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With 6 Illustrations and Map

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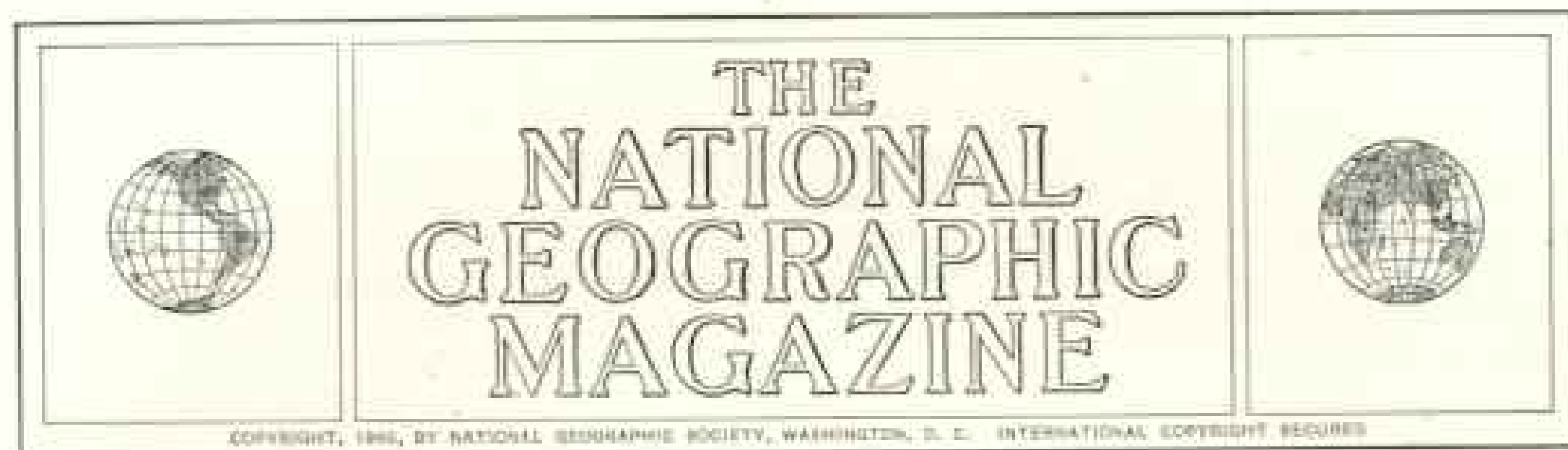
SAMUEL F. HANBY

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Nebraska, the Cornhusker State

BY LEO A. BORAH

AS LATE as 1860 school geographies described Nebraska, then a six-year-old Territory, as "an uninhabitable portion of the Great American Desert." Today it ranks sixth among the States in value of agricultural and livestock products!

The vision and faith of hard-working people have transformed it in 75 years. From inhospitable waste it has emerged a land of plenty.

On its eastern and central prairies horizon-sweeping fields of corn and wheat flourish where Oregon Trailers of the 1850's often found herbage, sparse at best, so depleted by buffalo hordes that their plodding ox teams had to be fed hay and grain brought in the wagons. Those early emigrants told of one stretch of 150 miles with only one tree!

Now even the western sand hills, despaired of not many years ago as wholly useless, fatten thousands of purebred cattle on lush wild grasses. The sandy soil once shifted willy-nilly by ceaseless winds is bound and stabilized by a carpet of green.

Nebraska has made amazing progress since its admission to the Union in 1867. With 640 square miles of water surface, and with vast areas of fertile soil needing only water to become garden spots, the Commonwealth still has a frontier—the rapidly opening frontier of irrigation (map, pages 516-517).

State Sticks to Pay-as-you-go Policy

Already nearly a million acres have been brought into rich production through irrigation, and that acreage will be doubled by projects now under way or scheduled for after the war. Enthusiasts hope eventually to insure all the tillable farms in the State against periodic droughts.

Ups and downs have made Nebraskans philosophical and thrifty. Into their Consti-

tution they wrote in 1875 a provision that Nebraska should not have a State debt exceeding \$100,000, and despite all emergencies they have kept that provision inviolate. They adhere strictly to the policy of pay-as-you-go, and every institution, every building, every highway, every bit of equipment the State owns is debt free (Plate I).

At the time construction was begun on the new \$10,000,000 Capitol in Lincoln, Will Rogers visited the city. He came through again ten years later and commented, "When I was here last, you had a man and a small boy working on this thing. Now the small boy has grown up."

"Yes, it has taken a long time," a Nebraskan replied, "but, you see, we paid for it by a small real estate levy as we went along. We don't owe a penny on it."

The famous humorist pretended consternation. "Why, that's strictly unconstitutional!"

With justifiable pride Nebraskans advertise their State as "the White Spot of the Nation." They have no State bonded indebtedness, no State income tax, no State sales tax, no State luxury tax; yet their colleges and schools, their roads and other public works are fully abreast the times.

In the first issue of the still-important *Nebraska Farmer*, published at Brownville in October, 1859, J. Garside of Nebraska City rejoiced editorially: "Four years ago all the corn, flour, and potatoes consumed in Nebraska were brought from abroad. . . . Now, instead of sending money down the river to buy the food we eat, we have money sent up the river to purchase what we have to spare."

Thus was heralded the beginning of the biggest industry in Nebraska, food production.

"Food will win the war" was a watchword in Omaha when I arrived there to begin a

survey of the State. In the months before my visit, an average of 1,200 carloads of meat a week had been shipped out from the 13 packing plants. Omaha had led all the cities in the Nation in production of butter and had maintained its position as one of the major grain markets of the country. In livestock receipts at public stockyards it had been second only to Chicago.

Omaha's Meat Story

Harry B. Coffee, president of the Union Stock Yards Company, took me to the roof of the Livestock Exchange Building for a bird's-eye view of the 4,000 pens which cover an area of 160 acres and have a capacity of 160,000 cattle, hogs, and sheep. These pens, all equipped with running water, are connected by 20 miles of alleys.

"It's hard to think about a meat shortage here," I remarked.

"If that looks like a lot of animals to you," Mr. Coffee laughed, "you should have been here when we had our record run of hogs. On January 17, 1944, we received 63,333. The line of trucks bringing them in was 81 city blocks long!"

"What was the reason for the big inrush?" I asked.

"There were two," he replied. "First, farmers had increased their production to help the war effort. Second, because of high feed costs they were marketing stock at lighter weights than usual.

"High ceiling prices on corn, coupled with comparatively low ceilings on fat cattle, have caused many cattle feeders to curtail or suspend operations. Before the war, cattle from the range were put into the feeding pens for 90 to 180 days of fattening. Now the period is seldom more than 30 to 90 days.

"That is why prime beef is becoming a rarity. A steer from the range puts on weight rapidly during the first month of corn feeding. After that the increase is slower, though the amount of corn consumed is the same.

"The hog raiser who has a good supply of corn on his farm can afford to keep his stock till it reaches a normal market weight. The man who has more pigs than his own crop will feed must sell them early. That accounts for the rush of hogs to the stockyards."*

It struck me that a succession of days like January 17 would soon jam the yards, huge as they are.

"What do you do," I asked, "when shipments are too big for your available space?"

"That has not happened to us yet," he replied. "By giving stockmen advance warnings when the situation is getting tight, we

have prevented their shipping more than we can accept. They know stock brought in without notice must be cared for at the shipper's expense until it can be taken into the pens."

To get more of the Omaha meat story, I went with Emery Hoenshell from the stockyards to Swift's packing plant.

Supt. G. H. Rydman, who has been in the employ of the company for more than 40 years, volunteered to show us around. Laying aside our overcoats and donning long ulsterlike coats, we started on a three-hour tramp which took us from the killing department to the railway platform where finished products were being loaded into cars.

It was a near-capacity day in the plant. Carcasses of cattle, hogs, and sheep slung by the hind feet on overhead carriers were passing from the killing rooms around the skinning and eviscerating floors in unbroken succession. Skilled workmen stationed along the lines each performed a special task, like mechanics on an automobile assembly line (Plate V).

At short intervals Government inspectors examined carcasses for different defects.

"The inspectors throw out anything that shows even the faintest indication of disease," Mr. Rydman explained. "You'll see them in every department of the plant."

We followed the processes for what seemed miles—along the cutting tables, through special departments, into rooms where cooked meats were being prepared and sausage casings filled, through the huge refrigerating chambers.

Women Do Men's Work in Packing Plants

In some departments all the workers were women. There were some women even among the crews doing the heavier tasks.

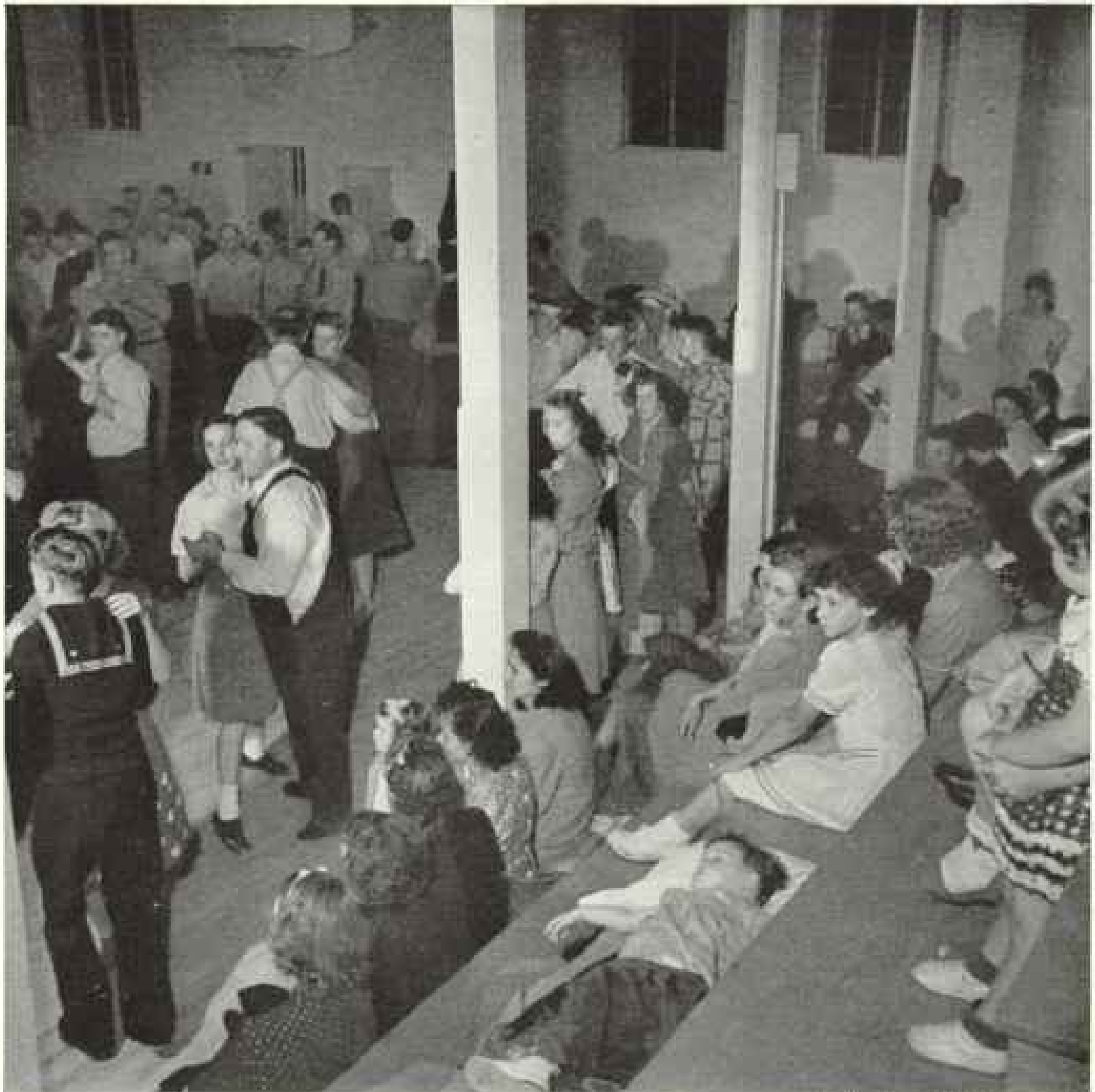
"Like all other concerns," Mr. Rydman explained, "we are handicapped by the manpower shortage. These girls are doing a lot of things we never asked them to do before the war. Unexpected Government orders sometimes catch us short of help and material, but we have not slipped on a delivery yet."

We watched a middle-aged man pressing steer skulls by hand into a heavy splitting machine and removing the brains intact.

"That is the most dangerous machine in the plant," Mr. Rydman told us, "but this man has handled it for 25 years without losing a day because of injury."

Remarkable to me was the sanitary cleanliness of the whole plant. We saw nothing

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Farmers Keep Them Eating," by Frederick Simpich, April, 1943, and "Revolution in Eating," by J. R. Hildebrand, March, 1942.



Staff Photographer H. Anthony Stewart

While Children Sleep, Their Parents Enjoy the Saturday-night Dance

Folk from the farms around Bassett have jolly times in the high-school gymnasium after they have done their week-end shopping. Handed down from pioneer days, when the settlers used to get together for an evening of merrymaking and a supper, the custom breathes the real spirit of Nebraska neighborliness.

revolting in the tour from beginning to end. Disagreeable odors were reduced to a minimum, and residents of South Omaha have little complaint because of their nearness to the meat-processing industry.

I was curious about by-products, and Mr. Rydman conducted us to departments where dog food, fertilizers, gelatins, and glue were being manufactured.

"We used to sell gallstones," he said, "to the Japs. They ground them and peddled them to the Chinese for medicine."

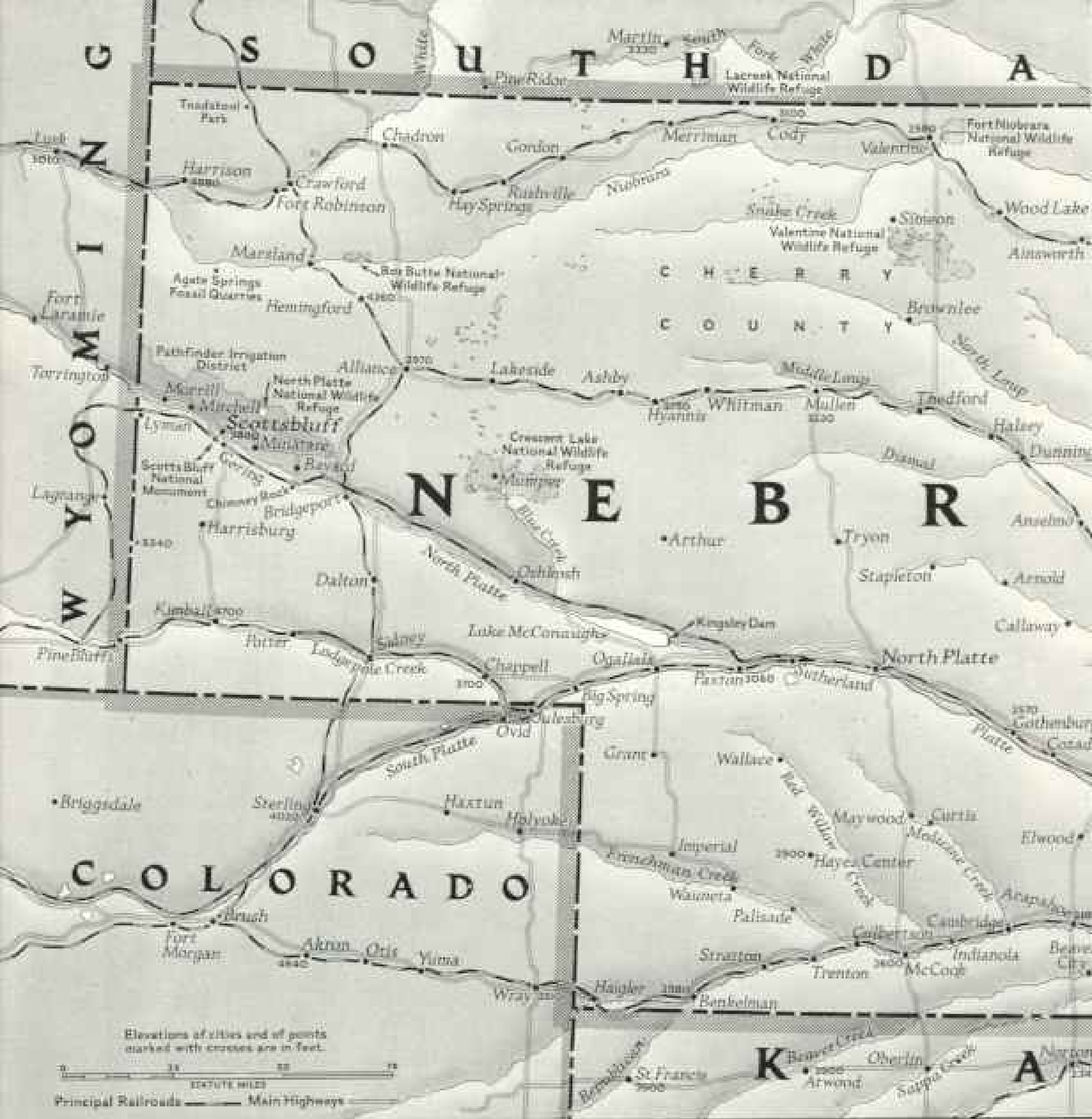
Nothing is wasted. Glands of medicinal value, bones, hoofs, bristles—all are saved,

though this South Omaha plant does not make some of the newer by-products.

"What we need in Omaha," Emery Hoenshell pointed out, "is some leather factories. It seems needlessly expensive to ship raw hides to the eastern seaboard for processing and then have them shipped back as leather for our farmers to use."

We went from Swift's to the new grain alcohol plant built by the Farm Crops Processing Corporation for operation under lease from the Defense Plant Corporation.

This plant, first of its kind in Nebraska, produces annually at capacity 17,500,000 gallons



Western Nebraska, Rising a Mile, Has Millions of Cattle, Irrigation, and a Lost World

of ethyl alcohol for synthetic rubber, explosives, and other war needs and requires nearly 20,000 bushels of corn, wheat, and malt barley a day. By-products are 126,000,000 pounds of livestock feed.

Progress in Farm Chemurgy

"The alcohol plant," said Dr. Leo M. Christensen, Director of Chemurgic Research, University of Nebraska, "means a lot in our farm chemurgy program. It furnishes another market for grain and yields protein concentrates for livestock feed. By combining the alcohol with cellulose, we can make several plastics of commercial importance.

"We can get such cellulose from flax, castor beans, soybeans, and a new oil-seed plant—safflower, recently imported from India. Safflower is well adapted to western Nebraska, where little vegetation of value grows.

"We have a small commercial production now and hope it can soon be expanded. Within two or three years we hope to have 10,000 acres of the yellow flowers blanketing semi-arid hills.

"Safflower oil is commonly regarded as equivalent to linseed oil in paints, varnishes, and enamels. Furfural, used in the plastics industry, can be made from its hulls, and the oil-cake meal is a good protein concentrate for



Drawn by Thomas Price and Irvin K. Allaman

The Lower Eastern Half Thrives on Hogs and Corn, Meat Packing, and Other Industries

livestock feeding. The stalks yield paper, cardboard, and plastics.

"Castor beans are adapted to south-central Nebraska. The oil from them is used as a lubricant, as a fluid in hydraulic systems, in specialty soaps, in some Nylon, and, after dehydration, in paints and varnishes.

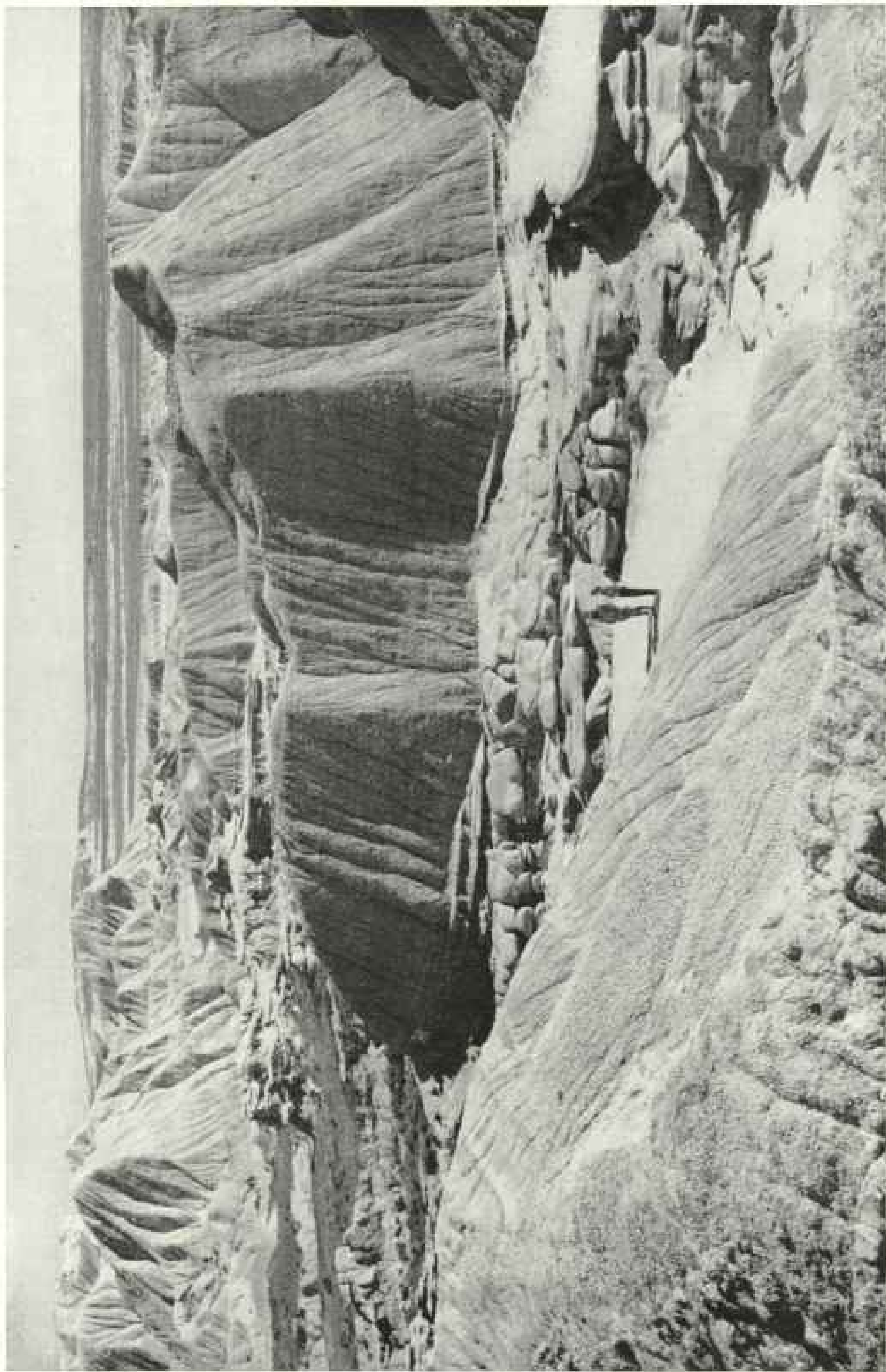
"Its stalks are even more useful than are those of safflower, but the oil cake, or pomace, is poisonous and for the present can be used only as a fertilizer. Research is expected to establish new uses and new values for it."

Next day President P. C. Hyson of the Omaha Cold Storage Company showed me around his huge plant. A jovial gentleman,

recently feted on the fiftieth anniversary of his joining the company, he was greeted as an old friend by the workers in every department we visited.

In addition to refrigeration and storage, the company conducts a large-scale creamery, egg, poultry, and chick-feed business. We watched crews of deft girls breaking eggs into electrically operated carriers that took them into drying ovens and on to powdering machines.

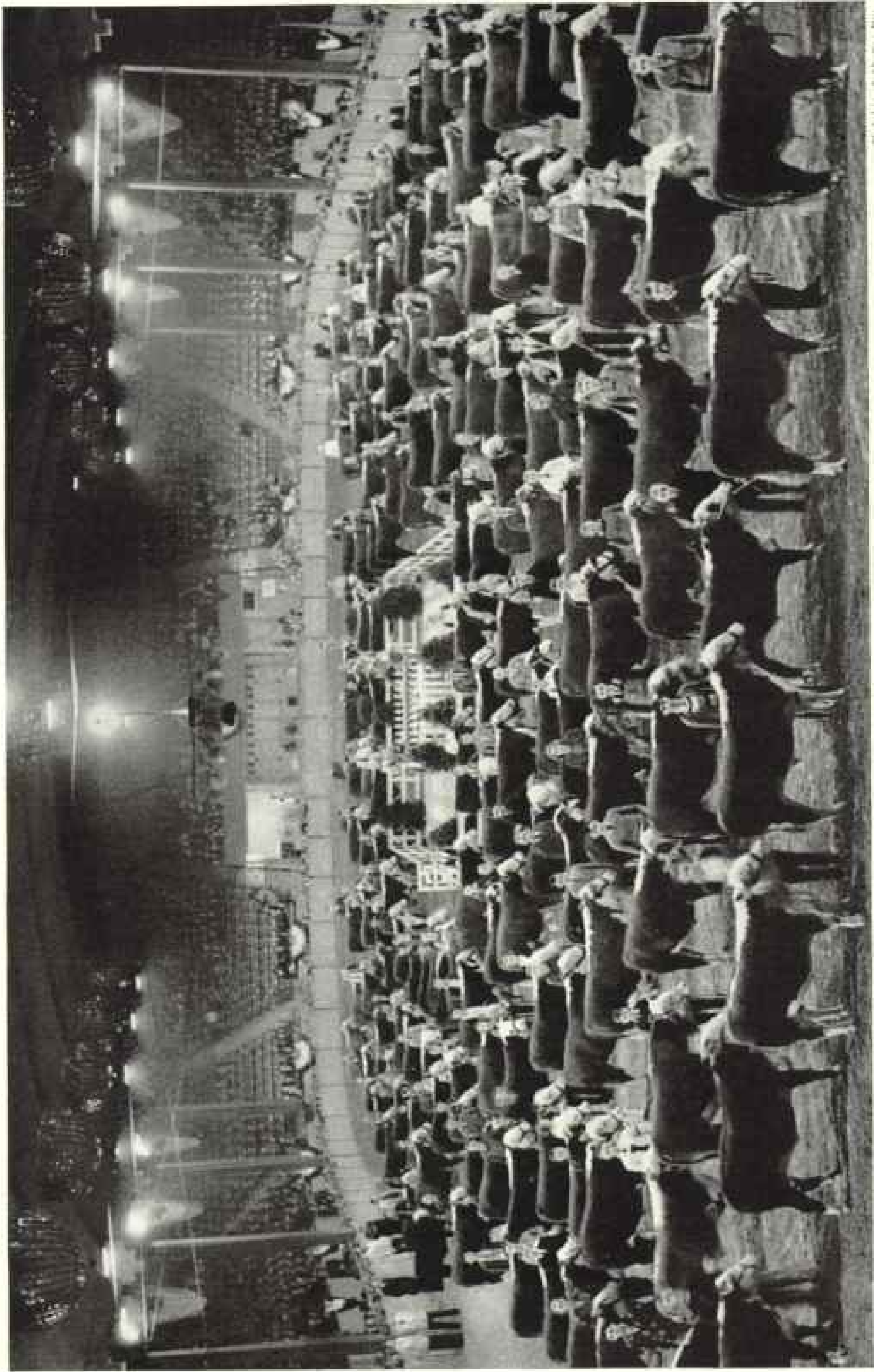
In our first year of the war, Nebraska raised, according to published estimates, 35,000,000 chickens. Mr. Hyson took me through one department where I saw girls drawing, washing, cellophane-wrapping, and



Prof. Photographed by B. Arthur Stewart

Prehistoric Animals Left Their Bones in Toadstool Park

Walking on the bottom of a forgotten sea in the Bad Lands near Crawford, the visitor may pick up fossil remains of creatures that lived when the world was young (page 544). Erosion has played strange tricks here, leaving a vast field of smooth stones resembling plant mushrooms.



Knights of Ak-Sar-Ben

In the Ak-Sar-Ben Coliseum Hereford Aristocrats Form the World's Largest 4-H Club Baby Beef Show

The arena has been turned over to the armed forces for use as a repair shop for motor vehicles, but after the war it will again be the scene of activities by which Omaha business men build good will. The Knights of Ak-Sar-Ben (Nebraska spelled backwards) purchased for eventual presentation to the public one of the largest bridges across the Missouri River between Omaha and Council Bluffs (page 370).

packing enough to remove any doubts I might have entertained of the staggering figure.

Gigantic churns in one big wing of the building were turning out tons of butter, which was being machine-pressed into pound blocks, wrapped, and put into waxed cartons. Here, as in the egg rooms, the workers were girls.

The chick-feed department puts up its product in bags of bright print dress material.

"The ladies like this idea," Mr. Hyson explained. "When a housewife gets enough bags of one pattern, she can make a dress."

Machines Fight Drought

Nebraska goes in for mechanized farming on a big scale. Labor savers such as tractors, corn pickers, and potato diggers were familiar to me, but I had never seen the new damming listers, use of which safeguards fields from erosion and prevents runoff of precious water from spring rains.

The damming lister is a sort of gang plow which opens up narrow trenches 20 inches apart and from 6 inches to a foot deep. Penetrating below the surface soil, the shovels leave the subsoil in ideal condition to absorb rain. A three-bladed revolving unit, operating behind each shovel, follows the trenches and breaks up earth to dam them at short intervals.

The machine not only builds the dams but presses them into place and packs them securely. The operation, repeated across the field, makes a pattern of shallow basins to collect water.

Special devices plant seeds on the sides of these depressions where standing water will not rot them or ice formed by late freezes kill the germs. This method has proved its worth in dry-farming areas, for it insures retention of moisture from spring rains long enough to carry crops past the early drought danger.

Let it not be supposed that Omaha is entirely an industrial city. With its Joslyn Memorial, Creighton University, Omaha Municipal University, the University of Nebraska College of Medicine, a splendid system of schools and parks, and attractive tree-shaded residence sections, it has much of the esthetic.

Unique among civic organizations I have observed is Ak-Sar-Ben, "Nebraska" spelled backwards. It was organized fifty years ago to entertain out-of-town visitors to the State fair, now long since removed to Lincoln, but its original purpose has been forgotten in its campaigns to build good will for Omaha.

Any Omaha business or professional man who is willing to pay \$10 for the privilege of being dubbed "Sir Knight" may become a member. When memberships reach 6,600, however, the lists are closed.

The Knights, incorporated under Nebraska laws as a nonprofit organization, were grossing before the war an annual income of \$5,000,000, and all earnings went into projects to promote good will and develop agricultural resources in the Missouri Valley.

At their \$1,500,000 Ak-Sar-Ben Field and Coliseum the Knights hold each year the largest exclusive 4-H Club livestock show in the world (page 519); conduct a 30-day spring race meet that draws thoroughbreds from all over the country; sponsor one of the leading horse shows of America; produce a home-talent comic opera which in seven performances a year is attended by 50,000 guests; and present famous musicians and other entertainers in performances for the benefit of charities. Their latest enterprise is a big ice rink on their Coliseum floor which has brought the "Ice Follies" and professional hockey to Omaha.

For the duration the Knights have suspended all activity at the Coliseum except war-supporting projects, and Ak-Sar-Ben Field is being used by the Army for reconditioning motor equipment.

Railroads Helped Pioneer

The Union Pacific, first railroad in Nebraska, was a mighty factor in the early development of the State. At its headquarters building it maintains a museum showing a pageant of progress from pioneer days to the present (Plate VII).

The Chicago, Burlington & Quincy Railroad, though a little later than the Union Pacific, shared with that road much of the credit for opening Nebraska to settlement.

Though Omaha is dependent primarily on agriculture, it has some industries of quite different nature. The American Smelting and Refining plant is one of the largest producers of desilverized lead; and the Omaha Steel Company, still making 155-mm. shells and last year turning out landing craft,* has won both the Army and Navy "E" and a special star for continued meritorious accomplishment.

At Fort Crook, 10 miles from Omaha, is the enormous new bomber plant of the Glenn L. Martin-Nebraska Company. A mighty B-29, first to be turned out there after a change-over from B-26's, was near completion. Since that time many of the giant Superfortresses have gone out from Nebraska to blast the Japs.

"We have hired 18,000 men and women, mostly from farms and small towns, and taught them to manufacture aircraft," J. T. Hartson, president of the company, told me.

* See "Landing Craft for Invasion," by Melville Bell Grosvenor, *THE GEOGRAPHIC*, July, 1944.

Cornhusker State Highlights

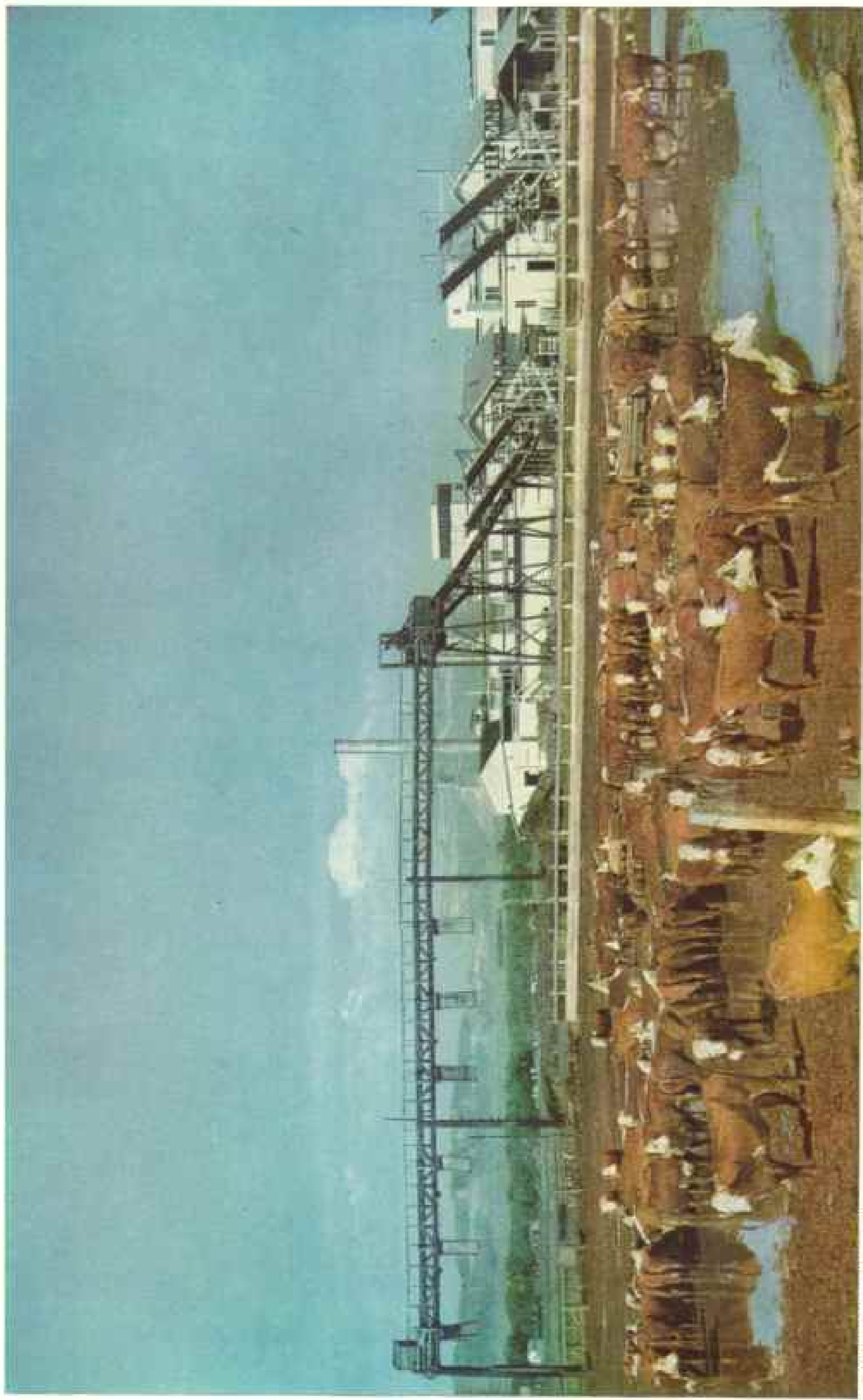


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Kodachrome by D. Anthony Stewart

Magnificent in Simplicity, the Capitol at Lincoln Symbolizes Nebraska

The 400-foot central tower is visible for miles across the prairies. Atop the gold, glazed-tile dome stands a statue of "The Sower." The \$10,000,000 edifice, ten years in the building, was fully paid for by taxes, without bond issues, as it rose. The Nebraska Constitution prohibits a State debt of more than \$100,000.

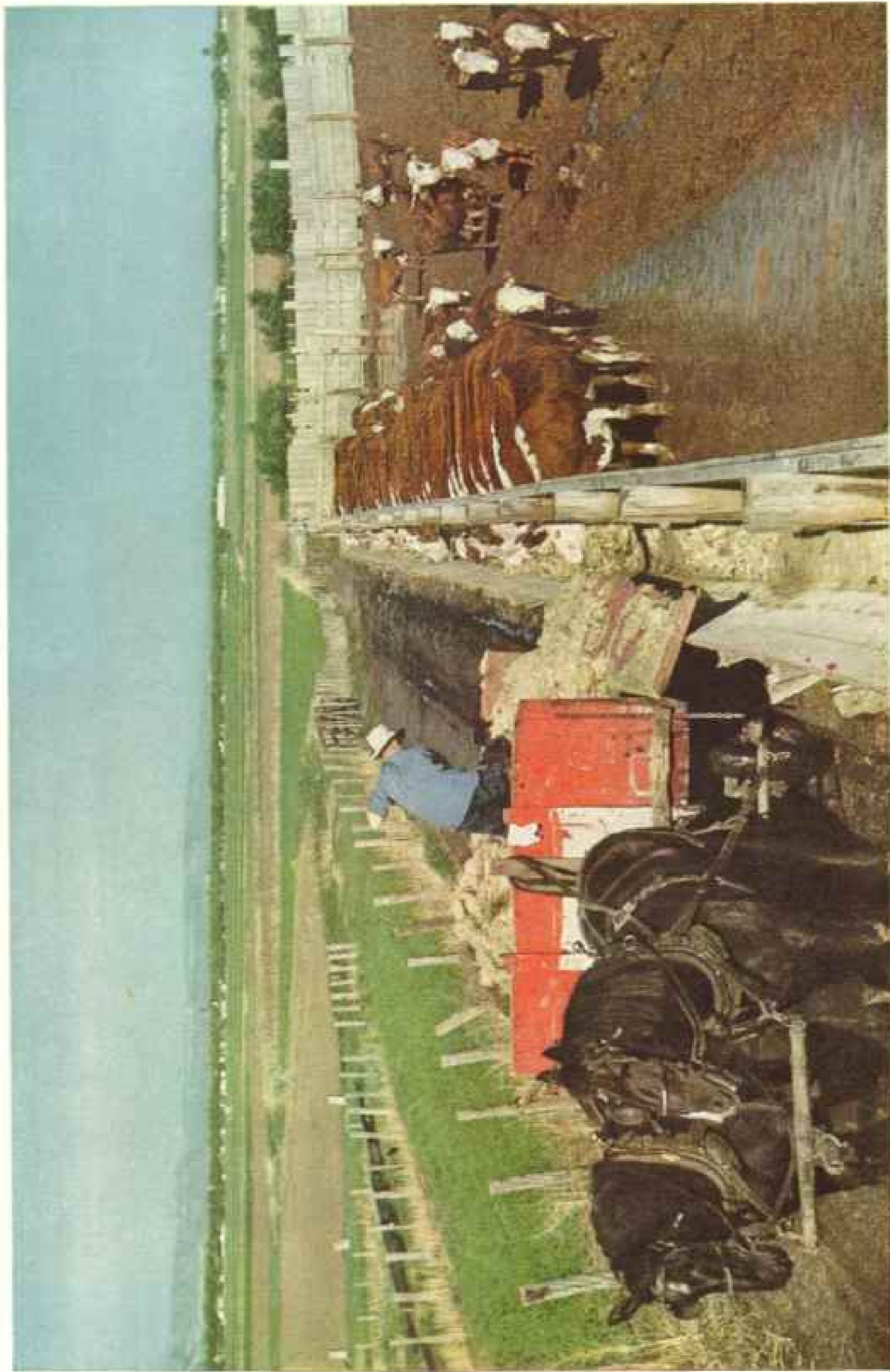


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Scottsbluff to H. Anthony Stewart

A Scottsbluff Beet Sugar Factory Feeds Herefords the Year Around on a By-product from Its Brief Operating Season

By train, truck, and wagon, thousands of tons of beets from the fertile fields of the Pathfinder Irrigation District are brought to the plant and processed during October and November. The pulp, which rivals corn as a quick fattener for cattle, yields income for the owners during the months when manufacturing machinery is idle. This is the area a Government expedition of 1819 reported so barren that "it is destined to be the abode of perpetual desolation."



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At the Feed Lot of an Independent Dealer Near Scottsbluff Two Big Nebraska Industries Work Together

The slick white-faced cattle are being fattened for shipment to market with inexpensive beet pulp purchased from the sugar factories. To study utilization of agricultural waste, the State maintains a farm chemistry organization.

Illustration by H. Aubrey Stewart



© National Geographic Society

Branding Day on the 140,000-acre Abbott Ranch Near Hyannis Proves Nebraska's Sand Hills Still Wild West

Rounded up from longtime desert now carpeted with wild grasses, 300 cows and their calves bawl lustily as cowboys rope and brand the calves. Blackleg inoculations, castration, and ear fits are taken care of at the same time. A few miles to the north lies spacious Cherry County, "home of a million cattle."

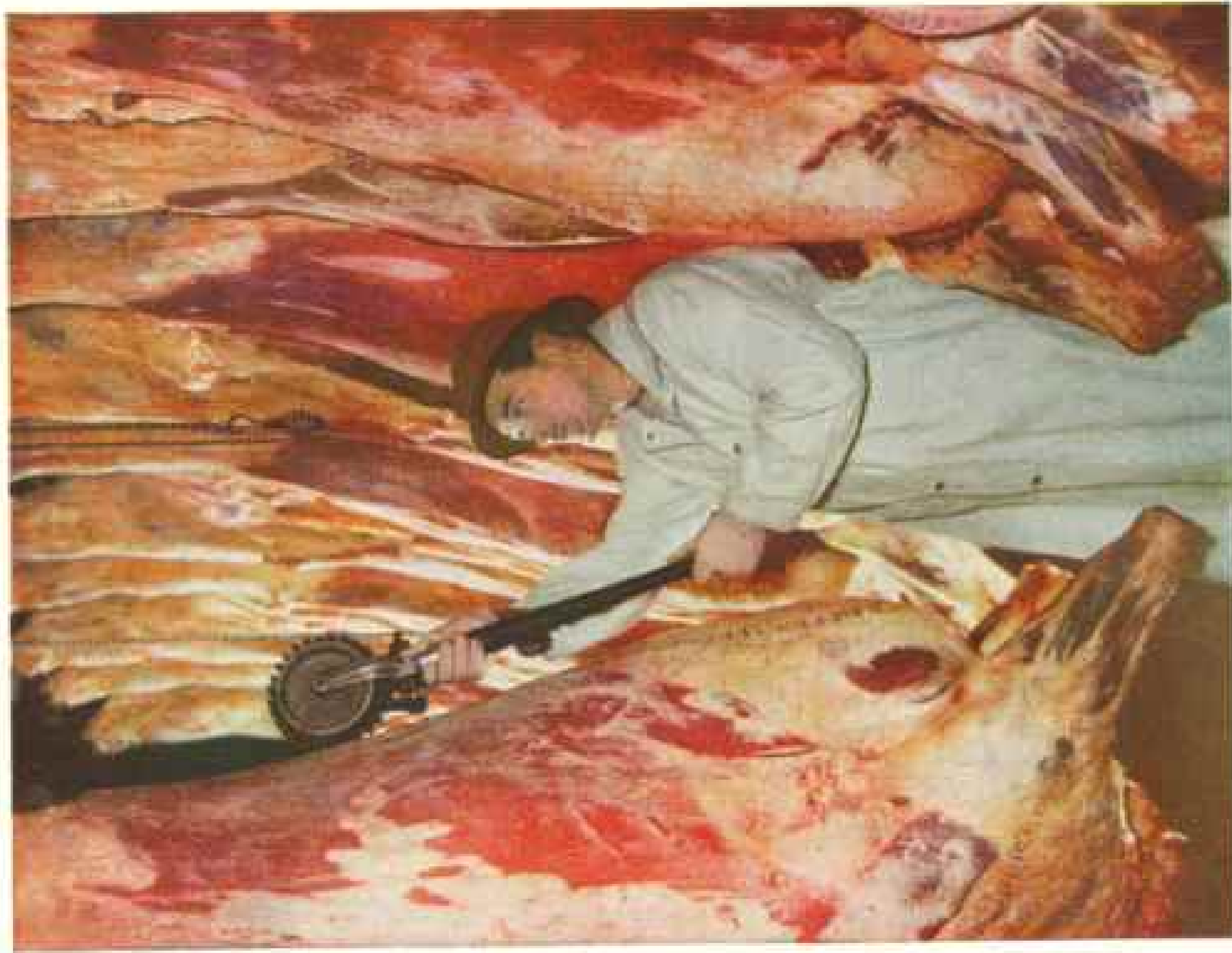
Restaurants by E. Anthony Stewart



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"Since Steaks and Prime Ribs Have Gone to War, Try These"

This girl at Swift's, one of 13 Omaha packing plants sending meat around the world, recommends "skinless" frankfurters. They are wholesome ground beef, veal, and pork, in casings of cellulose.



Illustrations by H. Arthur Stewart

Oh, for the Good Old Days before Rationing!

In one of the refrigerator rooms of an Omaha packing plant a Government inspector grades prime beef, rare now because feeders cannot afford corn for a long period of fattening.



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Reproduction by H. Armand Hamant

Behind Kingsley Dam, Lake McConaughy Ripples Where the Shallow, Wasteful North Platte Once "Ran Bottom Side Up"

Oregon Trappers bated the river, for its bed was treacherous with quicksand, and its water, thick with churned-up silt, was unfit for drinking or even washing. Now the world's second largest earth-fill dam holds the stream in a reservoir 28 miles long, to irrigate hundreds of fertile farms near Ogallala.



© National Geographic Society

A Fremont Girl Substitutes for a Boy Called to the Army

Throughout this rich district, famous for production of hybrid seed corn, women and youngsters have put their hands to plow and tractor to relieve farm-hand shortage. They are particularly helpful in cornfields at detasseling time.



Reproduction by B. Anthony Stewart

Union Pacific Shows a Model of Lincoln's Funeral Car

In its Omaha museum, the railway company which was first to enter Nebraska presents a pageant of transportation from pioneer days to present. The chair was in the car when it bore the martyr's body to Springfield, Illinois.



At Beatrice the Dempster Mill Factory Specializes in Pumps

A girl worker shows how the cistern size is operated. Large motor- and windmill-powered models draw water from the vast stores which lie from 4 to 30 feet underground in many semiarid areas of the State.



© National Geographic Society

Illustrations by B. Anthony Stewart

Cushman Scooters Made in Lincoln Are Helping Us Win the War

Dropped by parachute to beleaguered troops, they provide speedy transportation behind enemy lines. Both Army and Navy use these fast little motor vehicles, and the company turns them out in colors specified by the two services.

Cornhusker State Highlights

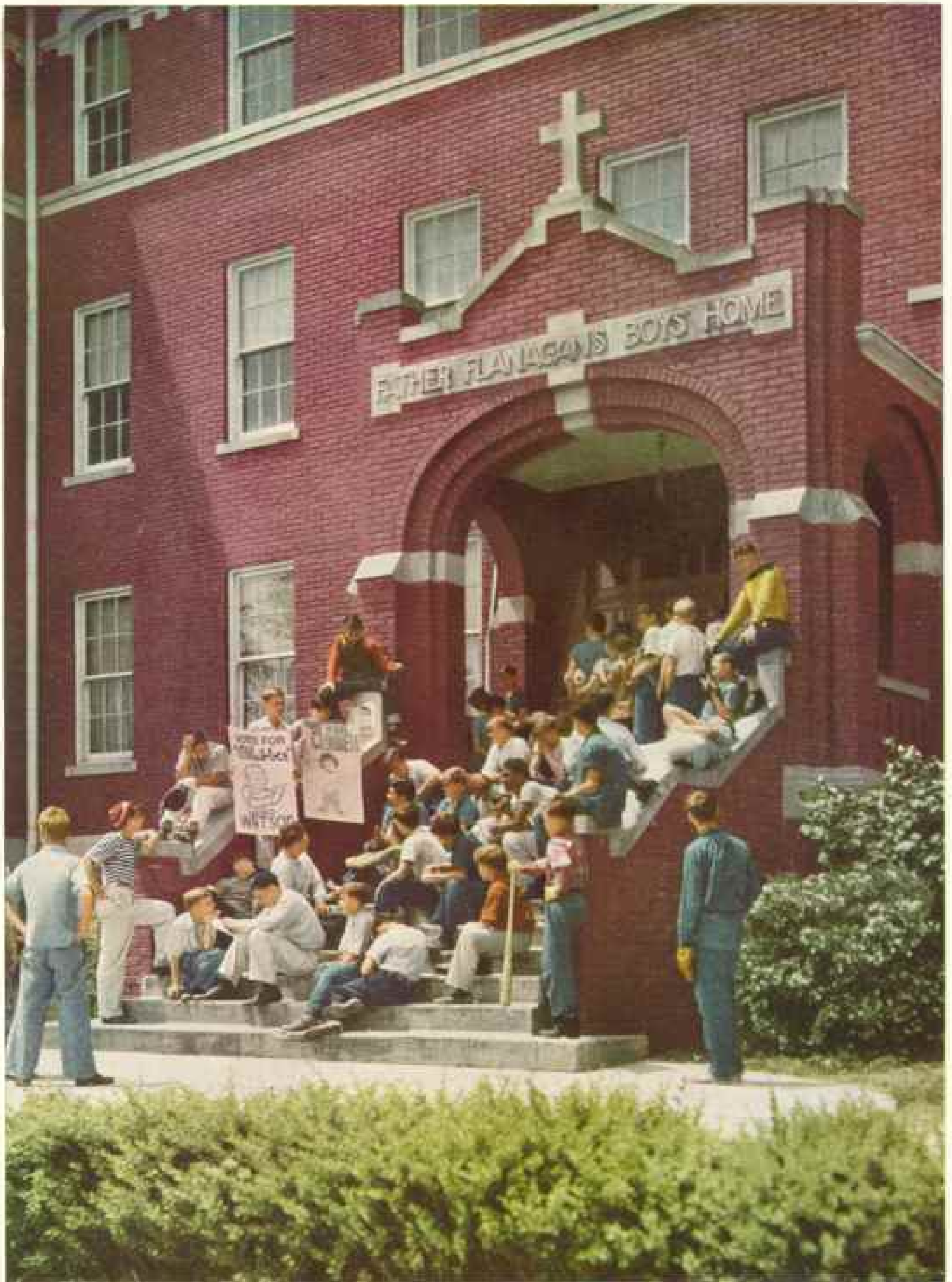


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Massive Doors Open to Nebraska's One-house Legislature

They are Central American mahogany, elaborately carved, and swing on rods and ball bearings instead of hinges. Each is four inches thick and weighs 750 pounds. The decorations memorialize the Indians who once roamed Nebraska. See "Indians of Our Western Plains," by Matthew W. Stirling, in *The Geographic*, July, 1944.



