by early-morning haze.

Down to Germany Valley

A State trooper at Franklin told me: "Just a few weeks ago I had to get a statement from an old woman who has lived up in the mountains a few miles from here all her life, and I had to take an interpreter with me, as she couldn't speak English!"

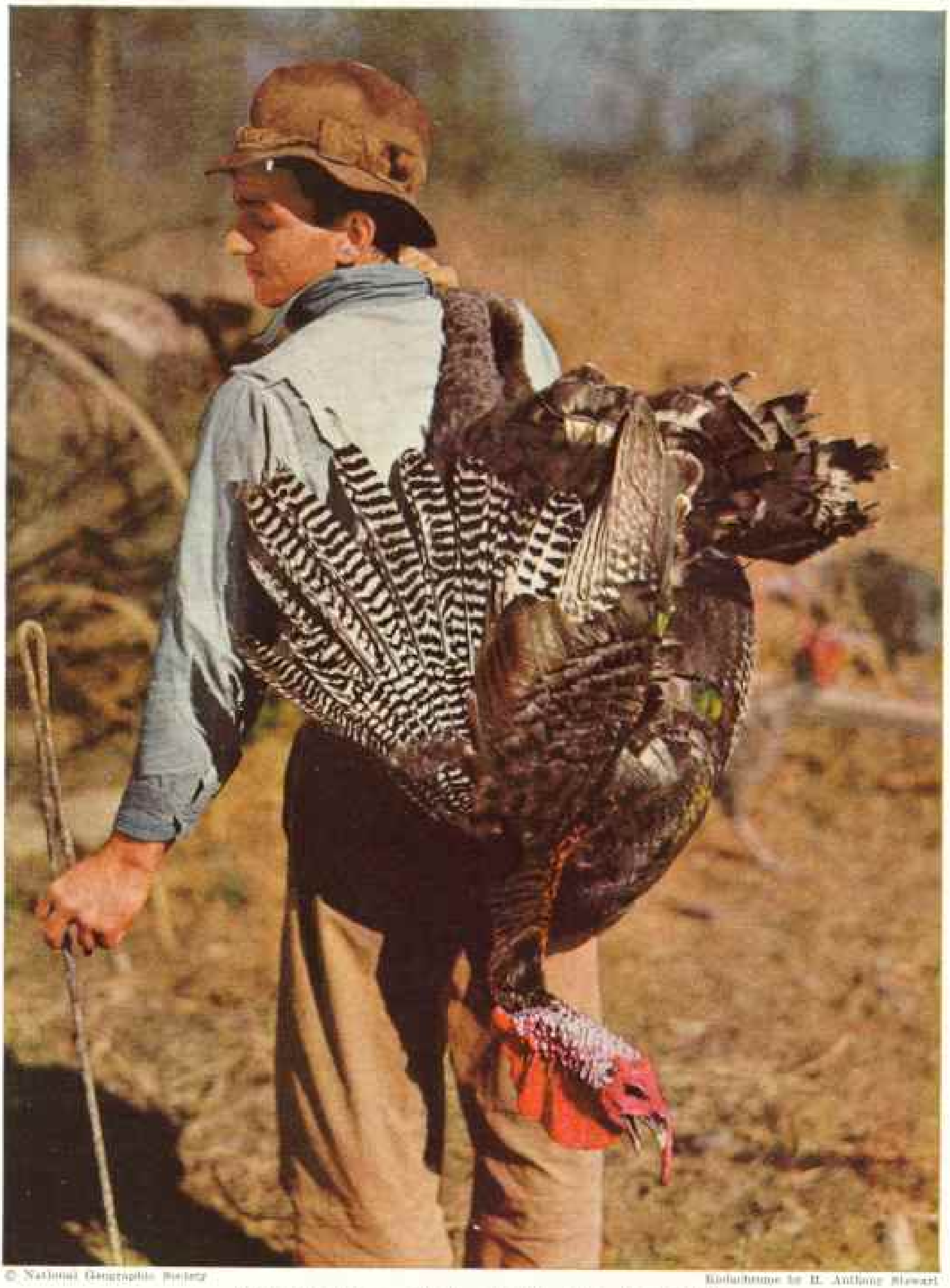
"What was she? Indian?"

"German. During the Revolutionary War captured Hessians were held in prison camps in this section and later they, as well as others, settled here because they liked the country. Some have family records that go back for hundreds of years, written on skins. The valley just west of here is called 'Germany Valley.' Be sure to see it; it's beautiful."

"By the way, how do you spell your name?" I asked.

"B-u-s-c-h," he replied, his eyes twinkling.

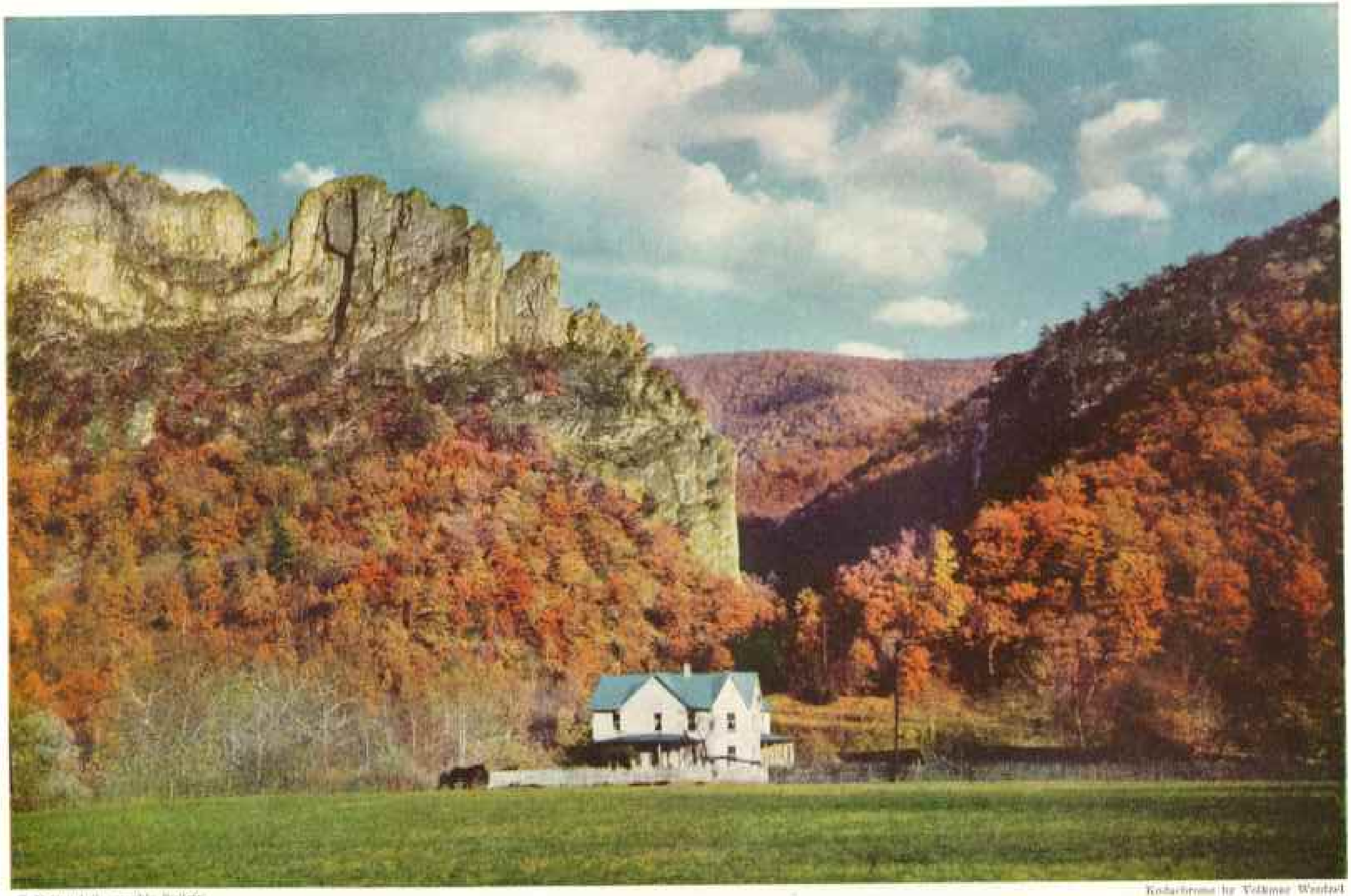
I headed west across the mountains. Throughout this area are many caves, sinks, and rocky formations. One of the former, near Mouth of Seneca, explored in 1939, had numerous large chambers, the biggest 307 by 156 feet, with a ceiling estimated 200 feet



 Kodachrome by B. Anthony Stewart

"Put Me Down—You're Ruffling My Dignity!"

West Virginia raises enough turkeys to serve nearly every family in the State a Thanksgiving dinner. Wild turkeys once were abundant, but they have decreased as commercial flocks have grown. Early settlers called breast of wild turkey and lean venison "bread." When pioneers spoke of "meat," they meant bear.



Kodachrome by Volkmar Wentzel

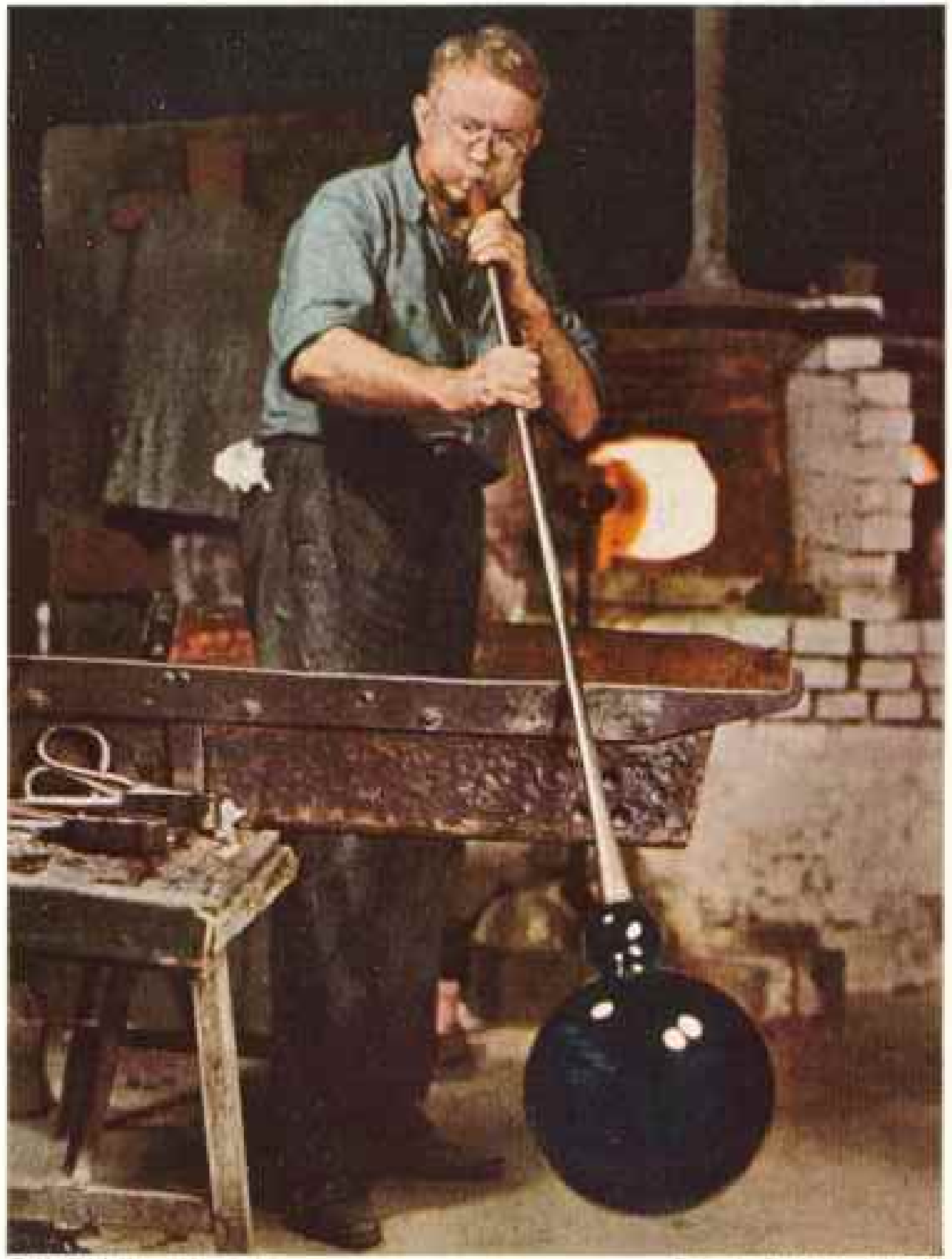
Jagged Seneca Rocks Protrude Like the Backbone of a Half-buried Prehistoric Monster

The quartzite formations are part of a series of outcroppings which dot the area southwest of Petersburg. Many rise almost vertically for several hundred feet.

Kodachrome by Volkmar Wentzel

Asbury Keeps Alive Old Skills in Weaving and Other Homecraft at Weekly Sewing Sessions

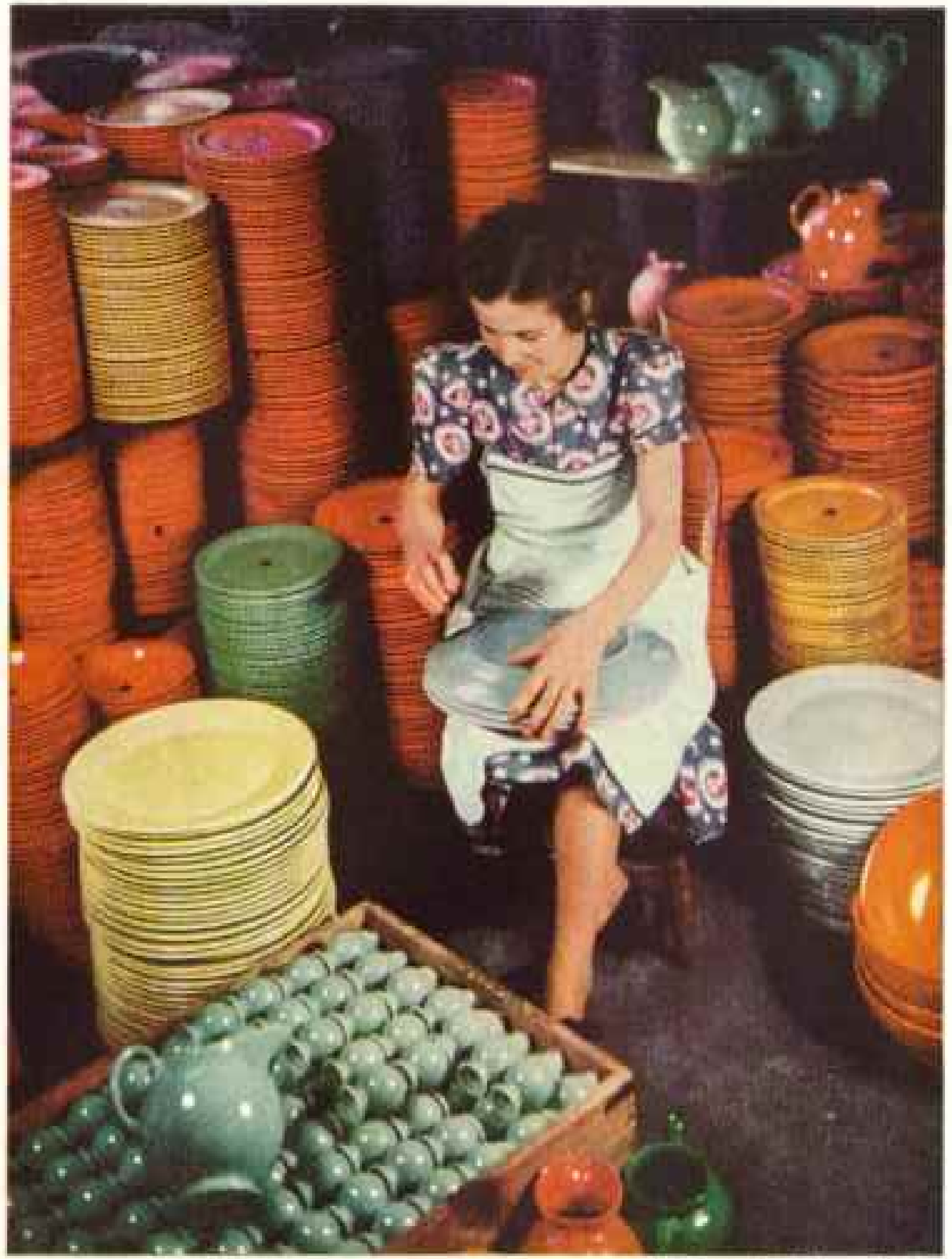
Hardy Farmers Challenge the Forest with Their Clearings High on the West Virginia Hills



 Dufay by B. Anthony Stewart

"Whistle While You Work" Is Not for Him

This Milton glass blower huffs and puffs as he whirls his blowpipe, with molten glass dangling from the end. Gradually the mass becomes a hollow ball and then is ready for more intricate shaping. Some blowers smoke while working, keeping the smoke from passing through the pipe.



Kodachrome by Volkmar Wentzel

Her Job Is to Chip New Plates!

Pieces of chinaware are supported on tiny clay points when they are stacked in the kilns for firing. Little rough spots, where the supports stick to the dishes, must be chipped off afterward. Then they are ready for packing, here at this Newell pottery plant.

Kodachrome by Volkmar Wentzel

Golden Corn—Staple Crop of West Virginia since Pioneer Days

Fields often lie on steep hillsides. An imaginative mountain farmer told one greenhorn visitor that he plants the sheerest slopes by loading his shotgun with kernels and blazing away at his nearly vertical acres!

Kodachrome by Volkmar Wentzel

Stemple Ridge Folk Work Their Names into a "Friendship Quilt" for a Departing Neighbor

Patches are stitched together to form a pattern. A piece of plain material then is stretched over a frame and is covered with cotton batting for interlining. The pattern is placed on top and all three layers are sewed together, or "quilted," with a running stitch in fanciful designs (Plate VIII).

Parkersburg Turned a Bicycle Track into a Lily Pond

A dozen water lilies were planted when the enclosure was deepened and filled with water 35 years ago. Today the pond is a showplace in the heart of the 30-acre city park.

 Kodachromes by Volkmar Wentzel

Like the March of Wooden Soldiers Is the Packing Parade of Clothespins

Deft workers in this Richwood plant pack regiments of them each day for the Nation's washlines.

high. Access to a near-by one was possible only by being lowered 187 feet on a rope. Wood rats (*Neotoma*) and deep deposits of bat guano were found.

From a point on the road to Judy Gap I could look down on Germany Valley. It was all that had been claimed for it. From this same point I could see Spruce Knob, highest in the State—4,860 feet above sea level.

Nearing the top of a stiff climb, my car began to heat up. While the motor cooled, I walked over to a near-by lumberman's cottage and chatted with the family. They insisted I have Sunday dinner with them. Outstanding were their friendly courtesy and "Grandma's" tomato butter, which looked like strawberry jam and tasted like Mexican *panocha* (page 166).

"How do you make it? Any special kind of tomatoes?"

"Oh, no. You jus' take plain ordinary termaters an' peel 'em. Then you boils 'em till they git thick. Then you adds a little sugar—I always use brown sugar—and boil 'em some more till the sugar and termaters is all cooked up together real thick. That's all."

"Do you add any water?"

"Oh, no, mister, you don't add no water. Termaters has a *lot* of juice theyselves!"

Elkins was my next stop. Traces of the old Seneca Indian Trail may still be seen where it crosses the campus of Davis and Elkins College. Each fall a Forest Festival is staged here with "knights" jousting; sawyers cutting huge logs in record time, and choppers wielding axes for championship honors.

Just north of Weston I noticed numerous trucks converging on a cross road and followed them in. Each truck was loaded with one or two head of cattle, half a dozen pigs, or a few sheep, and often the driver had his wife and two or three small children with him.

The weekly cattle sale was being held at one of the larger auction markets (page 160). In the past six or seven years more than 20 of these markets have been established in West Virginia. They do over $20,000,000 worth of business each year. In this market the sales start at noon on Tuesdays and often last until 4 to 8 the following morning, enabling a cattle raiser to sell a few head or a carload of his stock.

Bottles—by the Millions

Fairmont lies at the junction of the Tygart and West Fork Rivers, which form the Monongahela. It is often called the "northern coal capital" of the State, and is a busy industrial city as well. One company alone, the Owens-Illinois Glass Company, turns out a million pieces of glassware daily in the form of bottles for catsup, sandwich spread, and jam.

Morgantown, built on seven hills, is the home of the West Virginia University, with an enrollment of nearly 4,000 in its various colleges and schools (page 168).

Here, too, are many glass plants. One of these is the Seneca Glass Company, where beautifully decorated pieces of tableware are made by artists whose tools are grinding stones of various sizes. Thirty thousand different items—150 carloads a year—from tiny crystal dinner bells to large punch bowls, are produced. The company also furnishes glassware, with the seal crest of the United States on each piece, to United States embassies.

At one factory I watched cloth for men's shirts being spread out 500 layers thick and cut by an electric cutter, as neatly as you could slice a piece of cheese with an ordinary knife. Women at whirring machines sew the pieces together. "Jitterbug" machines, with eccentric needles that jump from hole to hole, sew buttons on in the time it would take to pick one up and put it in position by hand.

Headed westward, we stopped at Mannington where, in the Bowers Pottery Company's plant, we saw toilet tanks and bowls molded and baked in huge ovens. An odd sight was the men carrying finished pieces to the bake ovens for final firing, one piece in their arms and three others balanced on their heads!

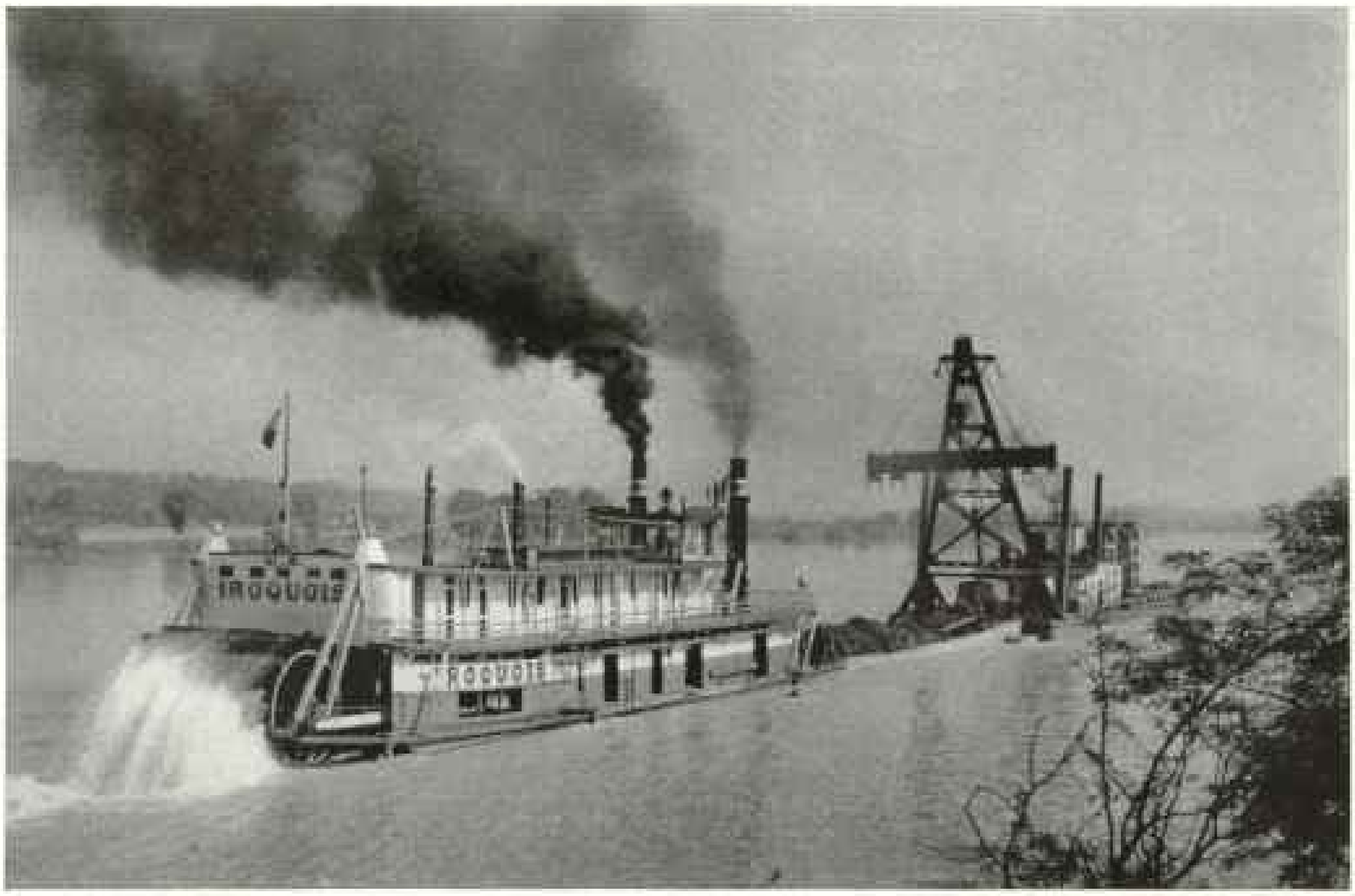
City of Stogies and Nails

Wheeling, third largest city in the State, has been famed since 1810 as the home of nails and stogies. Today those industries are still important, but Wheeling also makes china and porcelain ware, heavy steel and iron products, proprietary medicines, and glassware.

In one steel plant I watched Bessemer converters blowing like some titanic Fourth of July fountain sparkler. Stubby, white-hot ingots later shuttled back and forth through the blooming mills as they were flattened and elongated. Then they were rolled in small billet mills where the glowing metal raced through like a hissing, slithering snake, to wind up eventually, after numerous intermediate operations, as a length of steel pipe.

This company still makes cut nails, so famous in the earlier days, but now in its vast operations turns out varied products, from metal wastebaskets to barbed wire, range boilers to staples, and auto-body sheets to pipe.

Stogies, once handmade, are now largely produced by machinery with almost superhuman touch. One company turns out 70 million a year. A well-known brand of chewing tobacco is manufactured under conditions



Blunt-nosed Stern-Wheelers Still Churn the Ohio

The *Iroquois*, 148-foot "snag boat" of the U. S. Army Engineers, removes snags and wrecks from the channel of the Ohio River. Here she pushes a big dredge with its brood of barges. Stern-wheelers handle much river traffic on the Kanawha and Ohio. They have changed little in basic design since the days of Mark Twain and the lusty showboats.

of hospital-like cleanliness and candy-store aroma. Each of the half-million packages produced daily is X-rayed before leaving the factory. Sales charts tell when a new oil field is opened, they say, for oil men seem to be especially fond of this brand and have carried it to the far corners of the world.

Wheeling was the capital of the reorganized government of the State of Virginia from the time of Virginia's secession in 1861 until the formation of West Virginia. When the new State began to function officially, on June 20, 1863, the government of the reorganized State of Virginia was moved to Alexandria, Virginia, and later to Richmond. Wheeling was the capital of the new State from 1863 to 1870, and again from 1875 to 1885.

Bethany, Reminder of Scotland

On Sunday morning I drove to Bethany, about 15 miles from Wheeling, and attended services in the little college chapel with its excellent student choir. The buildings of this oldest institution west of the Allegheny Mountains chartered for higher education by the then State of Virginia are reminiscent of Scotland, having been designed along the lines of those at the University of Glasgow.

In 1818 Alexander Campbell, founder of the Disciples of Christ, established in his home a modest institution known as Buffalo Seminary, which later (in 1840) was chartered as Bethany College. It opened its first session as such in 1841.

In 1940, its centennial year, its academic standing is high, representative of the educational progress throughout the State.

From open farmlands and a population practically zero in 1909, the steel city of Weirton, 26 miles north of Wheeling, has grown to its present size by drawing on sons of many lands to work in its extensive mills and shops, its furnaces and coke ovens. It supplies products from railroad spikes to roofing, billets to beams, galvanized sheets to tie plates.

The first iron furnace west of the Allegheny Mountains was established on Kings Creek in 1794. In this furnace the cannon balls used by Commodore Perry against the British fleet on Lake Erie in the War of 1812 were made and then conveyed through the wilderness to him.

Chester, at the northernmost tip of the northern panhandle, and near-by Newell are pottery centers. In the latter, plates, cups, pitchers, and bowls are made in the vast

A "Swing" Duet on a Saw

On the grounds of Davis and Elkins College in a sawing contest during the Forest Festival at Elkins, lumbermen strive for $300 in prizes.

plants of the Homer Laughlin China Company.

Here clays from England, Florida, and elsewhere, flint from Pennsylvania, feldspar from North Carolina, and other ingredients may form the cup packed in Ohio straw and shipped in a box made from West Virginia lumber, from which you drink coffee from Brazil sweetened with Cuban sugar.

Crossing the Ohio River to East Liverpool, we followed the highway on the Ohio side southward to get a riverside perspective of the West Virginia "coast"; then back over the old suspension bridge into Wheeling and south to Glen Dale.

Here a former airplane factory now turns out an avalanche of stamped metal toys. From rough metal sheets, we followed through a busy sequence of stamping, forming, cleaning, enameling, and assembling until the shiny automobiles, trucks, engines, toy ranges, and what not were ready to delight the hearts of children everywhere.

At Moundsville the Fostoria Glass Company makes its glassware, using some 7,500 tons of silica sand received in paper-lined cars from the pits we had previously visited near Berkeley Springs.

Skilled workmen with consummate artistry grind or etch patterns on fragile glass, cut the new "reversed" bas-relief on heavier pieces, or caressingly rub gold leaf into delicate designs with bare fingertips.

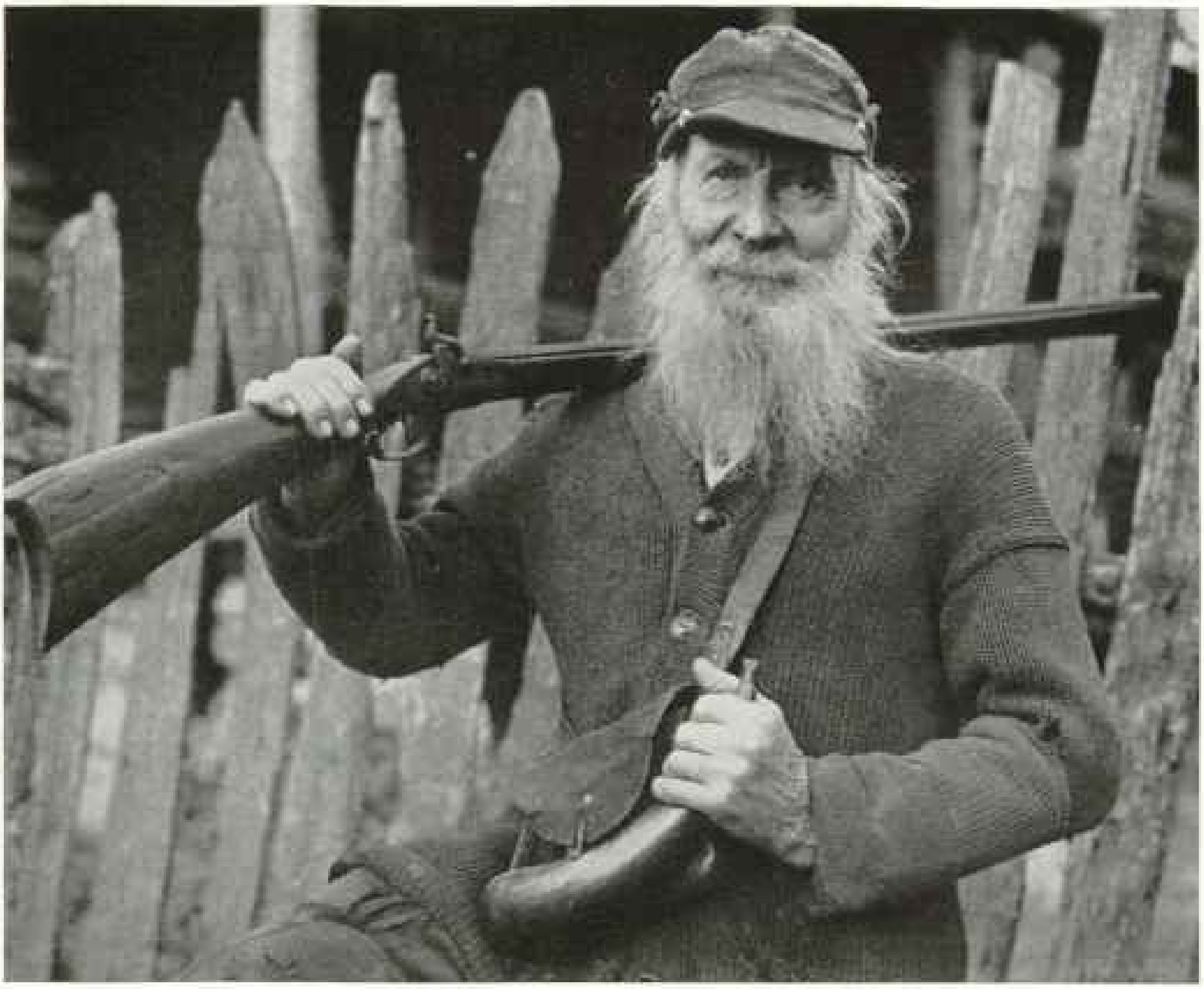
Across the street another company makes enamel kitchen and hospital ware, starting with the flat sheets of metal and forming the different shapes on huge stamping machines. Then they coat them with enamel, which actually is a form of fused glass, colored to give the desired finish.

Let your imagination play around your enameled saucepan. Picture nitrate of soda coming from Chile, clay from England, cobalt from Canada, cryolite from Greenland, and feldspar, quartz, soda ash, fluorspar, borax, iron, and steel from various parts of the United States, by cart and ship, by train and truck, to be transmuted into that everyday utensil.

Marbles—Gay and Gruesome

Picturesque St. Marys would delight the heart of any youngster, for here is a marble factory that can turn out 2,625,000 marbles a *day!* In showing us around, the proprietor waved his hand casually toward a series of storage bins: "Sixty-five million marbles!"

This one factory shipped 14 million Chinese checker marbles in six months. The old-



Keen Eyes of This Pioneer Belie His 90 Years

Blacksmith "Andy" Ayres, one of few surviving frontiersmen, prizes his old rifle and powder horn. In the rugged Smoke Hole region, a few miles from Petersburg, life changes slowly through the years.

fashioned games still take many marbles, and so do the pin-ball machines in corner stores. You find them also in reflecting road signs and the safety signals used on the backs of cars and trucks.

They are used in oil filters, for graining lithographic plates—and by undertakers! When a casket is to be placed in a vault, often a handful of marbles is thrown under it to make it roll easily (Plate VI).

We rolled away from the marbles and thirty minutes later reached Parkersburg, in the heart of a rich agricultural section that also produces much oil and gas.

In the city proper are makers of rayon thread; manufacturers of shovels and garden tools; and a company which makes tanks, derricks, and other equipment for oil-field use from West Virginia to Colombia, Iraq, Argentina, Russia, and Sumatra.

Two West Virginia brothers, David and Joseph Ruffner, invented the "jar" and much other equipment essential to deep drilling in certain types of rock. West Virginia has also sent many experienced drillers and workers to open oil areas in other lands.

As we headed homeward, we estimated that we had traveled more than 2,500 miles within the State, touching its farthermost corners and criss-crossing its 24,282 square miles several times in all directions. Between low and high points this gave us a varied range of climate equivalent to a trip from the Carolinas to Canada.

When I looked over my notes under such headings as steel and stogies; climate, coal, chemistry; livestock and lumber; parks and pottery; education and recreation, I began to think the comment one business man made to me was not wholly State pride.

"West Virginia is one of the few places that are practically self-sufficient," he said. "Consider everything that is grown, made, or needed for comfortable existence. We either grow it, make it, or can offer a satisfactory substitute for it right here in the State!"

Britain Just Before the Storm

A Canadian Canoe Threads Old English Waterways Athrob with the Midlands' Industrial Life

By Amos Burg

With Illustrations from Photographs by the Author

EARLY on a summer morning I stood beside a lock leading out of Regent's Dock Basin in London and accepted from the Grand Union Canal Company the "key" to England's longest canal system.

It was an iron crank tied with pink ribbon, to open locks where there were no keepers. Engineer Hadlow presented the all-important gadget ceremoniously, while Harry, my companion, paddled our Canadian canoe *Song o' the Winds* into oak-gated Commercial Road Lock, first barrier on our northward water route (map, page 191).

Warning us to be out of Limehouse before twilight, when gamins shy stones at passing craft, the Grand Union's representative bowed and vanished. At last we stood at the threshold of a web of freight canals spreading up over England to the rugged Pennines.

Across England by Water

In the next four weeks we were to paddle and crank our way clear across England, from London to Birmingham and Liverpool.

War had not yet burst upon Europe, but its mutterings were growing near and these century-and-a-half-old waterways serving the industrial Midlands were crowded with motorboat-towed barges bearing the raw materials for a rearming England.

Paddling through the back doors of Britain, we saw a side of her character shown to few—the sturdy life along hedge-hidden canals, the very existence of which is unsuspected by the casual traveler.

