Map of Northern Hemisphere

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THE NATIONAL GEOGRAPHIC MAGAZINE

Air Power for Peace

BY GENERAL OF THE ARMY H. H. ARNOLD

Commanding General, United States Army Air Forces

SINCE the birth of this Nation, the people of the United States, peace-loving and hoping for world-wide acceptance of our concept of democracy, have never sponsored a strong peacetime military organization. History has demonstrated that we have thereby neither avoided war nor deterred others from going to war.

If that policy in the past has been a tragic failure, how much more tragic it could be in the future!

With present equipment, an enemy air power can, without warning, pass over all formerly visualized barriers or "lines of defense" and can deliver devastating blows at our population centers and our industrial, economic, or governmental heart even before our surface forces can be deployed.

Future attack upon the United States may well be without warning, except what may be obtained from an active national intelligence agency.

Wars of the past have been won by ground forces alone, by sea forces upon the high seas, or by a combination of land and sea forces. World War II was won by the coordinated effort of land, sea, and air forces, each playing its part but with the air forces assuming a role of such import that it has well been said that no battles in this war were won without definite air superiority.*

So it also may be said that in any future war the air force, being unique among armed services in its ability to reach any possible enemy without long delay, will undoubtedly be the first to engage the enemy and, if this is done early enough, it may remove the necessity for extended surface conflict.

It is entirely possible that the progressive development of the air arm, especially with the concurrent development of the atomic explosive, guided missiles, and other modern devices, will reduce the requirement for, or employment of, mass armies and navies.

These latter forces must have sufficient rapidity of movement or be sufficiently dispersed at all times to avoid location and destruction by future airborne power.

Air superiority, accordingly, is the first essential for effective offense as well as defense. A modern, autonomous, and thoroughly trained air force in being at all times will not alone be sufficient, but without it there can be no national security.

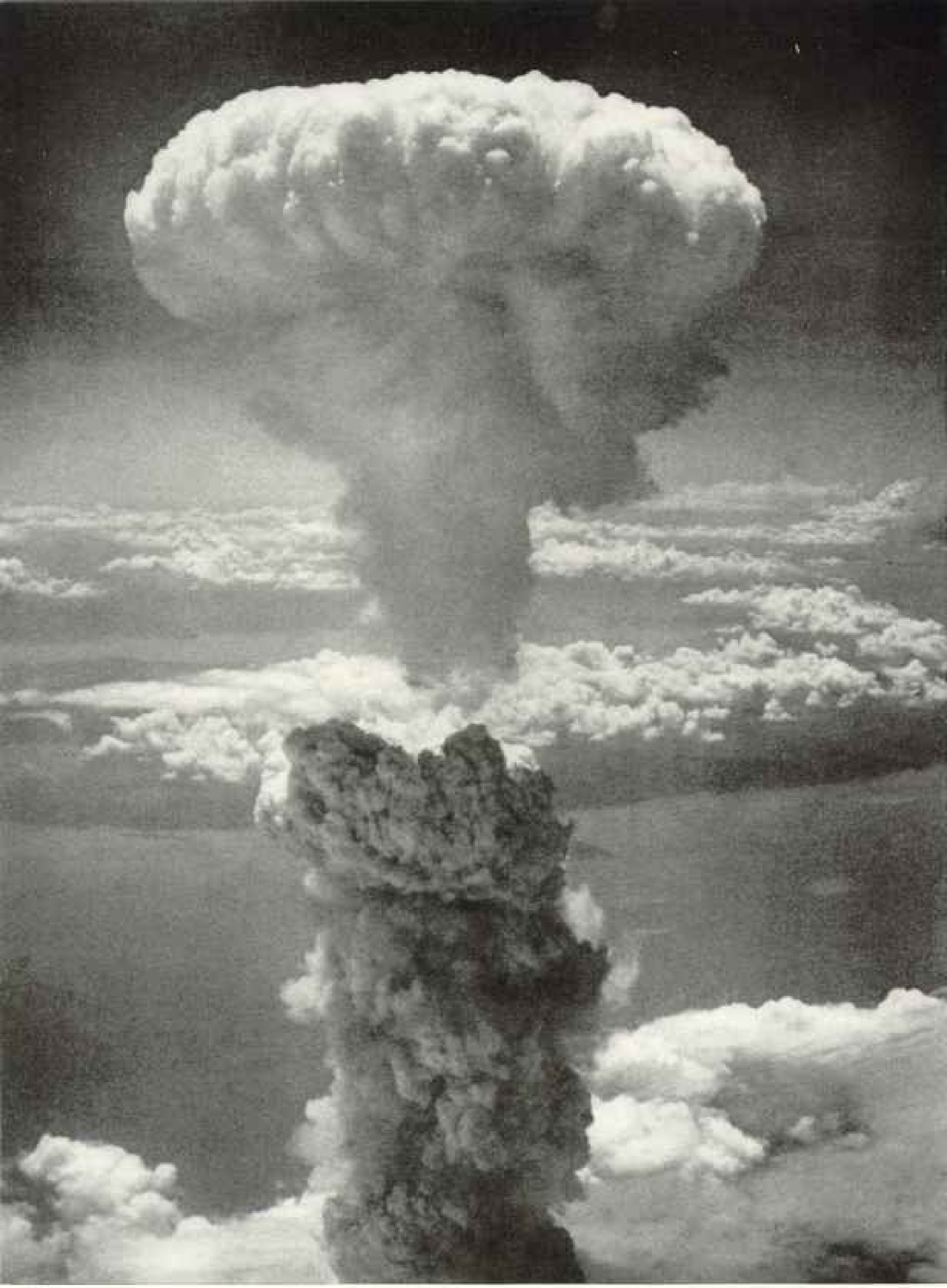
Air Power All-important in Atomic Age

It is our obligation, now and in the future, to organize our armed forces with the most modern weapons to secure the most powerful striking force at the least expense to the taxpayer.

We must do this, not to prepare for another war, because such a catastrophe would almost certainly throw the whole world back for centuries if, indeed, it did not destroy our present civilization. We must do this to *prevent* another war—to perpetuate peace.

While this country must employ all of its physical and moral force in the cause of peace, it must recognize that real security against atomic weapons in the visible future will rest on our ability to take immediate offensive action with overwhelming force. It must be apparent to a potential aggressor that an attack on the United States would be

*See "8th Air Force in England" (color photographs), in the NATIONAL GEOGRAPHIC MAGAZINE for March, 1945.



U. S. Army Air Forces, Official

Debris, Dust, and Vapor Rush Heavenward as the Atom Bomb Bursts over Nagasaki

A fiery explosion "too tremendous to believe" was reported by American aerial eyewitnesses of the B-29 attack on August 9, 1945. The detonation sent up a column of debris and dust topped by a cloud of white vapor boiling to 45,000 feet. The heart of the city was transformed into a desert and at least 40,000 were killed.

U. S. Army Signal Corps, Official

"Hiya, Pop!"

Highly informal was the greeting received by five-star General Henry H. Arnold, Commanding the United States Army Air Forces, when he stopped beside this young officer's jeep during an inspection tour of Okinawa in July, 1945. Reason: the young man is his son, Lt. Bruce Arnold, of the 834th Anti-aircraft Artillery. Commented the General dryly: "He's the only man on Okinawa who didn't salute me."

immediately followed by an immensely devastating air-atomic attack on him.

The application of atomic energy to war has made air power all-important. Air power provides not only the best present means of striking an enemy with atomic bombs, but also the best available defense against them.

Today, our Army Air Forces are the recognized masters of strategic bombing. Until others can match the present efficiency of our own antiaircraft defenses, we can run a large air operation for the sole purpose of delivering one or two atomic bombs. Our experience in the war suggests that the percentage of failures in an operation of this kind would be low.

By the time that improved antiaircraft defenses make this impracticable, we should be ready with a weapon of the general type of the German V-2 rocket (page 186), having greatly improved range and precision and launched from great distances. V-2 is ideally suited to deliver atomic explosives, because effective defense against it is extremely difficult. Now and for the moment, the only defense seen for the future is its destruction prior to launching.

If defenses which can cope with the 3,000-mile-per-hour projectile are developed, we must improve the weapon; be ready to launch projectiles having greater precision with regard to hitting the target, to give them a shorter time of flight, and to make them harder to detect and destroy. We must be ready to launch them from unexpected directions.

This can be done now from long-range bombers, but in the future such missiles may be launched from true space ships, capable of operating outside the earth's atmosphere. The design of such a ship is all but practicable today; research will unquestionably bring it into being within the foreseeable future.

Three Kinds of Defense

Three types of defense against the atomic bomb can be conceived:

U. S. Army Air Forces, Official

Liberators Bombing Ploesti Fly Through Bursting Flak and Smoke Billowing from Hits on Oil Tanks (page 167)

Black puffs of flak emphasize that this Romanian oil center was a hot target. In the entire war no Army Air Forces mission was turned back by enemy action.

AP from Press Ass'n

At the White House President Truman Presents the Hubbard Medal Awarded to General Arnold by the National Geographic Society

"For Distinguished Contributions to the Science and Development of Aviation (1911-1945)," reads the citation on The Society's highest award, presented November 16, 1945. Except President Truman, who is an honorary life member, all are officers or trustees of the National Geographic Society. Left to right: Alexander Wetmore, Secretary Smithsonian Institution; John Oliver La Gorce, Vice-President of The Society; Army General H. H. Arnold; President Truman; Gilbert Grosvenor, President of The Society; Robert V. Fleming, Treasurer; Thomas W. McKnew, Secretary; Melville Bell Grosvenor and Franklin L. Fisher.

U. S. Army Air Forces, Official

Jet-propelled, the Lockheed P-80 Shooting Star Can Exceed 550 Miles per Hour

At lower left is hot exhaust from the turbojet, which compresses air taken in at the nose and mixes it with fuel in a combustion chamber; the blast propels the plane, just as air escaping from a toy balloon causes it to leap. The dummy battleship serves as target for bombers on Muroc bombing range, southern California.

Air Technical Service Command

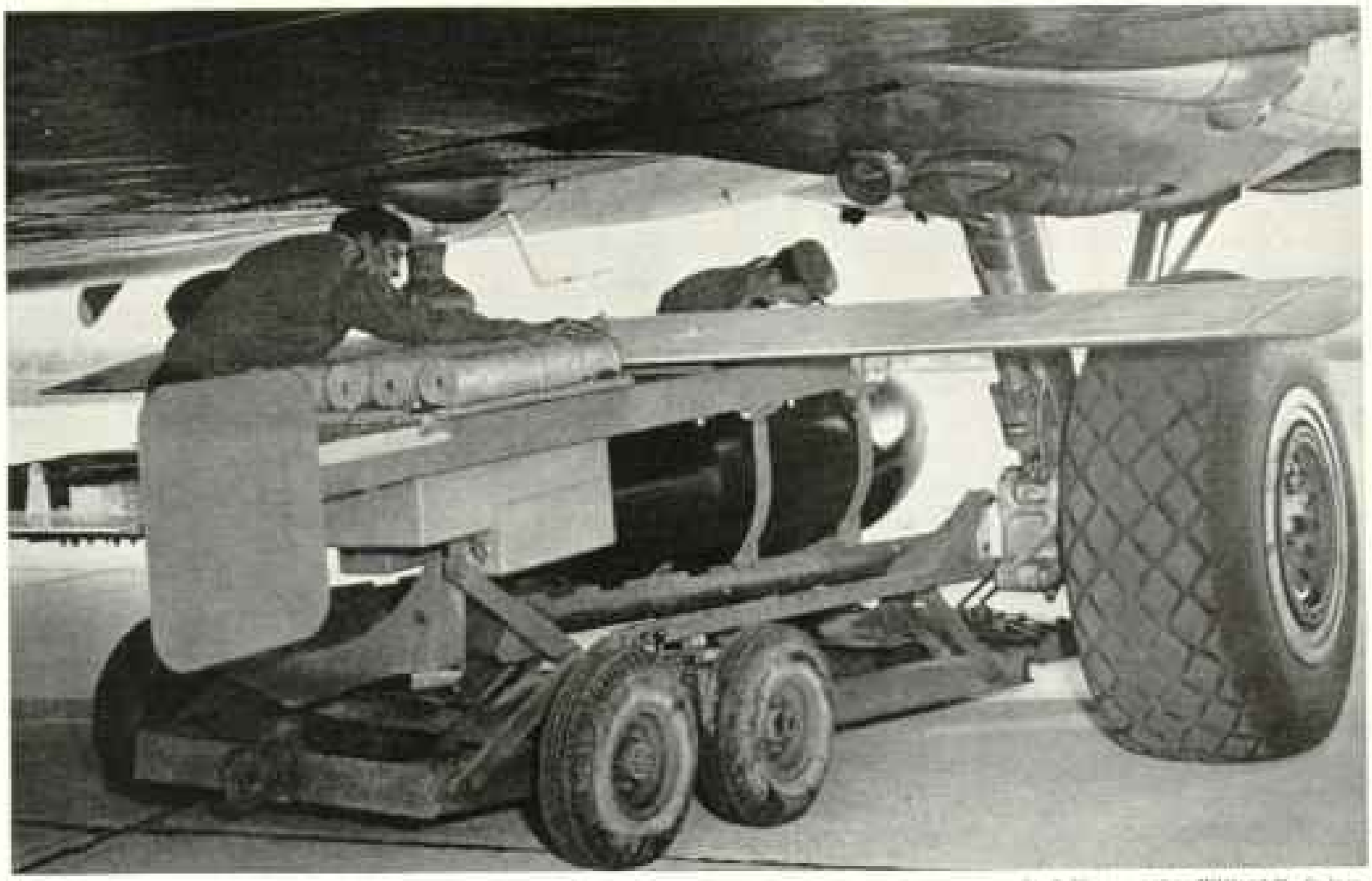
Flying Siamese Twins—North American's P-82, Postwar Plane Now in Production

Two P-51 fighter planes are joined to make this Twin Mustang, increasing speed, range, and versatility. Capable of more than 475 miles per hour, it can be used as a fighter, fighter-bomber, or medium bomber. With its two cockpits, it accommodates pilot and co-pilot, reducing fatigue on long-range missions.

U. S. Army Air Forces, Official

A New Recruit in Undress Uniform Proudly Wears the 13th Air Force Patch

Three-year-old Bobby Tangen, one of the youngest Americans liberated in the Philippines, made friends quickly at an Air Force base after he and his parents were released. Born in a Japanese internment camp near Manila, Bobby was the first white child some of the "Jungle Air Force" men had seen in three years.



Staff Photographer Willard R. Culver

Wheeling a Glide Bomb into Place Beneath the Belly of a Bomber

Cylinders on top of this guided missile are flares which aid in radio control from the parent plane (page 174). One type of glide bomb has television "eyes" which enable the controller in his distant plane to see the terrain over which the bomb is passing and fly it into its target (pages 186 and 187).

AP from Press Ass'n

Two Propellers Pushed the XB-42 Across the Continent at 432 Miles per Hour

Mounted in the tail and rotating in opposite directions, the novel pusher-type "props" were driven by 30-foot drive shafts, with joints every five feet to prevent undue rigidity and allow for expansion and contraction of the metal. The two motors, each driving one propeller, were in the fuselage and were accessible during flight. The plane could take off or fly on one motor alone. The propeller mounting gave "center-line thrust," eliminating the torque, or twist, that occurs when one motor of a conventional plane cuts out. Douglas Aircraft Co., Inc., its producers, plan a larger transport version of this experimental bomber, which set a record for the flight from Long Beach, California, to Washington, D. C., on December 8, 1945, covering the 2,293 miles in 5 hours, 17¼ minutes. It crashed near Washington, December 16.

First, we should attempt to make sure that nowhere in the world are atomic bombs being made clandestinely.

Second, we should create new-type devices and techniques to secure every possible active defense against an atomic bomb attack, once launched.

Third, we might redesign our country for minimum vulnerability to atomic bomb attack. However, complete dispersal of our cities and moving vital industries underground on a sufficiently large scale would be overwhelmingly expensive and would present technological problems of the greatest difficulty.

Unceasing patrol of the entire world, possibly under the guidance of the United Nations Organization, would do much to prevent the illegal manufacture or launching of atomic bombs in their present form. Air patrol, supplemented under international agreement by ground intelligence service, should be employed to the maximum possible extent.

The air forces used for patrol of this kind might very well be those air contingents which are made available to the Security Council for possible enforcement action. This, however, would be only a partial solution of the problem. An intelligence service, with an efficiency heretofore unknown to the U. S., must keep us informed of the activities within the boundaries of a prospective enemy.

Although there now appear to be insurmountable difficulties in securing an active defense against future atomic projectiles similar to the German V-2 rocket, this condition should only intensify our efforts to discover such an effective defense. To be really effective, the range of the V-2 must be increased from 250 miles to some 3,000. Is it asking too much to expect that, as its range is increased, we simultaneously develop a defense against it?

Meanwhile, the only known practical means of delivering atomic bombs over long distances in their present stage of development is the very heavy bomber, and that is certain of success only when the user has air superiority. This condition, although perhaps true only

© National Geographic Society Kodachrome, U. S. Army Air Forces, Official

"On the Ball!" Signals *Ike's* Pilot with Circled Thumb and Forefinger

Army Gen. Dwight D. Eisenhower christened his namesake, an Eighth Air Force Flying Fortress, with a bottle of Mississippi River water. *Ike* suffered its first major battle damage on its 65th mission. Over Germany flak tore a propeller from its hub; the blades narrowly missed the General's picture.

Kodachrome, U. S. Army Air Forces, Official

Like a Miniature Garden, a Sand-table Map of the Mediterranean Helps AAF Pilots Plan "Operation Strangle"

They listen closely as an officer briefs them for a mission. He points to Rome, which later fell to the Allies after relentless air attacks choked off the flow of enemy supplies from the north. Brenner Pass, heavily bombed gateway from Italy to Austria, is under the hand of the pilot at the right of the briefing officer.