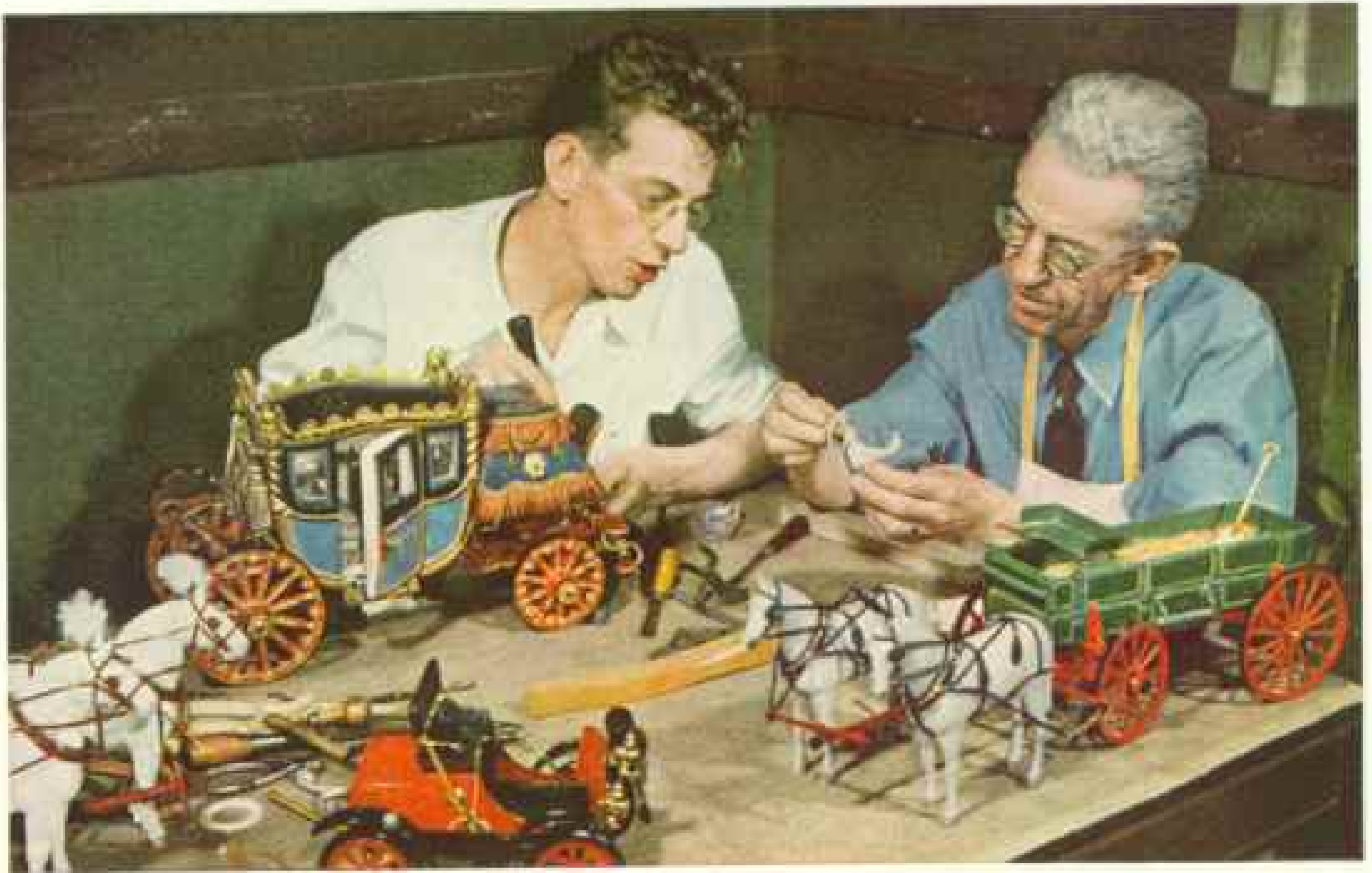
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Illustration by H. Anthony Stewart

Election Time at Boys Town Has All the Excitement of Grown-up Politics

Under the chaffing and the fun there is serious purpose. The young citizens learn civic duties by handling the affairs of an incorporated town. They elect from their own ranks mayor, postmaster, and other community officials. Kindly Father Edward Joseph Flanagan believes in giving them all the responsibility they can carry.

Cornhusker State Highlights



In Joslyn Memorial at Omaha the Halsteds Display Exquisite Handicraft

Young Hal won a Fisher Body Works prize several years ago for a coach model. His father joined him in his hobby. Now the boy designs aircraft for Boeing, and the older man carries on alone.

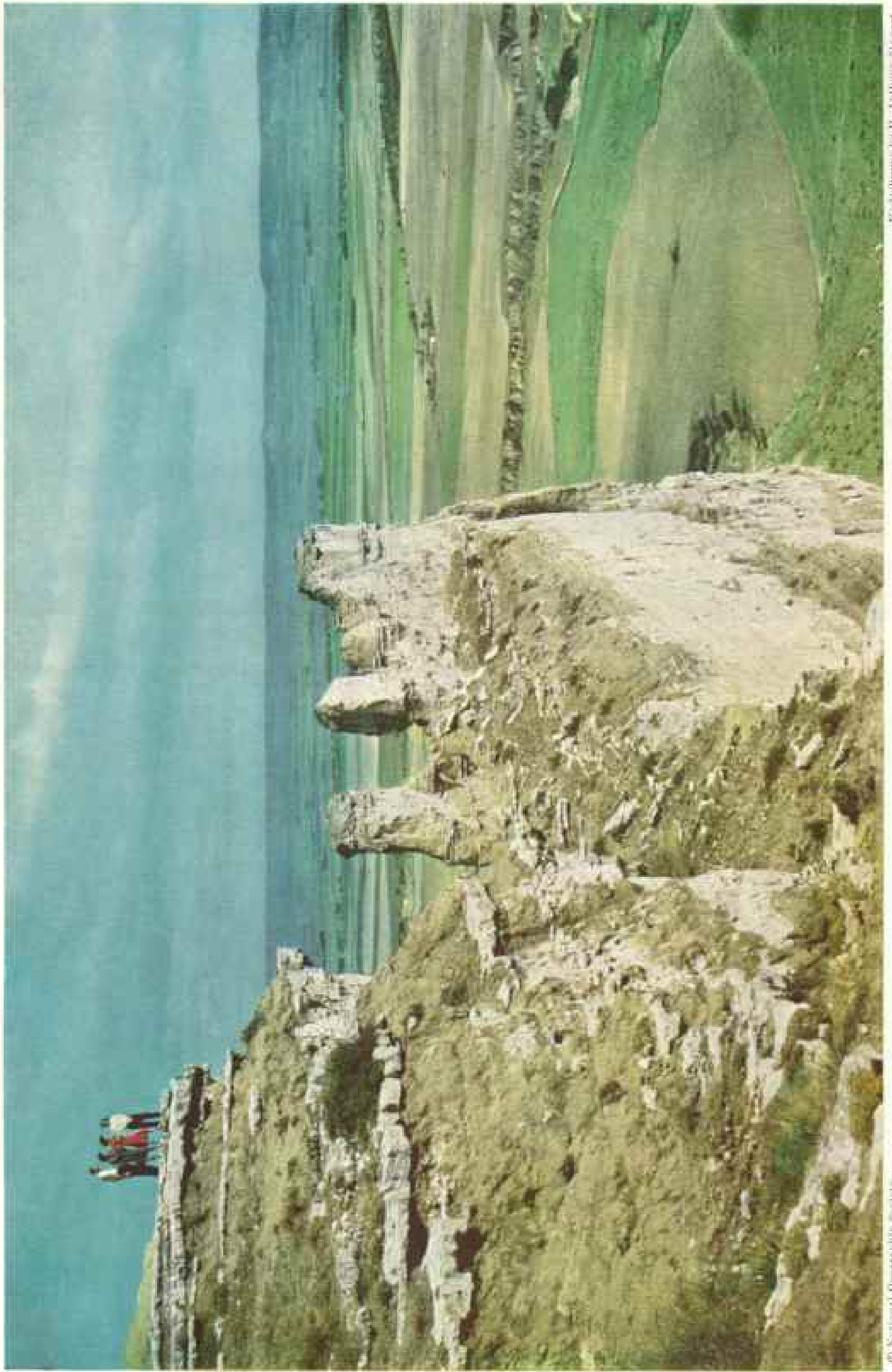


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Illustrations by B. Anthony Stewart

Grand Island Girls Enjoy a Swim in the Municipal Outdoor Plunge

Though few Nebraska towns have natural lakes or streams affording bathing beaches, most of them construct splendid pools in their public parks. This city, third in size in the State, plays host to many conventions.



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Rugged Landmark of Oregon Trail and Pony Express Is Scotts Bluff National Monument

Many pioneers of 1840-60 turned for a day from the tolls of ox road for slight-seeing climbs up this 700-foot promontory and carved their names on its summit rocks. The butte was named for a trader who, abandoned while ill 60 miles back, dragged himself here to die.

Reproduction by D. Anthony Stewart



Even in Drought Years Diversified Operation Insures the Well-kept Nebraska Farm against Failure

This place near O'Neill, in the finest hay-growing district of the State, combines production of crops with some dairying and cattle, hog, and poultry raising.



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Lumbering Ox Teams, Oregon-bound in the 1850's, Created Traffic Ties-ups in Mitchell Pass

Between Scotts Bluff, foreground, and Dome Rock, beyond the gap, toiled thousands of emigrant wagons. Breakdowns on the trail were like log jams blocking a flood.

Reproduced by B. Anthony Howard



© National Geographic Society

Illustration by H. Anthony Stewart

Servicemen Never Forget North Platte, Where the Canteen Food Is Tops

From as far as 100 miles east and 125 miles west, farm women come with laden baskets to the railway station. One day 36 women arrived, each with a birthday cake. Others brought 70 fried chickens, elk meat, and pheasants. Gifts of hard-boiled eggs average about 60 dozen daily and bottles of milk 800 to 1,000.

Cornhusker State Highlights



Portable Equipment Is Used to Grind Alfalfa for Turkey Feed

Through years of experiments with crossings of domestic and foreign plants, experts at the Agricultural College of Nebraska University at Lincoln have developed a wilt-resistant variety peculiarly adapted to the soils and climate of the State. This fine field is in the irrigated district near Scottsbluff.



© National Geographic Society

Illustration by B. Anthony Stewart

Pumps Supply Sufficient Water for This Barley Field Near Kimball
Ordinarily such irrigation is needed only a few times during the summer to supplement rainfall.



Fresh from the Incubator, Baby Chicks Peep Hello to the World

A girl at a Beatrice hatchery shows how poultry has become a big business. In our first year of war, Nebraska raised nearly 35 million chickens. Bright feed bags are popular with housewives for aprons and work dresses.



© National Geographic Society

Illustrations by R. Anthony Bennett

Her Novel Christmas Gift Idea Developed into a Profitable Home Industry

Fourteen years ago Mrs. Alma Peters, of Norfolk, sent to friends canned fried chicken prepared in her own kitchen. The recipients were enthusiastic and she began to sell a little. Now she keeps a flock of 1,000 fowls.

"Many of these workers had never attempted a mechanical job six months ago, but they are performing like veterans now. Of course we brought a nucleus of experienced mechanics from our Baltimore plant when we started out here.

"We have caused regular Nebraska industries some difficulty; many of their clerks and other employees have left them for the higher wages we pay."

"What will be done with this plant when the war is over?" I inquired.

"A question!" was the answer. "But whatever happens, we have taught Midwesterners new skills that ought to mean much to them when they go back to peacetime work."

Anecdotes of Early Days

With Chris E. Metzger of the Omaha Livestock Exchange and Howard Gramlich, Chicago & North Western Railway agricultural agent, I went down to Weeping Water to a Feeder's Day program. Both my companions were old-timers in Nebraska, and their conversation naturally turned to early days.

Overlooking the Missouri River about eight miles south of Omaha is Bellevue, oldest existing town in the State. Settlement began with a trading post in 1823, perhaps earlier, and increased so steadily for more than forty years that Francis Burt, first Territorial governor, took his oath of office there on October 16, 1854, intending to convoke the legislature in the community. Burt, however, died two days after his inauguration, and his successor, Thomas B. Cuming, chose the younger town of Omaha for his headquarters.

"Our first newspaper, the *Nebraska Palladium*, began publication at Bellevue the year the Territory was organized," said Mr. Gramlich. "In an early issue was described a Sunday service held at a wagon-train camp. Instead of a church bell, a tin horn called worshippers together, and a theological student, on weekdays an ox driver, preached the sermon.

"Another big news item was the arrival of the first piano in Bellevue. When it was played, crowds of curious Indians would gather under the windows to listen. The piano is now on display in the State Historical Society collection at Lincoln."

Plattsmouth is a typical prosperous eastern Nebraska county seat. As we drew up in front of a bank building, I noticed that the street curbs were higher than average.

"They are built high," Mr. Metzger explained, "to guard against floods. This town is right at the confluence of the Platte and the Missouri, and spring rains sometimes make shallow rivers of the streets."

At the handsome town hall in Weeping Water 300 farm folk were holding an all-day meeting. County Agricultural Agent Willard H. Waldo had arranged a program of talks on farm problems and a declamation contest among representatives of 4-H clubs. Of paramount interest to the meeting was the question of feeding stock.

On every hand they were discussing the probable merits of the cattle feed which the Farm Crops Processing Corporation was preparing to produce from waste at the new grain alcohol plant in Omaha (page 515).

In the basement dining hall the ladies had prepared a hearty meal of sandwiches, home-baked beans, pie, and coffee. Receipts went to the association treasury. That luncheon was like an old-fashioned pioneer's picnic, with the crowd sitting around long tables and calling pleasantries to one another.

On the Missouri River southeast from Weeping Water is Nebraska City, which sprang up like a mushroom in the 1850's as a wide-open river town and gateway for a cutoff branch of the Oregon Trail. It is now a thoroughly modern city of more than 7,000 population, center of an apple-growing district. Here in 1864 was built at a cost of \$31,000 the first high school in Nebraska.

Oregon Trailers Followed the Platte

Traces of the old Oregon Trail are still visible across all of southern Nebraska. Many settlers came into the territory by way of Nebraska City, but the main road came up from Marysville, Kansas, and crossed the Nebraska border near the present towns of Lanham and Barnston. From there the wagons toiled over a treeless stretch to reach the Platte at Fort Kearney and continued along the south bank to Scotts Bluff and thence to old Fort Laramie in Wyoming.

Nowadays the Platte is a pleasant, shallow stream, spread out in many places into numerous narrow channels separated by islands and harnessed near Ogallala by the Kingsley Dam to furnish irrigation water (Plate VI); but in the days of the emigration to Oregon and California it was tremendously wide and shallow, its bed was quicksand, and its water, poor to taste, was too muddy for washing. It well deserved the name Platte—"Flat Water"—given it by French explorers.

Sometimes violent storms, imperiling the lives of both cattle and people, sent roaring floods down the valley so that the river looked higher than the road, and disgusted travelers declared that it ran "bottom side up." It was too shallow to ferry, impossible to bridge with materials available to the emigrants, and

dangerous to ford because of its sucking quicksands and treacherous deep holes. When it was in flood, anyone who fell into its murky waves was likely to be swallowed from sight and lost, even though the water might be shallow enough for wading.

The emigrants thought the only good land along the river was the islands, for on these alone grew trees. What they did not know was that the Indians, setting fire to the prairie grass during some of their buffalo hunts, burned off much timber growing along the stream banks.

J. Sterling Morton, who originated the first Arbor Day celebration in the United States, in Nebraska on April 10, 1872, proved that the State can grow trees. One of the nicknames of the Commonwealth is the "Tree Planters State."

Where Buffaloes Roamed

Over the plains roamed thousands of buffaloes, which were both blessing and menace to the travelers. It was easy to kill an occasional animal for meat, and the hides made warm robes. Early fur traders and explorers also found the hides good covering for bullboats, useful in ferrying.

These bullboats were constructed by stretching fresh buffalo hides over a framework of green willow poles bent to shape by driving both ends into the ground. As the hides dried, they would shrink and bind the framework, so that the whole affair could be rolled over and launched as a fairly seaworthy craft.

Indians hunted the buffalo and, where there were large herds, the emigrants were in constant danger of discovery and attack. Another ever-present peril was the stampede. Sometimes a horde of buffaloes, harassed by Indians or angered by white hunters, would sweep relentlessly over a trail camp, leaving death and ruin in their wake and carrying along with them the emigrants' domestic stock.

The Big Blue River, up which many of the wagon trains went for considerable distance before turning west toward Fort Kearney, was much kinder than the Platte. Today it drains the rich farming country served by the pleasant agricultural and manufacturing city of Beatrice. The river winds slowly through the city and, pouring over a dam, furnishes power for mills and factories.

Here are made many of the pumps and other equipment widely used in Nebraska to draw irrigation water from wells. Pump irrigation has brought thousands of acres of otherwise semiarid land into full production, but opponents of the practice argue that it is a dangerous drain on the ground-water table.

Nebraska for many years was called the State without minerals, but that description must be modified now. Oil has been discovered in the southeastern corner, and some 70 wells are now in production, most of them in the district around Falls City.

Turning west near the point where Beatrice is now located, the Oregon Trailers moved across a long stretch of treeless, riverless country that looked like desert to them. Today that onetime desert is in the heart of the great Kansas-Nebraska wheat belt.

Hastings, with a population of nearly 16,000, fourth city in Nebraska, grew up in the wheat country as a college town dependent for income mainly on agriculture.

The U. S. Navy has located a huge permanent ammunition depot here, a \$54,000,000 plant served by three railroads.

Between Hastings and Kearney, on a grassy hilltop near Kenesaw, is a pathetic reminder of a tragedy of the Oregon Trail, the Lone Grave. A young bride, Susan Hail, westward bound with her husband in 1852, died suddenly here after drinking water from a well or spring. Old accounts indicate that the water had been poisoned by Indians, but a more likely supposition is that it was merely contaminated and that her death was caused by Asiatic cholera.

Hundreds of travelers on the trail died from cholera that year. Sometimes the disease would strike one member of a large train and within a week take the lives of the whole party. Many of the dead were merely wrapped in blankets for burial and their bodies later dug up by wolves and coyotes.

A Tale of Deathless Love

The husband of Susan Hail made for her a rude coffin from the boards of his wagon bed and buried her where he felt her grave would not be molested, but a horror seized him that he might forget the exact location of the burial place. He marked it carefully and went back to St. Joseph, Missouri, to purchase a tombstone. Unable to raise funds to pay for having the stone freighted back to Nebraska, he placed it in a wheelbarrow and on foot trundled it to the grave.

Old Fort Kearney, established in 1848, was the first in geographic position, though last to be built, of five historic forts famed as safe places to stop on the Oregon Trail. The others were Laramie, Hall, Boise, and Bridger, all west of Nebraska. At Fort Kearney was stationed a force of soldiers to curb the depredations of marauding Indians, who constantly preyed on wagon trains and if angered did not hesitate to kill the travelers.



Staff Photographer B. Anthony Stewart

Oregon Trailers Could See Chimney Rock 30 Miles Away

Badly worn by a century of erosion, this landmark near Bayard still towers 150 feet above the conical mound of reddish sandstone that forms its base. Early travelers estimated the pinnacle to be more than three times its present height. In a natural amphitheater at the foot of the spire, *The Gift of God*, a pageant by the Reverend Louis Kaub portraying the life of Christ, is presented in June in normal times.

Now the site of the fort is a State park in which visitors see only a few traces of the old earthworks and rifle pits.

The town of Kearney, population now nearly 10,000, was established in 1871. Set amid excellent grainlands, it is one of the fast-growing, progressive towns of the State.

Near Lexington is the privately developed and highly successful Tri-County Irrigation Project, which waters about 200,000 acres of fertile farmland and furnishes electricity from three power plants.

Putting the Platte to Work

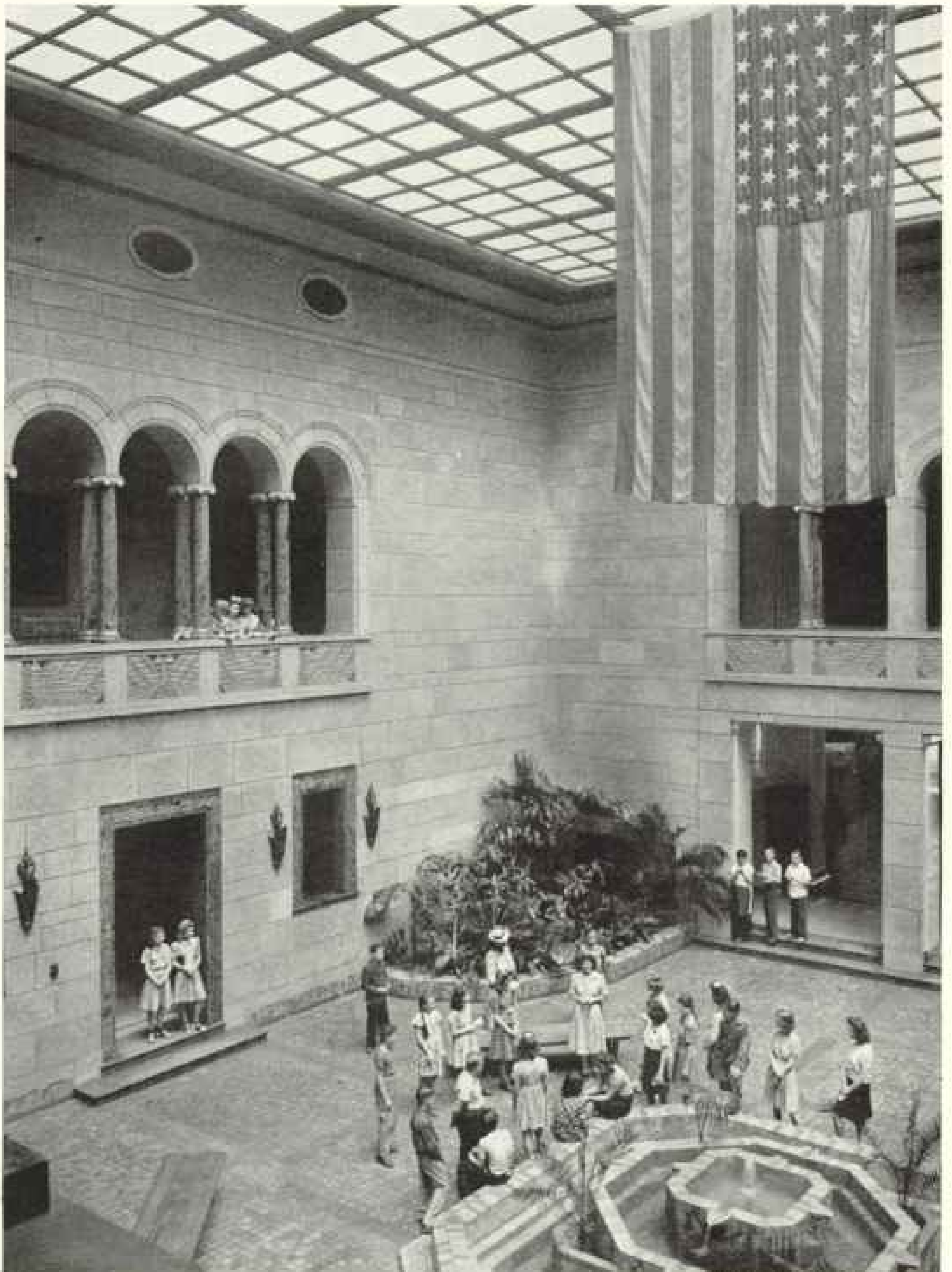
Westward from Lexington all the way to Scottsbluff and the Wyoming border, the Platte is being put to work for farmers. At the city of North Platte, where rainfall is considerably lighter than the average for the State, some irrigation was attempted as early as 1866; but until recent developments started,

the territory was principally grazing land. Now the city thrives as the center of a sugar-beet area.

North Platte, where the Platte's two big branches join, has grown from a small "cow town" to a city of more than 12,000. At Scouts' Rest Ranch near the town, William F. Cody, "Buffalo Bill," rehearsed the Wild West show that toured the country for many years.

Near Scottsbluff is Scotts Bluff National Monument, set aside by the Government as a memorial to the pioneers of the Oregon Trail. Such throngs of ox trains passed over Mitchell Pass between the 700-foot Bluff and its neighboring Dome Rock in the 50's that the trail was sometimes jammed with traffic. Here the Oregon Trailers began the first hard uphill pull to the Rockies (Plates XII, XIII).

The town of Scottsbluff is a child of irrigation. All around it are fields of sugar beets and alfalfa, and the two big industries are



Staff Photographer H. Anthony Stewart

A Teacher and Her Class Begin in Floral Court a Tour of Omaha's Joslyn Memorial

This \$4,000,000 shrine of the arts was given to the city by Mrs. Sarah H. Joslyn in memory of her husband, George A. Joslyn, a former president of the Western Newspaper Union. Besides free classes in drawing and handicraft, it offers exhibits of paintings and sculpture, and concerts and lectures in an auditorium seating 1,200.

beet-sugar manufacture and cattle feeding. Cattle are fattened on waste from the several large sugar factories (Plates II, III).

Still maintained as an Army remount station is old Fort Robinson, near the north-western corner of Nebraska. It was the scene of tense excitement during one of the last uprisings of Indians in 1875. When the chiefs found their cause was lost, they came in to the fort one by one and surrendered. Crazy Horse, whose attack helped break Custer's line at the Little Bighorn, was last to come in. While in the guardhouse, he was stabbed to death.

Near the western border of Nebraska the Agate Springs Fossil Quarries, which have been worked by expeditions sent out by the Carnegie Museum of Pittsburgh and others, have yielded a wealth of fossil remains, including many specimens of a small two-horned rhinoceros. Rarer finds are a giant hog, the dinohyus; the strange claw-footed moropus, resembling both the ancestral horse and the rhinoceros; oreodonts, queer little creatures with no modern counterparts; prehistoric alligators, camels, birds, and carnivores.

GEOGRAPHIC Staff photographer, B. Anthony Stewart, said, "It was like looking for sea shells on a beach. Right on the surface of the ground around the fossil beds, we found specimens which the professors from the State Teachers College at Chadron identified as bits of odd prehistoric animals."

From Alliance, midway between Chadron and the North Platte River, on a high, treeless plateau where the soil is excellent for farming, hundreds of carloads of seed potatoes are shipped out each fall.

Nebraska's Wild West

Stretching east from Chadron and Alliance to Valentine is Nebraska's Wild West, about 20,000 square miles of grass-covered sand hills. Spacious Cherry County is called "the home of a million cattle." In a little cow town, Hyannis, cowboys wearing ten-gallon hats teeter along the streets on high-heeled riding boots. Near here the Chris Abbott ranch of 140,000 acres, largest in the State, is only one of many vast tracts used for ranging white-faced Herefords (Plate IV).

The day of the six-shooter and pistol duels is past, but broncobusting contests are still the most popular entertainment. When calves are to be branded or steers selected for shipment, the herds are rounded up from the range, just as in the old days. Daredevil riding and lariat throwing in the sand hills are not rodeo stunts but part of the day's work.

Northeastern Nebraska is in the trade territory of Sioux City, Iowa, the town of South

Sioux City lying on the Nebraska side of the Missouri River. In this part of the State are some of the best corn farms. Wayne, where a State Teachers College is located, is a pretty college town; and Norfolk, built among the low hills of the Elkhorn Valley, is the ninth in population among the cities of the State. Norfolk was the home of the late Dr. Richard Tanner, "Diamond Dick," a dashing plainsman and crack shot whose exploits formed the basis for the *Diamond Dick* stories.

Fremont, 32 miles northwest of Omaha, is the hybrid seed-corn center of Nebraska. On the farming area tributary to the town, about 12,000 acres are devoted to the commercial production of this crop. Two thousand workers, in wartime mostly girls and young boys, are employed in the fields when detasseling is in progress (Plate VII). The varieties of corn to be crossed are planted close together, and at the proper time tassels are pulled off one kind so that pollination will be from the other. Hybrid corn averages from 20 to 30 per cent more bushels to the acre than ordinary corn, but it does not carry over from year to year. New crossings are made each summer.

The construction by the Army of a \$25,000,000 ordnance plant at Mead has benefited both Fremont and Wahoo. About 40 per cent of the employees live in Fremont.

Columbus is the headquarters of the Loup River Public Power District Project. Coordination of this in 1936 with the two other major power and irrigation projects of the State created what is known locally as "the little T.V.A.," extending for 200 miles across central Nebraska.

Though primarily an agricultural town, Columbus has considerable manufacturing. Unique among its industries is a wooden-sole shoe factory, which makes shoes for workers in packing houses, steel mills, and foundries.

North of the Platte River is Grand Island, a city of nearly 20,000 population, third in size in Nebraska. It is one of the largest livestock auction centers in the United States.

Grand Island "Patrols the Ether"

At Grand Island the Federal Communications Commission maintains a radio monitoring station to "patrol the ether." The site was chosen on the basis of signal strength, low noise level, and other related engineering factors. Here the Radio Intelligence Division is on the alert for subversive use of radio. Equipment is so delicately tuned that the station can locate the sources of broadcasts anywhere in the United States.

When a Portland, Oregon, station picked up a suspicious signal two days after Pearl Harbor



Staff Photographer B. Arthur Stewart

Cattle Brands on the Walls Make Cowmen Feel at Home in an Ogallala Hotel

When owners of big herds come to town, they find in the murals at the Duchess insignia burned on the flanks of "dogies" in two great ranch counties. These designs make alteration by rustlers difficult.

and reported it to Washington, several monitoring stations throughout the country located it near Washington, D. C. When the suspicious signal came on the next day, they traced it quickly to the German Embassy.

The station at Grand Island has antenna systems capable of covering efficiently all the radio frequencies in use in the world today. Radio signals, both telephone and telegraph, from every country in the world are heard readily at the Grand Island station.

Lincoln, the capital city, seems to me an epitome of the State. Though it has a population of more than 81,000, it is still an agricultural town. All its business, from its industries to the State University and the State government, depends upon the prosperity of farmers. Wherever Lincoln folk meet, the dominant topic of conversation is crops.

The University has an enrollment in normal times of 10,000 students in its ten colleges and four schools.

At the College of Agriculture I was particularly interested in experiments being conducted in turkey raising. In one building turkey poults in all stages of development were being fed on several kinds of scientifically prepared mixed feeds to determine the mixture that would produce best results. Outdoor

pens for young turkeys were equipped with raised floors of slats separated to permit offal to fall to the ground.

"We have found by experiment," said the professor who was showing me around, "that blackhead, the worst disease that menaces turkeys, is eliminated if the young birds are kept clear of their own droppings. Floors of the pens, raised about two feet, may be either of slats or chicken wire.

"Turkey raising is on the advance throughout the State. We are showing the farmers that turkeys make quicker and bigger profits than hogs."

By law, all concerns selling tractors in Nebraska are required to send their machines to the University for testing. Experts of the Engineering College put the tractors through exhaustive workouts and make detailed public reports of their efficiency.

The real heart of Nebraska is the Capitol Building, a 400-foot tower rising from a massive base building 437 feet square (Plates I and IX).

Atop its gilded dome stands a heroic bronze figure, "The Sower." That figure symbolizes the ideals and faith of a plains people. Nebraska has its feet on the good earth from which comes its prosperity.

Peacetime Rambles in the Ryukyus

BY WILLIAM LEONARD SCHWARTZ

AMERICAN landing forces, closing in on the Ryukyu Archipelago, which stretches in an arc for 700 miles between Japan and Formosa, have invaded an island group few foreigners ever visited.

Commodore Matthew Calbraith Perry based his squadron in the Loochoos, as the Ryukyus often are called,* during his famous journey to Japan in 1853-54. He closely studied this chain of some 140 islands, exposed reefs and rocks, mostly uninhabited (map, page 545). He found four-fifths of its land area and four-fifths of its population concentrated in eight islands about the size of Rhode Island and, today, about as densely peopled.

Perry wanted the United States to occupy the chief ports of the Ryukyus. But since 1878 they have been an integral part of Japan.

Since Perry's time a few foreign missionaries have lived in the islands, an occasional foreign naturalist or explorer has made a brief stopover there, and that is about all. For the last decade or so, the Japs have blocked travel by foreign visitors beyond Shuri, the old capital (page 557).

Reunion in the Ryukyus

My three trips to the archipelago were for family reasons. From 1907 to 1915 the Schwartz home was the Methodist parsonage in a suburb of Naha, capital of Okinawa, principal island in the chain. My visits meant a reunion (page 544).

Father traveled in the Ryukyus in 1901, and our family has been interested in them ever since. Most of the islanders did not understand Japanese, so father and his family settled there in 1907 in order to supervise the translation of the Scriptures, hymns, and prayers in the Ryukyuan tongue.

An American was needed to overcome prejudices such as that of a Japanese pastor who refused to "dirty his mouth" with the native language of this, Japan's oldest colony.

I first went to Okinawa in July, 1908, as a college junior on a summer holiday.

The slow, small freighters serving the Ryukyus took on mails and passengers at Kagoshima, near the southern tip of Kyushu. Father met me there.

We sailed on an old boat of about 2,000 tons. Our first port of call was to be Naze, administrative center of Amami O Shima, one of the northern islands.

Sailing down Kagoshima Bay (Kagoshima Wan), we saw astern cloud-wreathed Kirishima, on which the god Ninigi descended

to possess Japan. We passed the aged cone of Sakura Shima, truncated at 3,668 feet, on the port side. At the mouth of the bay we left the extinct cone of Fuji-shaped Kaimon (3,032 feet) to starboard.

Once out in the open sea, a head wind freshened into a gale, rain in sheets cut down visibility, and by night we were in a violent electrical storm.

Our summer crossing began to be uncomfortable. First class on our old tub was a deckhouse floored with Japanese mats on which we sat and ate, and on which quilts were spread at night. Mere breathing made us hot.

A Dubious Seasickness Preventive

Few Japanese look forward to a sea voyage. Though a Shinto priest once explained that people wouldn't get seasick if they could always get the smell of the earth, we noticed that the Japanese seldom lifted his head from his own pillow, filled with soil from his shrine garden. I never before had such a passage even in winter. We arrived at Naze hours late, after our second sunset at sea.

The weather changed as we entered Naze harbor, bringing relief from a pitching ship, but the July night grew all the hotter after we anchored.

The town of Naze was awake and seemed inviting, so we got ashore in one of the first sampans which had reached the ship's side.

Naze town, which has a punchbowl-like hill rising in its midst, climbs both sides of the wooded inlet that forms the harbor, but its few plain inns are near the beach.

Naze is a lively place, from a Japanese point of view. The population of some 20,000 is crowded into a few square miles. With the temperature around 80 and the moon shining, it was too hot for bed at 10 p. m.

Leaving a bag at the Ikebataya Inn, we strolled into a town where wheeled traffic had stopped for the night, and a lightly clad crowd, silent because barefoot, moved past teahouses and sellers of watermelon slices or shaved ice.

The inhabitants were talking in the Satsuma dialect, a sort of guttural Japanese, and fanning themselves. Flat blue Japanese tiles covered the town roofs. Schools and government offices were white-painted European buildings, and the Catholic mission church had a square brick belfry.

* Also spelled Lochu, Liuklu. Other names are Nansai and Okinawa, the latter from the largest island in the group.



U. S. Army Air Forces, Official

Aerial Photography Bares Japan's Secret Improvements to Naha Harbor

Compared with old maps, the photograph reveals reclaimed land along the waterfront. Entrance to the main harbor has been widened and doubtless deepened. The two fingerlike basins have been lengthened and broadened. In upper left-hand corner, houses of Tomari, where Commodore Perry landed, cluster at the mouth of the Asato River, the old harbor. A channel cuts across the plain between the main harbor and the Asato.



Drawn by Herbert R. Eastwood and Irvin E. Allen

The Ryukyus—Japan's Battered Guardians of the East China Coast

For 700 miles they stretch in an arc between Japan and Formosa—a chain of 140 islets, exposed reefs, and rocks. Eight principal islands make up four-fifths of the group's land area. They are about the size of Rhode Island and about as densely populated. Okinawa and Amami O Shima, administrative centers, and other Ryukyu islands have been heavily bombed and strafed by U. S. carrier-based planes.

Naze, cut off from the political control of the King of Ryukyu over three centuries ago, appeared to be a rural Japanese town, except for the few large dugout canoes that had been beached for the night.

I left the uninteresting streets and plunged into the lonely waters of the bay for a midnight swim. A few horses were being washed down on the sands, but adult Ryukyu islanders do not swim for pleasure.

Snakes "Milked" for Venom

On a later voyage to Naze, I was taken to a "snake laboratory" where hundreds of deadly pit vipers are kept in wire cages and "milked" for their venom. The several species of this snake to be found in the Ryukyus are called *habu*.

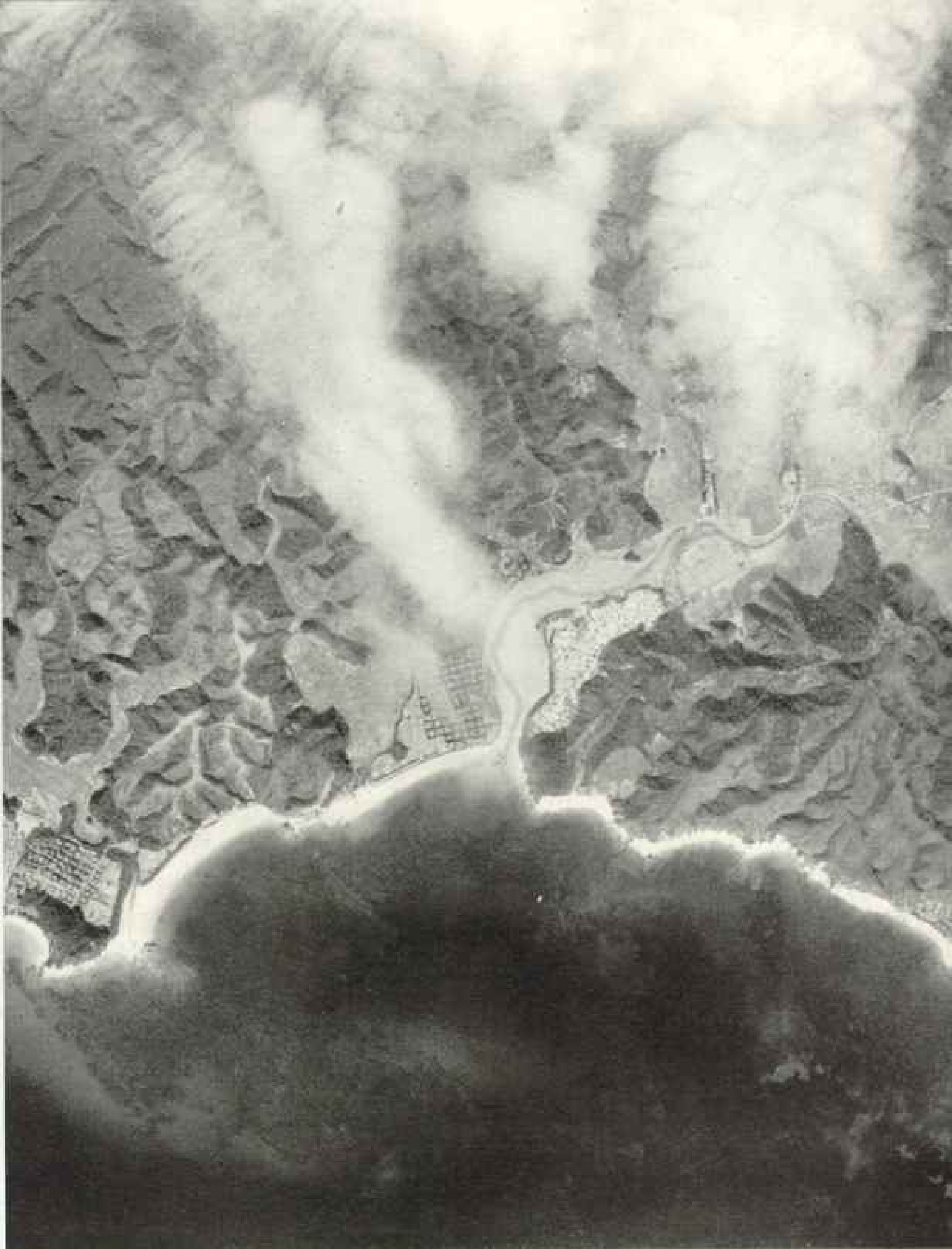
The adult is about five feet long, thick as a man's arm, and wickedly fanged.

In the cages, the writhing reptiles with cold eye and flicking tongue were a gruesome sight, including baby snakes hatched at the laboratory.

Most of the vipers had been brought in for the bounty given for them, dead or alive, throughout the archipelago. Professional snake catchers, armed with a stout straight stick and a bag, sold their dead snakes for medicine.

The venom from live snakes is injected into horses by graded doses to make a curative serum and an antivenin product which has saved thousands of lives.

The habu lurks in vines and low branches, and also likes to lie on the light-reddish clayey



U. S. Army Air Forces, Official

Winging over Okinawa, an Army "Recon" Made This Revealing Picture

Checkerboard patterns are villages with walled houses. Carrier-based planes from the U. S. Third Fleet, under command of Admiral William F. Halsey, bombed Okinawa in January, February, and March. On January 21, 70 Jap ships and 68 enemy aircraft were sunk or damaged. On March 3, the toll was 55 ships and 91 planes.



Mathotia Prince

Tattoo Patterns on the Hands Identify This Ryukyuan Woman's Family

Legend tells that once a Jap nobleman wished to carry off a Ryukyuan princess. She secretly tattooed her hands and arms with purple dye. Her suitor, believing she had contracted a skin disease, gave up his plan. Tattooing soon became fashionable among island women, and each family had its individual pattern. When the Japs took over the Ryukyus in 1878, they made tattooing illegal, but it still persists in some communities (page 553).

loams. No one will walk the trails at night without carrying a lighted paper lantern, from which the habu will retreat. Serum is kept available in all the police stations of Okinawa Prefecture.

Sugar is grown on O Shima, but it is less important now than in the days of feudal Japan (pages 556, 558). There are too many cloudy days on this humid island. Only one rice crop can be grown in a year. But the fishermen produce quantities of dried bonito, nearly all of which is exported to the mainland.

O Shima and its small neighboring islets are famous throughout Japan for the durable dyed pongee called *tsumugi*, made by the women. Mulberry trees are grown, cocoons produced, and the silk reeled, right here. Weaving provides the chief means of livelihood for seven-tenths of the people living in Naze.

But it takes nearly three months to make ten yards of the best O Shima *tsumugi*, 14 inches in width—just enough for one kimono—on a modern hand loom. My *tsumugi* kimono is 30 years old and still in good condition.

O Shima lies in the middle of the Japan

Stream. The islanders say it rains there "35 days a month." When we sailed away next morning it poured. The wind was rising and when the ship came out from the lee of the island it had reached gale velocity.

We were off schedule, but the Captain ran for safety into the seldom-traveled strait between O Shima and small Kakeroma Island, anchoring near Koniya. Between sheets of rain and brief clearings, I saw a wooded, steep, hilly terrain on either coast. No road skirted the shoreline in the usual way.

This anchorage was commodious and safe, but there were no indications of any naval installations then. At last we got under way with a sense of relief. I never experienced such a storm again, although the Ryukyus are notorious for summer typhoons.

Between O Shima and Okinawa, steamers skirt other small islands which cannot be seen in the darkness. Next morning we were in the lee of Okinawa. Our steerage passengers were coming up on deck to wash. Already Ryukyu fishing canoes, manned by three or four paddlers, were out dancing in a chop.

Although the boats are mere dugouts, masts can be stepped in them. One man, holding the sheets in one hand and a steering paddle in the other, can handle his craft.

Our vessel kept flushing flying fishes which drove blindly across her bow. Along the shore, I could see a coral shelf at the foot of low undercut bluffs, broken by inlets where streams had cut through the reef.

In southern Okinawa, the rolling open hills rise to a skyline at about 500 feet. These slopes are spotted irregularly by fortresslike stone or coral outcroppings, sometimes crowned by broad pine trees or clumps of sago palm. The brilliant white spots on the countryside are the graves of the rich. They are tortoise-shaped, like the tombs of the Foochow (Minhow) region of China.

Ryukyans Build Elaborate Tombs

Dr. Roy Chapman Andrews, of the American Museum of Natural History, who visited my father in Naha, makes these interesting observations on Ryukyu burial places:

"The average Loochoan bestows far more thought upon his tomb than he does upon his living abode.

"These graves are great vaults built above ground or into the side of a hill; those of the nobility and higher classes are in the shape of the Greek omega, while those of the common people have straight pitched roofs (pages 550, 552).

"Some have a little courtyard in front of the tomb, where devotional services are held.

"When a person dies, the body is placed in a squatting position in a small tub and put into the tomb; the door is then walled up. During the next three years prayers and offerings are made at the entrance to the vault, and at the end of that time the grave is opened and the remains taken out.

"The women of the family pick off with chopsticks any flesh yet remaining on the skeleton, after which the bones are carefully washed in alcohol and packed away in earthen jars upon the shelves within." *

We pushed on until an undercut crag, about 100 feet high, with a walled Japanese shrine upon it, lay dead ahead. *Nami no ue*, the name of the landmark for Naha harbor, means "above the waves." It is as dear to the returning Okinawan as is Hawaii's Diamond Head to homebound Americans.

Reminders of Commodore Perry

Now my impressions clear up; this landscape is not Japanese, it is almost Hawaiian, except for the red tiles of the larger roofs and the thatched farm huts skirting the towns.

Our ship passes Amiku, site of a small cemetery for foreigners where half of the graves go back to the time of Commodore Perry. These we would proudly decorate each Memorial Day (page 553).

Then come salt pans and the wharves and landings of Naha's inner harbor. In my time, most Okinawan junks had large eyes painted on their bows, a regular Chinese "safety first" precaution at sea.

Before my mother, and Anna and Laura, my sisters, can get on board to welcome us, father points out to me a broad white ribbon leading away from Naha city, the Japanese capital. This is the road which climbs to the skyline about three miles away, to the site of Shuri, the old royal capital.

The red-tiled houses of Shuri cluster on the plateau bearing the ancient castle and palace, the latter built to face China beyond the western sea (page 557).

The mission house could be seen part way along the slope. We identified it by the width of the house front and the wide garden wall. Clumps of cycads and thickets of the prickly pandanus, or screw pine, grow here, but there is no jungle.

What look like bamboo groves are patches of sugar cane. The least tropical things on Okinawa are the spreading red-barked pine trees. They are more conspicuous than the scattered banyan trees or the coconut palms, growing only on high ground beyond the reach of the salt spindrifts.

Ricksha Pullers Clamor for Fares

We were met by porters, speaking broken Japanese, who carried our things from the ship to the waiting rickshas in which we all rode off through Naha to the house above Asato in the suburbs.

When a ricksha got too old to serve traffic on the Jap main islands, it used to be shipped off to Okinawa. The pullers did not take their passengers by turn—they crowded around us and begged for fares, as do Chinese coolies.

If over 25 years old, the runners often had long beards and wore cheap rings on their fingers. A few still wore their hair long, fastened into a topknot by a hairpin, as was once the general custom among the men.

Dr. Andrews, on landing at Naha unannounced, immediately had a helter-skelter encounter with ricksha men. He writes:

"At the landing we were swallowed up in a great crowd of laughing, staring natives, who followed every step we took. We learned then

* Quotations in this article from Dr. Roy Chapman Andrews are from a paper written by him for the National Geographic Society.

how an animal in the zoo must feel, for no trained bear ever had an audience which watched its movements with greater curiosity.

"I stopped to light my pipe and almost lost it in the melee which ensued, as the natives fought for the vantage places of the inner circle.

"Finally in desperation we all climbed in rickshas, and one of my companions shouted "Ginko!" (bank), the one word of Japanese we then knew. We had not the slightest idea where the ginko was, or even if such an institution existed; but we hoped that it would at least get us where we could breathe in peace. The coolies pushed and shoved a way through, with our gallery stringing out behind.

"We eventually lost them and found the bank, but the financiers would have nought to do with our American gold. Apparently they had never seen the like and did not know its value. We stood in indecision, when suddenly one of our ricksha men started off on the run, beckoning the others to follow.

"He led us to a little shop in a hidden side street, and there, to be sure, was the ubiquitous Chinese, the business man of the Orient, who knew our gold and would change it. From Japan to New Guinea he is always to be found—honest, industrious, impassive, living in his dirty little shop but alive to all the possibilities of business, in whatever guise they may present themselves."

Weather Changes in Twinkling of an Eye

Today Okinawa has a Tokyo branch bank, in a modern bank building, and its officers are fully alive to the value of gold.

Before starting for the mission, we ordered



Michaelis Print

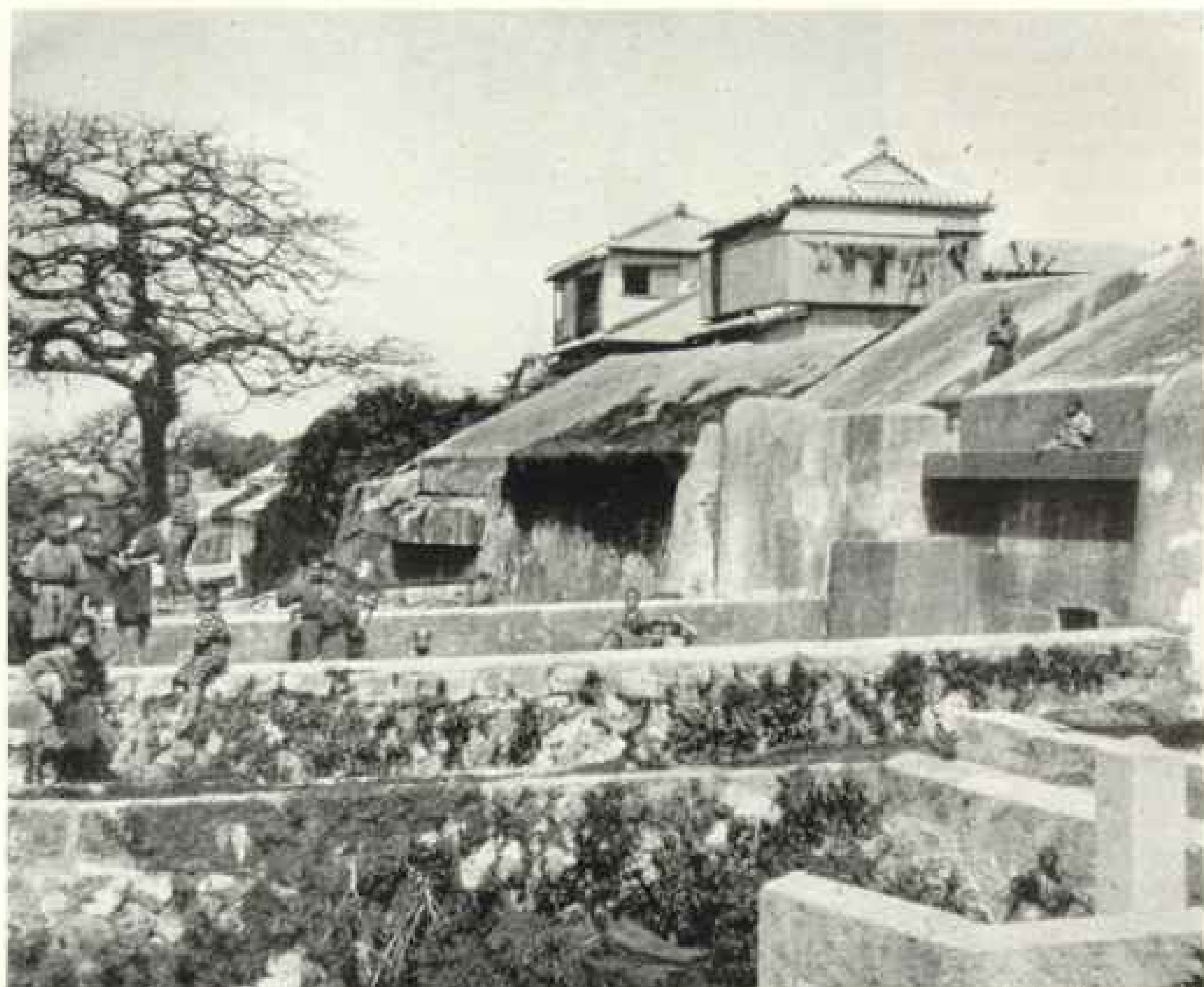
From a Yaeyama Hillside Comes a Car of Coal

Mining in the Ryukyus is of little importance. The Japs increased annual peacetime production of all minerals to about 90,000 tons. The islands' normal yearly output of *sake* was worth twice that of the mine products.

the waterproof hoods of the rickshas raised. It seems to me that Okinawa has weather rather than climate. B. J. Bettelheim, pioneer missionary in the Ryukyus, wrote one stormy September day in 1847:

"The suddenness of the changes in the weather are such as would scarcely be credited. You may see in a twinkling of an eye the brightest sky turn into a mass of wild clouds, and the threat is equally suddenly carried out, in a torrent poured down with violence before we have time to take up the shutters."

If earthquakes are almost unknown, some of the typhoons which sweep the islands create major disasters. In summer the sun beats down heavily if not dangerously after 9 a. m.



Richard H. Goldschmidt

Goal of Every Ryukyuan Is a Costly Houselike Tomb Like These in Naha

To the average islander the family burial place represents his entire fortune. A man who may have lived all his life in a wretched hovel and never have owned ten dollars at any one time in his life may have a stone tomb worth \$1,000. Pitched roofs here mark the mausoleums of the well to do. Those of the nobility are rounded, with large courts where ancestral feasts are held (page 549).

In the cooler months, November to April, rain clouds float overhead bearing "liquid sunshine" or startling downpours. The monsoon winds make the atmosphere endurable.

Red-tiled Naha city has—or had—a fair proportion of two-storied Japanese dwellings and shops with open fronts. Government institutions and the offices of corporations were built in European style. The first ride through town showed that more Japanese and Japanese-speaking Okinawans lived here than in all the rest of the archipelago (page 559).

High Walls around Homes Ward Off Gales

Okinawan town houses—or those that remain—are one-storied and secluded behind walls of coral as high as the eaves, to shelter them from gales. Banana plants and trees afford more protection. Even the openings are screened by other solid walls, planned, like those used in China, to keep evil spirits out of

the house. Some ornamental roof tiles are modeled into devil-eating dragons. Conventionalized lions shielded the patients of a recently established tuberculosis hospital.

In a few minutes the visitor was being trotted past Naha's principal market place. In all Asia, was there anything like the Okinawan general market? All the business was in women's hands. Nearly everything they sold had been brought there in baskets or bundles carried on their own heads: large jars, small pigs, home-woven cotton goods, live fish, fruit, and vegetables.

The barefoot vendors squatted on one heel under wide oiled-paper umbrellas and chafered with the women shoppers.

Everything that had to do with money was in the hands of Okinawan women, with the slight exception of banking or spending their profits. Farmers worked in the fields and brought in the sugar crop.



Methodist Prints

In This Pine Grove by the Sea Near Naha Lie Six American Sailors

They were members of Commodore Perry's famous expedition to Japan in 1853-54 (page 549). When the author and his family lived on Okinawa, they decorated the graves each Memorial Day. Now the tombs, with a few other burial places of foreigners, are going to ruin, in contrast to the well-kept Ryukyuan memorials at right.