These waterways were built about 150 years ago to carry the coal, machinery, and other bulky traffic of the adolescent iron and textile industries and to keep the bright promise of the Industrial Revolution from bogging down in muddy, deeply rutted roads.

Then came the railroads—and horse-gaited canals, their usefulness eclipsed, retired modestly behind their hedges. For almost a century only crumbs of cargo fell their way.

In the bustling nineteen-twenties, however, these somnolent waterways were revived to ease the strain on overtaxed highways and rails. Eleven old canals were united into the Grand Union system in 1929.

Large sums were spent on dredging, restoration, and modernization of locks. Through a network of old canals ran a quickening to new life, later to be stimulated by the rearmament program (pages 189, 192).

No Place for a Leisurely Canoe

It took me a week to get a pass on the Grand Union from London to Birmingham. Hundreds of barges parade up and down its reaches. I was told my canoe would be about as popular on that busy waterway as a free-lance handcar on the Broadway subway track. But since I had come with *Song o' the Winds* 6,000 miles from Oregon, permission finally was granted.

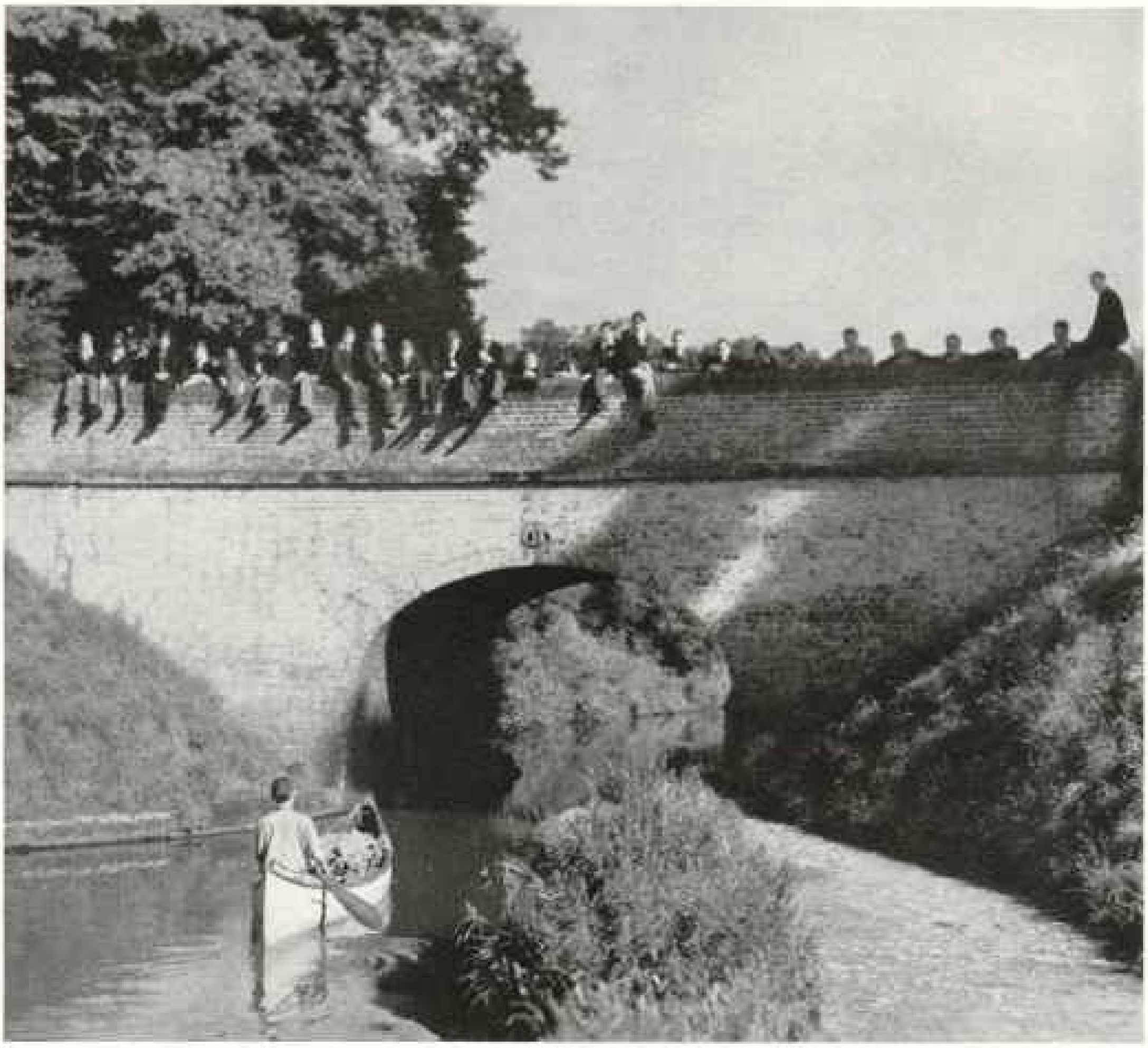
Harry, my companion for the trip, was chosen grab-bag fashion from a list of stranded Americans in the office of the United States consul. He consented to go with me as far as Birmingham. We spent a day shopping for camping equipment, got *Song o' the Winds* out of storage at West India Dock, and rattled in a lorry over the Limehouse cobblestones to Regent's Canal Dock (Color Plate I).

With Yankee emphasis on speed, we expected to launch our canoe and get under way immediately. But no Grand Canyon rapid ever looked more formidable to me than that basin, a seething caldron of shipping activity.

Long, narrow canalboats were being loaded and unloaded with scrap iron, steel, and copper for mills and foundries of the Midlands. British rearmament had skyrocketed the demand for metals. Foreign barkentines, schooners, steel freighters, Thames barges, heavy canalboats moving to moorings under dinosaur-necked electric cranes—all drifted and crowded together like ice floes (page 190).

In vain we looked for a clear lead across the basin to the canal entrance, and at last we gave up the attempt in favor of an early start the following morning, before port traffic awoke.

When we arrived at the docks they appeared deserted, but before we were launched the port activity that had continued uninterrupted since Chaucer was controller of customs was swirling about us. We beelined for Commercial Road Lock, racing with a pugnacious-nosed, heavily laden Thames sailing barge.



Schoolboys Gaze in Wonder at a Canadian Canoe on a Freight Canal

Here the author's craft became an educational exhibit. The headmaster of Brewood Grammar School, hearing of his coming, gathered his pupils on the bridge for an impromptu lecture (page 211). Mr. Burg described his adventures with *Song of the Winds* on turbulent rivers of Alaska, Canada, and western United States.*

After the Grand Union Canal engineer had handed us the beribboned crank, eleven "water elevators" lifted us quickly through the heart of the London Industrial district.

Diesel Engines Replacing the Horse

Brisk traffic kept us dodging ropes and prows. Slowest were the barges hauled by patient horses that plod the towpath ten hours a day at two miles an hour.

Beyond the London area, few horses are seen. Diesel engines propel the long, narrow, ornately painted "quick-boats" or "flyboats" that make Birmingham in 60 hours, a trip that once took seven days. These are the common family boats, built 72 feet long but only 7 feet wide, so they can pass through the narrowest locks.

They travel in pairs, the Diesel-powered lead boat, called the "motor," towing the "butty" (Plate III).

Bargemen's families live with them on the boats. A tiny decorated cabin in the stern serves as their floating home.

Children, often numerous, help handle the craft. Each member of a family takes a turn swinging the long, swan-necked tiller of the butty—from the small daughter, standing tiptoe on a box to see the course over the top of the cabin, to her sun-tanned father who usually, however, is busy steering the "motor."

* See, by Amos Burg, in the National Geographic Magazine, "Today on 'The Yukon Trail of 1898,'" July, 1930; "On Mackenzie's Trail to the Polar Sea," August, 1931; and "Native Son's Rambles in Oregon," February, 1934.

AP Photograph from Keystone-Underwood

Gala Ceremonies Marked the Revival of England's Inland Waterways

The Duke of Kent enjoys a cruise on the *Progress* after opening new locks on the Grand Union Canal, October 30, 1934. The project linked together and modernized a series of old canals, permitting the speedy transit of heavy freight, including war munitions, between London and the industrial Midlands.

Five thousand of these inland sailors live on the British canals. A few, in isolated districts, are veritable "water gypsies," but Grand Union Canal boatmen, industrious and resourceful, resent the term.

Toward strangers from beyond the towpaths these floating families show a certain clannishness and reserve. Paddling alongside one family boat, we held to the gunwale while we munched our lunch. Industrious every minute, the mother busily scrubbed the deck of the cockpit while the children swarmed over the brasswork with fluttering polishing cloths. They ignored us almost completely, as if their work was too important to be halted for curious idlers.

The father, slapping bright daubs of paint on the castles and roses that decorated the outside of the cabin, at last took notice of our presence.

"You gotta p'int yer boat," he remarked, "jist like you give yer old lydy a new dress."

"More often than that, Jock," his wife cut in, "or she'd look as weather-beaten as a lock gate."

Castles and Roses Adorn Each Barge

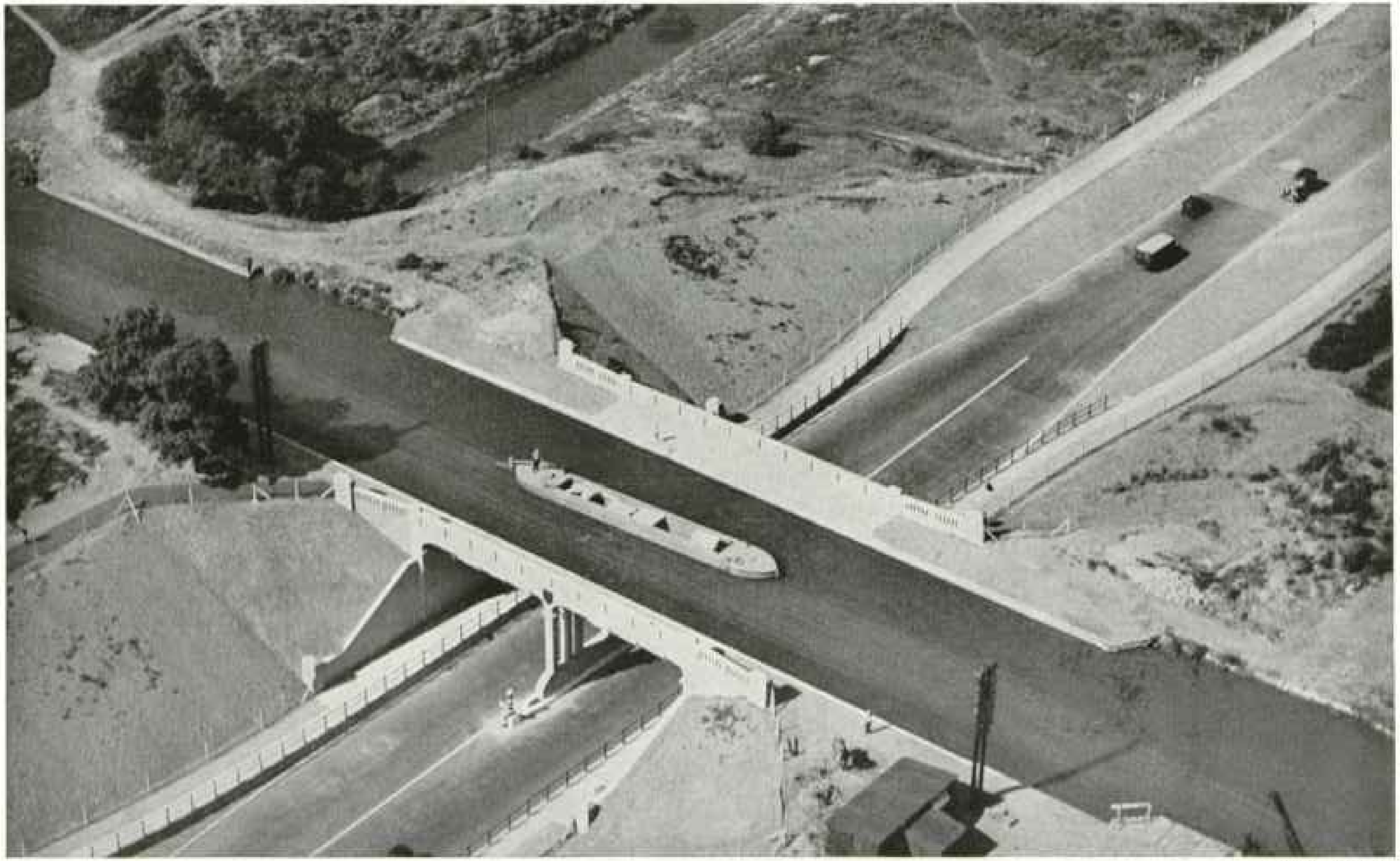
I asked the significance of the decorations. "No reason," was the reply. "But every bargee insists on castles and roses. Always has."

I have read, however, that there is a superstition among these folk that a barge will sink unless it bears a picture of a castle.

Proudly the father explained that they were waiting for two other children at school,

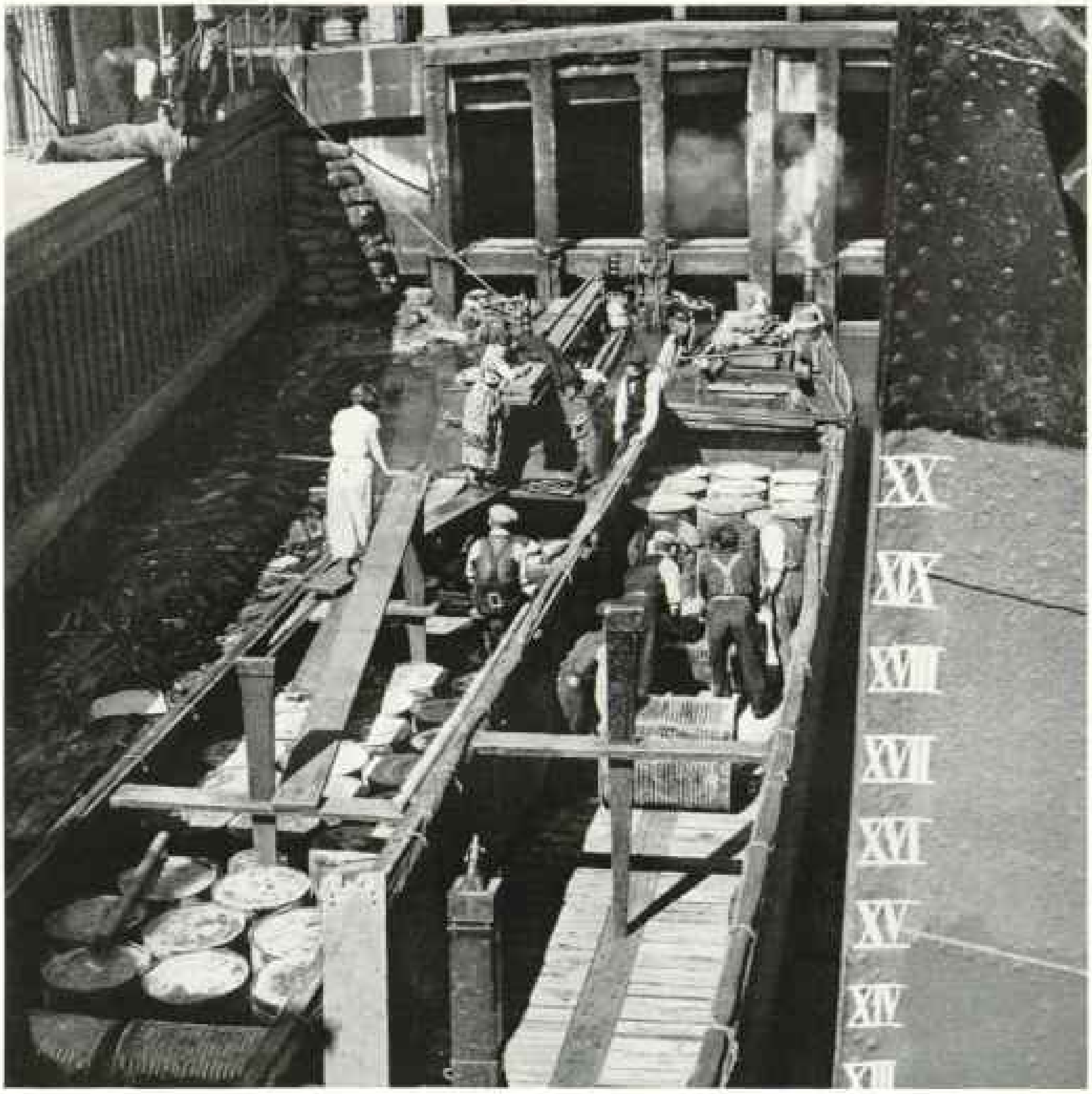
Tenting in the Heart of England, the Voyagers Entertain Friends from London

Knowing firewood is scarce along the canals, the visitors brought a bundle of kindling for the campfire. Most of the time the canoeists used a Swedish kerosene stove for cooking and obtained drinking water at farmhouses. This camp site was on the Leicester branch of the Grand Union Canal.



Where Waterway Crosses Highway, Buses Roar beneath the Keels of Barges

This aerial view shows how England has modernized some of its once-antiquated canal systems. Here the Grand Union Canal passes over the North Circular Road near Wembley, northwest of London. Between 1929 and 1934, locks were widened, concrete banks and bridges built, and side ponds made to conserve water.



In Busy Limehouse Barges Take on Cargo for the Midlands

No Grand Canyon rapid ever looked more formidable to the author in his frail canoe than this caldron of London shipping. To avoid being crushed between canalboats and steamers unloading raw materials for Britain's rearmament, the start of his voyage had to be made in the early morning hours.

snatching a few hours of writing and figuring before they all set out for Birmingham. Bargemen's offspring are thus educated piecemeal, with a bit of instruction at each terminus.

So that I might send him a photograph, the father laboriously scrawled on a scrap of paper the name his little son had taught him to write.

Movies and the radio lessen the canal folks' isolation. A multi-tubed wireless set in the cabin blared music.

"We 'eard the Coronation!" our host informed us.

As we drank the tea the barge wife offered, she described, with many a flourish of sturdy arms, the plot of *Mutiny on the "Bounty,"* which they had seen the night before.

The moment the son and daughter arrived from school this leisureliness abruptly ceased. Again the job was paramount. Lines were cast off and the boat chugged away toward the black maw of Islington Tunnel.

We peered ahead into the 11-foot, brick-lined tube that runs for more than half a mile under one of London's most densely populated industrial districts.

Although it was built in 1810, its existence is unknown to many who live atop the hills it pierces. We waited while a tug towing six

Drawn by Ralph E. McAleer

Across England through this Network of Canals, the Author Paddled in His Canoe

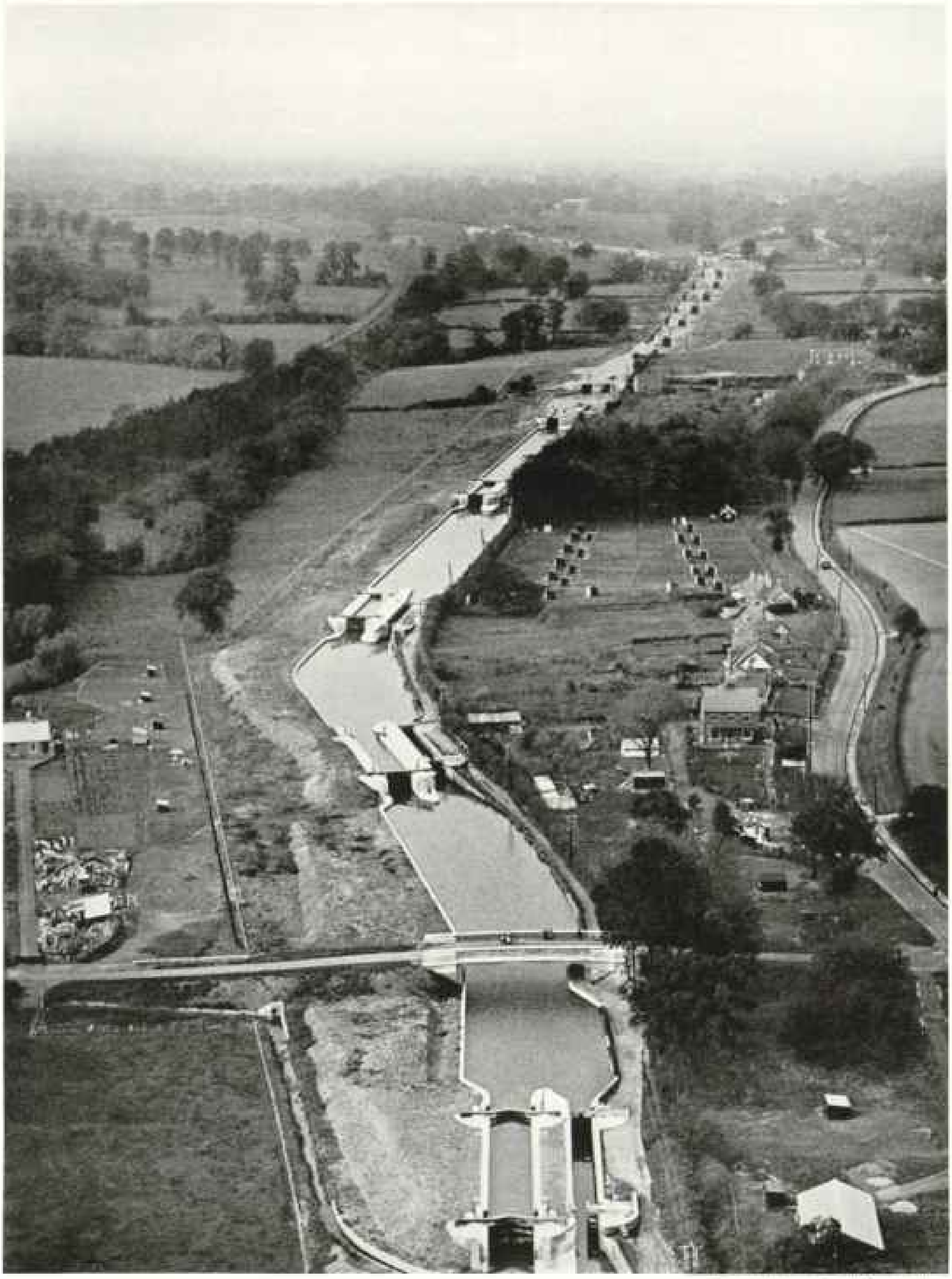
Little known to visitors but extremely important to Britain are the water arteries followed by *Song o' the Winds* for 250 miles from London to Liverpool. Threading a perilous way through the busy shipping of Limehouse docks the author cruised through tunnels and scores of locks to reach the back doors of rural England and the industrial Midlands, returning to tidewater on the River Mersey. Most of the way he followed the recently modernized Grand Union system, longest unit of a 2,475-mile network of inland waterways in England and Wales.

barges crept out. Then in we plunged, paddling swiftly toward the pinpoint of light that was the other end.

By the time we reached the relieving green of Regent's Park, we had passed almost a hundred factories and shipping firms—a grim and sooty avenue of industry. But in the park people were strolling on shady paths or lying sprawled in shoeless comfort on the grass. This passion for the fields and trees is shown, especially on holidays, in the leisurely, wholehearted way the English enjoy their parks and countryside—a love that has made their island a continuous garden, fiercely preserved, from Land's End to the fog-shrouded Orkneys.

Urchins Lay Down a Stone Barrage

As we passed under a bridge, a man shouted at us and pointed to something struggling in the water close to shore. It was his dog, which had fallen or jumped from the bridge and couldn't climb out because of the steepness of the canal banks. Scores of dogs and cats are



Photograph from London News Agency

Up These Water Stairs Barges Climb into Warwickshire

To adapt the Grand Union Canal for use by large Diesel-driven boats, more than 50 old locks had to be enlarged and modernized in this section alone. Because of intricate locks, a canal is vulnerable to aerial bombing and difficult to repair. Double locks make this section of the waterway less susceptible to air attack.

thus drowned. We hauled out the pet and returned him to his delighted owner.

At sunset we reached Paddington Basin, eight miles from our starting line, but still in London. Unfortunately, we were still in stone-throwing territory. When children began to toss rocks at us, we appealed to a policeman.

The bobby, however, was broad-minded. "Well," he said, "the little tykes are just out of school and need exercise."

So we chased a family of ducks off a tiny island and pitched our tent in a clump of willows. The aged brick factories and warehouses of 18 firms rose about us. It seemed strange to be tenting in the midst of London.

I strolled uptown, exploring for groceries. While searching for one of the popular milk bars, I saw a sign "Hot Dogs." I sampled one, sandwiched in a bun I could hardly gnaw. I had a notion to tell the proprietor of the requirements, but reasoned that since many of the British were not yet hot-dog connoisseurs he would probably find enough customers without my mixing in international affairs.

An English friend whom I phoned brought his wife to the basin for a canoe ride. As we paddled along, we joked with boys standing on the bank. Instantly they began to shower us with stones and clods, driving us back to the island, where we sat in the tent. Missiles continued to fall around us. Finally the tent sagged under the weight of an enormous clod.

"They've gotten our range," Harry remarked.

The next morning, as we paddled along, Harry and I moodily exchanged ideas that might solve problems not encountered in Rocky Mountain river voyaging. He said that even as a boy he was allergic to stones, especially when they were bounced off his head. He suggested that we stop in the next museum and rent a couple of suits of armor or at least trench helmets.

In western canyons, foaming rivers had often borne me too swiftly. On the Grand Union Canal there was no current at all, and strong head winds tried to blow us back. So we emulated the barge horses. One of us towed *Song o' the Winds* from the towpath while the other sat in her and steered.

At Cowley Lock we paddled out of London into the lush, green countryside. The quiet scenery, the patchwork of farms, and the beauty of rustic cottages surrounded by trim gardens made me realize why Britons in faraway parts of the Empire so often speak longingly of home. In every direction, houses differing centuries in age mingled and blended in harmony with the landscape.

England is full of the beauty of little things. Whether shaped in imperishable stone, half-timber, or thatched, her architecture stands and mellows in beauty through all the centuries. During late evening walks, the freedom of the open landscape of this little island puzzled me. It was hard to reconcile it with one of the densest populations in Europe and the world's largest international trade.

"Ugly ditches" was the countryman's opinion of the canals when they were dug more than a century and a half ago. Hedges were planted and stone walls built to hide these "scars" of commerce. For miles at a time we paddled along green aisles, like secret corridors through forbidden lands. Farms and villages on either side were hidden. Often we stopped to "climb up and have a look at England."

In my village shopping tours my long "a" pronunciation of "tomato" revealed that I was an American and brought from women shoppers, who pass three-fourths of the money across English counters, interested inquiries as to how I liked their country. English tomatoes became our favorite food and we ate them at all hours of the day.

Buses Roar beneath the Keel

Engineering marvels of a century and a quarter ago were the aqueducts, or "water bridges," by which canals are carried over roads and deep valleys. On the Grand Union we passed over some of brick and stone built about the time of Napoleon's defeat at Waterloo. Others, of freshly painted steel and concrete, arched over new super-highways. Extraordinary it was to hear giant buses roar by beneath our keel! (Page 189.)

July dawn breaks early in England, which lies in the same high latitudes as bleak Labrador. Shortly after 3 a. m. tentative peeps from the shadowy thicket tell that the bird glee club is about to warm up. The liquid whistle of the thrush and the swinging, cheerful note of the chiffchaff are gradually merged in a swelling chorus as scores of other voices answer their cues.

Progress was delayed after breakfast one day by a barge loaded so high with lumber that it had jammed under an old bridge. Sturdy arches of weathered brick are landmarks on English canals. Although mossy with age, they are strong and seldom require repairs. One near Weedon, built in 1800 for the passage of livestock, now carries the main highway between London and Birmingham with its continuous rush of heavy traffic, including 15-ton trucks.

When in Trouble Bargemen Send for the "Service Van"

Beyond the London district there are no lock keepers. Each boat has an iron crank similar to the one we carried, and a boy or girl usually runs or cycles ahead with the crank to open the lock gates.

Getting *Song o' the Winds* through the first few locks was a fumbling operation. Any bargee would have had less trouble with the *Queen Mary!*

Before I made my debut with a crank, I saw a pale little wisp of a girl turn the mechanism with ease to let through her father's pair of barges. It looked easy, but when I tried it for the first time I succeeded only after several clumsy attempts. Once I pulled the wrong gate and admitted water when I meant to pour it out. We struggled with many a lock before we got the knack of gate cranking as those canal youngsters have it.

Salt-water Sailors in Distress

Others shared our troubles. The job of handling canalboats has passed from father to son for generations. But when the Grand Union revived neglected ditches and called into service 200 pairs of new barges, the labor shortage became so acute that almost half a million tons of cargo were refused in one year. Deep-sea sailors finally were brought in as captains and mates to man the new fleet.

Accustomed to the ocean's expanses, these men found it hard to familiarize themselves with the tricks of navigation on waterways so narrow they could almost be jumped. Locks and boats were well bumped until the salt-water boys became adjusted.

Four locks above Cowley we overtook a motor and a butty jammed in a lock. Two distraught tars, fresh from the sea, hauled futilely on a line trying to clear the craft.

"We'd appreciate 'aving you keep yer camera in its kit this toime," one begged.

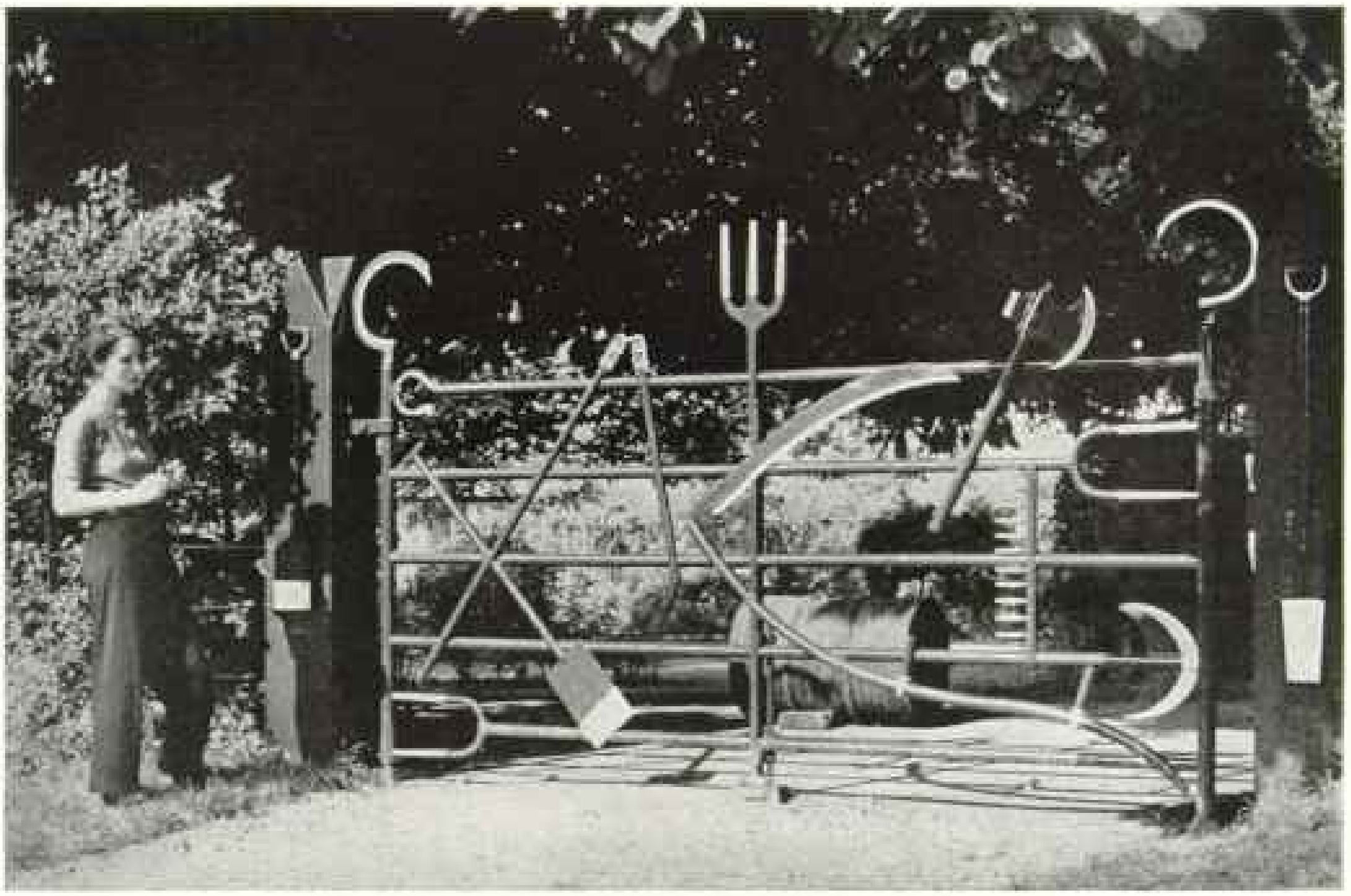
Out of the water came *Song o' the Winds* for the only portage around a lock on the entire cross-England voyage.

It was a huge thrill releasing 63,000 gallons of water at each lock. Between London and Birmingham we used almost ten million gallons just for our little canoe.

Watersheds are small in England, but fortunately there is a good rainfall and the lush vegetation retains moisture.

This hilly countryside is not so well adapted to canalizing as the pancake plains of the Netherlands and northern Germany. Forty-five locks lifted us almost 400 feet to the Tring Summit. The Grand Union climbs over the crests of three of these high land swells.

Fishermen frequented our canal world. They all took their sport seriously, sitting for hours on the bank staring at the point where their lines entered the murky water.



Tools of His Trade Compose a Farmer's Gate

This strange portal, along a shady lane near Tring, is made up of old hand implements—scythe, spade, spading fork, two-tine pitchfork, shepherd's crook, broadax, rake, sickle, and flail. In normal times fertile Great Britain imports two-thirds of the food for its dense population.

Perhaps they simply liked to get away from home and bask in the sun for a while, because we rarely saw them catch anything.

The way they refused to notice us showed how infinitely more important they regarded fishing in a canal than canoeing on it, although a canoe was a strange sight to most of the other people we met.

We stopped to chat with a somber-faced angler squatting on a stool shaded by an umbrella. He was togged out in full fishing regalia. An elaborate kit of hooks and baits was spread beside him on the towpath. Without taking his absorbed attention from the floating bobber, he informed us that he was fishing for bream and roach. He didn't eat them himself, he said, but his chickens enjoyed them.

I asked why he sat in plain view of the fish.

"They'd 'ave to look sharp to see me image through that muck," he replied, nodding toward the muddy canal.

The water became clearer as we ascended to higher levels on the Grand Union and was never quite as dirty as it looked.

I found a man raising watercress and asked if I might photograph his plots. But he insisted that I first take a picture of the fountain from which he drew refreshment for his crop. He explained that one writer had reported that he pumped his water out of the canal, and he wanted vindication (page 208).

Shopping for English Oaks

In the Walker shipyard at Rickmansworth the owner showed us canalboats under construction. They are built of sturdy English oak, increasingly hard to obtain. Trees in hedgerows, parks, and private forests give a false impression that England is heavily forested.

Britain's greatness was in large measure built on oak, for her early exploring fleets and conquering armadas were fashioned from tough timbers felled in the home shires. Myriad wooden merchant vessels assured England's commercial might, but almost exhausted the supplies of lumber suitable for shipbuilding.

Today, instead of purchasing timber in tracts, Mr. Walker must shop around, buying two trees here and three there from estates where an acre may support as many as eight or ten large oaks.

Extreme care and the finest workmanship go into the construction of canalboats. Critical Grand Union employees stood around watching repairs on old floating homes or the making of new ones.

"We have to build them strong," Mr. Walker explained, "or else they come back to us for repairs and our reputation suffers."

Country craftsmen still uphold the British tradition of painstaking and rugged workmanship. A village shoemaker outlined a program for overhauling a pair of my boots in as much detail as if I had handed him a contract to rebuild a battleship.

Next day was Saturday and week-end hikers and campers, disgorged by the scores from trains and buses, were beginning to overrun the countryside. Our camp by the towpath tempted many to stop for a chat. Some were searching for a break in the hedges through which they could cut across field and valley to reach another station and return to London.

Railway and bus companies encourage this weekly exodus to the country. The London Underground lists many miles of rambles in the Chiltern Hills alone. Shorter walks of five or six miles are given, as well as long 15- and 20-mile hikes. A series of walks may be strung together into tramps extending over several days and may cover 50 miles or more.

Trail directions are listed in meticulous detail so that the pedestrian may not lose himself in the confusing network of field routes. As long as a rambler keeps to paths when crossing private property, cultivated land, and meadows under hay, he is not likely to be stopped for trespass.

A Flood of Week-Enders

Our camp near Batchworth was pitched at the junction of railway, highway, and canal. The roads were congested with Sunday automobiles, cyclists, and pedestrians. Cars passed one place at the rate of 600 an hour. One railroad alone dispatched a train every five minutes from London. More than 1,000 motor coaches carried almost 50,000 trippers to the country.

It seemed as if most of this week-end army walked through our Batchworth camp!

Adding to the confusion, Diesel engines chugged and lock gates clanged all night as barges rushed north to Birmingham with steel and scrap iron for armaments.