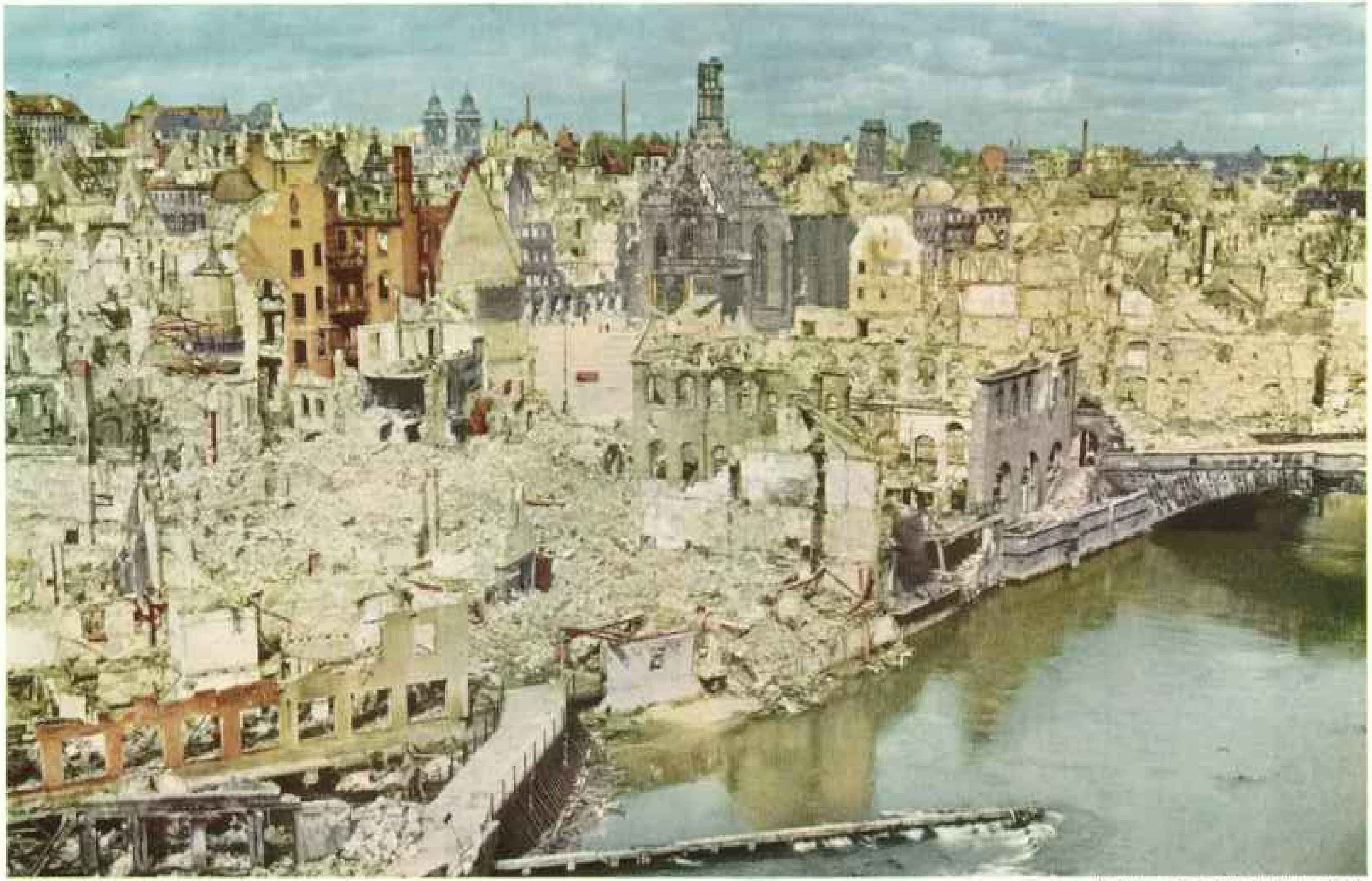
Ditched Airmen Take "Gibson Girl" for a Sail

One man is cranking out on the radio automatic SOS broadcasts. Its hourglass-shape suggested its nickname. His companion in the pneumatic life raft is preparing to send up a kite carrying the aerial. The still in the foreground makes sea water drinkable. Red tarpaulins double as sails.

Kodachromes, U. S. Army Air Forces, Official

Tow Targets Help Aerial Gunners Improve Their Aim

Here an airman attaches cable to a cloth sleeve, used to train aerial and anti-aircraft gunners. It will become a red streamer when unreeled behind a plane. For fighter pilots sleeves are trailed at 300 yards; for antiaircraft, up to 2,000 yards. Turret gunners fire plastic bullets at special target planes.



Rodarmour, U. S. Army Air Forces, Official

Gothic Nürnberg, Once Famous for Its Toys and Gingerbread, Becomes a Panorama of Destruction

Facing the marketplace is the ruined 14th-century Church of Our Lady. The steeple's spire is missing. The church clock, with seven moving figures appearing at noon, attracted peacetime visitors. Nürnberg, where Hitler held his annual Nazi rallies, became the scene of Allied war-crimes trials.

Kingsbury, U. S. Army Air Forces, Official

Bearing a Triumphant Slogan, "Finito Benito, Next Hirohito," a Bridge-busting B-25 Flies over the Gulf of Naples

Smashing the enemy's rail system was the specialty of Mitchell medium bombers in Italy. They even struck bridges smaller than the plane's 67½-foot wingspread. Early in the campaign they were based near Torre del Greco, at right above, six miles southeast of Naples. Later they moved to Corsica.

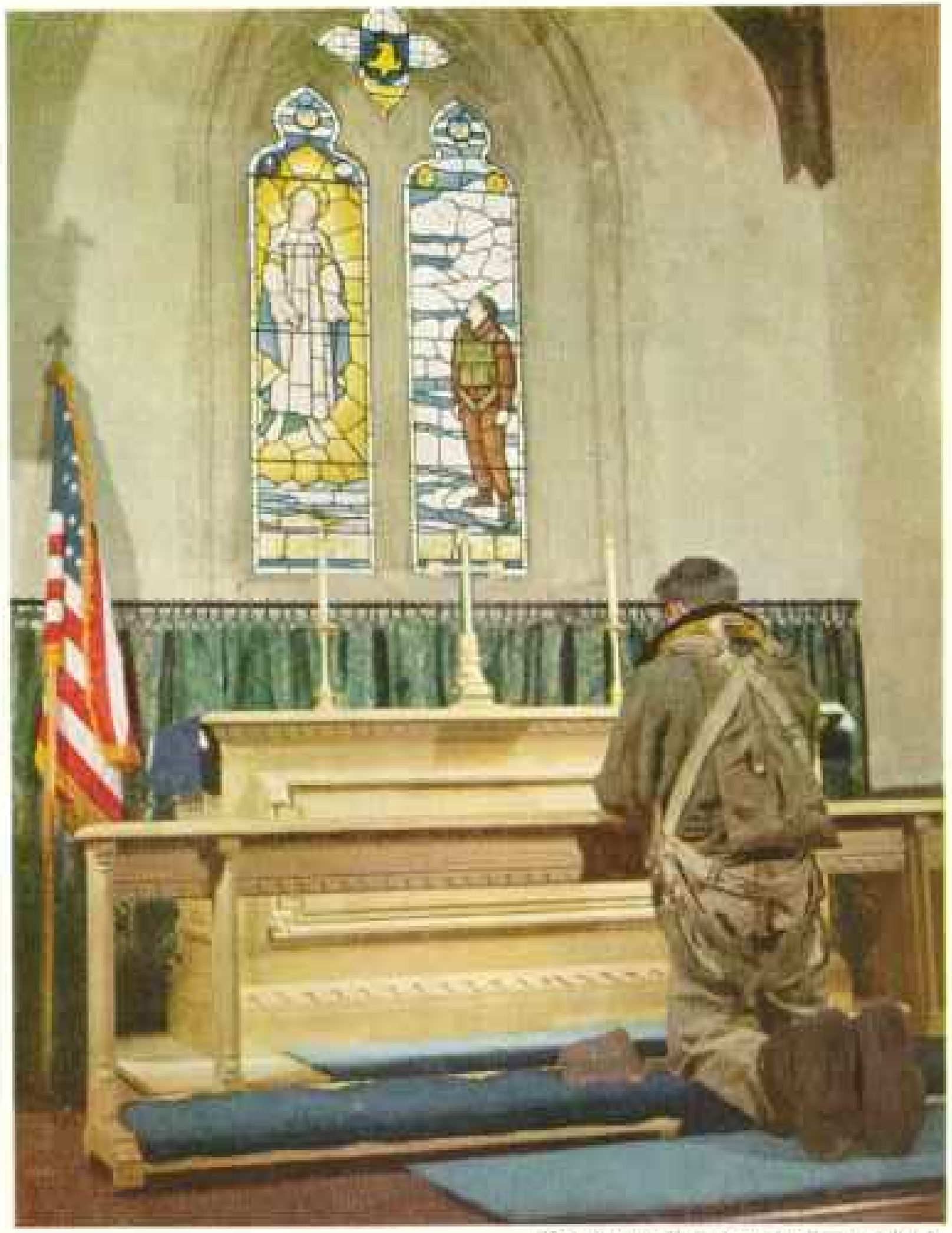
Kodachrome, U. S. Army Air Forces, Official

Fire Bombs from P-38 Lightnings Put the Heat on Japs Hidden in a Central Luzon Jungle

Incendiaries, ranging from a four-pound canister of magnesium to the atomic bomb, hastened the defeat of Japan. To drive the enemy from concealed positions, fighter-bombers swooped low and dropped 500-pound bombs containing a mixture called "goop." Auxiliary fuel tanks, filled with jellied gasoline, were also used.

2,000-pounders Become "Easter Specials" for Germany

Armorers, seated under the tail of a B-24 Liberator in Italy, worked with paint and brushes to color "eggs" tagged for the enemy's factories. Italian-based heavies struck repeatedly at the Ploeşti, Romania, refining center, which produced about a third of the enemy's fuel.



Kodachrome, U. S. Army Air Forces, Official

An Airman Prays Before Flying into Battle

Americans of the 96th Bombardment Group restored this chapel with their own money in appreciation of the hospitality shown them by the people of Quidenham, England, near their base. The stained-glass window honors lost group members. Several Yank airmen were married to English girls here.

 Kodachrome, U. S. Army Air Forces, Official

High in the Blue, Mustangs Escort Heavy Bombers to Their Target

These planes bear the tail markings of the 31st Fighter Group, which destroyed 570 enemy planes. The group first flew Spitfires and A-36's, later graduated to the faster P-51's. Wing tanks are dropped when enemy aircraft are met, to make the Mustang more maneuverable and to remove a target vulnerable to incendiaries.

U. S. Army Air Forces, Official

Nauru, One of the Richest Little Isles in the World, under Liberator Attack

Although less than three by four miles in extent, this British-mandated island west of the Gilberts contains immense deposits of phosphate—bequest of millions of long-vanished sea birds. Their guano became phosphate rock, used for chemicals and fertilizer (See "Nauru, the Richest Island in the South Seas," by Rosamond Dodson Rhone, NATIONAL GEOGRAPHIC MAGAZINE, December, 1921). The Japs seized Nauru early in the war, and installations there were heavily hit by U. S. land- and carrier-based planes.

temporarily, points up the urgent necessity for the maximum effort on air defense, both in the air and on the ground.

The atomic weapon thus makes offensive and defensive air power, in a state of immediate readiness, the primary requisite of national survival.

For the moment, at least, absolute air superiority in being at all times, combined with the best antiaircraft ground defenses, is the only form of defense that offers any security whatever, and it must continue to be an essential part of our security program for a long time to come.

Time to Prepare Will Not Be Given Again

It must be remembered that air power is the weapon with which the aggressor in the recent war struck us first, and we must anticipate that it will be this weapon, vastly improved, with which future aggressors will strike first if they can. We must recognize that the only certain protection against such aggression is the ability to meet and overcome it before the first blow is struck.

In two World Wars the aggressor suddenly struck peace-loving nations, in the belief that the United States would remain aloof or that other nations could be defeated before our overpowering might could be marshaled on land, sea, and in the air.

Luckily, in each World War there has been sufficient time for the mobilization of our terrific land, sea, and air power. As a result, the United States has twice been the determining factor in the defense of civilization.

This lesson is too plain for the next aggressor to miss. Accordingly, the industrial United States will surely be his first target and there will be no opportunity for gradual mobilization—no chance to rely on the initial efforts of other hard-pressed nations.

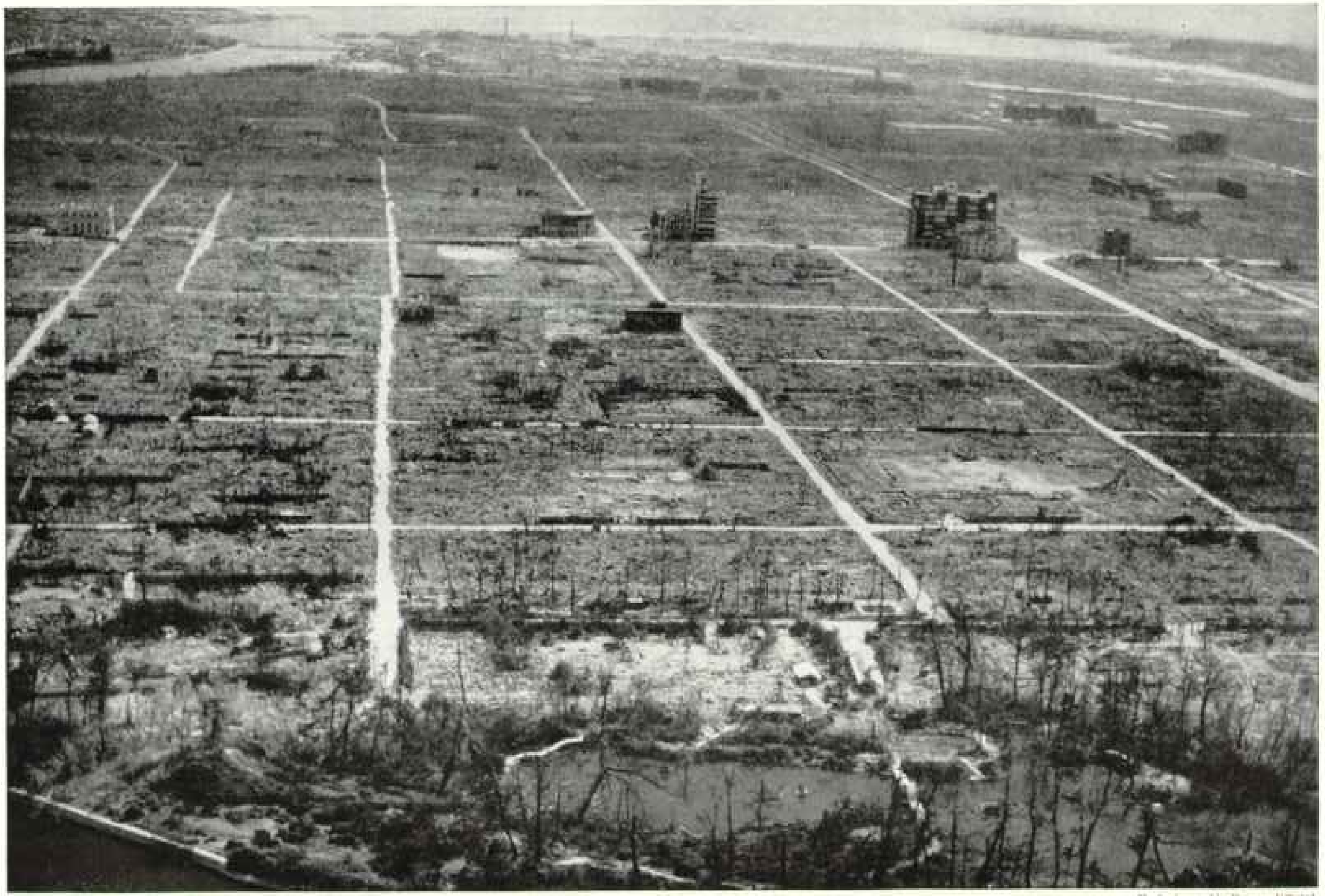
It is of the utmost importance that our air defenses be ably manned and fully supplied with the most modern equipment. We must be able to provide the time for other parts of the national-defense machine to mobilize and get into high gear. The United States must constantly maintain its position as the preeminent power in military aviation or run the risk of utter destruction.

Today many modern war devices of great

U. S. Army Air Forces, Official

Time Is Overtaking Even the Superfortress, Mightiest Plane Yet Used in War

From such aircraft the atomic bombs were dropped on Hiroshima and Nagasaki (pages 138 and 155). But General Arnold warns that the great airplane of today is the museum piece of tomorrow, and that the Air Forces must constantly have the latest-type equipment if our country is to be secure. The B-36 bomber of the near future will have a 5,000-mile radius (page 160).