Fishermen paddled their canoes back to the beaches and sold their catch to their wives. Husbands sat at home, drinking or smoking, or strolling abroad.

Male dress is not so different from that worn in Japan, but a larger number of working men wear hats. The women were always bare-headed, but if it rained they covered their hair to keep the raindrops from spawning lice on their scalps.

When we would stop for a glance at the market a silent crowd formed about our caravan. Even a white male was an object of curiosity out here, and the sight of a woman or a child would be talked over for months. Even today, few Ryukyuan have seen moving pictures.

When my sister Anna was 13, she was as tall as an adult Japanese. People always ask each other their age in Asia; so Okinawans who found out Anna's age would shout "Thirteen!"

to the people standing behind them, and these would call other adults and children to stare at the blond giantess.

I stared at them, too. People wore tight-sleeved kimonos woven in broader stripes or in brighter colors than adult Japanese ever wore. Some of the garments were marvels of industrious patchwork or quilted of a number of different patterns.

Mothers and daughters dress alike, with identical hairpins holding up a sort of Psyche knot. If their hair begins to come down, the knot bobs about, giving them a comically loose and dissolute appearance. Older women have tattooed indigo patterns on the backs of their hands.

Most Okinawans are better built, with higher noses, lower cheekbones, and better teeth than the Japanese. But if dressed alike, the men of the two strains cannot tell each other apart by eye.



Robert S. Rossier from Methodist Prints

Pastor Matsumoto, Jap Missionary, Lunches on Boiled Sweet Potatoes

His Christian mission was on Toku no Shima in the Amami group. Sweet potatoes are the staple diet of the Ryukyans (page 558). More than 40 percent of the islands' arable land is devoted to growing them. Sometimes typhoons are so severe they even blow tubers out of the ground!

Okinawans have leisurely, courtly manners and lovely soft voices. Indeed, the women seem to coo like doves. The word "yes" in Ryukyuan is a soft, long *aii*. Such long vowels, held two or three times as long as a long English vowel, are the distinguishing mark of their language.

Women Age Rapidly

Unfortunately, the women age rapidly. The older ones have hard faces, lined with furrows. They drink very seldom, and their fertility keeps the Ryukyu strain very much alive.

Few are more than four feet high, but their large eyes and erect posture, square shoulders, and deep chests, developed by carrying all burdens on their heads, contrast with the drooping slouch of Japanese women. A farm woman can carry a load on her head that two men have lifted off the ground for her.

In the Ryukyus the wide Japanese sash, or *obi*, and the Japanese wrapped petticoat are

unknown (page 561). Okinawan women wear drawers and a kimono undervest. Over these is a tight-sleeved kimono, cut shorter than in Japan. Then a looser kimono is worn as a wrap.

Most women keep their kimonos closed by tucking the garments at two places into the band of the drawers.

Though one hand must be free to readjust the tucks of the kimono, the women modestly conceal their bosoms. Like American girls, they move briskly and show their legs.

Richer women fasten their clothing with a soft sash like that of a Japanese male, but knotted in front. Babies are carried about on one hip or the other, and yet the mother manages to free one hand to hold a dark handkerchief and an umbrella.

Our ricksha procession moves on. We see no trappings of Shintoism, no stone lanterns, and pass only one temple. Behind the three-fold gates and substantial walls of Shugenji

Temple, the ancestral tablets of Ryukyu's kings, from Shunten (1187-1237) onwards, have been enshrined with Buddhist honors.

The coral tree, bearing great spikes of crimson pea-shaped blooms, is in brilliant flower. Bayonet cactus grows wild on the top of the older walls and keeps prowlers out. Broad-leaved orchids, euphorbias, and the Hawaiian shell ginger are common.

A wide bridge with a good balustrade carries us into the village of Tomari. This was the main landing place at the time of Commodore Perry's arrival (page 544).

Houses Too Small for Long Threads

We see some women working out in the street, straightening a bunch of dyed cotton threads. This will become the warp for the piece of kimono goods they will weave for some member of the family. Their houses are too small to hold these long threads.

If our fighting forces have time to catch a glimpse of a woman weaving, they will see that the Ryukyu loom has only three sides. The weaver must hitch the web to her own waist. She supplies the tension with her back. She cannot throw her shuttle between the threads, because it is over two feet long. It must be held in one hand until gripped by the other.

In open country on the highway to Shuri the road is surfaced with crushed white coral, dazzling to the eyes and surprisingly slippery if wet. At Asato we turn uphill and enter the gate in the wall around the mission house.

We were never afraid of our neighbors—the wall was built to keep snakes out of the vegetable garden. The house, though furnished in American style, had thick Japanese mats as a floor covering, and we removed our shoes before going indoors.

When church meetings were held in the house, chairs and tables were moved out. Everyone was used to sitting on the floor. The living rooms commanded a wide view over southern Okinawa and Naha.

Our windows had been screened against insects, but the mosquitoes could crawl through American-made mesh. If they bloated on our blood, they were unable to get out again.

Mother contracted dengue fever from the bite of the *Aedes* mosquito.* Filariasis is always present in the archipelago.

Since the departure of the Bettelheims, our family was the only Caucasian one to live on Okinawa during every month of the year.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Life Story of the Mosquito," by Graham Fairchild, and "Saboteur Mosquitoes," by Harry H. Stage, February, 1944.

Exercise warmed people even on cloudy winter days, but charcoal braziers had to be used in the house to take off the humid chill. With the frequent showers the washing took days to dry, even if hung indoors.

In summer the sitting room baked in the setting sun, the temperature rose after the kerosene lamps were lit, and we lay in bed under a mosquito net in perspiration. If relief came, it was brought by a thunderstorm.

Water More Valuable than Liquor

Should a gale arise, there was only one place in the house where a lamp could be lighted before the match went out. After the town got electricity, we had cool light and fans and were much more comfortable.

Like everyone in Okinawa Prefecture, we saved all the rainwater, but we distilled what we drank. The islanders marveled at the cistern built into the terrace at the rear of the house, and the way the kitchen slops drained off to water the garden. That seepage was collected by native neighbors for washing clothes. In acute drought, a quart of good water could be traded for a quart of native liquor.

Fresh water is scarce on many of the islands. On Takara it is brought in by boat. People on Gaja Island depend upon seepage from between rocks on the shore for their meager supply. On Ko Takara, inhabitants use water which condenses around volcanic steam outlets and blowholes.

Naha city now has 30 miles of waterpipe and 3,132 faucets, but only 20 percent of the population were served by this system. Besides, the piped water has a disagreeable taste.

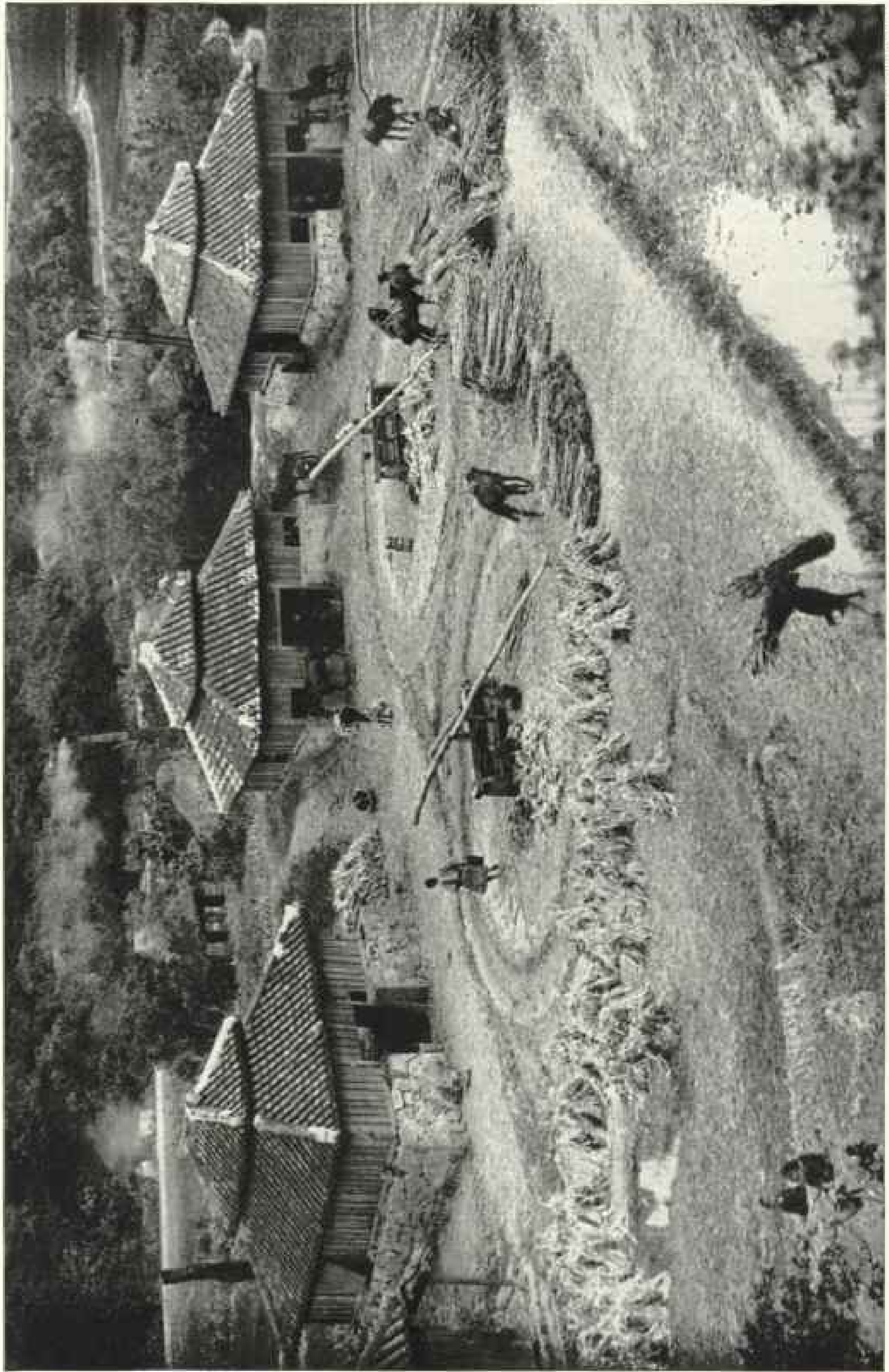
Father supplemented the island vegetables, such as eggplant, sweet potatoes, giant radishes, cucumbers, peanuts, and watermelons, with American okra, green peppers, good string beans, and fair tomatoes and sweet corn. He introduced good strains of figs and papayas.

Natives Fear Raw Fruit

Japanese agricultural stations have improved the bananas. There is a small native papaya, but the islanders think its raw fruit will give you leprosy.

We ate green vegetables and melons, but feared to touch the local pork. Beef, tough chicken, crab, lobster, and fish were sold at Naha. Butter and milk came from cans. Our poor neighbors sold us eggs, eager to make a cash sale of even one egg at a time.

Okinawans who would hire out to do housework had no idea of the way to sweep a room. At the end of a whole day, a green Okinawan



Round and Round the Ponies Go, Pulling Huge Sweeps Which Turn the Sugar-press Rollers

They crush the sugar cane, expressing the juice. A woman carries a bucketful of the juice to one of the tile-roofed sheds where it is evaporated. The finished product is packed in tubs and sent to Japan to be refined (page 558). Sugar is the principal commercial crop of the Ryukyus.

Hiroshi Princes

yardman had not been able to finish filling up all the lamps. The prefectural authorities came to us to borrow a suite of bedroom furniture for the use of a visiting Japanese prince and princess, whose rank entitled them to expect Western accommodations.

We were always ready to show people all over the house. It made them ask about Christianity and shielded the mission from suspicion, as mother made no attempt to hide anything. Classes of primary school children with their teachers would arrive unannounced and be shown everything from a hatrack to bedsprings; yet they never carried off any "souvenirs."

Anna has met Okinawan immigrants in Hawaii whom she had once shown over our homestead. Beggars never came to the door, and even begging Buddhist monks were seldom noticed. The only thing we lost was my pet dog, Jip, who got so fat that he was probably eaten by some of the hungry folks in the vicinity.

After dark the oiled-paper lanterns of people on the road below glowed like fireflies. A "brownout" spread over the island as the peasants put out their feeble seed-oil lamps or candles and went to sleep.

But on moonlit summer nights they could be heard working in the fields. This moonlight had a gleam which I have never experienced in other lands.

After I went to bed, I thought rain was falling, but it was only the deceiving rustle of the wind among the banana leaves. Overhead something produced a loud pop through the thin ceiling. This was the explosive call of the gecko, a mosquito-eating reptilian which we welcomed as we did other lizards and spiders.

Drunkenness and immorality are the besetting vices of the men of the archipelago. Ryukyu *awamori*, distilled from rice, has a higher alcoholic content than Japanese *sake*. *Shochu*, "burning liquor," distilled from sweet potatoes, is plentiful and cheaper (page 550).

Commercial amusement caters solely to the entertainment of men. They are loose livers as far as their fortunes permit, and most parties are in the gay quarters where the only women are professional entertainers.

There is almost no literature in the Ryukyu language, but the professional entertainers keep the old songs and little plays alive. Some of their musical instruments are more akin to the "banjo," flute, and fiddle used in China, but the islanders' tunes are more to the liking of an American.

I saw more of the other parts of the Ryukyus on later trips made after I had come out to

teach English in the 7th Higher School in Kagoshima city, Japan. Thus I revisited several times the ex-royal city called Shui by Perry (the Shuri of Japanese maps).

Shuri Is Still the Home of the Nobility

It is still the home of the wealthier landowners and former nobles, a group which preserves the features of a civilization imitative of the Chinese. They intermarry with people of the same former rank, and their names are still uttered with respect.

Their mansions have formal Chinese paved courtyards. These dwellings are surrounded by narrow verandas and their floors are several feet off the ground. They have servants' quarters, a library, or a tea room, in addition to the usual reception room, sleeping rooms, and kitchen, separated by removable wooden doors sliding in grooves.

Although some Ryukyu people admire Chinese ways, there has been practically no intercourse with China since 1875, and I have heard of no modern Chinese who took any interest in the islands.

Two miles of farmsteads separate Naha from Shuri. Since a large number of Ryukyans own their own farms, the peasants often build their huts on their holdings, but on such a densely populated island the villages are very close together. They tend to nestle in hollows, surrounded by the trees needed to break the wind.

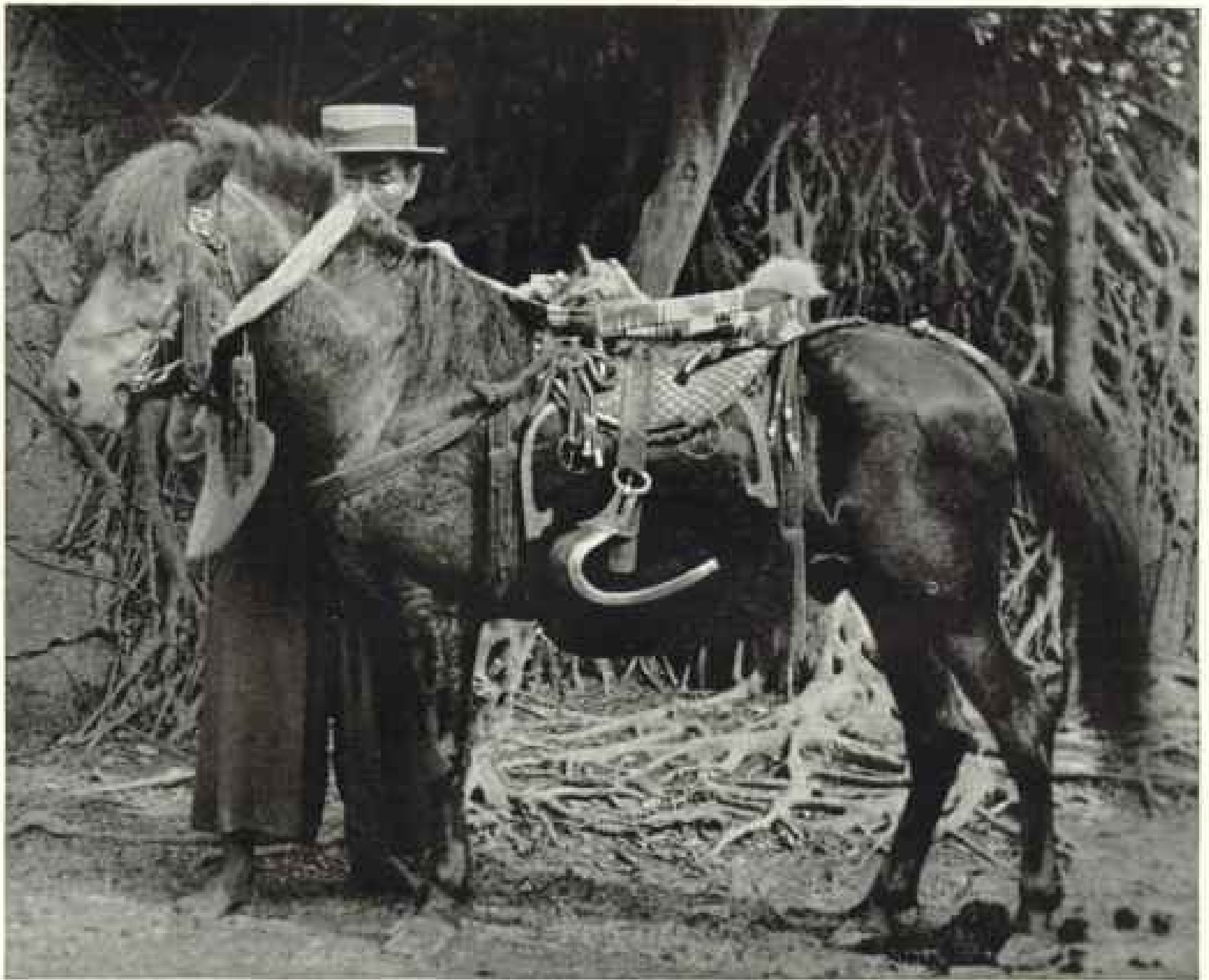
A typical farmhouse is a small one-roomed rectangular hut with a thatched pyramidal roof and wattled walls. There are no windows, the entrance being a narrow opening closed by a curtain. Here a jar of water is kept for foot washing.

The floor is the packed ground spread with rushes and dirty thin mats. Bleached pandanus fibers from which good Panama-type hats are made are distributed to women for weaving at home. The agent also deposits with them a white sheet, so the fiber can be kept clean while the hat is being completed.

Indeed, the farmer has almost no furniture except a cooking hearth, a few dishes and utensils, a pile of bedding, the necessary number of headrests, a green mosquito curtain, and a simple family shrine.

Prosperous farmers own lean-to stables and circular granaries supported on stilts, out of the reach of rodents. They also possess a family grave vault worth many times as much as all their other belongings.

Each householder has pigs in a coral sty, located where it can take the place of a privy. Thus the sour smell of hogs floats all year round over the archipelago.



Melhoffer Print

Huge Iron Stirrups Help a Ryukyu Farmer Keep a Firm Footing on Ponyback

Pony races, along with tug-of-war matches, feature holiday festivals. The man wears a cheap straw hat, but the islands are noted for a finer variety, which resembles a Panama in weave.

In harvest season, the pungent odor of boiling molasses dominates. Many farmers crush their cane in their own mills (page 556). They raise ponies, fowls, and cattle. Black sugar is the principal cash crop, but several varieties of sweet potatoes are grown by all Ryukyuan as the food staple. In Tokyo these are called "Satsuma potato."

This member of the convolvulus family was imported from the continent in 1605, according to local records. It is propagated by planting slips of the vine and it blooms like a morning-glory in the warm climate of Okinawa.

Daily Potatoes Are Hot and Cold

Ryukyuan mothers boil a batch of potatoes once a day, to be eaten hot at one meal and cold at the others. On holidays a piece of pork or fish can be added to the meal. The Japanese on the islands called the natives "hog-swill eaters" and despise them for their lack of personal cleanliness.

Vermicelli and beans are cooked in fat. The very poor eat a mush of sago obtained from the heart of the wild cycads. Eggplant is pickled for a relish. There are few rice fields in Okinawa.

Where a patch of garden lies fallow, it is soon bright with pink oxalis or yellow or purple violets. Barren rock outcroppings will be capped by sago palms, maidenhair ferns, and bird's-nest ferns.

All the old bridle paths on Okinawa led directly to Shuri castle. Travelers approaching it from the west entered the city through two ornamental gates of Chinese style, capped with twofold tiled roofs. The tablet exposed on the first of these bears characters meaning Middle Mountain (capital) Gate.

The first inscription was the autograph of a Chinese envoy of the year 1428. The upper gate was erected a hundred years later. The autograph of another envoy is exposed on it, reading *Shurei no kuni*, the Land Which Observes Propriety.



Methodist Print

Naha Builds Stone-walled Houses to Withstand Typhoons

Red-tiled roofs are laid in white plaster, a method unknown on the Japanese main islands. Missing are the light paper partitions most Japs use for interior walls. Instead, Ryukyuan houses have heavy wooden sliding doors which make the inner rooms dark and stuffy (pages 552, 560).

For centuries all classes of Ryukyuan have observed so much propriety that the kings ruled the islands by a wave of their fans.

Propriety means the ancient Chinese pattern of life, which restricted employment for the gentry to office holding in the bureaucracy.

Dr. Bettelheim (page 551) reported that officials "often express wonder on seeing me pretty diligent in study, and yet fiddle my tune and mend my shoes.

"'How is it possible,' they say, 'that one man should do so much business—study, write, make calendars, preach, feed the goat, pickle meat, repair the house, etc.?'"

Castle Walls in Chinese Style

The walls of the castle are built on Chinese lines. From the outside the stone ramparts appear lofty, but they are partly laid on the scarp. Even the watchtowers and gates are not really strong.

You climb flights of steps to reach the wide

courtyard which faces the palace, a Chinese structure with a Japanese portico. This hall is still the largest structure in the archipelago.

It was ruthlessly made over in the first years of Japanese occupation as quarters for a tiny Japanese garrison. Some pavilions were razed to provide a drill ground within these walls. One palace hall, in which Perry and his suite were entertained in 1853, later housed a girls' industrial school.

From the castle walls, wide views open out in the four cardinal directions. Down below, the red roofs of Shuri's houses crowd against one another at one's very feet.

Dr. Andrews describes the view thus: "I shall never forget the picture which we saw when my companion and I stepped out from the trees. Two-thirds of the island was spread before us like a relief map, every little cove and promontory of the coastline, every knoll and garden plot as sharp and as finely traced as if cut in steel.

"Below our feet the sheer rock wall dropped away 200 feet, then gradually sloped outward to the skirts of the village, where the tiled roofs glistened in the sunlight. We could see our ship, the *Albatross*, far off in the bay, looking like a great white gull floating on the water."

Neglected shrubbery is all that remains of pleasure gardens which were miniature reproductions of "The Eight Famous Views of Okinawa." Such spaces could be used by picnickers.

When we were lunching here, two venerable men asked mother to allow them to taste our "foreign *sake*." They smiled gravely and thanked her politely when they found out that we had been drinking cold water.

A reek of spirits floats over the castle from the quantities of *awamori* (page 557) being distilled near by.

A mausoleum of the royal family stands in a noble park in temple grounds not far distant. The walls of this sanctuary reveal the craft of the Okinawan mason; it is the only structure on the island which can be called cyclopean.

Ex-king Tai Sho assumed the Japanese title of marquis. He and his descendants spent most of their adult lives in Tokyo. The family owns a large mansion not far from the castle grounds. Some of the marquis's younger brothers or sisters, with an aunt or uncle, usually live within.

Shuri Famed for Lacquer Ware

Shuri formerly was a production center for lacquer ware. Dr. Andrews observed its manufacture. He writes: "Much of it is exported, and some of the finest boxes, bowls, trays, and tables in daily use in Japan and China and sold to tourists throughout the Orient come from the little town of Shuri. The lacquer ware, when first made, is a dull brown, but the really first-class pieces improve with age and soon change to a beautiful vermilion, becoming brighter and clearer the longer they are used.

"The trays and boxes are made of soft, straight-grained pine, fastened together with wooden pegs and smoothed with glass. They are then 'filled' with a dark-gray liquid and allowed to dry, after which the lacquer is applied with a brush as one would paint a board.

"The articles are not dried by heat, but set away in cool, dust-proof paper cupboards and left until the outer coat has become firm and hard.

"When we came to buy lacquer we were greatly surprised to find that bargaining had

no place in Loochoo. Without exception, the first price asked for an article was the one for which it was sold. Never in the Orient had we met with a similar condition."

The shops at Naha have grown at the expense of Shuri, which has steadily lost population. At one place in Shuri we find a cake shop where the specialty is gingerbread cookies. A rival shop is selling sweet-potato taffy (*ame*).

The bars, which look like chocolate, are slabs of jelly made from gelatin and powdered black beans. Japanese confectionery, made without shortening, tastes quite different.

All the shops seem dark, but that is because the sliding doors used for partitioning the rooms are made of solid wood instead of frames covered by translucent paper, known as *shoji* in Japan.

Many things made in the Ryukyus, such as oiled-paper lanterns and umbrellas, folding fans, tobacco pipes, roof tiles, or spectacle frames, are reproductions of Chinese models.

The southern part of the Ryukyu Archipelago is not overgrown by timber and thickets, as are the islands of Japan. All arable land is under cultivation, and the population is so dense that people can be seen everywhere working in the fields.

Their cattle are always stall-bred; the usual fodder is cane refuse and sweet-potato vines. There is no pasture land. Pigs are not driven but are carried squealing to market, while hogs are crated and shipped in one-horse two-wheeled drays.

The road to central Okinawa crosses a narrow isthmus and follows the east coast to the town of Nago, third largest settlement, where there is another Methodist church.

Although a center of education, Westerners are seldom seen here, and since the thirties their visits have been prohibited.

Perils of a Guest Room

One night when my mother and sisters were guests in a Nago home, the quiet crowd of curious villagers grew so dense that the wall beside the guest room was pushed down before their surprised eyes.

North of Nago, the population is thinner and more backward. These people are nicknamed *Yambara-jin*, "men of the mountains and moors," by their fellow countrymen in the south. The land is less fertile, and there is wasteland suitable for military installations near the big harbor of Unten, remote from any large population.

In our time there were no soldiers on Okinawa except a few gendarmes. All conscripts were shipped for training to Japan proper.

Anna has told me of a visit which she made with father to Kume, west of Okinawa. It was rainy and wooded. Mulberries and silkworms are raised there, and fine pongee is woven locally in every household.

Travelers were taken ashore from the steamer in sampans, but the Americans were too long-legged to be landed on the boatmen's backs without getting their feet wet after all in the surf along the beach.

Father also visited Miyako, the principal island of the small archipelago of the same name. The British man-o'-war, *Providence*, wrecked here in 1797, brought the first contact of the Western World with any of these islands.

Cloth from Banana Fibers

Agriculturally, this area is especially favored; sugar, sweet potatoes, and tobacco ripen rapidly, and there are many textile bananas; so it supports a dense population.

A "grass cloth" produced from banana fibers is woven in many Ryukyu households. Its natural color is a light tan.

This almost porous fabric is the favorite material for the summer garments of middle- and upper-class islanders. The *jo'u* is also sold in Japan as a high-priced specialty product.

Until war came, the islanders still observed the custom of gathering on the cliff of *Nami no ue* (page 549) to wave farewell to their friends who sailed out of Naha harbor. They would raise their arms to shoulder level, and wave their hands from the elbow with a restrained and slow movement.

Conditions of life have somewhat improved in this, the oldest Japanese colony, but I



They Can Carry Half a Pony-load on Their Heads

These women, walking down a street on the island of Miyako, have only light burdens. Unlike the Japanese, they do not wear the *obi*, or wide sash (page 554). About 4½ feet tall, Ryukyu women can carry heavier loads on their heads than they can lift. Sometimes they transport a tub of sugar in this fashion. A full load for an island pony is only two tubs.

firmly believe the people envied all who could depart for lands richer in material resources.

Many have been indentured for low pay and hard labor on the sugar plantations of the Marianas. About 80 percent of the Japs on Saipan were from the Ryukyus. A few live in Hawaii.

Cut off from the outside world, the Okinawans would have to go back to making fire by primitive methods. Nevertheless, they cannot forget that they once had a fair share of political independence.*

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Springboards to Tokyo," by Willard Price, October, 1944, and "South from Saipan," by W. Robert Moore, April, 1945.

The United States and the British Empire

BY LEONARD DAVID GAMMANS

Member of Parliament of the United Kingdom

I HAVE visited the United States three times since the war began, twice in connection with international conferences dealing with the future of the Far East, including those countries which are dependencies of European powers. I am convinced that on few subjects is the divergence of opinion on each side of the Atlantic more fundamental and apparently more unbridgeable than on the question of colonies or dependent territories.

The British and American viewpoints hardly meet anywhere.

This is all very unfortunate. If there is one truism in the world today it is that Anglo-American understanding and, what is more important, common action of English-speaking peoples, is a prerequisite to the establishment of world security, or, for that matter, the avoidance of World War III.

No cooperation between the two countries is possible if the American people believe that they are being asked to fight for the British Empire or to underwrite a colonial system of which they disapprove.

The average American naturally approaches the question from the viewpoint of his own history. He remembers that the United States came into being as the result of a revolt from the British imperialism of the 18th century. To him, it appears that the same system still continues.

He does not believe that any nation is fit to rule over another or that good government is any substitute for self-government. With his traditional sympathy for the underdog, he champions the cause of what he terms the subject races throughout the world. He considers that Britain should grant the same freedom to her colonial countries as the American people won for themselves.

Even if immediate self-government is not possible in some of the more backward parts of the earth, then a timetable ought to be fixed after which freedom becomes automatic. He has taken that course in the case of the Philippines, and he does not see why it should not equally apply to the British colonies.

Added to this, he has at the back of his mind the feeling that Britain makes a good thing out of her colonies in some way or another, and he does not like that, either.

Every Englishman would meet this viewpoint by conceding the absolute sincerity of the American approach, but that is about as far as agreement goes. His first answer would

be a purely debating point rather than one of principle.

"Why is it," the Englishman asks, "you always seem to pick on the British Empire? The Dutch, the French, and the Portuguese have vast overseas territories. Within the U.S.S.R. are millions of non-Russian peoples with a low standard of culture and political experience. Within your own borders you have a colored minority, denied full social and political rights. In several South American republics there exist tyrannical despotisms." And so on.

British Blood Shed in a Common Cause

But the real case goes much deeper than that. I was in the United States when Winston Churchill made his famous declaration that he had not become the King's First Minister to preside over the liquidation of the British Empire. Most Americans admired his candor and his vigor, but many were shocked at his words.

In point of fact, Mr. Churchill was only voicing the opinion of practically 100 percent of his countrymen.

There is today in Great Britain an almost overpowering sense of pride in the British Empire.* It could scarcely be otherwise when we remember the history of the war.

When Britain stood alone in 1940 on the abyss of complete annihilation, no country was prepared to fight by her side except the peoples of the Empire.

No Englishman will ever forget that Canada, Australia, New Zealand, and South Africa, completely self-governing democracies separated by many thousands of miles from the battlefield, voluntarily declared war on the common enemy and shed their blood in a common cause.†

It was the same in the nonself-governing parts of the Empire. If ever there was a moment when the "subject" races might have thrown off their "tyranny," this was it. But did they? On the contrary.

* See "British Commonwealth of Nations," by Eric Underwood, NATIONAL GEOGRAPHIC, April, 1943.

† See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Canada's War Effort," by Bruce Hutchison, November, 1941; "Making of an Anzac," April, 1942, "Life in Dauntless Darwin," July, 1942, and "Sydney Faces the War Front Down Under," March, 1943, all by Howell Walker; "Busy Corner—the Cape of Good Hope," August, 1942, and "Cities That Gold and Diamonds Built," December, 1942, both by W. Robert Moore.

From every continent and island the response was the same. India produced more than two million soldiers, all volunteers, and would have multiplied that number if enough arms and officers had been available.*

East and West African troops were largely responsible for the reconquest of Ethiopia and are today fighting in Burma in tens of thousands.

Are we likely to forget the people of Malta? †

Walk through the streets of London today, and you will see on the shoulder straps of men of many colors the name of every British colony, large or small, from the distant parts of the earth. All of them are volunteers.

With all its imperfections, a colonial system which can produce these results in two wars needs no apologies.

Personally, I do not believe the United Nations could have won without the British Empire. If Malta and the Suez Canal had ever fallen, the Germans would have gained all the oil of Iraq and Iran, and might have met their Japanese partners in Baghdad. Russia would have been outflanked from the south, and Britain herself would have fallen.

And what of American security? It is significant that in order to start fighting the war against both Germany and Japan, American forces, with few exceptions, had to operate from British bases.

Supposing Winston Churchill had announced that he proposed after the war to liquidate the British Empire. Would not American security have suffered a catastrophic deterioration? I suggest that if this had happened, the United States would have been compelled, for her very security's sake, to acquire many of these surrendered British bases for herself.

Mr. Walter Lippmann has pointed out that the Monroe Doctrine would have been valueless, unless it had been underwritten by the British Navy. Today, all plans for the defense of the United States are based upon the supposition that a friendly British Navy exists in the Atlantic Ocean and that British bases are available all over the world.

British Hold Statute of Westminster on Par with Magna Carta

On the development of constitutional government, I always ask my American friends one question: "Do you know of the Statute of Westminster and understand what it means?" My experience is that hardly any Americans have heard of it.

That is probably our fault, because few of us have ever told you. It is the statute

passed by the Parliament of the United Kingdom in 1931, which affirmed that the great Dominions of Canada, Australia, New Zealand, and South Africa are completely independent countries with full powers over external as well as internal affairs.

The best evidence of this is that Eire (South Ireland), legally a member of the British Commonwealth of Nations, decided to stay out of the war, and no compulsion was used to make her alter her decision.

To us, the Statute of Westminster is on a par with the Magna Carta and the Bill of Rights. But it is more than a legal document. It is also the pattern of independence to which all the nonself-governing countries are to attain, and to which some of them have in fact already nearly attained.

"Three Freedoms" for All British Colonies

The British Empire is like a ladder upon which different countries have reached varying heights, according to their cultural and economic development, but the top is always the same—full and complete self-government.

There is no issue in India which any further declaration of Britain can resolve. What could be more specific than the declaration of His Majesty's Government as late as July, 1944? The whole object of the Cripps' proposals was "to enable India after this war to attain complete freedom to unfettered control of her own destiny in the world, whether within the free partnership of the British Commonwealth or even without it, and an agreed constitution of her own devising."

That is at least as comprehensive as any American statement toward the Philippines.

The trouble lies not in London but in Delhi, in the inability of the various Indian factions to agree under what conditions they take over from the British.

Ceylon and Southern Rhodesia have been largely self-governing for years. Jamaica has just been given a constitution with full adult suffrage, male and female, white and colored, from the age of 21.

It is a completely untrue picture to suggest that the British went around the world destroying ancient civilizations or filching away other people's liberties.

Most of the overseas territories were either largely uninhabited or, if there was a civilization there already, it was noted for little except tyranny, slavery, oppression and, in some cases, even cannibalism.

* See "India—Yesterday, Today, and Tomorrow," by Lord Halifax, NATIONAL GEOGRAPHIC MAGAZINE, October, 1943.

† See "Malta Invicta," by Bartimeus, NATIONAL GEOGRAPHIC MAGAZINE, March, 1943.

I spent many years of my life in Malaya. Sixty years ago it was a jungle, almost completely uninhabited except for a few Malay kingdoms, which practiced a particularly revolting form of debt slavery.

In that short space of time, it became the richest country in Asia, with a range of social services exceeded nowhere in that continent.

Every British subject, whatever his color, has long enjoyed three of the four freedoms of the Atlantic Charter: freedom of expression and of worship, and freedom from fear. Universal freedom from want has been attained nowhere in the world as yet.

If Britain were to walk out of these territories, as is sometimes suggested, hardly one of these freedoms would remain in five years.

In other words, the Englishman would say to his American critic: "Study the facts. The picture you have in your mind of the British Empire, if it were ever true, is at least fifty years out of date."

We make no claims to perfection.

We can point to many disappointments and shortcomings which attend all human enterprises, but by and large the over-all picture is not too bad.

The British certainly need no exhortation so far as human liberties are concerned. We have pioneered almost every liberal movement of the past 150 years, from the abolition of slavery to social security in our own time. But there are no short cuts in human progress. An abdication of responsibility is no policy we can support.

What of the Future?

What of the future? As to India, one of three things may happen.

The first, and most to be desired, is that the Hindu and Moslem communities will be prepared to trust each other and agree on a plan to take over the government. Is that likely? There seems little hope as long as Mohandas K. Gandhi and Mohammed Ali Jinnah are alive and respectively direct the two communities.

The second is that India may relapse into bloody racial and religious wars, which was the prevailing condition before the British came, and which has been staved off by British rule for 150 years.

The last possibility is just a continuation of the present system, with its futile bickerings and its diversion of some of the best brains of India into the arid deserts of political agitation, instead of being available for economic and social reform.

There is, of course, always a possibility of history repeating itself and an alien invader

taking over. That would certainly have happened in 1942 if Mr. Gandhi and his "quit India" campaign had succeeded.

British colonial development seldom hits the headlines in the American press, with the result that many important facts and statements of policy are inadequately known.

For example, few Americans appreciate that the greater part of the Indian war effort supplied to the Allies has been provided from the pockets of the British taxpayer and not from the Indian exchequer, with the result that most British investments in India have been liquidated and that Great Britain owes India over four billion dollars.

No British colony makes any contribution to the home exchequer. India has enjoyed full fiscal autonomy for the past twenty years and has half ruined the Lancashire cotton industry by its tariff policy.

No handicap has ever been put in the way of the investment of non-British capital in a colony or dependency, and that explains the vast American investments in the Malayan rubber industry and the great American business houses in Singapore and Hong Kong.

At a time when Mr. Wendell Willkie was sitting in the gallery of the House of Commons and German bombs were actually falling outside, Parliament passed the Colonial Development and Welfare Act and voted two hundred million dollars from the pockets of one of the hardest pressed taxpayers in the world for schemes of colonial social and economic betterment, with implied promise of more to come.

Only last year the British Government suggested the formation of international regional councils for all parts of the world where colonial territories exist, to coordinate and speed up the development of these areas. These councils would have representatives not only of the colonial powers, but of all powers interested in the particular area.

The American, for the most praiseworthy and idealistic of motives, wants to see the dependent countries of the earth masters of their own destiny. This thought has perhaps been slightly tempered of late by consideration of his own security.

The Englishman considers, too, his even more vulnerable position in the world, but is pledged no less idealistically to a policy and a plan of political, social, and economic advance, with which, on the whole, he is satisfied, and to the fulfillment of which he invites American and world cooperation.

Is it possible to reconcile these two viewpoints? Let us hope so. The future of mankind may depend upon it.

Normandy's Made-in-England Harbors

BUILT in England and assembled off Normandy, two portable harbors, each the size of Dover's port, unlocked Fortress Europe to invasion. Product of British-American planning, they were steel and concrete proof that true allies can act with secrecy and swiftness.

Germany, her big guns commanding French ports, expected to push beachhead invaders back into the English Channel, making Normandy another Dunkerque. "Mulberry," the Allied code book's word for artificial harbor, upset Hitler's strategy. On schedule, it delivered a surprise—the heavy ordnance that safeguarded the beachhead.

Mulberries were approved in August, 1943, at the Roosevelt-Churchill conference in Quebec. By June, 1944, more than one million tons of prefabricated parts were ready. To win the race against time, all construction was done by the British. The cost was estimated at \$100,000,000.

On D Day, June 6, 1944, a fleet of 85 tugs was engaged in history's greatest towing job. First installations to cross the Channel, however, were 60 blockships under their own steam. Offshore they lined up bow to stern and scuttled themselves, creating five breakwaters. Under 20-foot tides, decks were awash (pages 568, 574).

A second type of sea wall was composed of "phoenixes," code for hollow concrete blocks. Under tow, they looked like icebergs. The largest were 200 feet long and 60 feet tall. As they lined up end to end, valves were opened and compartments flooded. Their tops remained above water as gun mounts (page 568). Like the fabled phoenix, the bird that rose from its own ashes, the concrete phoenix

may be resurrected by closing its valves and pumping out water. It would not be too surprising to see phoenixes off Japan some day.

Meanwhile, pontoon bridges thrust out from shore into the roadsteads to receive ships' cargoes (page 580). A floating wharf connecting these bridges was Mulberry's most surprising secret. Realizing invasion's need for such a device, Prime Minister Churchill directed in 1942: "Piers for use on the beaches. They must float up and down with the tides. The anchor problem must be mastered. Let me have the solution worked out."

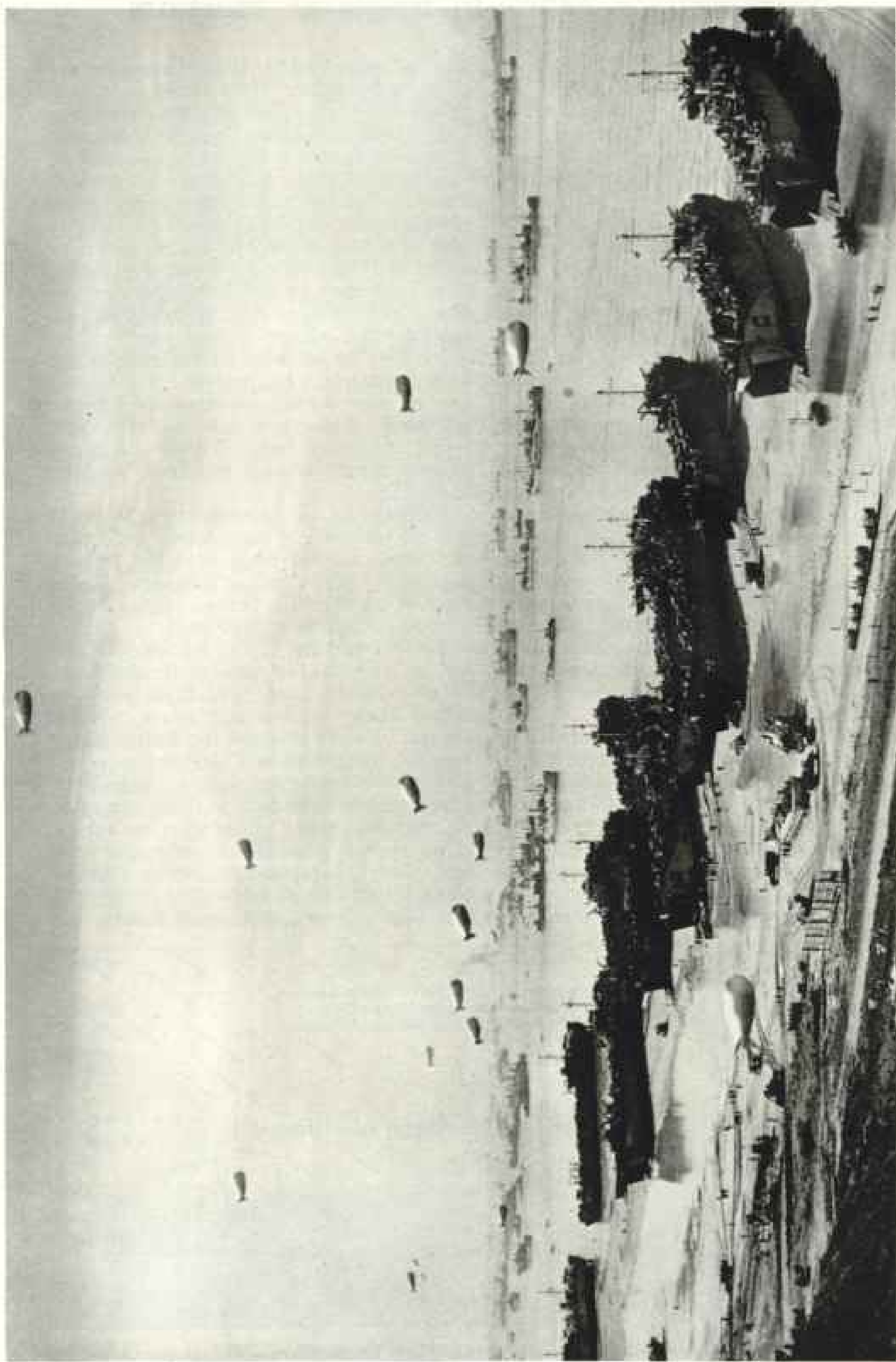
By 1943 he got what he wanted—a ship's deck floating on a big pontoon. Steel spuds, one at each corner, answered the "anchor problem." These legs, lowering splay feet, rested on the sea floor. Without the use of lighters, spud pierheads unloaded freighters and LSTs.

Protected by the breakwaters, other LSTs emptied vehicles onto the beaches. Still others discharged wheeled cargo onto the Seabees' flat "rhino" ferries, built of pontoons. During the first 10 days, the Seabees' rhinos landed some 21,000 vehicles (page 567).

By D Day plus 13 the British Mulberry and its American neighbor at Omaha Beach (a code name) were more than half complete. Then a three-day storm wrecked Omaha. Despite damage, the British harbor survived, partly because Calvados Reef served as a natural breakwater (map). Englishmen have reason to be grateful to that rocky shoal. As long ago as 1588 it ripped apart one warship of the Spanish Armada. *Salvador*, the vessel was called. Corrupted to Calvados, its name was applied to the reef as well as to the adjacent *Département* and its apple brandy.



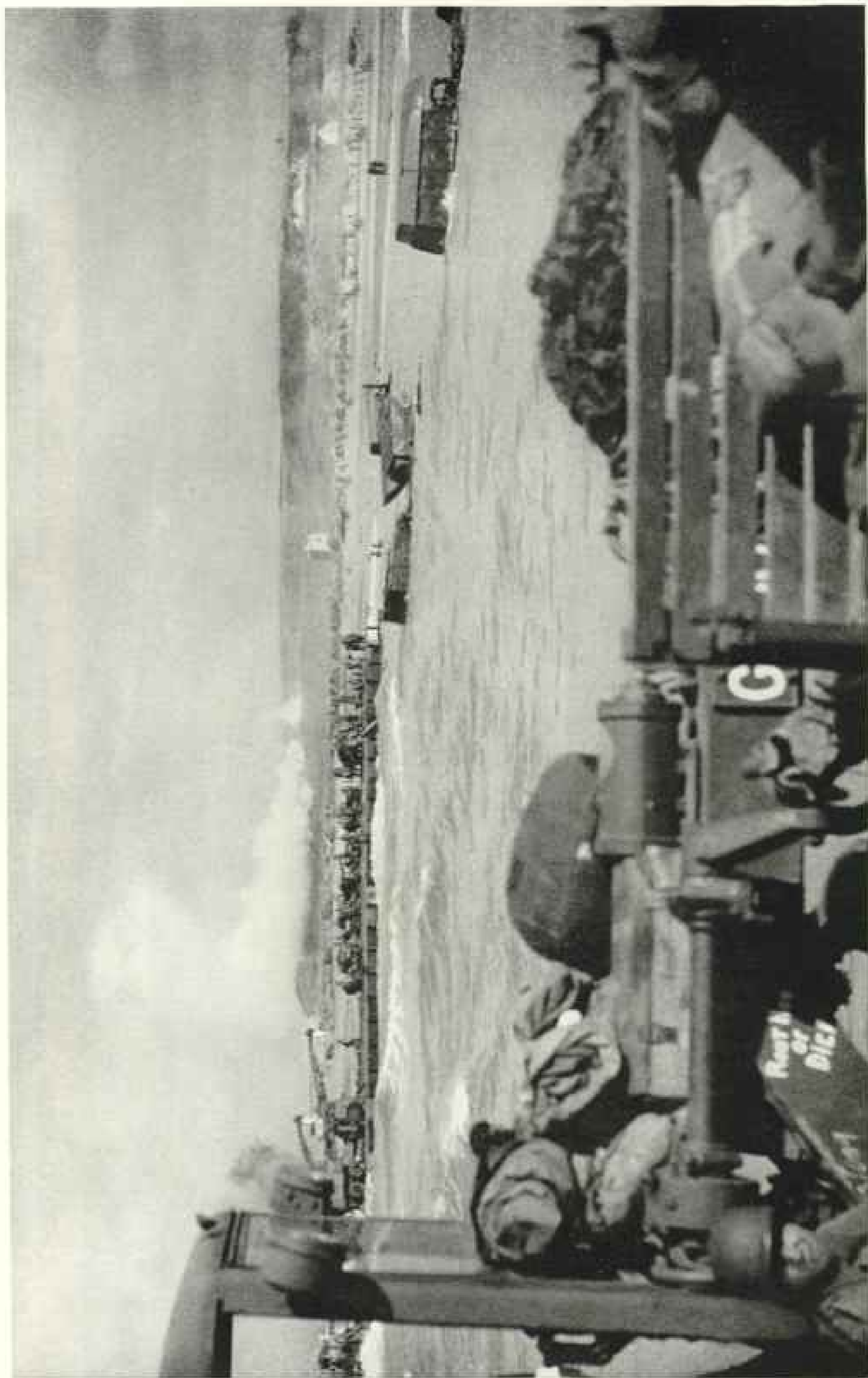
From England, 100 Miles to the North, the Allies Towed Two Portable Harbors to France



U. S. Navy, official

Barrage Balloons Float above LSTs Disgorging Trucks on the Americans' Omaha Beach Before Breakwaters and Piers Were Set Up

Deeper than it seemed at high tide on D Day, the lagoon between shore and sand bar took the lives of some Yanks wading ashore under packs.



U. S. Army Air Forces, Official

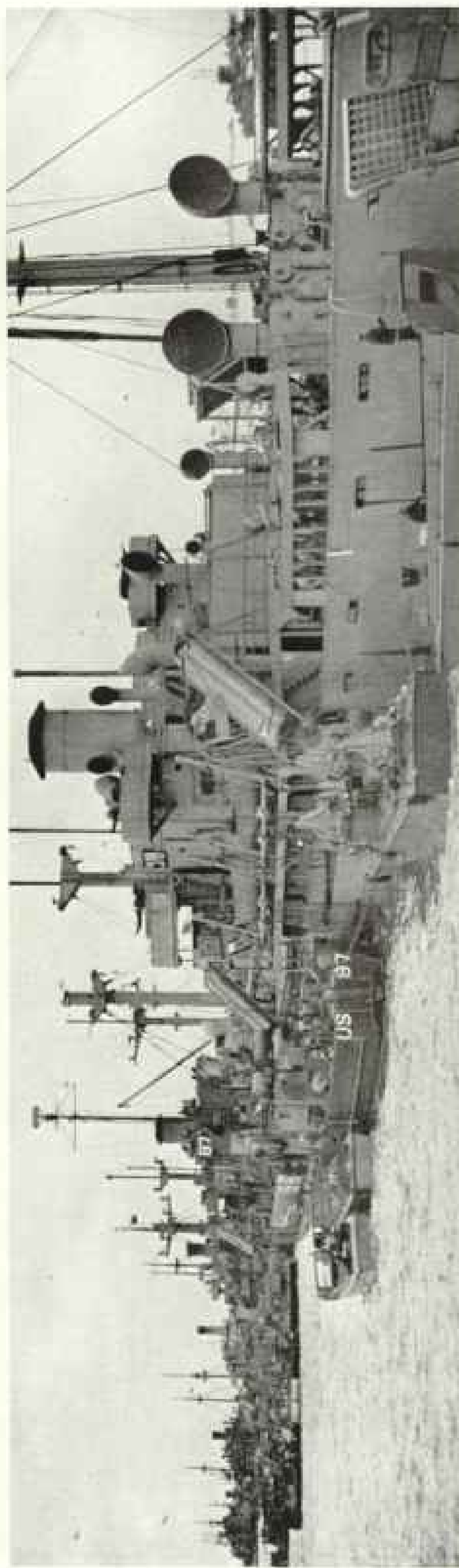
On D Day, Rhinos Ferry Yanks to "Root, Hog, or Die" on Beaches Sown with Barbed Wire, Upended Rails, and Land Mines

In the hills, Ninth Air Force bombs dust off Nazi pillboxes and, as a by-product, dig craters to shelter our soldiers. Crawling ashore in shallow water, two Army vehicles carry boats on their backs, so that crews can get ashore in case of breakdowns. A soldier launches his dinghy from the stranded truck second from right. Mobile cranes for removal of wreckage travel on a Seabee rhino. These rafts consist of steel floats bolted together.



Tugs Jostle Phoenixes, Buoyant Concrete Caissons of the Code Book, into Line for Sinking

Britain built 146, some from the rubble of blitzed cities. These carry anti-aircraft guns—one reason why only one was lost under enemy action.



U. S. Navy, Official

Landing Craft Tie Up to Sunken Blockships, Scuttled to Shelter Omaha Beach from the Waves—Off Vierville sur Mer

Sixty vessels, including many early Liberty ships, were dynamited in line. Together with caissons, they formed five breakwaters 24,000 feet in length.



U. S. Army Signal Corps, Official

Invasion Banishes Rehearsal's Taut Nerves. Yanks Leaving England Know "This Is It!" Camouflage Nets Are for Use Ashore.



British Official

This Secret Weapon, a Floating Pier, Suggests No Terrors, Yet It Dismayed the Nazis

This extraordinary engineering device was one of the invasion's main surprises. It set armies and heavy equipment ashore more quickly than the enemy dreamed.

Seen in the British harbor, seven spud pierheads unite to form a buoyant wharf (page 572). They take their name from the spuds, or steel legs, rising at the corners of each unit like the uprights of unfinished skyscrapers.