From the Batchworth Bridge we watched a lock in action (Plate III). Thomas Henry Cutler, lock keeper here, recorded every boat, with details of load, captain, destination, and owner. He told us that 40 pairs of barges passed daily, on the average.

"My great-grandfather began work here in 1794. All the Cutlers died in harness and never took a copper from the Government," he informed us proudly.

While we were loafing around the lock, two pairs of boats arrived simultaneously. We asked him which had the right of way.

"The first boat in sight," he answered. "Sometimes it's almost impossible to tell which has the lead."

In this case the wife on each craft claimed precedence. Bickering in unintelligible Midland accents, both demanded the right of way and both jammed the noses of their vessels into the mouth of the lock. Thomas Henry, of the fourth generation of Cutlers, shook his finger at the one whom he considered in the wrong.

At last one husband, tired of the wrangling, shouted to the captain of the other boat: "Come on, man. Let's go 'ave a mug of beer and let the lydies settle it."

A gentle retreat from this confusion of tongues was the Batchworth garden of a newfound friend who directs repair work along the canal. As he lovingly discussed each flower, I couldn't help thinking of a startling contrast. How different a person is the average Englishman, preoccupied with bringing his tiny garden plot to radiant bloom, from his adventurous countryman who spans continents and oceans on wings, endures shimmering desert heat, stabbing Arctic cold, and miasmal fever swamps to hold a vast Empire won by earlier generations of his kind!

Above Batchworth we paddled through the green oasis of Cassiobury Park, one of many recreational and scenic areas snatched by the National Trust from despoliation by uncontrolled real estate "improvement." Nature lovers, motorists, cyclists, and hikers give vigorous support to a campaign to save places of natural beauty and historic interest for the enjoyment of all the people. Forests, shoreline, lakes, mountaintops, castles, and cottages have been acquired by the Trust as a permanent national heritage.

One evening we passed through our 56th lock since leaving the Thames and reached Cow Roast on the Tring Summit—elevation, 393 feet, highest on the Grand Union. At the Navigator's Inn barge helmsmen were tossing darts and mugging beer. Pubs are usually found at the locks, where the men are delayed a few minutes while the boats are being worked through.

A mile beyond Cow Roast we pitched our tent. Immediately "visitors" arrived for dinner—with a grunt and a hiss a haughty swan cruised into camp. His wife and six cygnets were not far behind.

Until then, only one visitor had invaded our camp without some form of introduction. The exception was a breezy fellow who hailed us with, "Hi chief, where ya headin'?" He

Nomad Canal Folk Spend Their Lives Afloat

Once plodding, horse-drawn boats took seven days to travel from Limehouse docks, London (above), to Birmingham. Now trim, Diesel-driven craft carry heavy freight, including raw materials for war munitions, over a 150-mile waterway in two and a half days.

 Photo by Anne Berg

"Unostentatious" Is the Name of This Gaily Bedecked Craft!

Amid the grime and smoke of London's docks and Birmingham's warehouses, the canalboat strikes a note of cheer. A Rickmansworth decorator is retouching the traditional castle and roses which embellish many Grand Union Canal boats.

 Finder to Anon Bots

Children Play Beside an Unloading Basin near the Old World Town of Berkhampstead, Hertfordshire

At such quiet inns Grand Union Canal boatmen quaff a mug of beer while wives argue over precedence at the locks. The first boat in sight of a lock has the right of way, but often there is the question of which was first.

Photo by Anne Berg

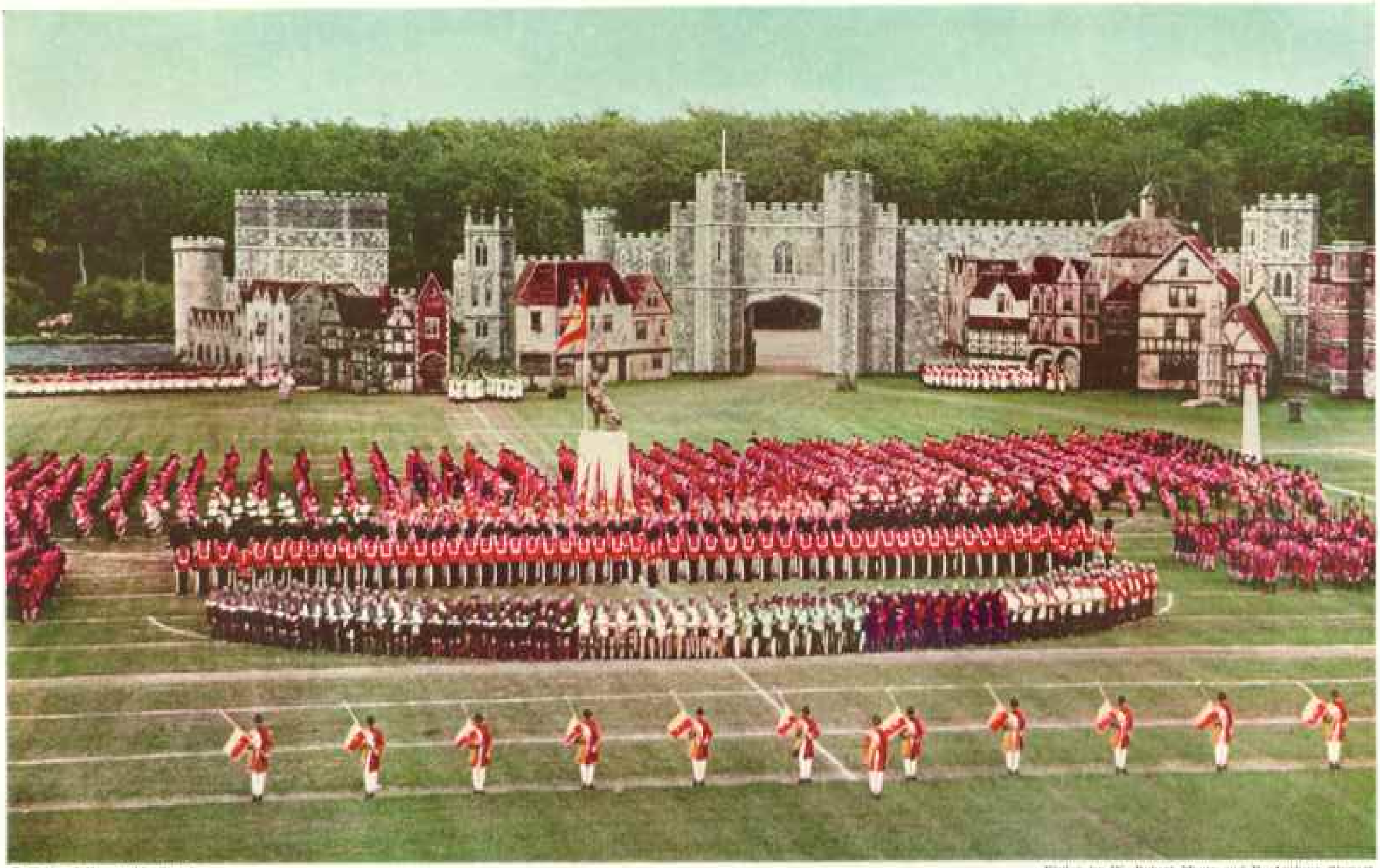
At Batchworth Locks Two Empty Northbound Boats, Lashed Side by Side, Are Warped Through

"Crew" of a pair of Grand Union Canal barges is usually a single family. The husband handles the "motor" (left) which tows the "butty" astern. When under way the boatman's wife or an older child holds the wooden tiller of the latter. Four generations of Cutlers have tended these locks. Usually the boatmen operate the gates.

Photo by W. Robert Moore and B. Anthony Stewart

To the Music of Massed Bands Stately Battalions Marched and Wheeled during Trooping of the Colour

As a birthday tribute to its colonel-in-chief, the King, the household brigade here assembles on the Horse Guards Parade, London, during one of its last prewar maneuvers. Although the ceremony honored the King's birthday, it was held in June, when weather conditions were ideal for the display of dress uniforms. On this occasion the escort for the colour was the Coldstream Guards.



Philip by W. Robert Moore and B. Anthony Stewart

In Peacetimes Britain Rekindles Its "Will to Win" Each Year at the Aldershot Tattoo

This famous pageant, suspended for the duration of the war, recalled stirring victories of Britain's military forces and highlights of her history. Before a backdrop representing old houses of London, part of the cast of 5,000 masses for the grand finale. Thousands of school children attended this afternoon dress rehearsal. Episodes that have been dramatized in this brilliant review are: Peninsular Campaign against Napoleon, First Burmese War, Capture of Havana, Meeting the Spanish Armada, Field of the Cloth of Gold, and the Siege of Namur.

Photo by Anna Burg

Flowering Heather Blankets Hillsides Rolling Down to the Caledonian Canal, in Northern Scotland

Sixty miles long, this picturesque waterway cuts a wooded rift straight through the "great glen" of Glen More. The Caledonian links a series of narrow lakes, Lochs Lochy, Oich, and Ness (of "sea serpent" fame), between the Atlantic and the North Sea. Because of its small locks, it has little commercial or military value.

Photo by Anne Berg

The Throb of Diesel Engines Disturbs the Quiet of Green Hertfordshire Farms, Not Far from London

Northward to Birmingham a pair of heavily laden canalboats winds through mirrorlike waters. The appearance of extensive woodlands is an illusion. Ever since England cut down many magnificent oaks to build the "wooden walls" of its Elizabethan navy, the country has been one of the least forested in Europe. Heavy rainfall means lush meadows, abundant vegetable gardens, and thatch covering for haystacks (foreground).

Photo by B. Anthony Stewart

Ships and Children by the Score—Symbols of the Busiest River and Largest City

Passenger liners, humble tramp freighters, and other craft, painted a dull gray, now thread their way through mine fields to this anchorage off Gravesend in the Thames below London. From far-flung outposts of the British Empire, such as Zanzibar and Singapore, Jamaica and Fiji, Hong Kong and Trinidad, New Zealand and Nigeria, come the raw materials and food that England needs to protect and feed its huge population. In exchange, the mother country sends manufactured goods to its colonies and dominions beyond the seas.

was an American hitchhiking across England. After three days of futile thumbing, he had decided to make it a walking trip.

While we paused under a leafy overhanging tree to dodge a shower, a woman spied us over her back fence and asked us in for tea. Accepting all such invitations as a chatty source of information and warming hospitality, we quickly acquired the afternoon tea habit. My record for one day was 24 cups of tea and 16 pieces of cake!

On Tring Summit reedy reservoirs feed the canal's upper levels. Beyond them roll green and peaceful Dunstable Downs. With a limited watershed, the Tring ponds dried up in the 1934 drought and every cupful of water was required to keep the boats afloat. Now powerful Diesel pumps have been installed to meet such emergencies.

Overhead the Wings of War

Every day we tilted back our heads to watch Royal Air Force squadrons roar past in formation. And in every busy town and quiet village stood melancholy monuments, often just slabs of granite, bearing the names of some of the million soldiers who had fallen for the Empire during the first World War.

At the old village of Blisworth a young mechanic offered me a morning ride behind him on his motorcycle. Along twisting roads we sped, through warm valleys pleasant with cottages. Unchanged by centuries, they peep through foliage everywhere, representative of the sturdy beauty of English craftsmanship.

The motorcycle leaned around uncounted S-curves, purred over hills, skirted the shores of meandering rivers and gemlike lakes, whizzed past fertile meadows and sleepy villages. I grew fidgety on the blind turns. It is impossible to widen these scenic routes without destroying the character of whole hamlets and towns. England's new motor roads by-pass, and save, many places of historic interest.

By noon Bill and I whisked back to Blisworth where I enjoyed lunch with him and his family. Shyly, his little daughter, Jayne, presented me with a flower. The gentle reserve, gracious charm, and deep humanness of this household were typical of many we met.

Bill had converted his father's smithy into a garage. His cottage is two centuries old.

"To modernize it, we dug holes for more windows through the 3-foot-thick walls," he explained. "We installed electricity, running water, and a bath. Yet the house still looks its age."

After lunch we purred back to the canal.

"Tie on yer boat," a steerer shouted, as I tossed him two shillings for a tow through Blisworth Tunnel.

We threw our line to the butty where it was made fast by a comely woman who handled the tiller with lithe, muscular movements.

The two youngest of several offspring were lashed to a brightly painted water barrel atop the cabin. The week before, the mother told us, one of her children had fallen overboard and drowned.

"Legging" a Barge Through

Chugging through Blisworth Tunnel, a 1¾-mile shaft of darkness under a hill, was like voyaging through the inky-black axis of the earth. Water streamed from the aged brick roof. Ahead we could hear the *pung, pung* of the Diesel and see the eerie, unsteady glare from the acetylene bow lamp searching out our course.

None of the longer tunnels have towpaths, and the more antiquated canals, without motor-towage service for horse-drawn boats, still employ the primitive method of "legging." "Leggers" lie on their backs atop the boats and push with their feet against the roof of the tunnel. The tow horses walk up over the hill and meet the barges at the far end.

It was killing work in the old days when this was standard practice with craft weighing 30 tons. The human engines were paid so much per boat, regardless of tonnage. By this outdated method, it took three eternal hours to make the passage through Blisworth Tunnel.

By contrast, it took us twenty minutes. As soon as we emerged into bright sunlight, the bargeman's wife, with a pleasant nod, dropped our towline and left us battling a strong head wind. To keep a week-end camping engagement with London friends at the Leicester branch, we thumbed another tow. The steerer's wife was a back-seat driver. In a shrill voice she shrieked instructions to her husband, turning occasionally to glower resentfully at her tow.

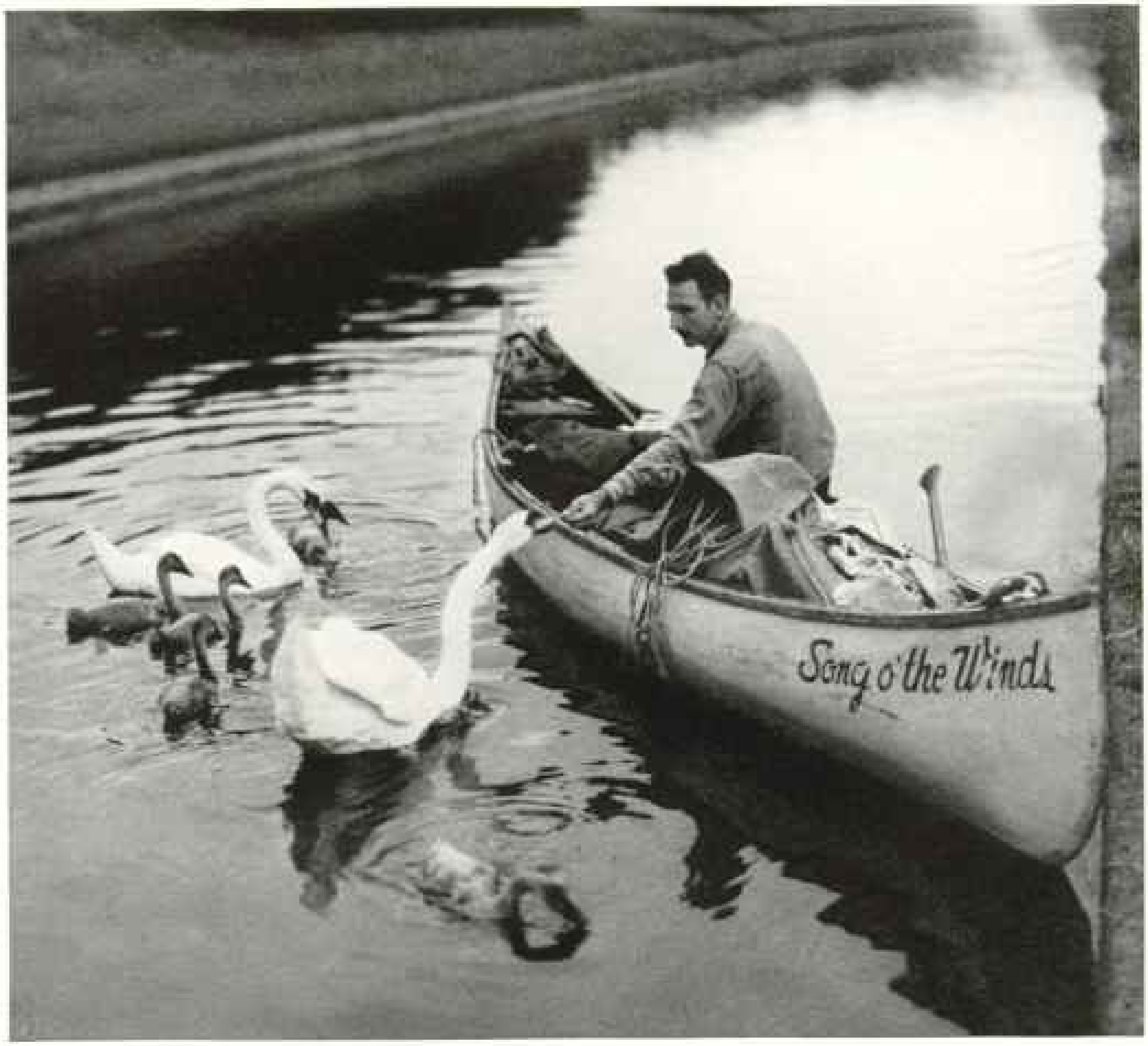
"Maybe we aren't steering to suit her either," Harry remarked.

Still, she looked after our interests. Just as fast as her little boy bobbed up out of the cockpit to untie our towline, she slapped him down.

After 15 miles we cast off, ascended Buckby Locks to Braunston Summit, and paddled north into the Leicester branch for night encampment.

Ernie was waiting for us on the bank with his wife and sister-in-law. His arms were full of firewood brought from London. We could never find any along the canal.

One of the girls had brought a little blue book containing "Fifty Rules of Camping."



Graceful Swans and Cygnets Form a Bread Line about *Song o' the Winds*

With grunts and hisses a family cruises up to the canoe for a handout. These semiwild birds are found on most of the inland waterways of England.

which she consulted constantly. It was her first overnight camp, but when Harry and I began pitching the tent she remonstrated against placing it under a tree.

"I had an uncle who camped under a tree in America once," I said. "Why can't we do it here?"

"Well, it just isn't done," she answered. I had heard the same reason for refusing to scramble eggs in London.

During breakfast the canal rang with excitement. Fishermen were dropping their poles and rushing to where an angler with taut line was evidently struggling with a whopper.

"A net, a net!" he pleaded.

Another, eager to share in the glory, swished a net under the fish and lifted it to the bank. It was a limp chub, barely six inches in length. Ernie's eyes twinkled.

"I see you didn't lose your bait," he said facetiously. The fishermen turned and their eyes blazed indignantly at Ernie as if he had ridiculed an epic.

"A Bit of the Yankee"

Next morning we passed through Braunston Tunnel (page 212) and dropped 176 feet in 29 locks to Leamington. This famous watering place had just received a shipment of tomatoes via the all-water route from Leamington, Ontario.

As we cast off after a shopping tour, a little girl in a group of children on a humpback bridge called out, "You are from Hollywood, aren't you?"

"How can you tell?" I asked.

"Oh, there's a bit of the Yankee about you."

After crossing the River Avon, which flows

© Fox Photos

Fishermen Beware!—of the Fish-snatching Cat

"Amos," black cat of the lock keeper on the Gloucester and Berkeley Canal, at Purton, Gloucestershire, is the bane of anglers. After making friends with a fisherman, he waits until he sees a fish securely hooked. Then Amos snatches it as it is being reeled into the boat.

south through the historic towns of Warwick and Stratford, we began to crank our way up the staircase of Warwick and Hatton Locks. Within three miles we climbed 162 feet through 23 locks. Here the Grand Union has installed new gears, the last word in modernity. After working a few of them, we were convinced they were the last word in stiff cranking.

We noticed how the canal banks were eaten away by erosion. Diesel motors push boats along at a speed which raises a sizable wave. This washes away the shore so quickly that repair crews are continually at work filling in the gashes. Gradually, however, cement walls are replacing the packed-earth banks.

By noon next day we had passed through Shrewley Tunnel, ascended the last flight of modern locks on the Grand Union, which lifted us 380 feet to Knowle Summit, and paddled in rain into the suburbs of Birmingham. Unable to find a dry spot, we splashed ashore at twilight through ankle-deep mud to spend a restless night under a dripping tree.

During the long wet hours Harry's interest in the voyage waned rapidly. He announced that he was getting off at the next stop.

Birmingham, Queen of the Black Country

Down an avenue of industrial smokestacks we paddled, dodging boats and coal barges, into the canal basin. Here boats from London discharging steel and paper were almost as thick as a Hong Kong junk fleet; others were loading manufactured goods for the return journey.

After weeks of quiet countryside, the

Like Rice, Watercress Is Grown in Flooded Fields

To meet the demand of London and other markets for this pungent salad plant, farmers in hip boots plant large beds where springs and clear streams abound. This thriving patch is near Wantage, in Berkshire (page 195).

Ruskin Extolled the Vale of Llangollen, "Entirely Lovely in Its Gentle Wildness"

Summer visitors on a horse-drawn pleasure boat halt for a "spot of tea" at this stone Welsh inn along a branch of the Shropshire Union Canal. At a weir just above the inn the clear waters of the "sacred Dee," as Tennyson called it, feed the old waterway, which now has scenic rather than commercial value.

Narrow Locks Mean a Tight Squeeze for Barges on the Shropshire Union Canal

In contrast to the Diesel-driven boats on the Grand Union, half of the craft on this old waterway are horse-drawn. The man drives the horse along the tow-path (left) while his wife steers.

immensity of sound and industry in Birmingham was overwhelming. Here in the Black Country of the Midlands many of England's fortunes were founded on coal, steel, and textiles. Miles of slag heaps have replaced forests and villages. Birmingham, fire-breathing queen of this industrial area, stands proudly astride her hills. In England itself only London is larger. Many other great population centers lie within a radius of a few miles.

We descended five narrow locks, then ascended 13 to climb through the heart of the city. In places the floor of this waterway has subsided because of the extension of coal mines beneath.

"Take My Picture, Too"

Hundreds of factory girls waved from windows, fluttering their addresses down on slips of paper so that we might send them prints of the pictures we were taking. They seemed to think we were making individual portraits. Once Harry and *Song o' the Winds* disappeared into a large pipe that led into a factory, then emerged with a scroll of names.

"These girls want photographs, too," he said.

When we paddled into Wolverhampton we were riding at 473 feet elevation, or 80 feet above the highest point on the Grand Union Canal.

Five centuries ago Wolverhampton was a center of the wool trade. Then came the Industrial Age, and local coal and iron ore made the town a blacksmith shop. But some of its streets still have the atmosphere of the Middle Ages.

Harry left here, boarding the train for London where he hoped to find passage to America. Steve, an American boy of 19, breezed up from the capital, eagerly grabbed a paddle, and pushed *Song o' the Winds* through 21 locks by which we descended once more to rural England. By this time, I was fairly proficient at cranking lock gates.

At Autherley Junction we passed into the Shropshire Union Canal. This artery of unhurried commerce heads northwest through flat pastoral country to Chester, the Mersey River, and Liverpool. Mile after mile, it runs straight as a rifle barrel, with the charm of peace and fresh greenness. Methods are slower and more primitive here, as compared with the Grand Union. Half the boats are horse-drawn.

Late one afternoon we camped in an open field near Brewood. Boys from the Brewood Grammar School broke up a game of Cowboy and Indian to swoop down on us with myriad questions about the American "Wild West."

Among these lads of England's middle-class families, I felt that reserve could be abandoned. Things were moving along nicely on a basis of firm friendship when I happened to mention that I was related to Sitting Bull. At once four of them, as if in answer to a prearranged cue, jumped on me to avenge Custer's death by scalping me!

Our irrepressible company kept us tightly bottled up within our tent until seven o'clock. At last they sang "Home on the Range" in broad British accents and galloped away astride stick horses.

Next day our camp was transformed into an educational exhibit. Classes were brought down to examine *Song o' the Winds* and listen to my lectures on western river voyaging (page 186). Finally the headmaster asked a boy to tell what was taken out of the Columbia River at certain times of the year. The boy said "Water," although I believe the teacher had salmon in mind.

On the third day from Wolverhampton, we camped in a hayfield near Tyrley Locks. When we awoke the following morning we found our tent surrounded by curious cows. Still dizzy from the schoolboys' flood of queries, Steve commented that at least the placid animals couldn't ask questions.

"Shoo, bossy!" I cried, and a large cow polishing her horn on a tent stay swung her head, hooked a loop in the rope, and bolted, hauling tent, pole, and stakes with her and leaving Steve and me exposed to a drizzling rain.

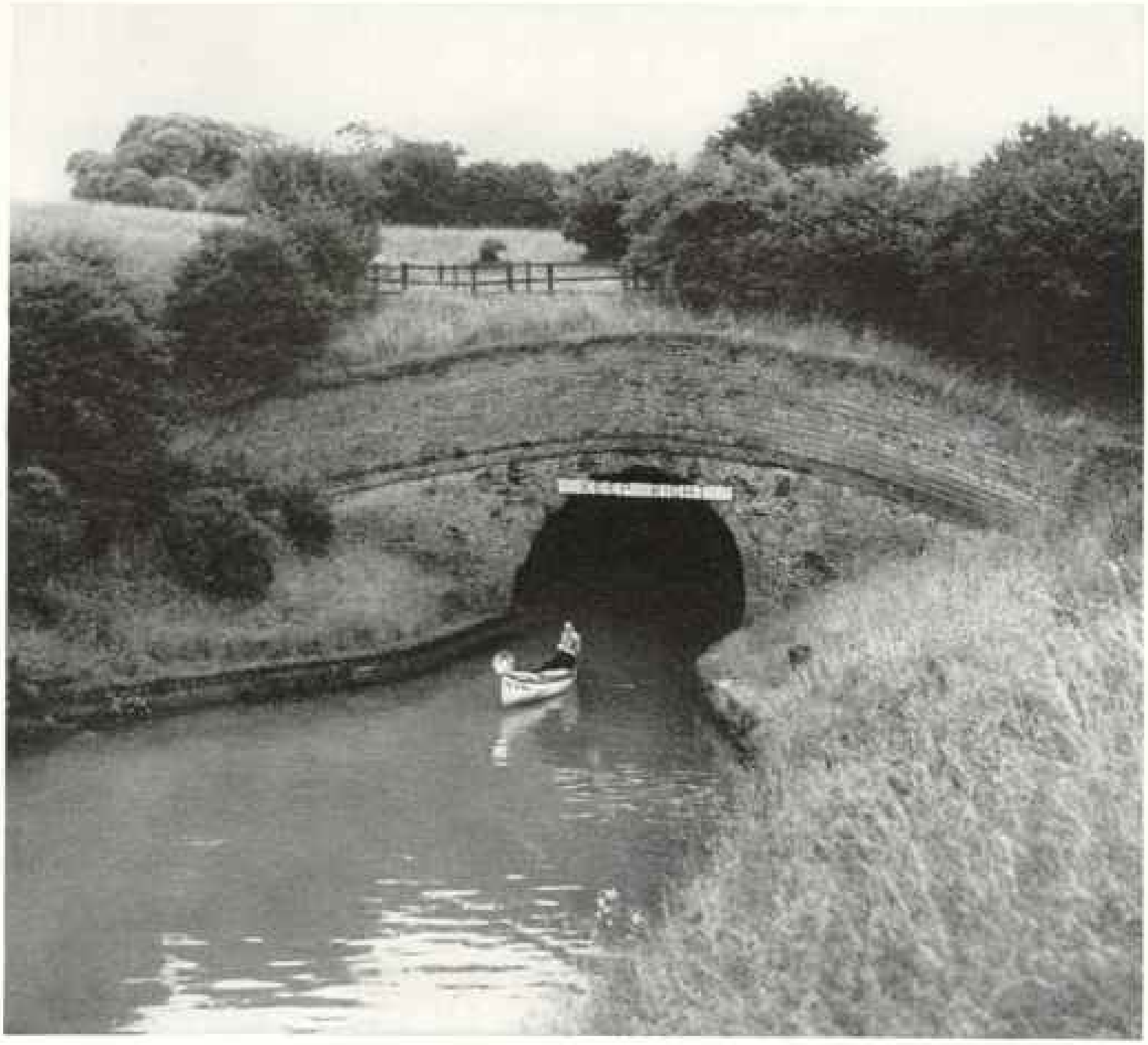
After a breakfast of pancakes and honey, we shoved off, accompanied by swarms of flies. Small gray clouds of them hovered around our honey-smeared hands. The canal at this point was soupy with mud, so we dared not wash until we found a village pump.

Beyond 26 more narrow locks, at Hurleston Junction, a branch of the Shropshire Union angles off southwest into the hills of Wales. Near Llangollen the canal is carried over the River Dee in a spectacular aqueduct supported by 19 towering stone arches. That stretch, and other branches like it, are practically abandoned commercially, but they are perfect for the idle voyagings of pleasure craft.

Castles in the Rain

Through a misty rain we sighted the grim castle ruins of Chester looming above a high swell of land that bulges up from the plain. Chester was a Roman city, a fact attested still by ancient and massive encircling walls. Norman lords made prodigious efforts to keep out Welsh invaders in the Middle Ages.

Experimenting with new double locks near



In Canal Tunnels "Keep Right" Is Rule of the Road

This is an exception to the English custom of traveling to the left on highways and railroads. *Song o' the Winds*, its headlight aglow, emerges from the black maw of Braunston Tunnel, more than a mile long and carrying the Grand Union Canal under Braunston Summit (page 206). Usually the canoeists "thumbed" tows from Diesel-driven barges.

Chester, I let water into a top lock already full. A small river spilled over the left bank and swept down into a barn where it routed out five squealing pigs belonging to the lock tender. That worthy, justly furious, was mollified by an account of our trans-England cruise, and finally admitted that his hogs had needed a bath anyway.

Nine twisting miles below Chester, at Ellesmere Port, *Song o' the Winds* was lowered through four locks into the broad Manchester Ship Canal.

The lock keeper's pretty daughter wanted a ride, but she had never been in a canoe before. To shift her position, she stood up and grabbed the edge of a wharf. Before I could prevent it, she had shoved out with her feet and hung suspended between ship and shore. She screamed for help, lost her hold, and fell in. We fished her out, unhurt but wiser in the ways of a canoe.

Three and a half miles more and we passed through the great ship locks at Eastham into the windy, choppy waves of the Mersey. Now we nosed into the ebbing tide that swept us down along the 29-mile dock frontage of Liverpool.

Landing, we packed our equipment and boarded a train that sped back to London, accomplishing in less than four hours by rail a journey that had taken us 25 days by canal. But, gaited to the leisurely tempo of the waterways, my companions and I had gained a new understanding of the character and strength of the English people as viewed in panorama just before the storm of war.

Man's Closest Counterparts

Heavyweight of Monkeydom Is the "Old Man" Gorilla, by Far the Largest of the Four Great Apes

By William M. Mann

Director, National Zoological Park, Washington, D. C.

ONE characteristic of the human being is that he is greatly interested in himself and other humans, so it is natural that he should also take a keen interest in the manlike apes.

No one nowadays suggests that these monkeys are his ancestors; yet there is a great deal of resemblance in structural, physiological, and even mental characteristics between the great apes and man.

Apes have no tails; they often walk erect and make homes of a sort for themselves; they have the same number of fingers and toes and teeth as man, but not the same amount of brain.

The smallest normal adult human skull known is an ancient one from Peru, whose skull cavity measures 910 cubic centimeters; the gorilla's brain measures approximately 600. The cranial capacity of a normal adult white man ranges between 1,300 and 1,900, with the average about 1,450.

One psychologist who visited our Zoo and made a number of experiments concluded that our young gorilla, N'Gi, had the mentality of an average 18-month-old baby.

Apes Snore and Have Appendicitis

The great apes are subject to many of the same diseases as man. They have a vermiform appendix and sometimes they snore.

Another resemblance to a human is that the young are exceedingly helpless. They live for months almost as external parasites on the mother.

The period of gestation in the gorilla, chimpanzee, and orangutan is nine months, the same as in man, and the baby at birth weighs from three to seven pounds. In the gibbon, somewhat lower in the scale, the period is only seven months.

Heavyweight of the tribe is the gorilla, with longer arms than the chimpanzee, much more beetling brows, and a tremendous chest and paunch. Usually it travels on all fours on its knuckles. Though the gorilla seldom walks erect, it can do so better than the other apes, and it stands up when it beats its breast to express joy, rage, general exuberance, or even a warning to other members of the family (Color Plate I).

One of our baby gorillas was fond of standing up and whirling around like a dervish until he finally lost his balance and fell over.

The gorilla has smaller ears than the chimpanzee and deeper, quieter eyes.

Chimp Is Imp of the Ape Tribe

The chimpanzee is more clownish in behavior, especially when young (Plates III, IV, and VIII). If one may compare animals to humans, the little boy chimpanzee is more like the little boy zoo visitor than anything else. He is the most precocious of the lot, full of playfulness, and loves to stamp mightily on the earth, or preferably on the floor of a cage where he can make more noise.

A red-haired, red-headed "funny-face" is the long-armed orangutan (Plates II and IV). Babies are especially comical, but adults, with their massive cheek callosities and small beady eyes can be ferocious in looks as well as in action.

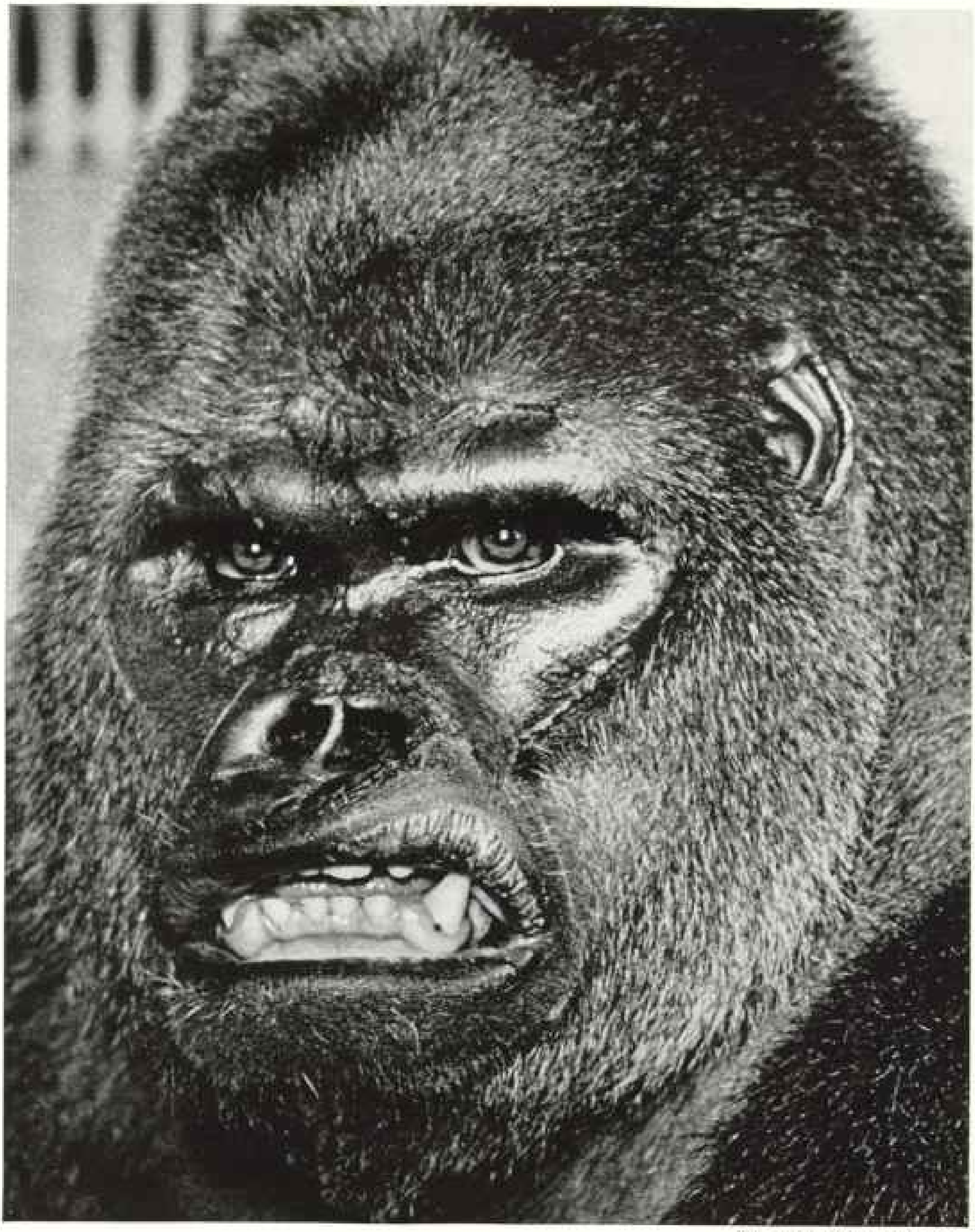
They are the most arboreal of the three biggest apes and seldom come to the ground except to change from one tree to another when there are no intervening branches on which to travel.

The gibbon, smallest of all, is the "baby doll" as a youngster, and when larger it becomes a superb gymnast, better than any other animal that I know.

Most of its traveling is done by swinging by its arms from one branch to another, but on a level surface this acrobat is apt to run erect, balancing itself by outwaved arms (Plates V, VI, and VII).