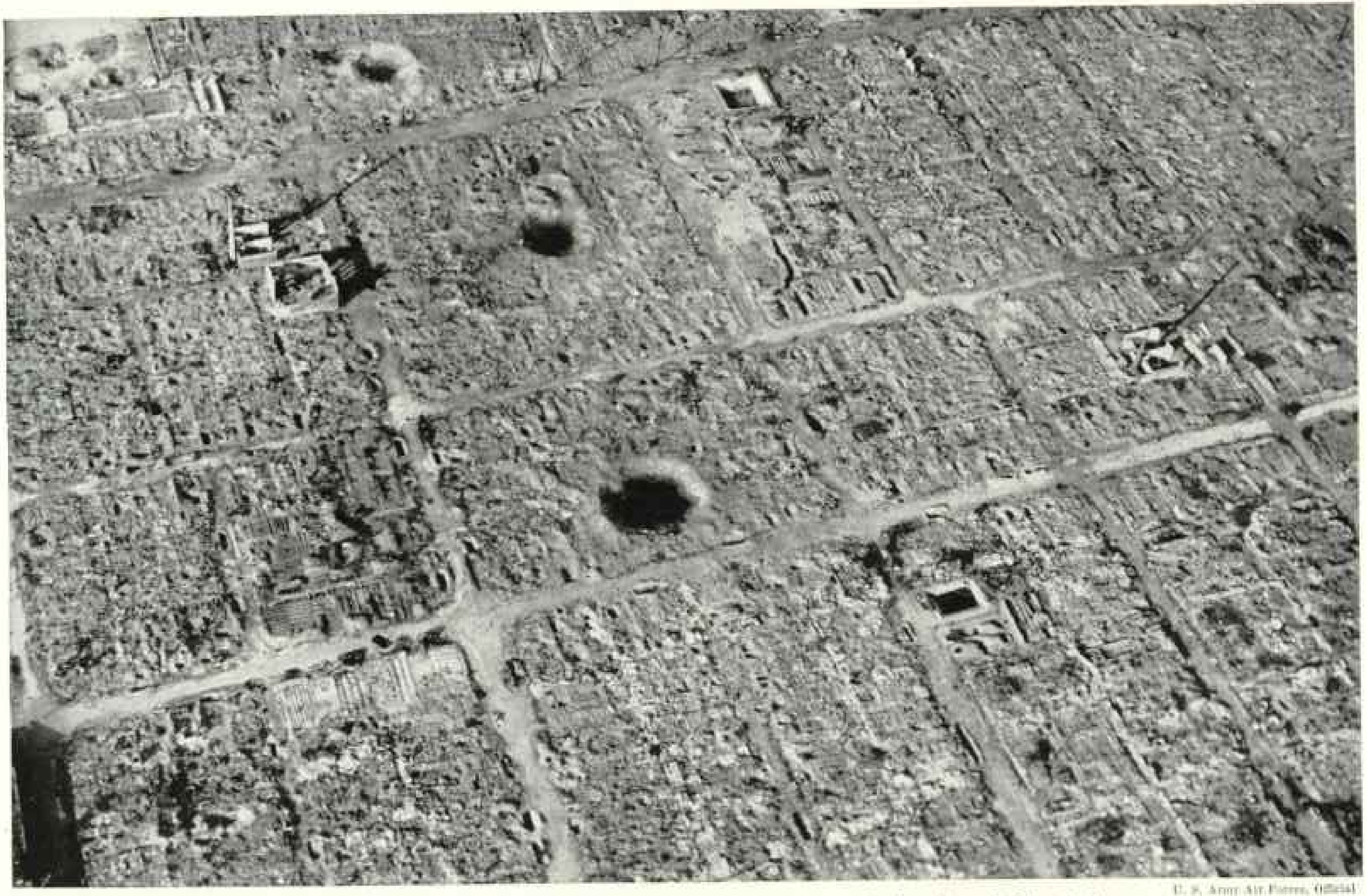
U. S. Army Air Forces, Official

Atomized Hiroshima—Four Square Miles of the City Were Flattened by the World's First Atom Bomb on Japan, August 6, 1945

U. S. Army Air Forces, Official

Japs Gape at Giant C-54 Skymaster Transports Landing Victorious Americans at Atsugi Airport, Honshu, Japan

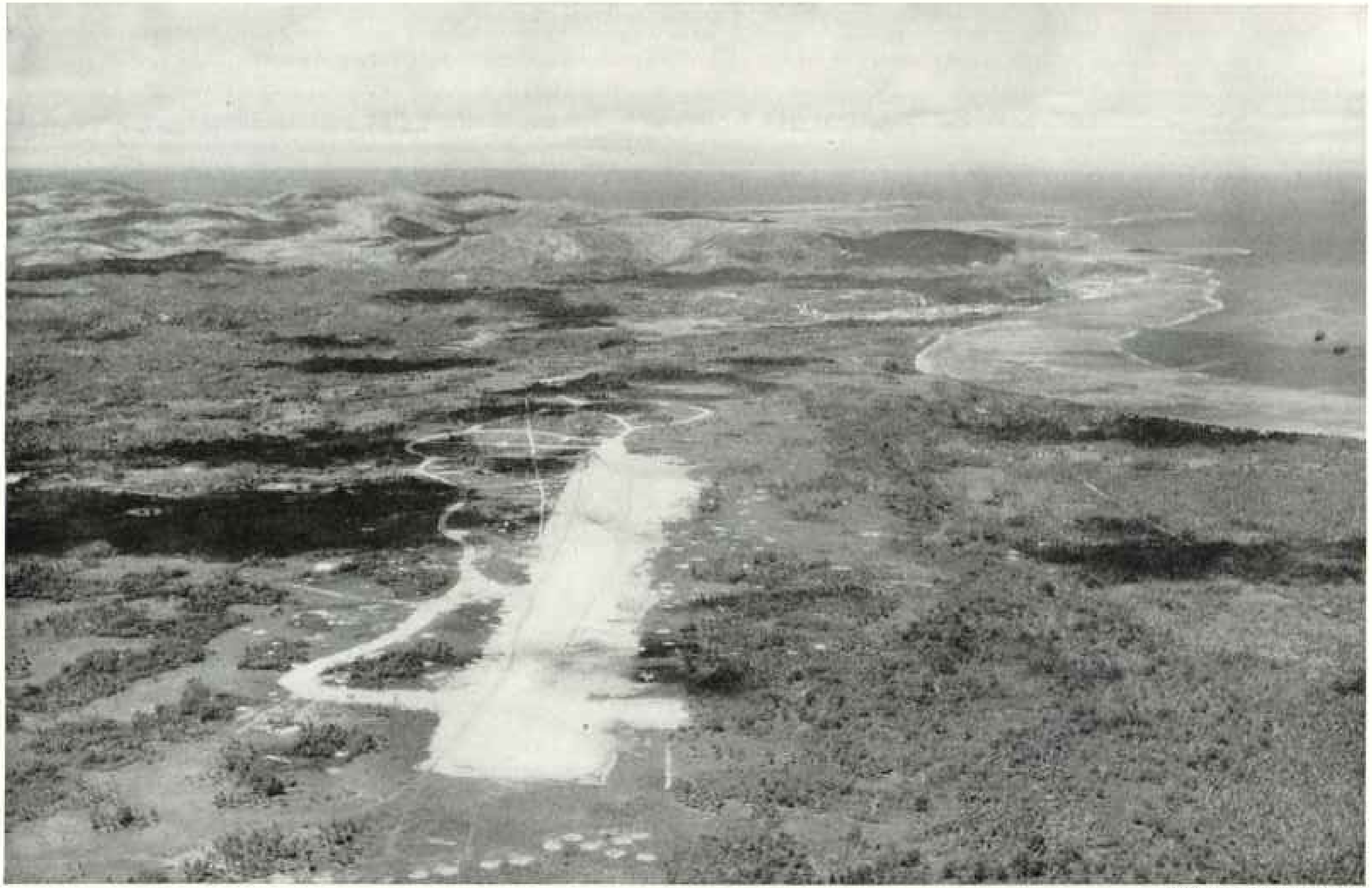
Japanese ambulances (left foreground) were ready for emergencies but were not needed, as the first day of American occupation passed smoothly. Pushed to the side of the field to make room for the big newcomers were remains of Jap aircraft like the "hangar queen" at left (wrecked plane used to provide parts for others).



U. S. Army Air Forces, Official

Desolation Reigns Where Superfortresses Sowed Fire Bombs on Osaka, Second City of Japan

Even the atom bomb could hardly cause greater devastation than the incendiaries which Superfortress fleets rained upon the principal Japanese cities. But far fewer atom bombs would be required, and the result would be accomplished in a fraction of the time.



Air Transport Command, Official

"Before"—A Jap Airfield on Guam Before Its Development by Our Forces (Opposite)

A muddy little fighter strip was good enough when the Japs held the island. But General Arnold's flyers, the Seabees, and Engineers had bigger ideas. This is how the bomb-pocked field looked on August 24, 1944, shortly after Guam's recapture by United States troops. The site is near the capital, Agaña (right).

Air Transport Command, Official

"After"—The Same Guam Airfield Transformed into a Base for Our Biggest Planes

Here is the Agaña field 10½ months later, on July 7, 1945. Boeing B-29 Superfortresses and Douglas C-54 Skymasters roar off from long hard-surfaced runways. Hundreds of buildings, replacing jungle growth, have magically sprouted in neat rows, forming a big, efficient city—Harmon Field—dedicated to air power.

destructive power can be built piecemeal and under cover. Sub-assemblies can be secretly made in underground laboratories and assembled into an annihilating war machine. War may descend upon us by thousands of robots passing unannounced across our shorelines—unless we act to prevent them.

Japanese and German cities now lie in ruins (pages 155, 157, and 173), but they merely suggest the vast destruction that can be done with the weapons of tomorrow. The first target of a potential aggressor might well be our industrial system, our economic centers, our military or economic planning headquarters, or our major centers of population.

If the United States is to be secure in the future, we must never relinquish the means of preventing such a blow.

Further, our concept of the implements of air power cannot be confined to manned vehicles. Controlled or directed robots will be of increasing importance.

A Doctrine of American Air Power

In practical terms for the immediate future, the doctrine of American air power can be expressed as a determination:

1. To maintain a striking air arm in being.
2. To keep the Army Air Forces and the aviation industry able to expand harmoniously as well as rapidly.
3. To maintain well-equipped overseas bases.
4. To support an alert and aggressive system of commercial air transportation—one of the foundations of American air power.
5. To remember that it is the team of the Army, Navy, and Air Forces working in close cooperation that gives strength to our armed services in peace or war.
6. To make available to the United Nations Organization, in accordance with the provisions of its charter, adequate and effective air force contingents for possible use by the Security Council in maintaining international peace and security.
7. To promote scientific research and development and to maintain close contact with industry.

Strategically Located Bases Essential

Operations of an air force can no longer be considered as being local in extent or limited in range. Bombers can now range the world, and we must have the necessary facilities, such as well-equipped bases, meteorological and communications facilities, and other devices including radar, to provide for such employment.

On the National Geographic Society's Pole-centered map of the Northern Hemisphere, which is distributed as a supplement to this issue, it is easy to see how our bases in the Philippines, Okinawa, and Alaska flank the whole eastern area of Asia. Similar bases in the Atlantic cover all of Europe and most of Africa.*

The continued manning of adequate, strategically located bases is essential to our security. The strongest possible deterrent to a potential aggressor will be our possession of air power based closer to him than he is to us, the ability to use those bases or other means instantly against a hostile land, sea, or air expedition.

With our geographic position, the occupation of our perimeter bases, and our resources, we have it in our power to preserve peace indefinitely.

If we fail in this responsibility, if we let another Hitler rise, we deserve to have our entire world wiped out. Any future trouble-maker must be stopped before he starts.

Any danger to this country must come from north of the 30th parallel of north latitude. South of that line there are no formidable and potentially unfriendly powers.

From the ring of bases we have used in the recent war, enlarged, fortified, and equipped to handle our biggest planes now under construction, we can reach any spot in the world that would be a potential danger.

With the 5,000-mile-radius bombers of the near future, our Air Forces could cover practically all danger spots in Europe or Asia from bases which we now occupy. Conversely, similar planes of an enemy could bring our principal industrial centers under direct bombing attack.

The National Geographic map centered on the North Pole brings out the true geographic relationship between the nations north of the 30th parallel. America and Asia are neighbors nearer by hundreds of miles by the polar route.

No longer can our northern approaches be considered as guarded by ice, snow, and

(Continued on page 170)

* Members may obtain additional copies of the new "Map of the Northern Hemisphere" (and of all other maps published by The Society) by writing to the National Geographic Society, Washington 6, D. C. Prices, in United States and Possessions, 50¢ each, on paper; $1 on linen; Index, 25¢. Outside United States and Possessions, 75¢ on paper; $1.25 on linen (postal regulations generally prohibit mailing linen maps outside Western Hemisphere); Index, 50¢. All remittances payable in U. S. funds. Postage prepaid. The "Northern Hemisphere" map shows the principal U. S. airbases overseas and "kickoff" bases in the United States. It also includes four tables of distances showing mileages between the most important points in the Pacific, the Atlantic, the Arctic, and the Americas.

Over Kasserine Pass Allied Air Power Helped Stave Off Disaster

THREE months after landing in North Africa, the Allies had driven the Axis from Morocco and Algeria. American forces faced the enemy in western Tunisia along a thinly held 200-mile front.

Suddenly on February 14, 1943, Field Marshal Erwin Rommel struck through the lowlands between Faid Pass and Sidi bou Zid and drove the Americans back. Axis tanks smashed boldly through Kasserine Pass, hoping to break through to the Algerian plain. If they had, they might have captured Constantine, Philippeville, and Bône, main supply points for the Allies.

But the Allies were ready. They sprang a trap which caught these Axis spearheads in a narrow corridor near Thala, walled by mountains rising to 4,000 feet.

The Allied Air Forces, teaming up with the infantry, tanks, and artillery, threw everything they had at the enemy and broke the back of the attack.

Swift twin-engine A-20's, such as the plane above, after dropping their bombs, swooped down and raked the foe with machine-gun fire. Almost every weapon in the Allies' aerial arsenal, from tiny Spitfires to giant Flying Fortresses, joined in the attack.

When Americans occupied Kasserine Pass without a shot on February 25, smoking and twisted hulks were all they found of the flower of Axis armor. Remnants of the whipped Panzer forces were retreating toward a final stand in eastern Tunisia.

The Tunisian campaign, costly to the Allies, was fought on historic soil. From Kasserine Pass the Allies pressed on toward the prize port of Tunis, built near the ruins of ancient Carthage. After the capture of this city on May 7, many GI's visited Carthage, destroyed by the Romans in 146 B. C. La Marsa, a near-by seashore resort, became Allied Air Forces headquarters.

© National Geographic Society U. S. Army Air Forces, official

A B-25 Wings over Pantelleria, the Axis "Gibraltar" That Fell to Aerial Siege

WITH the foe driven from North Africa, the Allies looked from Cape Bon, the northeasternmost tip of Tunisia, to the next major objective—Sicily. Beyond lay Fortress Europe itself.

Roughly midway on the 150-mile hop lay the Italian island of Pantelleria, an egg-shaped bit of volcanic rock nine miles long and five miles wide.

Mussolini began fortifying Pantelleria in 1937, hoping to seal off the Mediterranean into a "Mare Nostrum." He even planned to stretch submarine nets from Pantelleria to Sicily and Tunisia. The island was to be Il Duce's "Gibraltar," a "second Malta," an "unsinkable aircraft carrier."

Since Pantelleria had no beaches suitable for amphibious landings, the Allied Air Forces were assigned the task of removing this stumbling block.

The grand air assault began on May 20, 1943. It went on day after day, night after night, growing in severity. So heavy was air traffic that some formations were forced to circle over the target, awaiting their turn to bomb. Fighter-bomber pilots swooped to within 50 feet of the island's one airfield and skipped bombs into the underground hangars. Shells from naval vessels standing close inshore added to the destruction.

On June 11, the Italian garrison could "take it" no longer and put out a large white cross, the surrender signal. Thus Pantelleria became the first instance of territory conquered almost completely by air power. More than 10,000 Italian soldiers were captured. The airfield became an advance fighter base for the invasion of Sicily.

Before becoming a fort, Pantelleria was used chiefly as a penal colony to which Italian political prisoners were banished to work in the olive groves, vineyards, and fisheries. First colonized by the Phoenicians, it was captured by the Romans in 255 B. C. and finally wrested from the Carthaginians in 217 B. C. Now the island is governed by the Allies, its final fate yet to be determined.

 U. S. Army Air Forces, Official

Smoking Mount Etna Looms above the Scene of the Final Battles for Sicily

KNOWN to ancients as the "forge of Vulcan," 10,758-foot Mount Etna formed a massive backdrop for the fighting that knocked Italy out of the Axis line-up.

After the conquest of North Africa, Pantelleria, and the smaller Mediterranean islands, the full weight of Allied air power was employed to "soften up" Sicily.

Hard-hitting Mitchells, like the one flying past snow-clad Etna, led the air attack. Used mainly as medium bombers, these B-25's also raked enemy shipping with 75-mm. cannon mounted in their noses. Hundreds of enemy planes, too, were wrecked as they sat on their fields. Other B-25's, carrying depth charges in their bomb bays, helped drive U-boats out of the Mediterranean.

Largely because of this aerial softening up, the Allies conquered Sicily in slightly more than five weeks. In contrast, the ancient Saracens laid siege to the Sicilian town of Enna for 31 years, and it took the Normans a quarter of a century to reduce the same stronghold.

The assault on Sicily began on July 9, 1943, when C-47 transports dropped paratroops on strong points inside the island (Plate VI). These were the first American troops ashore.

While airborne units were fighting in the enemy's rear, an armada of more than 2,000 vessels landed an invasion army on the east coast. By July 25 the enemy had been pushed back to his Mount Etna line. Three weeks later remnants of the Axis forces were retreating across the Strait of Messina to Italy.

Etna, highest volcano in Europe, covers an area of 460 square miles, with Catania at its southern base and Taormina, a famous resort, to the northeast. In 1928 an eruption wiped out the town of Mascali and almost destroyed Nunziata. Streams of lava 100 feet wide blocked the Messina-Catania railway line and caused heavy damage to property.

U. S. Army Air Forces, Official

As if in League with the Nazis, Vesuvius Conducted Its Own Blitz

QUIESCENT when this P-40 Warhawk sped past its crater, the ancient volcano on March 18, 1944, put on one of the most spectacular side shows of the war. After several days of smoking and glowing, the volcano erupted suddenly with loud rumblings and explosions. It sent up brilliant fireworks of red-hot rock and ash. Streams of molten lava poured down the sides.

In a few days the crawling lava streams engulfed many homes in San Sebastiano, Cercola, and other villages at the foot of the mountain. Thousands of refugees and their household belongings were evacuated by the Allies.

Clouds of ash, carried southeast by the prevailing wind, settled on highways, halting traffic. Downpours of ash mixed with rock on an airfield wrecked 70 American planes, 35 of them beyond repair.

Though mild in comparison with the great eruption A. D. 79, which destroyed Pompeii and Herculaneum, this blowoff was the biggest since 1906.

It was not the first time Vesuvius had aided the enemy. The mountain, standing directly on the path from the Salerno beachhead to Naples, delayed the advance of Allied armies.

After the Allied occupation of Naples and while Vesuvius was building up to its big show, German night bombers often found their way to the target by "homing" on the volcano's red glow high above the crowded harbor.

Vesuvius, the only active volcano on the European mainland, attracted thousands of GI sightseers from Naples and vicinity. They rode up the mountain on a funicular railway from a station near Herculaneum. They climbed on foot over warm lava to the edge of the crater. Many wondered why Italian folk persisted in clinging to their vineyards on the slopes, in view of Vesuvius' reputation. They learned the volcanic soil produces fine grapes from which comes a wine called "Lacrimae Christi," or "Tears of Christ."

 U. S. Army Air Forces, Official

"The Army Air Forces Did Much to Save the Day at Salerno"—General Arnold

THE A-36 Invader, banking over the beach near Salerno, fought brilliantly as a dive bomber in the early stages of the Italian campaign. The A-26, a new twin-engine light bomber, now bears the name Invader, while the A-36 has evolved into the swift P-51 Mustang fighter (Plate VII).