Each pierhead is a "ship," complete with crew quarters and dynamo. Once their home has been towed into position, the operators switch on winches and drop the spuds. These stilts have wide, blunt feet to rest on sand or rock. They hold the pierhead in position.

A steel pontoon displacing 1,000 tons lifts each pierhead. Each unit is 60 feet broad and 200 long. Thus a wharf composed of seven pierheads has some

1,400 feet of docking space along the outer side.

To pierhead sides, ships tie up and transfer cargo to trucks. Leading to Normandy, two pontoon roadways (left) permit one-way traffic.

The pierhead, like a ship at anchor, slides up and down its spuds with the Channel's 20-foot tides. White-painted figures indicate the depth. No matter what the water level may be, the pierhead is always within reach of cargo handlers. A stationary wharf would tower above decks at low water and be submerged at high tide.

Pierheads were built like ships in British yards. A sample unit was delivered in 1943. Stiff trials were passed before the Allies accepted the device.

Here a mobile crane is in position to dip into a barge (left). A truck carries pipe, perhaps for the gasoline line built across France at the rate of 50 miles a day to follow the tank armies.



British Official

British Ambulances Carry Wounded to a Hospital Ship for Swift Return across the Channel

Flying the recognition signals of the day, the ship is moored at the end of the British harbor's LST pierhead. Seen through the spud pierhead's steel arch, a traffic director waves machines to left or right. Those going to the right take a ramp to an overhead loading platform.

From an adjacent LCT (right), Army Fire Service trucks drive onto a floating ramp, or false beach, leading to the pier roadway. Ashore, the crews will be fire watchers at supply dumps. Although the trucks are British, they bear the American star on their tops. D Day's innovation, this insignia was used by the Allies as a recognition signal to friendly aircraft. Similarly, all Allied planes had black-and-white stripes for easy identification.

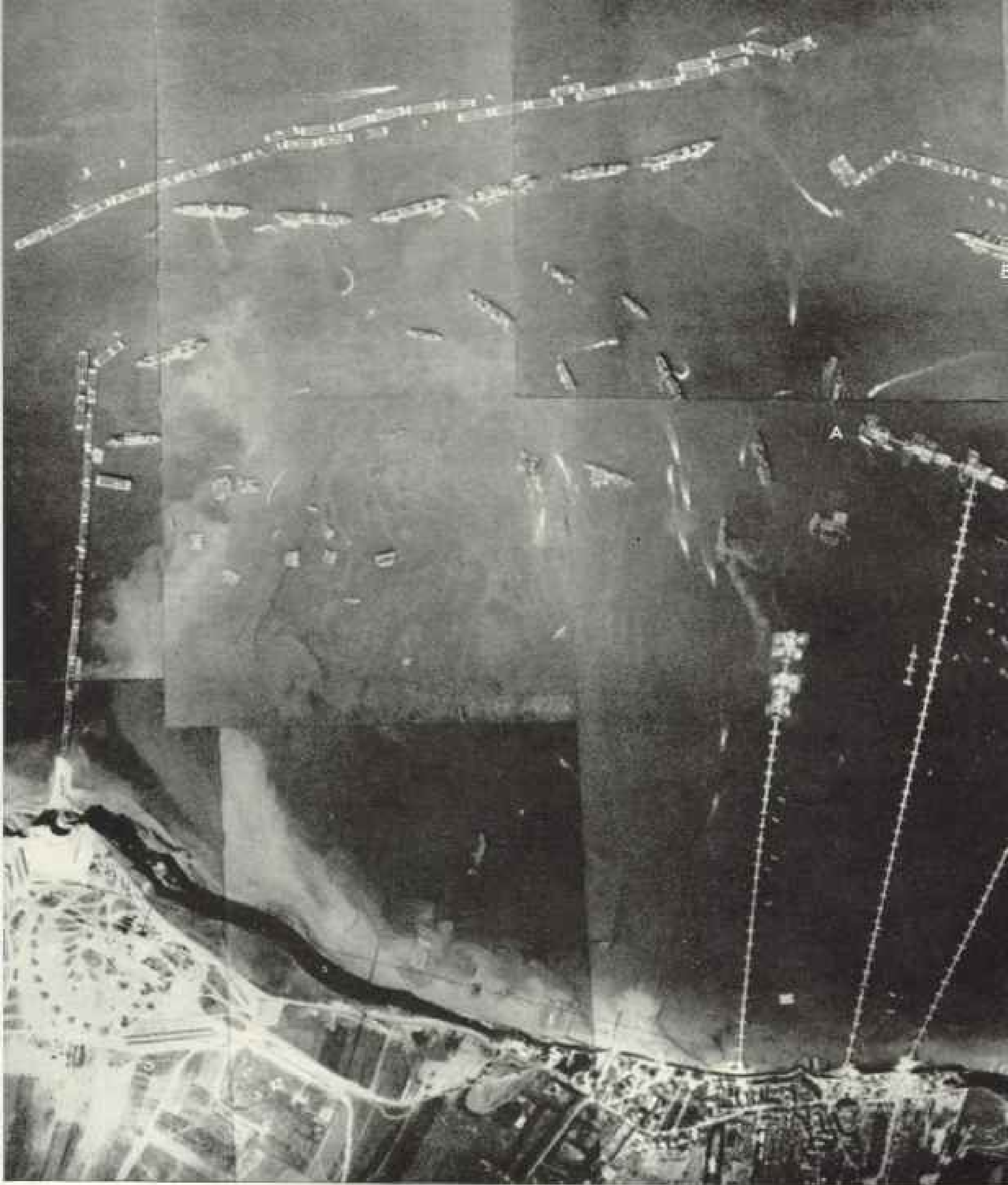
Invasion's first casualties returned to England on the night of D Day itself. By D plus 6 the beaches were clear of wounded except those unable to stand

the trip. Two American and two British hospital ships shuttled across the Channel.

As hospital ships, LSTs did double duty. After weapons rolled out of bow doors, stretchers were borne in. One LST carried 400 wounded.

To land their armies and bring back the wounded, the Allies left almost nothing to chance. These trucks and ambulances, for instance, are sure of their footing ashore. Months before the invasion, civilian scientists undertook a commandolike raid, making a sneak landing on a dark night. Creeping within range of German guns, they took samples of beachhead soils for a study of the terrain. Soft spots were bridged when the troops landed.

Applying a lesson learned on the Dieppe raid, the British waterproofed every Allied invasion vehicle exposed to the surf. Tanks were sealed to withstand six feet of water (page 569).



France's Busiest Port! Arromanches, Bathing Resort and Fishing Village, Can't Believe It

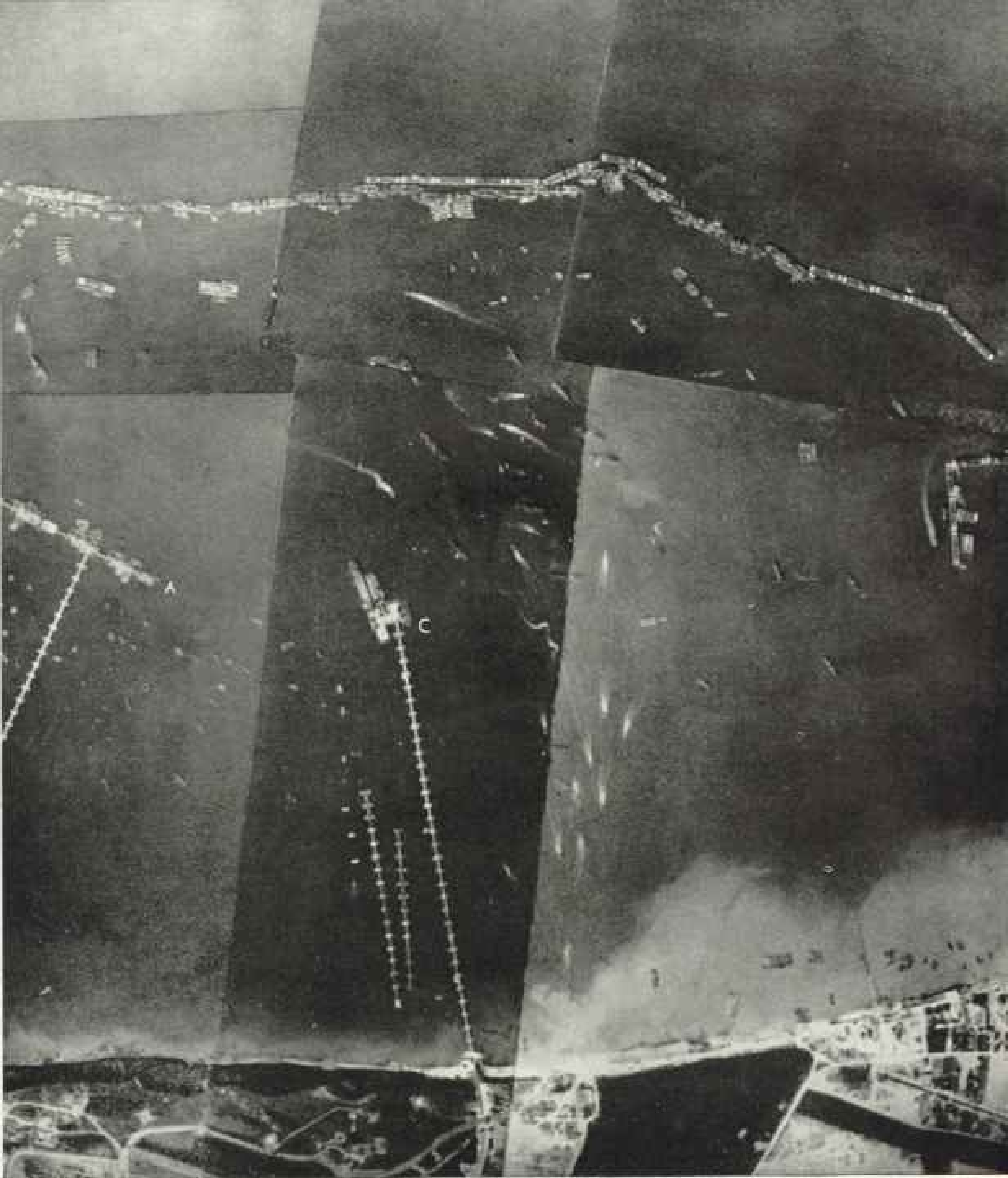
Arromanches, here sitting at the foot of three floating piers, was known to invasion planners much more intimately than it realized. Many prying eyes were turned on the French town during the months its harbor was being prefabricated in England. Every building torn down, every fortification erected by its German garrison was detected by aerial photography and shown on a scale model.

Two long piers carry traffic into Arromanches from the seven pierheads forming the wharf (A-A). White dots enclosed by piers are spare pon-

toons. A shorter road leads to a barge pierhead.

Crisscrossed by new roads, a supply dump occupies the mound in the lower left. Above it, the harbor is walled in by a line of caissons extending almost to the cliff. Between the entrances, six Liberty ships lie in the shelter of 30 caissons.

Just below the long breakwater rides an overage British cruiser (B), nerve center of the harbor. Port-control officers flew their signals from her mainmast. Her holds served as a supply depot and her deck as an anti-aircraft gun tower.



British Official

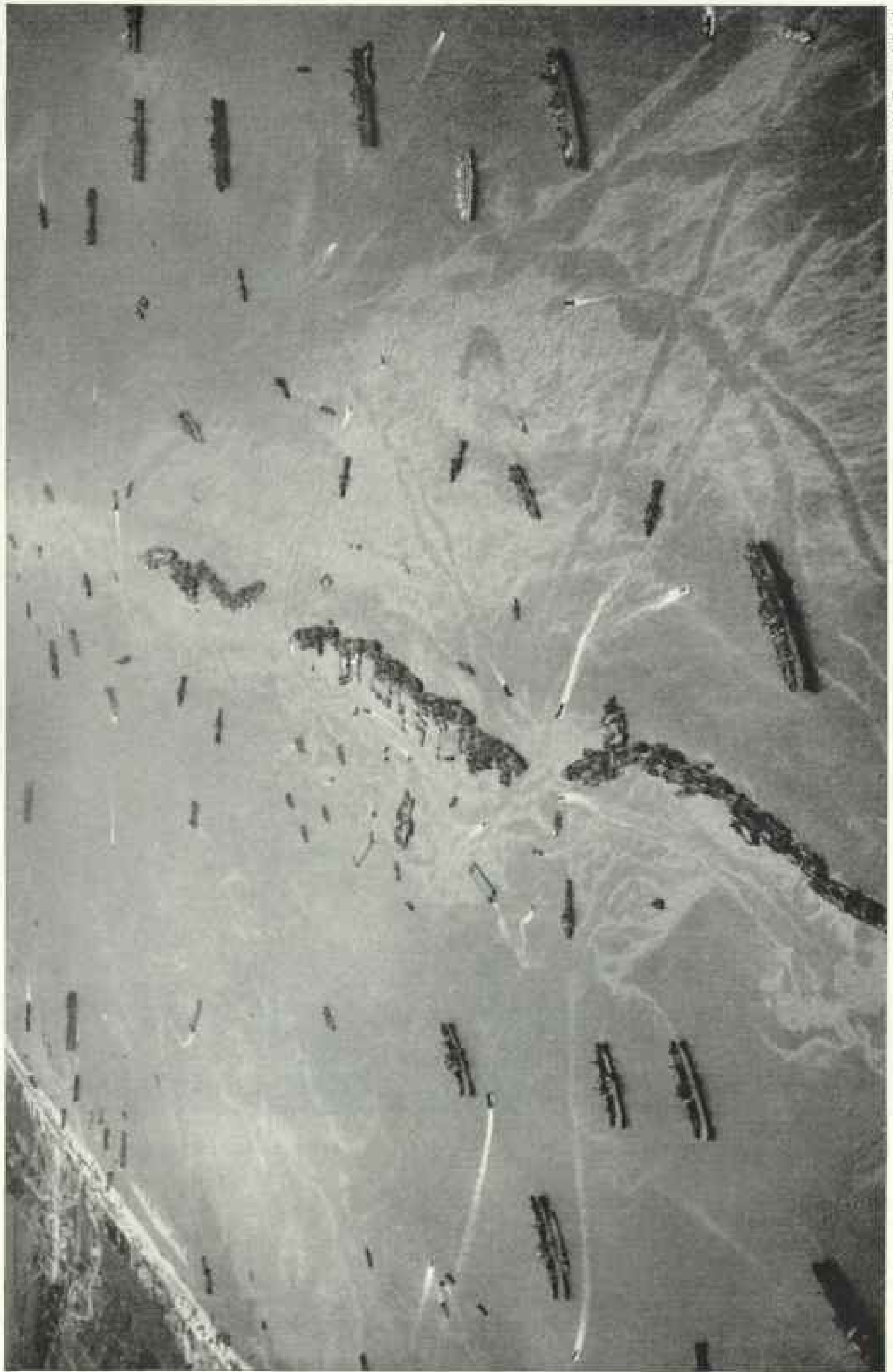
One Mile Wide and Two Miles Long, British Mulberry Is as Large as Dover Harbor

Its boundaries marked out on June 7, this artificial harbor was complete by mid-July. Here it is so vast that eleven aerial photographs, pieced into a composite, are needed to show its dimensions.

Mulberry has been called the eighth wonder of the world. Never, says Supreme Headquarters, did so much shipping use a like amount of space at one time. Through these works flowed the hundreds of thousands of tons of supplies that finally cracked German resistance in Normandy. Even as the war moved east, Mulberry remained in use, but the cap-

ture of Antwerp and other ports made it of secondary importance. It survived the worst winter storms.

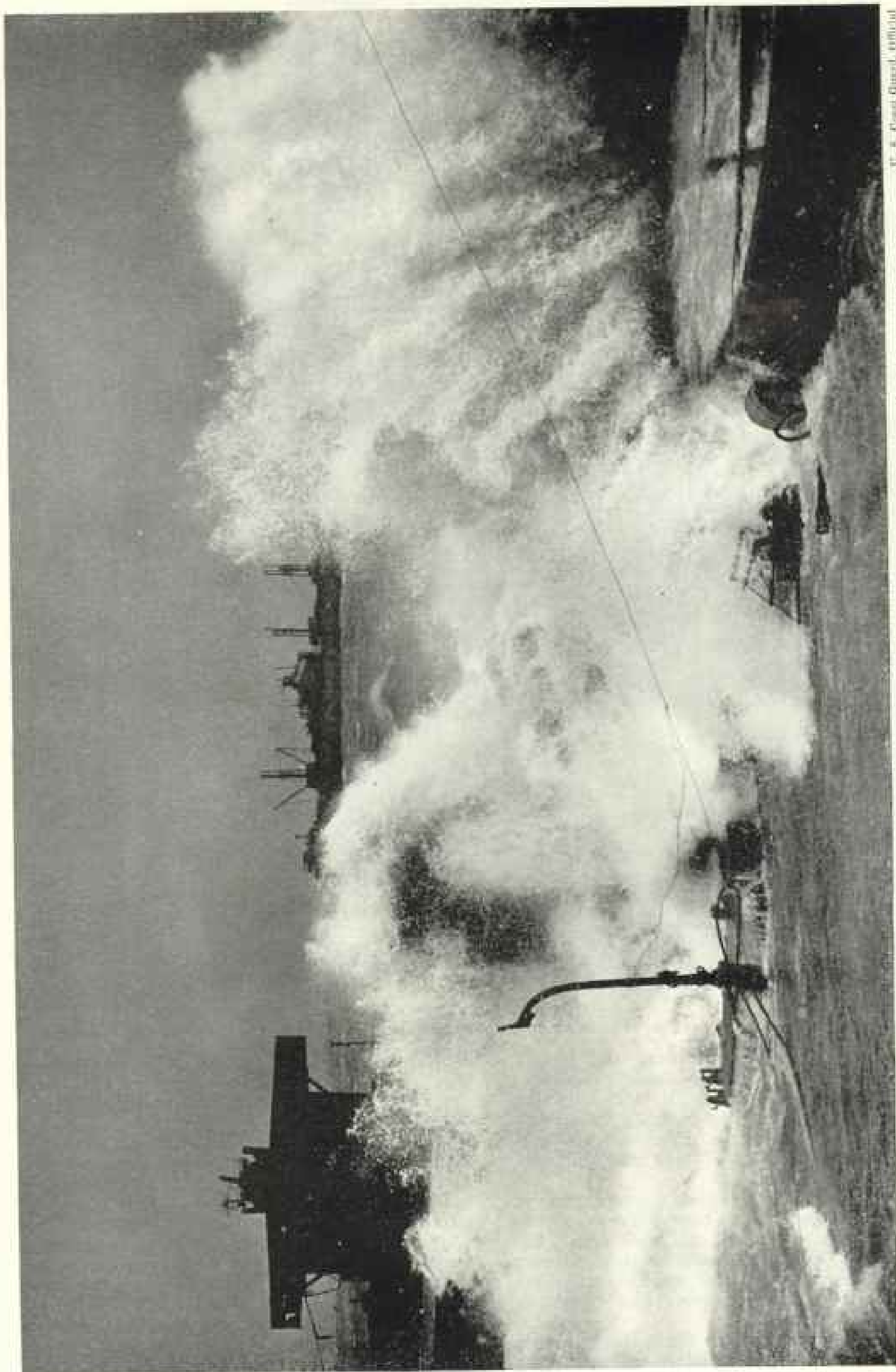
Egg-box-shaped concrete caissons, relieved by blockships, form the long breakwater. Clusters of small boats lie in its lee. Five extra caissons are parked in an angle at the extreme right. The long straight line from shore is a floating roadway to the LST pierhead (C). Beside it rest two spare sections of pontoon bridging. Small craft race in and out of the harbor like meteors.



U. S. Army Air Forces, Tibbetts

Decks Are Grave Markers for 13 Liberty Ships, Scuttled to Protect Vessels Unloading on an Invasion Beach

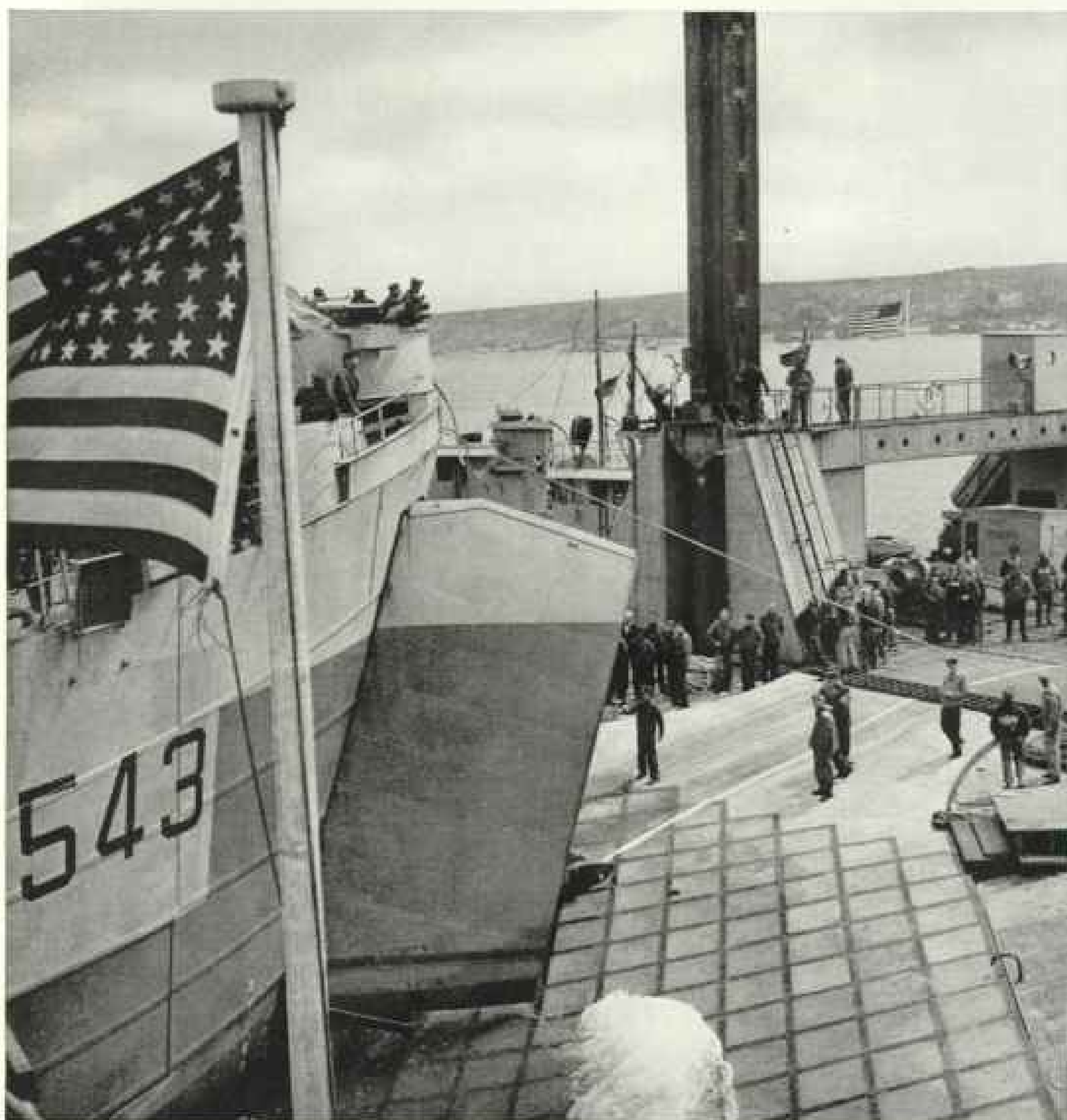
At the far end rests the British battleship *Crested*. This outworn veteran of Jutland was sunk, together with other obsolete men-o'-war. Painted white, a hospital ship steams in. 'Rhino ferries expose tops as flat as carriers'. On shore, white streaks are roads built for invasion traffic.



U. S. Coast Guard official

That Living Ships May Not Perish, a Dead Merchantman Absorbs the Blows of a Mountainous Wave

At high tide her gun tub contains only salt water. A neighboring punching bag, the tall casison on the left, retains its flak gun. Seen through the foam, a freighter rides the storm outside the harbor walls. Waves like this wrecked the American installations (opposite and page 576).



U. S. Navy, Official

Sitting on a False Beach, or Portable Doorstep, an LST Unloads Her Wheeled Traffic

A wave beats against the inclined ramp as LST 543 opens her bow doors for delivery of cargo to the floating pierhead. Low tide is indicated by the figure "20" on its black upright. In the distance barges lie at the foot of the American beachhead off Vierville sur Mer. French villas still stand on the shore.

By D plus 12, half the Yanks' equipment was in line. On the following day came a three-day blow described as the worst June gale in 40 years. Exposed to its full force, pontoon bridges were wrecked, sunken breakwaters smashed, and floating breakwaters driven ashore. Pier equipment crossing the Channel sank.

As a consequence, work on the American harbor was discontinued. Its breakwater mended, it was

used thereafter only for landing craft. In consolation, the speedy capture of Cherbourg gave the Americans a battle-wrecked harbor they could repair.

Most salvageable material was turned over to the British. Their harbor, protected by Calvados Reef, suffered far less damage, though its floating breakwater was lost. Even on the worst day, Mulberry landed 800 tons of supplies, as well as many troops.

Heavy LSTs experienced little trouble crossing the Atlantic under their own steam. Smaller LCIs (Landing Craft, Infantry) likewise made the voyage, though they bounced like corks. LCVPs (Landing Craft, Vehicle, Personnel), LCTs (Landing Craft, Tank), and some other smaller vessels were ferried piggyback by cargo ships.



U. S. Army Signal Corps, Official

To Drive Headfirst into France, a 155-mm. Howitzer Backs into an LST in England

Trucks likewise enter in reverse, for once inside there is no turning around. Soldiers also pour in from a rhino ferry engaging the LST's ramp.

These men undertook a crossing of the Channel that stopped Hitler cold. His strategy was to seal the big French ports so tight the Allies could not land heavy artillery.

That plan was upset by two Allied weapons, the landing craft made in USA, and the artificial harbors built in England.

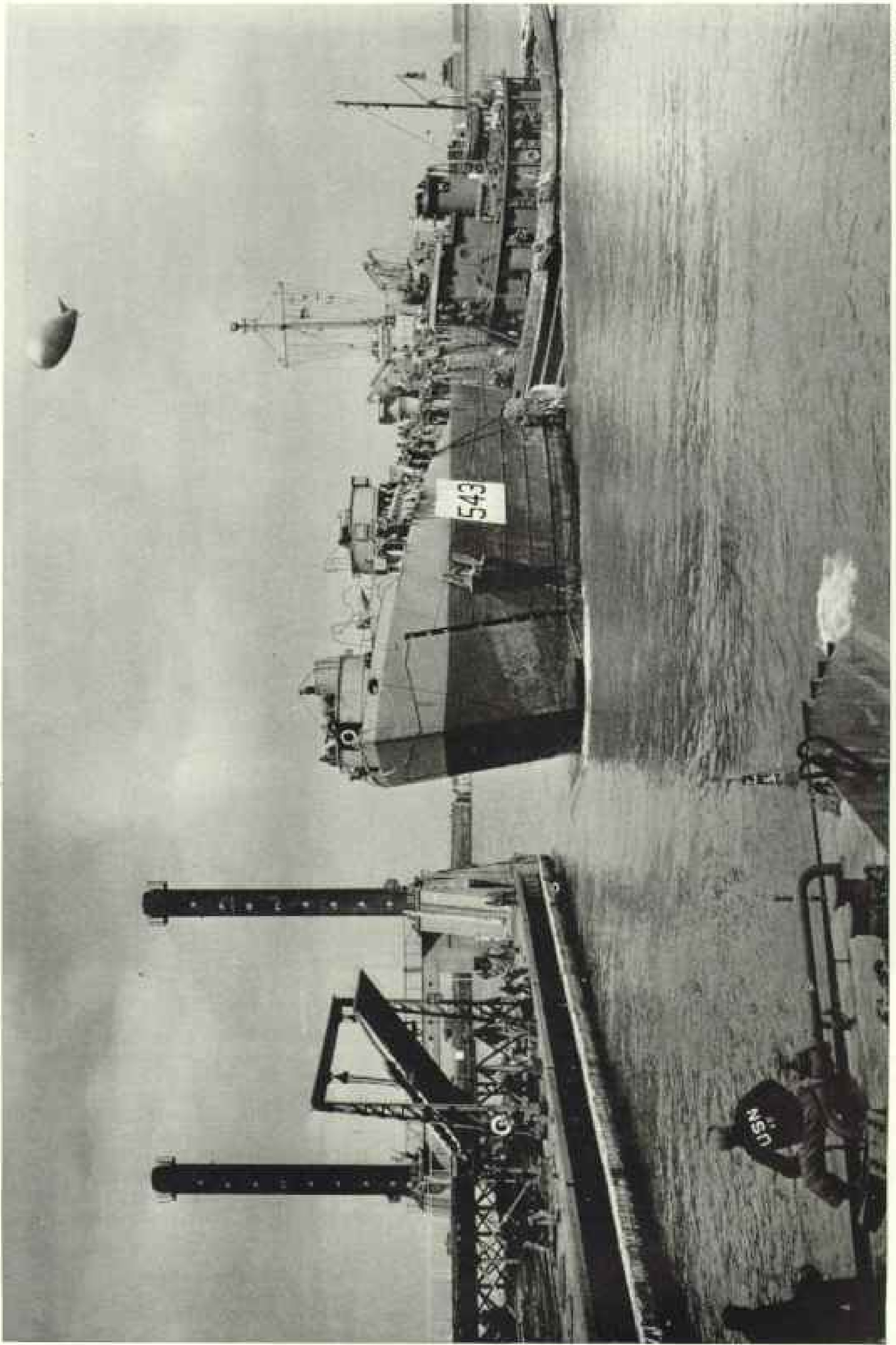
Thirteen days after its birth, the British Mulberry alone was delivering some 12,000 tons a day, a volume equal to that normally handled by Galveston, Texas.

Equipment was built piecemeal in many obscure harbors all around Great Britain's coast. Some

concrete caissons were laid down in dry basins scooped out of mud beside the Thames. Later dikes were cut and the hollow blocks floated into the river for finishing, ship fashion, in wet docks.

Mulberry was the Allies' "top secret." Hundreds of contractors and tens of thousands of workers making parts could only guess at their purpose. Strange shapes under scaffolds baffled people living near the yards. Even naval men were puzzled on hearing code names. If photo planes caught any secrets, the enemy failed to read them.

Finally the strange "ships" which had caused so many wrong surmises were towed under camouflage to parking areas off southern England. Assembled off Normandy, they were fitted together like pieces of a jigsaw puzzle.



Guided by a Tug, an LST Noses into a Floating Pierhead to Unload Tanks and Trucks

Already her bow doors are opening, preparatory to lowering the ramp to the false beach in foreground. Deck cargo will go over the upended span on the ramp.

U. S. Navy official



V. B. NAYR, OFFICIAL

Duck, the Army's Land-going Launch, Waddles Down a Pontoon Pier with Equipment for Infantrymen

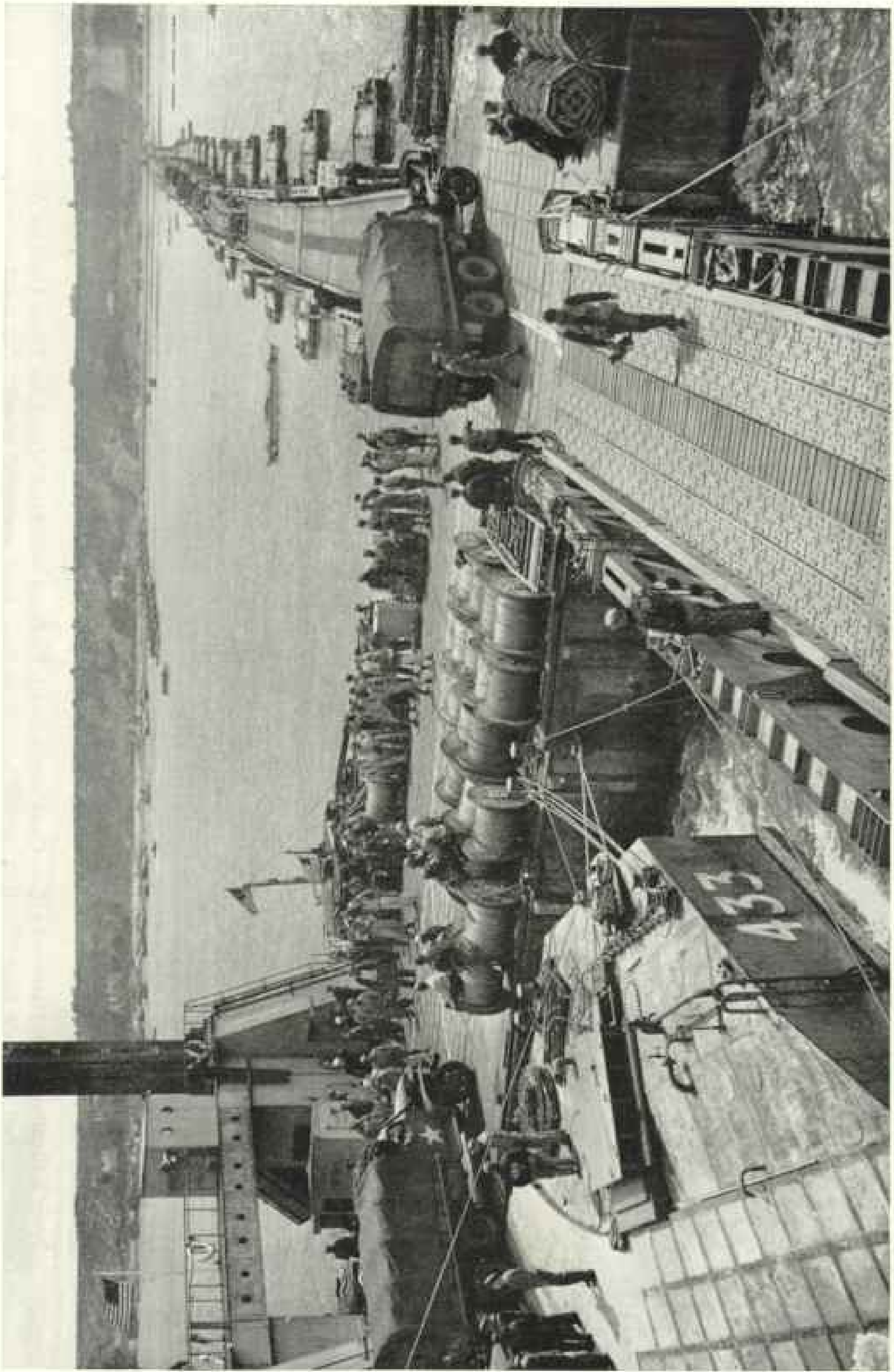
Steel and concrete "beetles" support the span. Sections fit like pieces of a Meccano set. Telescopic joints in the girders guard against buckling.



V. B. NAYR, OFFICIAL

From a Floating Road, Half-tracks Tow Guns onto a Beach Surfaced with Steel Mats Like Those Used on Airstrips

Seabees, landing on D Day, built this Omaha Beach road, which rises and falls with the tides. Spare parts appear to right. Tugs towed pier sections in 480-foot lengths.



U. S. Navy, Official

For Delivery of Trucks at Sea, False Beach No. 433 Serves as a Steppingstone to a Spud Pierhead.

Here pierheads are joined side to side; a man in a jacket walks one of the links. Spools of wire resembling cable are a reminder that a telephone line laid under the Channel was at work three days after D Day. "Load limit 25 ton," says a bridge sign. Inshore, another span is pushing out.

The Turkish Republic Comes of Age

BY MAYNARD OWEN WILLIAMS

ON the day Turkey, by unanimous vote of the Grand National Assembly, broke off diplomatic relations with Germany, I watched the ferryboats leave Istanbul's Galata Bridge and disperse, lest vengeful bombs disrupt the traffic of the city by the Golden Horn (Plate X).

August 4, 1944, at Ankara's big, clean station, I saw Franz von Papen make an inglorious exit while a few misguided Axis puppets gave the Nazi salute and waved handbags and hats in front of the press cameras.

Hundreds of poker-faced Turks silently watched a shiny private car, attached to the crack Anadolu Express, bear the German Ambassador away. Five minutes later the broad platform was empty, the restaurant loudspeaker was at full blast, and thick Turkish coffee was being inhaled with noisy gusto.

In 1911, when I first went to Turkey, it was a huge Empire which stretched from Balkan snows to Libian sands. But World War I stripped it of vast territory, including Palestine, Syria, and Arabia.

Turkey's strong man, successively known as Mustafa Kemal Pasha, the Ghazi, and Kemal Atatürk, divorced the Moslem Church (Islam) and the State from a union which had endured for 1,200 years. He moved the capital from Constantinople (Istanbul) to Ankara and on October 29, 1923, proclaimed the Turkish Republic (map, pages 594-5).

The *fez* was abolished, and elder men in caps turned the visors back, like old-time aviators and movie directors, so that their reverent foreheads could touch the footstool of Allah the Merciful.

Setting up his blackboard in the very shadow of the once-sweet-scented seraglio, Kemal Atatürk taught his people a new alphabet, akin to our own. Even he dared not rudely tear aside the veil. But when the new railway to Kayseri was opened, only unveiled women got the choice seats!

To help them carry out his dictum, "Be Proud," he sought to imbue Turks with a knowledge of their history, which goes back to the days when men were first cultivating grain and domesticating animals.

The memory of Atatürk, reinforced by many a monument and countless pictures, lives on. His hardy, homogeneous people, led by President Ismet İnönü, are working out their own destiny. The Turkish Republic is now of age.

From the car window during the hot ride last summer from Kayseri to Ankara, it would

have been easy to believe that no progress had been made. Peasants in many-patched clothing were treading out the grain in the immemorial way. Peasant women, dressed in Turkey-red pantaloons and with their head shawls pulled close about their faces, looked unchanged (Plate XVIII).

But never had I seen such fine flocks and herds along these valleys where young trees were spreading their shade. Wheat was piled high. And at Ankara it was as if some Aladdin had rubbed his magic lamp.

When, in 1927, I toured the new republic with truck, tent, and interpreter, I had seen some of the first new buildings of Ankara rise from the forbidding plain. Malarial mosquitoes reigned in the low swampland, and the passing of every vehicle was marked by a cloud of dust (Plate XV).

Today, white-sailed "yachts" tack back and forth on the pleasure lake which has replaced the miasmatic swamps, and Diesel-motored buses roll down such boulevards as few cities know.

Countless trees shade the broad highways. In every quarter there are parks and flower beds galore. At sidewalk cafes young men in fashionable dress eat their cakes and ices in cosmopolitan ease. Their fathers wrestled with the serpentlike tubes of gurgling narghiles.

New Freedoms of Turkish Women

Were Turkey still the man's world it was, with women decked like black crows within "yes" distances of their lords, Ankara would be a remarkable city. Through it now move pretty young Turkish girls, short of skirt, sheer of stocking, and red of lip, with freedom and poise. Cork-platformed sandals add to their streamlined height (Plate XVI).

Male influence still exerts its conservatism on them. There are many things that these slim princesses may not do. But so far as I could judge, they are as independent as American girls. These free-striding young women seem the finest fruits of the New Turkey.

From the Turkish Press and Printing Bureau, where I got my press card, Nuri Eren and I drove to a modern broadcasting studio. A recording was being made for transmission to America. Few studios have finer equipment.

Perhaps it was the glow of the young woman announcer, who was wearing a new engagement ring; but every time this dark-eyed girl spoke over the microphone it was as if an inarticulate race of women suddenly had found voice.



Turkish Dress Bureau

Old Turkey Inspires the New

Shown in water color, the Ottoman Empire costume was the pattern for the model's dress. She and fellow students at Ismet İnönü Institute design hats, gowns, and suits for Ankara ladies. They give two fashion shows a year.

Here is a quotation from her broadcast:

Listen, America!
 We are the women of Turkey!
 We are free, as our country is free.
 We have won our liberty and we cherish it.
 Like you, we have equal rights with men.
 Listen, America!
 We are the women of Turkey!

During a glorious Ankara sunset I sat near the base of Pietro Canonica's light-footed equestrian statue of Atatürk, overlooking the

city. A suspicious soldier looked askance at my notebook.

Behind my right shoulder anti-aircraft guns added a strange touch to the Citadel, which dates back to Hittite times. Phrygians, Galatians, Romans, Byzantines, Seljuks, and Ottomans had ruled there without getting far from the fortified ridge. But Atatürk spread his capital across the plain and up the distant slopes (Plates IV, XI, XV).

To this city of long life, variations of the same name have clung for thousands of years. "Ankara," whose "k" is almost a "g," may relate itself to the "anchor" which was once the city's symbol, or to "Angora" cats and goats.

A cluster of zinc domes on the historic hillside marked the restored Bedesten, or wool market. There, set in just such order as I saw them emerge from the soil at Carchemish in 1913, are the finest Late Hittite sculptures now known.* Woolley and Lawrence, the Carchemish archeologists, were occasionally helped by the Kaiser's engineers who then were pushing the Baghdad Railway across the Euphrates. Hillside cuttings unearthed carved stones and house walls.

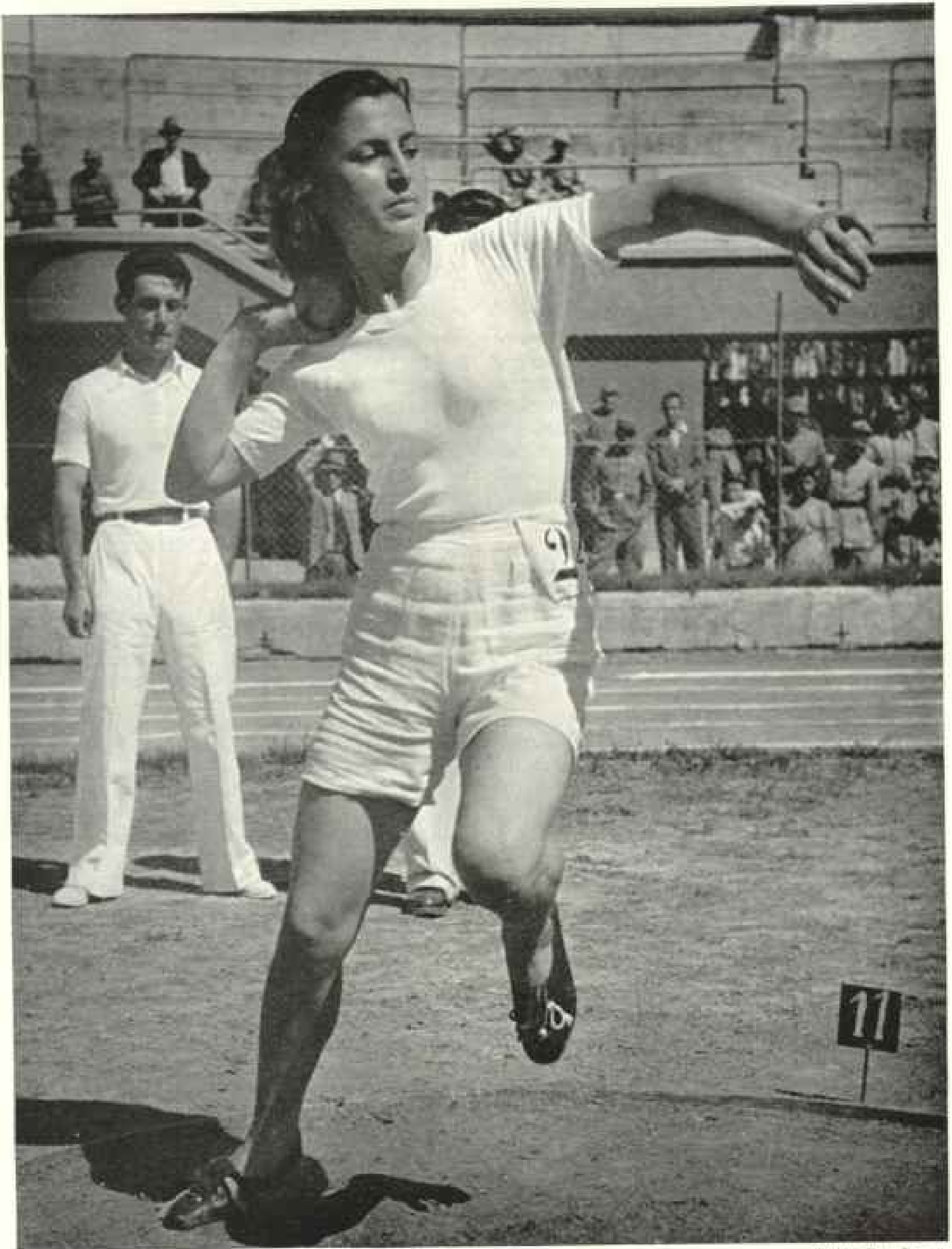
On one black basalt slab is a long inscription in hieroglyphic Hittite, with its symbols marching back and forth in the oft-reversed pattern of an ox plowing a field.

The streets in the Citadel, and those throughout much of older Ankara, have changed little. But modern apartment houses with overhanging balconies are replacing the overhanging upper stories of the older homes.

Motorcars climb smooth roads to the fortress gates. A garden gives a verdant setting for the ruddy battlements whose first stones may antedate those of the Pyramids.

From here the eye sweeps over the broad bowl where the schools, banks, and bureaus of the capital are rising above the growing trees. Diplomatic society climbs the long slope

* See "Archeology, the Mirror of the Ages," by C. Leonard Woolley, NATIONAL GEOGRAPHIC MAGAZINE, August, 1928.



Turkish Press Bureau

In Revolutionary Shorts, She Heaves the Shot Heard Round the World of Islam

This girl in the Ankara stadium participates in sports on a basis of equality. Her grandmother could not show even her fingertips in public places. Atatürk said: "If a social group contents itself with the progress of only one sex, that group is weakened by half . . . Our need is the higher education of our women . . . Let them reveal their faces to the world." Turkey's example has had profound influence in neighboring Moslem countries.

toward Çankaya, where the Presidential Palace spreads its ultramodern verandas above bright gardens. These slopes are known for their wines.

When Mustafa Kemal was trying to induce foreign diplomats to leave the delights of the Bosphorus to help build a remote capital on the bleak plateau, spacious grounds were granted the Germans and Russians near the town.

The English and Americans later acquired even choicer locations, close to Turkey's "White House" and the wide-roofed country home of the Prime Minister.

The hilltop Embassy of the United States is still unbuilt, and our officials occupy several humble buildings within shouting distance of the monument to Public Security near the beginning of a mall. There the neat functional buildings of 1935 are about to be dwarfed by a new palace for the Grand National Assembly.

Along Atatürk Boulevard acacias, horse chestnuts, and plane trees almost hide the sky, and the air is scented by young pines.

A Boom in Books

The adoption of the New Alphabet has brought a prolonged boom in books. Windows of the excellent bookstores reveal an amazing display of desirable books in Turkish. If Turks seem to read little, it may be because few have read at all for very long.*

Turkey has recently depended on Germany for many of her imports. Now "Roosevelts" (army shoes from America) and "Churchills" (officers' boots from England) give a better footing for Turkey's fighting men.

A score of electric irons in a single window had found no buyers, because of the high price tags. Electric heaters and fans, radios, alarm clocks, and cheap watches gathered dust.

Government workers, obliged to wear stockings, spend a sizable share of their salaries on sheer glamour. Not the seraglio, but silk and nylon are Miss Turkey's present concern.

Turkish-made nylons, at \$3.50 a pair, are so attractive that when you leave the Republic, customs men ask if you have any in your baggage.

While getting my shoes shined, I appraised the wardrobe of a well-dressed Turk beside me at something like \$150.

It is hard to quote prices, for there are three rates on the Turkish lira. For commercial transactions, \$100 buys only 130 liras, of 100 piasters each. Visitors can cash their dollars for personal expenses at 180 piasters each. In the black market, Turks needing American funds may pay 200 or better.

Counting the dollar at 180 piasters, a two-pound can of Golden Syrup was offered at

\$1.50 the can; olive oil at \$1.80 a quart; condensed milk, 70 cents a can; canned peaches or plums, \$1.60 a can.

At my favorite restaurant the first course of a three-course lunch was delicious string beans. Two such generous helpings, if canned, would cost a dollar. The price of a can of peaches or plums would buy a whole meal, including all the fresh peaches, pears, apricots, grapes, or melons one could eat.

One of the best meals in Turkey is that served on the Anadolu Express, which leaves Ankara late in the afternoon and slides along opposite Istanbul's domes and minarets in the cool morning. Soup, swordfish, a tomato and cucumber salad (very swanky in Turkey), tender roast lamb, a stuffed eggplant, in the preparation of which Turkish chefs have no equal, apricots in a mound of crushed ice, and a slice of sweet melon come to \$1.65.

One pays extra for bread and mineral water, and there is not only a fixed service charge but the added tip brings such a meal up to something over \$2. À la carte prices and a dinner with music cost more.

"Food is reasonable but entertainment comes high," is the way one friend expressed it.

In Ankara the center of food and entertainment is the restaurant of the beloved Karpıç. Nowadays he seldom serves dusty bottles of rare wine, as he did when Ankara was rising from the earth. To see him adjust his pince-nez and fondle a bottle was one of the choice spectacles of hostly showmanship. His skill in seating the diplomats of nations at war with one another in a single garden won the admiration and envy of protocol officers.

In Ankara I saw only one real bargain—delicious hazelnuts from the Black Sea at 35 cents a pound. When candied in the incomparable Turkish way, they are only 60 cents a pound, five cents more than the cost of granulated sugar. Switzerland usually buys them for chocolate bars, but war has interfered, and the growers around Giresun are getting little for their crop.

Banks Provide Park Benches

Between Ankara's fine station, with its adjoining casino, and the business center lies the wide stadium. There I saw a "golden gloves" champion teaching his Turkish fellows to box, a fashionable tennis club, and football fields where interned English and American aviators kept in trim. Eventually these flyers found their way back to their units.

Across the Boulevard of the Republic is Ankara's Central Park, with a yachting basin.

* See "Turkey Goes to School," by Maynard Owen Williams, *THE GEOGRAPHIC*, January 1919.

Star and Crescent on Parade

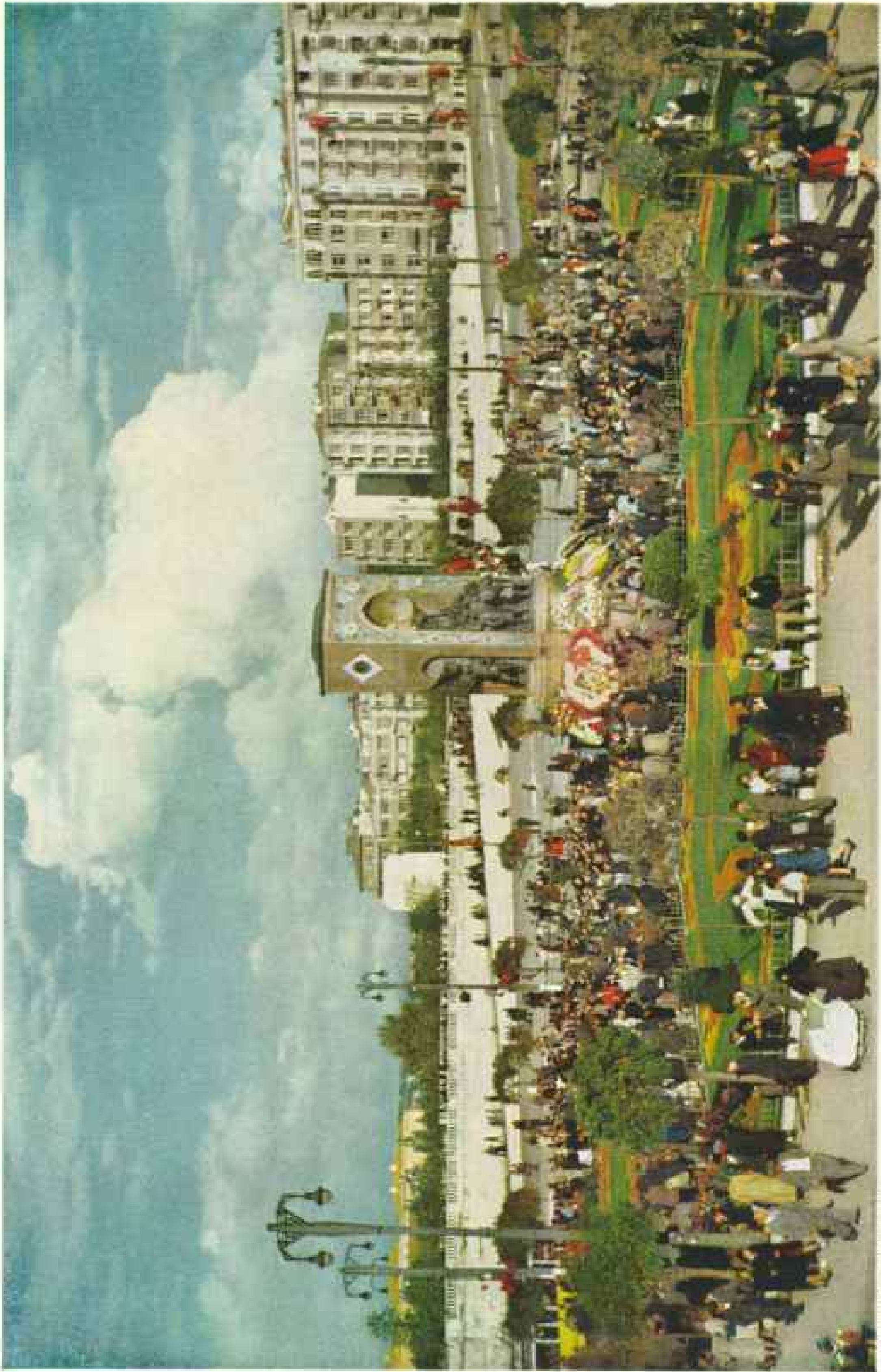


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Kilastirime by Maxwell Owen Williams

Graven Figures, Tabooed for Centuries, Exemplify Turkey's Break with Backwardness

In Istanbul (Constantinople) the Monument to the Republic honors heroes of 1919-21-22. Creator of the Nation, late Mustafa Kemal Atatürk holds the center. His successor, Ismet İnönü, stands in bronze at left.