These four—the gorilla, chimpanzee, orangutan, and gibbon—are usually known as "the great apes," but the group varies enormously in size, from the gorilla to the small gibbon found on the Pagai Islands off the coast of Sumatra. One big baboon from West Africa would weigh as much as a whole family of these little creatures and yet they are called "great apes." The name undoubtedly was first applied to the gorilla, chimpanzee, and orangutan, all of which are large, but systematically the gibbons are included in this group.

None of the manlike apes is found in the New World.



Photograph by Ellsworth from Pix

"'My Strength Is as the Strength of Ten,' but There's Murder in My Heart"

Gargantua, 500-pound mass of muscle and savagery, glares malevolently at thousands of humans each year from behind the bars of his special air-conditioned cage in the Ringling Brothers and Barnum & Bailey Circus (page 220). The 10-year-old mountain gorilla's features are even more terrifying than Nature intended. When two years old, he was purchased by a ship's captain, who brought him from the Cameroons to Boston to sell. Someone, perhaps a disgruntled sailor, disfigured the animal by hurling acid into his face the day the ship reached port. The photograph shows the scar tissue about the gorilla's eyes and the permanent sneering curl of his lip. Gentle in his youth, Gargantua became unmanageable three years ago and his feminine owner had to sell him.

Everyone reacts in some way upon seeing the great apes. I like to watch people in the Zoo look at them. The two commonest remarks are: "Doesn't it look human!" and "Isn't it horrible!" Neither is really true. Apes are not human but animal, and no animal is really horrible—to me, at least.

More than most animals, monkeys express themselves by certain calls or other noises, some of which seem to have a very definite meaning. For instance, anybody who can give the proper accent to "whoo whoo whoo" can get the attention of a young chimpanzee. I have heard apes whine when sad and actually growl with rage when angered. Of course, the morning and evening song of the gibbon could not be construed as a language at all.

One student of the gorilla, R. L. Garner, the "ape language man," lived for 112 days in a cage which he constructed in the African jungle and from which he made numerous observations. He learned to repeat many ape calls and, later, would sometimes attract the attention of an organ grinder's monkey with the sound that indicated food. The monkey folk have sounds that mean alarm, anger, and pleasure.

People have asked me which is the more intelligent, the dog or the ape. In structural development there is no comparison at all between the two. The ape is far more highly developed physically and mentally, but it is first and foremost a wild animal, while the dog is a domestic animal. It was domesticated long before the dawn of history and has accustomed itself to living with man, one might say as a member of the family.

The ape, on the other hand, retains its rugged individualism. It has never been domesticated and perhaps never can be. Though it can be taught certain things and though the young are amusing pets, at its maturity it always reverts to the primitive.

Apes are precocious but also moronic and do not progress beyond a certain stage. They are able to profit by their own experience but not to communicate it to others, a power in which man excels.

Hanno's "Wild People" Called "Gorillae"

Hanno, a Carthaginian who sailed down the west coast of Africa about 500 B. C., described "wild people" called by the natives *gorillae*. Three were slain and their skins taken back to Carthage. It is doubtful whether Hanno actually saw the true gorilla, but probably he saw chimpanzees.

Andrew Battell, an English sailor who was captured by the Portuguese in 1590 and sent a prisoner to Angola in West Africa, described a huge and ferocious beast known as the "pongo." He explained that the chief way in which it differed from man was that it had no calves to the legs.

He told how it could walk erect and build itself shelters in the trees; further, he related that it slew natives whom it found traveling in the forest and that it attacked elephants with its clenched fists and with pieces of wood, driving the tuskers away from its feeding places.

Our knowledge of the gorilla really dates from 1846, when the Reverend Dr. J. L. Wilson discovered a skull. Ten years later, Paul du Chaillu rediscovered the animal.

Du Chaillu was at first discredited, perhaps because of the vivid way in which he wrote, but most of his observations have been confirmed by recent students. At least, he brought the first good description of the gorilla and the first specimens of the animal into America and Europe.

When I read his books as a boy, I got the impression that an enraged gorilla would stand upright and beat its breast with a resounding "boom boom." Whether the adult produces that result, I do not know, but the smaller ones I have heard beating their breasts sound "rat-a-tat-tat" rather than "boom boom."

Uncontrolled hunting would soon exterminate the gorilla, but thanks to conservation efforts, both national and international, it seems that this most interesting creature will long survive. It lives in the lowlands of West Africa and in the mountainous regions about Lake Kivu.

Gorilla Could Bend a Rifle Barrel

In the time before high-powered rifles, the gorilla was undoubtedly a fearsome creature to hunt. The cheap gaspipe-barreled guns sold to natives were inefficient arms.

The old story is that the native would wait until the gorilla took the end of the rifle in his mouth and then fire, but if the gorilla clamped down on it first and closed it, the gun, of course, backfired.

Then the gorilla was said to stand upright and bend the gun barrel in circles.

Considering the power of an adult gorilla and the constitution of the old-type trade guns, this does not seem at all improbable. Just the other day our big orangutan, Susie, pulled out and bent the three-quarter-inch iron rods of her cage—and a gorilla is much stronger than an orangutan.

An adult gorilla could have few natural enemies. It is too powerful to be annoyed

Photograph from International News

Baboo Wins a Fight for Life Against Double Pneumonia

When the animal was stricken last April, he was taken to Victoria Hospital, Miami, Florida, by his owner, Edward Strassburg. Three-year-old Baboo received the same oxygen-tent treatment as humans. In two weeks he was pronounced cured.

by any of the common predatory animals. On the other hand, large animals, such as the African buffalo, would let it alone, and vice versa. In general, the gorilla does not occur in lion country.

Of course, the young might be preyed upon by leopards, and all gorillas seem to have an abnormal fear of snakes.

In spite of its enormous canines and great physical strength, the gorilla itself is not a predator, preferring vegetable food, though it probably picks up an occasional bird or egg.

In recent years many studies have been made of gorillas in their native haunts, chiefly in the forest reserve of the Kivu District, Belgian Congo, by serious naturalists.

Carl Akeley, foremost of them, spent many years in the study of these animals and it is through his efforts that the Albert National Park, a paradise for gorillas and other animals, was established by the Belgian Government north of Lake Kivu.*

Akeley brought back and mounted for the American Museum of Natural History a notable group of gorillas shown in their natural habitat. Enjoying the full confidence of the Belgian Government, Akeley had practically unlimited permits for shooting specimens; but, as he said, he could make a group depicting their life with five examples and accordingly he limited himself to these rather than take additional life.

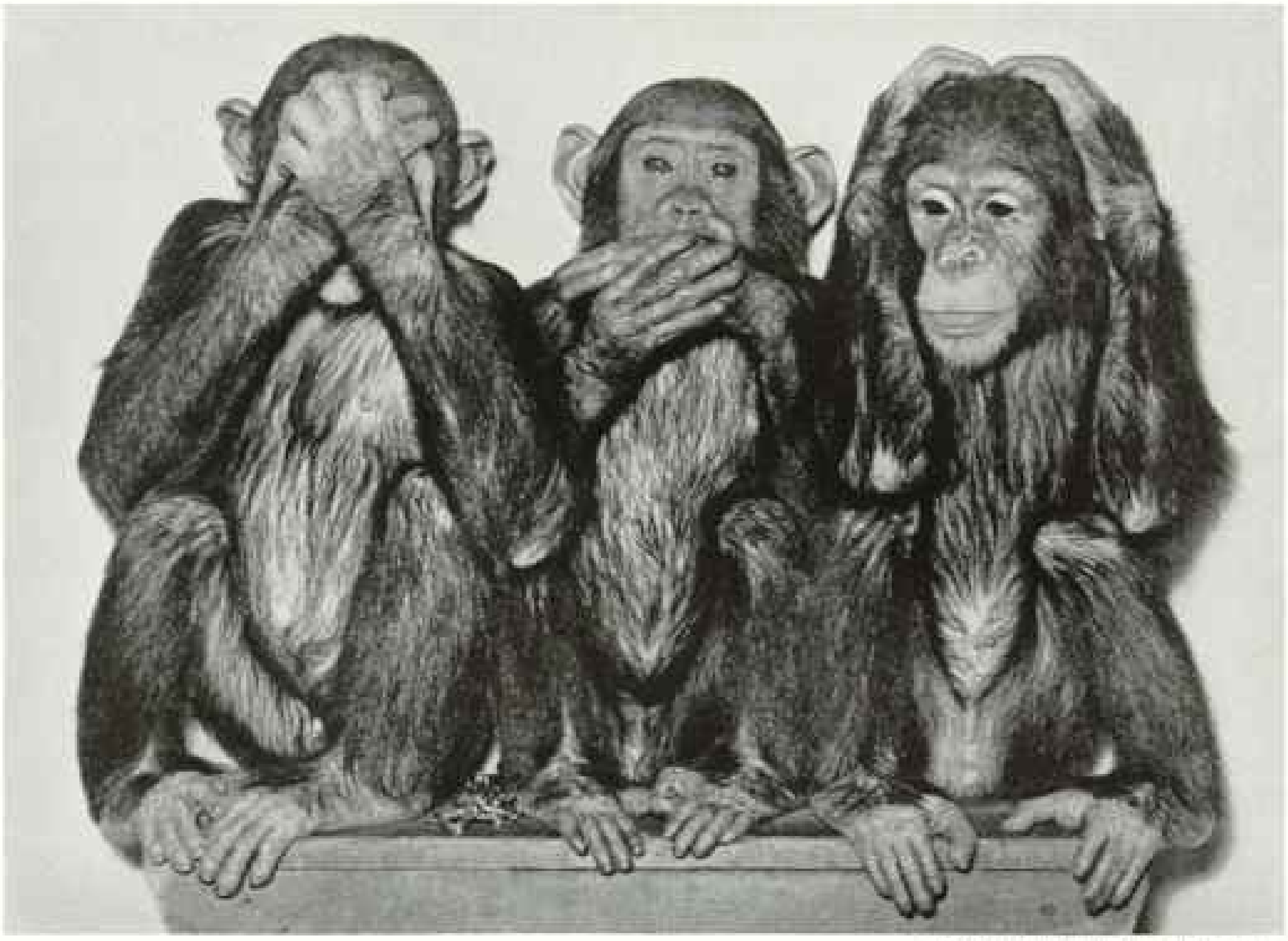
* See "We Keep House on an Active Volcano," by Jean Verhoogen, National Geographic Magazine, October, 1939.

"Old Man" May Sleep Sitting Up

Gorillas in the wild usually travel in family groups, but during the heat of the day the grownups are likely to rest while the youngsters play.

At night the gorilla makes a bower to sleep in, usually on the ground, though sometimes in the forks of low trees. The "old man" himself will sleep leaning up against the trunk of a tree or in a crude bower built on the ground, any upper berths being reserved for the females and children.

When morning comes, gorillas go out for food, pulling up plants and eating the roots; they are very fond of wild celery, bamboo shoots, and berries. Their appetites are large



AP Photograph from Publishers' Service

"See No Evil, Speak No Evil, Hear No Evil"

A cameraman with the patience of Job persuaded these St. Louis Zoo chimpanzees to imitate the famous desk set. The celebrated pose originated in Japan, where the "three wise monkeys" represented monkey day in the ancient Japanese calendar.

and they wander from place to place to get new supplies of food, for gorillas are real nomads.

A Few Gorilla Personalities

Until recent years nobody had any success in keeping these giant monkeys in captivity for long. In 1855 a traveling English menagerie exhibited one as a chimpanzee, the manager not knowing what he really had. This is a reversal of a custom common in the United States about 20 years ago, when I used to pay ten cents to see the "lion-slaying gorilla," which was usually a Hamadryas baboon or whatever else the sideshow manager happened to have on hand.*

In 1876 a young gorilla was brought to the zoo in Berlin and lived about 16 months. Then in Breslau a little one was secured and lived with the family of the zoo director. It was a female and never grew very large, but lived apparently very happily for seven years, which was until recently the record for longevity.

The New York Zoological Society exhibited a gorilla, Madame Ningo, in 1911. She lived less than a month. Garner, on his return from his ape studies in West Africa, brought another little female, Dinah. She lived in the New York Zoo for about a year.

Since then, a number have been imported and most of them have done fairly well.

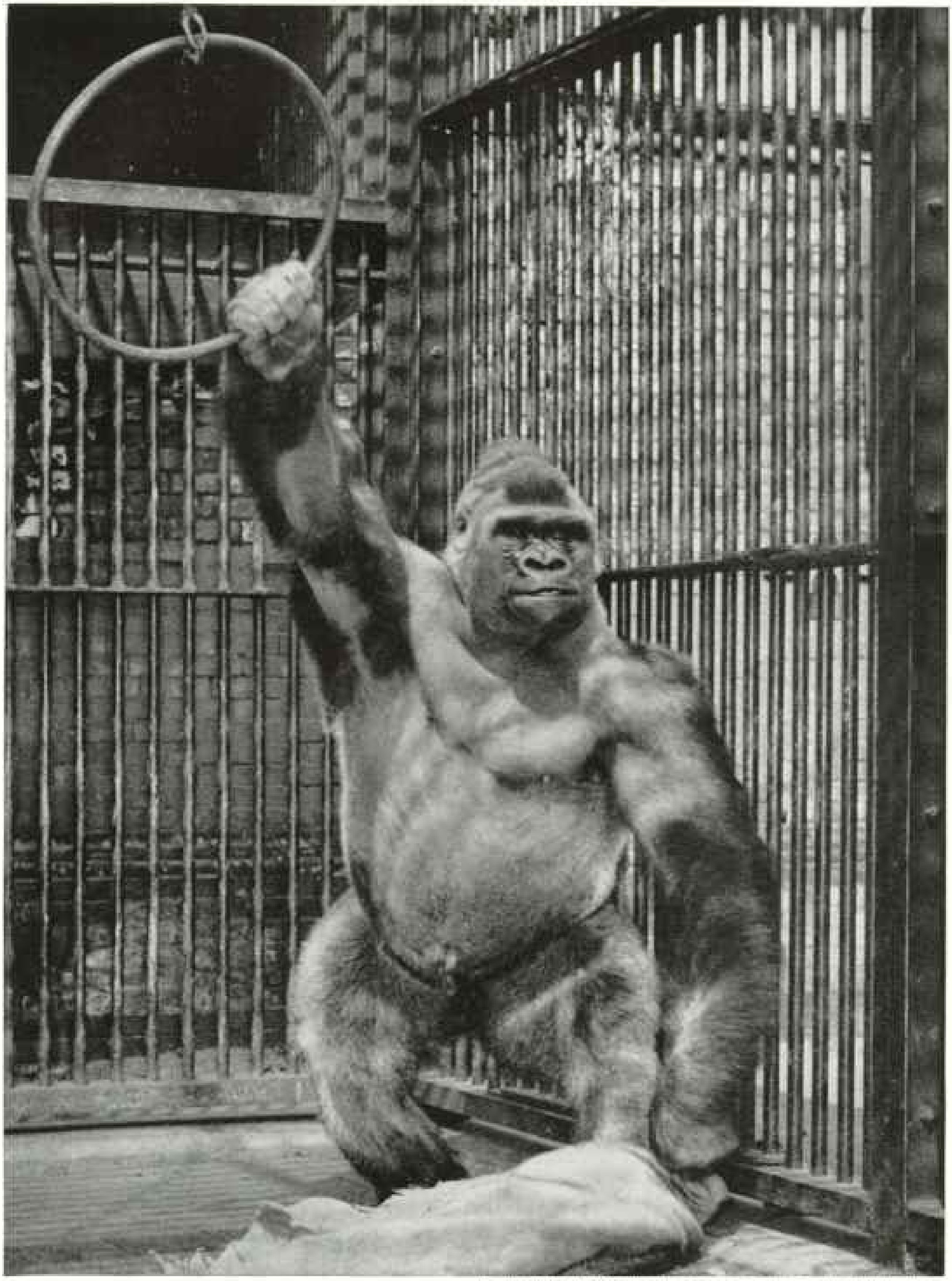
At present there are about a dozen gorillas in the United States; one, Bamboo, has been living in Philadelphia for 13 years.

Air-minded Gorilla Has a Bank Account

Susie, whom we first met in Elberfeld, Germany, was the first (and so far the only) gorilla to be a *Graf Zeppelin* passenger, arriving in the United States in 1929. She toured America with traveling shows and then retired to the Cincinnati Zoological Gardens, where she still is thriving.

Susie has been cared for by three keepers since she arrived from Germany. It used to be said that a gorilla was a one-man animal and if anything happened to its keeper it would die of lonesomeness. For this reason, when we had our gorillas at the Na-

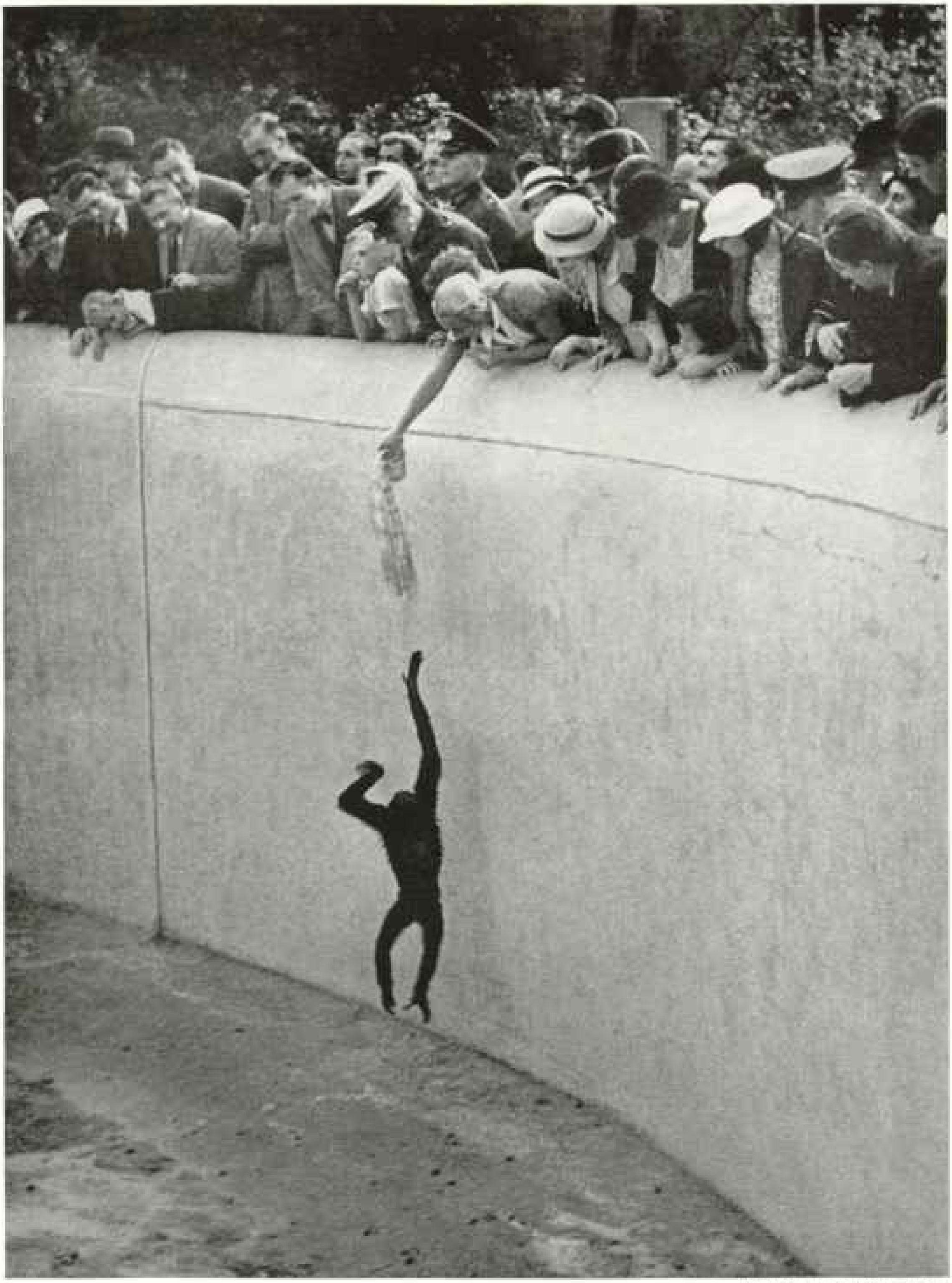
* See "Monkey Folk," by William M. Mann, NATIONAL GEOGRAPHIC MAGAZINE, May, 1938.



Photograph by Mark Mooney, Jr., courtesy Zoological Society of Philadelphia

Massa, Philadelphia Chest-Beater, Tips the Scales at 350 Pounds

This husky mountain gorilla, 10 years old, still is growing. He has a long way to go to equal the records of Mbongo and Ngagi, San Diego Zoo giants, who weigh 602 and 539 pounds, respectively. Massa enjoys the companionship of another gorilla, Bamboo, a Philadelphia Zoo resident for 13 years.



Photograph by Zellaer from Gliss

Level Take-off Cramps the Gibbon's Style as He Leaps in Vain for the Dangling Scarf

In treetops the agile animal can glide through the air, but here in his pit at the Stellingen Zoo in Hamburg, Germany, he has difficulty in jumping straight upward from the ground. Some gibbons, in daring leaps from bough to bough at dizzy heights, seize birds on the wing. Though born acrobats, they sometimes suffer broken bones (p. 233).

tional Zoo we had different keepers for them.

Susie is the only gorilla that I know of that has a bank account of her own. Postcard pictures of her are sold in the Zoo and this money is credited to her. Last year her apartment was greatly enlarged and improved with these funds.

Mbongo, a male who has lived at the San Diego Zoo since October, 1931, is one of the largest gorillas. He now weighs 602 pounds.

Last, but far from least, is 500-pound Gargantua, who arrived on a freighter from West Africa several years ago. Traveling with Ringling Brothers and Barnum & Bailey Circus, he lives up to his reputation as the "world's most terrifying living creature" (page 214).

Gargantua lives in a specially constructed air-conditioned cage with special lights to display his fearsome features. In the past year he traveled more than 17,000 miles throughout the States, and also took a winter cruise for a circus season in England. He has hurt several of the people connected with the circus, including the manager.

A Little Snake Works a Miracle

Naturally, it is difficult to handle such an animal, and Gargantua does not always like to go into his retiring room when his keeper wants him to.

Prodding the giant from one section of the cage to another is distinctly out of the question, and bribery by fruit or sweets arouses his suspicion; but he is persuaded to shift by the simplest possible expedient. The giant beast is shown a small, harmless live snake carried by the circus for just this purpose. He immediately stops cavorting around the cage and, glancing apprehensively at the snake, hurries into the adjoining compartment. I did not believe this until I had seen it myself several times.

Like other monkeys, gorillas have a tendency to become sullen and ferocious as they age. I know of only one sizable gorilla that is allowed its liberty and this is the pet of an American woman, Mrs. E. Kenneth Hoyt, who brought it from West Africa to her home in Cuba. Here it has the run of the garden, having many human friends (page 230).

The gorilla that we knew best was N'Gi (the native name for gorilla in parts of Africa), who came to the National Zoological Park with the man who had obtained him in the lowlands of West Africa.

We met the gorilla at the station and he sat on the knee of his owner in the automobile, looking out the window with evident interest in the Nation's Capital. It was not our intention to buy him at first, gorillas being expensive animals; in fact, he was on his way to Cuba, to be left there with a large collection of chimpanzees, and merely stopped off in Washington to rest from his journey.

Our guest was put in a large cage that contained an orangutan and a pair of gibbons. His captor had told me that N'Gi had always looked down on other monkeys, but he had never seen an orangutan and was noticeably interested.

Both of them were a little wary of each other, but suddenly N'Gi crossed the Rubicon, landed on Jiggs, who received him with an embrace such as only an orang can give, and from then on they were friends.

Jiggs spent a great deal of his time at the top of the cage. N'Gi insisted on following him wherever he went, although gorillas are indifferent climbers. The two gibbons, perhaps resenting him as an intruder, would swing near him, strike at him, and then glide to the other end of the cage before N'Gi's slow grasp could reach them.

After N'Gi had nearly fallen several times, it was necessary to take him out and put him in a cage by himself. For a time he acted lonely and whimpered a good deal, but soon became reconciled and interested in his new surroundings.

A large tin pan and a pair of dumbbells were given him and he would play with them by the hour. One of his favorite stunts was to put the tin pan on his head and then stand on his head. He would pile the dumbbells on his shoulders while he climbed about the cage.

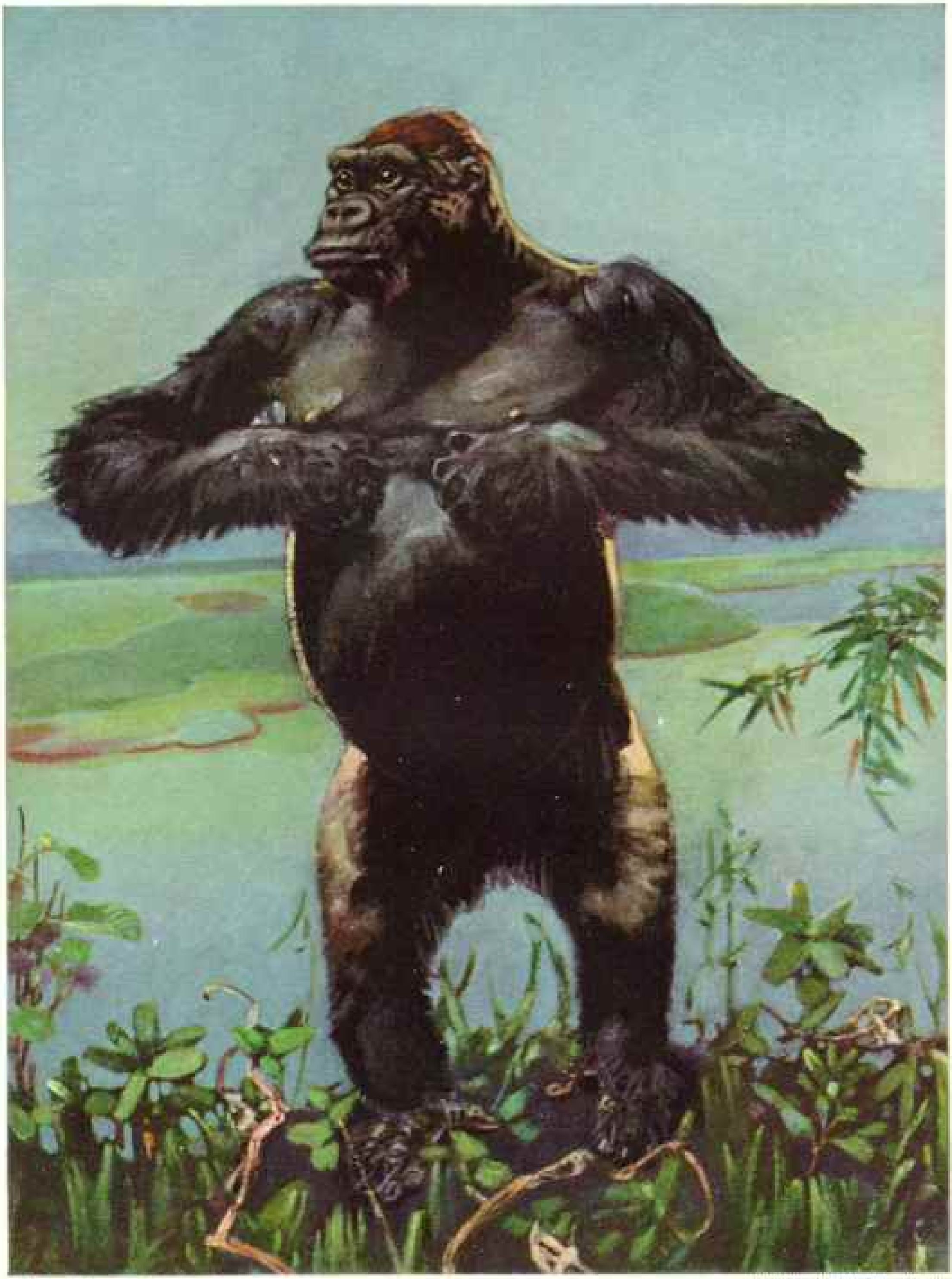
N'Gi Took Washington by Storm

A small, lovable baby he was, and he soon became the favorite of the Washington zoo goers. We kept him in a large glass-fronted cage in the lion house and put special glass in the skylights to admit ultraviolet rays.

Like all zoo monkeys, N'Gi had his favorites in the audience as well as among his keepers and he would occasionally take an unreasonable dislike toward someone. For some reason, he took a special dislike to the head keeper of monkeys in the Zoo.

This man had worked with monkeys all his life and was very fond of them, so naturally he would drop in to see N'Gi. As soon as he was sighted, N'Gi would go into a corner and hide his head and not move until the man had left. We could never understand this, and our monkey man felt it very personally and deeply.

After more than three years N'Gi got pneumonia, which is one of the commonest ailments that attack monkeys, large and small.



 Painting by Elie Cheverlange

Shy and Peaceful by Nature, the Gorilla Fights Savagely When Provoked

The powerful giant here drumming his chest with cupped hands challenges a foe. Largest of all the anthropoid, or manlike, apes, male **Gorillas** weigh more than 300 pounds—even 600 in captivity—and grow to a height of about 5½ feet. The animals dwell in small family groups in the tangled forests of west Africa and in the mountains of the eastern Belgian Congo. From the brush of Elie Cheverlange comes this color series, painted especially for the NATIONAL GEOGRAPHIC MAGAZINE and based on detailed life studies.

 Painting by Ellis Christensen

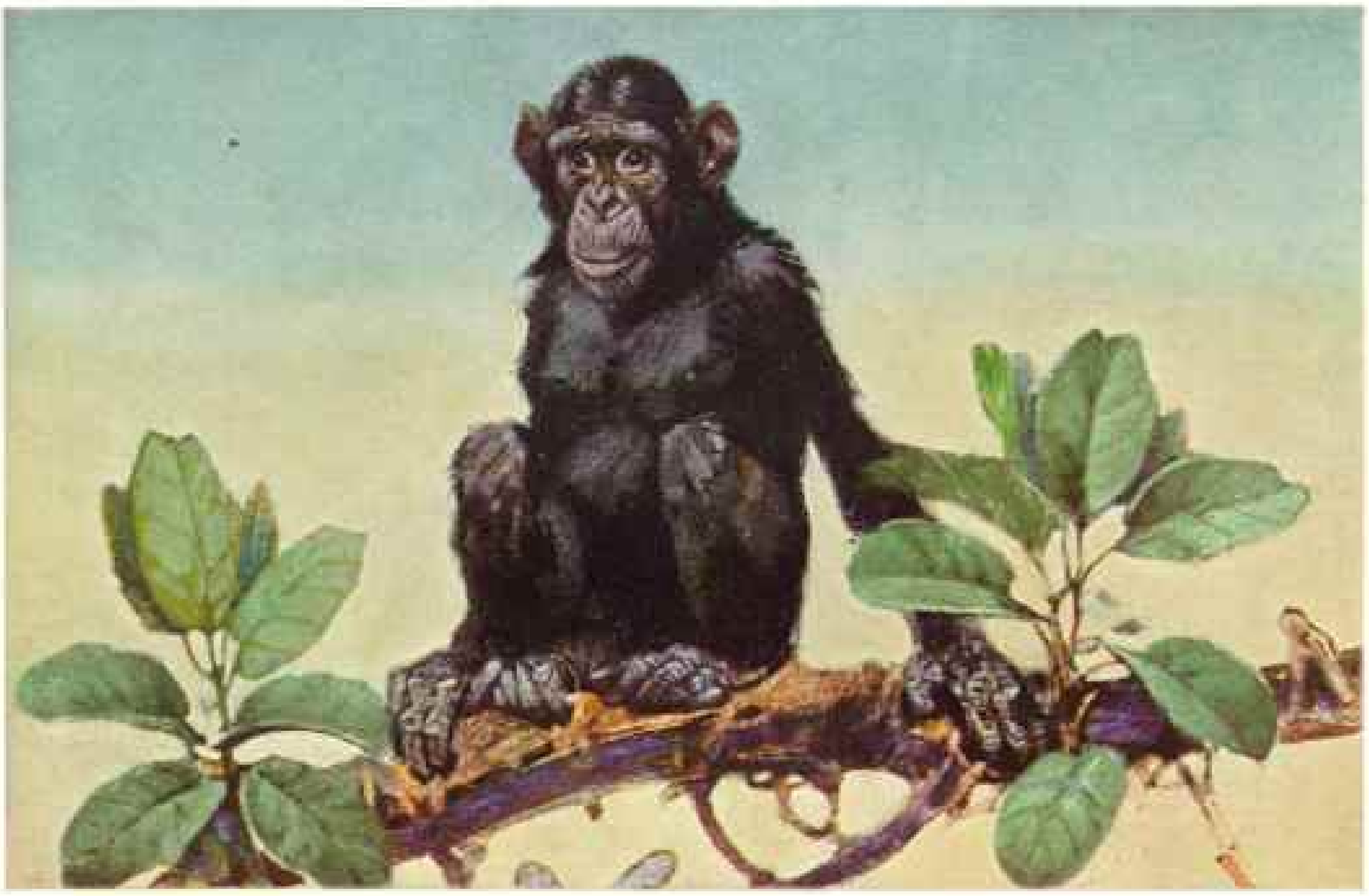
Malayans Call These Long-armed Gymnasts "Men of the Woods"

Seldom descending to the ground, Sumatra **Orangutans** live peacefully in the trees of swampy jungles, usually in family groups of mother, father, and goblinlike offspring. Tousled mops of carroty hair cover heads, backs, arms, and legs. Orangutans are fearless and resourceful. When sun rays become too hot, or heavy rain falls, the animals carefully cover their heads with parasols of large leaves.

 Painting by Ellis Cheesman

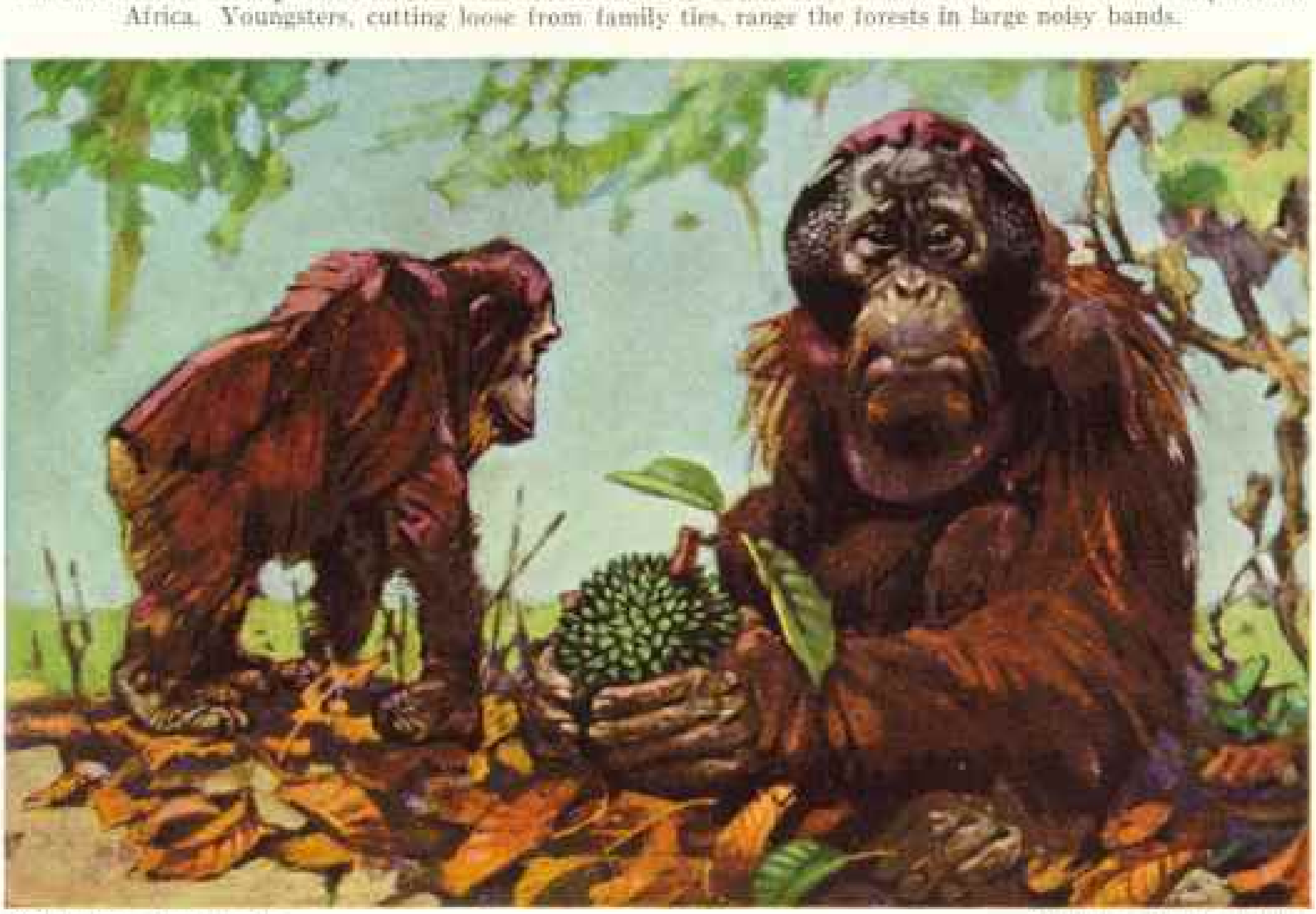
Alert White-faced Chimpanzees Pass Intelligence Tests with Flying Colors

Many young ones acquire impeccable table manners in the company of humans. Tea and luncheon parties for **Chimpanzees** have been a London Zoo feature for years. One chimp learned to count up to six. Highly emotional, these African apes are the only primates which habitually express affection by kissing and hugging. Scientists believe chimpanzee intelligence is fully developed between the ages of three to five.