Repeating the tactics which won Sicily, A-36's and other Allied warplanes went to work on the Germans in Italy days before our troops hit Salerno's beaches. To isolate the enemy and disrupt his flow of supplies, bombers raked the Italian boot from the toe to the Brenner Pass.

A daring low-level strafing attack on 200 German planes massed on the Foggia airdromes enabled the Allies to establish the Salerno beachhead September 9, 1943, with little air opposition.

Four days after the landing, the American Fifth Army called for air reinforcements to help beat back a German counterattack. Before dawn the next day, 1,300 fully equipped paratroops, flown from a Sicilian base, marched into the front lines.

"There was no resisting an effort of that magnitude," General Arnold said of air power's feats at Salerno. He added prophetically: "The breach it helped make in the European fortress can never again be sealed."

Driving northwest to capture Naples, American troops fought over some of the most beautiful country of Europe. Salerno, an ancient port at the foot of a natural amphitheater, is the western terminus of the famed Amalfi Drive, a spectacular highway hewn from cliffs 100 to 500 feet above the sea.

The route to Naples led through Amalfi, Ravello, Positano, Sorrento, and other beauty spots frequented in peacetime by artists and visitors.

Near Salerno is Paestum, the "city of Neptune," founded by the Greeks about 600 B.C. An Air Forces headquarters camped for a while close by its three ruined temples.

 U. S. Army Air Forces, Official

America's Peacetime Transport, the DC-3, Drops War Supplies by Parachute

ALL manner of jobs fell to the Douglas transports, which became the C-47's of the Troop Carrier Command. They dropped paratroops and supplies, towed gliders loaded with infantrymen, served as aerial ambulances, and hauled freight and passengers over war-zone airlines.

Though two-engine C-47's often were targets for flak and fighters on these missions, they always flew unarmed.

C-47's kept the flame of resistance alive in France, Italy, and the Balkans. They dropped tons of food and arms to hungry allies and flew in hundreds of underground agents.

To deliver supplies to Marshal Tito's Yugoslav forces, the transports had to cross the Adriatic and German-held territory at night. They brought back wounded Partisans to hospitals in Italy.

Attached to the parachutes dropping from the C-47 above are plastic cylinders containing supplies. Originally, parachutes of different colors were used to identify dropped equipment. But this plan was abandoned because of the information it gave the enemy. However, white parachutes are still reserved for personnel in most operations.

Largest piece of equipment dropped in combat was a 75-mm. pack howitzer. This was dismantled into seven sections, each fastened to a parachute. The seven chutes were tied together with a loose cord, so that all would land together for quick reassembly. Jeeps have been dropped experimentally.

Crewmen who push supplies out of a C-47's big door work without parachutes, as they need freedom of movement. A slip would mean death.

An early Troop Carrier Command epic was the flight of 39 C-47's, laden with paratroops, nonstop from England to North Africa. The unarmed transports flew through skies still patrolled by the enemy. Twelve hours after the take-off, the paratroops were helping with the North Africa invasion.

© National Geographic Society U. S. Army Air Forces, Official

Bound for Balkan Targets, Mustang Pilots Climb High over Yugoslavia

INSIGNIA of three famous Mediterranean Allied Air Forces fighter groups adorn the tails of these P-51's. The black-and-gold checkerboard design is the insignia of the 325th Fighter Group. The diagonal red stripes represent the 31st, and the solid red tail is the badge of the all-Negro 332d.

Starting in Mediterranean combat as a dive bomber, known as the A-36 Invader (Plate V), the improved P-51 Mustang became a top-notch long-range fighter.

Extra fuel in wing tanks gave Mustangs a range of about 1,500 miles, enabling them to escort heavy bombers all the way from bases near the heel of the Italian boot to the target and return. On longer missions—such as Berlin, which Italian-based heavies attacked only once—the bombers flew some 200 miles north to meet their escort.

Mustang-escorted Flying Fortresses and Liberators contributed heavily to the European victory by attacking German targets from British and Italian bases and blasting at refineries centering about Ploeşti, Romania, which produced about 30 percent of the Axis oil supply.

In a 4-month campaign American heavies, aided by RAF night bombers, braved a ring of 250 anti-aircraft guns and an efficient smoke screen to drop 12,870 tons of bombs on Ploeşti. When Romania surrendered on August 23, 1944, the refineries were reduced to 10 percent of their normal capacity.

The Ploeşti attacks cost us 252 bombers and 39 fighters. Of more than 2,200 American airmen shot down and taken prisoner in Romania, almost half were returned to Italian bases in "Operation Reunion," a dramatic air rescue.

Escaping in a German plane flown by a friendly Romanian pilot, one American returned to Italy and organized the rescue.

While Mustangs flew overhead, Flying Fortresses landed at Bucharest after the Russian occupation, loaded the airmen aboard, and took off for Italy.

 U. S. Army Air Forces, Official

High over the Alps, B-24 Liberator Crews "Sweat It Out" in Sub-zero Weather

TO STRIKE at targets in Germany, Austria, Czechoslovakia, Hungary, Romania, or even as far north as Poland, Liberators and Flying Fortresses from bases near Foggia, in southeastern Italy, always had to contend with the Alps.

Towering peaks, great glaciers, and famous resort lakes such as Maggiore, Lugano, Como, and Garda passed beneath their bomb bays, but the crews did little sight-seeing. They were too busy watching for enemy fighters. Besides, landmarks usually were obscured by heavy clouds and seldom were seen clearly. Navigation was almost entirely by instruments, and the expression "flying blind" had its fullest meaning on these missions.

At altitudes of from 12,000 to 15,000 feet, crewmen wore oxygen masks. They protected themselves against the intense cold by plugging in their electrically heated flying suits. Frostbite, usually suffered when a gunner or engineer removed his gloves or goggles, was a common ailment.

Many a bomber failed to get home because one or more engines were shot out over the target and the remaining power was insufficient to boost the plane over the roof of Europe.

Some American airmen were forced to bail out of faltering planes over the Alps. The luckiest were those who reached hospitable Swiss soil. Many, landing in enemy-occupied countries and evading capture, made their way back to their bases with the help of Partisans.

To combat bad weather along the Alpine routes, the Mediterranean Allied Air Forces created a special weather-reconnaissance squadron. Flying P-38 Lightnings, pilots covered the course well in advance of the bombers and radioed their findings back to the oncoming formations.

In this way, formation leaders were told how best to approach the target. Once over the target, bombs could be aimed accurately by radar through heavy overcast.

U. S. Army Air Forces, Official

Boosted by Rockets, a B-29 Leaps from the Runway

This photograph from Army Air Forces Proving Ground at Eglin Field, Florida, shows how rocket-assisted take-off is used to get a heavily loaded bomber into the air when the field is too short for a normal run. The method is known in the Air Forces as "Jato" (jet-assisted take-off).

U. S. Air Technical Service Command, Official

With Buzz Bombs a Flying Fortress Launches a One-two Punch

Flying bombs of the German V-1 type were launched experimentally by American aircraft, although the abrupt end of the war prevented their use against the enemy. Some of the V-1's that blasted London were launched by the Germans from airplanes, while others began their deadly flight to London from ramps near the Continent's coast. The AAF puts its familiar star insignia even on its flying bombs (page 175).

U. S. Army Air Forces, Official

A Bursting Phosphorus Bomb Takes the Form of an Octopus, White and Fantastic

The spectacular burst with its spreading tentacles enfolds an islet just off the coast of Oahu, Hawaii, after a direct hit during training. White phosphorus shells and bombs are sometimes used for smoke-screening, but they also have what military men call an "antipersonnel effect," since bits of the stuff fly in all directions and will burn through flesh and bone.

bad-weather barriers. Modern aircraft are becoming increasingly independent of such conditions. This is strikingly emphasized by the fact that our own losses of aircraft in flights over Arctic and sub-Arctic routes have been proportionately lower than those incurred in flying the southern routes.

Detailed Intelligence System Vital

A surprise attack could readily come from across the roof of the world unless we were in possession of adequate airbases outflanking such a route of approach.

Attack across the oceans instead of the polar region would be a waste of 2,000 miles, and no smart military commander would add 2,000 miles to a trip if it could be avoided.

Of vital importance is a system of intelligence of a much more far-reaching character than we have had before. Our past concept of intelligence needs was insufficient to cover the requirements of modern war.

Detailed and moment-by-moment knowledge of all aspects of civilian and military activity within the territory of an enemy or a potential enemy is essential to sound planning in times of peace or war.

Continuous knowledge of potential enemies,

covering their entire political, social, industrial, scientific, and military life, is necessary to provide warning of impending danger.

Strategic air warfare can be neither soundly planned nor efficiently executed without a continuous flow of detailed information of this kind. In the future it will be suicidally dangerous to depend upon pre-World War II reports of military attachés and routine or casual sources of information regarding foreign states. Only through specialized channels can we keep a constant check on the technological developments of potential enemies.

There is a great need for a permanent national organization which not only deals with broad questions of policy but also collects, evaluates, and disseminates a continuous stream of intelligence data available alike to Army, Navy, Air, and State Department officials.

In addition, we must have a competent and active air intelligence organization within the Air Forces working with such a national organization in times of peace and war. The targets of the future may be very large or extremely small—such as sites for launching guided missiles—requiring exact intelligence information as well as bombing accuracy to destroy them.

U. S. Army Air Forces, Official

How a Gun Camera Is Placed in a Fighter Plane's Nose

Just above the mechanic's hand is the 16-millimeter motion picture camera which most fighters carry. When the pilot fires his machine guns, shown at top, the camera automatically photographs the result through a porthole in the nose cap, which here is open. Dirt is kept out of guns by muzzle caps which are shot away when the pilot opens fire.

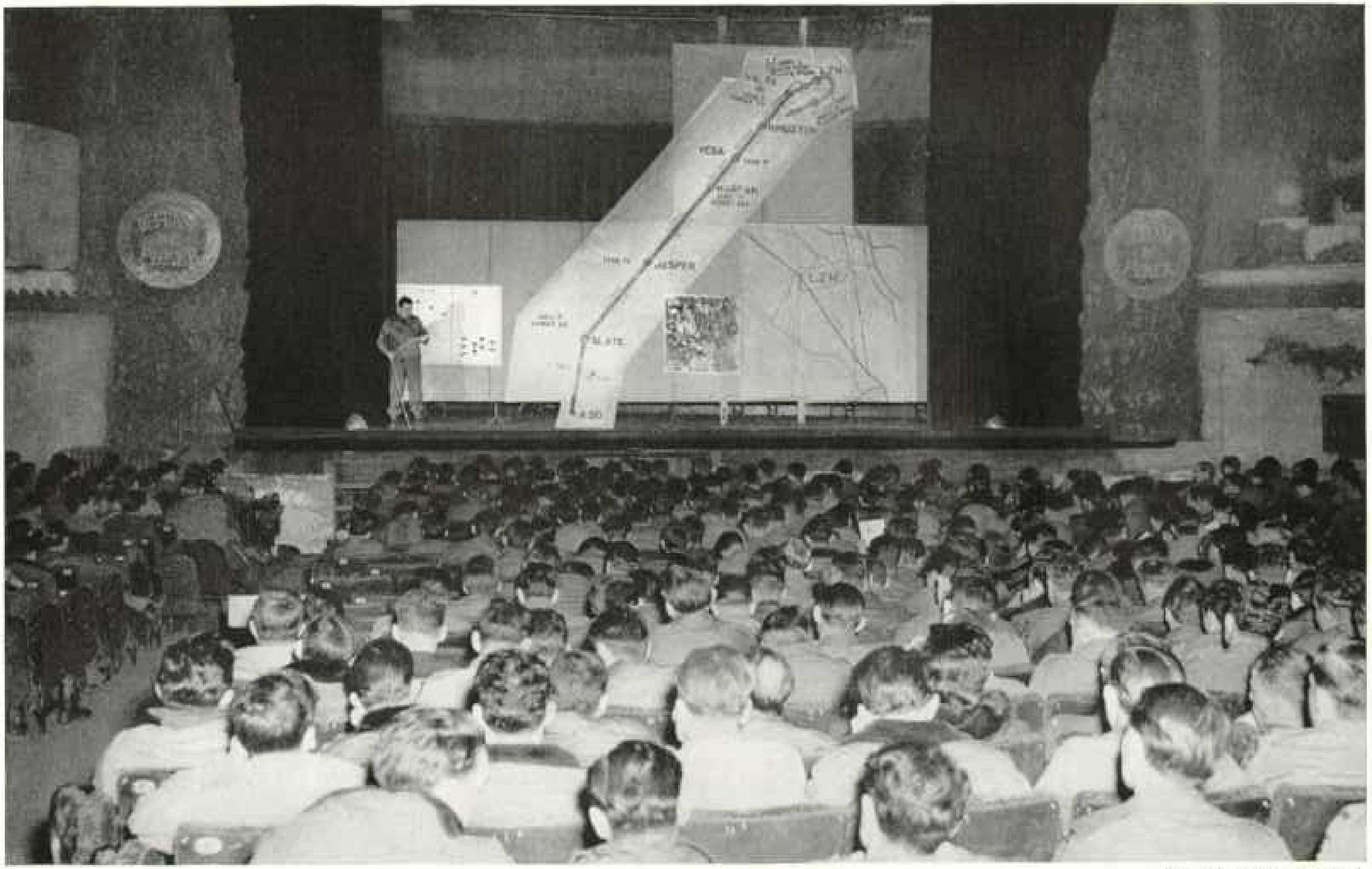
Today's Weapons Are Tomorrow's Museum Pieces

The spectacular innovations in technological warfare which appeared with ever-increasing momentum in World War II and culminated in the atomic bomb emphasize that continuous scientific research is imperative to ensure our national security and world peace.

No war will be started unless the aggressor considers that he has sufficient superiority in weapons to leave his adversaries in a state of ineffective war-making capacity.

In the past, the United States has shown a dangerous willingness to be caught in a position of having to start a war with equipment and doctrines used at the end of a preceding war. We have paid heavily for this error. A repetition of this error in the future could mean annihilation.

Possession of large stocks of war equipment at the end of a war affords a serious temptation to continue to use that equipment in training peacetime forces.



U. S. Army Signal Corps, Official

In a French Theater, Plane Crews Are Briefed for the Airborne Landings Beyond the Rhine

Charts show formations and route to be flown. Place names such as "Yalta," "Kingston," and "Vega" are code words. A ground liaison officer is briefing personnel of the 440th Troop Carrier Group and 139th Engineer Battalion at Orléans, France, in late March, 1945, before the vast operation which landed Allied airborne troops in the enemy's rear as British and American ground forces, with naval aid, stormed across the Rhine River barrier. "Défense de Fumer" signs forbid smoking.

Sergeant Reg Kenny from YANK

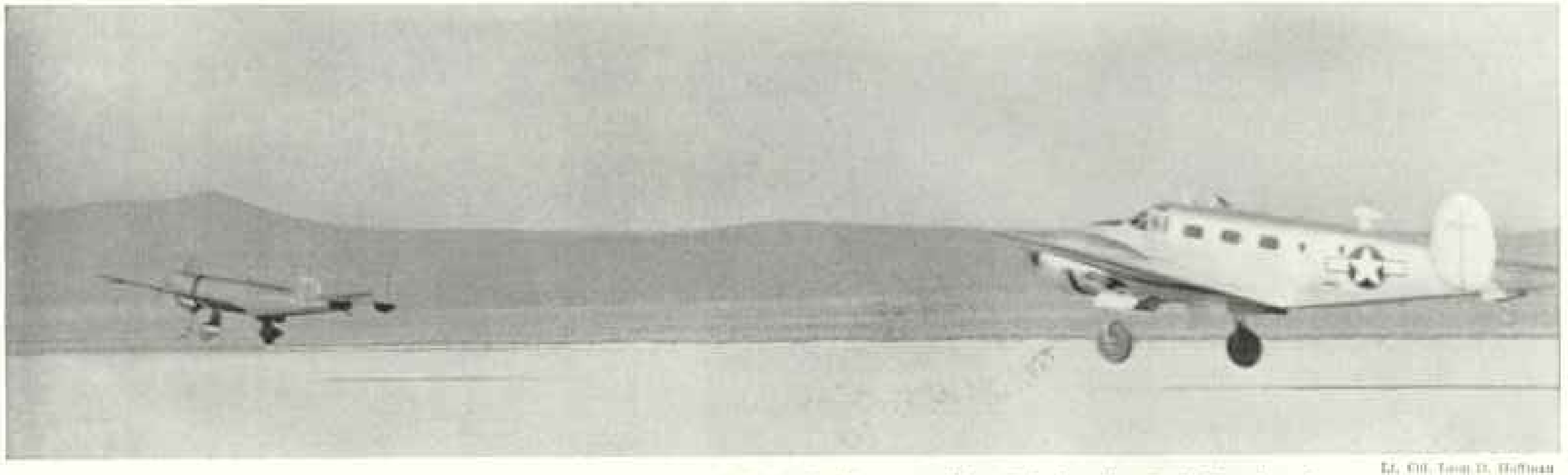
Cologne—Such Ruins "Merely Suggest the Vast Destruction That Can Be Done with the Weapons of Tomorrow"

So writes General Arnold, pointing out the targets which an aggressor would attack first and declaring that the United States must never relinquish the means of preventing such a blow (page 160). Had this area beside the Rhine been hit by a single atom bomb, hardly a stone would have been left in place.

Wright Field

A Flying Fortress Gives Birth to Lethal Twins, a Brace of Glide Bombs

The parent plane may stay out of danger, launching the bombs some distance away. Like V-1 and V-2, glide bombs were first used in World War II by the Germans. Americans employed them in August, 1944, against patrol boat pens in France (page 187). Those shown here are pre-set, but other types are guided by radio (page 143). Some have television (page 187); others, like the Navy "Bat" used against Jap ships, have radar "eyes"; new types are attracted to heat or light.



Lt. Col. Leon D. Hoffman

Pilotless, a Culver Cadet Takes Off Ahead of Its Radio-controlling "Mother," a C-45 Beecheraft

The Cadet is a fast little civilian plane used experimentally as a guided missile. War-weary B-17's, explosive-laden, served as radio-controlled missiles in the recent war, but pilots had to take the big planes off the ground, bailing out afterward (page 185).

Staff Photographer Willard R. Culver

"Japanese Sandman," American-made Flying Bomb, Is Launched by Rockets from a 50-foot Trailer Ramp

In this improvement on the German V-1, four rockets supply the launching thrust. Then the bomb flies by means of the big stovepipelike jet-propulsion unit (p. 169).