© National Geographic Society

Illustration by Maynard Green Williams

Steel and Concrete Apartment Houses Ask the Question; Can This Be the Land of Bulbous Domes and Slender Minarets?

Istanbul, emulating American and Russian cities, clears away the old to make way for the new. Here where the Sultan's troops used to drill, city planners have created a new vista. Scarcely a brick is a fourth years old. Taksim Square celebrates the Republic's 21st anniversary, October 29, 1944 (Plate 1).

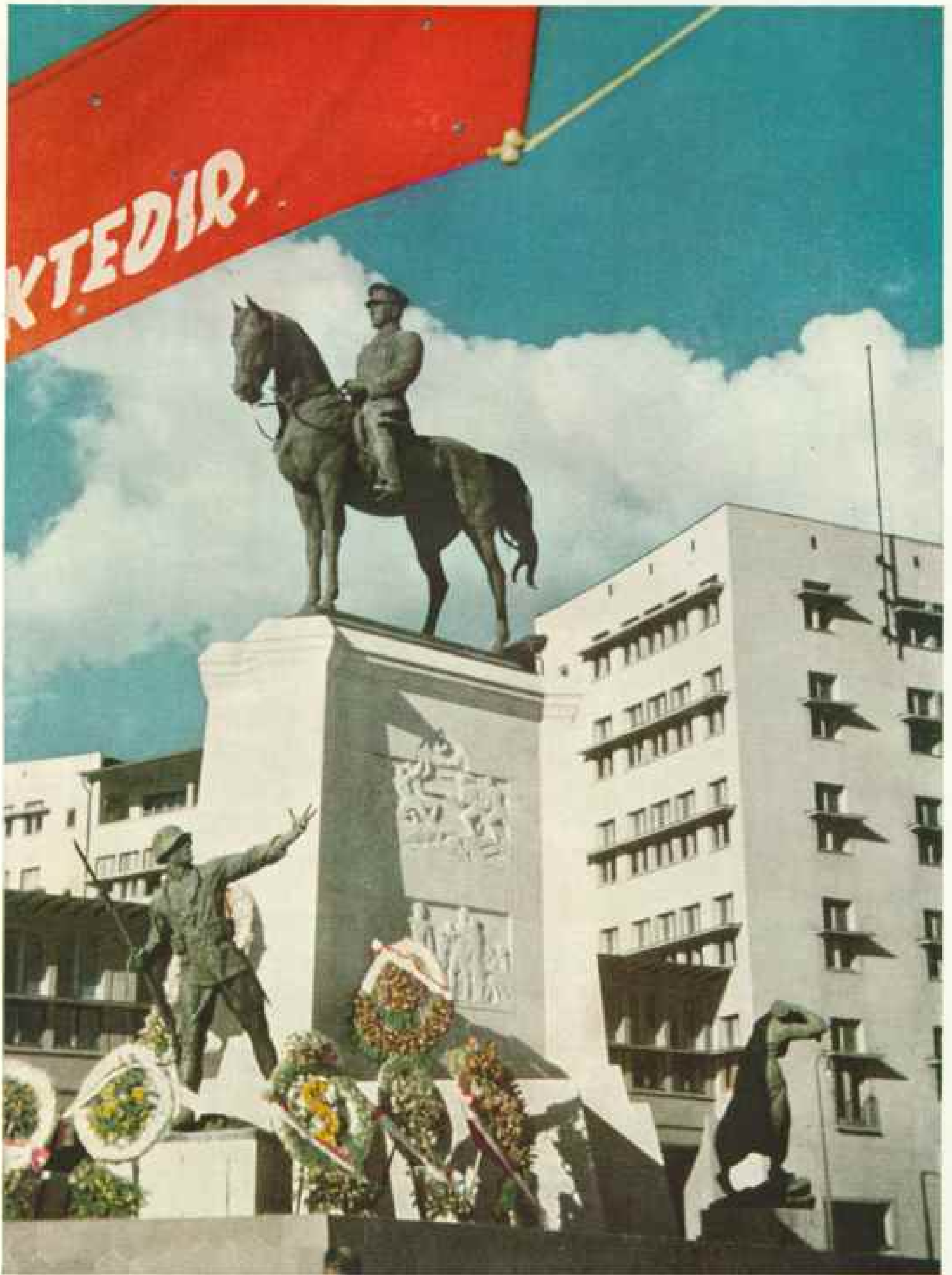


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Photographs by Margaret (now Williams)

Who Are These Turks, Speaking an Asiatic Tongue? Faces and Styles Suggest They Are Europeans

Out of Central Asia came their forebears, Seljuk and Osmanli Turks. Much of Asia Minor's original stock they absorbed. An Istanbul policeman (left) and soldier keep order during the coming-of-age party (Plate II). Between them, a woman has an old-fashioned black head-dress, but no one wears fez or veil.



© National Geographic Society

Modeling by Margaret Owen Williams

Ankara Honors Atatürk, Who Made This Sleepy Old Village His Smart New Capital

A bank building (right) is a sample of what he did to the onetime Angora of cats and goats. Overhead, a slogan, "The future lies in the skies," reminds the people to be air-minded. Below, a Turkish soldier holds the bayonet that drove out foreign powers after World War I. Right, his sister carries an artillery shell.

Star and Crescent on Parade



Boy Scouts, Not Teen-age Fascist Armies, Represent Istanbul's Youth Movement

Virtually every school has its Boy Scouts, who take the Scout oath and essay good deeds. They resemble their counterparts in America. Turkey fosters the organization as a mold of good citizens.



© National Geographic Society

Kidashimoi by Margaret Owen Williams

His Nominee for Queen of Turkish Girl Scouts Salutes the Photographer

Girl Scouts vie with Boy Scouts in numbers and enthusiasm. Hat devices are similar. Old-time *mullahs*, who believe a girl's place is in the home, mutter in their beards but cannot stop her progress.



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Star and Crescent, Dread Emblem of Turkish Conquerors, Parades at Peace with the Cross

At the Turkish Empire's zenith this flag held sway from Persia to Morocco, from the Sultan to Austria. Today the Republic has renounced territorial aggrandizement. On marble steps, thousands review Istanbul's Boy Scout drummers; On the curb, soldiers and policemen alternate as honor guards (Plate V).

Hyacinthum by Raymond Green Williams



As Girl Scouts Turn Their Backs on the Camera, Schoolgirls Bring Their Faces into Vision

Cap, white collar, and black dress are uniform at most Turkish schools. Not long after these girls paraded, their country declared war on the Axis.



© National Geographic Society

Reprinted by Maxwell Green Williams

By Their School Caps, Turkey Knows These Young Men Are Her Future Doctors, Engineers, and Teachers

Old-time Koran schools are abolished. New State schools are free, compulsory, and secular. Two decades have not produced all the teachers needed.



"TC" Represents *Turkiye Cumhuriyet* (Republic) and "XXI" the Number of Its Years
A few days earlier the photographer saw the wall plastered with posters announcing Gary Cooper in "Marco Polo." From a distant rooftop (right), spectators look down on students and flags.



© National Geographic Society

Photographs by Maxwell Owen Williams

Faces and Arms Are Bare, but Minds Are Clothed in Knowledge

Their obvious vigor contrasts with the idleness of harem beauties who, sheltered from books and society, lived in ignorance. Were such a one to appear on the streets in veil today, small boys would hoot.

swimming pool, open-air restaurant, and many a shady bench bearing the name of the bank which provided it. As night drew on, these seats were full of peasant folk resting from the city sights, while happy couples strolled by, enjoying the cool breeze.

From the low-arched bridge sunset lovers could see the bright reflections from hilltop homes, while the Exhibition Hall added a World's Fair touch. The cream-and-white People's House (Plate XV) and Ethnographic Museum shone forth from their high bench.

The stork, symbol of hearth, home, and peace, is familiar to the Turkish capital. One stork nest tops the baggy-wrinkled shank of the Column of Jovian. Another stork dwells appropriately on the roof of a bank which specializes in home financing and the care of children. A third makes its home in an old building which once was Near East Relief headquarters, near the Square of the Nation.

On the sidewalks near this square are iron-pipe mazes through which passengers go before entering a bus, so that in rush hours there will be no crowding.

About eight miles from Ankara are the Çubuk Dam and Reservoir, which have so changed the face of the capital with trees, lawns, and fountains. Since 1936 life-giving water has been impounded in this artificial lake. Local residents believe firmly that it has changed the clear plateau climate.

Today, with four tires costing as much as a whole car with four tires and a spare used to cost, fewer motorists visit the Çubuk Dam. Graceful willows and tall poplars frame the water and ruglike flower beds. On a shady island, chairs and tables suggest some chic corner of the Bois de Boulogne or Central Park. But all were empty, though it was Sunday, which has supplanted Friday (the Moslem Sunday) as Turkey's weekly holiday.

Picnics and a Conga

Inside the pavilion were two picnic parties, having a grand time. In the center of one group a ten-year-old was dancing to the syncopated clapping of many hands. But her dance was not Oriental; she was doing the conga.

Within sight of Ankara is Atatürk's farm, now operated by the State. Where pure milk and butter are prepared for market, blooded stock is raised, and modern farming methods are taught, I found five stalwart young men gravely listening to one small woman.

In what began as a modest repair shop, new spare parts for Case and McCormick threshing machines and tractors were being forged, and thousands of plows were being turned out with assembly-line dispatch.

Another excursion from Ankara was to Hasanoglan, once visited for its crude carvings from a remote past. But today Hasanoglan is a typical experiment station for the Turkish peasant.

The first party of young men arriving at the site brought their own food and slept in tents. Today their huge dining hall has a sloping floor and doubles as a theater. Fifty-one excellent buildings are already completed and more are in construction. All this has been done by the boys and girls themselves, with a minimum of supervision.

Village Institutes Aid Farmers

Of the 760 students at this one Village Institute, 100 are girls who weave fabrics; study to be midwives, sew, study music, painting, and dancing while the young men are tilling the fields, threshing the crops, or adding new units to the ground plan.

Turkey's peasants constitute 80 percent of the country's population. They live in more than 40,000 widely scattered villages, few of which have any schools. Much as teachers are needed, a mere teacher would be a luxury in a poverty-stricken hamlet. Certainly a city-trained teacher would not be happy there.

Until the peasants develop more earning power—and wartime prices which now favor them cannot last forever—it has seemed desirable to train young peasants who can teach rudimentary subjects and also add to the current earning power of the village. Heavier sheaves, bigger udders, sturdier stock—those are lessons the peasants understand.

By means of the Village Institutes, boys and girls born to the village environment and trained in the open countryside are sent back to help solve Turkey's basic problem—a poverty-stricken and unschooled rural population.

In 1935-36, when the huge new Government Center at Ankara had been completed at heavy expense, 6,901 teachers taught 370,000 villagers in a land of some 17,000,000 inhabitants. In 1942-43, 14,284 teachers taught 603,000 pupils.

Six out of 18 Village Institutes are already self-supporting, and thousands of graduates a year are going out to lift the standard of Turkish village life.

In a school where masonry, gardening, well digging, husbandry, and weaving are required, one might expect purely academic subjects to be neglected. But in a 260-week course the equivalent of 114 weeks is devoted to cultural subjects, 58 to agricultural practice, 58 to technical work and shop, and 30 weeks to vacation.

During the current shortage of manpower



Turkey Straddles the Straits, Goal of Conquerors Since Ancient Greeks Took Troy

in field and factory, many a Village Institute lad earns good money during his vacation.

As we arrived at Hasanoglan, scores of young students were studying penmanship; others were raising timbers for a new roof. I inspected dozens of practice sheets. Turkey's villagers are better penmen than any class of high school or college students I knew at home.

Teaching Farmers to Farm

When an Institute student is graduated, he receives a plot of ground, some draft animals, and implements for improved farming. Classmates go with him and, beside the almost windowless homes of an adobe village, build him a new house with big windows and a door that will swing and latch. Then a school is built,

and he becomes teacher, agricultural adviser, veterinary, and model citizen.

Before I left, after a double-size lunch with the Institute leaders, the director asked if I had any suggestions to make.

"Light is one of the chief needs in village homes," I replied. "Why don't you turn out some standard-sized window frames so that the villagers of Hasanoglan can tear out a few mud bricks and let the daylight in?"

Before I finished, the director was chuckling.

"Fine idea!" he said. "That's just what we have been doing."

The old village is less than a mile from the neatly laid out Institute. But Hikmet Geray, a Robert College graduate, told how heavy is the weight of rural inertia.



Vast Anatolia Holds the Soil, Mineral, and Human Riches That Make Turkey Strong

"How many Institute students do you suppose we have been able to get from that village? The people go back and forth, see our crops and gardens, our airy dormitories, and neat girl students, our open-air theater, and our bright flower beds. How many of them have joined the procession toward a better life? Just two.

"Time and again we have tried to move villagers from played-out areas. Although there is coal near Zonguldak, our fields lack the fertility that they might have if we did not burn manure as fuel.

"The farmers, even when their crops are poor, resist change. They cling with superstitious caution to the fields they know.

"They say, 'These fields have been proved; the new ones haven't.' Yet all that some of

their fields have proved is that the man who sticks to them will die poor.

"Soil analysis won't convince them. In a democracy you can't force them to abandon their old homes. But the Institute graduates wake them up, for on their new fields, scientifically chosen, they produce better crops. One thing a farmer can't stand is seeing his neighbor get a better yield than he does."

To the Cone Country of Cappadocia

At Kayseri, where I had to wait for a train to go farther east, I found my old friend Paul Nilson, principal of Talas College. During their work in the Cappadocian troglodyte region, John Whiting and Eric Matson made Nilson's home their base and darkroom.

After 16 years, I decided to revisit one of

the strangest areas on this eroding earth, where homes and chapels were carved in natural cones between Ürgüp and Nevşehir.

We set out in the same four-cylinder Ford I had used on my previous visit. Fortunately I had taken along a copy of the December, 1939, NATIONAL GEOGRAPHIC MAGAZINE, which served as an introduction to the local governor.*

Arriving at Ürgüp, I was promptly arrested for photographing a village market. But my new friend, the governor, quickly robbed the eager soldier, whose proud prize I was, of any hope of immediate promotion.

Deep in the Cappadocia of Bible Days lies the coneland of early Christians. Here Nature and man combined to form fantastic rock dwellings. By estimate, the region contains 50,000 cones, some no larger than tents, others the size of lesser skyscrapers (Plates XXI-XXIII).

Long ago volcanic Mount Argæus (Erciyas Dağı), extinct now beneath a snow blanket, fathered the cones. Its eruptions laid down a plateau stratified with soft ash and hard lava to a depth of several hundred feet. As this mass cooled, cracks formed. Gradually rain gouged gullies, then chasms, finally rounded the cones. Weathering is slowed wherever the soft cone wears a hard cap of pumice or lava.

Some fifteen centuries ago a band of Christians made these badlands their retreat. Some lived in towns hewn in the sides of cliffs, like the Ürgüp of today (Plate XX). Others resided in monasteries or nunneries built in solid rock; some walls are still frescoed with fading Byzantine art.

In solitary cells dwelt the hermits, some attended by disciples. Like moles, they tunneled the cones to create airy living quarters. Their water came from rain-fed cisterns cut in the rock. Ropes and ladders were elevators to high fortifications where they shut out the world and the devil.

We found all but the townsmen gone, and they of course are Moslems. Thousands of the old chapels and caves are pigeon cotes. These wild birds are never molested. Guano supplied by them fertilizes the villagers' volcanic gardens. Local apricots, melons, grapes, and tomatoes are delicious.

A Center of Winter Sports

Back at Kayseri, we passed between one of Turkey's key airfields and a new vocational school, which, with equipment, is to cost more than a million dollars.

When Paul Nilson first went to Talas, he spent years inducing Turkish students to play football and volleyball and to accept manual

training. Now comes this modern school where the Government is to carry out the ideals and dreams of an American missionary.

Every student at Talas College makes his own skis. He forges the clamps and fittings, and makes the hammers with which the rivets are capped. Every one of them knows how to ski, and close at hand Mount Argæus, nearly 13,000 feet of grandeur, provides an increasingly popular center for winter sports and mountaineering, adding a new note to the classical picture.

We drove out to one of the biggest textile factories in the Near East, where women prisoners were among the nearly 4,000 workers.

From Kayseri to Sivas I slept in the dining car, stretched out on three lumpy chairs. Breakfast, at 6 a.m., consisted of a thimbleful of black coffee. For the first time since leaving the United States, my wartime trip to the Middle East was living up to my expectations.

Women Forsake Rugmaking for Factories

At Sivas we visited a rug factory where little girls, following patterns which they must have learned in their cradles, were turning out choice carpets whose local price has advanced to about \$4 a square foot.

Two unfinished rugs, still on the loom, had as their pattern a map of Turkey.

Lack of transportation, a change of dyes, the loss of Anatolian Greek carpet weavers—all have lessened the production of Turkish carpets. But a bigger factor is the high wages women can earn for other work. When there is a demand for women workers in modern factories, the tying of hundreds of intricate knots to a square inch becomes unduly expensive or inadequately paid.

If you have a rug dating back to the days when woman's place was the home, even though it was a felt tent in the heart of Turkistan, take good care of it. One produced today, and equally fine, will cost much more.

Across the road from the rug factory is a technical school whose products have professional quality. Hundreds of heavy vises were ready for shipment to less fortunate schools, and scores of cabinets, splendidly dovetailed and doweled, were being provided for sewing machines destined for remote villages. One machine may help fashion the dresses for a whole community.

In no other school have I seen larger or finer lathes. Sivas is coming to understand giant

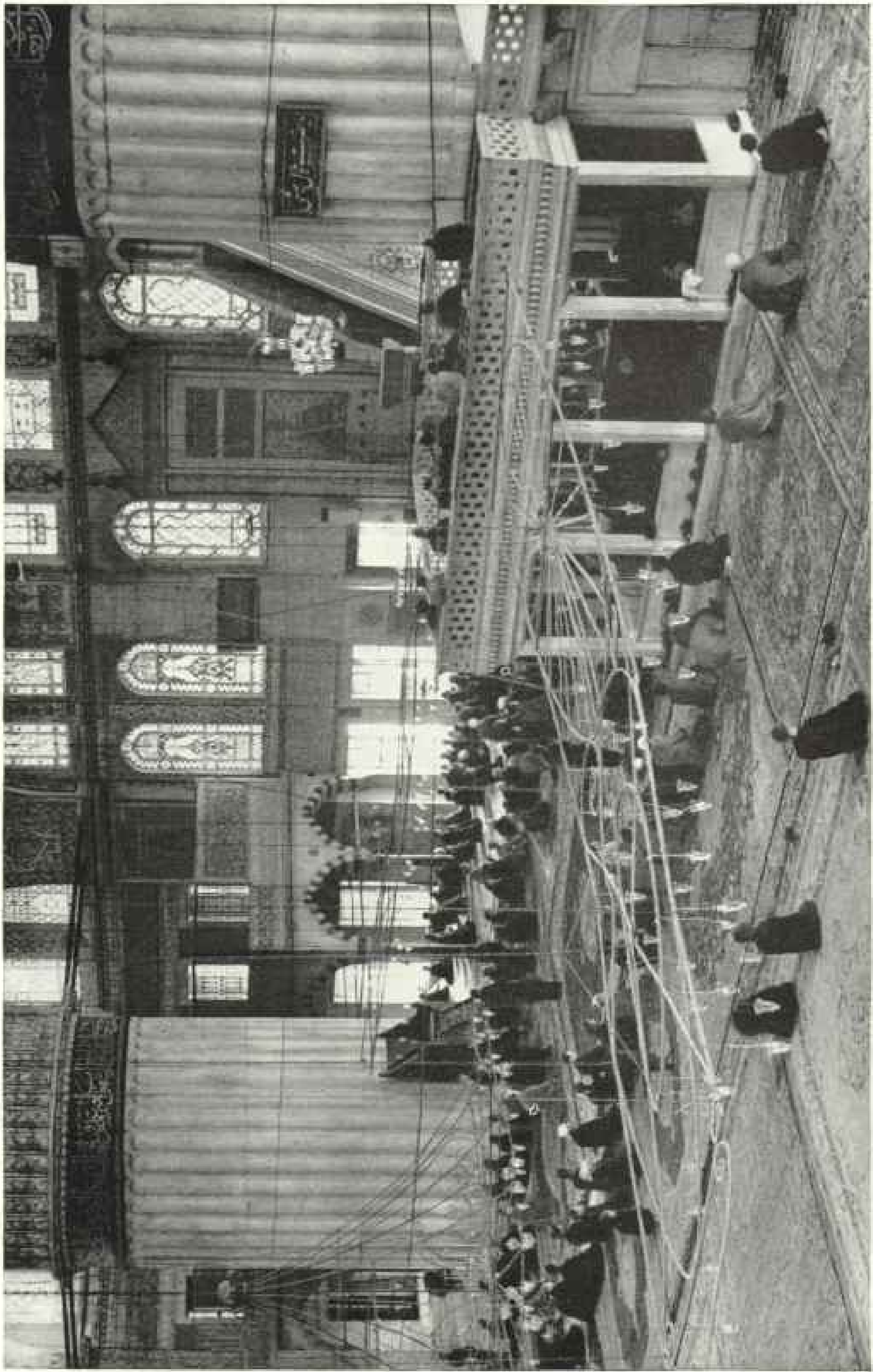
* See "Where Early Christians Lived in Cones of Rock," by John D. Whiting, NATIONAL GEOGRAPHIC MAGAZINE, December, 1939, and "Cone-Dwellers of Asia Minor," by J. R. S. Sterrett, April, 1919.



© Bruno Heffert

New Mosque of the Sultan's Mother Is a Monument to Two Sultanas and Their Deadly Feud

Begun in 1615 by Machpeiker, the mosque was finished in 1663 by her daughter-in-law and rival, Tarkhann. Their envenomed struggle for influence ended only with the mother-in-law's death in a palace revolt. Two tapering minarets, each bearing three lacelike galleries, contrast with the cascade of receding domes.



Turkish Press Bureau

Immense Candelabra Overhang the Faithful Praying in Istanbul's Richly Carpeted Mosque of Sultan Ahmed I

Pillars, inscribed in Arabic, are 72 feet around. *Hafizi*, those who know the Koran by heart, sit in the gallery. Beyond it, the mihrab or groove in the wall, points to Mecca. From the pulpit steps was read the fateful 1826 decree abolishing the Janissaries, the professional soldier corps. Rebellions, some 40,000 were killed. While building his mosque in 1609-16, pious young Sultan Ahmed tolled each Friday with his workmen.

lathes very well, for it has a shop for building and repairing railway coaches and cars.

Near Sivas a new factory is turning out 300 tons of cement a day. Since New Turkey is defaced by many a crack in its stucco, I asked if the Sivas cement is really good.

"Our cement is pretty good," I was told. "But builders won't wash the sand and gravel. And the best cement isn't good if the sand and gravel are mixed with mud or dust."

Hastily he drew a diagram of the plant, showing how rock is brought in from the hills by overhead trolley and powdered coal is shipped in to the other end of the grounds.

"Out of season we can get all the labor we want at 20 piasters (15 cents) an hour," the director continued. "In plowing and threshing season, I have to pay twice as much; so I do all I can when labor is cheap. Luckily, our coal comes by rail and avoids Black Sea storms.

"Up on the hillside we are building a big swimming pool and a reservoir. If my workers won't swim, they can at least have all the water they need for bathing."

State Stud Farm Has the Kentucky Touch

Near the cement factory we visited a State stud farm which had the true Kentucky touch. Both the director and his proud son were horsemen to the core.

One fine breed, the Nonius, native to Hungary, was new to me. But when a magnificent white stallion sniffed the air, pointed his ears, and switched his long tail, I knew him as the blood brother of those splendid mounts which add dignity to the princely Arab. Artificial insemination is employed to increase the productivity of such spirited sires.

Over many a bridge and through scores of tunnels our double-header lifted our long train out of the rich Sivas plain, passed green alfalfa patches near Armağan, halted for serve-self food and drink, and then entered a Swiss-like landscape.

At Erzurum the Turkish-gauge line joins the 107-mile narrow-gauge line to Sarikamis, Turkish terminus for the Russian-gauge line to Tiflis (Tbilisi), Moscow, and Vladivostok.

The Istanbul train pulls in only twice a week, after a trip through the rocky gorges of the upper Euphrates. Within a few minutes of its arrival, the long cobbled highway leading up to the old citadel seems like a moving platform of sturdy figures carrying huge bundles wrapped in bright *kilims** and smart officers in well-kept victorias.

Erzurum was long a center of American missionary work, but few foreigners visit it nowadays. It is backed by a lofty ridge of mountains, still snow-patched in August, and

has a fine mosque which was designed by Sinan, mosque builder par excellence.

The streets near the mosque were torn up for modern improvements in the drains, perhaps similar to those of one of my favorite Turkish hotels.

In digging the hotel's foundations, the builders found some Roman drains, perhaps a bit older than the Christian Era but apparently still able to carry on. The builders had no idea where these ancient drains led, but it seemed a shame to ignore such a gift. So the sewage of a modern hotel goes somewhere or other, by courtesy of some keeper of the drains in the time of Augustus Caesar.

In Erzurum, aside from repairs to historic monuments, the Turks are doing little to keep the old town in trim. But beside it they have stretched the wide boulevards, planted countless trees and geraniums, filled the big circular fountain, and built a swank officers' club, a large cinema, a businesslike post and telegraph office, a People's House, a high school, and civil and military hospitals.

Since Erzurum is high, and therefore chilly at night even in August, the officers, dressed in gray-brown woollens, were the nattiest I saw in all Turkey.

At the People's House I was shown the splendidly equipped little theater, the spacious cafe, the library and conference rooms which make the People's Houses social and cultural centers for Turkey's towns.

A specialty of Erzurum is its black amber. When combined with very expensive gold, which Turkey is trying to conserve, this black cousin of golden Baltic amber is fashioned into rings worthy of a Fifth Avenue jeweler. Brooches, bangles, and rosaries have a wide enough sale to support a dozen shops where the rare material is fashioned and sold.

Vivid Hours on a Turkish Train

From Erzurum a few hours' flight would have carried me to Istanbul. But I preferred to spend 60 hours on the train, close to the people, the green valley bottoms, the bright flocks, the singing wheels of the slow-paced oxcarts, the long piles of iron ore, the eternal merry-go-round of peasant threshing, the rail-side warehouses bursting with grain, and the bright flash of Turkoman costumes. Beneath the clear skies and tawny hills of the great plateau was the Rivieralike beauty of the Marmara shore and the ferry crossing, marked by the minarets of the Blue Mosque and Aya Sofia.

* A *kilim* is a kind of rug, but it is woven instead of being knotted. It can be used as a wall hanging or covering for floors and couches.

The Turks have opened vast vistas in Istanbul and built a sports stadium on the site of the vegetable gardens of Dolma Babçe Palace. The Bosphorus remains one of the most beautiful and majestic of waterways (Plates XIV and XVII).*

It took Robert College forty years—1863 to 1903—to produce its first Turkish graduate, Hüseyin Pektaş. His lovely daughters and our own children attended the same classes and swam together in the swift Bosphorus.

His talented wife has been a member of the Grand National Assembly for years. Her combined broadcast to England with Miss Irene Ward of the British Parliament was a red-letter day for Turkish women.

When Gilbert Grosvenor, President of the National Geographic Society, was born on a beautiful hillside whence one looks across from Europe into Asia, the grandfather of Hüseyin Pektaş was sheik of the Pektaş dervishes. Their cypress-candled *tekke* (monastery) crowned the hilltop above the Grosvenor home (Plates XIV and XVII).

The dervish sheik defied Sultan Abdul Hamid's order forbidding Turkish students to attend Robert College, and his grandson, who served as Ismet İnönü's secretary at the Lausanne Conference, is now the Vice President of Robert College.

Seated in their delightful home, I asked him and his alert wife whether Turkey still needs American aid in education.

"I can't foresee the time when we won't," was the prompt reply. "The irrefutable argument in favor of any type of education is the men it produces. Robert College and other American schools have produced the type of men Turkey needs."

"And the kind of women," added Madame Pektaş, both of whose attractive daughters are now on the staff of the American College for Girls (Plate XVI).

A City of Refuge

I decided to celebrate August 30, Turkey's Victory holiday, in Smyrna (İzmir) where, 22 years earlier, the plans of Turkey's enemies had gone up in the smoke of a three-day fire; where the blue harbor was murky with blood; and where, some years later, the bodies of Atatürk's political enemies hung from the gallows at the Konağ (town hall).

Time has healed the wounds of 1922. Exchange of populations which Melville Chater thrillingly described for GEOGRAPHIC readers did much to solve the vexing problem of a Turkish plateau surrounded by a Greek littoral.†

Smyrna, a place of horror to the Greeks of a generation ago, has become a city of refuge, as

Constantinople was 400 years ago, when the tolerant Suleiman the Magnificent ruled beside the Golden Horn. He welcomed Jewish refugees from Spain, exclaiming, "Allah must have blinded Spain's rulers, that they should rob their country of such wealth and add it to mine!"

Two decades ago Anatolian Greeks, removed to Athens and Macedonia, added to the wealth of Hellas. Recently many of them, fleeing Nazi torments, paid tribute to Turkish tolerance in time of need. And in the open-air theater at Smyrna, Turkish artists enacting *Oedipus Rex* and *Antigone* give sympathetic interpretations of these immortal Greek tragedies.

In Smyrna the people refer to "the fire" which destroyed the whole waterfront and swept into the plain. If the Turks had waited for normal business to rebuild this ruined eyesore, it would have taken decades to wipe out the blot on the landscape. So they covered the scar with trees, parks, an artificial lake, and scores of pavilions and made it the site of the far-famed International Fair.

Back across vineyards whose drying grapes, turning from green to brown, were spread like changeable silk on the fruitful earth, I flew to Ankara. And then, in a four-motored De Havilland, we crossed the craggy Toros Dağları at 12,000 feet and glided down on Adana.

There great bulging bales of cotton piled high on ox-carts came squeakingly across the many-arched old bridge. In the fields, stacked in block-long heaps, were countless tons of barley and wheat (Plate XIX).

In Turkey, a bread-eating land, bread is cheap but strictly rationed; wheat is dear but seemingly without limit.

Those great piles of wheat at Adana and many another Turkish town are held at a price twice that of grain in Chicago. The warehouses cannot hold all this wealth. Even canvas and straw roofs cannot protect it when the rains come. Flocks of fat pigeons perch on the unsteady footing of sliding grain and feed at will.

These dunelike masses are the farmers' tribute to a nation which parades its parks, schools, and public buildings before their eyes, seeking to improve their lot and thus reward them for the patient toil which coaxed such riches from bleak Anatolian earth.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Seeing 3,000 Years of History in Four Hours," December, 1928, and "Summer Holidays on the Bosphorus," October, 1929, both by Maynard Owen Williams.

† See "History's Greatest Trek," by Melville Chater, NATIONAL GEOGRAPHIC MAGAZINE, November, 1925.

Star and Crescent on Parade

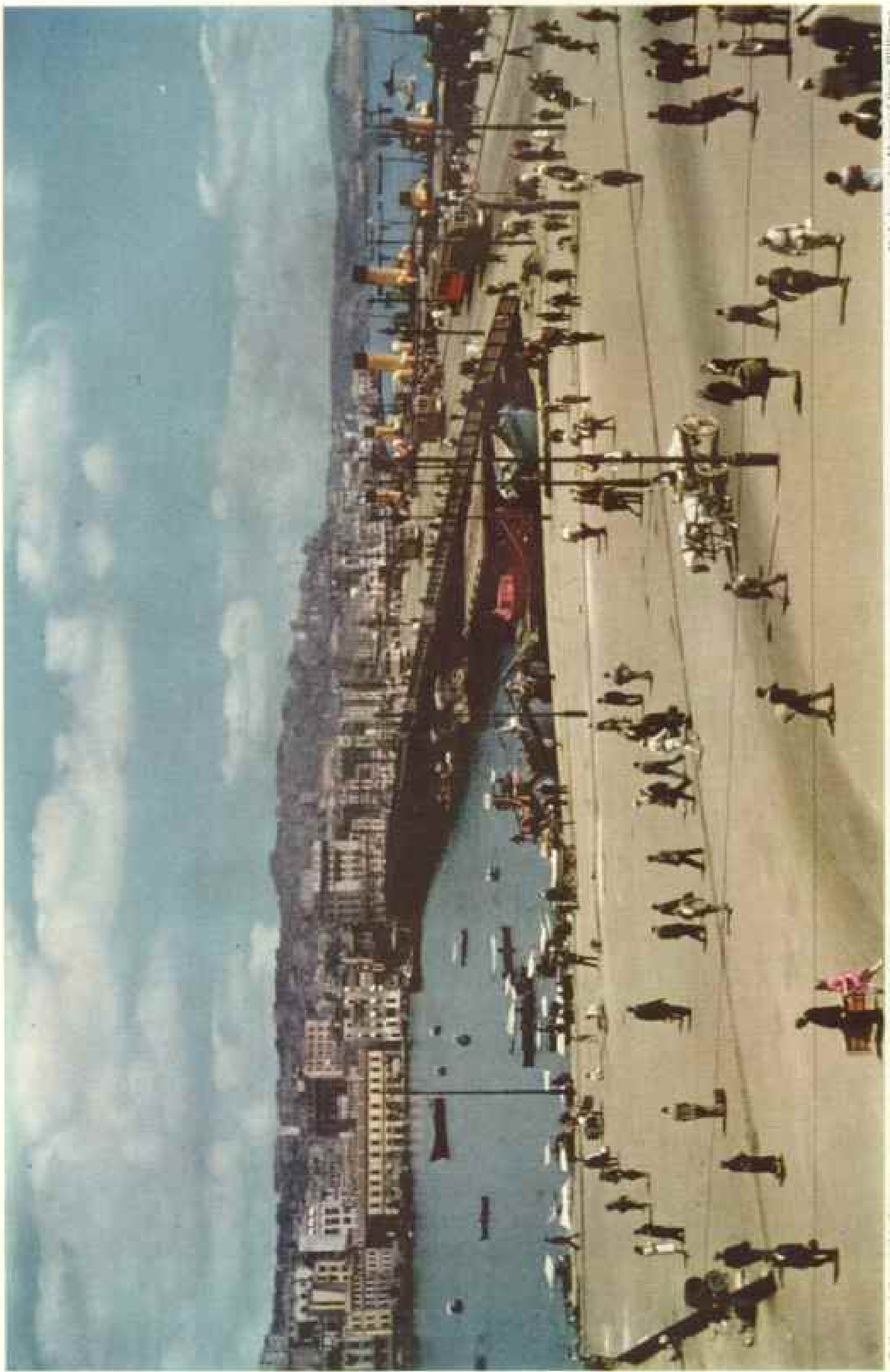


© National Geographic Society

Illustration by Maxfield Owen Williams

Istanbul's "Gondolier" Oars a Water Taxi, One of Thousands in the Golden Horn

He ferries fishermen and picnickers; often they row for exercise. Buoyant *Dalgic*, tempting fate, means *Diver*. *Silivri* carries wood. Fifth-century skyscraper, the Tower of Galata dominates the modern skyline. It was called Tower of Christ when Moslem Istanbul was Christian Constantinople. Built as a fortress, the cylindrical tower is now a fire watchers' post in the Galata section (Plate XXIV).

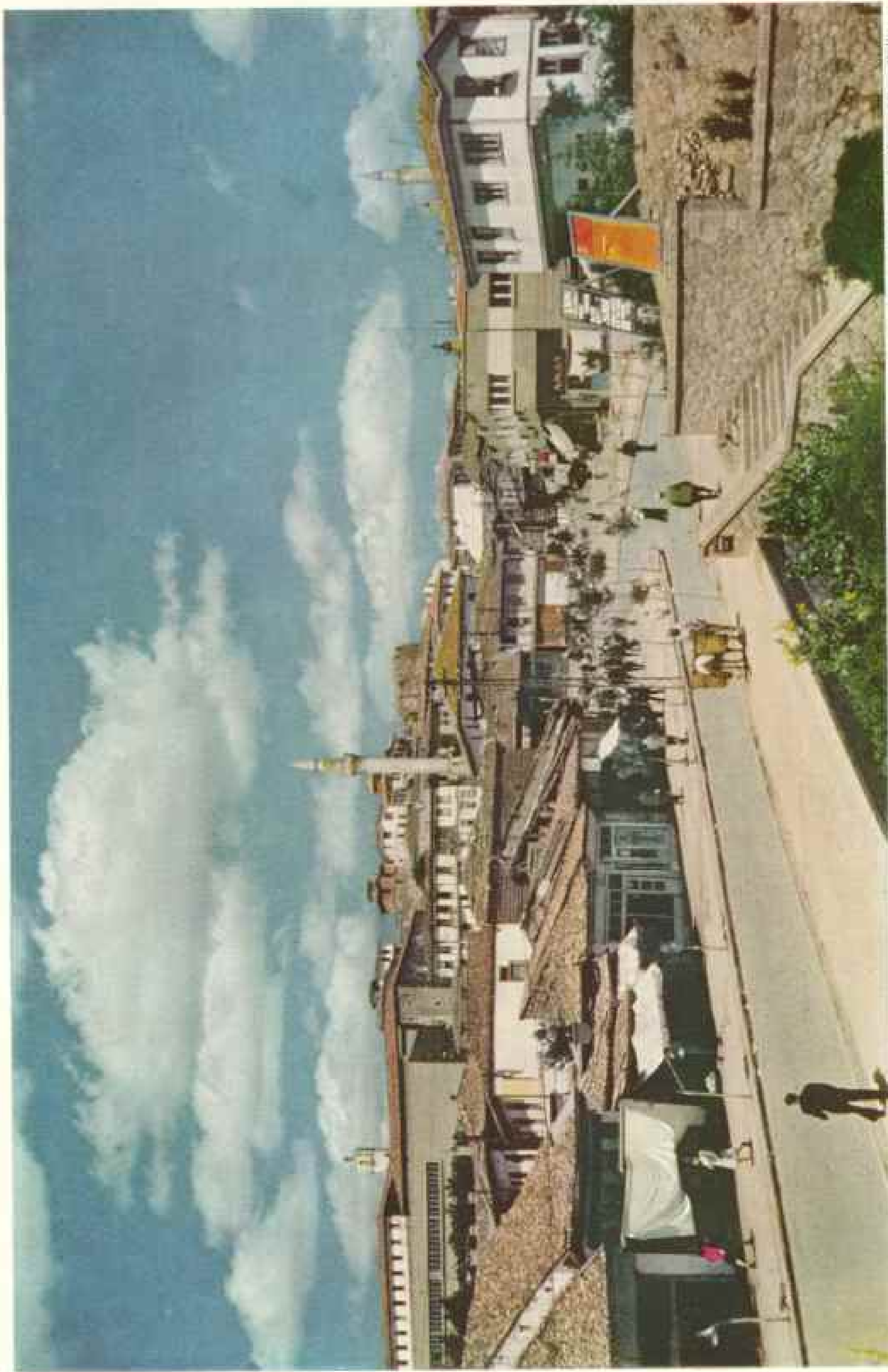


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Testifying to Gasoline Shortage and \$1,500 Tires, Galata Bridge Carries Not a Single Car across the Golden Horn at Istanbul

In the foreground, the Stamboul section has raised old bazaars for the 500th anniversary of Constantinople's fall in 1453. Left: water taxis raise sunbathers. Right: the amokestacks of commuter ferries. In the distance stands Galata, for centuries the "European" city. Even in the nineties, 150,000 crossed here daily.

Footstomps by Millions from Williams



© National Gallery, U.K. 2010

Photograph by Margaret Owen Williams

In Ankara's Old Town, Donkey and Master Trespass on Smooth Sidewalk Lest Hard Cobbles Bruise Their Feet

Since history began, many of Asia Minor's conquerors, including Hittites, Romans, and Turks, have held this approach to the Citadel, a ruined hilltop fortress. Old land-lies refuse to quit their venerable quarters for Atatürk's lusty modern city below. Seen from a park, a theater poster (right) advertises a magician.



© National Geographic Society

Kodakchrome by Harvard Owen Williams

Faces and Legs from Hollywood, the All-conquering, Give the East a Western Eyeful

Saha is a humor magazine. *Bugün* means *Today*. *Spor* (*Sport*) epitomizes Turkey's switch from difficult Arabic to easy Latin letters, enabling millions to read. These customers do not thirst for knowledge; they crave water from the stand's American refrigerator. Chin on hand, Humphrey Bogart broods over the change.

Star and Crescent on Parade



Hasanoglan, Progressive Farm School, Winnows Grain in the Immemorial Way

Coverall uniforms protect Village Institute students against chaff, itchy bane of harvest hands everywhere. These boys prepare to preach the gospel of scientific agriculture to dirt farmers.

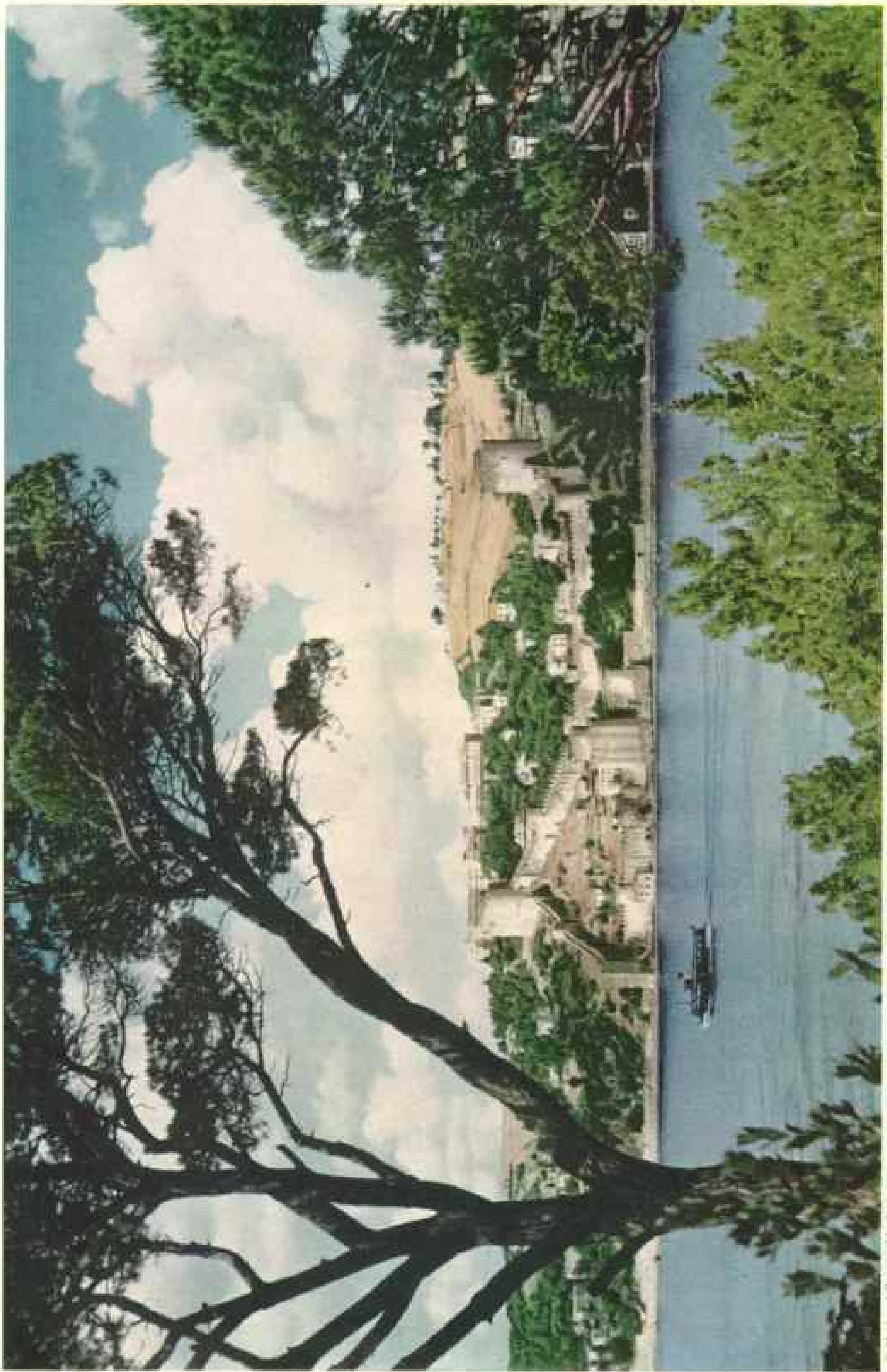


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Kodachromes by Marjory Green Williams

Through the Land of Their Dreams, Make-believe Princesses Ride a Fairy Chariot

These are the grounds of the ambitious International Fair. War, however, has confined participants virtually to Turkey. Buildings stand where old Smyrna perished by fire in 1922. Turks and maps now call the city Izmir.

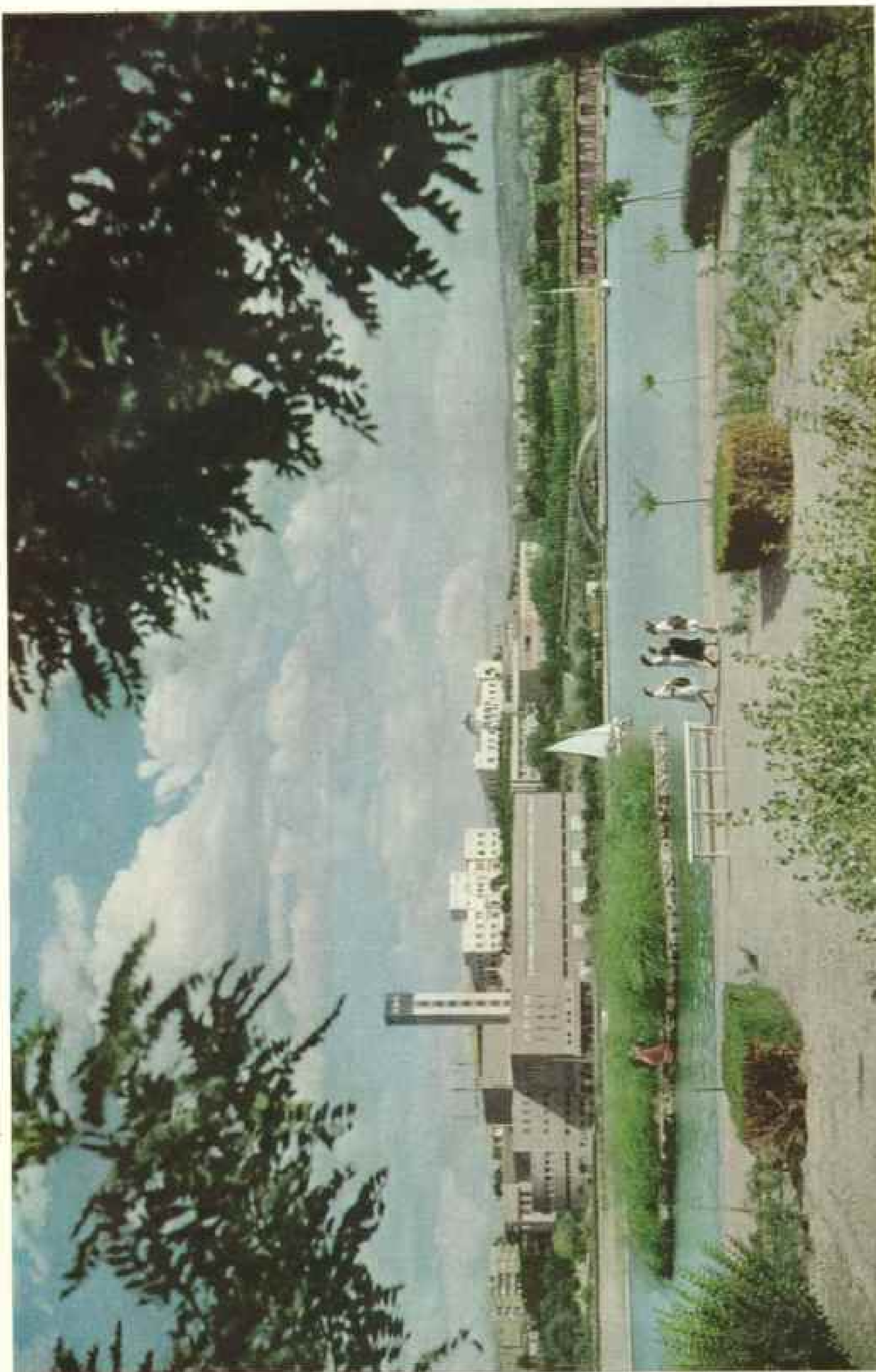


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Illustration by Margaret Green Williams

Asia Looks at Europe across the Bosphorus, Where Armies Have Changed Continents and Made History since Remote Antiquity

Grim walls and towers are ruins of Rumeli Hisar, a fortress built in 1452 by Sultan Mohammed II to invest Constantinople. On the far hill, derelictes once assembled. Today one of their sons is Vice President of American-built Robert College. Its halls and professors' homes stand above and between the castle walls (Plate XVII).



© National Geographic Society

Redesigned by Maximal Oyon-SWilliams

New Ankara's Pleasure Lake Was Old Town's Swampy Abode of Malaria, One Cause of the Ottoman Empire's Decline

Sergü Evi (lettering) denotes an exhibition hall. Back of its tower, the gleaming People's House fosters adult education. The Nation demands every town have one like it. Next door, the domed Ethnographic Museum holds the body of Atatürk, architect of Ankara's greatness, pending burial in a hilltop mausoleum.



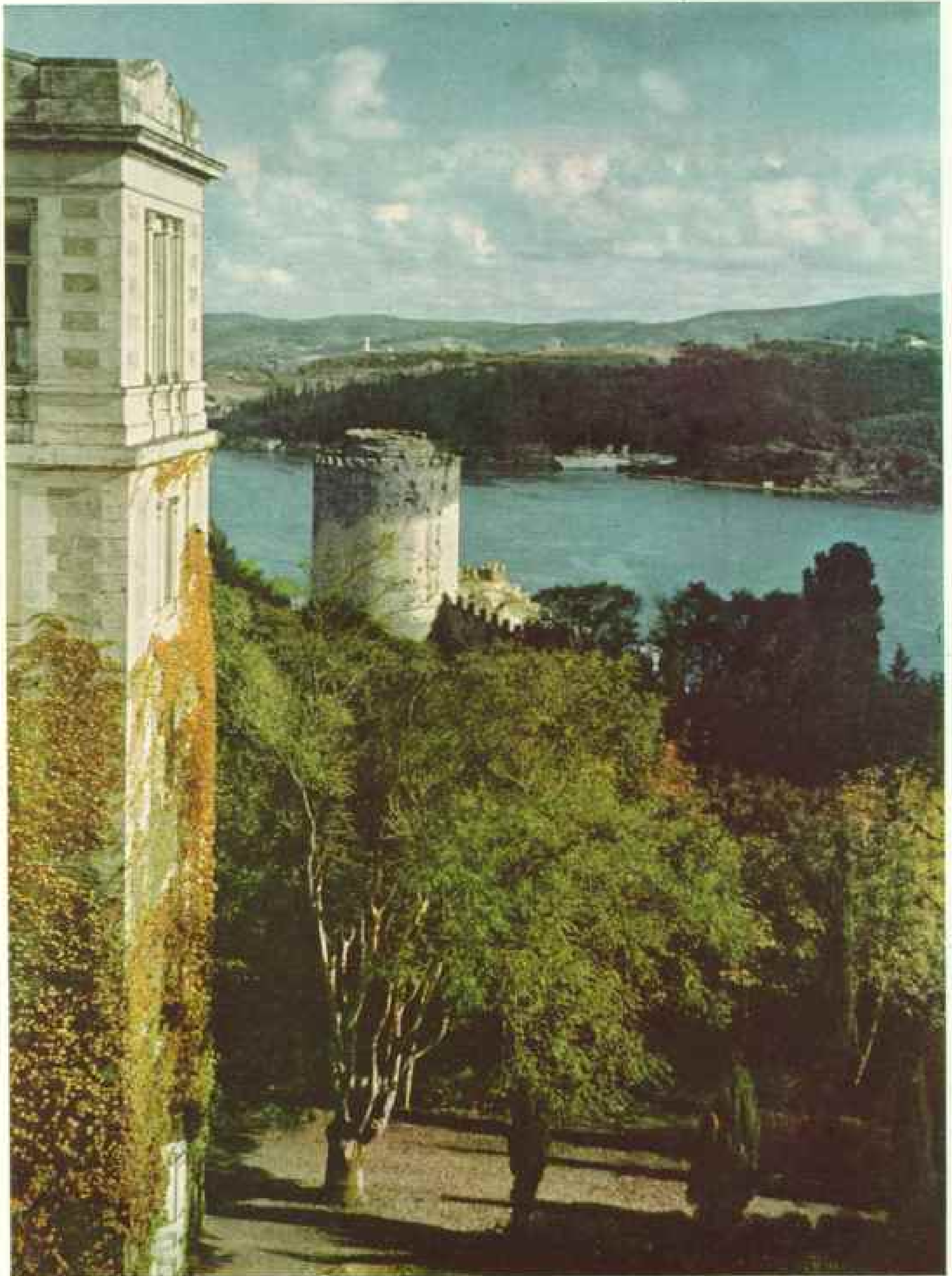
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Redrawn by Margaret Owen Williams

Better than Words in Stone, Bobby Socks Prove American College for Girls Is American

In the twenties bobbed hair and middie blouses were the rage. Overlooking the Bosphorus at Arnautköy, the school is a neighbor of Robert College (for boys). Originally a high school, American College confers degrees on Turkish, Greek, Armenian, and other girls. Graduates have had wide influence in emancipating Moslem women.