Extremely Sensitive, This Prima Donna Sulks under Ridicule

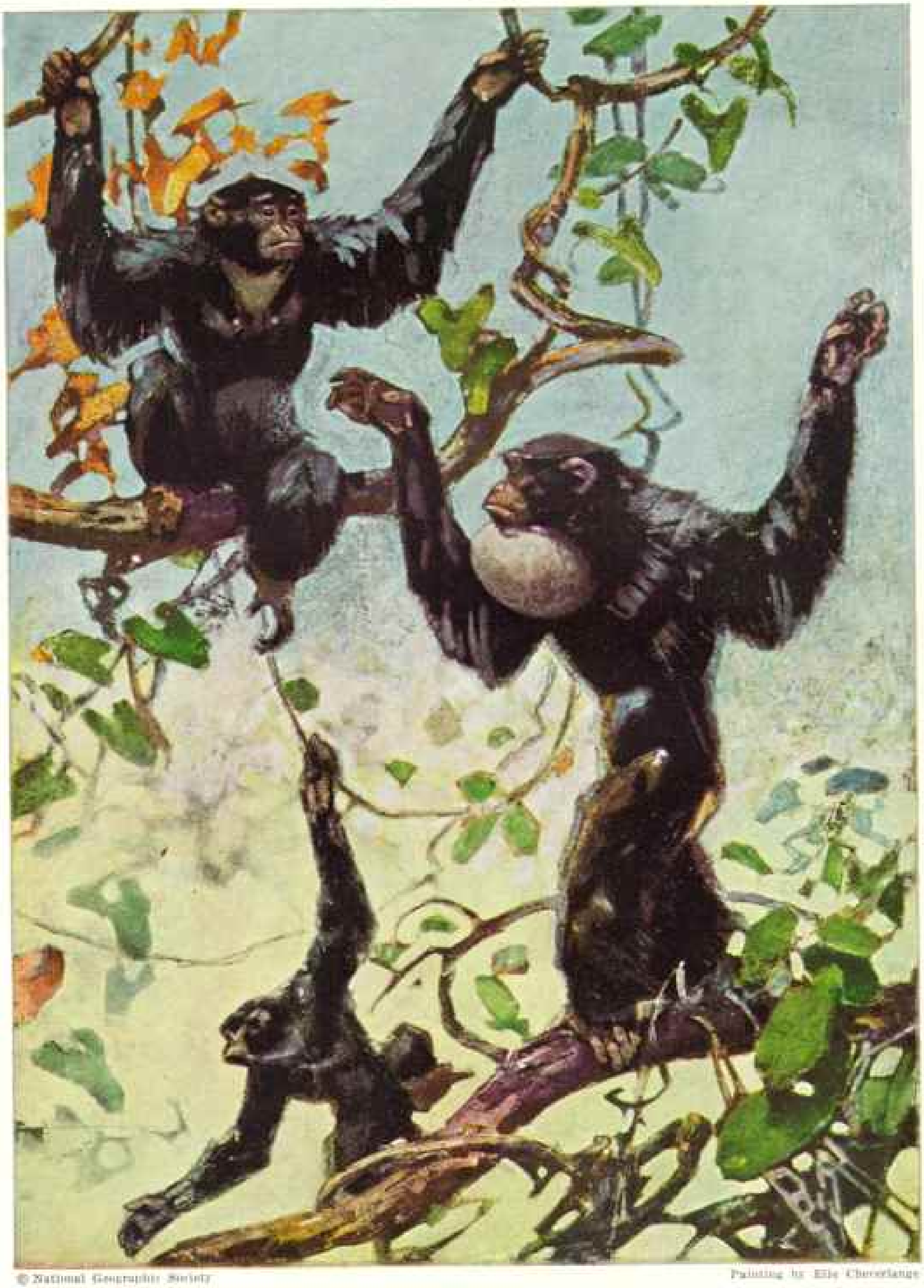
The black-faced **Chimpanzee** and its white-faced relatives (Plate III) inhabit western and central Equatorial Africa. Youngsters, cutting loose from family ties, range the forests in large noisy bands.



 Paintings by Else Cherertango

Poor Mixer, the Orangutan Shuns the Society of Other Apes

Expansions of calloused skin on the sides of his face and the pendulous, semicircular sac beneath his chin identify the Borneo **Orangutan** as an adult male (youngster at left).



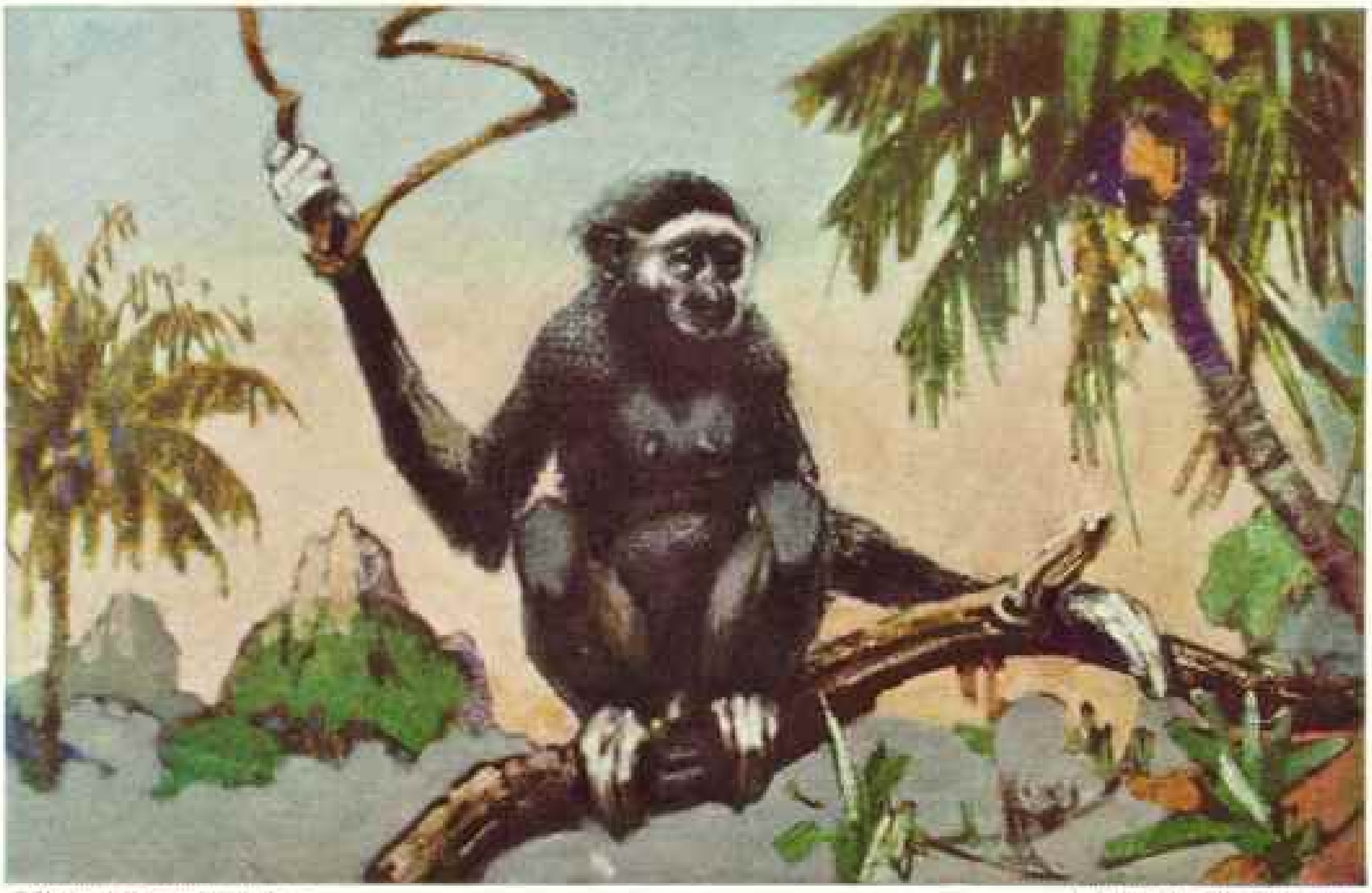
 Painting by Else Cheverlange

Throat Sac Inflated, the Siamang Is Ready to Scream—or Yawn!

Usually at sunrise and sunset, **Siamang Gibbons** exercise their powerful voices. Often the shrieks may be heard a mile off. These largest members of the gibbon family dwell in Sumatra and the Malay Peninsula.

His Voice Can Be Imitated on a Violin

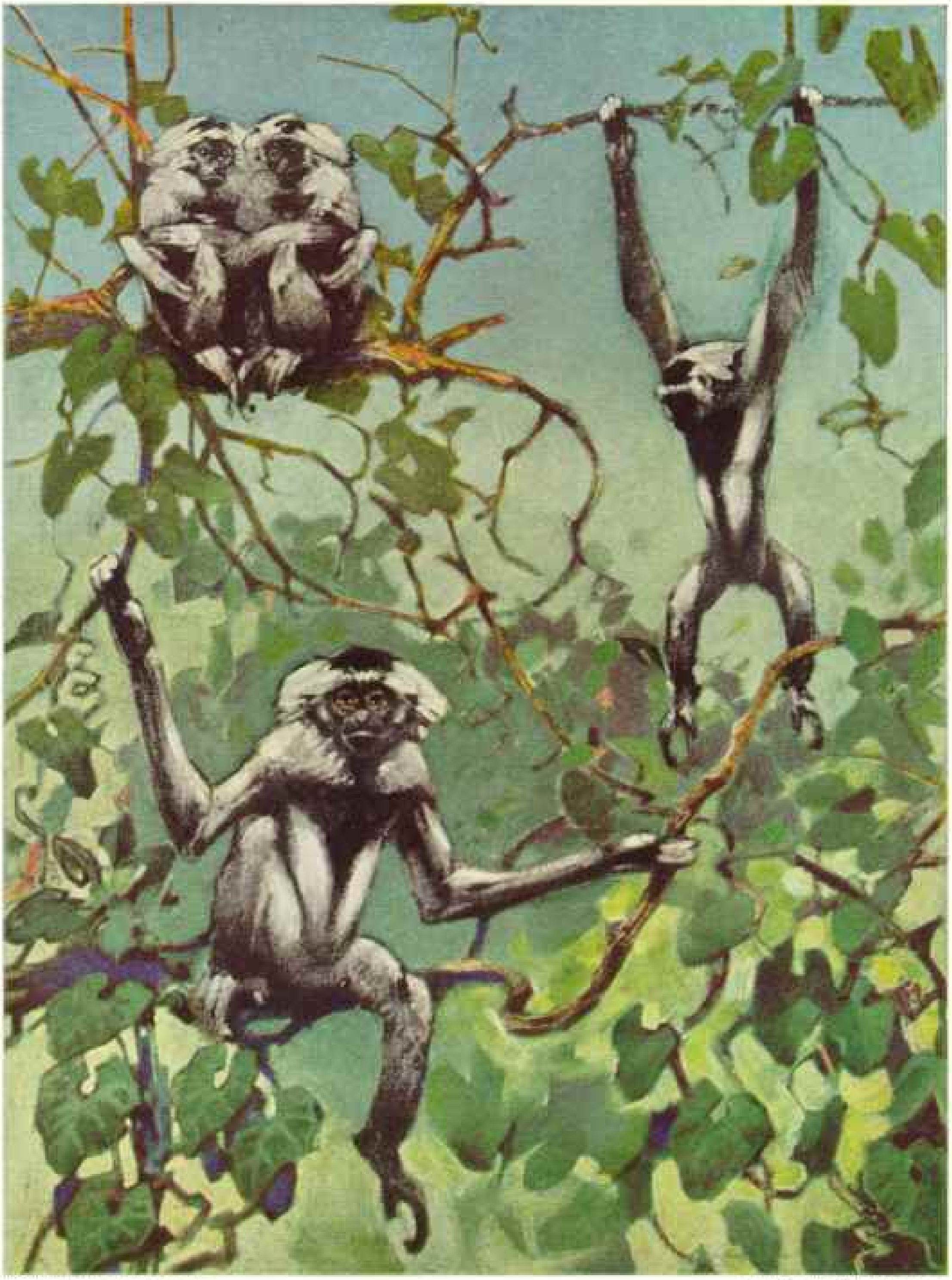
Although some of the notes "sung" by the dark **Sumatra Gibbon** are a trifle nerve-racking, others have a musical quality. Voices of some gibbons have a range of more than two octaves.



 Paintings by Ellis Cheverlange

When This Long-armed Rascal Stands Up, Fingertips Touch the Ground

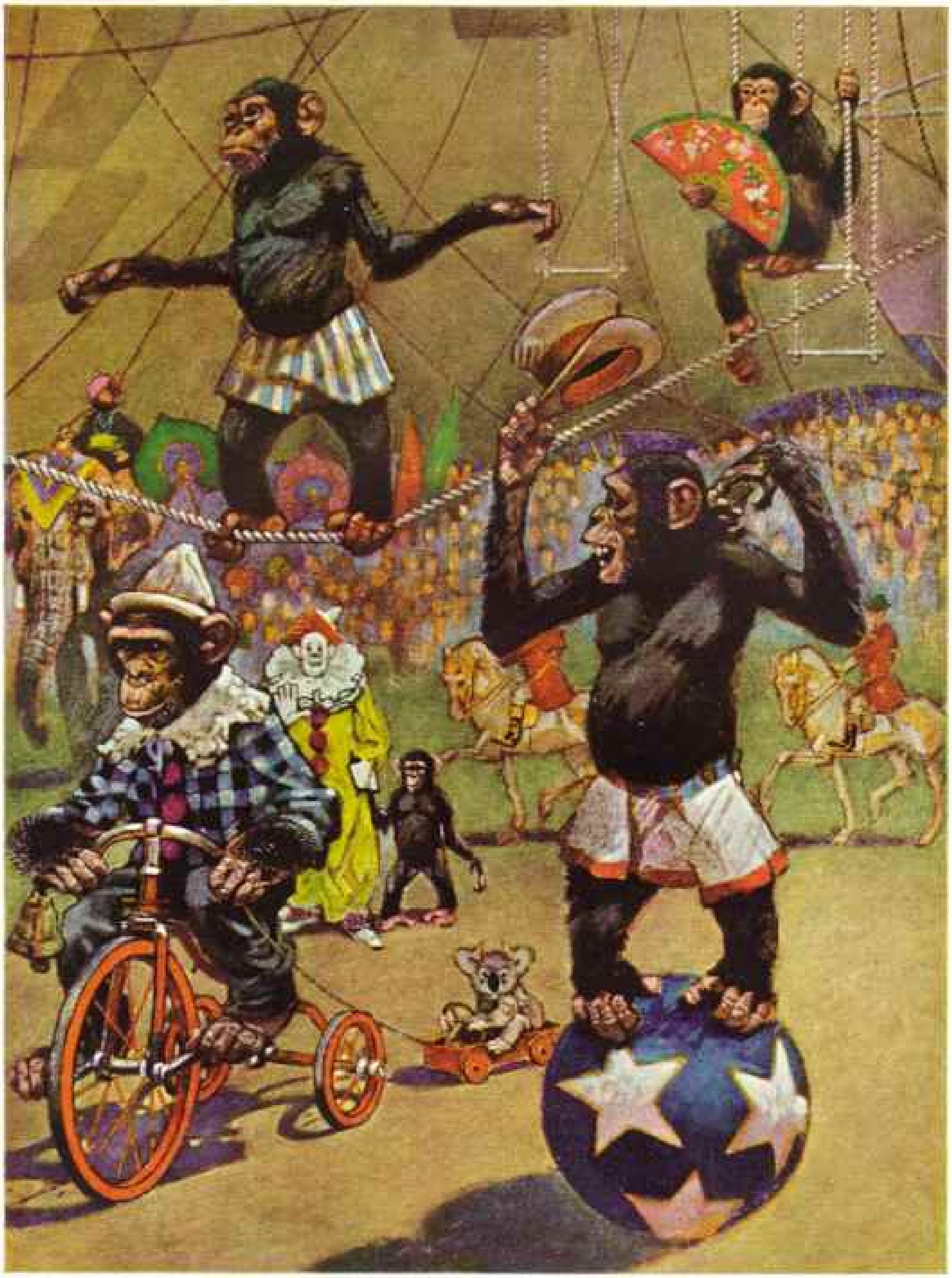
The **White-handed Gibbon** of Tenasserim, northern Malay Peninsula, and its relatives travel in large bands (Plates V and VII). One baby is born to a pair each year and does not shift for itself until three or four years old. Often families contain several small children of various ages.



 Painting by Ellis Cheverlange

With Amazing Agility, the Gibbon Hurls Itself Through the Treetops

Even on the ground, the **Black-capped Gibbons** of Thailand (Siam) travel at surprising speed, with long arms held up at a comical angle, elbows bent and hands drooping. In the same way they run swiftly along branches. Poor swimmers, the animals cross streams by aerial routes where trees on opposite banks intertwine. One variety, the hoolock, is as helpless in the water as a human being who has never learned to swim.



 Painting by Elie Chevrlange

Lovers of Human Applause, Chimps Act with Gusto under the "Big Top"

Alert minds and responsive muscles enable **Chimpanzees** to master a tricycle or walk on a large ball. After they reach the age of seven, the animals are difficult to handle because of their great strength. Adult males may weigh more than 120 pounds. They develop a bearlike hug (Plates III and IV).

It was complicated with empyema and N'Gi was operated on by a famous specialist. A Washington newspaper rushed by airplane an oxygen tent and two technicians from New York, but all to no avail; the baby died after some weeks of illness.

Entertainer of Thousands Mourned

Naturally, we kept the building closed during this time and there were always groups of visitors outside, some of them children with tears in their eyes, asking about his health. Parents would call us up at night and say that their children refused to go to bed until they had had the latest word about N'Gi. When it was reported that my wife had made eggnog for him we had numerous offers of high-grade liquor. (This was during prohibition.)

After he died, his body was sent to Johns Hopkins University for embalming and study.

I have often thought that N'Gi did more in his three years here than many people do. He gave happy entertainment to thousands of people, and through him oxygen therapy received great publicity, with resultant saving of human life.

Gorillas in captivity are fed much like children. They get cod-liver oil and orange juice for breakfast, and throughout the day are given a variety of fruits and vegetables, milk, eggs, and an occasional bit of meat and bread. When it is raisin bread the raisins are carefully picked out and eaten first.

Okero Prized His Medicine Ball

Our second gorilla was the longer-haired mountain species brought to us by Mr. and Mrs. Martin Johnson. His name was Okero, meaning Snowball, because he was so black. A playful, affectionate little fellow, he was also a great favorite.

Like most monkeys, Okero had a tremendous sense of possession. His playthings were most precious to him, especially a big leather medicine ball which we gave him. His quarters were so arranged that he could go indoors or out, as he chose.

One day he had rolled the medicine ball out into the open when suddenly a big blimp came by, flying unusually low. He took one glance at it and then dashed indoors for shelter, leaving the ball out on the ground.

After a time he furtively crept out and started rolling the ball back toward the door. He became frightened again by the airship and dashed back, but soon came out and after five efforts managed to get the ball and himself both back into the safety of his own quarters.

The late Arthur Brisbane used to be fond of remarking, when discussing two heavyweight prize fighters, that "a gorilla could lick them both." This is easily true, although a gorilla would hardly abide by Queensberry rules. In combat the gorilla uses its long canines, as well as its powerful arms.

Robert M. and Ada W. Yerkes, in their notable study, *The Great Apes*, give a comparison of Carl Akeley's 360-pound gorilla specimen with a former heavyweight pugilist champion.

For similar purposes of comparison, I give below the relative measurements of the Akeley gorilla and the current heavyweight champion. In weight, reach, and chest particularly, the gorilla is certainly a superheavyweight.

	Gorilla	*Champion*
Height	5 ft. 7½ in.	6 ft. 1¼ in.
Weight	360 lbs.	203 lbs.
Chest	62 in.	41 in.
Upper arm	18 in.	14 in.
Reach	97 in.	76 in.
Calf	15¼ in.	15 in.

Chimpanzees, of course, are the commonest of all the great apes in captivity. They stand confinement well and in their native haunts are much more abundant than either the gorilla or the orangutan. For instance, in the last fiscal year there were imported into the United States 64 chimpanzees and 40 gibbons, but only two orangutans and no gorillas.

Because of its docile nature, its ability to learn quickly, and its comparative abundance, the chimp is a favorite with showmen as well as with zoos, and is seen in vaudeville acts, circuses, carnivals (Plate VIII). Baby chimps are most engaging. Precocious, they nature comparatively early and after five or six years become difficult to handle. One seldom sees a full-grown chimpanzee performing.

A Continental Chimp

Young chimpanzees can probably be trained more easily than any other animals to do the things that people do.

Once when Mrs. Mann and I were visiting a zoo in Frankfurt, Germany, the keeper called over a chimpanzee and introduced us formally. The ape gave me a hearty handshake, but when he was introduced to Mrs. Mann he took her hand, turned it over, and gave the back of it a courtly kiss. His manners were perfect and distinctly Continental.

Of course, the chimpanzee had been trained to do this, but the interesting thing to me was that he distinguished a man from a woman and greeted them accordingly.

Photograph from Mrs. E. Kenneth Hoyt

Toto Shows Affection for His Lifelong Mentor

Mrs. E. Kenneth Hoyt, of Habana, Cuba, acquired the gorilla in 1932 when he was three months old. Mr. Hoyt had just shot Toto's father in the French Congo. African villagers, without the knowledge of the Hoyts, then killed the mother. Mrs. Hoyt, unwilling to see the baby die, procured an African nurse for the gorilla and he thrived on human milk (page 220).

Chimpanzees range over a large part of equatorial Africa; that is, in the forested area, where they sometimes occur in family groups, as do the gorillas. Occasionally numerous youngsters will band together, as many as twenty-five or thirty, and range through the forest in groups, not unlike the children of our own block in Washington.

Chimps are much more arboreal than the gorillas, from which they can be readily distinguished by their smaller size, a great deal less disparity in the sizes of the male and female, the lack of the big frontal ridge, and the altogether different shape of the nose.

Showmen recognize two forms, the white-faced (Plate III) and the black-faced (Plate IV); then there is the koolokamba, which may be a distinct species.

The chimpanzee can walk upright far better than can the gorilla. In general, the chimp is much more active and lacks the big paunch of its larger relative.

Even more so than gorillas, chimps have been recognized as personalities. Practically all in captivity have been given human names, which they learn to recognize. Most of them when little are taught to sit at a table, eat with knife, fork, and spoon, pour their own milk from bottle into glass, and burlesque, in a way, small children.

A Fight with a Chimpanzee

One of the more famous individuals of his species was Casey. Casey was sold to the zoo in Melbourne, Australia, by a well-known collector and animal dealer, Ellis Joseph, himself a man of prodigious strength. He and Casey had been companions on the boat from South Africa to Australia and had developed a friendship, so when Joseph returned from a collecting trip after six months' absence he walked into the cage to greet his old friend.

Casey, perhaps in a fit of excitement, grabbed him and sank his teeth through Joseph's cheek and jaw. Joseph forced the animal's mouth open and knocked the chimp down with an uppercut, then walked to the nearest hospital. After that, Casey would fly into a violent rage whenever his former friend approached.

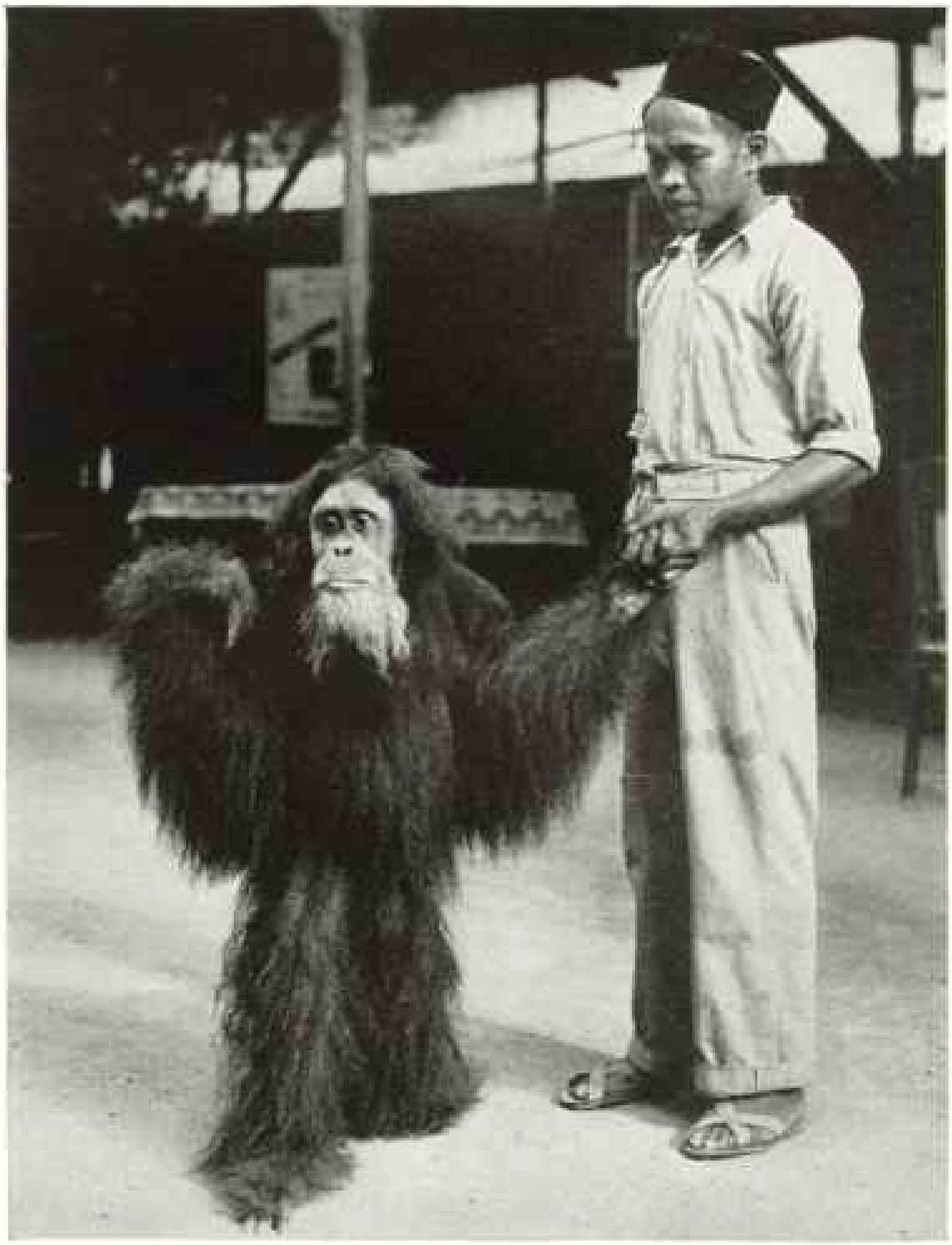
The National Zoological Park has had a half-dozen chimps, and one of them, Soko,

lived in Washington for about 24 years. He was purchased from a dealer in 1915 when four or five years old and 38 pounds in weight. When he was 17 years old, he weighed 130 pounds, and gained little if any after that.

Like many other young captive chimps, Soko dined sitting in a high chair at a table and his manners were very good indeed. After one attempt to pour a pint of milk into a half-pint glass, he saw his mistake and never again let his glass overflow.

He enjoyed riding a bicycle, played at raking up leaves, and pushed baby carriages, though he had to be watched when he noticed a nursing bottle in the carriage. He longed to get hold of it.

Eventually Soko smashed up his table furniture and reverted somewhat to the primitive. The custom of taking walks with him through the park in the summer had to be discontinued, because he developed strong dislikes toward certain visitors and would charge viciously at them, dragging his keeper behind him.



Photograph by Maynard Owen Williams

Sumatra's Bewhiskered Movie Actor Welcomes Travelers

This tame orangutan has appeared in several Hollywood films made in the Far East. He is a privileged guest at the Medan Zoo, clearing house for wild animals captured in the Sumatra jungles. Young orangutans often are kept as pets on the island plantations, roaming about the houses at will and eating meals at their own tables (page 232).

In his old age he became more and more of a recluse so far as his keepers were concerned and would recognize only a few of them. He would make a loud buzzing noise to attract the attention of the nearest keeper or guard and would point at the faucet when he was thirsty.

Once Soko was bothered by an aching tooth and it was pulled by our head keeper, W. H. Blackburne. Several months afterward, the chimpanzee made his characteristic buzzing sound to attract Mr. Blackburne's attention, pointed to another tooth which was troubling him, and patiently held his mouth open for it to be extracted. Sometimes he would stretch out his foot and spread the toes to show his keeper that his nails needed trimming.

Throwing Things a Favorite Sport

Often Soko would show his dislike of certain visitors by going into a tremendous tantrum, running up and down the floor of his cage, beating the bars with his elbows (which developed large calloused spots) and with his wrists. Finally with a lightninglike gesture he would fling at the visitor a handful of sawdust or whatever he had in the bottom of his cage. Plate glass in that case was a useful protection.

At other times he terminated his dance of rage by climbing swiftly to the top of his cage, reaching through the bars, and hitting the ceiling a resounding thump.

I remember once at Madame Rosalia Abreu's in Cuba when a big male chimpanzee caught me on the side of my head with what he wanted to throw at me and glued my eyeglasses to my cheek.

Madame Abreu, a distinguished French lady living in Habana, maintained for about 40 years a famous collection of living primates. We visited her in 1930, when she had 22 chimpanzees in the collection, many of them with babies in their arms. One family consisted of three generations—grandmother, mother, and child.

At Madame Abreu's death the collection was broken up, but a large part of it went to the celebrated psychology laboratory at Orange Grove, Florida, maintained by Yale University and directed by Robert M. Yerkes. The following year Monona, one of Madame Abreu's chimps, already the mother of several offspring, produced twins!

Chimpanzees have been born also in zoological gardens, New York and Philadelphia among others, as well as in the menagerie of Ringling Brothers and Barnum & Bailey Circus.

"Man of the Woods"

Next to the gorilla, the orangutan is probably the least abundant of the great apes. It lives in the wild in few places—Borneo and two regions in the island of Sumatra—but it is protected so well by the government that despite its small numbers it will probably be preserved as one of the most interesting living creatures (page 231).

Recently, Harvard University and associated institutions sent an expedition to the East Indies for the sole purpose of studying the orangutan and the gibbon in their natural haunts. Some specimens were taken for anatomical studies and numerous observations were made on the family life of the wild ones in the trees.

While in the Far East, we did not hear the word "orangutan" used, although it is a Malay phrase meaning literally "man of the woods." In Borneo these apes are called *myas;* in Sumatra *mawas*, or *mawas kuda*, the latter name being used for large specimens with unusually broad cheek callosities.

The natives maintain that there are two different species on the island. However, this is disputed by zoologists. In fact, the difference between the Borneo species and that of Sumatra is not very great.

Like other apes, orangutans live in small family groups in the trees and seldom come to the ground, on which they are quite awkward. Their nests, made of coarse twigs, are cruder than most birds' nests, and there is no protection from the rain.

When young, orangutans are even more docile than chimpanzees and make attractive pets. One finds frequently, on plantations in Sumatra, young ones that have been brought in by natives and taken care of by the plantation management. They are often allowed their liberty and roam around the vicinity of the house at will, coming in for meals and eating in a most civilized manner at their own tables. One that we met and became friends with in Sumatra enjoyed very much a cigarette after his luncheon.

These animals are captured either by heartlessly shooting the mother or by getting the baby separated from the others, when it becomes terrified and is easily picked up. They tame almost at once.

One big one we had in Sumatra was captured by a European and a group of natives without injury to others or to himself. He was found in a large tree. All trees near by were cut down; so, when he was forced to the ground to go to another tree, nets were thrown over him.

Some years ago, before government protection was given to orangutans, they were obtained in great numbers, and we once saw 21 of them, including several groups of father, mother, and baby, at an animal warehouse in Hoboken.

I understand that this shipment originally consisted of 60 specimens, which were sent to Europe and the United States. They were said to have been caught by making fires beneath the trees in which they were staying, the gases causing them to become stupid and fall down.

None of these remained alive in captivity for more than a few years. Fortunately, this method of capturing them has been completely stopped. Sending out periodic shipments of dozens of orangutans would soon exterminate the species.

Among those that came to Europe with the above-mentioned shipment was a family group, composed of an enormous male, two females, and a baby, which I saw in the Dresden Zoo. Dr. Gustav Brandes, director of the Zoo, was a student of apes and a great authority on them. Going into the cage with a little food and a comb, he combed the hair of each one. They seemed to enjoy it. He fed the adult females from his own mouth and petted the male before he came out of the cage.

© International News

Henrietta Turns a Pet Shop into a Battlefield

The 150-pound chimpanzee shrieks defiance at would-be captors from her vantage point atop a parrot cage in a New York City store. The parrot has retired discreetly to the bottom of its cage, while the cat below eyes the obstreperous chimp with alarm. Henrietta escaped from her cage and created a vast commotion among the other pets. Finally she tried to smash a plate-glass window. Adult chimpanzees often become dangerous (Plate VIII).

Photograph by Lillian Schweiker

A Gibbon Family Solves the Traffic Problem on Thakkek's Main Street

Baby clings tightly to mother (right) and father brings up the rear in an aerial "stroll" through the heart of the French Indo-China town. Sometimes the agile monkeys vary their methods by walking on the lower telegraph wires and balancing themselves by grasping the upper ones with their hands. Often they traverse the length of the town by the hand-over-hand method. Gibbons' arms are so long that when they walk upright their fingers nearly touch the ground.

The male was a particularly formidable creature, and I considered this one of the greatest feats of animal training I had ever seen, especially when Dr. Brandes told me they had all been captured only eight months before.

Dispositions of orangutans vary widely. Two young ones we brought home from the East are completely different. Dopey, from Sumatra, is a sedate creature who takes little interest in the affairs of the world and yet can, by himself, execute the most amazing gymnastics on his horizontal bar. The other one, the Wrestler, from Borneo, was our pride and joy on the steamer partly because he would eat when no other animals would.

Dopey was very choosy about his food and would discard one morsel after another until he found something to his taste. Wrestler, on the other hand, at our approach would open his mouth as only a baby orangutan can, and absorb with evident enjoyment anything we handed him.

Toast with Cod-Liver Oil and Honey

As soon as Wrestler saw me coming, he would whirl round and round in his cage, standing erect; then, sitting back of the bars, would open his mouth to take anything I wanted to put in. His first course in the morning was a bit of toast on which had been smeared a cod-liver oil concentrate covered with honey. Then he would have half an orange; after an interval, more solid food. He loved raw sweet potato and baked potato; a banana was a tidbit to him and a boiled onion an orgy. In fact, he ate everything.

We called him Wrestler because he had a habit of grabbing us through the bars of his cage as we walked by. All of us spent much of our time on hands and knees retrieving oranges, onions, and apples from the deck of a rolling ship when he had knocked the tray from our hands.

He had a beautiful disposition, but did not like to be crossed. We fed him milk from a can with a long spout. When the can was empty he still wanted it, and I have seen a benevolent baby expression turn suddenly into a fiendish glare.

Susie, our big orangutan, is friendly enough, but mischievous and much stronger than a man. She spends hours trying to reach things on the outside and break them. A large, powerful

AP Photograph from Pictures, Inc.

"I Don't Want an Auto Ride—I Want to Walk"

Young Miss Gorilla tries the door handle, prepared to dive through the window if the lock won't work. Her boy friend in the front seat is contented in the lap of George P. Vierheller, director of the St. Louis Zoo.

monkey with plenty of time at its disposal—as captive monkeys have—can always find a way to do something it shouldn't.

Recently Susie escaped from her cage and for a moment effectively handled five keepers who tried to grapple with her. She was finally coaxed inside by kindness and a few peanuts.

The Tree Walkers

Born acrobats are the long-armed gibbons, found in southeastern Asia and on some of the East Indian islands.

The name Hylobates, which includes all of the gibbons except the big black siamang from Sumatra, means "tree walker," though, realizing from experience how difficult it is to keep them alive, I have often said jokingly that Hylobates must really mean "pain in the neck" (Plates V, VI, and VII).

Essentially arboreal animals, living on the products of trees, they rarely come to the ground and then only in order to reach other trees. Even their water is obtained from rain water in holes in trees or from the rain itself, by licking it off the back of their wrists. In captivity they drink in the same way, dipping their wrists in water and then licking it off. An exception is the siamang, which sometimes drinks in the ordinary manner.

We have seen gibbons in the northern Sumatra forest in trees so high it made us dizzy to look up at them, and there they literally glided through the air, taking hold only momentarily of a branch that would enable them to swing to another limb. Sometimes they would drop 20 or 30 feet, seize another branch, then make off again.