U. S. Air Technical Service Command, Official

Guided by Radio, an Azon Bomb Scores a Direct Hit on a Bridge

Radio-controlled bombs were effective in destroying several important bridges in Burma, including this highway bridge over a small river on the Jap escape route between Taungup and Prome (page 186). The Azon bomb (page 189) could be guided only to left or right. The newer Razon, whose fall can be diverted also to correct a tendency to be over or short of the target, was perfected too late to see action.

This was strikingly true in the case of our Air Forces when we used the World War I DH-4 for ten years after peace was declared and the plane was obsolete. We must depend on scientific and technological advances requiring us to replace about one-fourth of our equipment each year.

The weapons of today are the museum pieces of tomorrow. So tomorrow the B-29 (page 154), the Superfortress of today, will belong in the Smithsonian Institution with the Wright* and Lindbergh planes. Its place on the line will be taken later by bombers that will carry 50 tons of bombs, planes with jet or rocket motors and capable of flying around the world at supersonic speeds.

We must look at the future of aerial warfare in the light of the following considerations:

1. Aircraft, piloted or pilotless, will move at speeds far beyond the velocity of sound, well over 700 miles per hour.

2. Improvements in aerodynamics, propulsion, and electronic control will enable unmanned devices to transport means of destruction to targets at distances up to many thousands of miles. However, until such time as guided missiles are so developed that there is no further need for manned aircraft, research in the field of "conventional" aircraft of improved design must be vigorously pursued.

3. Small amounts of explosive materials, as in atomic bombs, will cause destruction of many square miles.

4. Defense against present-day aircraft may be perfected by target-seeking missiles.

5. Only aircraft or missiles moving at ex-

* This refers to the first Army Air Forces plane, made by the Wright brothers and purchased by the United States Government in 1909. The original Wright plane is in the Science Museum in London.

Pico, Volcanic Summit of the Azores, Is a Landmark to a United States Navy Plane

Today, as in the war, the Portuguese-owned Azores provide important American and British naval and air bases. They shorten the winter run for planes to Europe and Africa. Here 7,615-foot Pico Island wears its customary necklace of clouds. On a clear day it may be seen for 85 miles.

Kodachrome, U. S. Navy Official

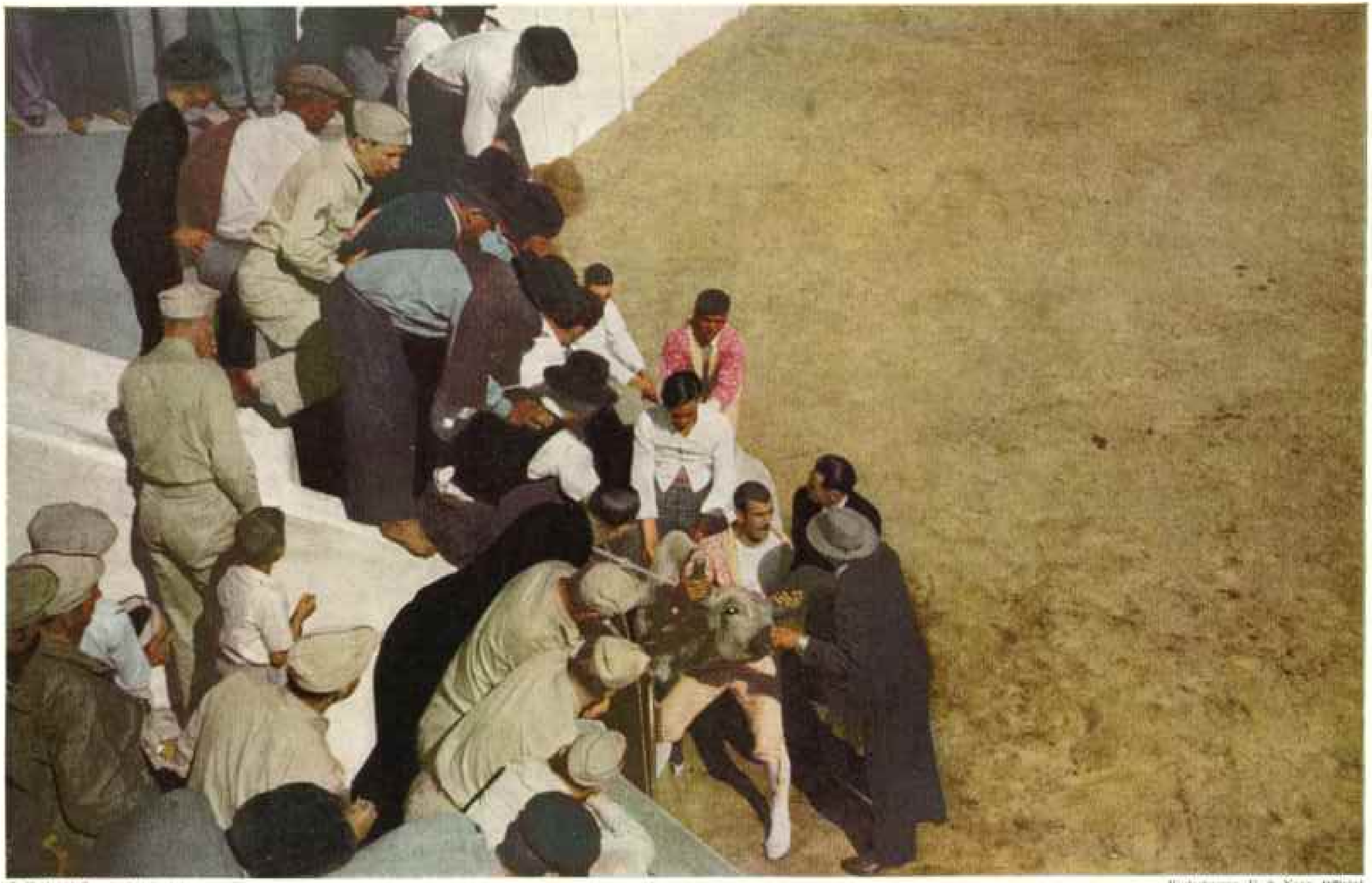
Clouds Squeezing Past a Ridge Puff into Balloons above Mountainous São Jorge Island

São Jorge is one of the nine Azores (Hawk Islands). They are upthrust crests of submarine volcanoes.

Kodachrome, U. S. Navy, Official

Between Rounds at a Bullfight, American Airmen, British Sailors, Azores Civilians, and a Toreador Meet at a Refreshment Stand

This arena at Angra do Heroismo stands on Terceira Island, one of two Air Transport Command bases in the Azores. Santa Maria Island, the other, contained 2,200 Americans. Peace transformed it into a big ferry station for B-17's and B-24's flying back to America. Britons did war duty here as Portugal's centuries-old allies.



Rodarbaron, U. S. Navy, official

Astride a Savage Bull, an American Army Sergeant in Azorean Costume Turns the Bullfight into a Western Rodeo

Men in the stands tug at a rope and a bullfighter grips the horns. Holding the beast's nose, the arena's worried owner implores the rider to play safe. Friends shout, "Ride him, cowboy!" At Angra do Heroismo, laws spare the bull from death. Occasionally a bull is released in the streets. Amateurs bait him with sticks and umbrellas.

Kodachromes, U. S. Navy Official

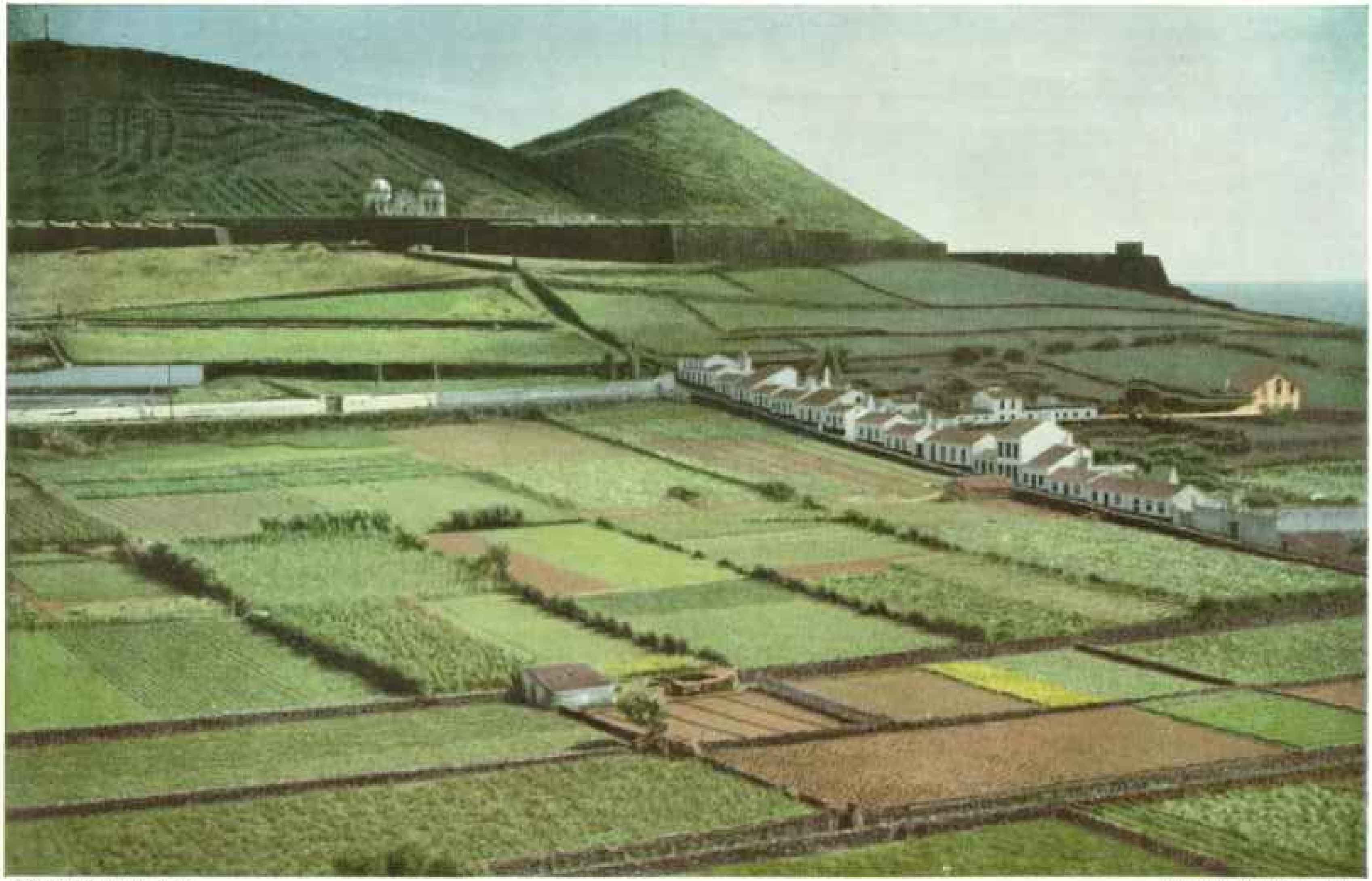
On Terceira Island, Cows Pull a "Singing" Cart. As Solid Wheels Revolve, Axles Cry for Grease

Friction has set such carts on fire. So slow are the oxen that, according to jest, the noise tells the driver whether they are moving. An American who oiled a cart's wheels found that the team, awed by the quiet, balked. Terceira, meaning "third," is so named because it was the third island discovered in the Azores.

Reduction, U. S. Navy, Official

Angra do Heroismo (Bay of Heroism) Owes Its Name to Its Valiant Resistance to 16th-century Spanish Invaders

This Terceira seaport served Americans on Lagens Airfield. Whitewashed walls are of lava, roofs of tile. Iron balconies are for second-story maidens wooed by street-bound swains. The wooden "derrick" (lower left) is an empty corn rack (Plate VIII). Adjacent rooftop "pyramids" are enormous chimney pots.



Monte Brazil, an Extinct Volcano, Dominates Angra do Heroismo. Suburban Row Houses Are Convenient to Their Farm Lands

Massive walls, enclosing a twin-towered chapel, belong to the castle of São João Baptista (St. John the Baptist). This fortification was built by Spaniards in the 17th century. It has been a prison for a Portuguese king, an African chief, and, during World War I, hundreds of Germans.

Kodachrome, U. S. Navy, Official

Ox Goad in Hand, a Farm-to-farm Salesman Wanders over Terceira Hawking His Native Red Wine from a Cask

On festival days he puts on shoes. He and his compatriots, speaking the Portuguese of the first settlers, greet American military men cordially. Fences made of lava separate the fields. Dirt roads, built for oxcarts, bore American heavy trucks well.

Corn Drying on "Wigwam" Poles Forms Make-believe Tents for Terceira Children

Each ear is stripped of husks save for strands left for tying. Regularly a supply is taken down for corn bread and porridge or for livestock. Distant towers are chimney tops.

 Kodachrome, U. S. Navy, Official

While Sight-seeing in Angra's Main Street, American Navy Flyers Buy Fresh Plums

For ten months before V-E Day Navy Liberators flew thousands of night hours out of Terceira on a U-boat hunt. Together with the day-flying RAF, they extended an Allied roof across the Atlantic.

U. S. Army Air Forces, Official

Mount Vesuvius, in Angry Mood, Gives Bombers a Rough Ride

Italy's famous volcano was coughing ash and smoke thousands of feet into the air as B-25 Mitchells of the Twelfth Air Force flew toward the front to bomb German troops in the Cassino area. Crew members reported the air highly turbulent in the vicinity of the old fire breather (page 164).

treme speeds will be able to penetrate enemy territory protected by such defenses.

6. A communications system between control center and each individual aircraft will be established.

7. Location and observation of targets, takeoff, navigation, and landing of aircraft, and communications will be independent of visibility or weather.

8. Fully equipped airborne task forces will be able to strike at far-distant points and will be totally supplied by air.

Guided Missiles as Used by USAAF

When the Germans' first V-1, or "flying bomb," hit London in June, 1944, the beginning of a new era in aerial warfare was marked. These jet-propelled craft (pages 169 and 175) were dependent on a mechanical brain instead of a human one.

Later the V-2, the giant rocket without wings, gave the world a foretaste of how death and destruction could arrive from the stratosphere with no warning and without a human pilot (page 186).

In our own Air Forces, the potentialities of robots and guided missiles were carefully explored, and three types were actually used by us in combat in the recent war: war-weary aircraft, Azon bombs, and glide bombs.

"War-wearies" were worn-out bomber aircraft which were stripped of all armament, armor, and other equipment not essential for flight and were loaded with about 20,000 pounds of high explosive. A pilot took the plane off, but upon bailing out he turned control of the war-weary plane over to an operator in another aircraft whose task it was to guide the missile to its target by remote radio control.

Such robots were used in actual combat during the winter of 1944–45, their targets including the German naval and air base of Helgoland. In January, 1945, however, it

U. S. Army Signal Corps Official

A Yank Inspects V-2: Its Capture in Germany Prevented a Bomb Blast in London

Unlike the jet-propelled and robot-controlled V-1 (pages 169 and 175), the V-2 bomb is a true rocket. When ready for firing it stood on its tail fins on a camouflaged concrete base, whence it zoomed 60 to 70 miles into the stratosphere. Early models were guided by radio; later ones were pre-set (pages 139, 187). Two railroad cars were required for hauling one of these giants. This train, captured at Bromskirchen, had been strafed by Allied planes.

was decided to suspend combat use of this weapon pending development of a method of taking off the robot airplane under radio control without the need of a pilot.

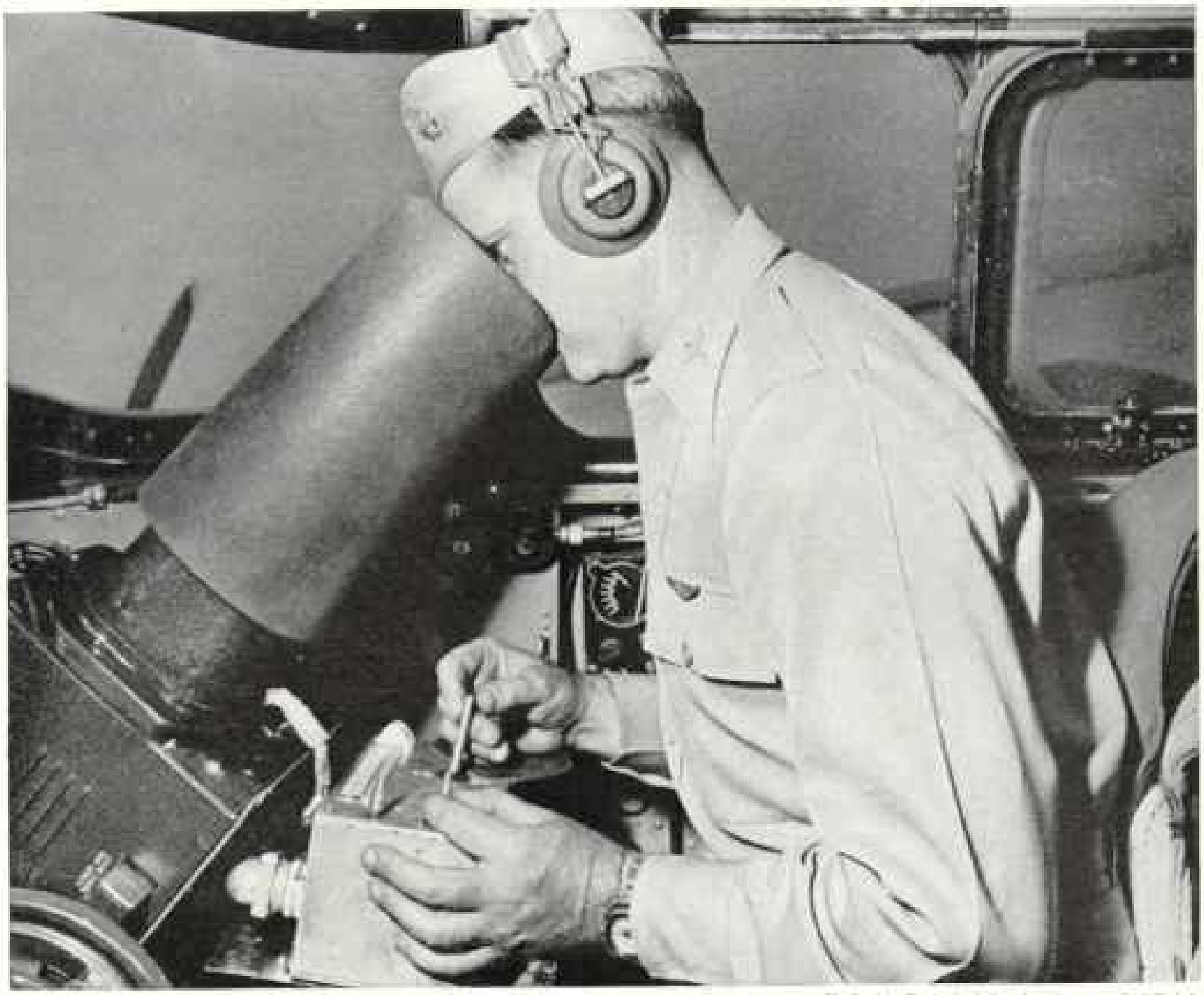
Another guided missile is the Azon bomb, so-called from the fact that it is guided in azimuth only—that is, to left or right but not forward or backward. This bomb is dropped in the usual manner and is followed visually by the bombardier, who watches a flare installed in the tail of the bomb (pages 176 and 189). Necessary corrections in course are transmitted to the bomb by radio.