Star and Crescent on Parade



© National Geographic Society

Restoration by HERMAN OWEN WILLIAMS

Robert College's Ivied Walls Look Down on Turkey's Presidential Yacht in a Bosphorus Cove

Founded by Americans in 1863, the college has survived both World Wars. Most of its students are Turks; graduates are in demand for shaping the Republic. Classes are in English. Allied successes, ending German blockade, reopened the channel. The straits—not Murmansk or Persian Gulf—are the direct water gate to Russia.

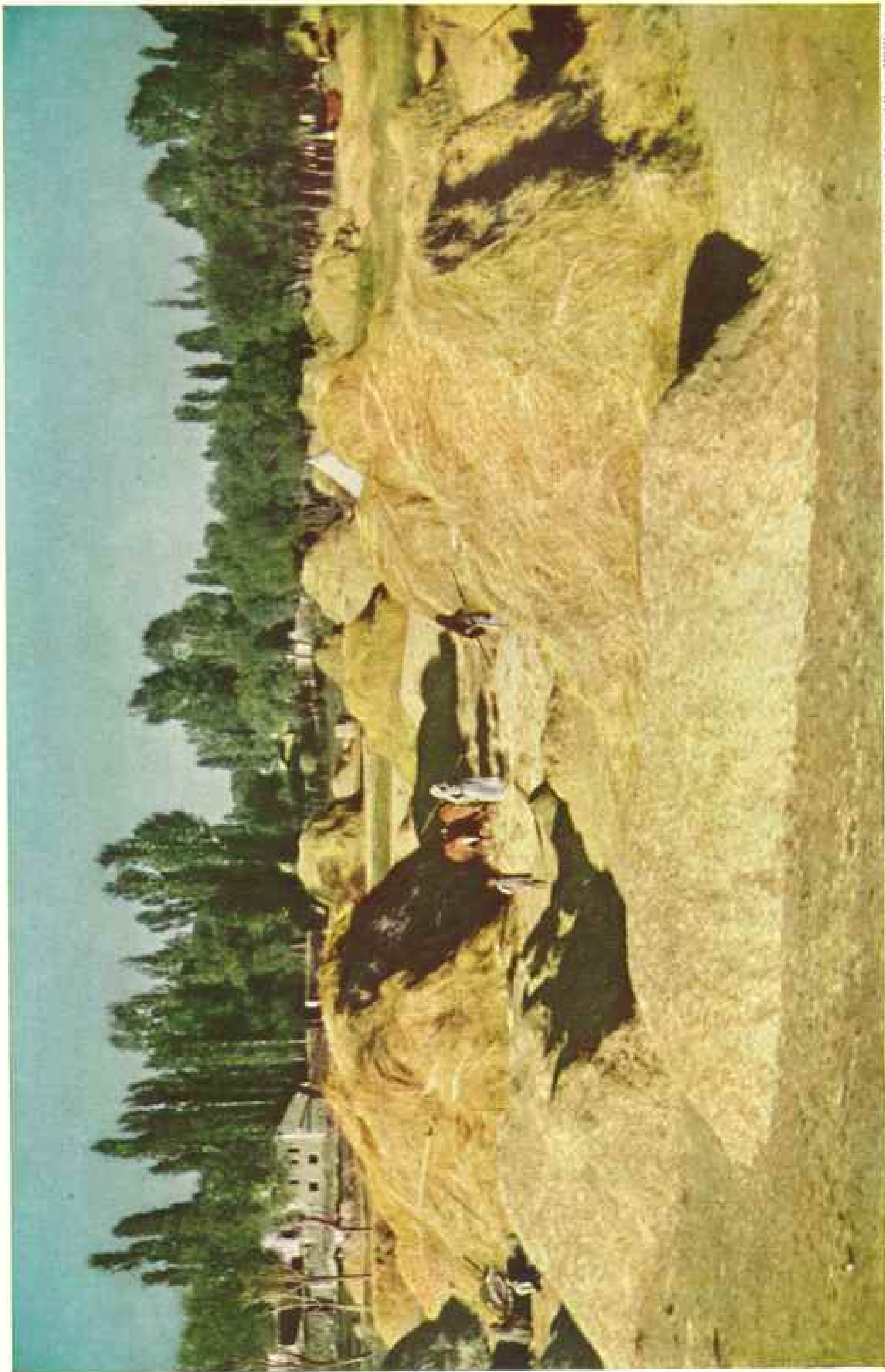


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Rephotographs by Margaret Owen Williams

Fair and Sturdy, Country Women Smile for Geographic Readers Only because Their Menfolk Gave Permission

City styles and women's rights penetrate the interior slowly. However, these Cappadocia girls' mothers never languished in harems, but worked, faces seldom veiled, in the fields. Yet here several conceal the chin. Center: old style's black, baggy coverall, designed to hide the female form. Left: a two-piece adaptation.



Photographs by Margaret Owen Williams

Seen from the Author's Train in Sivas, Women Rake and Cattle Thresh Turkey's Harvest Gold

Dr. Williams found bumper crops and wartime prices making wheat growers financially independent. National independence was saved at this country town. In chaotic 1919, when partition threatened, Mustafa Kemal called patriots to Sivas. Defying the Sultan's ban, they established the Provisional Government that led to the Republic.

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Kodachrome by Howard Owen Williams

Heedless of Familiar Wonders, Not an Eye Looks Back on Ürgüp, Cappadocia's Anthill City

Out of the butte's volcanic rock, home builders dig pumice blocks for their sunlit front parlors. Emptied quarries become Stygian-black annex rooms used as granaries, proof against rain and thief. Thus a man may extend his cellars horizontally into the bowels of the cliff, and his neighbors need never be the wiser.

Star and Crescent on Parade



Boldly Junior Leads the Way, with a Backward Glance to Make Sure Dad's Still There

His broad saddle, encouraging bowlegs, is a Turkish rug bought at Urgiip. Now he rides home amid the chambers of the old-time cone dwellers. This lesser cavern is only one of uncounted thousands (Plate XXII).

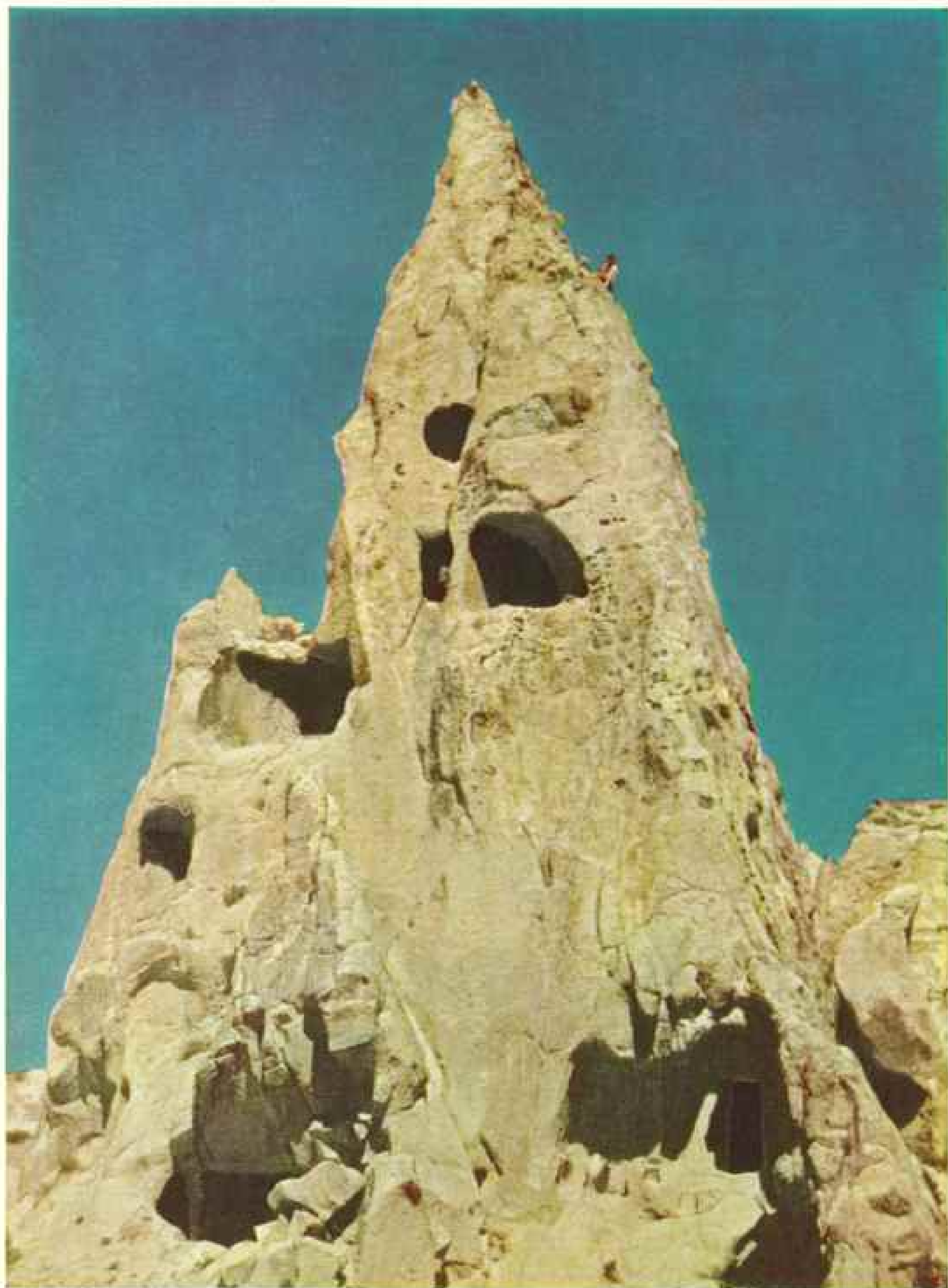


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Photographs by Michael Owen Williams

A Display of Caps at Sivas Certifies These Grain Growers as Devout Moslems

Ritual demands that heads bowing to Mecca have cover and yet touch prayer carpets. Brims, interfering, make hats unsatisfactory substitutes for the outlawed fezzes. Caps, visors up, satisfy Church and State.



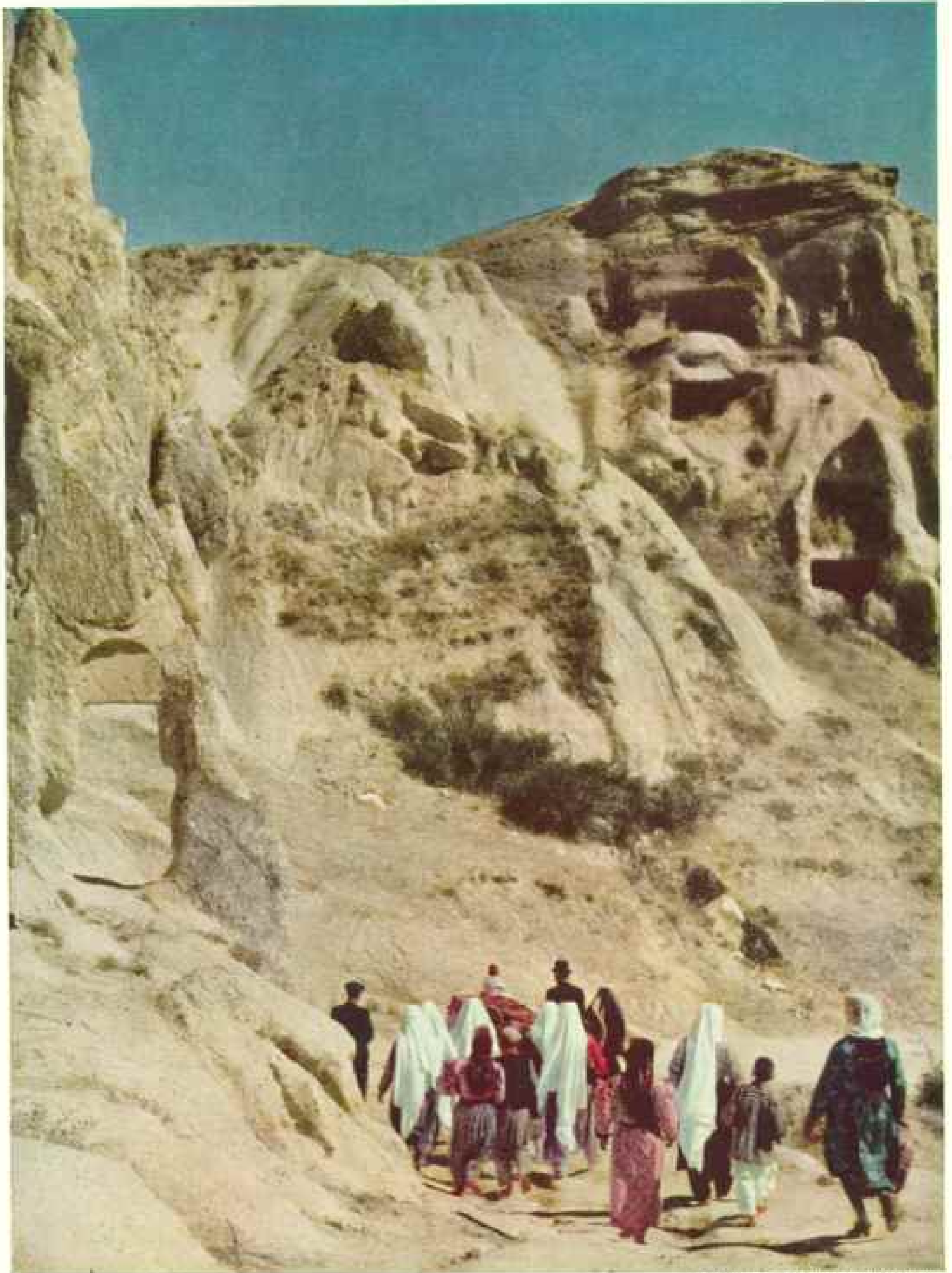
© National Geographic Society

Kodachrome by Marshall Owen Williams

Nature Built This Dunce-cap Skyscraper; Early Christians Dug Its 5-story Hermitage

In Cappadocia, erosion fashioned some 50,000 cones. On them dwelt an estimated 30,000 celibates fleeing the medieval world's temptations. They reached their lofty rooms by rope ladders and toe holds. Today the hermits are gone; wild pigeons nest in their cells. This giant is measured by the man near its peak,

Star and Crescent on Parade

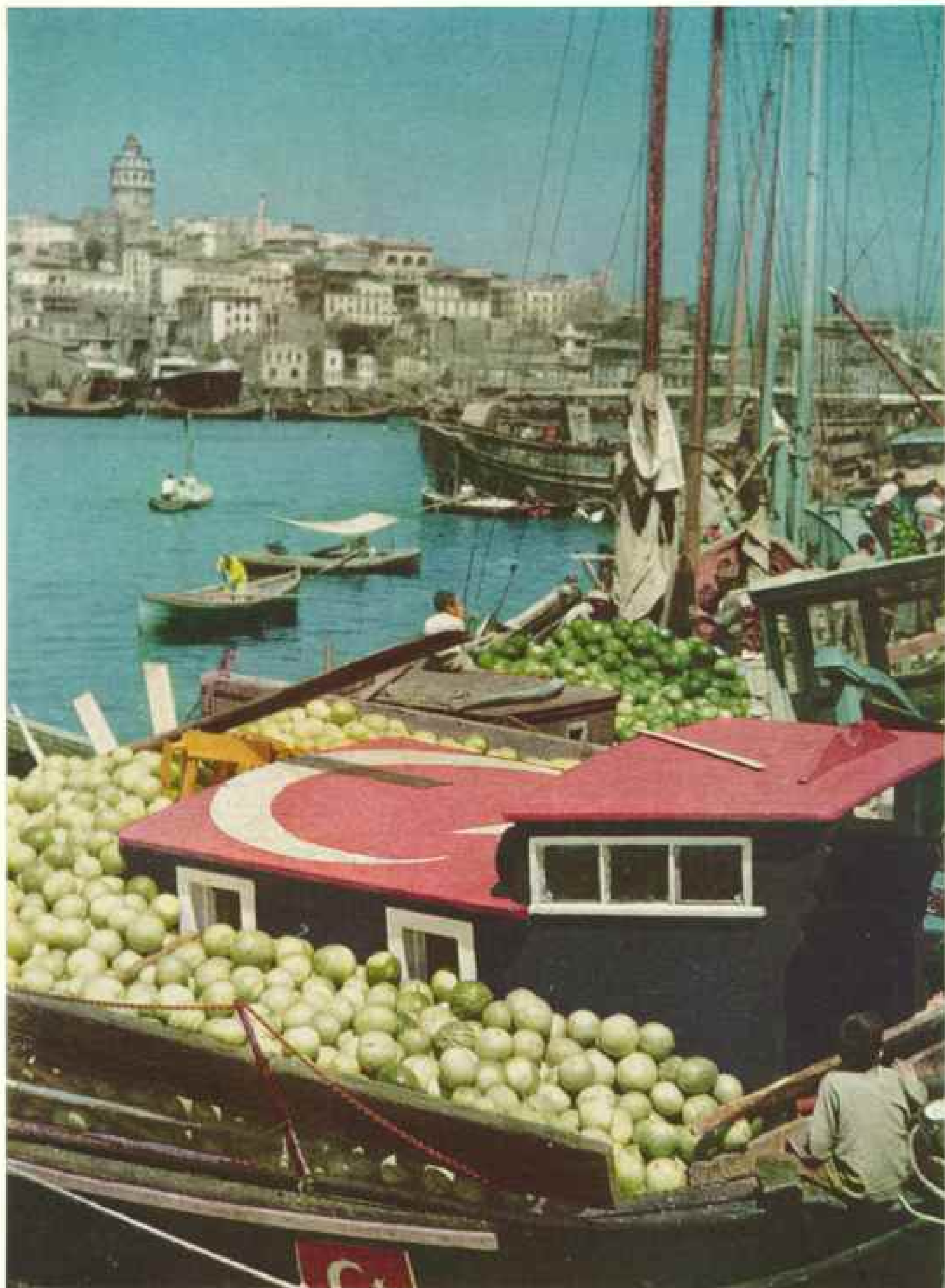


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Kashkistan by Maynard Owen Williams

A High-arched Gate in the Valley of Cones Saves a Picnic Party from a Dizzy Climb

Slowly rain and wind chisel and sandpaper fantastic structures. Buttes and cones with hard-rock caps live the longest, as at the right. Even as these shapes weather away, new ones form in the plateau of volcanic ash hundreds of feet deep. A few caves dug long ago still serve as grain warehouses.



© National Geographic Society

Illustration by Maxwell Green Williams

In Changing Istanbul, the Turks' Love for Fine Melons Remains Unchanged

Summertime least for small boys' eyes, watermelons are in from Marmara and Black Seas. Sailor-merchants tie up at Stamboul docks for ship-to-shore sales. Prices normally are in the reach of every purse. Across the Golden Horn, the Galata waterfront is jammed, as it has been for century upon century (Plate IX).

They Survived at Sea

By LT. COMDR. SAMUEL F. HARRY, USNR

THE United States Navy has been amazingly successful in saving the lives of its seamen and air personnel after shipwreck. Approximately 85 percent of the men whose ships are sunk return to base and are kept in the fight. The percentage of loss among air personnel whose planes crash, or are forced down at sea, is somewhat higher, but still a remarkable number of these men are saved.

This achievement involves good men, good training, and good equipment. Furthermore, it requires top-notch physical condition and the indomitable spirit for which our boys are famous.

Navy men, particularly flyers, are given a rigid course of instruction in survival techniques: the best methods of abandoning ship, of staying afloat once in the water, and of combating burning oil, underwater concussion, exposure, and the other hazards of shipwreck.

They are provided with the most up-to-date emergency gear, and they are drilled intensely in its use. Motion pictures, classroom instruction, field demonstrations, and actual practice sessions are used. No expense is spared in research, procurement, or training to prepare our men so that they can make the most of a bad situation—if it occurs.

In addition, the Navy has a well-organized Air-Sea Rescue Service, consisting of planes and surface vessels which follow the fleet into battle and scour the areas of conflict for days after the fighting has ceased.

Flyers Rescued under Nose of Japs

An excellent example of this cooperative effort was the stirring rescue of an entire crew of a B-29, which was forced to land in the open sea when it ran out of gasoline on its return trip from Tokyo to Saipan.

Before the Superfortress hit the water about 7:30 p. m., its radio flashed the story of its plight. The next morning rescue planes sighted the twelve passengers in life rafts. By 3 p. m. an American destroyer had picked them up (pages 624, 626).

After dive-bombing Tokyo in February, 1945, a carrier pilot and his radioman were forced down off the coast. A waiting destroyer rescued them under the nose of the Japs within 10 miles of Tokyo Bay.

As a result of this teamwork it has been possible to concentrate on short-term survival problems, specializing equipment and training for emergencies. From now on there will be few of the long open-boat and raft

voyages such as amazed experts and general public alike earlier in this war. There still may be exceptions, and for this extreme the men are thoroughly prepared.

Factual stories of outstanding survivors embody stark drama and human interest and illustrate the simple fundamentals of survival.

A 73-hour Swim

Ensign J. H. Carroum (he is now a lieutenant) was better known to his friends as "Tiny," because he barely measured up to the Navy's minimum requirement of 5 feet 4 inches. He had just completed a successful attack on a Jap transport when his plane was hit by anti-aircraft fire.

Limping along, he was an easy target for the Zeros which came in hot pursuit. He managed to make a dead-stall landing on the ocean, at about 70 miles per hour, but he was thrown against his instrument panel with such force that he lost consciousness for a moment.

When he came to, he saw his rear-seat gunner preparing to inflate the rubber boat and, as Zeros were still overhead, ordered him to "hold it" for fear of inviting further attack.

Then an unfortunate thing happened. The uninflated rubber boat got caught in the tail section of the sinking plane, and Carroum himself was almost dragged down with it. He managed to wriggle out at a depth of about 10 feet, but the raft went to the bottom with the plane.

Carroum, who was at home in the water, was not in the least dismayed. They were only 25 miles from shore and would swim for it. But his companion didn't regard the matter so lightly. Such a long swim seemed impossible to him. However, when "Tiny" struck out for shore, the gunner reluctantly followed. The stronger swimmer would go ahead a little way until his partner seemed to be lagging too much; then he would swim back to encourage him and help him along.

These tactics lasted all night, but it soon became apparent that adverse wind and currents were having more effect on the gunner's attitude than his pilot's words of encouragement. Finally, at about 9 o'clock, when Carroum looked for the gunner, he was nowhere to be found.

After searching for 15 minutes, Carroum took a fix on the spot as well as he could and then struck out for the nearest island alone. With a little luck, he reasoned, he could make shore, perhaps locate a boat, and return to search for his pal. But luck was against him,



U. S. Navy, official

Frigate Birds Soar Overhead—Castaways Are within 75 Miles of Land

Forced down by mechanical trouble in Panama waters, the crew of this Navy Catalina patrol bomber anxiously scans the sky and horizon. Soon a sister plane spotted them and sent a tanker to the rescue. Navy manuals carried in planes contain excellent advice on what to do to survive such ordeals. Frigate birds normally cruise within 50 to 75 miles of shore and, because they do not rest on the water, must return to land to sleep. Occasionally stragglers range farther to sea. They are known also as man-o'-war birds.

as were the wind and currents. Carroum himself escaped death only by a narrow margin and what seems to have been a superhuman effort to make shore or die in the attempt.

On the morning when he lost his companion, Carroum was about 12 miles off the north shore of Kobiloko Island, one of the northern Russells, in the Solomon Islands.* He headed south, but there was a strong easterly current, and he soon found that his progress was southwest. He might well be swept past the island altogether. So he changed his course to southeast, hoping to make the westernmost tip of Kobiloko by nightfall.

He swam all that day, using the breast stroke with scissors kick. His method was to swim for about 55 minutes of each hour, then rest five minutes. He must have covered three times 12 miles through the water, but when night fell he was still about six miles offshore

and being swept westward at an alarming speed. However, he could now see Baisen Island to the west of Kobiloko and, taking advantage of the easterly flows, he decided to make for this new island.

He swam all night—his second night in the water—and made good headway until he was within 600 yards of the eastern end of Baisen Island. There the offshore current became so strong he could make little progress against it. He nevertheless tried so long and so hard that about 3 a. m. he lost consciousness and drifted for what must have been five or six hours. Fortunately his life jacket was the new type, which will keep a man's head out of the water even when the wearer is unconscious.

* See "Map of Southeast Asia and Pacific Islands, from the Indies and the Philippines to the Solomons," issued as a supplement with the NATIONAL GEOGRAPHIC MAGAZINE, October, 1944.



U. S. Coast Guard, 011644

Help at Last! Survivors, Battered by Mid-Atlantic Waves, Grab Lifelines

Numbed by the cold and constant wetting, the men must be lifted aboard carefully to avoid injury. Because their raft has a suspended bottom, which does not keep out the wintry sea, they are lying across the cork ring to keep out of the water as much as possible. They hope to avoid "immersion foot," a sea malady similar to frostbite, caused by continued exposure to cold salt water. Rescuers must not rub or apply direct heat to the feet and must avoid breaking the skin.

When Carroum came to, at about 8 a. m., he found that he was some two miles to the northwest of Baisen Island, and again he started swimming for it. A third island, Leru, was on his right, but when he got into the channel between Baisen and Leru he again found he could make no headway toward Baisen.

Since Leru looked uninhabited, he decided to continue with the current into the West Bay, which seemed surrounded by islands.

All this day, his third, he headed south-southeast into the bay, but progress was slow. His jaws swelled until they were tight. Since the previous midnight he had been unable to spit; there was no saliva left in his mouth. At noon his eyes began to swell and to hurt, and they got progressively worse from that time on.

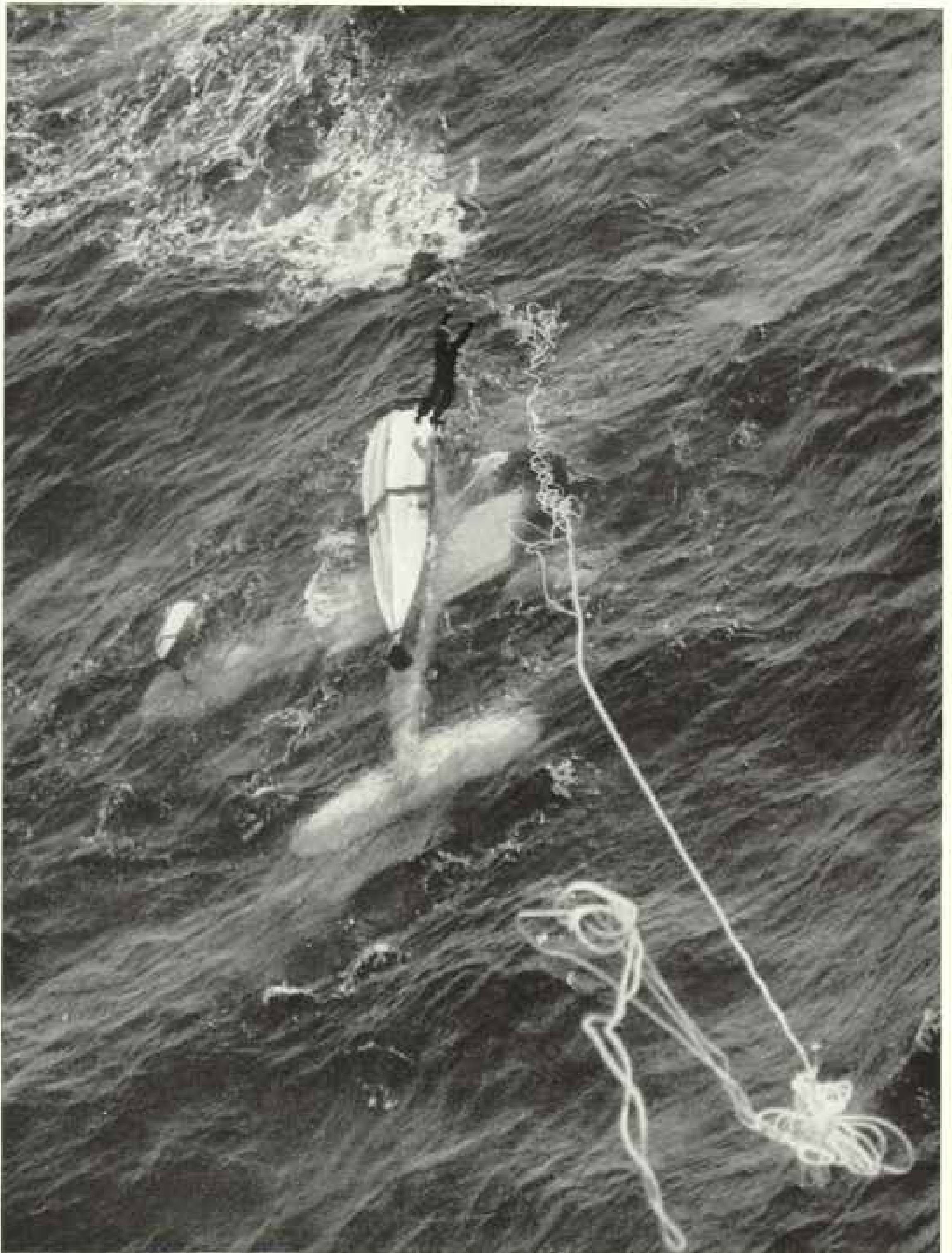
By late afternoon he could barely see; one eye remained open, and that just a little.

He was fully dressed when he abandoned ship, but had kicked off his shoes as he started to swim to shore. Carroum believes his clothes kept him warm and helped protect him from predatory fish.

At about 6 p. m. the third day, a rainstorm blew up from the east. It provided much-needed drinking water and blew him west toward Mane Island, where he observed huts along the shore. He swam downwind until midnight, making a terrific effort to reach shore, but in the midst of this struggle he again lost consciousness and drifted for about ten hours.

A Dream of Fresh Water

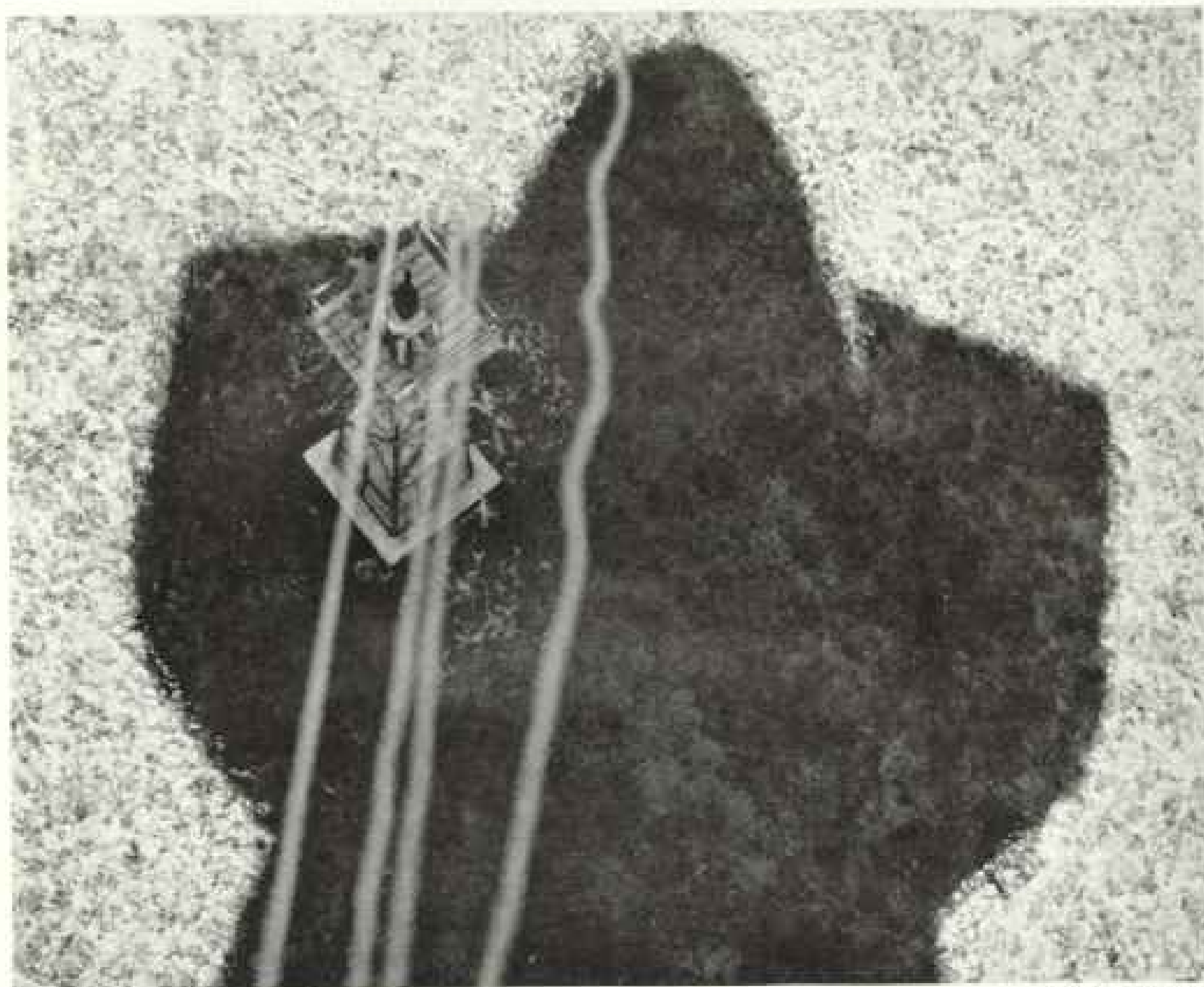
This business of "passing out" whenever he became thoroughly exhausted was drastic medicine, but it helped Carroum to survive by giving his tired body a chance to relax and



U. S. Navy, Official.

An Airman Leaps from His Overturned Plane for a Line Thrown to Him by a Blimp

Ordered to look for survivors of a plane crash in the Atlantic, Navy Blimp K-89 noted a spot of green dye on the water. Heading down, it saw this man perched on the pontoon of his overturned SO3C (Scout Observation plane). The blimp radioed position, dropped a life raft and emergency rations, and hovered aloft until a Coast Guard cutter picked up the survivor. The pilot failed to surface after the crash.



U. S. Navy, Official

A Blimp Casts Its Elephantine Shadow over Survivors Marooned on a Beacon

While patrolling in submarine-infested waters around Cuba, the airship sighted wreckage of a sunken ship and then searched for survivors. These two were found on the tower of a beacon light. Here they reach for food and water lowered by lines from the blimp.

recuperate a little from his enormous exertion.

Consciousness and the fourth day came together. It started with a dream about drinking fresh water, and before he realized it he had swallowed three mouthfuls of sea water without tasting the salt. His face was hard from swelling, and he had to wash open his one usable eye every few minutes to see where he was going.

An ordinary man would have quit, but Carroum swam on, robotlike and with unflinching drive, all that day. At about 6 o'clock his feet struck bottom.

"Land at last! Praise Heaven for its gentle mercy!"

But its mercy was not so gentle. This land proved to be a coral reef 200 yards offshore. The swelling surf which broke on the reef tossed him and rolled him against the jagged rock so that he was cut and torn in a dozen places. He could not walk because of his

weakness and because his bare feet would be cut and gashed by the sharp coral.

So he paddled and crawled over the reef, allowing himself to roll with the waves and offering as little resistance as possible. It took a good deal of time and suffering to make that shore—but make it he did!

At dusk the fourth day, November 17, 1942, Carroum dragged himself up on the northwest beach of Mane Island.

He had been in the water 73 hours, much of this time swimming against or across strong currents. For 15 or 16 hours of the time he was unconscious.

Once on shore Carroum sighted a pool of rain water. Crawling on all fours, he reached it and drank his fill. He also washed his sore face and eyes and felt greatly refreshed. Then he opened a coconut lying on the ground, ate part of it, and fell fast asleep on the shore.

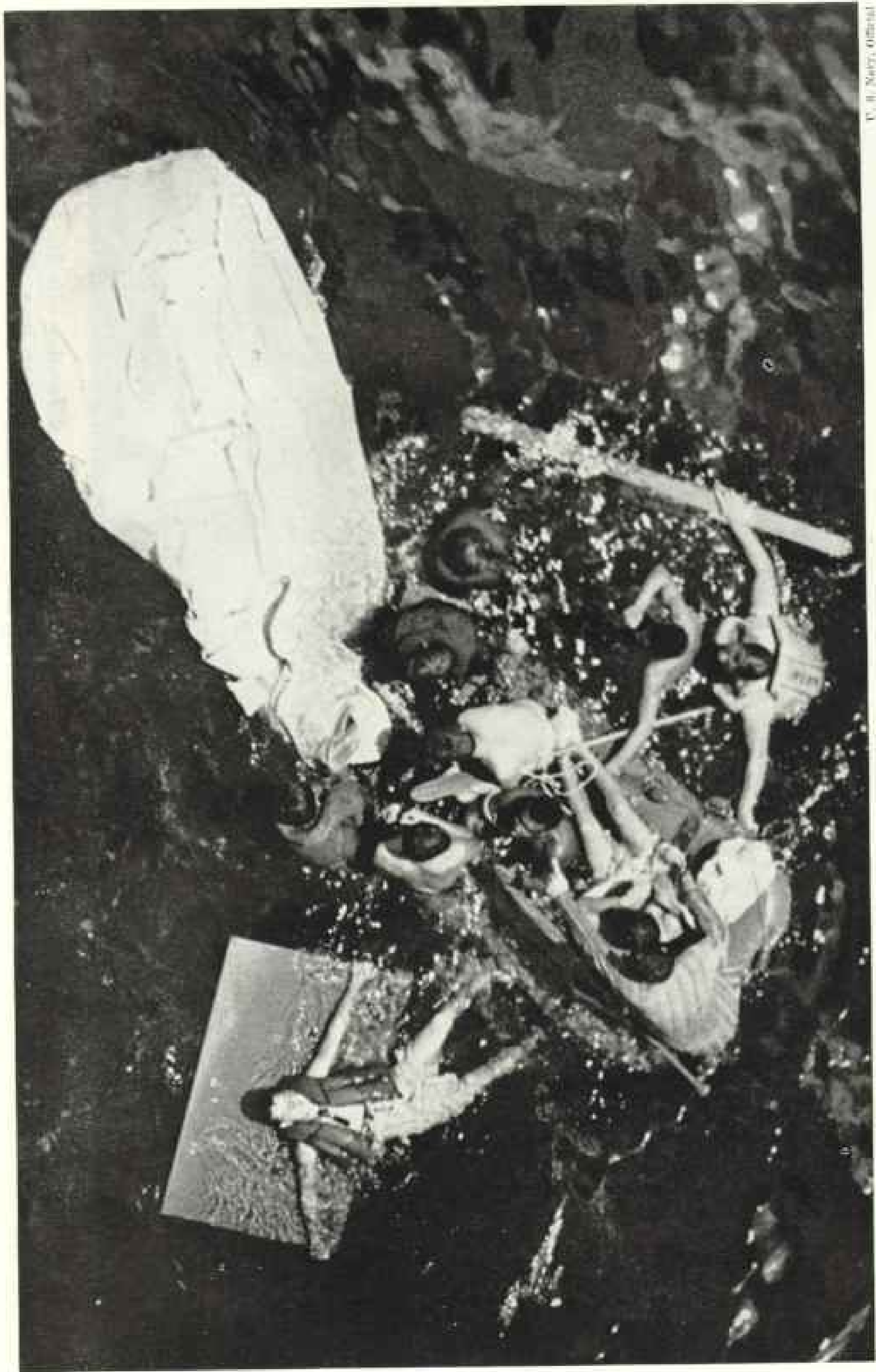
Rain awakened him at dawn. He felt well enough to take off his wet, dirty clothes and



Getting Aboard a Tiny Rubber Raft Is as Tricky as Climbing into a Canoe from the Water.

Here a fighter pilot shows how to board a float without turning it over. First, he inflates the bag with CO₂ gas from the bottle. Then he places his left forearm under the seat and pulls himself up (1), reaches for the opposite side (2), works his way across the boat (3), inserts oars in the earlocks and paddles away (4).

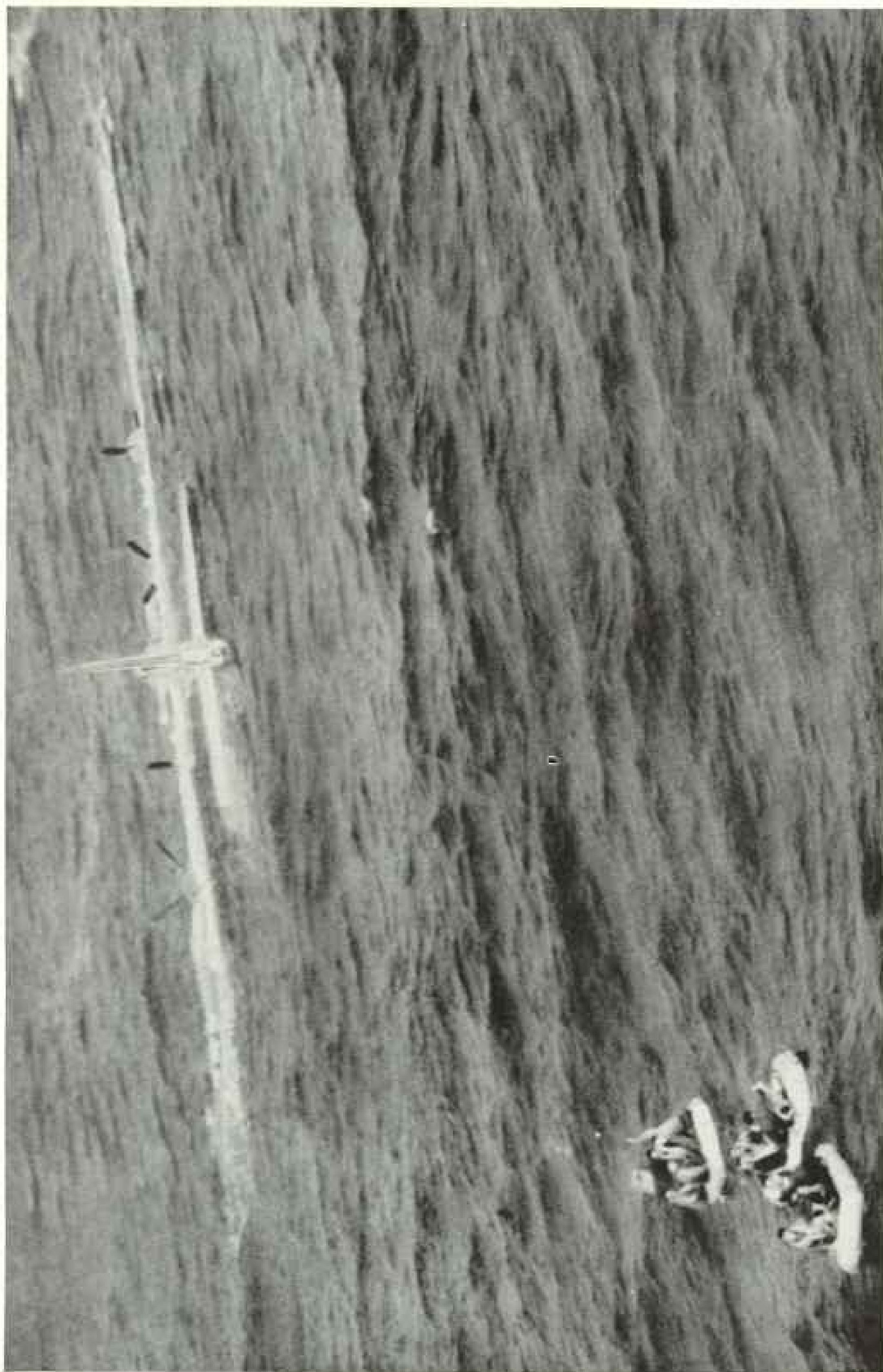
T. W. Nooy, comical



V. H. Meyer, Official

Hovering Overhead, a Blimp Drops a Life Raft to 11 Seamen Clinging to Wreckage from Their Torpedoed Ship

Within a few hours after the glow of burning oil was reported early in April, 1943, the airship discovered these survivors off the Florida coast. Men at top are inflating the big rubber boat by releasing carbon-dioxide gas from its cylinder. Four others with no life jackets crowd the doughnut raft at bottom. The blimp stood by until a Coast Guard cutter, summoned by radio, picked them up and landed them at Miami.



Downed B-29 Keeps Vigil over Its 12-Man Crew Hobbling on Three Life Rafts, Lashed Together with Sea Anchors Out

A "Dumbo," or Catalina search plane, has just spotted the big Superfortress forced down on its return from bombing Nagoya, Japan. Most planes sink instantly after "sitting down" on rough Pacific seas, but many B-29's stay afloat for hours, kept afloat by empty gasoline tanks and airtight pressure cabins (page 626).

V. P. New, Official

rinse them in the pool of rain water. While doing this he was discovered by five friendly natives, who took him in tow and cared for him until he was well enough to return to base, where he rejoined his squadron aboard the U. S. S. *Enterprise*.

Carroum lost most of his rescue equipment at the scene of his water landing because he was unable to get it away from the plane. The lesson of this and other tragedies emphasized the importance of emergency equipment so designed that everything attaches to the flyer's person and remains with him when he takes a hurried departure, either before or after the plane hits the water.

Most notable aspect of this experience was the remarkable levelheadedness of the man under extreme difficulty. He never ceased to struggle, never gave up hope. He worked consistently and intelligently with every bit of strength he had—every waking hour. He never lost his judgment, though he often lost consciousness. And even at the end of his 73-hour ordeal when, nearly blind, his feet touched the coral reef, he knew what to do—and did it.

Guts plus sense—that's the stuff survivors are made of. And Carroum had plenty of both.

New Type of Equipment Used

The case of Lt. (jg) George H. Smith* was one in which the pilot had the new-type equipment, retained it all, and put it to the severe test of 20 days afloat.

On July 14, 1943, Lieutenant Smith, flying a Grumman Wildcat, was en route to Munda from Guadalcanal. His flight encountered a series of thunderheads and was forced to take the long way around to avoid trouble. Smith was eventually separated from the rest of the flight and, as he had an unreliable compass and almost no fuel left, he was forced to make a water landing in the dark on a rough sea.

After the belly of his plane hit the water, the plane went forward 15 or 20 feet, then nosed down for Davy Jones's locker.

Smith, well trained, had prepared in advance for a quick getaway. An extra canteen and an extra emergency kit were tied on his parachute harness; his shoulder straps and safety belt were drawn tight. When the plane stopped its forward motion, he disengaged the safety harness, kept the parachute buckled on, gave a hard push with his legs, and went about five feet up to the surface. Split-second timing was essential to get out alive.

This feat accomplished, the next thing was to pull the cord on his Mae West and inflate the life jacket; then, with this support, break

out the rubber raft. His raft was the one-man seat-pack type attached to his parachute harness.

Inflating the rubber boat took Smith about five minutes. It consisted of jerking the pin and turning the valve on the CO₂ cylinder, a difficult operation to figure out in the dark, but one easy to perform if practiced in advance (page 622). Smith followed instructions exceptionally well, even saving his unopened parachute, which was to come in very handy later.

A Tiny Craft in a Vast Ocean

The sensation of riding such a small craft in a vast ocean was thrilling and fearsome. His water-soaked equipment was weighty and, with his own bulk, crowded the raft. He felt as though the least move would upset the tiny craft and leave him to the mercy of the sea. Therefore, as soon as he was rested, he moved cautiously to trim ship and lash down its loose gear, so that if his raft capsized his precious gear would not be lost.

Cold winds blowing through Smith's wet clothes spurred him to open his parachute and use the silk as a blanket. The huge canopy proved cumbersome; so he cut off the top half and about a dozen shroud lines, bundled up the rest, secured this to the boat with a line, and cast it overboard to drag along aft in the water, where it helped the sea anchor steady the craft. He used the shroud lines to secure his gear further, then tucked the silk about him and tried to sleep.

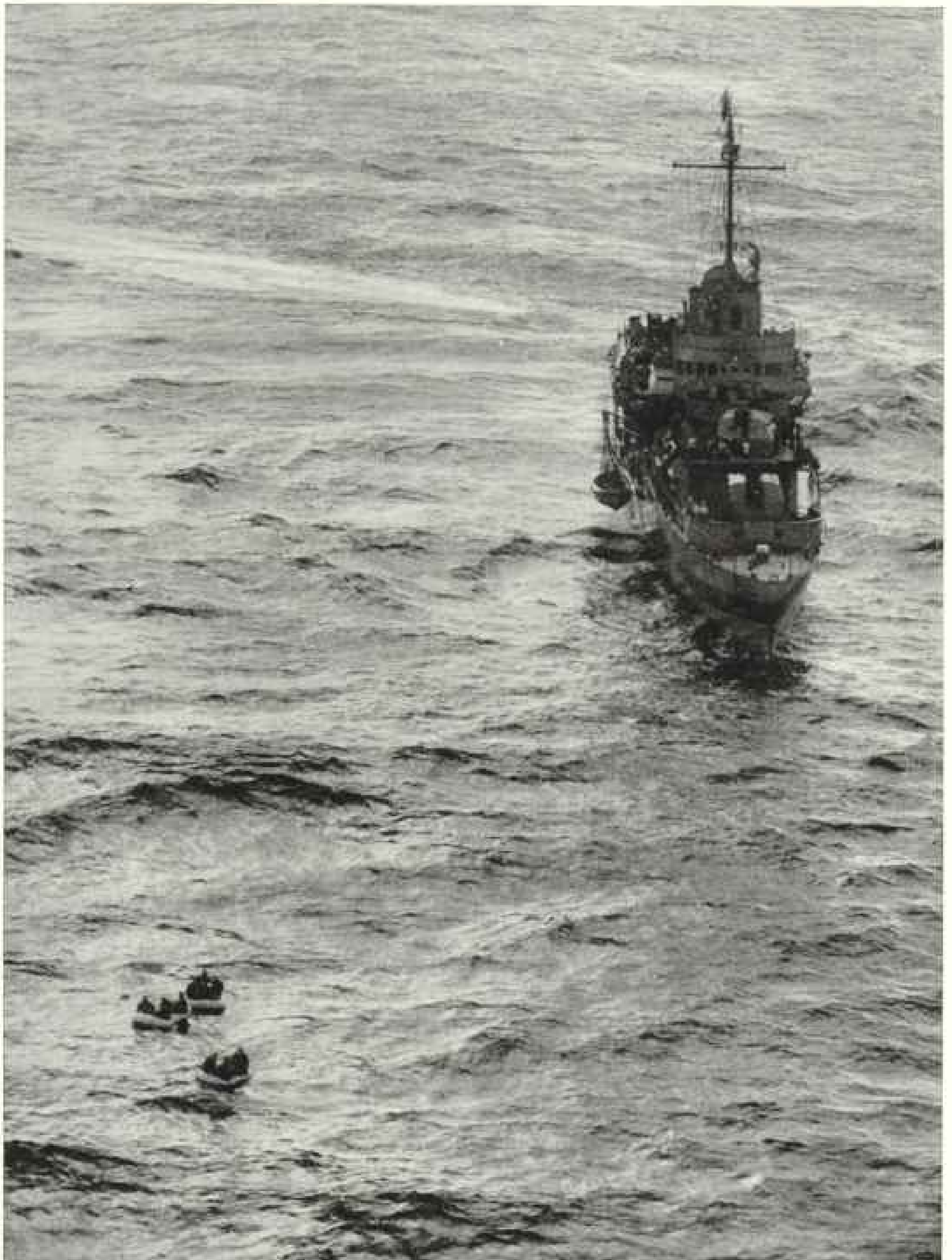
There was little sleep that first night, but later on he learned the trick and could sleep at least several hours a night despite the bobbing of his floating leaf.

The worst thing was the pounding of the waves on the bottom of the raft, or rather on his own bottom, as only a thin sheet of rubberized cloth separated him from the sea. That was nerve-racking and nearly drove him mad. Three times, at night, he resorted to the morphine syrettes of his first-aid kit for relief. They seemed to soften the pounding and induced much-needed sleep.

The days were hot, the nights were cold, and the waves were merciless. Smith wisely kept on all his clothes, including shoes, helmet, and goggles. Being blond and particularly subject to sunburn, he fashioned a mask of parachute silk and so protected his whole face.

Having an extra canteen and a week's rations, he did not immediately worry about subsistence. The first 24 hours he fasted.

* This narrative follows Lieutenant Smith's own account, in the Bureau of Naval Personnel Information Bulletin, February, 1944.



U. S. Navy, Official

A Destroyer Comes to the Rescue of "Ditched" B-29 Flyers

More than 60 percent of Army and Navy airmen forced down in the Marianas area are saved by PBY's and surface craft of the Air-Sea Rescue Unit. Catalina search planes spot the tiny rafts and call surface vessels, since landings in the big waves common in this region are dangerous. As the destroyer here slowly circles, its whale-boat is lowered to pick up the survivors. Most crews are located within three days, but one search lasted 11 days.