They seemed infallible in handling themselves in the air; yet collectors have found quite a percentage of them have broken bones, a fact which shows that sometimes they do make mistakes. Even in a zoo I have seen them fall, though rarely, considering the gymnastics they do (pages 219 and 234).

One of our gibbons, a black and white one from Indo-China, will swing from a horizontal bar, do a somersault and twist in the air, land on a smooth wall of his cage, bounce back to the bar, and then do a giant swing or two before leaping up to another bar some seven feet away and starting to play tag with a cage mate.

They travel at high speed, and it has been said that they sometimes can leap in the air from a branch and catch a bird on the wing.

In addition to eating fruits and vegetables, they sometimes rob birds' nests and are fond of certain insects, grasshoppers being highly

prized. In captivity an occasional meal worm is taken with relish.

The young are gentle and affectionate, by far the nicest pet monkeys that I know, but unfortunately very delicate, especially if captured when extremely small. Four or five years has been considered an average age for them to live in captivity, but there are some outstanding records.

One white-handed gibbon lived in the Philadelphia Zoo for more than 30 years, and Kalawat, Mrs. Martin Johnson's pet that she brought from Borneo, traveled with her all over the United States and went on an African expedition with her. There Kalawat accidentally electrocuted herself on an electric wire in Nairobi.

While the gibbon can swing himself yards through the trees, he apparently cannot take off from the ground, and we have seen the animals in captivity confined on little islands with five or six feet of water in the moat.

One group that we remember especially lived in Clères in Normandy. The owner, a prominent naturalist fond of keeping animals loose on his estate, gave these gibbons their liberty until they went so often into the village, climbed the belfry, and rang the church bells that the good people of the town complained. After that, they were confined.

One of our friends, Mr. Harold Coolidge, some years ago was collecting in French Indo-China. He (most laudably) likes to bring an occasional animal home for the National Zoological Park, and he saw a lovely gibbon that belonged to the French Governor General.

Since the animal had the run of the house, Coolidge became disturbed at the idea that it might do some harm to a choice collection of china belonging to the Governor, but was informed that the animal never broke anything. Then one day the gibbon darted into the house, jumped to a shelf, seized a priceless plate, tossed it to the ceiling, and caught it again with great ease just before it hit the floor! We understand that both the Governor and Coolidge swallowed hard for a moment.

A Gibbon Family Catches Cold

Anyway, the gibbon, with his wife and child, came to the Zoo. They landed on the west coast, all of them with bad colds. One of the sailors wanted to go back to his home in New England, so Coolidge sent him, with the understanding that he care for the monkeys on the way.

The sailor rigged up electric-light bulbs in the cages before the animals were put on the train, and thus kept them warm all the way across the continent. They arrived in the Zoo in good condition, to live a number of years here and eventually have another baby.

Gibbons are rarely born in captivity. Our little one lived for only a month. There was one born in Copenhagen, but it did not live; however, I understand that one born in San Diego is thriving.

Tiny gibbons are the soul of affection. Their one ambition is to get hold of you and hang on. My wife kept a number of them as pets, but often remarked that when they got really comfortable on her shoulder they were about as interesting as a fur neckpiece.

One, so tiny that we called it Stengah, which means "half a portion" in Malay, would run across the floor toward her, its tongue sticking out, and then grab hold, put its tongue back where it belonged, and register complete contentment.

On the ground or on level surfaces gibbons usually walk erect, balancing themselves with their long arms. I do not believe they ever go on all fours, as do the other apes.

Siamangs Carry a "Drum"

Siamangs, largest of all the gibbons (Plate V), differ from the others in having the second and third toes of the foot joined together by a web, and in possessing a tremendously inflatable throat pouch.

From this pouch emerges one of the most piercing cries of any of the apes, a combination of a shrill bark and prolonged crescendo whoop, the pouch giving it the resonance of a bass drum. We actually had to keep our Zoo specimen indoors part of one summer because its cries disturbed a sick woman in her home half a mile away from the park.

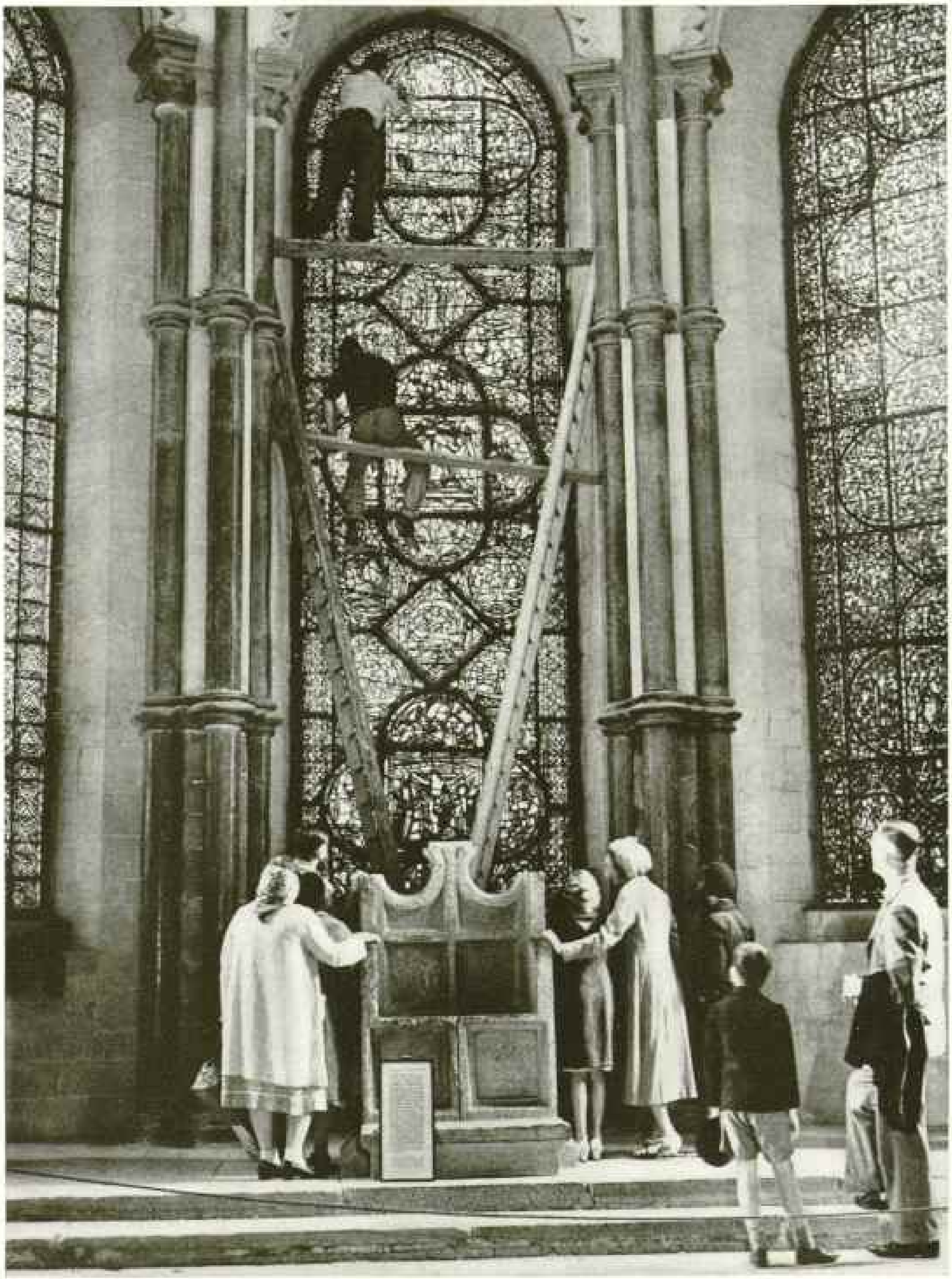
This sound is the morning and evening call of Sumatra and one hears it from woods both near and far away, because there the siamang is one of the most widespread of the animals.

The word "siamang" is a Batak term meaning "honorable father."

Like the other gibbons, the siamang is possessed of remarkable agility. We keep ours in a cage about 30 feet long. One day it was sitting at one end of this cage looking through a window at its next-door neighbors, a family of gibbons. A keeper was standing at the opposite end and momentarily turned his back.

The siamang in two long glides reached him, grabbed him by the hair with one hand, pulled his head to the bars, gave him a resounding thump with the other hand, and then flew back to the window—all before the keeper could turn around.

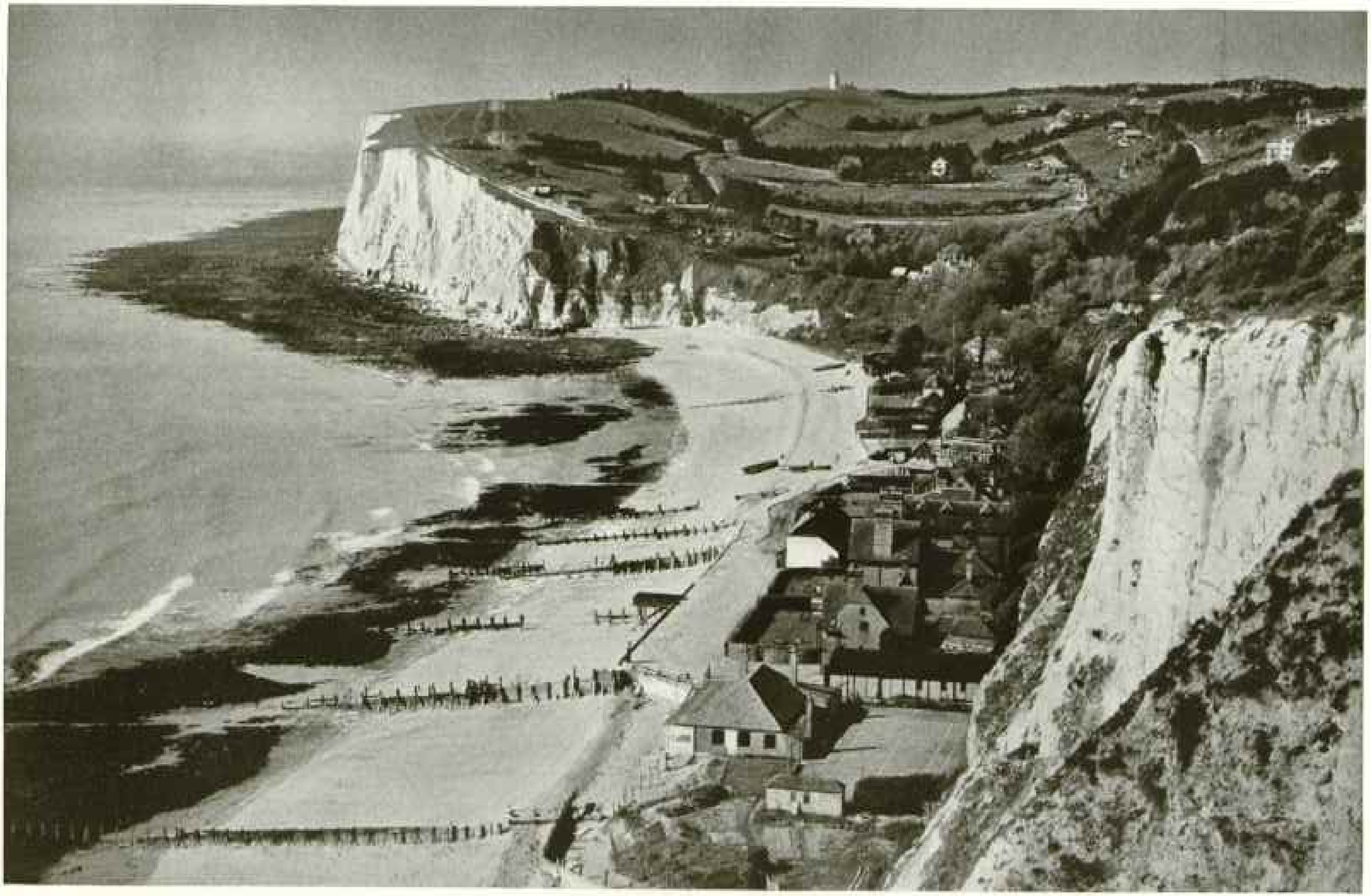
Intelligent attempts are now being made to preserve the great apes, which bear so many resemblances to man himself.



Photograph by Sport and General from British Combine

Lest Air Raids Destroy Stained-glass Treasures in Canterbury Cathedral

The exquisite windows of 13th- and 14th-century craftsmanship were removed in the summer of 1939 by experts and stored in the crypt for protection against the fate of French shrines during the first World War. The mecca of Chaucer's pilgrims is only a few flying minutes from northern France.



Photograph by Maynard Owen Williams

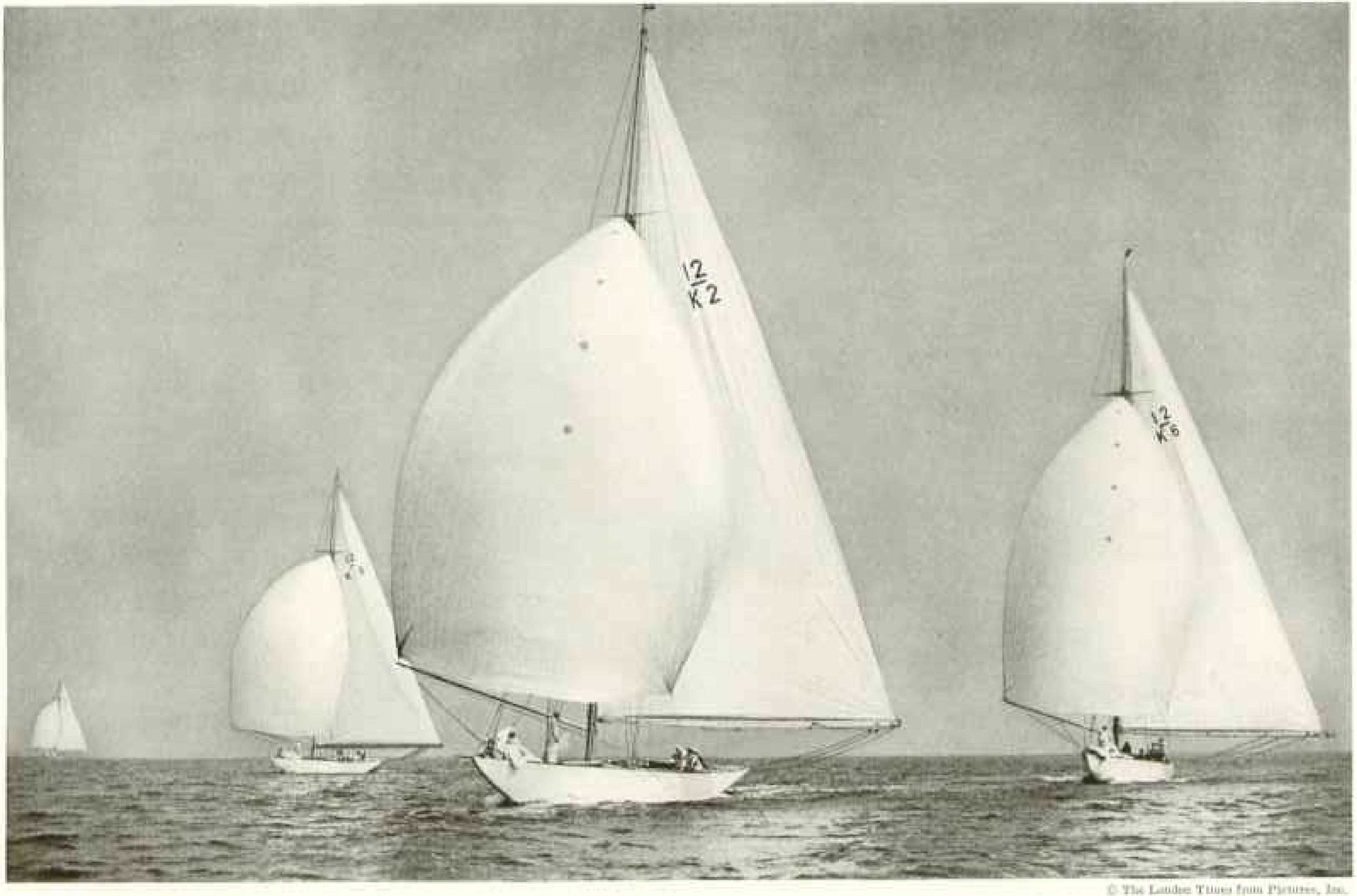
The Famous Dover Patrol Defended the Strait off the Chalk Cliffs at St. Margaret's Bay in the First World War

In memory of the heroes a granite obelisk stands near Leathercote Point, on the Kent coast, and a similar monument surmounts Cap Blanc Nez, on the French side of the Channel. Ships of all nations, hurrying to and from London in peacetime, pass South Foreland, which is the spot in England closest to France.

© K. O. Hopper from Doreen Leigh

Children No Longer Go Happily to this Cowden Shop with Pennies for Sweets

Because bombs have been dropped in many places in Kent and the black menace of war hangs over their homes, they and their mothers have been sent farther inland. A few months ago a place of gracious country living, the village—its name means "Cow Clearing"—is now in the zone of danger.



© The London Times from Pictorial, Inc.

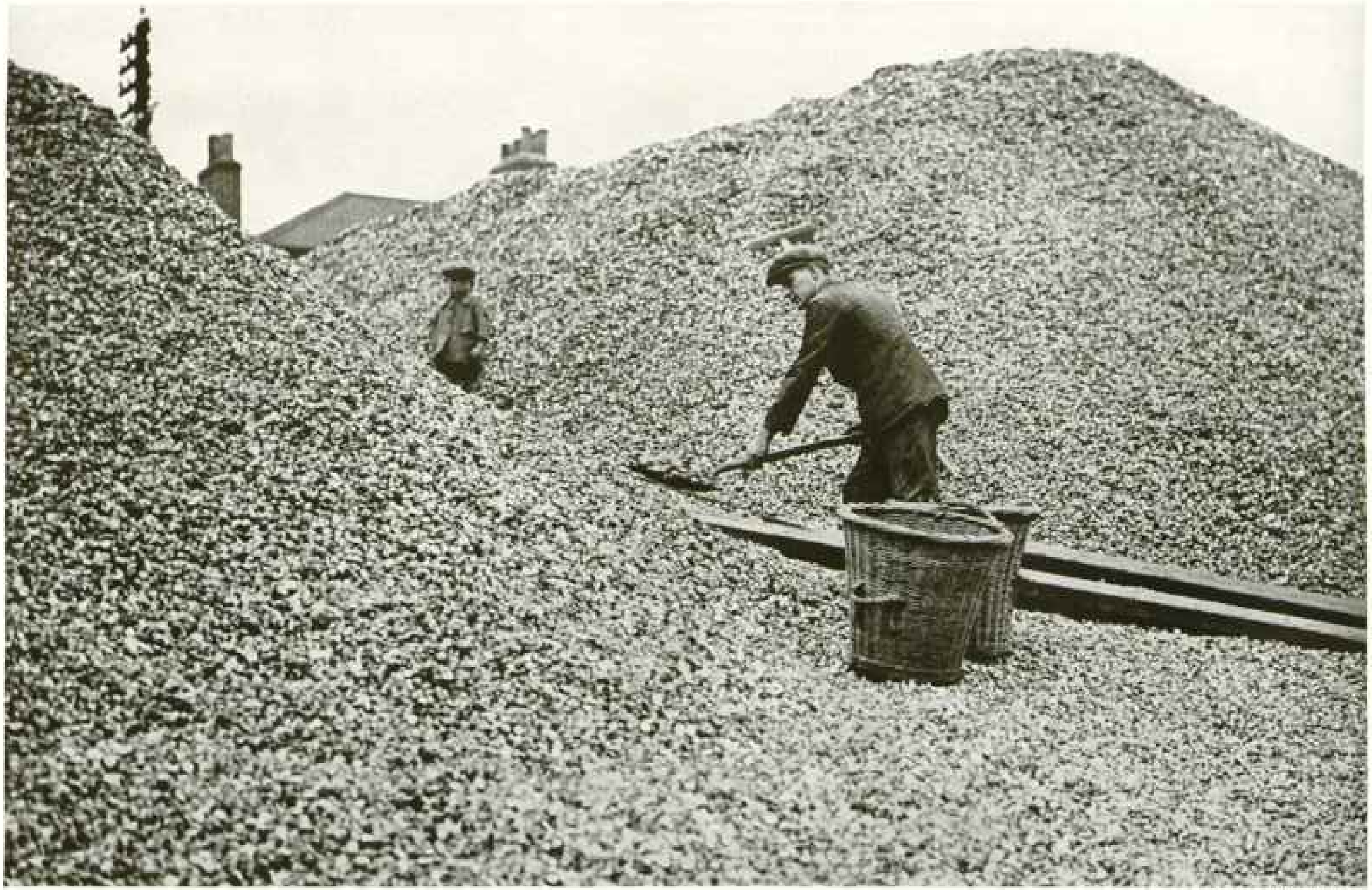
Where These Yachts Raced in August Regattas, Fighting Warships Now Thresh the Waters

From Southend Pier to the Nore Light, round the Shoebury Buoy and back, sleek sloops of the 12-meter class have competed annually in the races conducted by the Royal Thames Yacht Club. Southend, fast-growing resort, is near the mouth of the Thames.

Photograph from Topical Press

Hardly a More Peaceful Scene in England than the River Chelmer, with a Horse Towing a Laden Barge

Along the slow stream, through landscapes softened by light mist, moves a load of grain and timber. Yet this idyllic spot is near Chelmsford in Essex, one of the first counties bombed by German raiders.



Photograph by Topical Press

Leigh-on-Sea Has Mountains of Shells, but They Are Not for Guns

Cockle fleets of centuries have brought their daily catches of edible mollusks to this fishing port on the Essex coast to be cooked in specially fitted huts. The old village has clung to its traditions unchanged by time, but adjoining it is a district of ultramodern villas.

Photograph from London News Agency

"Alive, All Alive," as in the Old Song, Cockles Come to Leigh-on-Sea in Essex

And to the deep joy of England, 335,000 war-weary soldiers came home alive from Flanders, many of them carried in such tiny fishing craft as these. All kinds of boats were pressed into service, and they ran the gantlet of dive bombers and machine-gun fire.

Photograph by Aerofilms, Ltd.

No Foe Has Invaded England Since William the Conqueror Won the Battle of Hastings Near Here in 1066

The historic city, with the adjoining St. Leonards, has an open sea front of three miles lined with bathing beaches. One of the famous Cinque Ports which the Spanish Armada vainly sought to capture in 1588, it has become a popular resort, attractive for its pleasant climate and traditions.

© E. O. Hoppé from Dorien Leigh

What Merry Voices Have Reverberated from the Paneled Ceiling of Ship Hotel in Faversham!

Before Becket's shrine was raised in near-by Canterbury, pilgrims flocked to the altar of St. Crispin in this town, perhaps gathering in just such an inn to tell tales like those of Chaucer. A King of England, Stephen, son of William the Conqueror's daughter, lies buried in a canopied tomb beside the altar of the church.

© K. O. Hoppé from Doctor Leigh

Centuries of Love May Be Brought to Nought by a Moment of Hate

In the garden of Lord and Lady Sackville-West at Sevenoaks, Kent, an old gardener pursues his wonted tasks, hoping that the terror that flies by night may pass by the bit of Eden he tends. Asked how he produced his velvety lawn, an Englishman replied, "Oh, very simply; we just plant the seed and care for it for 300 years."

Photograph by Clifton Adams

"A Thing of Beauty" May Not Be, as Keats Thought, "a Joy Forever"

Standing today much as it was in the days of Henry VIII, when it was the home of an influential yeoman, Ightham Mote exemplifies the futility of 14th-century defenses against modern warfare. It was in feudal days a safe stronghold behind its moat when the drawbridge was up, but now a single bomb could destroy it.

Photograph by Realeam, Ltd.

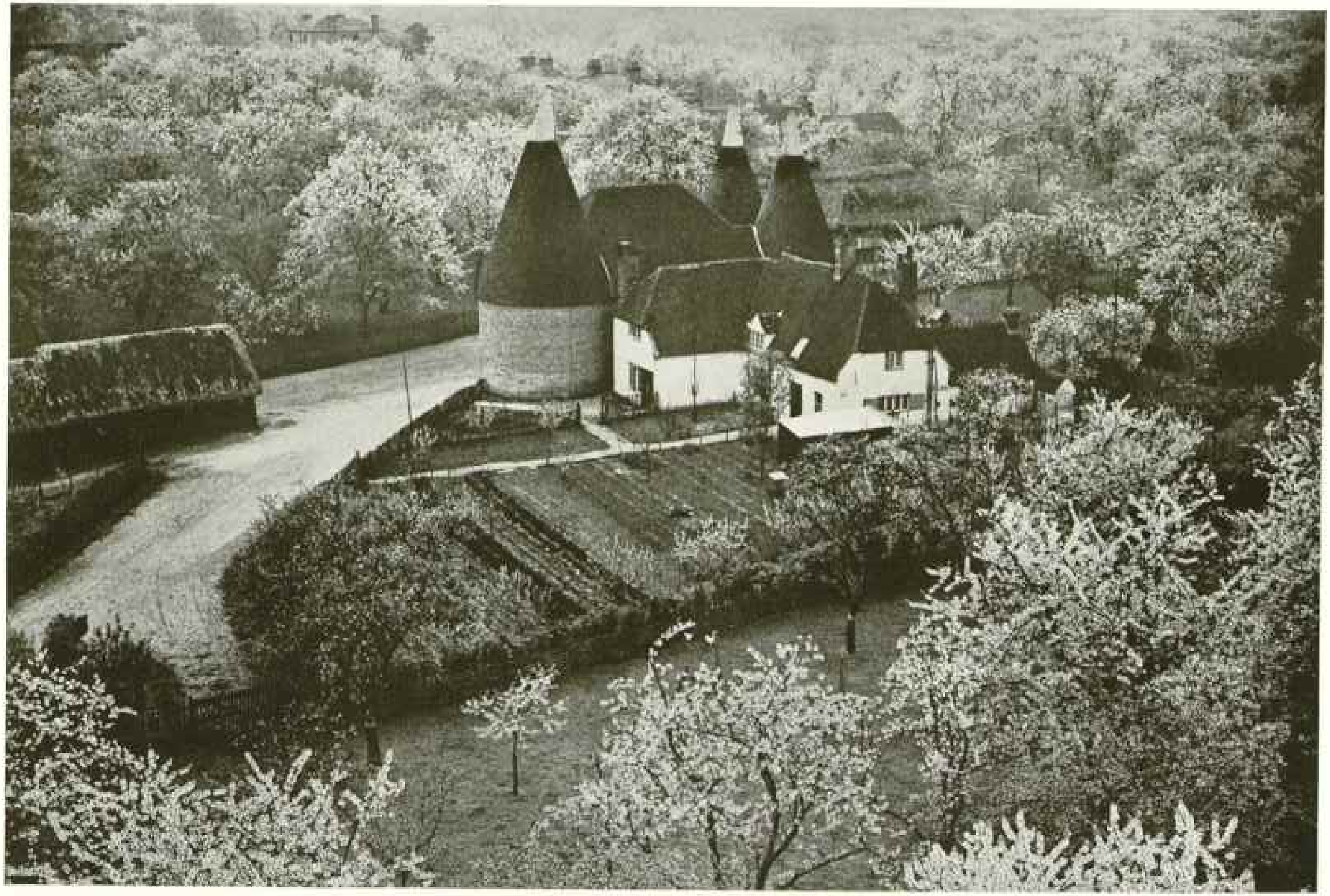
Peacetime Playground of Thousands, the Beach at Margate Is Only Two Hours by Train from London

On summer days city dwellers, rich and poor alike, throng to the broad, firm sands of this popular seaside resort. It is a favorite spot for family excursions and offers amusements suitable to all manner of tastes and pocketbooks. By trains and buses the countryside is easily accessible.

Photograph by Ewing Galloway

To Venerable Dover under Terrific Fire Many of the Imperiled British Expeditionary Force Came Home from Flanders

Its white cliffs are to Englishmen returning from abroad what the Statue of Liberty is to Americans, a symbol of their country. Of all the Cinque Ports, Dover, now guarded by an embattled fleet, has passed through the greatest vicissitudes. It saw the Romans go and the Saxons come, knew Caesar and William the Conqueror, welcomed Henry V back from Agincourt, and a million weary veterans from the last World War.



Photograph from Topical Press

Through Fragrant Orchards Newington Folk for Centuries "Have by Holy Bell Been Knolled to Church"

Country Folk Near Maidstone, Kent, Furnish Potatoes for London

Bountiful crops are grown in this rich garden soil. After the fall digging the tubers are heaped in long ridges and covered with mold to mature. At planting time the workers and their wives sort them, selecting the best for seed and sacking the rest for shipment to market.

© Sport and General Press

The Stilt Man Is Up in the Air Preparing for an Invading Army

The forces he expects, however, are a throng of pickers who will come to Paddock Wood in Kent to gather the hops that make "brown October ale." To facilitate the laborers' task, he hangs the topmost branches of the vines over high wires. This method of preparing for harvest has been in use for a hundred years.

Wanderers Awheel in Malta

British Stronghold Has Been a Steppingstone of Conquest Since Phoenicians Cruised the Mediterranean and St. Paul Was Shipwrecked There

By Richard Walter

"LOOK out!"

Ham's warning was almost too late. A glistening wall of blue Mediterranean swept across the deck of our little Maltese banana trader and dashed up the companionway after my flying feet.

Eighteen inches of trapped sea water swirled about in the crew's quarters. Clothes, battered books, and boxes washed over doorsteps into the passage, and with the next yaw scooted out to the foaming deck. Two shoes and an old hat sailed saucily from bunk to bunk.

Mounting the companionway to the bridge, I joined Ham where he sat high in the starboard shrouds. It was drier up there.

As I shinnied aloft, I could see comber after comber rush furiously at our struggling little craft, each one threatening to swamp us, but merely crashing across our starboard bow and throwing another ton of seething water into our superstructure. Each time the boat seemed to gasp as she righted herself, like a girl who has received a pail of cold water full in her face.

Seasick Canaries Add to the Din

The *San Georg* was a strange vessel. Not over 70 feet in length, she plied between the Canary Islands and Malta, stopping at several north African ports on each incoming voyage. She was loaded ten feet above the gunwales with bananas, a cargo which placed her center of gravity dangerously high.

To add to the confusion, each member of the crew had a number of canaries stowed below in makeshift cages, making the bowels of the *San Georg* sound like Central Park Zoo before feeding time. At every pitch and toss of the boat a broken bunch of bananas careened across the deck and bade us adieu, followed by a new chattering outburst from a hundred seasick canaries.

The Maltese sailors love storms. Their faces betray their love for the sea. They are hardened to its fitful ways, for their lives, like those of any islanders, are wedded to the seaways.

I gazed around our tossing mess table. These were the men who had welcomed two foreigners—and cyclists at that—into their crew. These were descendants of Europe's first sailors, who left the shores of Phoenicia to settle the Mediterranean's tiny gems, the Maltese Islands.

Across from me sat the captain, fat, jovial, kind, but unusual looking. His face bore Maltese characteristics common to every member of his crew. Dark, almost black hair covered his wide, squatty head. His complexion was decidedly olive-hued. His eyes were dark and sparkling, his forehead low, his mouth friendly and expressive. The queer glint in those eyes, and in the eyes of every Maltese we met, was soon to provide for us the key to their charm.

But this was no time for thoughts of charm. An increase in the gale's intensity jacked up new combers which roared across our deck as if they wore roller skates. Once again Ham and I hustled ourselves aloft, but not with our pre-breakfast hilarity.

Each swell threw the *San Georg* propeller free of the water, where, racing with futility, it made the whole ship tremble. Any moment we expected to hear the ominous rumble of burned bearings.

Suddenly my thoughts were arrested by two familiar objects washing across the deck below. Our bicycles! Our good steeds, veterans of 6,000 miles of pedaling in Europe and Africa, had snapped their fastenings and were on their way to Davy Jones! The next swell poised them on the edge. One more would ring the curfew. Seething and foaming, it rushed toward us.

Then we saw a shirtless figure moving carefully from post to post across the boat deck. Suddenly he lunged, caught our bicycles on the rise of the giant swell, and then himself was caught by a six-foot wall of sea water.

Rescue of the Bicycles

When the wash cleared away, our bicycles were still on deck. Beside them lay the Maltese mate. Amid persistent spray, we dragged him to cover and emptied his lungs. His first words were: "Your cycles—did I catch them?"

The storm's crescendo had passed when we hove into sight of the Maltese Islands. It was

Photograph from Richard Walker

Two American Cyclists Rest Their Steeds on the Isle of Malta

The author (right) and his companion, Edward Hamilton, stopped at the British Crown colony in the Mediterranean during a 42,000-mile tour of the world. They pedaled 9,000 miles, covering most of the remaining distance on shipboard.

the view which greeted the eyes of the Apostle Paul, whose experience at sea was more disastrous than ours. Two thousand years ago he was shipwrecked upon these very shores.

Tales of Ulysses and Cyclops

Ulysses, too, according to the Maltese, happened upon these three islets. And with their rocks and caves, they may have afforded excellent stamping grounds for the mythical one-eyed Cyclops.

Weary and bloodshot from a two-day sleepless vigil, our eyes were greeted with a pleasant calm as we passed between the sheltering arms of the Grand Harbour of Valletta. It was an impressive moment. The blue water of the Mediterranean wound fingerlike into the heart of brown, 16th-century Maltese battlements (pages 255, 260, 261, 262).

Scattered here and there, like bits of driftwood, were many small boats, both sail and steam, anchored in midstream.

Had it not been for the sleek British men-of-war bristling in an inlet to our left, the whole scene would have made an excellent medieval woodcut.

Skippers of fishing yawls hailed us good-naturedly as we passed, and our captain responded with a wave and a comical toot for each one. *Dghaisas* darted from town to town in the various reaches of the harbor. These were colorful gondolalike boats propelled by short but sturdy Maltese who stood out against the water's surface with their black hats and scarlet sashes.

Absent-mindedly, I wished that we might take a long ride in one of the graceful craft. Instantly the captain waved to a gondolier.

"Pietro! Take these two chaps on a complete circuit, will you—as a favor to me?"

The boatman grinned in assent, and rowed us far up to the head of the inlet, or Marsa, as the natives call it. Settings of pirate tales unfolded before us. Wine merchants rolled

Photograph by F. W. Hope from European

This String of Floats Bars Intruders from Britain's Naval Base in Wartime

Here the floats, chained to a breakwater, have been drawn together to leave the channel open. When stretched across to the other side, they support submerged nets which block the entrance to hostile submarines. Valletta rises in background.

huge kegs into bouncing lighters. Sailmakers, each with his circle of admirers, dotted the quay.

Returning along the opposite bank upon which perched the three cities of Vittoriosa, Cospicua, and Senglea, we were overshadowed by massive hundred-foot bastions (maps, page 257). The water gnawed at the junction where man-made wall met natural rock. And as we rounded the point of Senglea, our boatman directed our attention to a small turret upon the peak of a bastion.

A Heroine of "Maltese Misses"

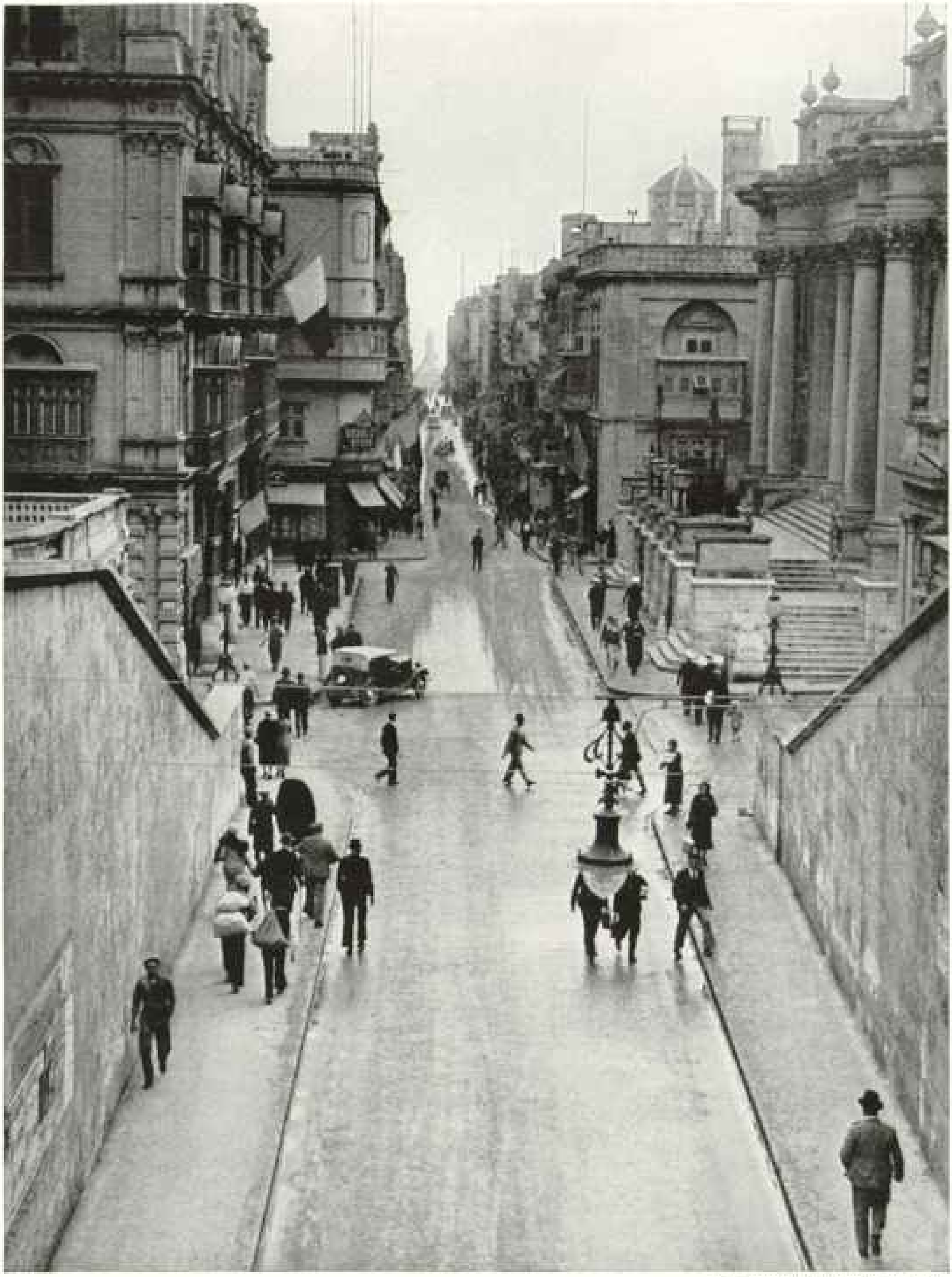
Surprised, we noticed a hand-carved eye and ear upon it—reminding us of the gargoyles of Rome. But this, the boatman told us, was no mere ornament. It recalled the valiant Maltese girl who jumped to her death from that point, to escape mistreatment at the hands of Napoleon's marauders. The lofty turret was a monumental tribute to the spunk of those whom we were soon to know as "Maltese misses."