This missile was effective in destroying several important bridges in Burma, including the Pyinmana Bridge on the rail line connecting Rangoon with Mandalay and Lashio. That important target, which had been subjected to many attacks by heavies, mediums, and fighters during the previous two years with no success, was unquestionably destroyed by the Azon bomb on December 27, 1944, in its first extended combat test.

As a result of the excellent results obtained in Burma, Azon bombs were standardized and were subsequently used also in the European and Mediterranean Theaters of Operations. A later refinement is the Razon bomb, which can be guided not only to left or right but can also correct a tendency to be over or short of the target.

The glide bomb as used by the AAF is a bomb mounted on a radio-controlled, streamlined airframe of 12-foot wing span (pages 143 and 174). Mounted under the airframe of one type is a television camera photographing the ground below.

Control is exercised from an accompanying airplane containing a television receiver (page 187). By watching this receiver and utilizing



U. S. Air Technical Service Command, Official

By Television He Controls a Glide Bomb Five Miles Away

Before the eyes of the operator in the parent plane appears the televised picture of the terrain over which the bomb is gliding. By pushing the miniature "stick" in his right hand either forward, backward, left, or right, he operates the bomb's controls by radio and literally flies it into his target. With his left hand he adjusts his radio tuning controls.

radio control, the operator is able to select his target and guide the bomb to a hit almost as accurately as if he were a suicide pilot riding the missile.

Glide bombs were first used in August, 1944, when they were launched against E-boat pens at Le Havre and La Pallice, France. Other drops were made against targets at Düren and Salzbergen, Germany.

As a result of these combat tests, it was decided to standardize the bomb and at the same time to work on a method of radar control to permit use through an overcast where television reception becomes spotty.

A few experimental models were built utilizing seekers for light, heat, or magnetic attraction instead of the television camera and remote control. These models are fully automatic once they are launched.

Air-to-ground guided missiles being developed as a result of our experience in the past war will remain of tactical value until the enemy is able to perfect a defense against them or to build a ground-to-air guided missile that will destroy either the launching aircraft or the missile, or both.

When satisfactory ground-to-ground missiles become standard equipment, the need for both air-to-ground and air-to-air weapons will be definitely decreased.

Of great potential importance is the long-range ground-to-ground guided missile. This will be the strategic long-range bombardment airplane of the future.

In range and accuracy such latter-day robots will far surpass the German V-2, which had a practical range of about 250 miles and was suitable only for hitting rather wide target areas.

It is now entirely possible, with the engineering information obtainable, to build a ground-to-ground missile capable of traveling

Air Technical Service Command

Its Job Done, the Target Plane Floats to Earth to Fly Again Another Day

If the little radio-controlled target and its packed parachute have not been too badly shot up by practicing fighters, antiaircraft, or bomber gunners, it descends in this manner (opposite page). Bullet holes in its light fuselage can be readily patched.

more than a thousand miles, and it is probable that in the not-distant future it will be possible to send remote-controlled missiles to any spot on the earth's surface.

Rockets, Jets, Radar Revolutionize Warfare

War and scientific developments have opened vast new vistas in regard to employment of the rocket. Among its new uses are winged missiles for extreme range; guided antiaircraft missiles; launching supersonic, long-range pilotless or manned aircraft; and deceleration devices for aircraft with high landing speeds.

Jet propulsion is in its infancy, despite the fact that this war evolved six distinct methods of utilizing atmospheric oxygen for propulsion: (1) *motorjet*, or reciprocating engine plus ducted fan; (2) *turboprop*, a gas turbine plus propeller; (3) *turbofan*, a gas turbine plus ducted fan; (4) *turbojet* (page 142), a gas turbine plus jet; (5) *ramjet*, a continuous jet with compression by aerodynamic ram; and (6) *pulsojet*, or intermittent jet.

These new and strange-sounding words will be familiar ones in our speech in the near future, and right now they carry more meaning for Americans than any other six words I know.

An outstanding contribution to the effectiveness of an air force is radar, the radio "echo" device which enormously extends the range, power, capabilities, and accuracy of human vision. Radar is a primary factor in making possible the eventual attainment of the goal of an all-weather 24-hour air force.

In the final months of the B-29 bombardment of Japan the AAF had one of its combat Wings bomb by radar alone, to test the possibilities. Greater accuracy was obtained than by the best visual means employed by the Wings, and it is fair to

Air Technical Service Command

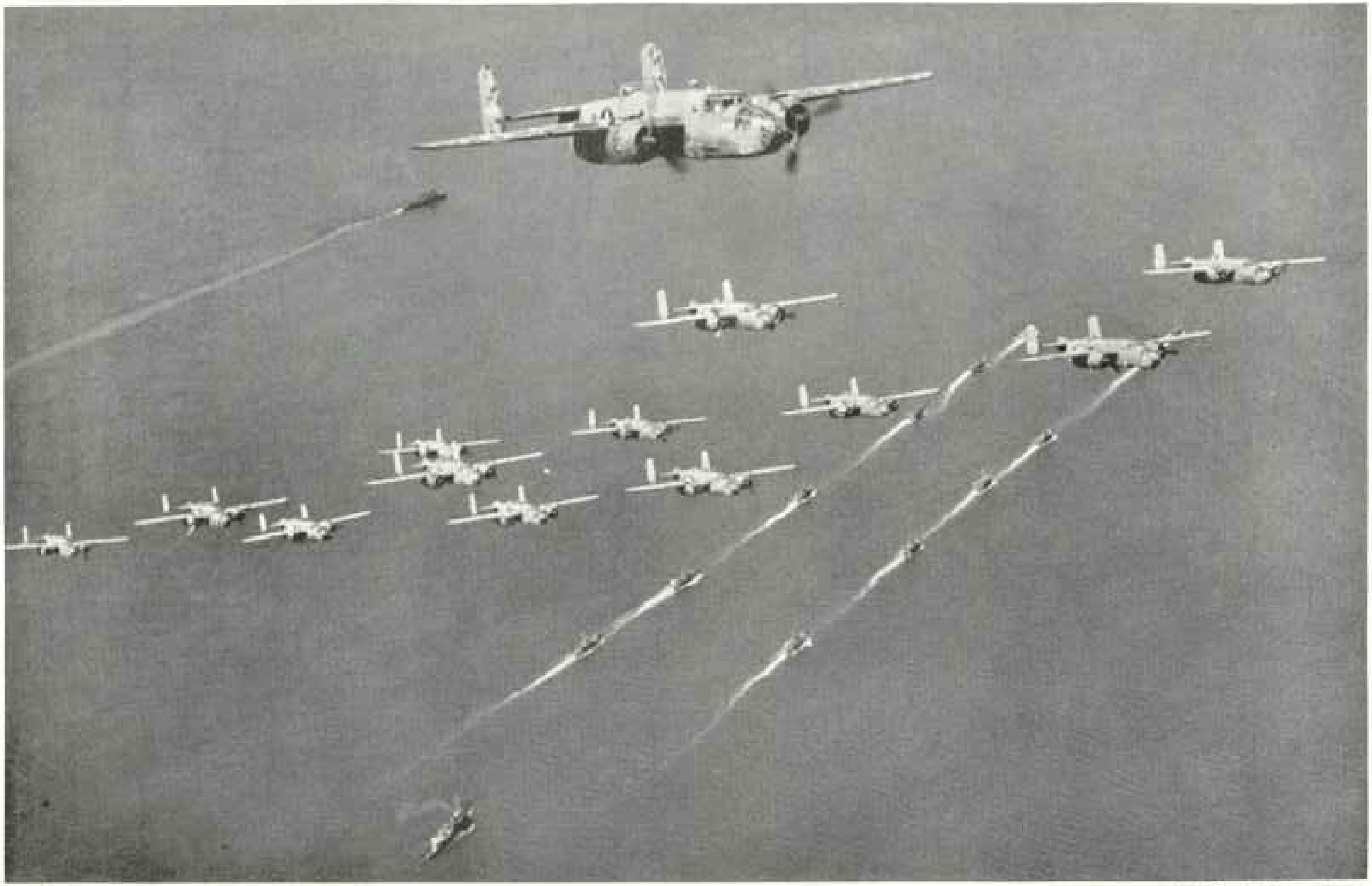
A Radio-controlled "Clay Pigeon" Takes Off with No Pilot Aboard

On the catapult, ready to be launched, is a light plane developed to serve as a target. The pilotless craft is guided by radio from the ground. When its mission is over, it descends by parachute (opposite).

Staff Photographer Willard R. Culver

This Bomb with a Radio-operated Tail Steers Its Way to the Target

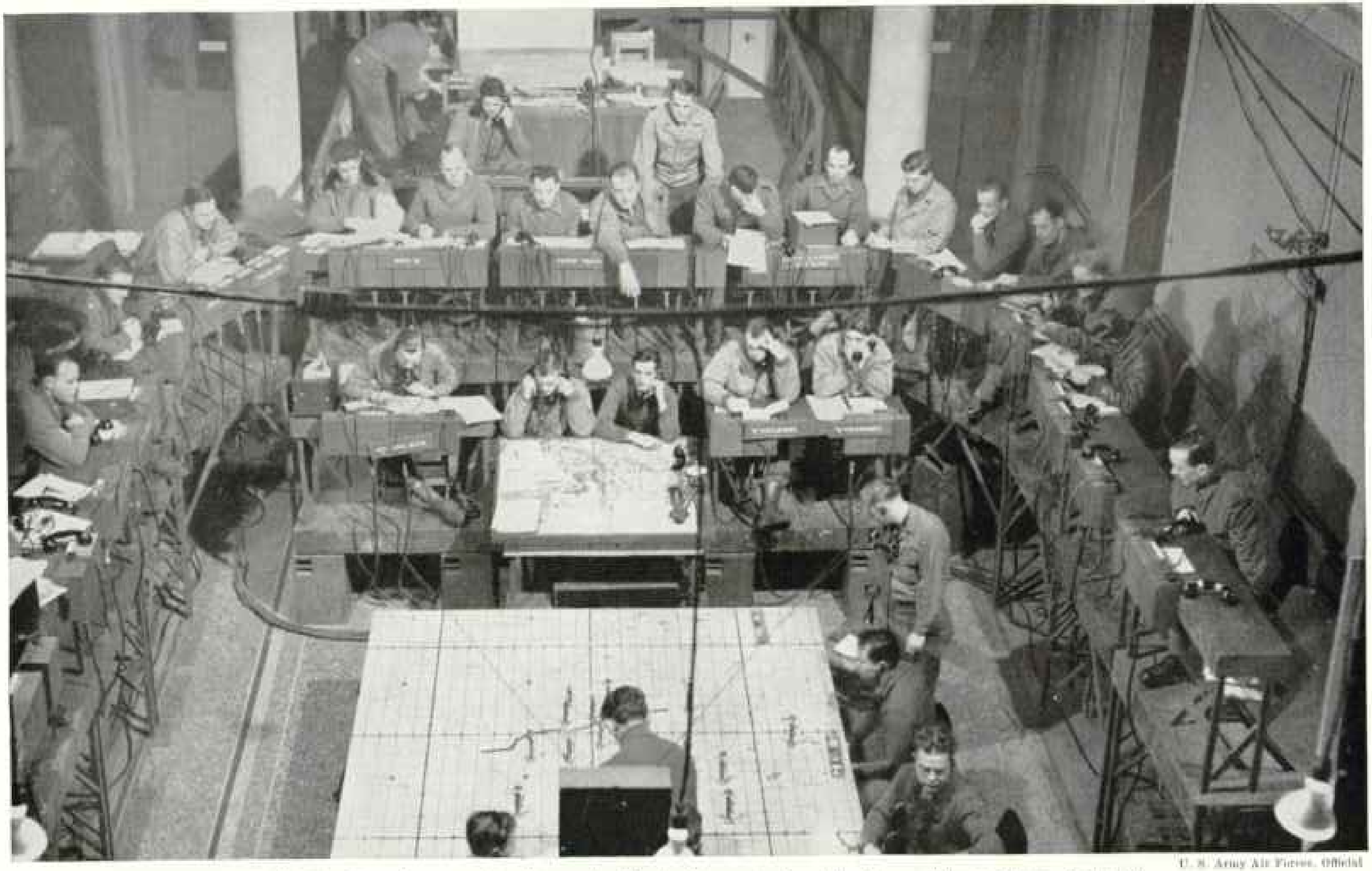
Known as the Azon bomb, this guided missile was used effectively in the war (pages 176 and 186). Whereas the Azon can be guided only to left or right, a later improvement—the Razon—can be guided in all directions. Here at Wright Field, Dayton, Ohio, the all-important tail is being affixed to a 2,000-pounder.



U. S. Army Air Forces, Official

Air and Sea Power, Synchronized, Launch a Well-planned Blow—Such Close Cooperation Won the War

It's D Day in the South Pacific, and a camera in one of the bombers catches this momentary junction of American planes and ships on the move. The B-25 Mitchells are headed for Rabaul, New Britain, to blast Japanese airdromes while the invasion convoy of LCIs churns toward the Green Islands to set the land fighters ashore.



U. S. Army Air Forces, Official

"Tell That Squadron to Get After the Tank Concentration the Recce Planes Have Spotted"

Heart of the teamwork between air and ground forces is the Control Center of a Tactical Air Command. Fighter-bombers in the air can be diverted instantly by the Chief Controller (center background), flanked by his Operations and Intelligence officers. On the map in foreground the position of friendly and enemy air units in flight is constantly shown by radar plots as the IX Tactical Air Command works with the First Army in Europe. "Recce" is slang for "reconnaissance."

U. S. Army Air Forces, Official

C-54 Skymasters Poise on Okinawa for the Flight to Surrendered Japan

Big four-motored transports jamming the hardstands formed part of the armada, largest of its kind, which transported occupation forces to key points in Japan. On the Pole-centered Northern Hemisphere map which accompanies this issue, strategic Okinawa, won by American blood, is listed as one of our principal airbases.

expect that the visual bombing which served us well in this war may soon be obsolete.

It is in the national interest to establish a national research foundation composed of the most highly qualified scientists in the United States and charged with the responsibility of furthering basic research and development in all fields of science and the scientific training of adequate numbers of highly qualified men.

Scientific planning must be years in advance of the actual research and development work.

The Air Forces must be advised continuously on the progress of scientific research and development in view of the new discoveries and improvements in aerial warfare.

A permanent scientific advisory group consisting of qualified officers and eminent civilian scientific consultants must be inducted in the Air Forces organization to ensure that equipment is kept abreast of the progress of research and development and that all research required by the Air Forces is being undertaken by the appropriate agencies.

We can no longer set up "military characteristics" for a new weapon or airplane, award a contract, and expect to have a finished article delivered which can be put into use immediately. The entire process, from development through production, training, and operational use, is a continuous one.

Specialists must be at hand to give intelligent guidance at every turn. This will require adjustments in the military organization to provide for a group or corps of full-time scientists in uniform, and adjustments to provide adequate compensation for highly qualified civilians.

Furthermore, the time has passed when an air staff can be composed exclusively of command pilots. It must have officers who have mastered the production skills of scheduling materials and synchronizing the flow of industrial components, and scientists who understand radar-electronics and their application to air technique. A modern air staff without such technicians is as obsolete as a model T Ford.

Of one thing we can be sure. We of the United States are most fortunate in having the finest, the most versatile, the sturdiest young men in the world; young men who have initiative and intelligence and who can always be counted upon to do a given job regardless of the obstacles they may meet; young men who will never say that a thing can't be done.

For instance, our young pilots did not accept the fact that we couldn't fly across the Greenland icecap or across the North Atlantic during the winter months. They didn't accept the fact that we couldn't fly fighter planes across the Atlantic from Labrador or Newfoundland to England, and they didn't know that they couldn't fly two-engine bombers across the Pacific.

Others said that these things couldn't be done. But our young pilots didn't know they couldn't be done, so they just went ahead and did them. They made these impossible flights routine, and my hat is off to those marvelous young men, the youth of America.

Since military air power depends for its existence upon the aviation industry and the air-mindedness of the Nation, the Air Forces must promote the development of American civil air power in all of its forms, both commercial and private.

In view of the national security responsibilities of the Air Forces, and considering the adaptability of civil-aviation facilities to military uses, it is in the national interest for the Air Forces to have a voice in civil air matters.

The security of the United States as well as the performance of its responsibilities in the maintenance of world peace require the availability of an extensive system of airways and commercial as well as military airbases outside the United States.

No activity having to do with aviation in any form can be considered as being completely independent of national security. Civil aviation must be encouraged, both internally and internationally, and all arrangements, plans, agreements, and operations should be carried out with due regard for their military implications.