AP from Press Ass'n

Carrier-based TBF Drops Rescue Equipment to Survivors

A large inflatable boat (top) and two shipwreck kits are seen in mid-air. A light outboard motor and fuel container will follow. All are packed in waterproof canvas and are lashed together. They are dropped upwind and will drift down upon the survivors. Most droppable kits are smaller—less lavish. Supplies can be dropped with only a life jacket to keep them afloat.

then used the stored rations sparingly. His equipment included a fishing kit, a sheath knife, and his .45 automatic strapped about his waist.

In the weeks which followed he hooked not a single fish, but shot nine birds. He did find an 8-inch mackerel in the sea anchor one morning. He ate it, and he managed several times to dip up minnows with his mosquito head net. Sharks got his lines early in the voyage, but, though he shot them, they sank out of reach.

His biggest excitement over marine life came when two huge sperm whales appeared.

One of the giants came up to his boat, nudged it with his nose, and slid gracefully under. Smith was scared stiff, but he sat still and lost only about ten years' pleasant dreams.

A Marlin and a Mackerel Fight

Another time he saw a desperate struggle between a marlin and a mackerel. The marlin was about seven feet long, with an 18-inch spike, and was apparently trying to catch the 30-inch mackerel.

The two fish came directly toward the boat and finally splashed out of the water within three feet of Smith, who was petrified for fear

the marlin would pierce his rubber raft and leave him on the ocean without a seat. But luck was with him, and nothing happened.

On July 20, his sixth day, he sighted the first of many Japanese planes he was to see, as he was now drifting on a 300° course deep into enemy waters. A few of these planes passed directly overhead, as low as 500 feet, but failed to see him.

From then on he sighted planes almost every day. He would wait until they were close enough to identify and, if friendly, would signal excitedly with tracer bullets, a mirror, or sea-dye marker. However, not until August 1, his 18th day, did he succeed in attracting the attention of a plane. This was a New Zealand land-based Lockheed Hudson, which passed very close.

The tail gunner saw Smith's sea-marker dye on the water; the plane turned, made a wide circle, and flew down close to the raft.

Smith said of this incident later: "For the first time in my life, and I hope the last, I cried for joy. I was afraid they would check my position and leave without dropping supplies and, frankly, I was getting pretty hungry and thirsty. I put on my rubber paddles, leaned back in the raft, and signaled in semaphore the letters E-A-T."

The plane made another wide circle and then dropped an inflated life jacket with supplies attached. The bundle hit the water about 30 feet from Smith's boat. He paddled to it and found Army-type emergency rations, a canteen of water, a map marking his position, ammunition for the .45, a waterproof flashlight, first-aid equipment, a Very pistol, and other useful items. The New Zealanders flew by once more, wobbled their wings, and headed for home.

Catalina Comes to the Rescue

The 20th day was overcast and dreary. The wind still blew in squalls. It was not a day to expect rescue. But just before noon three Navy Catalinas hove into view. Smith jumped with excitement and spread a sea marker. Two of the Cats passed within half a mile but failed to see him. The third came directly overhead, saw his signal, dropped a smoke bomb, and then called the others back.

Waves and swells were 10 feet high, and the three flying boats circled as they considered the risk of landing on such a rough sea. Two of the planes lowered their retractable wing floats in an attempt to land, but both pilots decided not to chance it.

The third pilot was more daring. He knew that, as the weather was closing in, if one of them didn't set down on the water in the

vicinity, they would probably never find this castaway again.

So the pilot dropped his depth charges and about 800 gallons of gas to lighten the ship and made a power-stall landing on the water.

His starboard wing float hit a swell as he was landing and started to spin the plane to that side. Instantly he hit the throttle on the starboard engine and kicked the rudder and stick to port.

The lumbering Catalina straightened out and dropped safely into the sea.

A wave broke over her and smashed the port gun blister, filling the after compartment with water. But the plane remained afloat and the crew bailed out the water as it taxied into the rain squall where Smith had disappeared. After taxiing about two miles they saw the smoke bomb and found Smith wolfing the last of the rations dropped by the New Zealanders.

The sea was so rough that the pilot decided not to risk a take-off until it calmed a little. Smith told him that it had been no smoother for more than two weeks. But they stayed on the water all that afternoon and all that night.

The Catalina creaked and groaned like an old haunted house. The waves engulfed the bow of the plane and broke against the hull.

Smith was indescribably grateful for companionship and, despite the precarious plight of the Catalina, he felt he was in the lap of luxury. He drank two tumblers of grape-juice, a couple of cups of coffee, ate two big steaks and a large dish of peas. It's a wonder he didn't die from this extravagance alone; but he was the only one who remained well. The rough sea got the best of the others.

Finally, the pilot decided to make an attempt to take off. They were only a hundred miles south of the enemy base at Kahili, and, if the waves didn't break them up, the Japs certainly would strafe them before long. So they revved the engine and made a dash for it. The trial was successful.

With marvelous skill the pilot bounced the big craft from wave to wave until she finally soared into the air at about 10 knots below her proper speed.

The castaway was taken back to a field hospital on Florida Island, where he spent only three days recuperating. Despite meager rations he had been able to keep his body in fairly good condition for the 20 days afloat. He lost a total of 20 pounds, suffered from salt-water sores on elbows, back, and buttocks, and for a few hours after rescue was unable to move from the waist down because of sitting so long in a cramped position. These

difficulties, however, did not last, and he was soon ready for the long trip home.

A Model Castaway

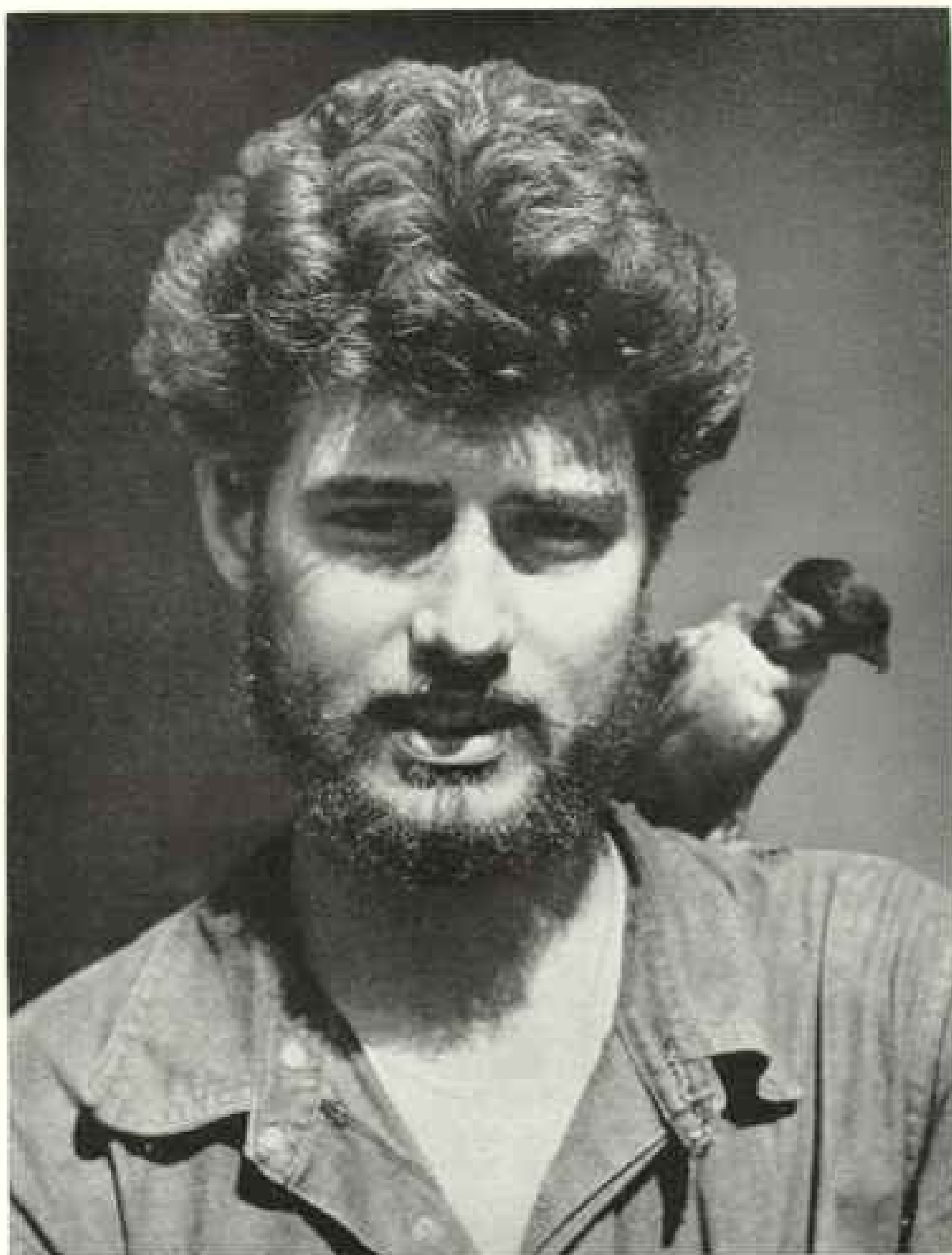
Smith was a model castaway, and he used his equipment to excellent advantage. He was temperamentally suited for such an ordeal and is probably the one in a thousand who could endure it. His little boat was intended only for temporary emergencies, and the fact that it served him so well so long is a remarkable commentary on the quality of American equipment—and men!

There is one part of Smith's adventures which drew adverse criticism from the experts. He claimed that by greasing his mouth and throat with bird fat he was able to drink a pint of sea water daily for five days without ill effects. Numerous experiments have been conducted by the Naval Medical Research Institute and other scientific bodies which show, without exception, that where there is no other source of water and men drink from the sea, death will occur sooner than if they consumed no water at all; that is, in less than a week.

When Smith began his experiment, he was not badly dehydrated, and rain came in time (five days) to relieve his condition before serious harm resulted.

There are chemical methods of treating sea water to remove the salt and leave the water potable. Compact chemical filter sets are now being supplied by both Army and Navy to air personnel, and plastic sun stills are often provided as an additional safeguard against the hazards of shipwreck and the sea.

The experience of Harold F. Dixon, An-



U. S. Marine Corps, Official

A Marine "Robinson Crusoe" after 72 Days of Wandering

Forced down on an air mission in the Southwest Pacific, Marine Staff Sgt. Bill Coffeen, Chicago, Illinois, landed at sea and then traveled from island to island, living on coconuts. Friendly natives gave him food and care. A Navy patrol plane flew him back to Guadalcanal.

thony J. Pastula, and Gene Aldrich is well known because of the wide circulation of their story as told in *The Raft*.*

Three Men on a Raft

Their stirring adventure opened the eyes of the experts by proving that men can survive for more than a month without any initial supplies of food and water, with very little equipment, and with only an inflated rubber sheet for a craft. It was the first great survival story of this war.

Another story of three men on a rubber raft

* *The Raft*, by Robert Trumbull, published by Henry Holt & Company, Inc., New York City.

is laid in the cold North Atlantic region in the autumn of 1943. Robert E. Coffman, Norman E. Greenaway, and Ronald E. Snow were members of the Royal Air Force Transport Command, engaged in ferrying bombers across the Atlantic.*

Ordinarily the aircrews who deliver planes to England are flown back as passengers to the Ferry headquarters in Montreal. However, this crew was working both ways by flying back to Canada operationally obsolete twin-engine Hampden bombers for use in the flying schools of British Columbia.

They had completed the first leg of the journey, from Britain to Iceland, and were in sight of Greenland when engine trouble forced them down. The decision to land was made well in advance; so the crew got emergency kits ready to pile out on the wing as soon as the plane hit the water.

It was early afternoon and an easy landing. The rubber raft was released and inflated automatically as soon as the water soaked through the engine nacelle where it was stowed. The bomb bay had shattered on impact, and the airmen seized some of the wooden wreckage from it to supplement the two canvas hand paddles with which their boat was equipped.

The bomber sank in about 70 seconds, and it was not until then that the men looked about them to take in the full gravity of their situation. They were in the midst of an active ice field; pack ice was everywhere in the direction of the mainland, which lay some 15 miles to the southwest. Their course toward shore was dotted with bergy bits about the size of a small house, and dead ahead was a vista of icebergs as high as the masts of a battleship.

They were afraid of cutting or puncturing the boat on the sharp ice; so they proceeded cautiously. Several times the dinghy bumped ice, but the edges were all smooth-surfaced, and the glancing contacts without casualty. Each took his turn as boatman, and the reliefs would bundle together to keep warm, for even their winter flying suits were poor protection in the sub-zero weather.

Their equipment consisted of two hand paddles, the strips of planking from the lost plane, which were used as pole and paddle, a Very pistol with 27 cartridges, and three emergency kit boxes each containing the following: 45 malted milk tablets, four squares of barley sugar, a small quantity of chewing gum, twelve sealed pints of water, first-aid kit, a yellow distress flag, and a 4-inch-square metal mirror with attachment for use as a heliograph.

For 20 hours after they landed on the ocean the battle to cleave a way through the ice went

on without respite. By the light of the moon the little dinghy kept up a nimble rate of 22 yards a minute along the 15-mile avenue of ice, one of the strangest sea journeys that men can ever have made. As ice formations met in collision and the bergs shed their mass, the air was full of a great crackling and the incessant sound of thunder, interspersed with a noise like the drumfire of heavy artillery.

Dawn showed the soaked paddlers that they had kept a true course, and they reached land less than a mile from the point intended. But it was not the mainland. A swift coastal current forced them to land on a big black rock 50 yards from the shore.

This rock rose sheer from the ocean to a height of 3,000 feet. As the men climbed up it, they saw some of the snow-filled valleys of Greenland and the enormous ice sheet; and they saw also, with dismay, that they would not be able to take their dinghy across the raging water that separated them from the icecap.

The island was completely bare except for ice and snow; there was not even a cave to provide temporary shelter.

The first two days of snow and sleet blizzards were followed by 48 hours of sub-zero temperature, which froze flying suits and underclothing to the hardness of stone.

Then came three days of serious gales, blowing away the distress flag which two of the men had scaled the summit to plant. Finally there was a long snowstorm which lasted intermittently for the rest of their stay.

Ferry headquarters in Montreal organized a large-scale search for the missing crew with aircraft from Labrador, Newfoundland, and Iceland.

Two hours after Coffman had settled down on the clifflike precipice he heard these aircraft overhead, but the storm and bad weather prevented his being sighted. Very lights were fired whenever the sounds of engines were heard, but these signals went unnoticed.

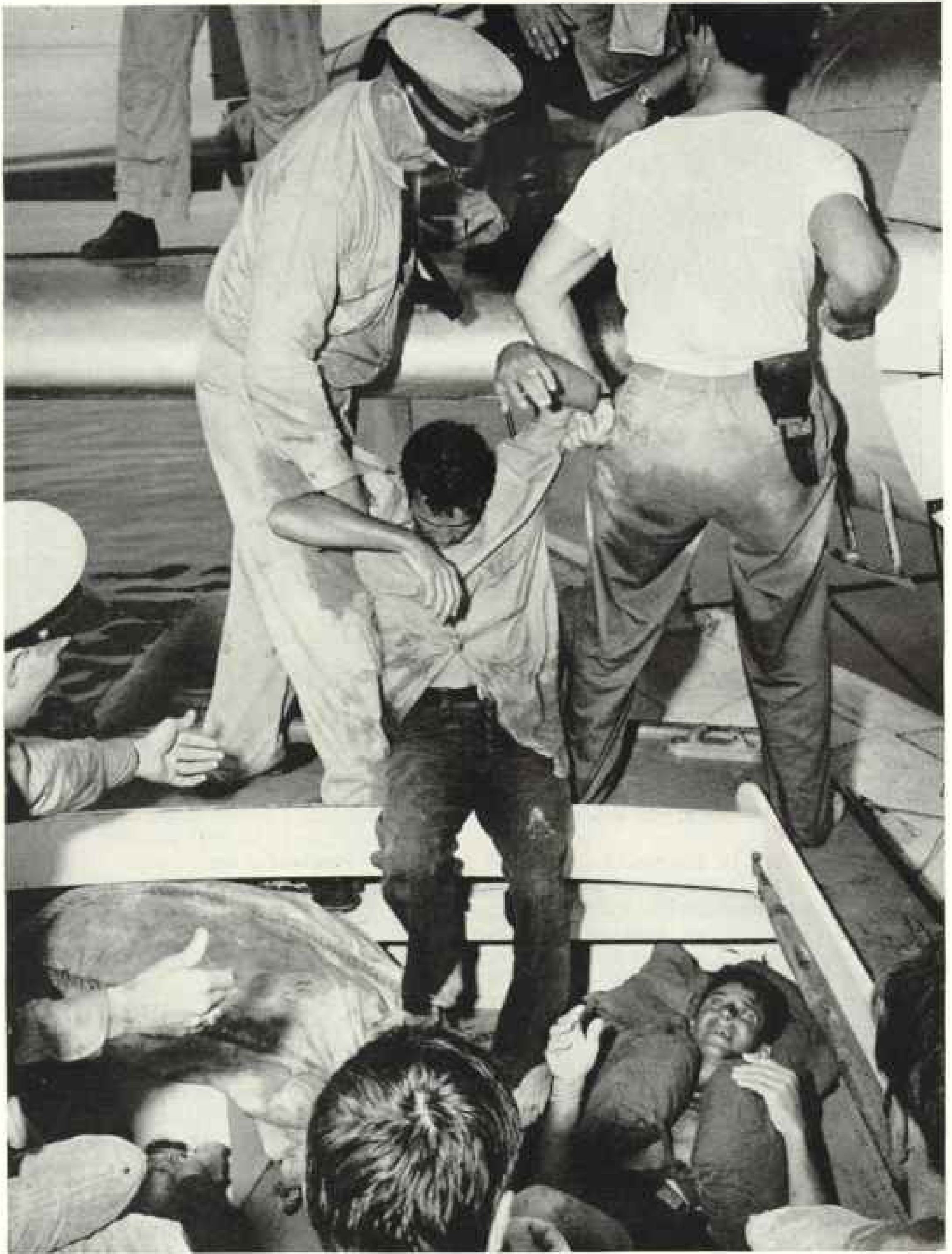
Ten Days on a Rock

The marooned crew's ten days on the rock were a terrific ordeal.

When their condition became so bad that they could not carry on ordinary tasks necessary for survival, they took benzedrine from their first-aid kits as a stimulant. Their hands and feet became frozen and were of little use.

At the opening of the tenth day, the three airmen were at the limit of despair. An aircraft came with sunrise but, like the others, was flying too high. Cloud ceiling was very

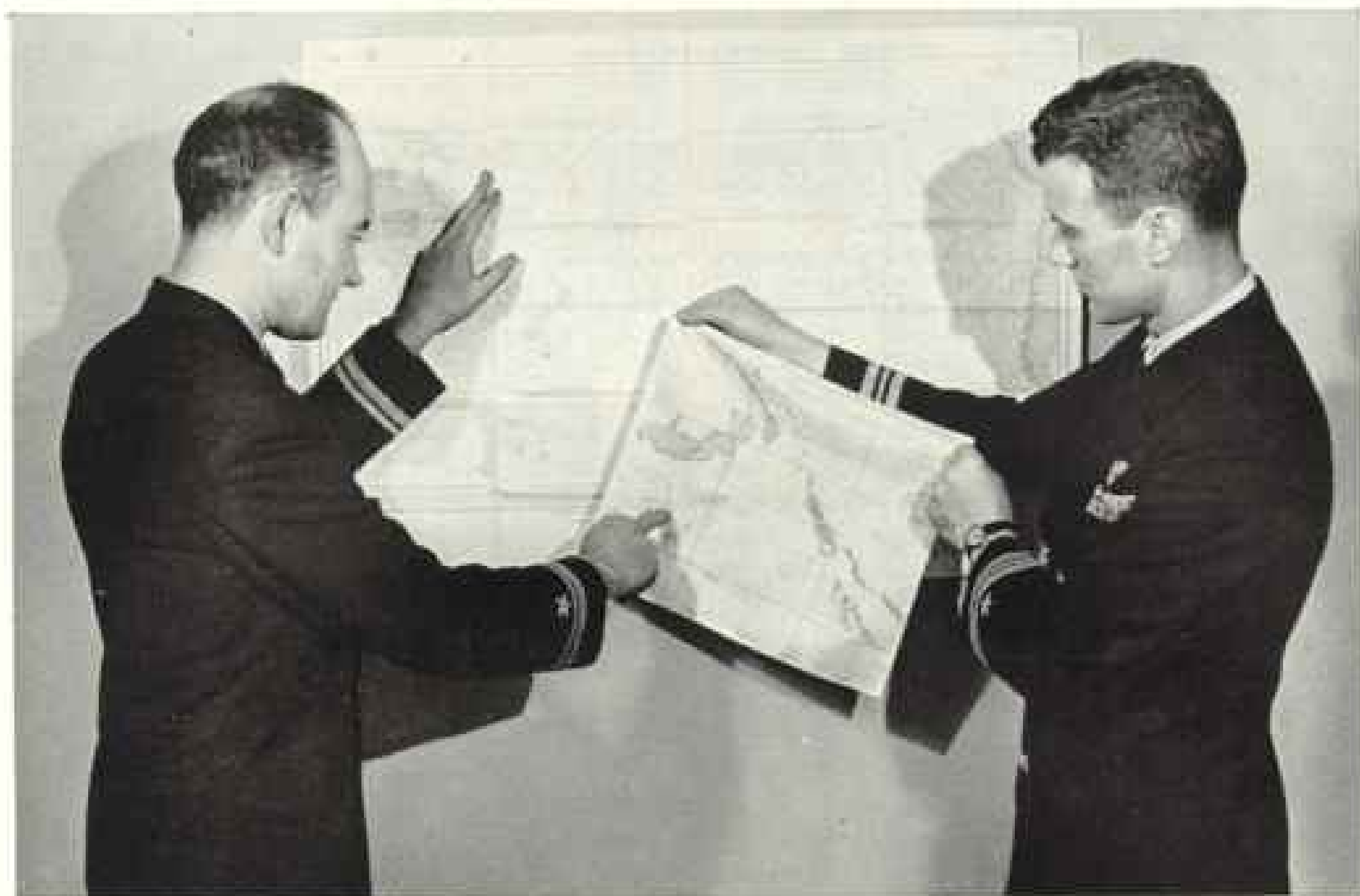
* Reported in RCAF Sea Rescue Bulletin, No. 60, July 1, 1943.



U. S. Coast Guard, Official

Not All Survivors Are Victims of the War

Rescued crew members of the Coast Guard cutter *Jackson*, which capsized and sank in the hurricane off the Virginia coast in the fall of 1944, are transferred from a Coast Guard plane to a small boat to be rushed ashore for medical attention. A Kingfisher observation plane, which patrols the Atlantic waters from the Elizabeth City, North Carolina, Coast Guard Air Station, made the rescue.



U. S. Navy, Official

Navy's Waterproof Charts Can Be Stuffed in the Pocket Like a Handkerchief

Airmen operating in the South and Central Pacific carry rayon charts, such as this one of the Solomons, for use if forced down at sea. Printed on both sides, the maps show islands, seasonal winds, currents in winter and summer, and compass variations. The charts are impervious to mildew, fading, and salt water.

clothing. They actually keep a man dry though he is swimming in the ocean. They are clumsy and cumbersome aboard ship, but invaluable if you have to go overboard. Men have been known to float in icy water for eight hours with these suits on and come through unharmed by the cold.

Lifeboats and rafts carried by surface vessels are very much heavier and more seaworthy than those carried by planes. Where the fighter pilot carries only three pints of water in his emergency equipment, the standard aboard ship is ten quarts per man.

Though a lifeboat is undoubtedly the best craft for a long open-boat voyage, it has been augmented by the life raft in recent years because the latter is easier to launch and is practically indestructible.

Rafts can be heavily stocked and, in a pinch, will serve many more than the number for which they were designed. No special skill is required for their handling, as they are almost unmaneuverable, and they will ride out furious gales (pages 636, 639).

One of the commonly used Merchant Marine life rafts has been 8 by 10 feet square and 3 feet thick. It is a wooden frame built over 6 metal barrels, with open-slat decking

and a central well about 4 feet by 5 feet, in which supplies and equipment are stowed. The compartments in which stores are kept are built in below decks and can be reached from either side.

These rafts weigh about a thousand pounds apiece and are set at an angle on skids by the ship's rail so they can be launched at a moment's notice by simply knocking loose a pelican hook.

This ease of launching has even proved a hazard in some shipwrecks, for excited men will set them free on the first torpedoing, while the ship is still underway, and the rafts will be left behind, out of reach of the men who abandon ship later.

Adrift for 83 Days

The S.S. *Zaandam* was a Dutch luxury liner, leased by the United States after the Netherlands fell to the Nazis. She was carrying a mixed crew of Dutch and American seamen on the afternoon of November 2, 1942, when she was torpedoed 200 miles off Recife, Brazil.*

Seaman Basil Dominic Izzi and Ensign

* *83 Days*, by Mark Murphy, published by E. P. Dutton & Company, New York City, 1943.



U. S. Navy Official

Three Men on a Raft Are Rescued after 83 Days Adrift!

Reduced to skin and bones by hunger, thirst, and exposure, Cornelius van der Slot is helped aboard a Navy patrol boat off the Brazilian coast January 24, 1943. His companions, Nico Hoogendam and Basil Dominic Izzi (right), were survivors of the S.S. *Zaandam* torpedoed off Brazil. The men existed on meager rations, supplemented by raw fish, birds, and rain water which they managed to catch. Their extraordinary story is told on page 633. This type of ship's raft is easily launched and is practically indestructible.

spotted the first ship. Excitedly they set off flares, waved their flag, and shouted; but no response came from the ship.

They had one consolation, however, the thought that they must be in a shipping lane, and the prospect of other opportunities kept their spirits up.

Sure enough, the next day they sighted a second vessel, but had no better luck attracting attention.

Had their raft been equipped with the new heliograph signaling mirrors, which can be accurately aimed, almost surely they could have raised an alarm on either of the two vessels. As it was, they remained unnoticed and were left to drift for 64 more days, and during that time two out of the original five perished.

They sighted a third ship about the middle of December and were passed up once more. After some six weeks on the raft, they were

in dire straits, and this third near rescue left them pitifully low and discouraged.

Quoting Izzi: "We all slumped down and cried. We had always said a *third* ship wouldn't pass us up, and here this one had gone right on by, away out there in the distance. We didn't talk much about it; we just sobbed."

It was more than a month before their hopes would be raised again. On the 82d night, as their raft approached Trinidad, they heard motors and spotted an airplane high above them. It was too far away to see them and the light of day was almost gone, but it made them feel good to know that they were near some place where airplanes were. The next day they saw another, and then several in succession.

Each time their hopes rose a little higher, and finally on the 83d day they sighted the



Poon Lim, World's Champion Survivor

The Chinese steward of the torpedoed S.S. *Benluna* poses at Salinas, Brazil, after his record of 133 days alone on a raft. So extraordinary is his survival, with inadequate clothes, tools, and few rations, he stands as a model for all survivors (page 637).

Italian fasces sketched on its conning tower. The sub approached the raft. Some of the British seamen were taken aboard for questioning. Lim was in the line of its course when it got under way again. As it approached, he called out, "Save me, or I drown!"

The men on the bridge heard and looked him over quite dispassionately, but the only answer he got was a jesting "Goodbye!" shouted back in broken English.

After an hour in the water he sighted an unoccupied raft, probably one blown free when the first torpedo struck. It was a long, hard swim to reach it, but once aboard Lim found provisions which would last him about 50 days. By this time all his companions were out of sight, and he was so exhausted that he immediately fell asleep.

The first week afloat was uneventful. Lim studied his situation and used his supplies frugally. Having lost all his clothes except shirt and vest before he reached the raft, he made a skirt from a burlap bag in which the bottle of lime juice had been wrapped and fashioned a knife from a piece of tin off a pemmican can.

His total stores consisted of:

Hardtack	6 large boxes
Chocolate	7 pounds
Pemmican	10 small cans
Lime juice	1 bottle
Evaporated milk	5 cans
Water	10 gallons

There were also four poles and a tarpaulin, a long strip of canvas for a bulwark and a smaller piece to cover the well, two paddles, some signal flares and smoke pots, a can of massage oil, a flashlight, and some rope. There was no fishing equipment, no first-aid kit, and not a tool except an iron key to the water tank, which Lim later used to pound out other tools necessary for survival.

At the end of the first week, he sighted a ship and used his smoke pots to attract attention. He was apparently observed, for the ship changed course and came within half a mile of his raft, but did not pick him up. He was uncertain whether they saw him and used up all his signaling devices to make sure.

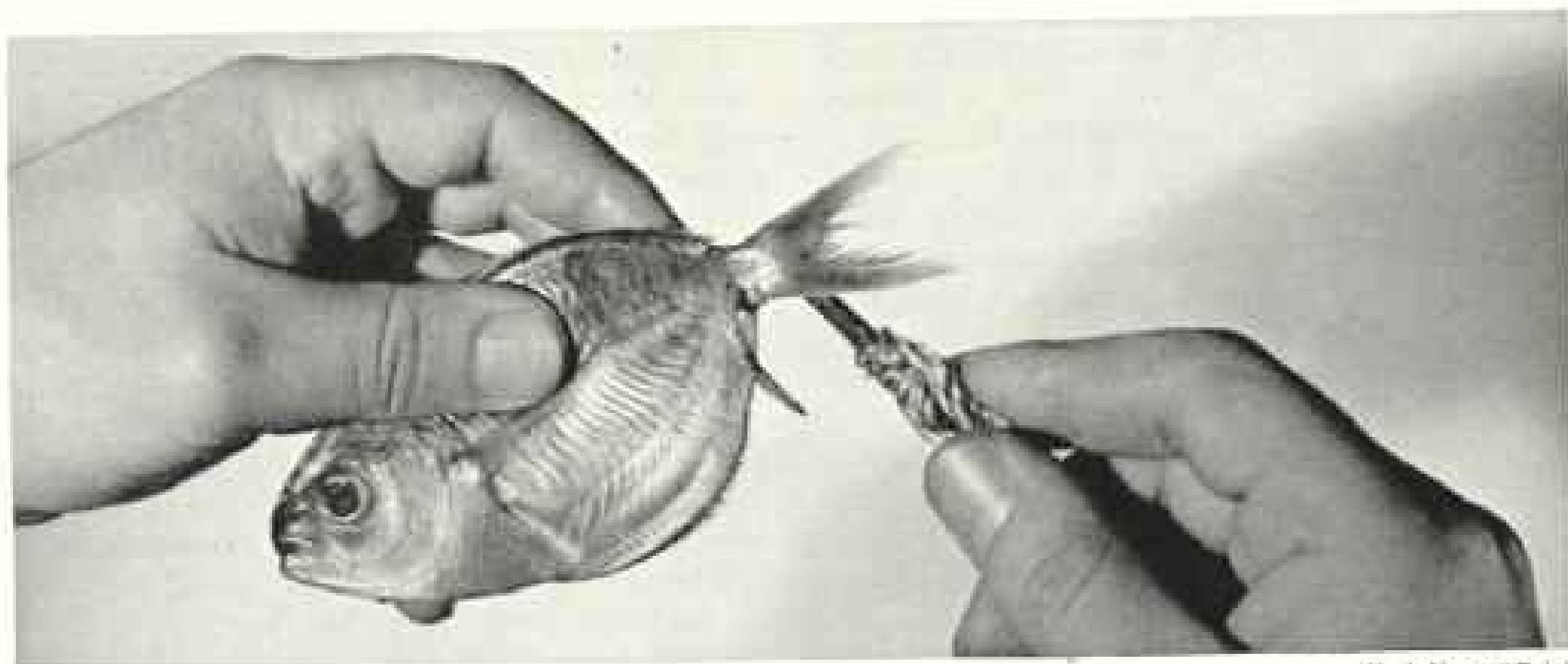
This failure to pick up a survivor can be explained only by the possibility that the people aboard thought Lim was a decoy, and, being in submarine-infested waters, didn't care to take the risk. There may be circumstances that warrant such a drastic decision, but they are rare.

Lim, however, accepted the matter stoically. He had decided from the first that if his number were up, he would die; and if not, he would come through all right.



To Help Other Castaways, Poon Lim Re-enacts His Raft Adventure

Here he floats on a ship's life raft similar to the one he used. A canvas awning protects him from the sun and serves as a rain catch. The yellow flag on a pole is a distress signal. He carried his improvised knife tied to a string around his neck. In the evenings birds occasionally roosted on his awning. Moving snakelike, Lim would stalk the birds, then in a flash grab them by the legs. Sun-dried bird meat tasted better than raw. Such rafts can be used right side up or upside down and require no balling.



U. S. Navy, Official

With a Live Lure, the Shipwrecked Chinese Caught His Big Fish

When his rations were gone, Poon Lim caught small fish with a hook fashioned from his flashlight spring. After bigger game, he bent a nail into a hook and stuck it through the tail of the live fish. Big 20-pounders struck at this bait. From then on Poon Lim had plenty of food. At first he ate his fish raw, but then he preferred it sun-baked. Various species differ in taste; so he could vary his diet.

He kept reminding himself that China had been able to stay in the war against Japan for almost six long years, and that if China could survive so long in the face of such tremendous odds, then he likewise could survive until help should come. This philosophical attitude, born of centuries of struggle, undoubtedly enabled Poon Lim to hang on to his sanity where other men would have gone stark, staring mad.

Lim swears that at no time did he get delirious or have hallucinations, or in any way go out of his head.

The approximate location of the torpedoing was 00.30° N, by $38^{\circ}45'$ W. This is above the easternmost tip of South America and about 750 miles from the mouth of the Amazon. The weather is warm in this region and there is plenty of rain, as well as an abundance of marine and bird life.

Improvising Fishing Tackle

Poon Lim did not attempt to fish until the rations with which the raft had been stocked originally were consumed. Then he fashioned a small hook from the wire spring in his flashlight. This he pounded to a bent point on one end and a ring on the other, using the metal key to his water tank as a hammer. He unraveled strands of rope and twisted these into a fish line, then baited his hook with pemmican and tried his luck.

The pemmican bait would disintegrate on contact with the water and drop off the line. Looking around for something better, he discovered a barnacle on the side of the raft. This was promptly attached to his line and, presto—he caught a minnow!

But he wanted bigger game and set to work making heavier tackle. He pounded the deck of his raft with the metal key until he literally dug a large nail out of the planking. Not wishing to risk the loss of the nail overboard, he completed the extraction by pulling it out with his teeth. Then, like the smaller hook, this was hammered to a point and bent into shape. A strong line was twisted and braided directly on the nailhead, and the new gear was ready for use.

At first Lim's luck with the large hook was poor. The big fish seemed very cagey, and it was not until he used live bait that he really became "of age" as a fisherman. His practice was to catch a small fish on the small line and transfer it to the larger one, putting the big hook through its tail in such a way that the minnow could still swim.

From the moment he discovered this trick his success as an angler was assured. He regularly pulled in big 20-pounders, and what he

could not eat at one sitting was carefully cut into strips and hung in the sun to dry.

Poon Lim's skin is no darker than that of many Americans, but he did not wear even a hat during the 133 days afloat. He says that his face and lips did not crack or burn to any great extent and that he experienced no soreness of the eyes or loss of vision.

A partial explanation lies in the fact that his body was covered with oil from the torpedoing, which he could not wash off, and that his long black hair stood up all over his head, serving in some measure as a shade.

On the 100th day afloat, he sighted a formation of six airplanes and signaled them as best he could, waving his flag and canvas. One came down to investigate and dropped a smoke bomb to mark the spot, but since the sea was rough, it did not land. Words are inadequate to describe the feelings of a man when, after drifting for 100 days, a would-be rescuer passes him by.

This was Lim's second great disappointment, and he was destined to carry on alone for another month before help should come.

Help finally arrived in the form of a small fishing boat manned by half a dozen native Brazilians. They spoke only Portuguese, but where the need is great men can usually make themselves understood. Lim got along very well with these people, actually a family, including a woman and a girl. They cruised for another three days before putting him ashore at Salinas, in the State of Pará, Brazil. An incident occurred on the second day with these people which proves that our castaway must have been in good condition when they found him. The father asked Lim if he would like to marry the girl, his daughter.

A comparison of Poon Lim's photograph, taken when he landed in the State of Pará, with those taken of other great survivors on rescue shows a decided difference, favorable to him. Of course, it is no discredit to men like Dixon and Izzi that they were nearly dead when rescued; but the fact that this Chinese boy came through so well should redound to his everlasting credit.

Poon Lim's experience is a wonderful example of how a rugged physique and resourcefulness of mind will extend the limits of human endurance beyond all expectations.

Though we hope no human being will have to undergo such privation again, we have learned from Poon Lim, and others like him, never to give up hope. Survival is an all-or-none proposition; the alternative is death. The secret of success here, as elsewhere, lies in having good equipment and knowing how to use it.

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Magazine

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the United States

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Railway System

JOHN OLIVER LA GORCE
Associate Editor of the National
Geographic Magazine

ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

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

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

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

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

In Mexico, The Society and the Smithsonian Institution, January 16, 1926, 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, 701 B. C. (Spinden Correlation). It antedates by 200 years anything heretofore stated in America, and reveals a great center of early American culture, previously unknown.

On November 17, 1932, 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 72,303 feet. Capt. Albert W. Stevens and Capt. Grvid 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 \$25,000, and in addition \$75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

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



October 10, 1868, the famous Rock Island steam train, the "Rocket," made its initial trip between Chicago and Juliet, Ill. Several years later the Rock Island Lines opened the first bridge across the Mississippi. With true pictorial license, the artist has brought these two events together.

The Rock Island Lines operate a fleet of fast and powerful General Motors Diesel freight locomotives known as the "Hercules." They are fitting railmates indeed to the General Motors Diesels which power the new and modern Rock Island "Rockets" of today.

GREAT THINGS ARE HAPPENING IN TRANSPORTATION

When people discuss travel you'll often hear mention of the big, powerful Diesel locomotives that are hauling so many of America's crack trains.

You may, or may not, know that by far the greater number of these new and modern locomotives are built by General Motors. Railroad men know it. And they will tell you, too, how these amazing GM Diesels have changed all previous ideas of speed with comfort and safety for

passengers; how they have effected economies and efficiencies beyond all previous railroad experience.

It may be your good fortune to ride behind one of these passenger Diesels on your next railroad trip. Or, perhaps you have seen one of these powerful freight locomotives pulling a mile-long loaded train. If so, you'll know why it's a great new day for railroading—with even greater days to come.

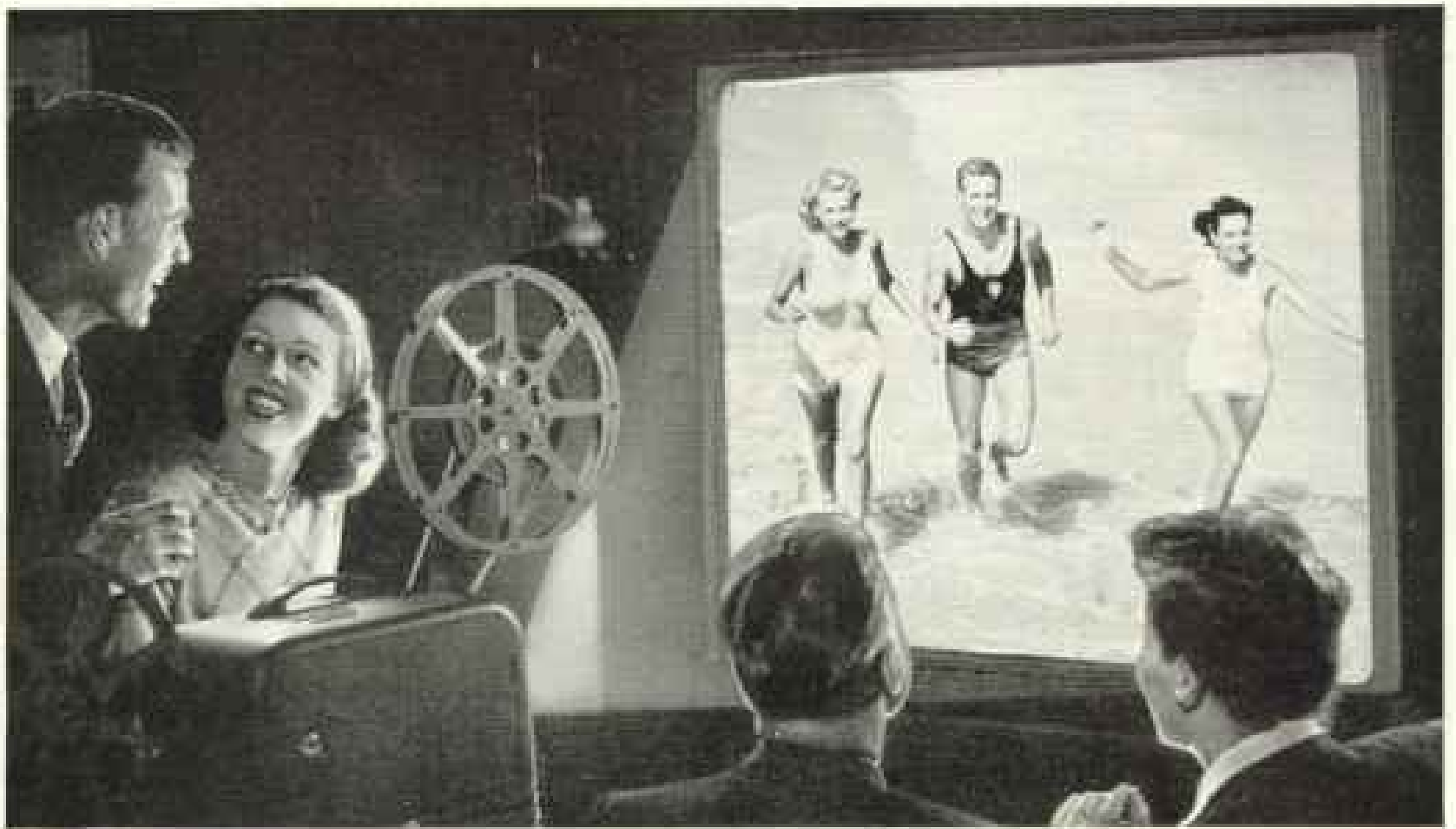
ON TO FINAL VICTORY
BUY MORE WAR BONDS



LOCOMOTIVES **ELECTRO-MOTIVE DIVISION**, La Grange, Ill.

ENGINES . . 150 to 3000 H.P. . . **CLEVELAND DIESEL ENGINE DIVISION**, Cleveland II, Ohio

ENGINES . . . 15 to 250 H.P. **DETROIT-DIESEL ENGINE DIVISION**, Detroit 23, Mich.



"Vacation Spots Now Come to Us... via FILMO MOVIES"

"Until Victory we're letting Filmo movies bring our favorite vacation spots to us. That way we avoid nonessential traveling, and save money to invest in extra war bonds. Our *movie* travels are especially thrilling, because all our friends can enjoy them with us."

When you can travel again, remember this—trips are more fun if you take movies. For then you'll know that every cherished scene will be preserved for you, forever.

Most discriminating travelers choose *Filmo* Movie Cameras, precision-built by the makers of Hollywood's preferred studio equipment to give professional results with amateur ease... in beautiful full color or in sparkling black-and-white.

To be high on the preference list when the improved Filmo Cameras and Filmosound and silent projectors become available, register your wants *now* with your B&H dealer. Bell & Howell Company, Chicago; New York; Hollywood; Washington, D. C.; London. *Estab. 1907.*



THERE'S A FILMO CAMERA EXACTLY SUITED TO YOU

Here's Filmo Auto Load. It loads in an instant with 16mm. film magazines, color or black-and-white. Other Filmos use low-cost 8mm. film.

BELL & HOWELL COMPANY
7104 McCormick Road, Chicago 45
Please send information about the Improved
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Name.....

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OPTI-ONICS—products combining the sciences of OPTics • electRONics • mechanICS

PRECISION-MADE BY



Bell & Howell

DOROTHY LAMOUR starring
in **A MEDAL FOR BENNY**,
a Paramount Picture.

FM Radio by General Electric—
you hear the tones in all their
"natural color" and beauty,
virtually free from static, fading
and station interference.



Conventional Radio — lacks color
and richness. Something is missing.



Listen—it's Dorothy Lamour herself in natural color on **FM** radio

DOROTHY LAMOUR! . . . A beloved voice floating in velvety silence . . . so breathlessly *real* that suddenly you realize something truly revolutionary has taken place.

This is Lamour on General Electric FM—the radio with "natural color" tone . . . brilliantly new, and entirely different from conventional radio which misses more than half the range of tones you ought to hear.

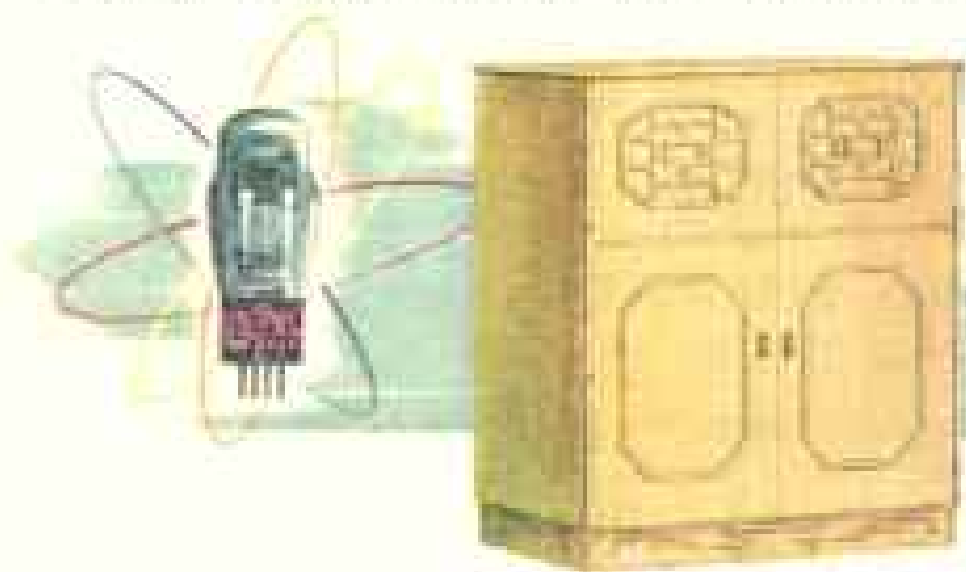
FM (Frequency Modulation) brings you all the gorgeous, resonant beauty of the voice—because you hear those thrilling and delicate *accents* that give to each voice its own inimitable richness and glowing charm.

This is General Electric FM "natural color"

radio. It is radio that reaches new heights of tonal fidelity, with static, fading and station interference reduced to the vanishing point. It is the kind of radio you will want to own after Victory.

FREE: A fascinating booklet, "YOUR COMING RADIO," 28 pages profusely illustrated in full color. Previews the revolutionary, new General Electric Radio and Television sets. For your free copy mail a postcard to Electronics Department, General Electric, Schenectady, N. Y.

Hear the G-E radio programs: "The World Today" news, Monday through Friday, 6:45 p. m., EWT, CBS. "The G-E All-Girl Orchestra," Sunday 10 p. m., EWT, NBC. "The G-E House Party," Monday through Friday, 4 p. m., EWT, CBS.



GENERAL ELECTRIC
LEADER IN RADIO, TELEVISION AND ELECTRONICS

FM RADIO

Mineral-rich Mexico

SENDS US VITAL ORES
FOR MANY INDUSTRIES



THE Spaniards of old were dazzled by the galleon-loads of silver and gold they carried away from Mexico. A treasure far richer in modern eyes is the wealth of metals in Mexican mines that are essential to American industry—*lead, copper, zinc, antimony,* and many others.

Manufacturers here, for instance, use millions of pounds of lead from Mexico in articles of daily use. When you see telephone men installing a new cable—when you buy paint or water pipe for your house, a battery or brake lining for your car—the chances are that Mexican lead went into the product.

Transporting metals from Mexico was one of the important functions of the Cuba Mail Line before the war. On return trips

the ships carried manufactured goods from U. S. factories . . . mining and construction machinery, trucks, tractors, and electrical apparatus loomed large on the invoices.

★ ★ ★

Today Cuba Mail steamers, under the guidance of the Maritime Commission and the War Shipping Administration, are helping to bring Victory nearer. But when their war duty is done, they will resume their 50-year-old service to Mexico.

The Line's docks and warehouses will also be ready, and trained personnel will bend every effort to expedite—whether by sea or by air—the movement of both passengers and freight between Mexico and the United States.

CUBA MAIL LINE

ATLANTIC GULF and WEST INDIES STEAMSHIP LINES

Foot of Wall Street, New York 5, N. Y.

Cuba Mail Line ★ Porto Rico Line ★ Clyde-Mallory Lines ★ Southern S. S. Co.

URGENT! Experienced seamen needed to man merchant ships!
See your Maritime Union or any U.S.E.S. office.



Buick M-18 Hellcats Score In 21 Days of Steady Action

Mounting evidence that the Buick Hellcat M-18 Tank Destroyer is the "hottest thing in armored warfare" is being reported in Army news magazines.

Valley, Okla., commands Company B of the Sixth Tank Destroyer Battalion. In his outfit there are 12 M-18 Hellcats. His company was recently

LONG AGO we decided some thing about the American fighting man.

Give him good weapons to fight with—and he'll do the rest.

That thought guided us in building the big Pratt & Whitney aircraft engines that keep the B-24 Liberator bombing relentlessly through the skies.

It guided us, too, when we set down to design the M-18 as an answer to the German Tiger Tank.

Shortly after the breakthrough out of Normandy, stories began to trickle back about what the Tank Destroyer Battalions were doing with this lightning-paced slugger.

Typical of these exploits is the tale of a single battalion—12 Hellcats—that spent 21 days in continuous action. Score: four Tigers, two Mark

IV's, four armored vehicles knocked out—and hundreds of enemy troops killed, wounded or captured!

It seems that the men like to keep busy—especially with the Hellcat. For in all this action only two M-18's were damaged—neither beyond repair—and the crews suffered only minor injuries.

That's what Buick men and Ordnance officers were after when they joined hands to perfect the M-18.

They gave it hitting power—in a high-velocity 76-mm. cannon. They gave it traction to go anywhere and speed to outrace any other land vehicle.

It now appears they also gave it ability to take care of itself.

And given tools like that, you can count on the boys who use them to do the job!



BUICK
BUILDS
THE M-18 HELLCAT

BUICK DIVISION OF GENERAL MOTORS

YOU LEND A HAND WHEN YOU LEND YOUR DOLLARS. INVEST IN MORE WAR BONDS

GENERAL MOTORS SYMPHONY OF THE AIR—NBC Network
Buick Sunday Afternoon
The Army-Navy "E" prominently featured on all Buick plants



ONE SAW MOUNTAIN SNOW TURN TO GOLD...

You'd recognize the song if you heard it. But for you it would paint quite a different picture... one out of your own memories or your dreams.

That's what music does... grows into each of our lives in different ways. What matters most as you listen to the kind of music you like best is that you hear it at its best. So your enjoyment of music will become far richer when FM comes into your life. For FM will bring you music and all radio programs virtually without interference, without

static, without noise.

Stromberg-Carlson FM will reproduce music for you as you are used to hearing it only in the presence of the musicians. With high and low notes and overtones, lost by some FM sets! With beauty that will come to you at its best in both FM and standard broadcast reception, as Stromberg-Carlson's 50 years of fine tradition step ahead in combination with new electronic developments.

THE OTHER STOOD IN A GREAT CATHEDRAL



TONE GLORIOUSLY TRUE AND CLEAR... in both FM and Standard Broadcast reception and reproduction of records—this was the difference people found in a Stromberg-Carlson before the war. When production can begin again this important difference will stand out even more. For the beautiful instruments we will offer over a broad range of prices will more than live up to what you expect when you turn to Stromberg-Carlson for the best.