After leaving the captain with our inadequate thanks, we found our second taste of Maltese generosity when we looked for a place to sleep. Unfortunately—or, considering later developments, fortunately—it was Saturday evening and banks were closed.

Not wishing to borrow money from the captain, we sought out the Boy Scouts, with the idea of camping somewhere outside of town. The Valletta scouts had no camp to offer, but they immediately set out in searching squads to find us shelter.

Inside of an hour we had a dozen offers of hospitality. Olive-skinned young men from all over the city earnestly insisted that we be their guests.

Though it had been almost unknown to us, Ham and I soon realized that Malta was one of the most prized treasures in European history. Many world powers had fought for it



Photograph by Paul from Three Lions

Shops and Public Buildings Flank Strada Reale, Valletta's Main Street

To the Royal Opera House, with its tall Corinthian columns (right), come traveling opera companies each season (page 269). The Maltese also attend English musical plays and concerts here. Large British payrolls to soldiers, sailors, and workers in the vast naval yards bring prosperity to Malta's stores.

Malta, Mediterranean Danger Spot and Melting Pot

Only 20 minutes' flying time from Italian Sicily, this strategic naval base is a steppingstone between Gibraltar and Suez. Great Britain gained possession in 1814.

"Stepchild of the Mediterranean," Historians Have Called Malta

Before the coming of the British, Malta was ruled by Phoenicians, Greeks, Carthaginians, Romans, Arabs, Normans, and French. Actually there are three small islands in the group—Malta, Gozo, and Comino—but usually they are referred to simply as Malta. Italy casts a covetous eye on the tiny area, whose deep, rock-sheltered harbors seem built to order for a modern fleet.

Photograph by Paul from Three Lions

Shallow Balconies Encased in Wood and Glass Jut Out from Maltese Walls

Nearly every building is made from island limestone, which assumes with age pleasing shades of reddish yellow and brown. Walls are thick, floors often paved with stone, and ceilings high. Such a combination keeps the interiors cool, even in the hottest weather (page 271).

as the most strategic point in the Mediterranean.*

The ancient Phoenicians were the first colonizers, using the island as a base for western explorations. They were supplanted in the sixth century B. C. by the Carthaginians, who in turn were conquered by the Romans.

Rome gave way to the Byzantine Greeks, who then let it pass into the hands of the Saracens. Next came Normans, then Spaniards, and for almost 300 years the Knights of St. John held sway, defending their shores against Turkish and Arab invasions.

This order, which is more commonly known as the Knights of Malta, is among the most colorful groups of actors on the stage of history. Though of varied descent—Norman, Italian, and Spanish—they maintained in Malta one of the most trouble-free governing organizations in history. Remnants of the culture which they preserved from the earlier Mediterranean civilization, with the armor and coats of arms of the Knights themselves, are now on display in the Palace of the Grand Masters in the capital, Valletta.

The reign of the Knights was shattered when Napoleon thundered through on his way to Egypt in 1798. And he soon lost to Admiral Nelson, who brought this naval prize under the British flag.

At the time of our visit many rumors were rife. Among them was one that the Italians were setting up artillery to shoot sixty miles so they might bombard Malta from Sicily, 58 miles away. Naval assault would be difficult—but what of attack by air?

Strong Secret Defenses Guard Malta

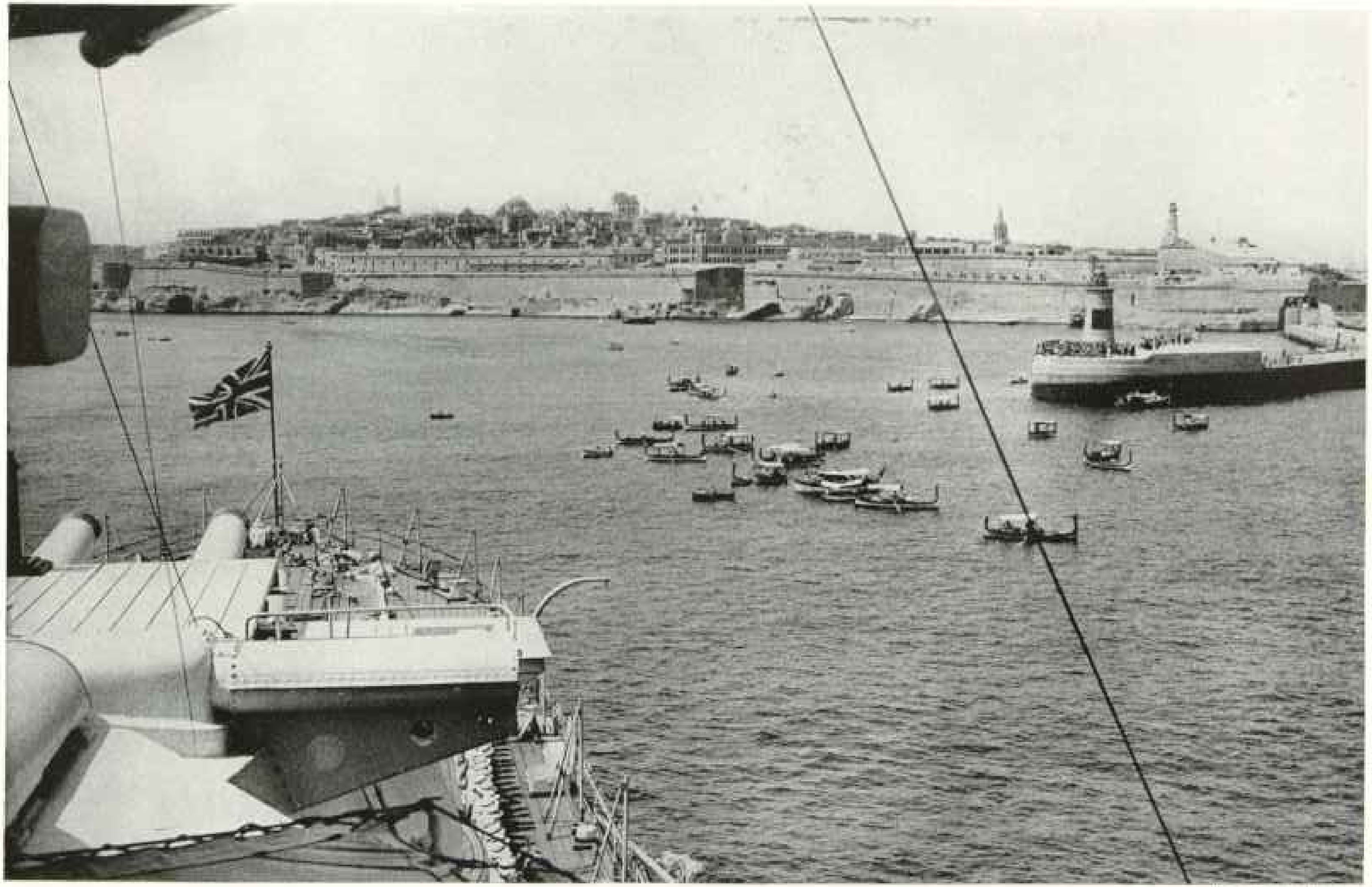
At Malta, as at Gibraltar and Singapore, Britain has concentrated strong defenses. A

* See, in the National Geographic Magazine, "The Maltese Islands," by Sir Harry Luke, November, 1935, and "Malta: The Halting Place of Nations," by William Arthur Griffiths, May, 1920.

Photograph by Burton Holmes from Ewing Galloway

Ghostly Sentinels of Armor Line a Corridor of the Grand Palace

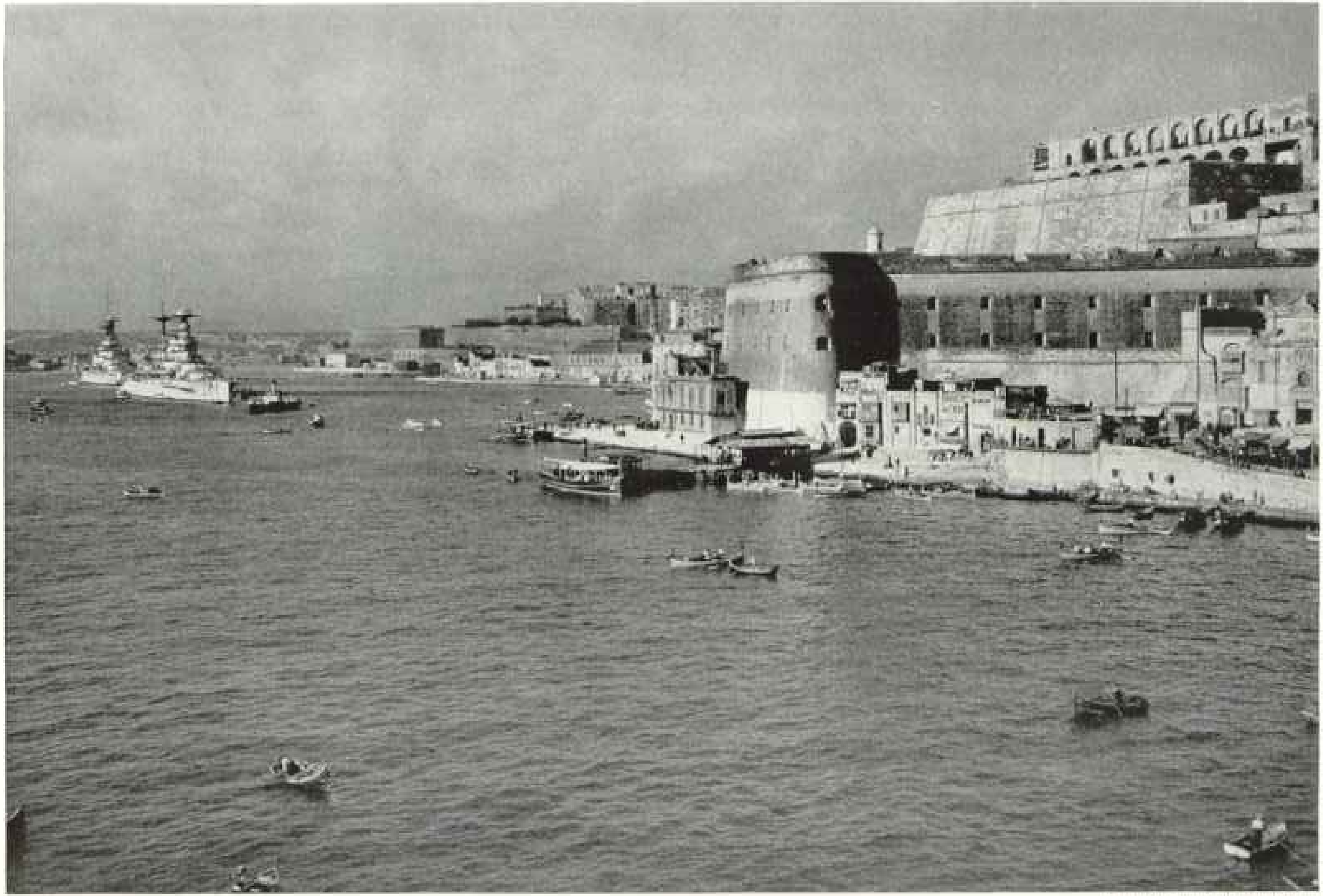
Government offices now occupy the first floor of the huge edifice, built by the early Knights of Malta. The second floor is filled with a vast collection of armor, weapons, and paintings of distinguished Grand Masters of this Crusader order. The Knights came to the island in 1530. Fifty years later they built the capital, Valletta, with its majestic buildings. The order continued to flourish for two centuries, but finally succumbed to the power of Napoleon.



Photograph by Keystone

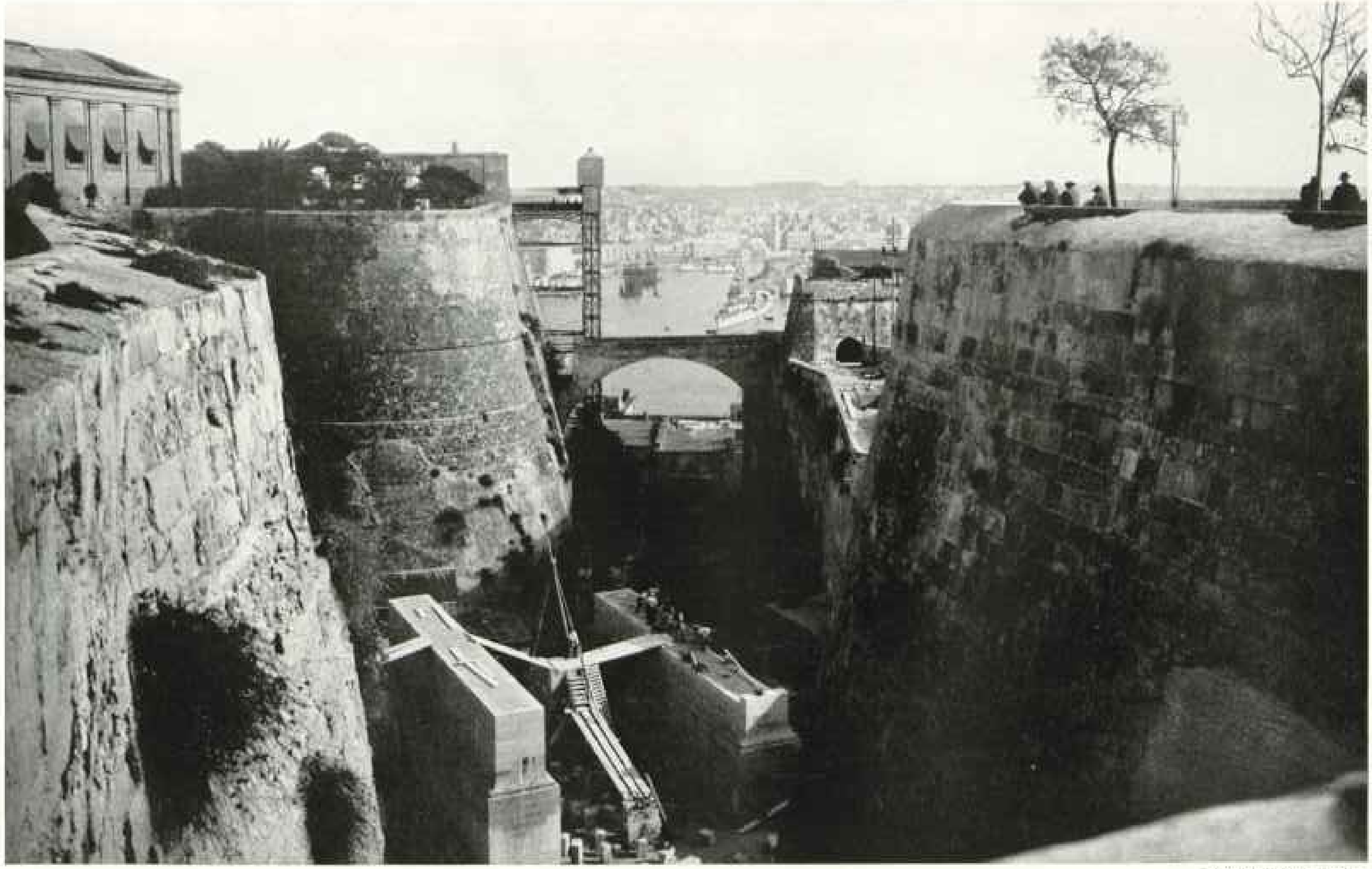
Malta Welcomes the British Mediterranean Fleet as It Steams into Grand Harbour

This peacetime picture was made from the decks of the *Queen Elizabeth* when the mighty battleship led strong units of the British naval force to Malta. Old ramparts and buildings of Valletta rise on the rocky promontory in background.



Photograph from Underwood-Stratton

Valletta's Old Citadel Commands Malta's Harbor, Where British Battleships Lie at Their Moorings

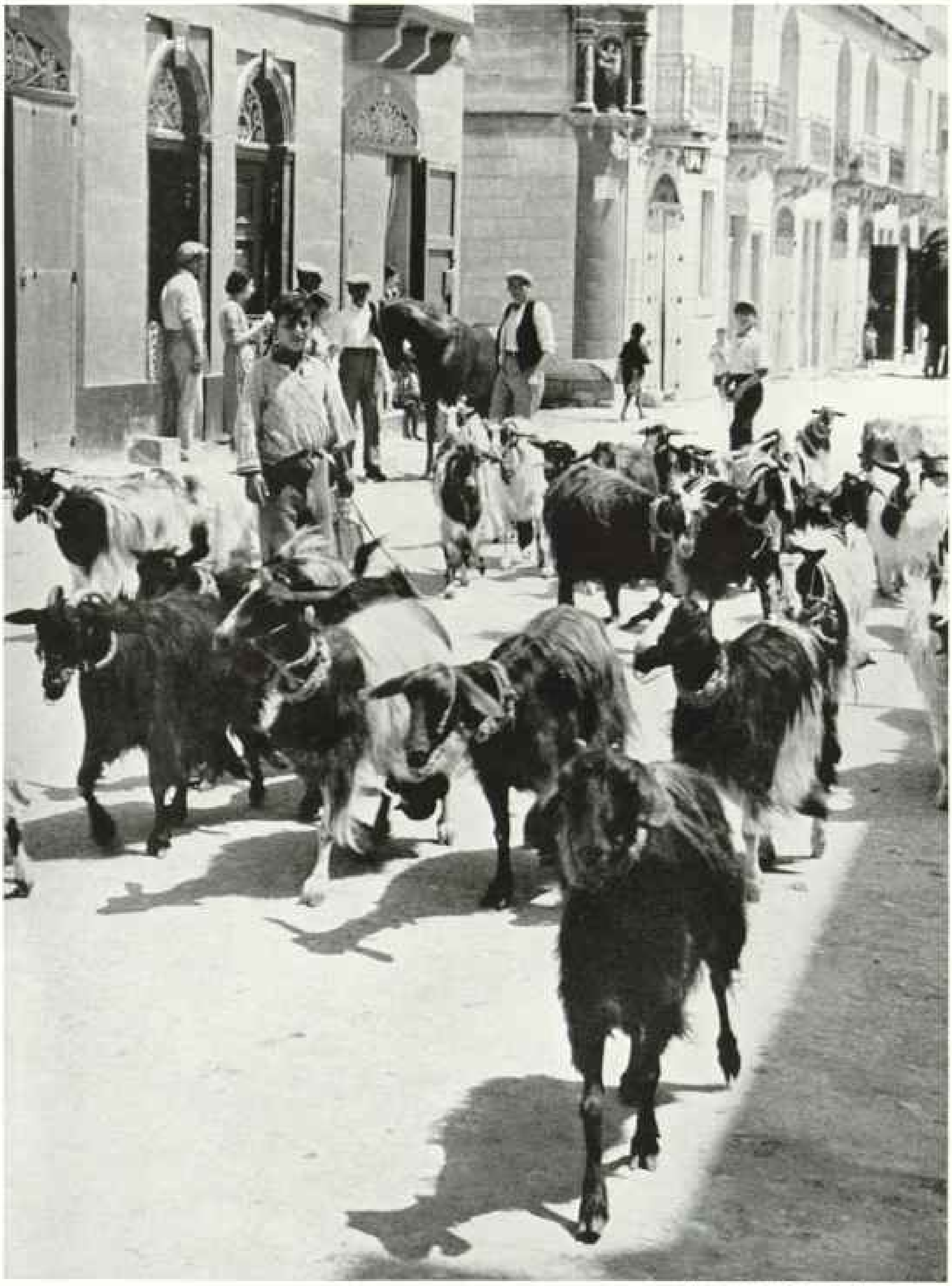


Valletta's Ancient Bastions Dominate Malta's Grand Harbour

These old ramparts, called the Upper Baracca, now bristle with modern guns. Atop the walls tropical gardens flourish. The slender tower (left center) houses the elevator which brings passengers from the customhouse below, at the water's edge. In the distance, warehouses flank Dockyard Creek, where the navy yard and huge floating dock are located.

Photograph by Burton Holmes from Kirby Galloway

Imported Wheat Goes into Big, Dry Storage Bins beneath Valletta's Open Square



Photograph by F. W. Stone from Kompass

Goats Give Valletta Her Most Serious Traffic Problem

Automobiles and horses are few, but flocks like these crowd the streets all day long. The three Maltese Islands are so small that there is not sufficient pasturage for cattle. Goats, not cows, are the principal source of milk. British soldiers and sailors drink canned milk to avoid contracting Malta fever (page 270).

Photograph by F. W. Shane from European

From Producer to Middleman to Consumer

Door-to-door delivery in Valletta has its drawbacks. Goats sometimes acquire an infection which is transmitted by their milk to humans. Origin of this disease, Malta fever, was discovered in 1887. Thirty years later, a U. S. Department of Agriculture bacteriologist found that many cows were infected. More commonly called "undulant fever," it is now world-wide and is acquired from unpasteurized milk of goats and cows.

three years' supply of grain lies stored in Floriana's subterranean vaults. Medieval castles with rugged bastions have been refitted and tunneled with secret fortifications.

Emergency submarine refuges and hidden anchorages have been established in the several inlets in the islands. St. Paul's, Mellieha, Salina, Madalena, St. Julian's, and St. Thomas Bays are plotted for such use with micrometer-like accuracy.

We were personally conducted through many of the defense works by British naval officers. Others, which were secret, were of course merely hinted at.

Afloat in the Grand Harbour, and ready to slip into action upon a second's notice, was half of Britain's Mediterranean naval might.

Thus, today, because of its proximity to Sicily, Malta wears a new and far more potent coat of armor just as defiantly as when she was held by her famous Knights. At present the island is a Crown colony of the United Kingdom.

Irrespective of the numerous régimes, the Maltese people have remained basically Phoenician, with only slight traces of Italian, Greek, and Arabic in their blood, and Latin and Arabic in their language. Nearly 265,000 of them live on the three islands—Comino, one mile square; Gozo, 9 miles by 4 miles; and Malta, 8 miles by 17 miles.

How this isolated, densely populated land can support all its thrifty but good-humored and startlingly prolific race has puzzled visitors for years. How do they live?

© Publishers Photo Service

Tombs of 400 Heroes Lie Beneath the Floor of St. John's Cathedral

The imposing structure, designed by Girolamo Cassar, the architect who built many of Valletta's fine buildings in the sixteenth century, is the home church of the Knights of St. John of Jerusalem. Every inch of the exquisite interior glows with paintings and carvings. Napoleon carried off most of the vast treasures of the church in 1798, but spared a group of magnificent tapestries which are hung on these walls during Pentecost (page 258).

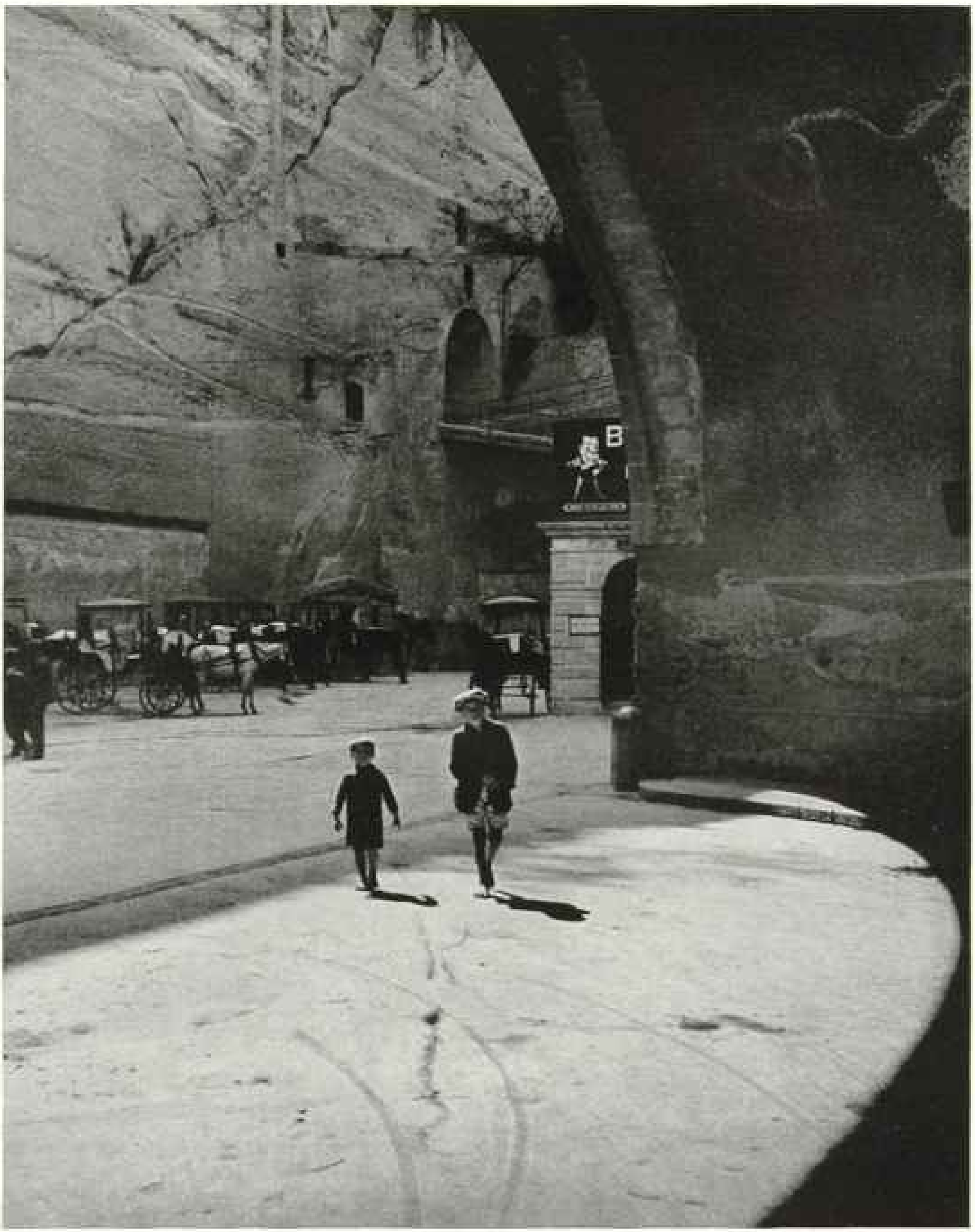
Agriculturally speaking, Malta could support itself only part of the year. This means that the remaining supply for local consumption must be imported. So, in its balance of trade, we find imports for 1938 totaling nearly $20,000,000. Below this sum stands the unbelievable figure for exports: less than a million and a quarter dollars.

British Navy Nourishes Malta

This sounds economically impossible, and it would be were it not for one notable and two incidental sources of income. First of all, the British Navy pays thousands of pounds each year to dockyard workers, skilled craftsmen, and merchants, and for various entertainments. In addition, remittances to relatives from Maltese abroad, and returns on foreign investments held by well-to-do descendants of the nobility, constitute a considerable buying power.

The Maltese know full well that they could not live were it not for the British Navy, and their respect and loyalty toward it are profound. In 1514 some 22,000 inhabitants could barely make a living on the Maltese Islands. With the increasing birth rate came poverty and, in 1667, the great plague which took 11,000 lives. In the early nineteenth century some 20,000 islanders died of starvation.

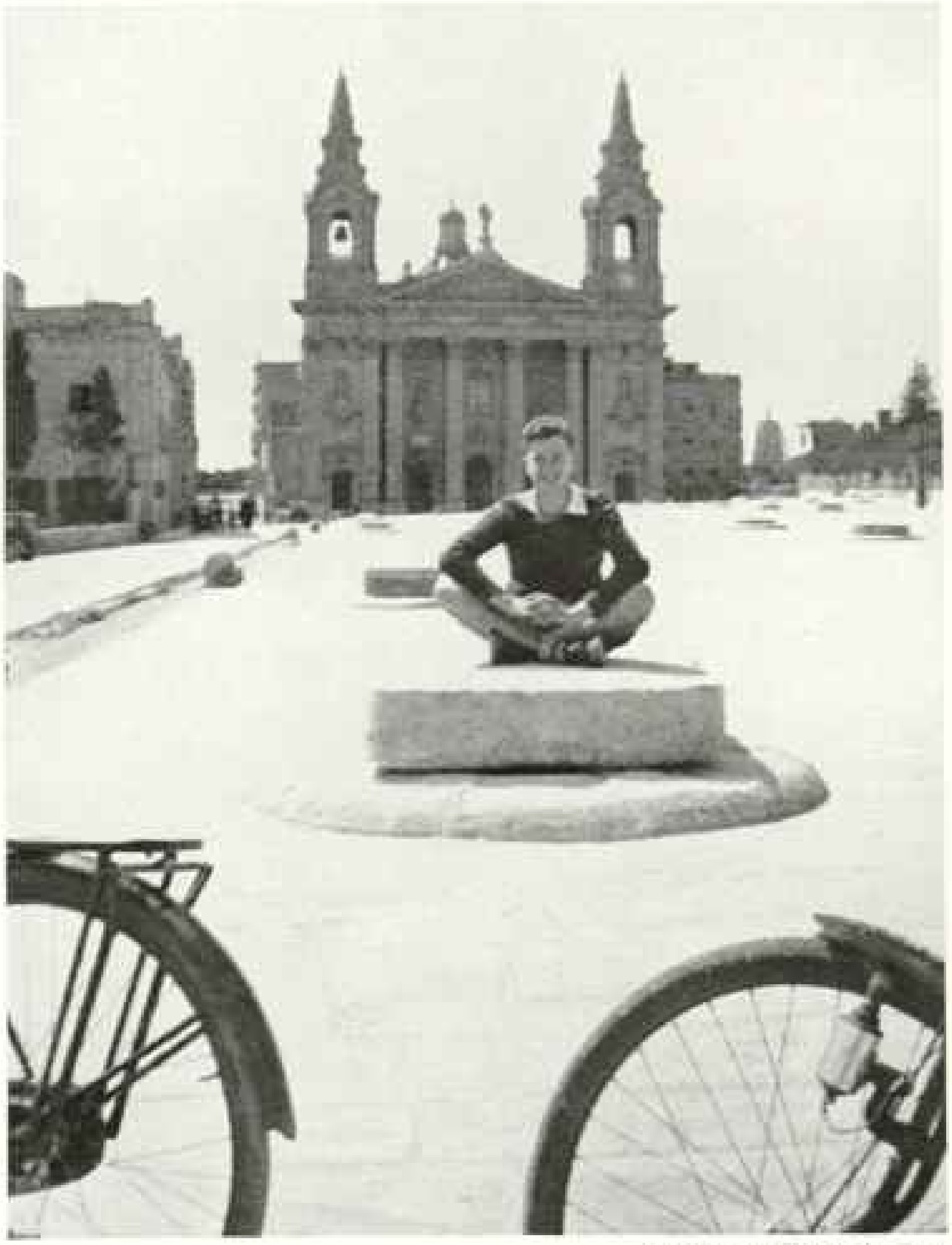
But under British influence, Malta's population increased twofold until the close of the World War, when sudden unemployment



Photograph by Burton Holmes from Ewing Galloway

Underground Streets and Tunnels Honeycomb Malta

Many subterranean passageways, including ancient catacombs, now are a part of the island's fortifications and defense system (page 258). Supplies are kept in many tunnels; others are bomb shelters. Beneath Valletta some of the underground areas serve as homes for the poor. Prehistoric man built temples and chambers in these vaults. In a pit beside one sacrificial altar lie thousands of human skeletons. Years ago one could walk underground from one end of Malta to the other. The Government closed the entrances to these tunnels after school children and their teachers became lost in the labyrinth while on a study tour and never returned (page 272).



Photograph by Edward Hamilton

The Author Sits Atop a Mine of Golden Grain

In dry subterranean strongholds, Malta stores enough grain for three years' use in the event of siege (pages 263 and 265). Although every available foot of land is cultivated, home-grown foods are not sufficient to supply island demand. Most provisions must be imported. Floriana's Cathedral of St. Josiah rises in background.

forced 15,000 to emigrate to the United States. Then increased naval activity caused a rise in population from 241,621 in 1931 to 264,663 in 1937.

The language of the islands is Maltese, a basically Phoenician tongue with mixtures of Latin and Arabic. Through the schools, English has come into fairly common use; most business transactions, as well as street signs and names of buildings, are in English. Strangely enough, the language of the courts formerly was Italian, although only a sixth of the people understood it. Now it officially is Maltese.

We saw at a glance that education is fairly well cared for. One hundred and fifty-seven public elementary schools cater to 32,221 children, and 10 schools are maintained for the use of 1,845 secondary students. There is a small university in which English texts are used and lectures are delivered in Italian, English, and Maltese. However, many students study abroad. We visited ten of them at the University of Rome.

American Cyclists Go on the Air

Our introduction to Maltese generosity and kindness was soon followed by an unparalleled demonstration of hospitality.

The word had spread that two American cyclists were on the island and a flood of invitations to teas, luncheons, dinners, automobile rides, bicycle trips, club meetings, and dances poured in. Though we had no good clothes, everyone was friendly and appeared even more impressed than if we had worn conventional dress.

A druggist proffered free medical supplies for our expedition. Women whom we had never seen before offered to do our laundry, darn our socks, and patch our clothing. A cycle shop volunteered to overhaul our bikes, piece by piece, furnishing us with new sets of tools and painting on our crossbars the flag of every country we had visited. The Lieutenant Governor gave us passes to every museum, palace, and monument on the island.

One of the island's newspapers took our picture and splashed our story across three columns. That dual-language spread must have reached every corner of the island—even the satellite isles of Gozo and Comino—because before the day was up requests for our

appearance on the air began to pour into the local broadcasting station.

A Contract "to Reminisce"

Two days later we signed a contract for twenty-five cents per minute on a half-hour broadcast. All we were required to do was to reminisce.

Radio in Malta is not radio; it is telephone. The system is called "rediffusion." One central radio station normally receives programs from all over Europe, selects from them the best program for each hour, and passes this on to the people. Radio sets are rented for $3.75 per year and are connected to the main station by telephone lines.

Regardless of the time of day, we had merely to throw a switch and our program was preselected and pretuned in for us. The only advertising allowed consists of short local announcements.

Other means of entertainment are centered about the capital city, Valletta.

Setting the town ablaze, and showing the best British and American films, are several motion-picture houses, the most famous of which was named for Grand Master Manoel de Vilhena.

Maltese praise the gilt-adorned balconies of their Manoel Theater, reputed to have been built in 1731 and to have operated ever since without major repair.

Climate Encourages Cycling

The winter season sees the arrival of the finest traveling opera companies at the Royal Opera House in Valletta. There the music-loving Maltese can enrich their esthetic education at nominal prices (page 256).

Photograph by Paul from Three Lions

Their Hats Are Their Parasols!

Older Maltese women stiffen black silk with cardboard or wire to make the arched hoods. The rest of the material falls as a cloak, the lower end being gathered in one hand to keep it from touching the ground. Maltese call their hood-and-cape combination a *faldetta*.

Cycling is popular. Many cycle from necessity, since only about 2,800 people own automobiles, but a large majority consider it a sport.

Every town supports several cycling clubs whose members tour the island in groups and who sponsor races every month of the year. The agreeable climate, with its annual mean temperature of 67 degrees, makes this possible.

Several times Ham and I were asked to officiate at these races. And we were invited upon many of the tours, the first of which gave us our initial view of the island of Malta as a whole.

AP Photograph from Pix

Old and New Styles Blend in Valletta's Narrow Streets

The younger generation is abandoning the cumbersome Maltese hooded cape called the *faldetta* for European dress (page 269).

The landscape appears barren of trees, the only ones on the island being grown in moist valleys.

Our general impression was one of rolling brown hills covered with rocky fields, each bounded by a rock wall. Indeed, some call Malta "the Mediterranean's rock pile." But that is a harsh overstatement.