In the final analysis, it is the American people who will decide whether this Nation will continue to hold its air supremacy. Air power must, in the future, be the business of every American citizen.*

*See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Aerial Invasion of Burma," August, 1944, "Aerial Color Photography Becomes a War Weapon," June, 1940, and "Our Air Frontier in Alaska," October, 1940, all by Gen. H. H. Arnold; "Our Transatlantic Flight," September, 1927, "First Flight to the North Pole," September, 1926, and "Conquest of Antarctica by Air," August, 1930, all by Richard E. Byrd; "Our Search for the Lost Russian Aviators," by Sir Hubert Wilkins, August, 1938; "My Flight Across Antarctica," by Lincoln Ellsworth, July, 1936; "Man's Farthest Aloft," January, 1936, "Flying the 'Hump' of the Andes," May, 1931, and "Exploring the Valley of the Amazon," April, 1926, all by Capt. Albert W. Stevens; "Future of the Airplane," by Rear Adm. Robert E. Peary, January, 1918; "Flying Around the North Atlantic," by Anne Morrow Lindbergh, September, 1934; "New Queen of the Seas," by Melville Bell Grosvenor, July, 1942; "Arctic as an Air Route of the Future," by Vilhjalmur Stefansson, August, 1922; "America in the Air: The Future of Airplane and Airship," by Brig. Gen. William Mitchell, March, 1921; "Aerial Locomotion," by Alexander Graham Bell, January, 1907.

U. S. Army Air Forces, Official

Like Huge White Weights on a Two-mile Bar Bell, Manama and Muharraq Are Joined by a Motor Causeway

Down to the coral-surfaced airfield at the right, shared by the AAF and the RAF, nosed the sunrise plane. Across the dark channel between Muharraq and distant Bahrein Island a swing bridge permits passage of small craft. Flying boats land on the deep water of Khor al Qali'a, farther left. Beyond Manama, capital of the State of Bahrein, is the green of palms and gardens which dot the north end of the oil-rich, but barren, island.

Bahrein: Port of Pearls and Petroleum

By Maynard Owen Williams

With Illustrations from Photographs by the Author

SOUTH from Abadan, Iran, we flew over the Persian Gulf, where navigation may have been born, for the history of "the Gulf" is older than that of the Mediterranean.*

From our bucket seats we peered through sand-scratched windows at brackish waters diluted by rivers which flowed through Eden.

Stretched at full length on the aluminum floor, our flight sergeant snoozed. Opposite me, a husky corporal was deep in a world history prepared for Army use. This modern soldier, far from home, was reading that Alexander's GI's, returning from India 2,270 years ago, here made maritime history.

Then a slight tilt, a hardly perceptible change in wind rush, and everyone came to life. We were coasting in. Below were two of the Bahrein Islands, outpost for American air communications and oil.

Manama, capital of the State of Bahrein, lies at the north tip of Bahrein Island and looks across a narrow channel toward residential Muharraq, chief town on the three-mile island of the same name. Umm Na'san, to the west, is largely desert. Palm-covered Sitra helps tote the pipe line to a new wharf in the outer Gulf.

Lesser islets, almost invisible at high tide, complete the archipelago inside the protecting thumb of the oil-rich Qatar peninsula.

The blue of the sea had many tones, for around Bahrein Island one must go out for 60 miles to reach water a hundred feet deep.

Under our wing, two glistening white towns were joined by a two-mile motor causeway, like two weights on a bar bell (page 194).

Slightly behind us lay Manama. Below our right windows a British flying boat floated in the channel of Khor al Qali'a, like a table ornament on a blue-glass mirror (map, p. 199).

Slightly ahead, and growing as we glided in, lay the close-packed city of Muharraq.

A Coral Landing Field

Our objective was a vast expanse of sand, smooth as a floor, which almost cuts the island of Muharraq in two. Long before man learned to fly, coral polyps had prepared this ready-made landing field on a much-traveled route between industrial Europe and the East (p. 197).

Sometimes rain, wind, and tide close this natural airport for days at a time. In December, 1944, it was open only 13 days out of 31.

One day I watched our soldiers set up a metal pole for an electrical transmission line. Almost at once they struck water. At the Terminal Building a sign reads "Elevation 1 foot."

Around the terminal were the barracks, hangars, hospital, chapel, PX, mess halls, and motor pool of two military posts, one British, one American. In the open-air theater, winter spectators sat wrapped in the blankets of two great nations. In the summer, dark sweat-drenched khaki betrayed little difference between our GI and his RAF seat-mate.

From the airfield we motored along Muharraq's new sea-front boulevard whose straight course runs between the Gulf and tidal pools. At high tide, light-toned homes are reflected in walled-in flats. Gaily colored rowboats seem plastered to topsy-turvy palace facades. At low tide this flattering mirror looks more like a city dump.

Then I crossed the causeway to Bahrein.

Even before petroleum outranked piracy and pearls as a source of riches, Bahrein was credited with the highest per-capita wealth on earth. The archipelago contains only 120,000 inhabitants, and the receipts from pearls alone have been as high as $9,000,000 in a single year.

Now that oil royalties are pouring in, Bahrein's income is much greater.

Mrs. George Talia, who modeled the Bahreini mask for me, showed how a respectable woman hides the sequined ends of her veil before venturing forth (Plate V). "Our women wear their fine feathers and war paint indoors," explained Mr. Talia.

Fresh Water from the Salt Sea

Sitting in the office where this interpreter of world events writes his broadcasts, I drank fresh water, drawn from the salt sea.

"'Bahrein' supposedly means 'Two Seas,'" he explained. "But fountains in the floor of the Gulf cause some to spell it 'Bahrain'—'Sea of (sweet water) Springs.' You'll find authority for both.

"The water gushes up with considerable force, so that by diving into the sea with a collapsed goatskin, a water seller can collect drinking water at the bottom of a salt sea.

* See "Mediterranean Checkerboard," by Frederick Simpich, in the National Geographic Magazine for April, 1942.

Marco Polo, Centuries Ago, Saw Such Air-conditioning Towers Beside the Persian Gulf

Catching any possible breeze in one of its four triangular shafts, this ventilator near the American Mission Hospital serves as a wind scoop, pouring cool air into the home (page 209).

"As a matter of fact, the Gulf is not as salty as the outer seas. Into it flow the great rivers of Mesopotamia, and the Strait of Hormuz is so narrow and crooked that little salt water enters.

"Even so, I would not offer you such water to drink if I could not trust my dealer. Sometimes the divers are careless and 'water' the product of submarine springs, as a dishonest dairyman does his milk.

"Another way to collect the water is through a bamboo tube. The tube is sunk endwise and pressed against the submarine source until potable water bubbles up several inches above the harbor level."

George Talia and I had both studied at the American University in Beirut (Beyrouth), but his Bahreini Arabic phrases were strange to me. "May it agree with you," he said, although in Asia unboiled water seldom does.

Since 1926 the financial adviser to the ruler of Bahrein has been C. Dalrymple Belgrave, correspondent for the London *Times*, author of *Siva, the Oasis of Jupiter Ammon*, and holder of the Sudan medal.

Mr. Belgrave welcomed me to his wide-open house, which is set in a lovely garden. He also arranged for me to attend the weekly levee and photograph His Highness Sheik Sir Salman bin Hamed al Khalifa with an up-to-the-second wrist watch strapped to his traditional gold-incrusted dagger (Plate I).

A Posthole Reveals Water Only a Foot below Muharraq's Landing Field

Billions of coral polyps gave their skeletons to build this island. Wind and waves smoothed the sterile flats so well that steel landing strips were not needed except for heavy planes (page 194).

Conditions have changed since V-E Day. Tanker crews can once more draw a peaceful breath. The Calcutta-Kunming pipe line, some of whose materials flew "the Hump," is now surplus property. But millions of motors still pant for fuel, and woe to him who tries to separate oil royalty from its royalties!

Holding Court on a Balcony

While His Highness told me of his appreciation of British and American friendship, a pipe line was reaching across from the Arabian shore. Near the administrative and residential section of Awali, close to the mysterious graves of prehistoric men (page 198), construction workers were doubling the Bahrein refinery's capacity to 60,000 barrels a day.

His Highness betrayed no haste. Dignity and politeness marked his weekly audience, which was held on the wide upper balcony of the Manama municipality, high above the market place but intimately connected with it. The poorest peasant could not only see his ruler but also those who found favor in his presence.

As I roved among the peddlers, my actions were visible to Sheik Salman's retainers.

The fact that I had just come from photographing their ruler won me no official favor from the common folk. In a Moslem gathering, some always distrust a camera (Plates III, IV, and VI).

Ancients Piled Coral Sand to Build Bahrein's Prehistoric Tumuli

Thousands of such artificial mounds dot the depression near the air-conditioned oil company quarters at Awali. Some of them are probably 4,000 years old, but who built them is still a mystery (page 250).

Who Wouldn't Smile? They're Genuine Pearls

At an upstairs shop in Manama, toe dancer Judy Lane says, "That's for me," and the brown-fingered Arab answers with the Arabic equivalent for "Says you!" Former Arab pearl divers now earn steady wages in oil refining; fewer than 300 pearl ships are now based at Bahrein, which once boasted 1,000 (page 209).

Bright textiles, old and new; palm fronds for fish traps, hut walls, or split-palm crates; live chickens, high-powered cosmetics, aromatic spices, and Roosevelt and Churchill postcards were popular.

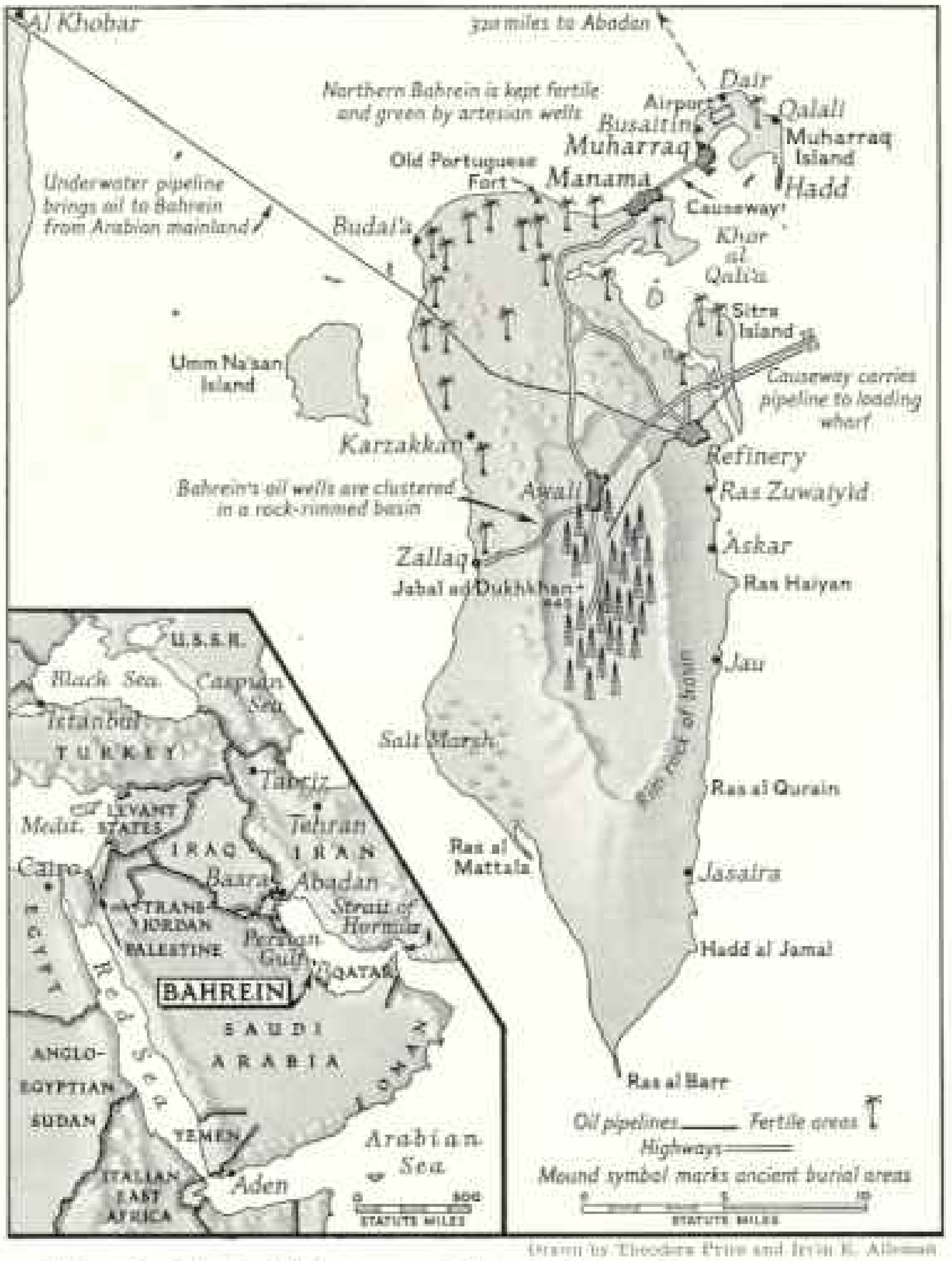
Well-woven mats—both table and tablecloth—and some passable pottery spoke of local handicrafts.

In this oil island, crossed by excellent highways for cars and buses, the famous white donkeys fight a losing battle.

At the Bapco refinery I was permitted to watch white-hot flames lick at pipes full of highly combustible fuel. Lacking oxygen, this powerful fuel lacks kick. Otherwise it might have gone up in one devastating explosion instead of in millions of piston-thrusts to give seven-league boots—or wings—to modern man.

Up from the Gulf moved cool water for the condensers. Down a parallel channel it returned, steaming hot.

Offshore, squat ships took on gasoline through submarine pipes. On Sitra, an island steppingstone between refinery and tanker, great dump trucks toiled in chalklike dust, pushing a causeway across three miles of shallows toward a loading pier.



Drawn by Theodore Price and Irvin E. Alleman

Bahrein, Port of Pirates and Pearls, Now Refines Petroleum

Oilfield and refinery lie near the center of 30-mile-long Bahrein Island, which gives its name to the entire archipelago. Muharraq town shares its name with its crescent-shaped island, important for its landing field. Sitra Island acts as steppingstone for roadway and pipe line (page 195).

Air-conditioned Awali

I visited the air-conditioned town of Awali, where the oil men on a steaming tropical isle sleep in an atmosphere like that of the Adirondacks. This is a region of which many travelers, probably cool-season visitors like myself, tell of hot winds which shrivel the skin and suffocate their victims.

Marco Polo relates how at old Hormuz, in the strait of the same name, "the inhabitants immerge themselves to the chin in water and continue in that situation until the land wind ceases to blow."

Awali has an 18-hole golf course, softball is played at night, even in summer, and cricket, tennis, and swimming are provided for. Among the magazines at Bapco Club, the NATIONAL GEOGRAPHIC helps keep the workers in touch with the world.

Thousands of Americans have passed a summer on Bahrein or Muharraq without ill effects. On these hot, humid islands, the Bahrein Petroleum Company has done something about the weather and created a comfortable life.

Oil royalties—fully as much a problem

here as in Oklahoma*—are divided three ways.

One-third goes to His Highness Sheik Salman, whose sheikly hospitality is the Arab equivalent of social security. As recognized chief of a feudal society, he must distribute presents to myriad retainers. In hard times thousands look to him for aid.

Another third goes into long-term investments for the State of Bahrein.

The rest goes for police, government, good roads, and education.

One oil executive foresees the day when a lowered infant mortality and improved general health and prosperity may lead to overpopulation on Bahrein, to which both kerosene and drinking water were formerly imported and where wide extension of agriculture is unlikely.

"Some day," he told me, "these wells may be exhausted. By that time we want to leave Bahrein better than it was before we came."

Mystery of Island Mounds

History at Bahrein did not begin with the belated discovery of oil in 1932.

Here Sindbad sailed. To this Gulf Marco Polo brought the fair Kukachin, who blossomed from sweet 17 to 19 during her trip from Cathay, and married the nephew of the Khan of Persia (Iran), her intended spouse.

Close to the ultramodern oil town are prehistoric burial mounds which probably antedate the departure of Phoenicia's ancestors for yet-unborn Tyre and Sidon,† although some scholars question the theory that the Phoenicians set out from Bahrein (page 198).

Thousands of tumuli resemble early Carthaginian tombs. In the smaller tumuli no metal objects have been found. The men of mystery who built the larger mounds possessed bronze weapons and believed in a future life.

I saw stone bowls which British Museum authorities date from 2,000 B.C. Found in the same mounds were fragile specimens of 10th-century Islamic glass. How such relics of widely separated periods came to be found in the same burial mound is still a mystery.

Some believe that Bahrein was once a cemetery. Manama, "Place of Sleep," Awali, "High Place," and Muharraq, "Place of Burning"—all suggest funereal rites.

Modern interest lies in the dead plankton which helped produce oil, dead oysters which produced pearls, and dead coral polyps which produced building materials.

The walls of house and garden are made of coral slabs pried loose from the floor of the Gulf. Each human family is thus closeted by billions of coral family skeletons.

There is not enough wood for building, and it is too precious for fuel. On maps the symbol for oil is a derrick (map, page 199). Few oil derricks are seen in the depression at the center of Bahrein Island. Only inconspicuous valves, half sunk in the sand, mark the site of an active well.

Near the refinery is an accumulation of residual coke, an almost smokeless and ashless by-product, rich in calories and comfort when clammy winter brings shivers to the hell-hot Gulf.

In the rush of shipping motor fuel, no market for this coke has been developed; but vast areas, bare of trees and lacking in coal, offer markets close to Near East ports.

Fisher huts and the drafty homes of the poor are made from palm fronds.

From the air we saw verdant patches where artesian wells water gardens in Muharraq and the north end of Bahrein. Agriculture and grazing are so limited that the cows are fed dried fish.

Near the Muharraq airport a brother of Bahrein's ruler lived in a simple home like a beach cabin. A great admirer of our soldiers, he was a frequent visitor to Army Air Base 1267. When driving through the city, he stopped to give our men a ride and let his bearded son, Rashid, practice his English.

"My Father, He Say"

So modestly and loyally did Rashid serve as translator that our soldiers, no experts in Arabic names, called him "My Father, He Say."

Just when the young man was planning formal study at the American University of Beirut,‡ his father's secretary died and Rashid had to take over the secretarial duties.

When USO Unit 316 played at Bahrein, the jolly Sheik Khalifa and his filial interpreter exchanged autographs with our entertainers and offered to give them a personally conducted tour of the bazaars.

In a city where men wear gowns, our girls wore trousers. Over her blond hair Judy Lane wore the Arab headcloth and goat-hair crown.

When Sheik squired show girl to market,

* See, in the National Geographic Magazine, "So Oklahoma Grew Up," March, 1941, and "Today's World Turns on Oil," June, 1941, both by Frederick Simpich.