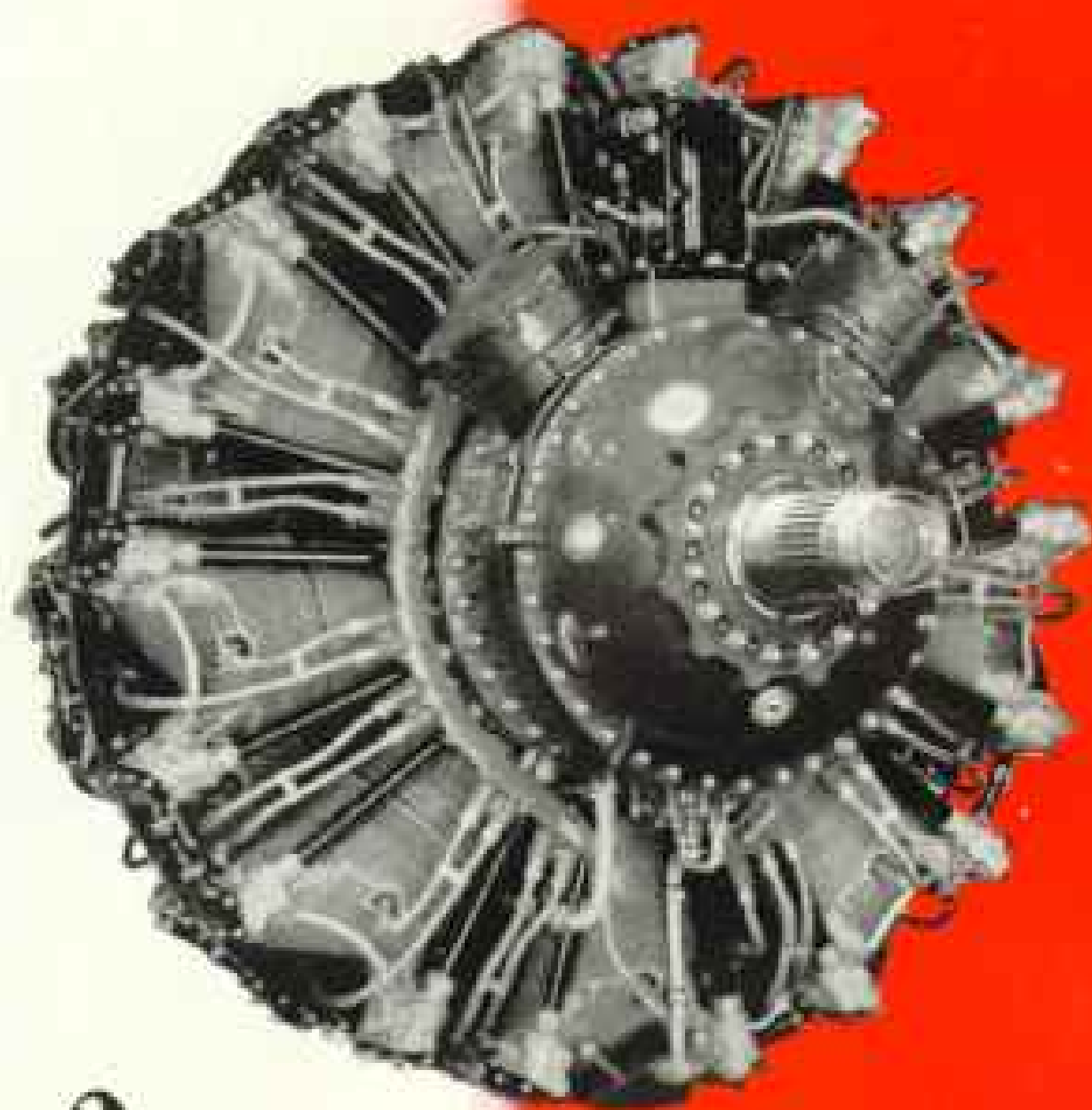


For the main radio in your home

... there is nothing finer than a

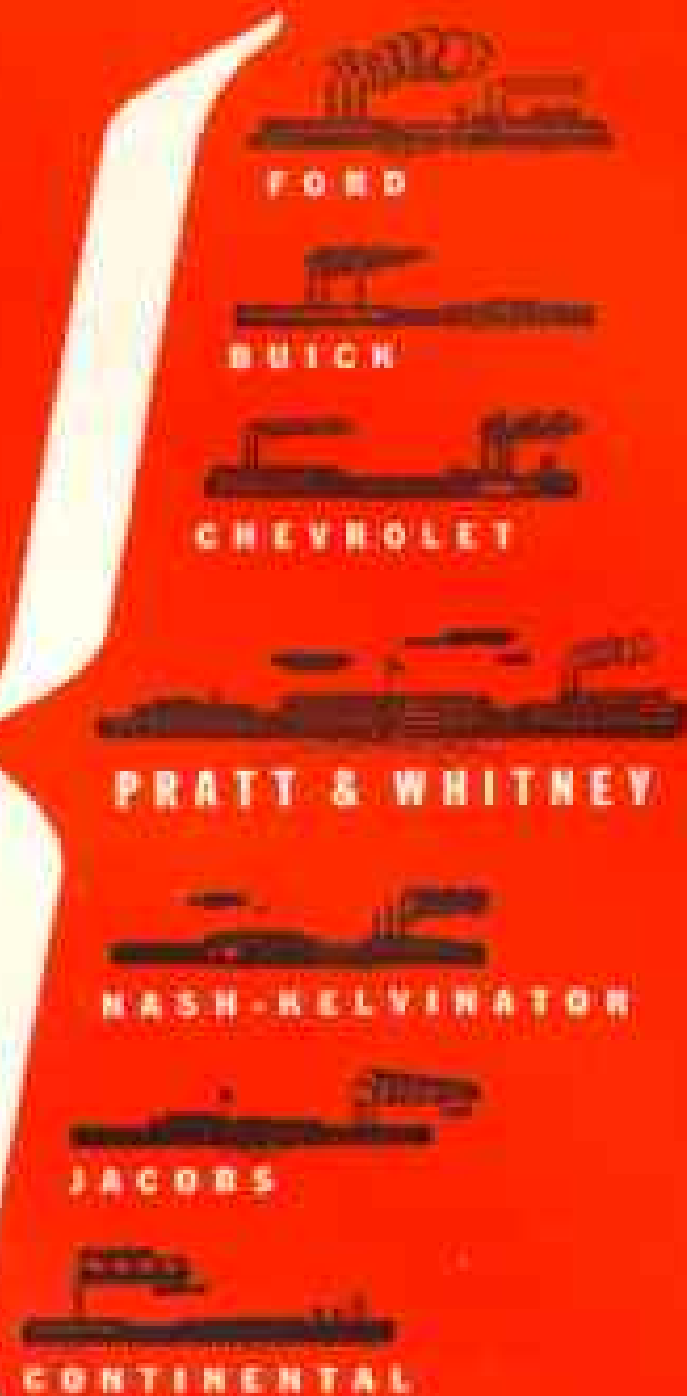
STROMBERG-CARLSON

© 1946, Stromberg-Carlson Company, Pittsburgh, Pa., U.S.A.



300,000

PRATT & WHITNEY ENGINES GO TO WAR



Proven Designs... Many Makers

More than 300,000 Pratt & Whitney aircraft engines have already gone to war. Built by a great industrial team, with six other manufacturers adding their output to Pratt & Whitney's own, they provide the horsepower for more than half of America's airpower.

Great as that achievement is, it was possible only because those engine types had been designed by Pratt & Whitney Aircraft long before Pearl Harbor — and then refined, developed and *thoroughly proven* until they were ready for wartime quantity production when the need came.

Today, Pratt & Whitney is still

improving the engines now in production. Simultaneously, it is creating the new engines that will be needed in the years to come.

As with Pratt & Whitney Aircraft, so it is with the entire American aircraft industry. As a result of the development programs carried on by the industry, working in close cooperation with the Army and Navy, America now holds the vital technological edge that spells supremacy in the air.

From the experience of the past, let us remember that America's future world position in the air will depend upon continuing, aggressive research and development by the aircraft industry to maintain that hard-won technical leadership.

UNITED AIRCRAFT CORPORATION EAST HARTFORD CONNECTICUT

PRATT & WHITNEY ENGINES • HAMILTON STANDARD PROPELLERS • GRANCE VOUGHT AIRPLANES • SIKORSKY HELICOPTERS

Cameras of Tomorrow from Jewels of Today



These Jewels of Today . . . the fine lenses made by Argus . . . have attained a higher brilliance by the use of a new lens coating.

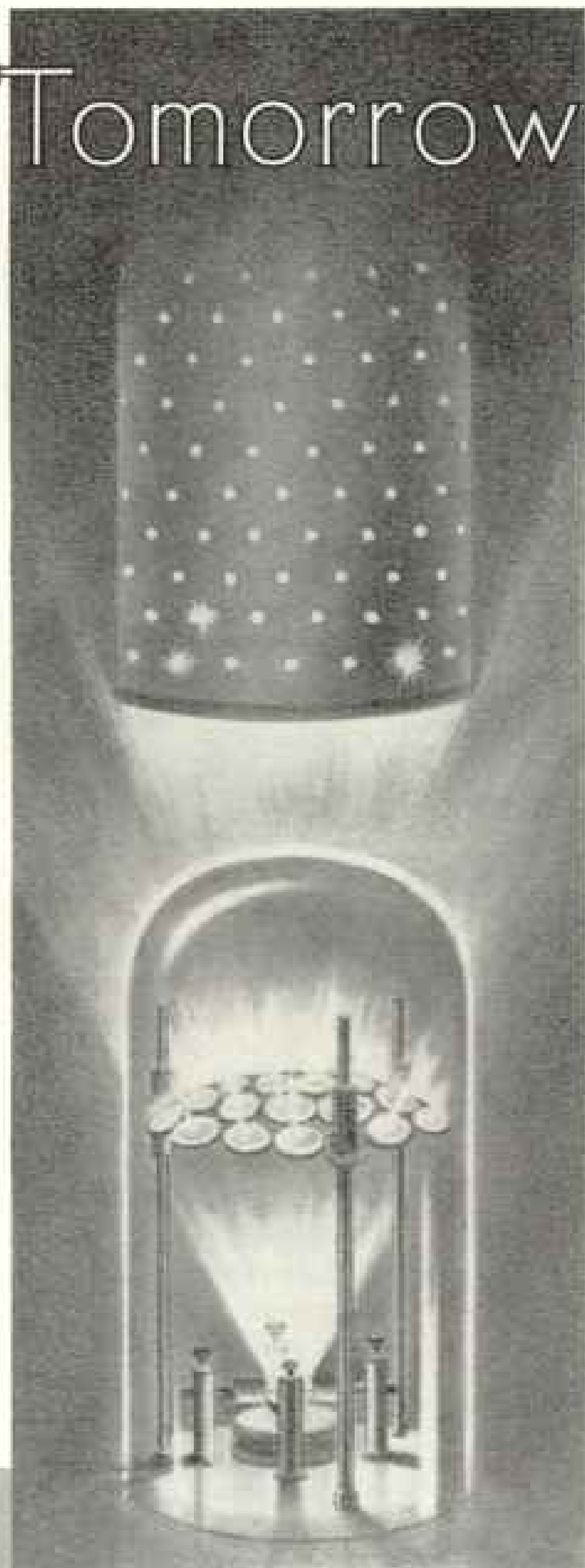
The superiority of these new coated lenses, in speed, which has been increased as much as 30% depending on the type of lens . . . and in the elimination of flare and ghost images, has been proven by the Army. And they have been adopted as standard by Argus for their cameras, binoculars and spotting scope lenses.

The illustration shows one of the battery of evaporation chambers, evacuated by oil diffusion pumps, used to apply hard surface, low-reflection coating to Argus lenses.



The famous C camera which made Argus a household word.

ARGUS, INCORPORATED
Cameras and Optical Instruments
ANN ARBOR . . . MICHIGAN



argus

INCORPORATED





*Just alike?... wait until they've
been around awhile*

... tires differ, too ~

**The longer you have Generals the more
you appreciate their extra mileage !**

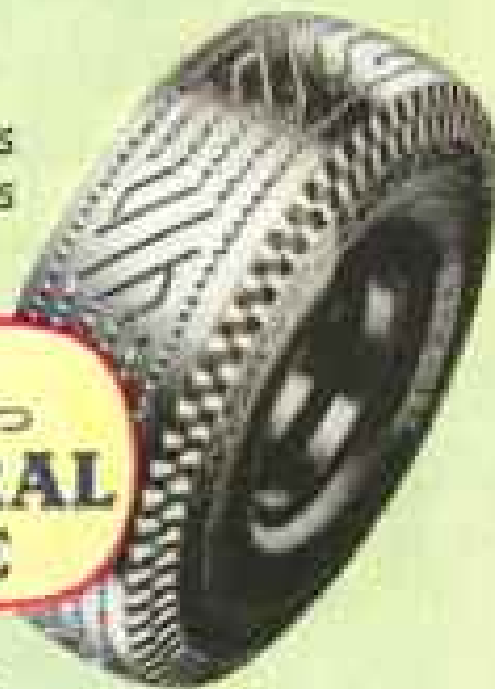
Even farther ahead of ordinary tires in mileage than before... today's General Tire is proving, on the road, that synthetic tires are *not* all alike.

30 years of recognized leadership in getting the *most miles* out of rubber have produced a tire that is delivering the kind of economical, extra mileage... greater safety... and trouble-free travel that people have come to expect from a General.

Once again, General has demonstrated to car owners

that America's Top-Quality Tire always has been and always can be depended upon to be America's *Long Mileage* Tire.

BUY
WAR BONDS
— FOR KEEPS



— goes a long way to make friends



Hear every instrument

in its own voice

on a Scott

The miracle of the Scott

is in this amazing chassis

SCOTT
FINE RADIO
RECEIVERS

• Even if you haven't an engineering bone in your body, *look* at the Scott chassis before you buy any fine radio. After you have heard its wonders of reproduction, let your eyes confirm the judgment of your ears that here is an engineering marvel indeed.

A good department or music store near you will soon, we hope, be displaying the Scott with considerable pride. See it and hear it for yourself.

You'll know why it has won world-wide recognition, why it is the favorite of musicians and conductors, why our men on the seven seas say that it catches "everything on the air."

The Scott has everything you hope for in a radio—and more. In standard broadcasts or Frequency Modulation, in record reproduction or short wave the Scott sets a standard which will win your excited admiration.



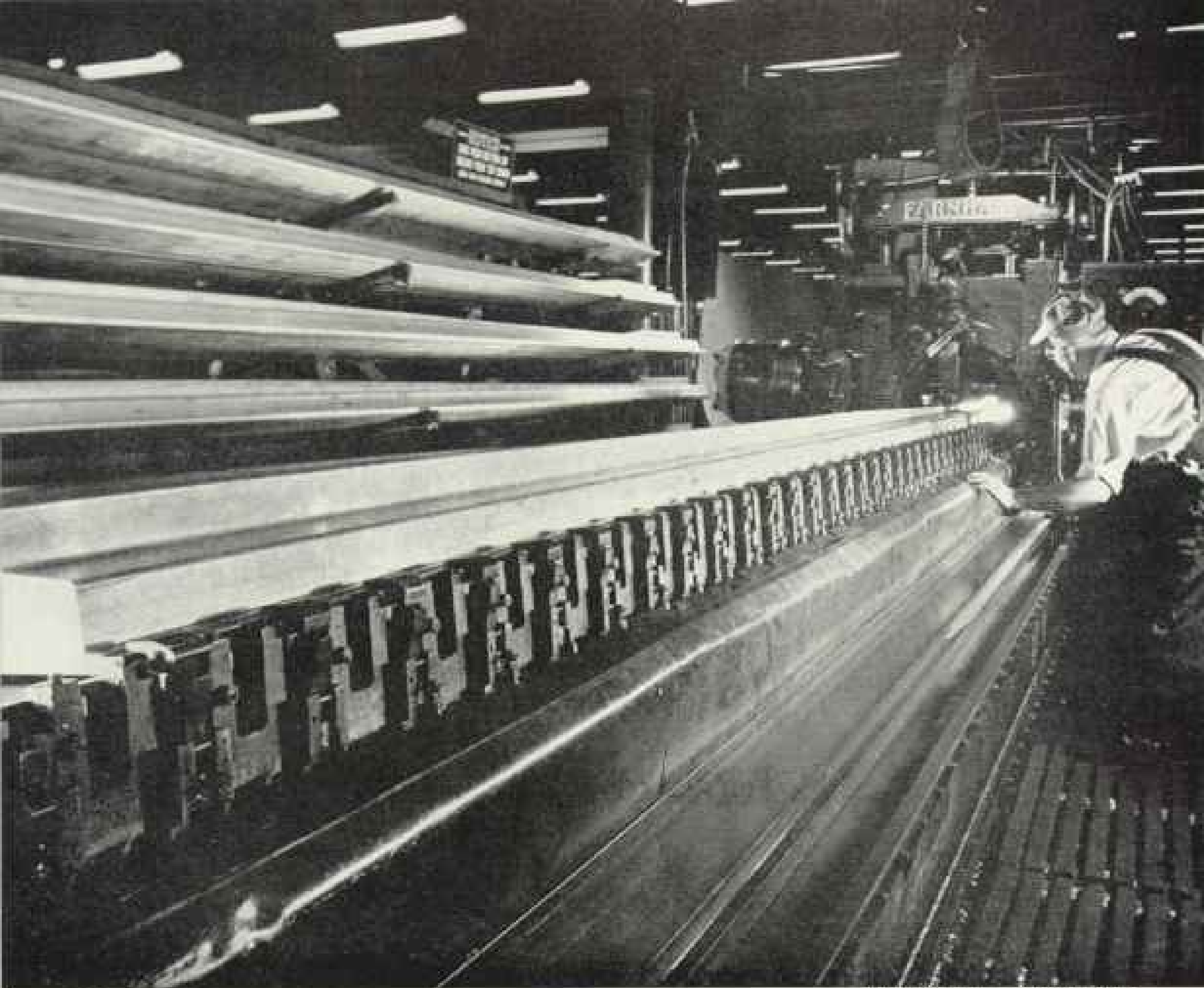
E. H. SCOTT

E. H. SCOTT RADIO LABORATORIES, Inc.
 Dept. 1115, 4448 Ravenswood Ave., Chicago 40, Ill.
 Please send me your new booklet on radio, "Achievement Through the Years."
 Please get my name on your announcement list.
 Name.....
 Address.....
 City.....State.....

E. H. Scott
Radio Laboratories, Inc.

4448 RAVENSWOOD AVENUE
CHICAGO 40, ILLINOIS





Finish the Fight — with War Bonds

Wing strength for a Superfortress

That gleaming mass of metal, rugged and thick as a railroad rail, is a lower rear spar chord, one of the vital structural members of a Boeing Superfortress wing. When the photograph was taken it was being shaped on a huge milling machine in Boeing's Wichita plant. Today it's flying over Tokyo.

The design and construction of the wing—utilizing the Boeing "117" airfoil—is one of the factors that make B-29 performance possible. Without it, long-range missions, at fighter-plane speed, with immense bomb loads, would still be in the realm of wishful thinking.

Engineers of the Boeing Aerodynamics Unit developed the wing and proved the remarkable qualities of its airfoil in wind tunnel tests. Building the necessary tremendous strength into the wing structure was the next step, and heavy chords were designed for the main spars. Weighing 255 pounds when machined, this chord of aluminum alloy, pictured above, is the largest extruded part ever used in a production airplane.

In the systematic bombing of Japan, the B-29's superior aerodynamic design and sturdy construction have helped the stout-hearted

men of the 20th Air Force to bring many a crippled Superfortress back to base, even though severely damaged over the target by flak or fighter opposition.

To the task of building warplanes that will be worthy of the skill and high courage of American airmen, all Boeing's abilities are dedicated today.

In a future time of peace, Boeing products will continue to be soundly and honestly designed, engineered and manufactured. Tomorrow, as today, you can know of any airplane . . . if it's "Built by Boeing" it's built to lead.

DESIGNERS OF THE B-29 SUPERFORTRESS • THE FLYING FORTRESS • THE NEW STRATOCRUISER
THE KAYDET TRAINER • THE STRATOLINER • PAN AMERICAN CLIPPERS

BOEING

Groves of War

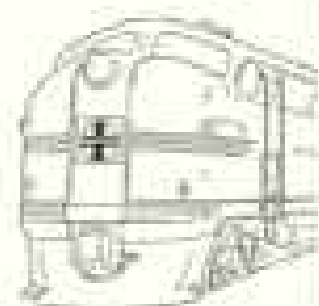


FORTY MILLION CITRUS TREES in America's West and Southwest have gone to war!

Here in this land of friendly soil and sunshine grow year-round crops of oranges, lemons, grapefruit, and limes for fortifying wartime diets of our own country and our allies.

And from these Groves of War come great supplies of concentrates, citric acid, essential oils and other citrus products for our armed forces—including citrus juice that fights the fatigue of our combat troops and sharpens the vision of our night-flying pilots.

You of the citrus industry are doing a grand job for America! We of the Santa Fe are proud of the part we have in serving you.



SANTA FE SYSTEM LINES

Serving the West and Southwest

YOU'LL TAKE
YOUR EASE
IN STYLE—



There's a *Ford* in your future!

Some day—when America's biggest job is done—peace will return. And with it will come a big, new Ford. . . . Then you'll have the kind of gentle ride you've always hoped for. So smooth. So packed with comfort. In front seat or back, you'll find yourself at ease and completely relaxed.

. . . But that's not all! Many other refinements will be found in this new Ford. Smart, improved styling. A new richness, both inside and out. And, of course, you'll enjoy in full measure the thrift and reliability that have always been traditional with Ford cars. . . . When the time comes,


we'll be ready to start production plans. Meanwhile, however, the full Ford resources and facilities are being used to help bring Victory closer.


FORD MOTOR COMPANY





"STARS OF THE FUTURE." Listen to the Ford musical program on the Blue Network. Every Friday night, 8:00 E.W.T., 7:00 C.W.T., 9:00 M.W.T., 8:30 P.W.T.

Whichever service he's in he's glad there's a *Martin Mariner*

 *Looking for Trouble*, from Europe to the Philippines, big, powerful Martin Mariners have served with the U. S. Navy on every front. Mariners helped crush the Jap fleet in the first and second battles of the Philippines, hit the Nips hard at Saipan, crippled a Shokaku class Jap carrier at Leyte—accomplished scores of such exploits.

 *Serving as Transports*, Mariners have speeded mail and supplies to remote Marine garrisons, evacuated wounded, trained Marine paratroopers. With the Naval Air Transport Service, Mariners pioneered routes in the Pacific and the Atlantic . . . carried in one year nearly 6,000,000 pounds of cargo, 25,000 passengers.

 *In the Battle of the Atlantic*, Mariners have sunk many U-boats to help Army transports with men and supplies get through safely. One helped capture Germany's ace U-boat commander who sank the British carrier "Ark Royal." Others have bombed enemy vessels, fought enemy planes, intercepted blockade runners.

 *Many Rescues* are credited to Mariners and their Coast Guard or Navy crews. Landing in 15-foot waves to pick up 48 survivors of a troop transport . . . effecting rescues under enemy fire . . . giving courage and confidence to valiant Navy airmen by flying with carrier-based planes to rescue airmen downed in combat.

They're in up to their necks . . . are you only ankle-deep in this war? Buy War Bonds! Take a war job! Buy only the things you need!
THE GLENN L. MARTIN COMPANY, BALTIMORE 3, MD., U.S.A.

Martin
AIRCRAFT
 Established 1917



S. O. S.! Soudy construction, high gill wings and a 3000 mile range make Martin Mariners tops at high-seas rescue work . . . heavy firepower and bombload make them bad news to the enemy. Ranging the world's sea lanes, these big 24-tin patrol bombers are blazing trails for tomorrow's overocean airmen.



How love of music can grow with the years

HAPPY play is a natural part of children's lives. So, too, is good music when it becomes a regular part of their recreation. It's a simple step from *Farmer in the Dell* to Beethoven . . . for the child's taste in music grows steadily with the years.

« « Wise parents can stimulate this artistic development by careful selection of a radio-phonograph. With Magnavox, for example, every home can know the living beauty of good music. Its life-like tone sets this fine instrument apart from all others in reproducing either broadcast or recorded music.

« « That's why Magnavox can help so much in furthering your child's musical education. Ears of children are extremely sensitive, as you know, and care must be taken to see that the child becomes accustomed to good music, rather than to poor or distorted reproduction. Your Magnavox is by far

the best way to assure this great basic advantage.

« « Magnavox makes music more fun for *all* of the family. For, next to your own presence at great musical events, the Magnavox is the nearest approach to complete musical enjoyment. No wonder it is the chosen instrument of such artists as Kreisler, Ormandy, Beecham, Horowitz and many others!

« « Magnavox is ever an investment in good living, for it combines a superb musical instrument with truly fine furniture. You have a choice in styling, too, from authentic traditional to the smart contemporary designs . . . each a beautiful example of the cabinetmaker's art.

Send for Booklet—*Every parent, every youngster, will want to read Dr. Spach's "Music . . . A Priceless Heritage."* Ask for free copy at your Magnavox dealer, or send coupon below with 10¢ War Stamp to cover mailing cost.

M
Magnavox
RADIO PHONOGRAPH

The choice of great artists

The Magnavox Company
Dept. NLG-5, Fort Wayne 4, Indiana

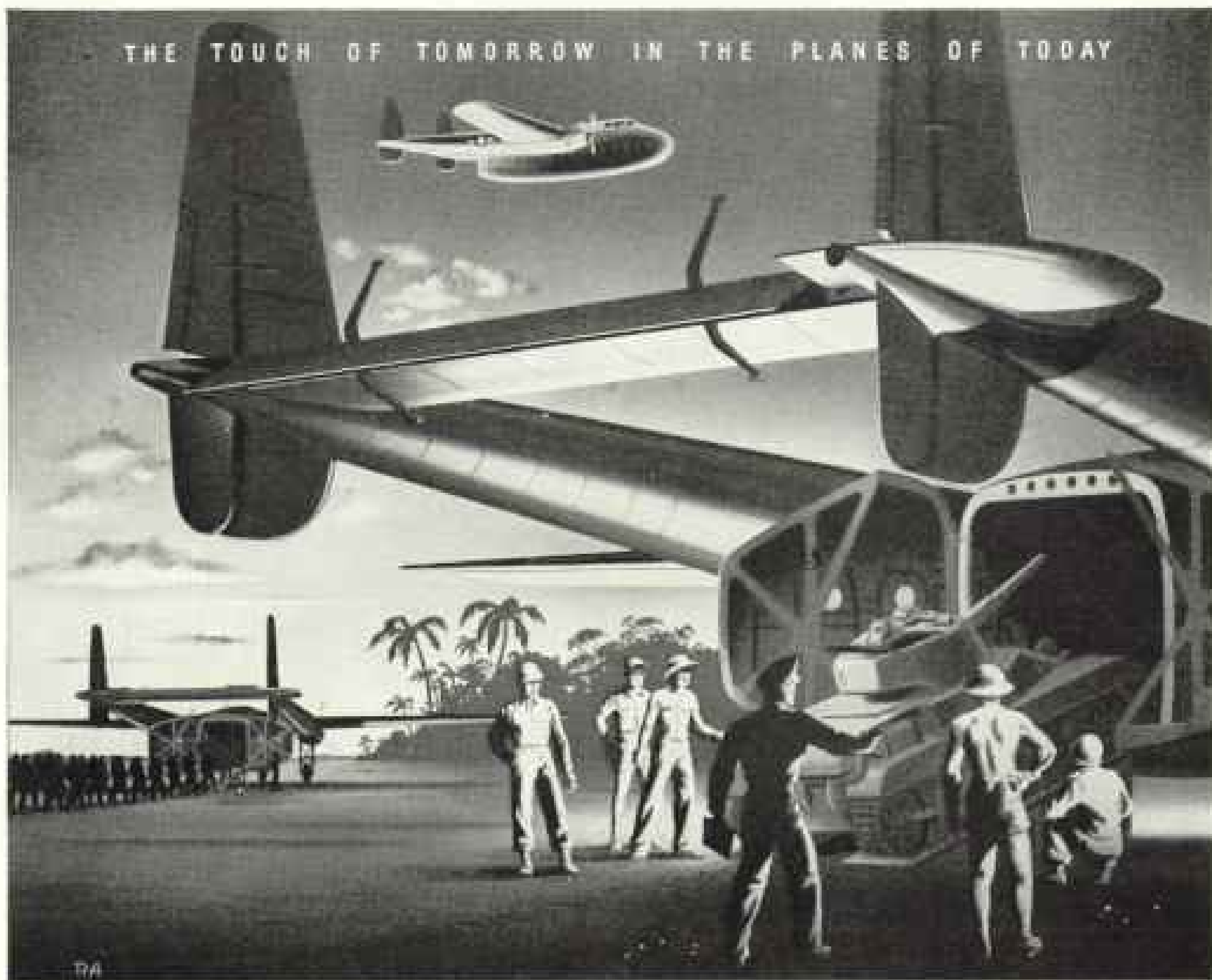
Enclosed is ten cents (coin or war stamp) to cover handling and mailing of Dr. Sigmund Spach's booklet, *Music . . . A Priceless Heritage*.

Name _____

Address _____

City and State _____

THE TOUCH OF TOMORROW IN THE PLANES OF TODAY



Loads for a Landing on Nippon

Into the spacious hold of the Packet will go lethal cargoes—destination Japan.

Guns, light tanks, shells, trucks or paratroopers; material and men for victory in the Pacific will be air-borne in the Army's "flying boxcar," the new cargo carrier designed by Fairchild and built by Fairchild and North American Aviation.

The Packet, first airplane produced *specifically* for cargo transport, can carry up to nine tons. Its range, with lighter loads, is more than 3,500 miles.

Forty-two paratroopers with full equipment can be "delivered" through two jump doors in the stern, clear of any obstruction. An ingeni-

ous device sends equipment parachuting through special doors in the belly, simultaneously with each paratrooper's jump.

The Packet is loaded with extreme ease. Its fuselage floor is level and at standard truck-floor height. Cargo capacity is 2,312 cubic feet—about 88 per cent of the capacity of a standard railroad boxcar.

This all-metal, twin engine, flying boxcar possesses characteristics inherent in all Fairchild products, "the touch of tomorrow in the planes of today." With but minor modifications it will become an efficient and profitable carrier of cargo in peacetime commerce, the flying boxcar of the new air age.

BUY U. S. WAR BONDS AND STAMPS

 **FAIRCHILD**

ENGINE AND AIRPLANE CORPORATION

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Ranger Aircraft Engines Division, Farmingdale, L. I. • Fairchild Aircraft Division, Hagerstown, Md. • Diamond Division, Jamestown, N. Y.
Auxiliary: Alfa Corporation, New York, N. Y. • Williams-Strotes Corporation, New York, N. Y.



Under admiral's
 They made a machine out
 from native bakwood, set a 30
 gallon cooking kettle inside, fitted
 the kettle with rotating paddles.
 They took the fan belt from a
 battered machine, the cooling
 engine from a portable generator,
 the transmission and differential
 from a bush-rocker jeep, and
 hooked 'em up together.
 Then they filled the water tub
 with ice, the kettle with cream
 mix, cranked the one-lugger, put
 the jeep in high and let her whir.
 In half an hour, they had to shift
 into low. In 40 minutes more, the
 mixture was so stiff it stopped
 the engine. And there in the
 steaming jungle, they enjoyed 20
 gallons of the smoothest, coldest
 ice cream you ever ate.
 Said the admiral:

BUT WAR BONDS AND STAMPS

Ice Cream? Can Do!

True to their motto, "Can Do," Seabees in the South Pacific have often built ingenious ice cream machines from salvage materials. The clipping and picture* above show you how one such job was done.

Many another American outfit has invented strange freezers in far places — adapting old oil drums to new duties — bending pipe around palm stumps for cooling coils. Sailors have patiently scraped frost off ship refrigeration lines to make ice cream.

Why? Because ice cream is a symbol of home and a tonic to morale. Because it's not only good to eat, but good for the men who eat it. Ice cream is a valuable food, rich in vitamins and calcium, like the creamy milk from which it's made.

We're glad we've been able to ship so many tons of ice cream ingredients to boys like these overseas. We're grateful for your patient acceptance and understanding of the limited supply left at home.

*The Navy had no official photos, so we built this careful reproduction.

Meanwhile, the National Dairy Laboratories have been busy developing dairy products in new forms that will be as useful in peace as they are in war. All of them help bring to you and your family the good health inherent in milk—nature's most nearly perfect food.

Dedicated to the wider use and better understanding of dairy products as human food . . . as a base for the development of new products and materials . . . as a source of health and enduring progress on the farms and in the towns and cities of America.



NATIONAL DAIRY PRODUCTS CORPORATION
 AND AFFILIATED COMPANIES



Enchanted by the Magic of Meissner

As He Listens, Wilfred Pelletier Dreams of the Great Voices of Tomorrow

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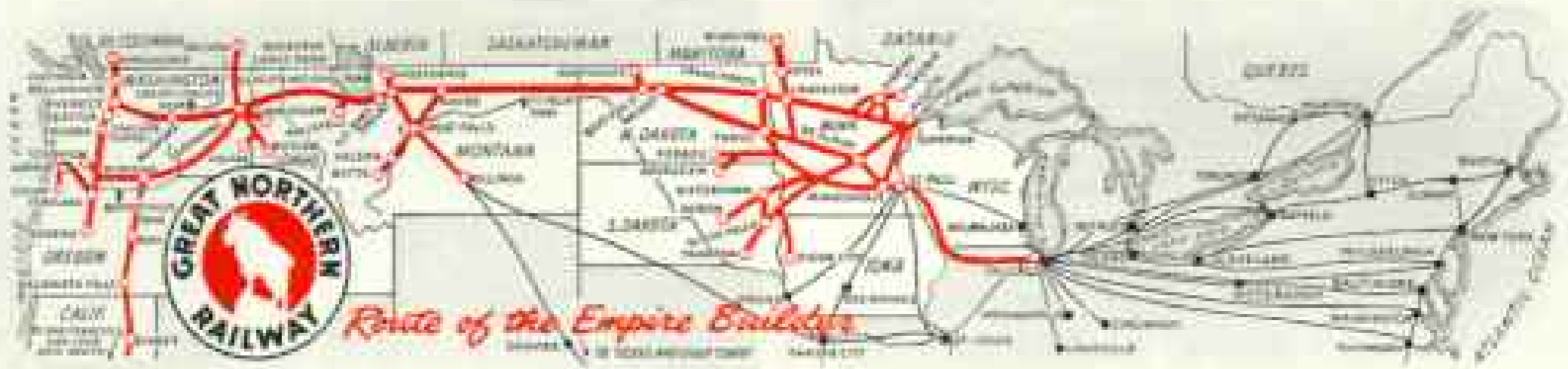
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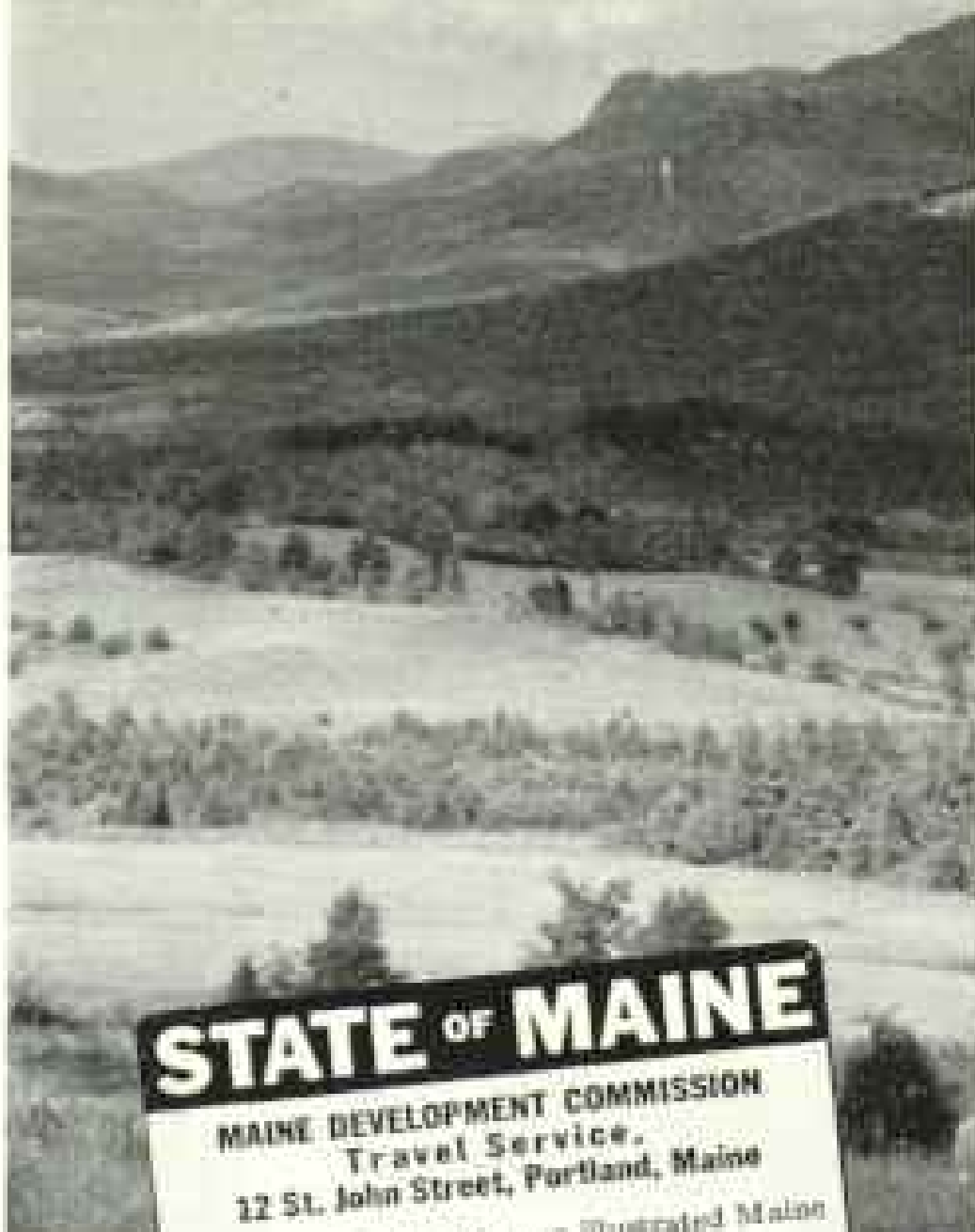


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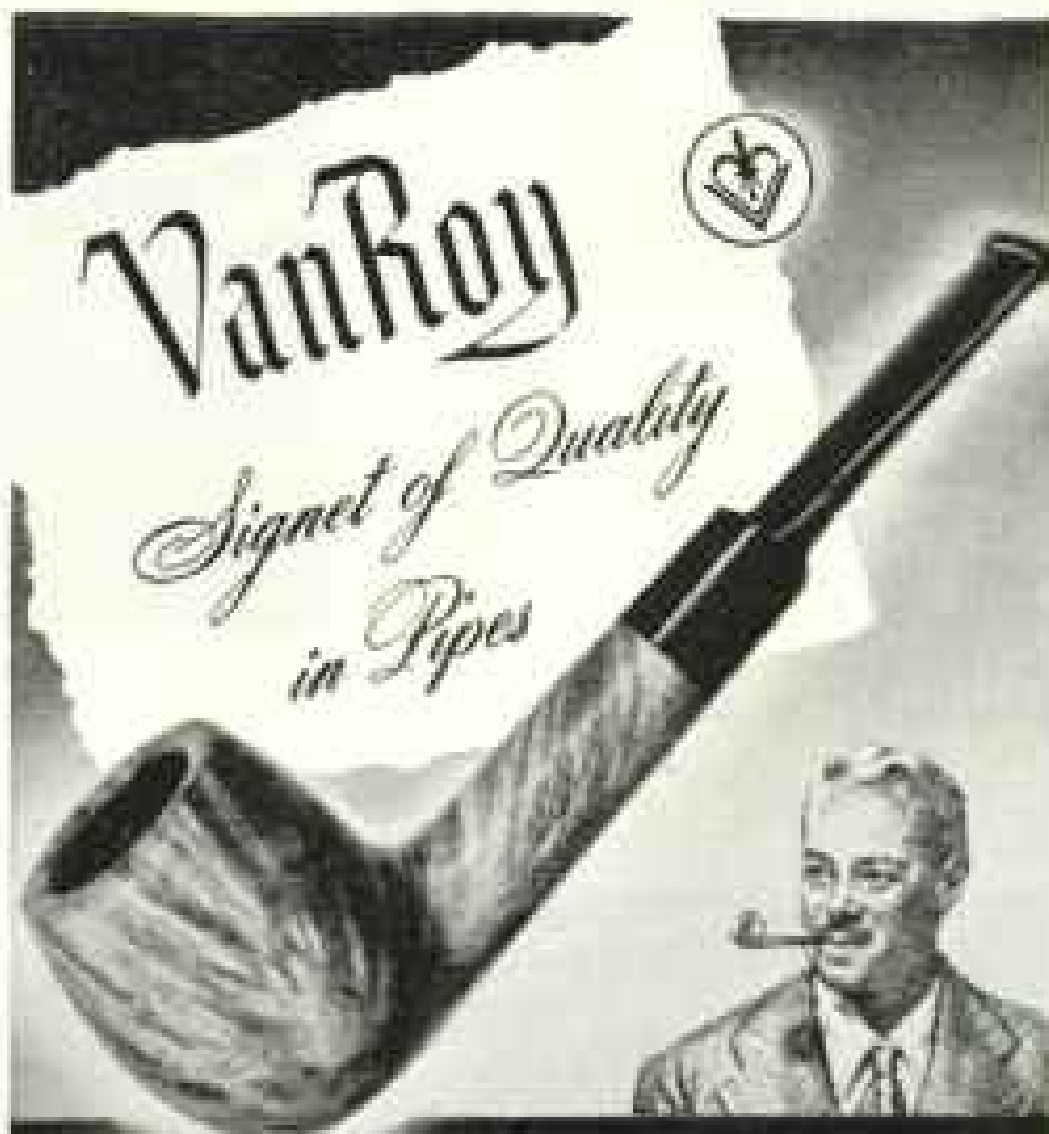
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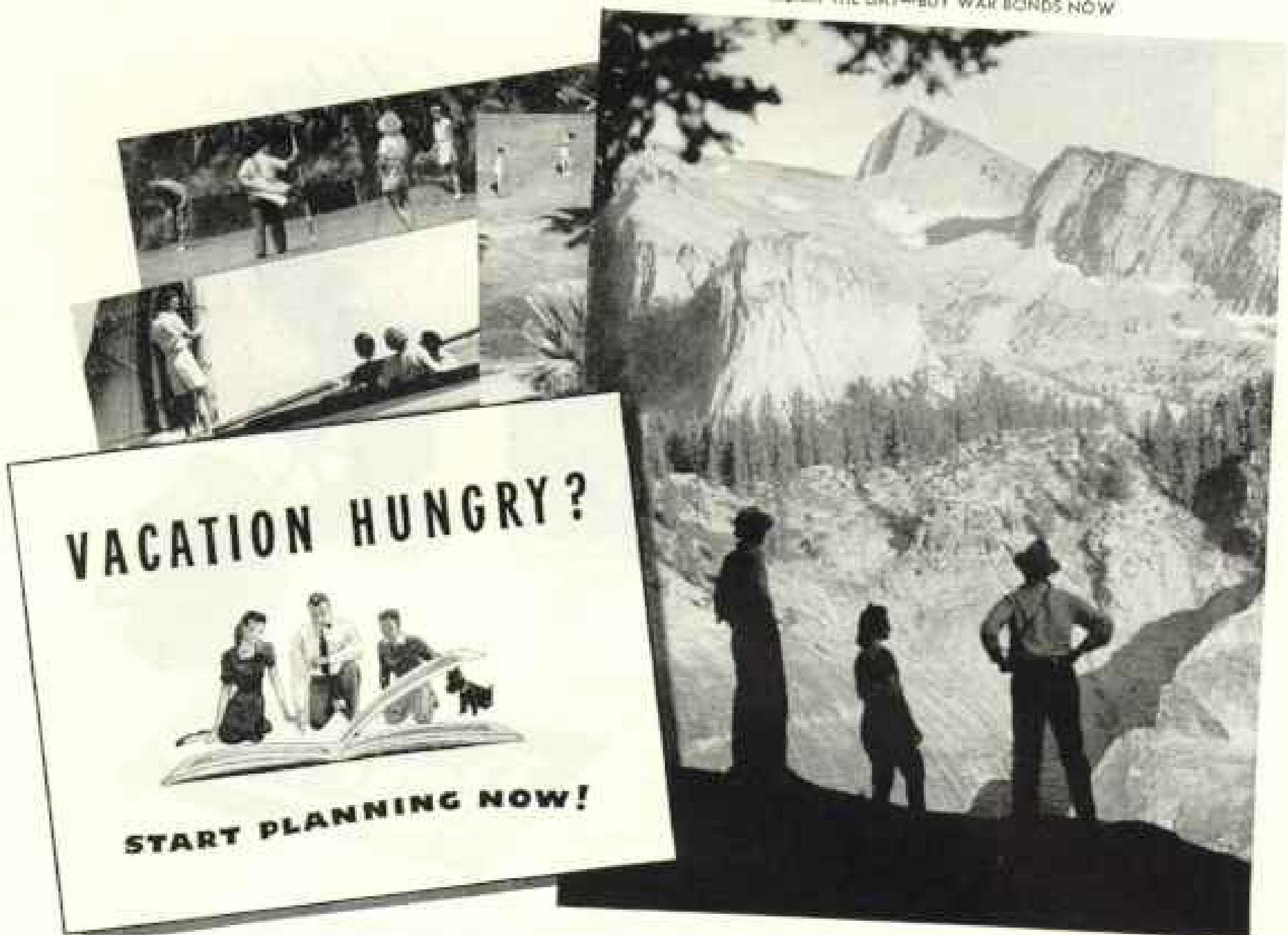
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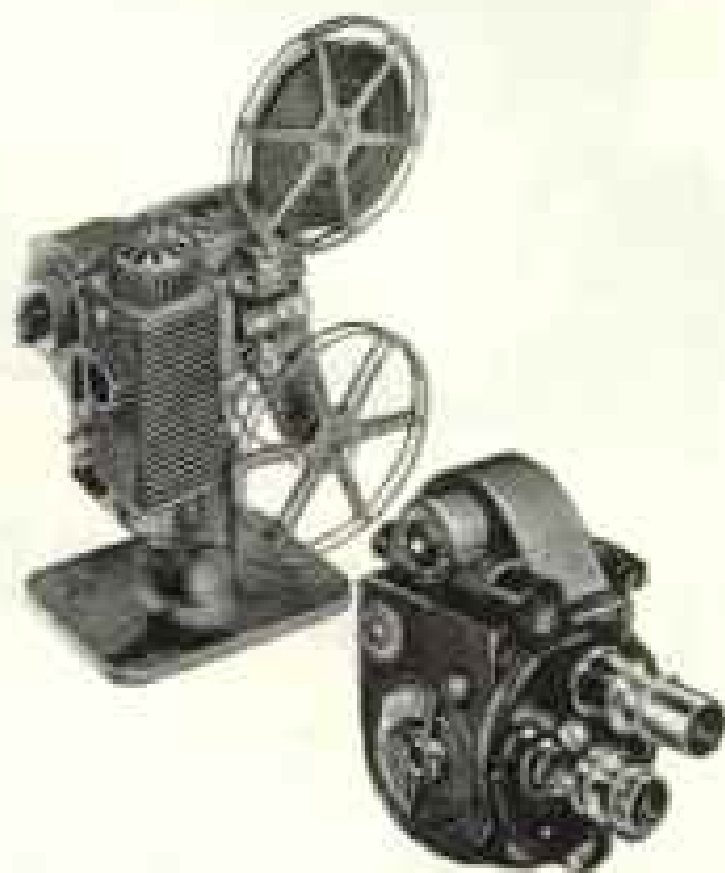
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Rheumatic fever in its early stages is very difficult to recognize—all the more reason why parents should be alert to its telltale symptoms. The most striking is pain and swelling in joints and muscles. The pain often travels from joint to joint and is frequently preceded by a sore throat or tonsillitis.

Other signs such as continued loss of weight or appetite, or fleeting muscular aches, call for a medical checkup. They may or may not mean rheumatic fever.

Unfortunately the disease has a tendency to recur, so it is vitally important that the first attack be recognized and treated promptly.

Generally the sufferer must stay in bed under a doctor's care until all signs, including laboratory tests, show that the inflammation has disappeared.

Equally important, thereafter, he should be protected as far as possible from contact with people who have colds, since recurrence often appears to be brought on by mild illnesses like grippe, sore throat, and respiratory trouble.

Three quarters of those attacked by rheumatic fever are between the ages of 5 and 30—and of these, most are between 10 and 15.

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IN THE densest South American forest lives the three-toed sloth, (*Bradypus tridactylus*). Even stranger in his behavior than he is in appearance, this little animal spends almost his entire life upside down.

Instead of balancing above the branches in tall trees where he lives, he walks and sleeps suspended beneath them, holding himself secure with powerful, hooked claws.

His body is well adapted to this topsy-turvy existence. But he is not equipped to defend himself against the formidable harpy eagle or tree-climbing enemies like the jaguar. Nor can he escape when stalked, because he is so slow-moving.

The sloth is protected from danger in a curious way, unique among mammals. His long, coarse hair is encrusted with a peculiar green alga which closely resembles lichen on the trees.

During the day, he sleeps, hanging with feet close together and head drawn up between his forelegs. In this position he looks just like the stump of a lichen-covered bough, and is generally safe from detection.

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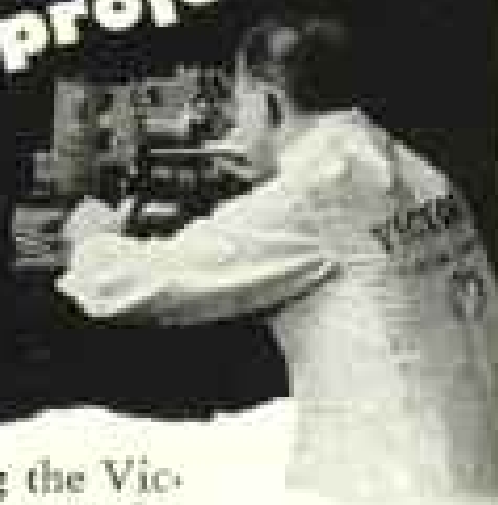
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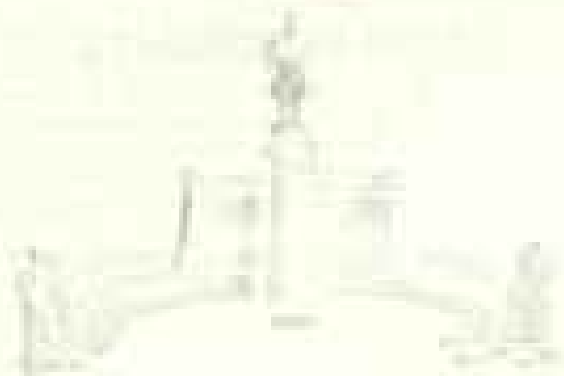
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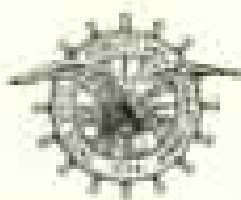
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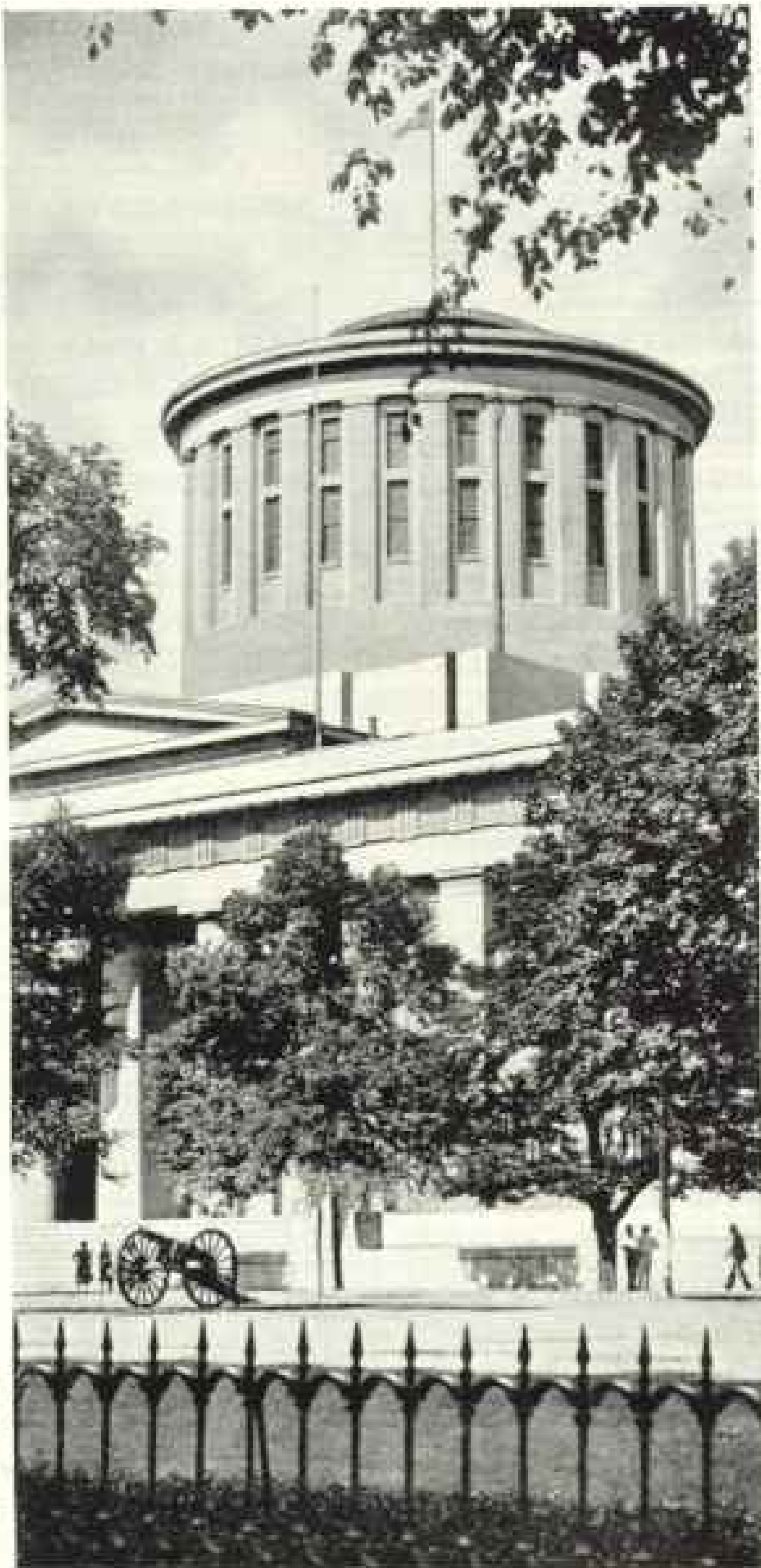


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