The farmers have fought rocks for centuries, constantly refining and enriching their soil until it produces bumper crops of clover, wheat, barley, cotton, potatoes, onions, and citrus fruits.

The only difficulty lies in the fact that there is insufficient land to grow enough for the people. The eleven thousand farmers are for the most part tenants, renting their land for so much an acre. By careful irrigation and scrupulous terracing of every square foot of soil, they manage to cram three successive crops into one year.

Excellent water is piped from natural springs and artesian wells. Most of Malta's 21 inches of rainfall soaks into the lower water-bearing strata, thus keeping the wells amply supplied. Drainage facilities are good, and health standards are high.

Only one serious menace to health remains. This is a disease known as "Malta fever," caused by the bacteria *Brucella melitensis* in goats' milk (pages 264, 265).

The Maltese, because of the scarcity of pasture lands, have always kept goats instead of cows. A few of the latter have been introduced, but it was a common sight still for us to see large herds of goats being led from house to house.

As the goats mingle in the streets, the disease is spread among them and, in turn, the milk becomes generally infected. The only control available here at present is either the individual boiling of all milk, or the extermination of all goats.

Some years ago Gibraltar nipped an epidemic in the bud by the latter method; but Malta can scarcely risk the equally serious

Photograph by Williams from Pix

They Live Astride Britain's Lifeline of Empire

More than a quarter million civilians dwell on the three Maltese islands, heavily fortified Mediterranean naval base. They speak Maltese, basically an old Phoenician tongue (page 268). About one-sixth understand Italian. Many have learned English from British soldiers and sailors.

danger of a milk shortage for her people.

As one might judge from the density of population in Malta, there are so many towns that little space is left for countryside. Five cities are clustered around the Grand Harbour itself. On this first cycling trip we came upon a closely packed town every two or three miles.

Practically every building is constructed of Maltese stone, a type of Tertiary limestone which assumes with age beautiful shades of reddish yellow and brown.

The streets are narrow and lack sidewalks, but there is not enough wheeled traffic to cause congestion. Many streets are not wide enough for an automobile.

Interior design of most houses follows closely the Italian plan. House fronts push up to the street and all yard space lies in a court at the rear where century-old fountains bubble over exquisite rock gardens, blooming flower beds, and tiny patches of vegetables along the walls. Here family communion is held.

Religion comes first in the life of a Maltese. One need only note the staggering number of Roman Catholic churches on the islands to realize it. An English friend once remarked that nowhere on Malta was there an outdoor spot from which at least one church could not be seen.

An example of the place of religion in Maltese life is the erection of the Musta church. Despite their poverty, church members with wholehearted sacrifice donated their savings to its erection.

One of World's Biggest Domes

Carpenters, masons, plumbers, and merchants contributed labor and materials free. And from this co-operative venture arose the third largest dome in the world. Only St. Peter's in Rome and St. Sofia in Istanbul have domes of greater dimensions.

As we rode about the island, we asked one of the girls in our party to talk to us more about her religion.

Tessa shook her dark curls, and her eyes fairly snapped.

"Our faith is the greatest thing in our lives. It was founded by the Apostle Paul when he was shipwrecked on this island and has remained unchanged for nineteen centuries. One of the many great services our Church did was to isolate victims of the great plague of 1667. Had it not been for the Church, everyone on the islands would have died."

As we cycled on, Ham and I were struck more and more by the broad scope of knowledge of Maltese youth.

It amazed us to discover how much they knew about the world. Their newspapers contain many educational items. And the desire of these young Maltese, ably demonstrated by their intense interest in us, seems to be to learn more and more of life about them.

Hundreds of Maltese youths visited Italy either to study or to travel. A few got to England. Many sail the ships of interoceanic trade, returning with vivid accounts of all they have seen and heard. But most striking of all is their knowledge of every inch of their own islands, principally of their little-known wonders of the world.

A Prehistoric Periscope

The strangest of these, the Hypogeum near Hal Saflini, is a remarkable megalithic temple where prehistoric man worshiped his deities and buried his dead. Long shafts descend 30 feet below the earth's surface, where, carved from solid sandstone, lie dozens of odd rooms, including an altar, a long hallway, and a treasure vault.

The entire structure is said to have been illuminated indirectly with polished stone mirrors arranged periscopically in the shafts above. Some archeologists tend to discount this theory, as such early sanctuaries were supposed to be dim and mysterious for religious reasons. It is doubtful whether one person in a thousand would think of such an arrangement even now!

One of the chambers opens to the outside through a long shaft into which snakes and wild animals fell to their death. It is still littered with bones and tusks unfamiliar to our age. Near this gruesome butcher shop lies the megalith's reservoir, a deep, tapering rain catcher. In another chamber is a hollow in the wall into which the high priest must have spoken.

When Ham spoke into it, I could hear his words in any room in the temple. The whole structure seemed to vibrate with the sounds.

Most uncanny of all was the fact that whereas low tones could be heard everywhere distinctly, high-pitched notes did not carry farther than the chamber itself. When Ham shrieked a falsetto version of "O Sole Mio" into the hollow, not a sound of it reached my ears!

More than once we soundly cursed the remiss methods of megalithic people. Their smoothly hewn halls and doorways were not over four and a half feet high, forcing us to "pleat" our six-foot statures to a more practical height.

Tragedy in Malta's Tunneled Maze

While we cycled homeward, our friends told us that the island was honeycombed with a network of underground passages, many of them catacombs.

Years ago one could walk underground from one end of Malta to the other, but all entrances were closed by the Government because of a tragedy.

On a sight-seeing trip, comparable to a nature-study tour in our own schools, a number of elementary school children and their teachers descended into the tunneled maze and did not return.

For weeks mothers declared that they had heard wailing and screaming from underground. But numerous excavations and searching parties brought no trace of the lost souls. After three weeks they were finally given up for dead.

Sections of this underground network have been used to protect military and naval supplies. Indeed, many of the fortifications themselves are merely caps atop a maze of tunnels (page 267).

Thus is Malta fortified. Her thrifty, religious, and intelligent people love peace. Yet, with war in Europe, they now are in the center of Mediterranean strife.

Among the first activities of Italy after Mussolini's declaration of war on June 10 was the bombing of the island.

The establishment in 1937 of a new air base, in addition to the tremendously strategic naval position she occupies, makes Malta guardian of the central Mediterranean—a possession to be prized, perhaps again to be fought for.

NATIONAL GEOGRAPHIC SOCIETY

GEOGRAPHIC ADMINISTRATION BUILDINGS

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ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

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

Articles and photographs are desired. For material which The Magazine can use, generous remuneration is made.

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

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

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

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

The National Geographic Society-U. S. Navy Expedition camped on desert Canton Island in mid-Pacific and successfully photographed and observed the solar eclipse of 1937. The Society has taken part in many projects to increase knowledge of the sun.

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

The Society granted $35,000, and in addition $75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

The world's largest ice field and glacial system outside the Polar regions was discovered in Alaska by Bradford Washburn while making explorations for The Society and the Harvard Institute of Exploration, 1937-8.

THE THOUSAND CLOCKS THAT KEEP GRAND CENTRAL RUNNING "RIGHT"

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What does he check them with? What watch has such unquestioned accuracy that the dispatcher's office can rely on Bachtold's checking to route over 550 trains per day in and out of the terminal—one every 60 seconds during rush hours? A Hamilton—the same Hamilton watch that Mr. Bachtold has used to do the job for over 20 years.

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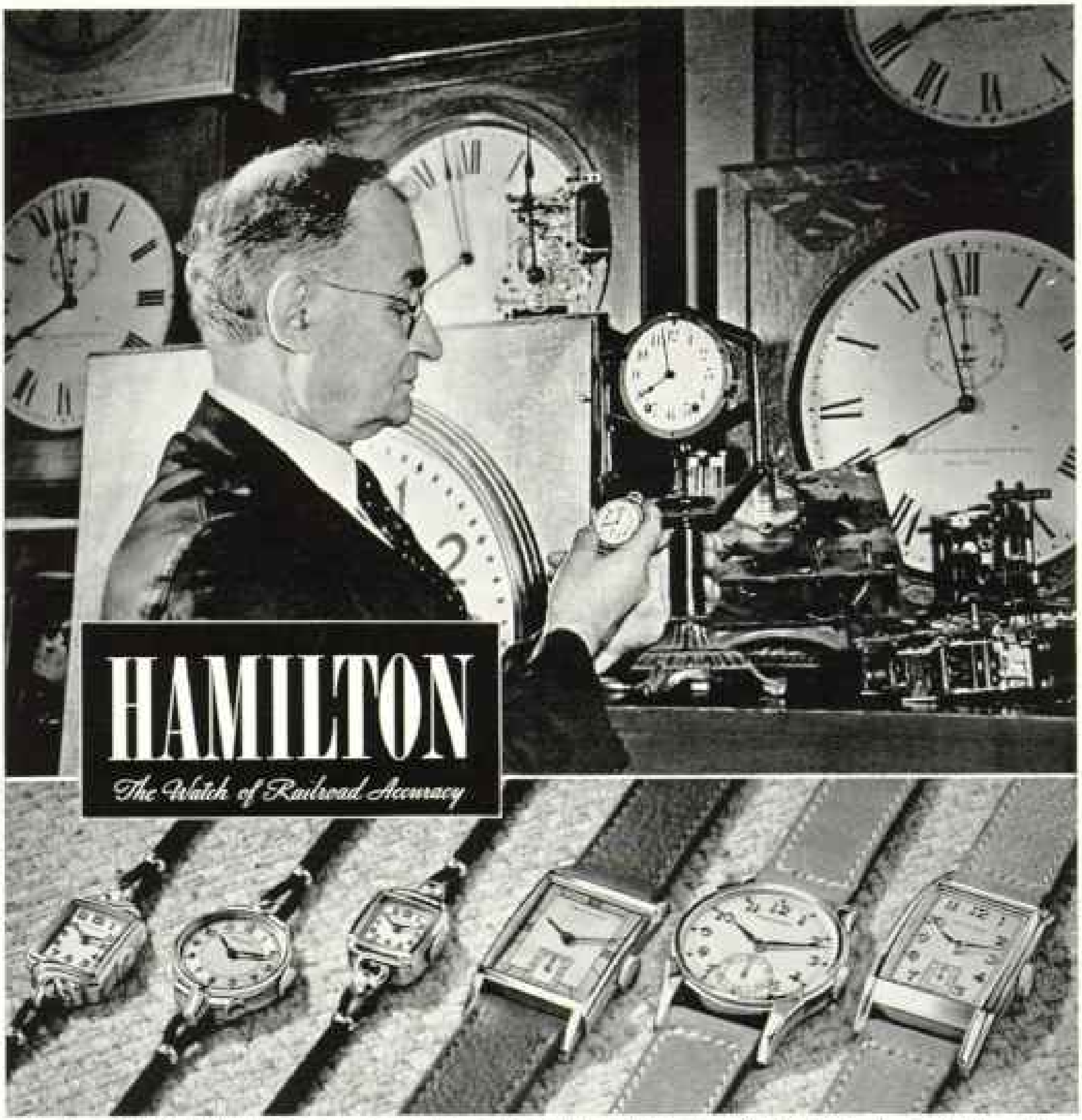
*Hamilton's experience building watches for railroad men insures greatest possible accuracy in every other size and grade Hamilton makes.



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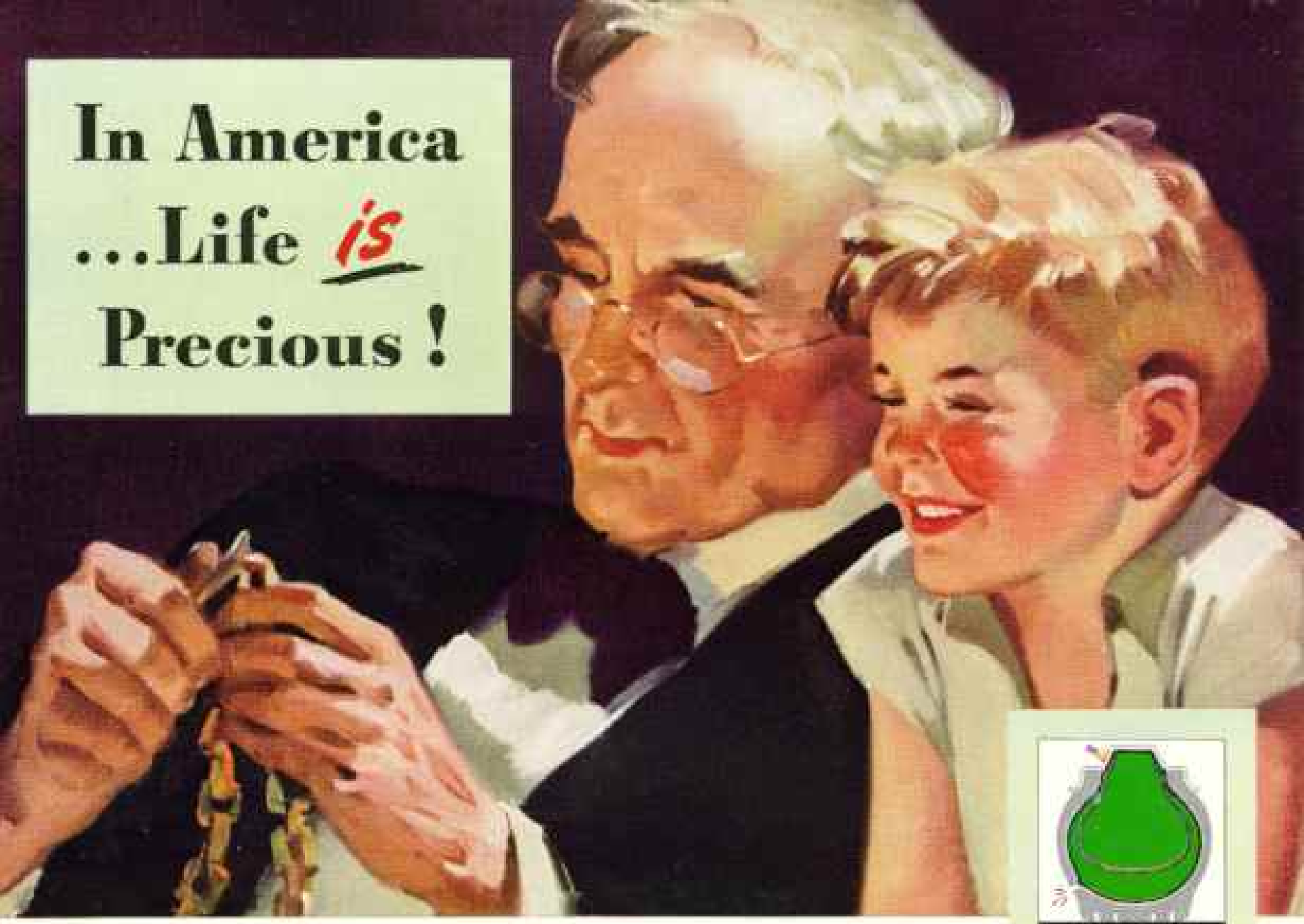

IN America, the government protects your liberty ... it goes a long way to protect your life!

But the government can't undertake to keep you from running needless risks ... without interfering with your freedom.

You are aware, for example, that blowouts do happen by the thousands ... every day ... to new as well as to old tires. *They can happen to your tires!*

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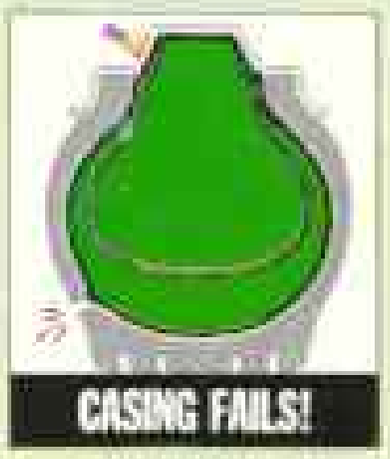

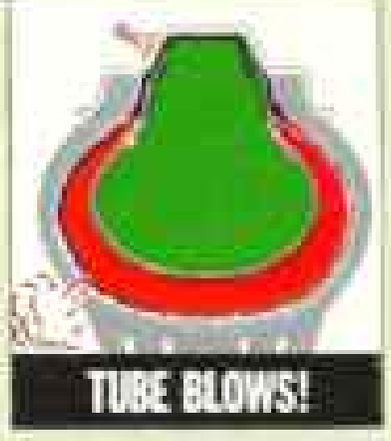

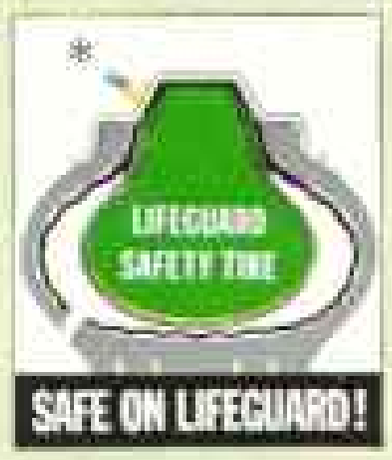

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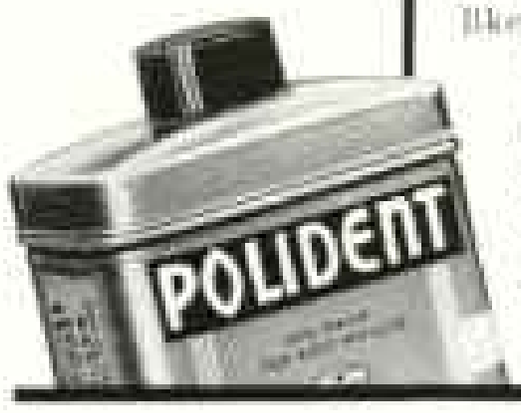
NO BRUSHING!

Do this daily: Add a little Polident powder to ½ glass water. Stir. Put in plate, bridge 10-15 minutes. Rinse—and it's ready to use.



False Teeth can't be cleaned with make-shift inefficient methods!

A tough, dingy almost invisible film forms on plates and bridges. It absorbs impurities like a sponge! Mouth washes, ordinary pastes or powders are *not designed* to clean false teeth! Household cleansers can ruin them. No brush can reach all crevices. Yet Polident cleans and *purifies* plates —like new —with safety!

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TONIGHT

They're Playing Under Lights!

by Westinghouse

• *Few fans ever dreamed* the day would come when after dinner they could ride out to a stadium and watch a professional baseball game played under lights.

• *Yet, the idea* of night baseball was advanced as early as three decades ago. True, nothing was done about this so-called "fantastic dream" then. But twelve years ago, a minor league club toured the country with a portable lighting system and played before fans at night in much the same manner as a carnival troupe.

• *Night baseball* at last became a reality. And it proved increasingly popular, evidenced by the fact that in the past ten years it has developed in the minor leagues to a point where seven games out of every ten are today played under lights.

• *In 1935* night baseball graduated to its first major league park. So rapidly has it caught on here that eight of the big league parks are now equipped with the most modern lighting facilities. And we are proud to say that five of these lighting systems were designed and installed by our own company.

• *One has only* to check the turnstiles to appreciate how eagerly the public has taken night baseball to its heart.

• *In 1939,* for instance, nearly one million persons attended major league night baseball games. The night games at Shibe Park, Philadelphia, topped the daytime attendance average five to one. In Comiskey Park, Chicago, the first six night games drew over 188,000 paid admissions.

• *There has been* similar enthusiastic response to night games played in the Polo Grounds, New York; Sportsman's Field, St. Louis; Forbes Field, Pittsburgh; as well as those at other baseball parks.

• *Consider if you will* the unusual demands of a lighting system that must provide glareless illumination for a fast night baseball game. At Forbes Field, Pittsburgh, our most recent installation, more than 210 million candlepower of light is spread over the field from 864 floodlights, each of some 1500 watt capacity. Their combined output would be enough to light every home in a city of 25,000 population. Distributed as it is, the illumination over Forbes Field is 19 times brighter than the average business man's desk.

• *Fortunately,* we at Westinghouse were able to bring to this exacting problem a long and highly varied lighting experience. Through the important contributions we have made to better lighting, stores have been made more attractive to shoppers; factories and offices more efficient for employees; school rooms more conducive to study; public thoroughfares, airports and river docks infinitely more safe.

"Where shall we stay?"

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WHILE radio and automobile have thinned band concert crowds, in many a town the bandstand still remains in the Square, its slender carved pillars and fretwork gray against the evening sky. Birds have nests under the pagoda-like eaves. Children, using the stand as "home" for run sheep run, clatter up the circling stairs. Yet throughout the nation, old-fashioned band concerts still play a part in the lives of kindly towns where folks believe that nothing graces a summer evening quite so well.

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The National Geographic Directory of Colleges, Schools and Camps

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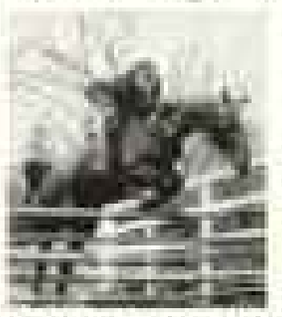

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A Lot of "*Heart Trouble*" Isn't!

TOO MANY PEOPLE have fear in their hearts—about their hearts.

They have been told that "heart trouble" usually announces itself by such warning symptoms as shortness of breath, sense of oppression or actual pain near heart, or fainting.

However, no one symptom should make you decide, "I have heart trouble!" The cause may actually be disease of the lungs or digestive system, or nervous strain—or it may be something relatively unimportant. But, whenever any signs occur *—your physician should be the one to decide what's really wrong!*

▶ Such aids to accurate diagnosis as the stethoscope, the fluoroscope, the electrocardiograph, enable him in most cases to determine the heart's condition. He may be able to assure you that your heart is sound, that something minor needs correction.

Even if the trouble *is* in your heart it need not necessarily mean that you will be an invalid—if it is detected in its early stages. You may be able, by following the doctor's instructions, to continue working and enjoying life for many years.

▶ Today, many men and women whose hearts are not normal lead useful, active lives. They and their doctors know what their hearts can and cannot do; their habits of work, exercise, recreation, rest, eating, and drinking, are sensibly regulated.

The most common forms of heart trouble strike most frequently after the age of 40. As you and your heart approach this period, it is wise to modify your work and play so as to avoid overexertion. Too much of either is dangerous. Get plenty of rest and keep your weight down. Remember, too, that sudden indulgence in unusual or over-long exercise is apt to place too severe a strain on the heart.

▶ And at this time—more than ever—it is important to have thorough annual health examinations. Such examinations often can detect trouble before serious symptoms appear.

For information concerning the hearts of young and old, send for Metropolitan's free booklet, "Protecting Your Heart." Write today to Dept. 540-N.

How a curious grass saved the city of Provincetown

ABOUT one hundred and fifteen years ago, the lovely old city of Provincetown, on Cape Cod, was in danger of being swept into the sea.

The strong gales which blew across the cape were carrying the sands from behind the town into the harbor at its feet, while along the shore near the town the sea was washing huge sections of the beach away. Unless the movement of the sands could be stopped, it seemed that ere long the town would be deposited at the bottom of the ocean.

A commission investigated the matter and recommended the planting of a special grass. This grass had tremendous roots which would grow to a great depth, and anchor the sand so that neither wind nor waves could sweep it away.

The grass was planted and laws were made prohibiting animals from roaming at large and eating it up. The grass took root rapidly, the movement of the sand was checked, and from that time on Provincetown has rested safe and secure, no longer at the mercy of the wind and water.

Many a man has a little city of Provincetown of his own; this city is his home and his cherished possessions which the storms of life can take away from him. But for a man there is a "beach grass," too, that will secure him and his family from such danger.

This grass, as you can guess, is insurance. It keeps your home secure and safe against the threat of fire and wind. In case an accident interferes with your earning power, it provides you with an income to meet taxes and mortgage payments.

If you are sued by someone as the result of an automobile accident, it can keep you from losing your property and your savings. And should you be taken away, it will allow your wife and children to keep up the home so dear to them and to live in a decent fashion.

Such beach grass is worth planting now.

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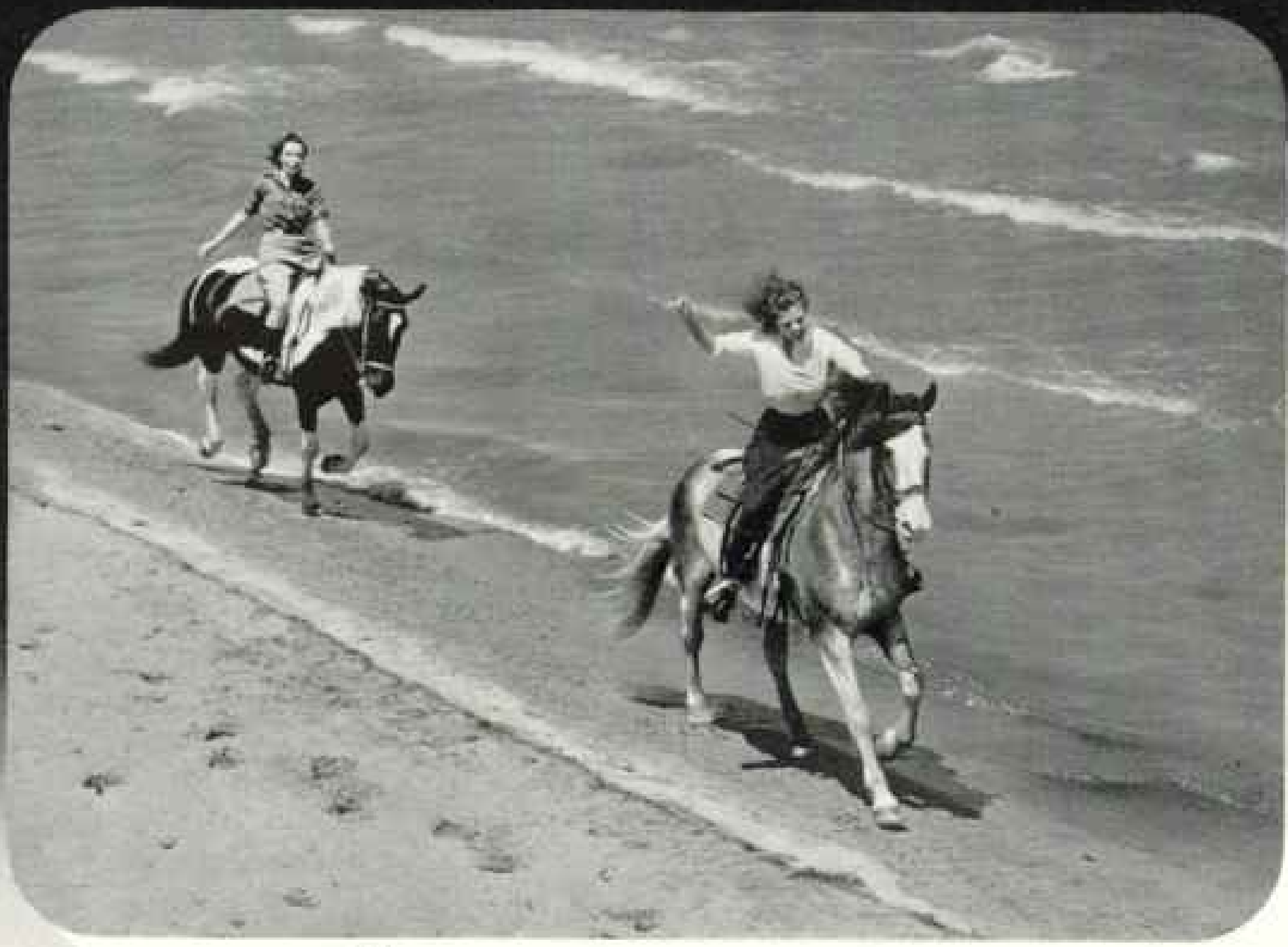
THE PAUSE THAT REFRESHES



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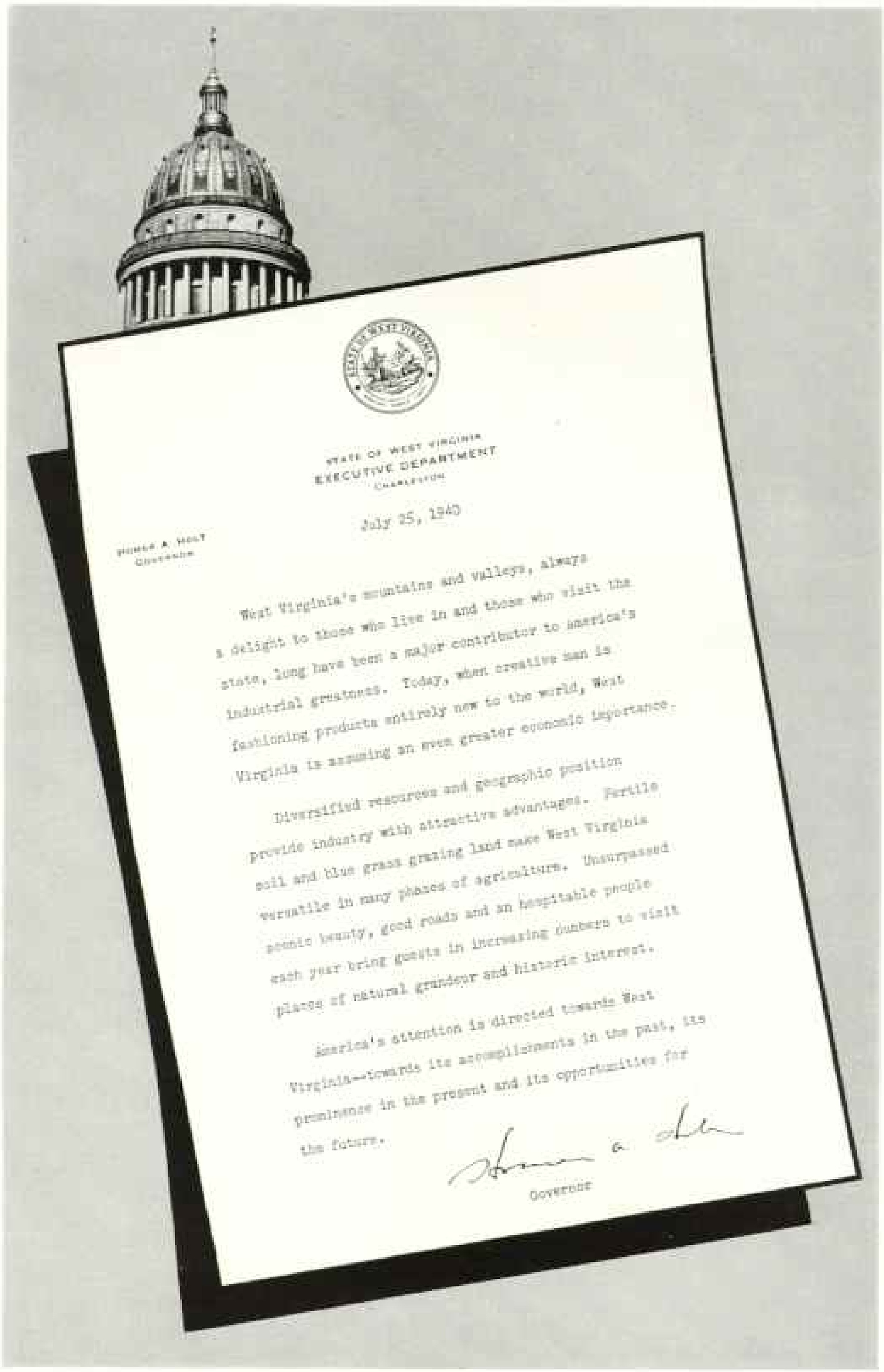

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DAMON RUNYON
in the *New York Mirror*

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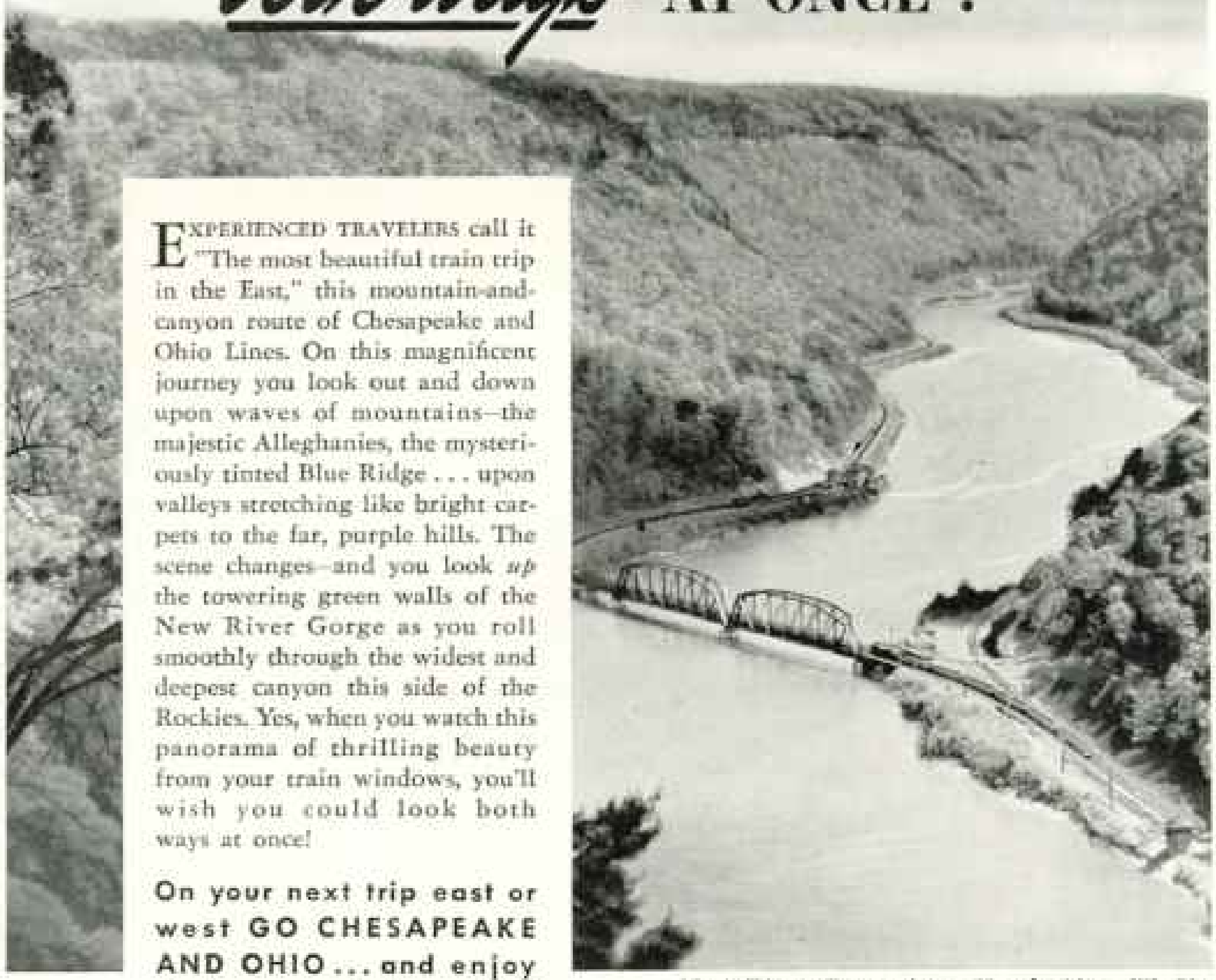
YOU'LL WISH YOU COULD LOOK *both ways* AT ONCE!



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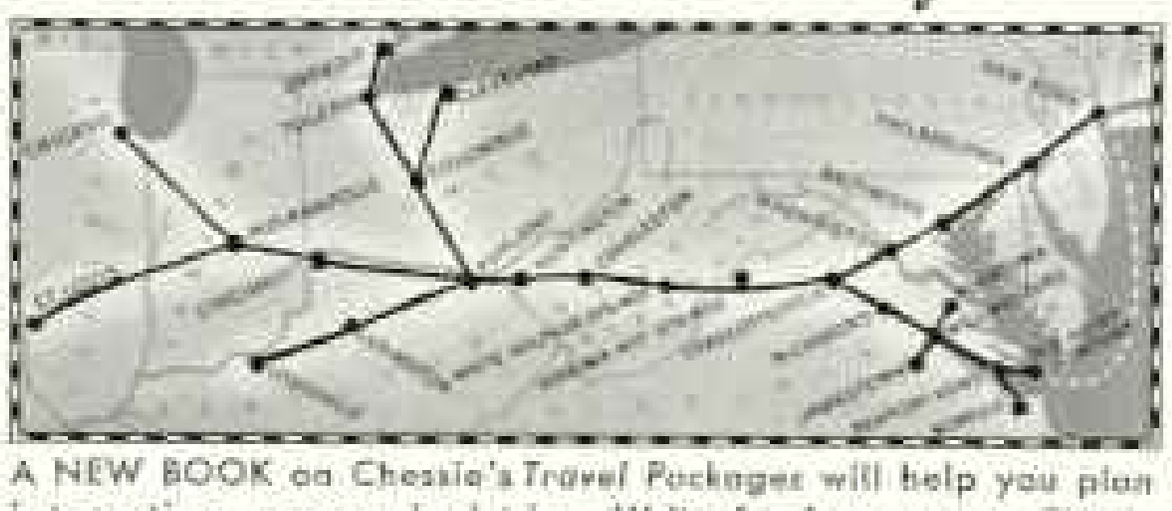

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