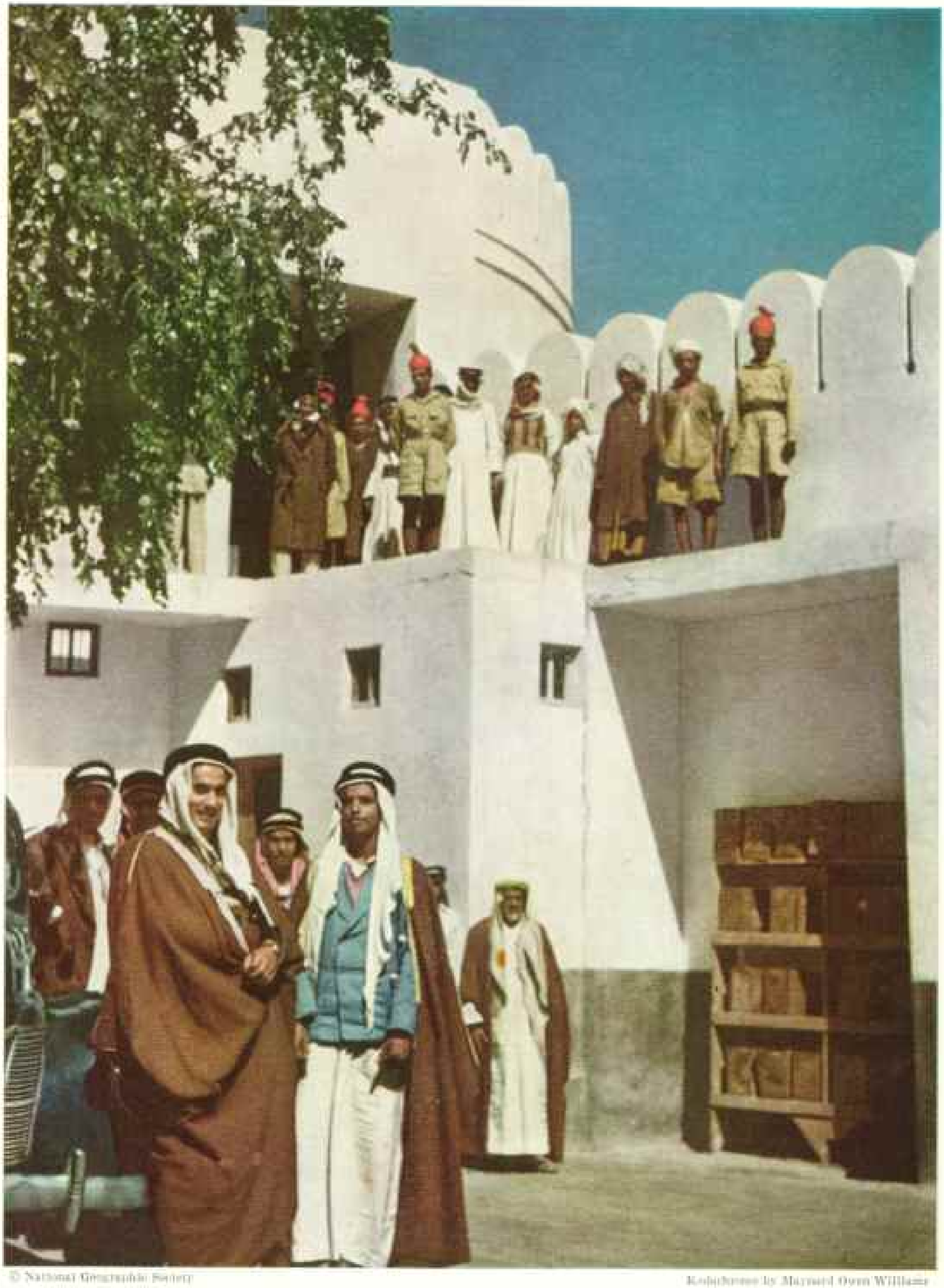
† See, in the National Geographic Magazine, "Syria: The Land Link of History's Chain," by Maynard Owen Williams, November, 1919; "Skirting the Shores of Sunrise," by Melville Chater, December, 1926; "Change Comes to Bible Lands," December, 1938, and "Bombs Over Bible Lands," August, 1941, both by Frederick Simpich; and "On the Trail of King Solomon's Mines," by Nelson Glueck, February, 1944.

‡ See "American Alma Maters in the Near East," by Maynard Owen Williams, National Geographic Magazine, August, 1945.

 Kodachrome by Maynard Owen Williams

The Dagger Is Only for Ceremony; the Wrist Watch for Use

Within a 500-mile radius of the Bahrein Islands, long famous for lustrous pearls, lie the far greater riches of newly discovered oil. When Dr. Williams photographed their ruler, His Highness Sheik Sir Salman bin Hamed al Khalifa, the Persian Gulf, no longer on the defensive, was helping fuel the Pacific war.



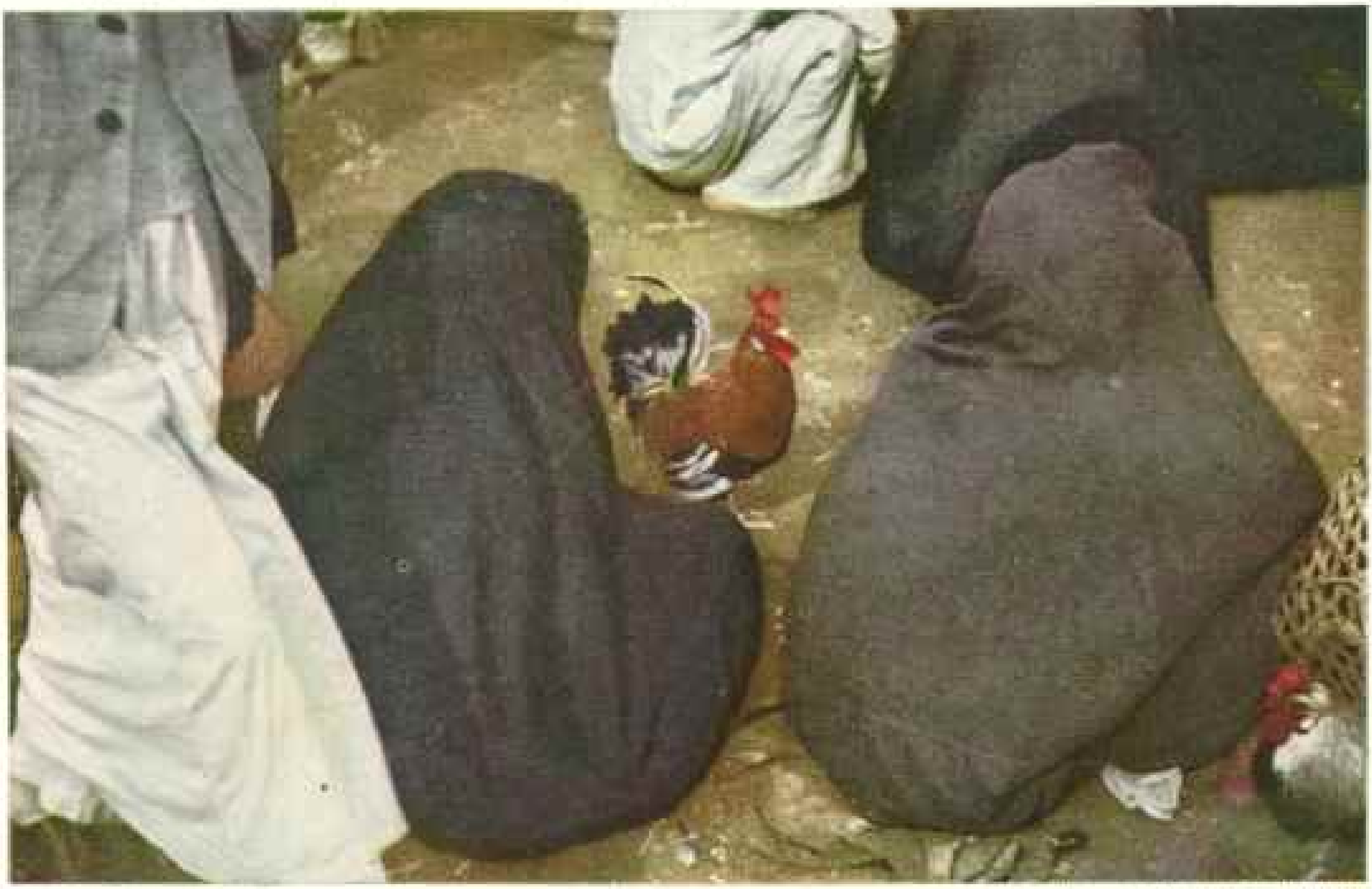
 Kodachrome by Maynard Owen Williams

Arab Gentry Await an Audience with the American-educated Chief of Police at Manama

Bahrein's turbaned police are under the direction of Sheik Khalifa bin Mohammed al Khalifa. Educated at the American University of Beirut, he talks the same language as his Army Air Forces friends at the Muharraq airport, breeds Arabian horses, and gets exercise by cultivating his fertile garden set in coral sand.

Low Tide Reveals the Small Propeller of a Pearl-fishing *Mahaila*

The shallow waters around Bahrein facilitate pearl diving, teem with gamy fish like the barracuda, discourage steamers from coming in too close. Only at long piers can deep-hulled tankers drink their fill of oil.



 Kodachromes by Maynard Owen Williams

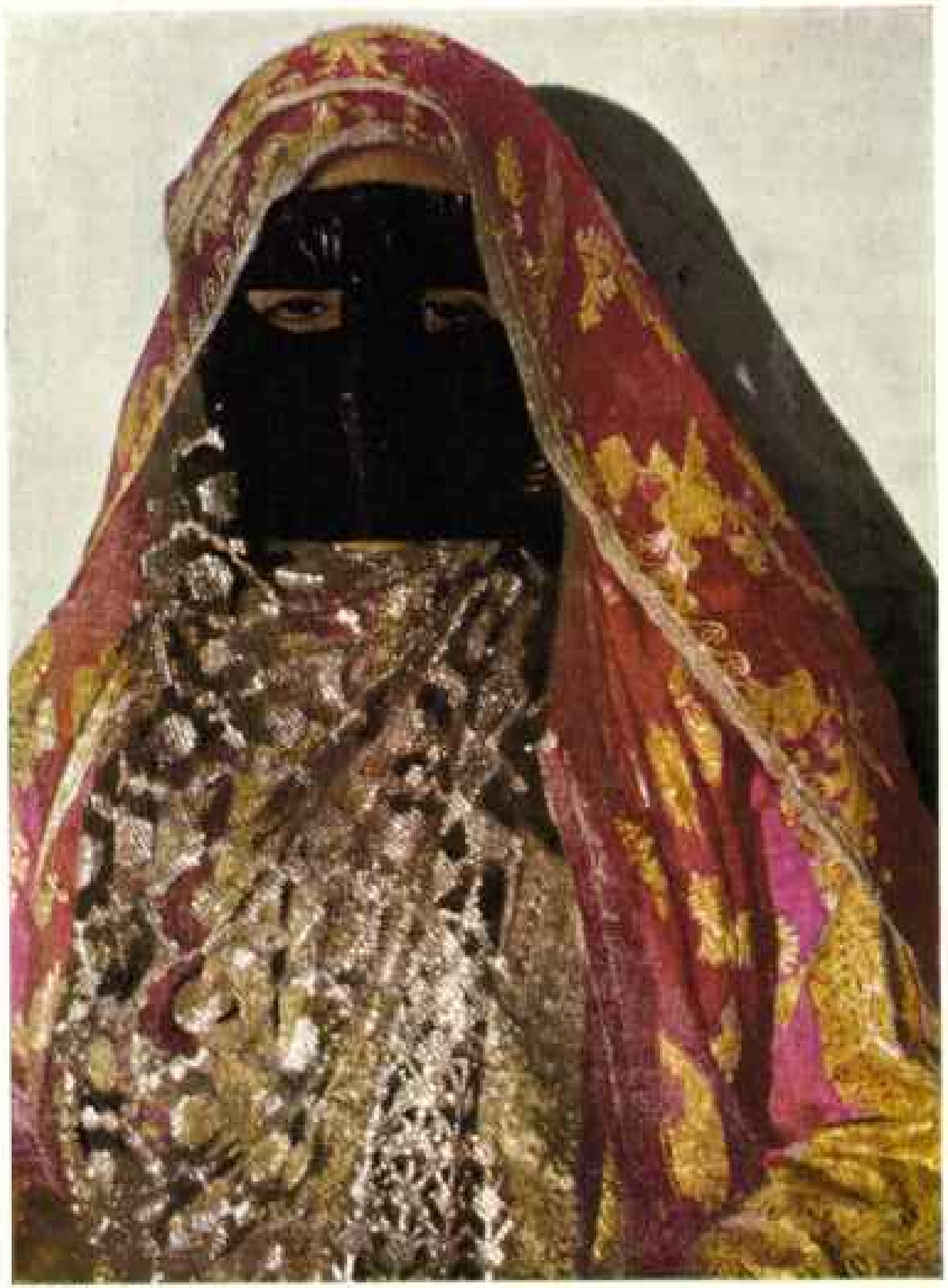
A Cocky Bit of Color Adds Life to the Manama Market

Once a week the ruler of Bahrein holds court on the high balcony of the Manama municipality, while below him surges a crowd come to buy and sell or to see the week's crop of petty criminals publicly flogged.

Kodachrome by Maynard Owen Williams

In a World of Rationing, Manama's Open-air Market Features Secondhand Clothing

Long-snouted coffeepots are close at hand; garish slippers have a special compartment for the big toe; an idle dealer fingers his nervous beads. Countrymen throng the weekly market while their leaders confer with the ruling sheik on the balcony overlooking the throng.



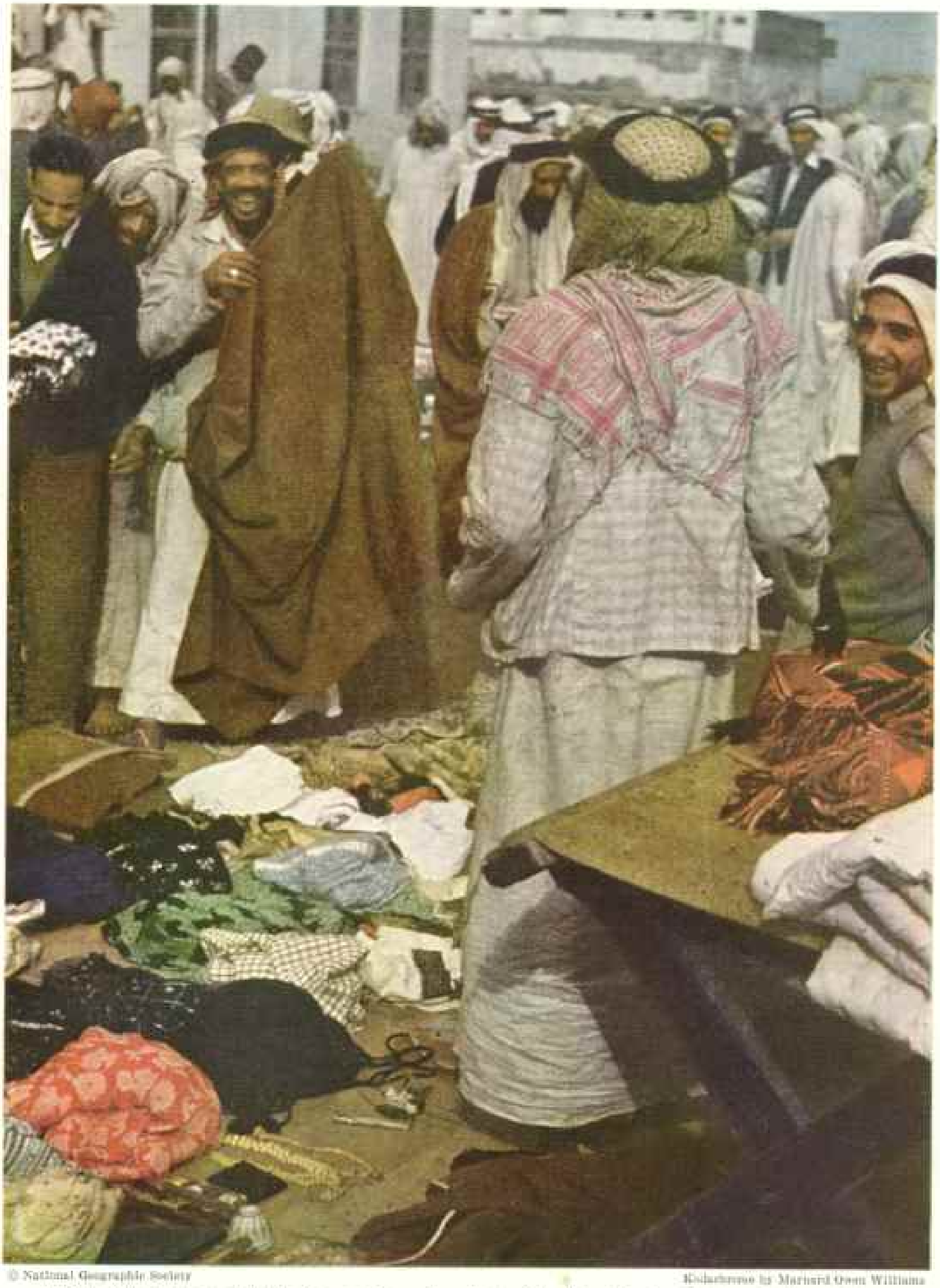
A Broadcaster's Wife "Models" Bahreini Mask and Sequined Veil

When worn outside the home, all such finery is carefully concealed, for she who glitters is thought bold. Her husband broadcasts in both Arabic and English.

Kodachromes by Maynard Owen Williams

A Bahrein Khalifa Helps a USO Girl Buy a Kashmir Shawl

Indian rupees are the local coinage, and Bahrein gentry summer in Indian hill stations. Such headcloths can be threaded through a wedding ring.



Kodachrome by Maynard Owen Williams

While Their Ruler Holds Court Near By, Bahreinis Bargain for Robes, Old and New

"*Abadan*" (never), said the dealer, signaling displeasure at the suggestion of being photographed, but the cameraman's friendly "*Ma bitsayil*" (never mind) brought out the smiles. Normally solemn and resenting a camera, these Arabs melted at the greeting in Syrian Arabic which the author learned at the American University in Beirut.

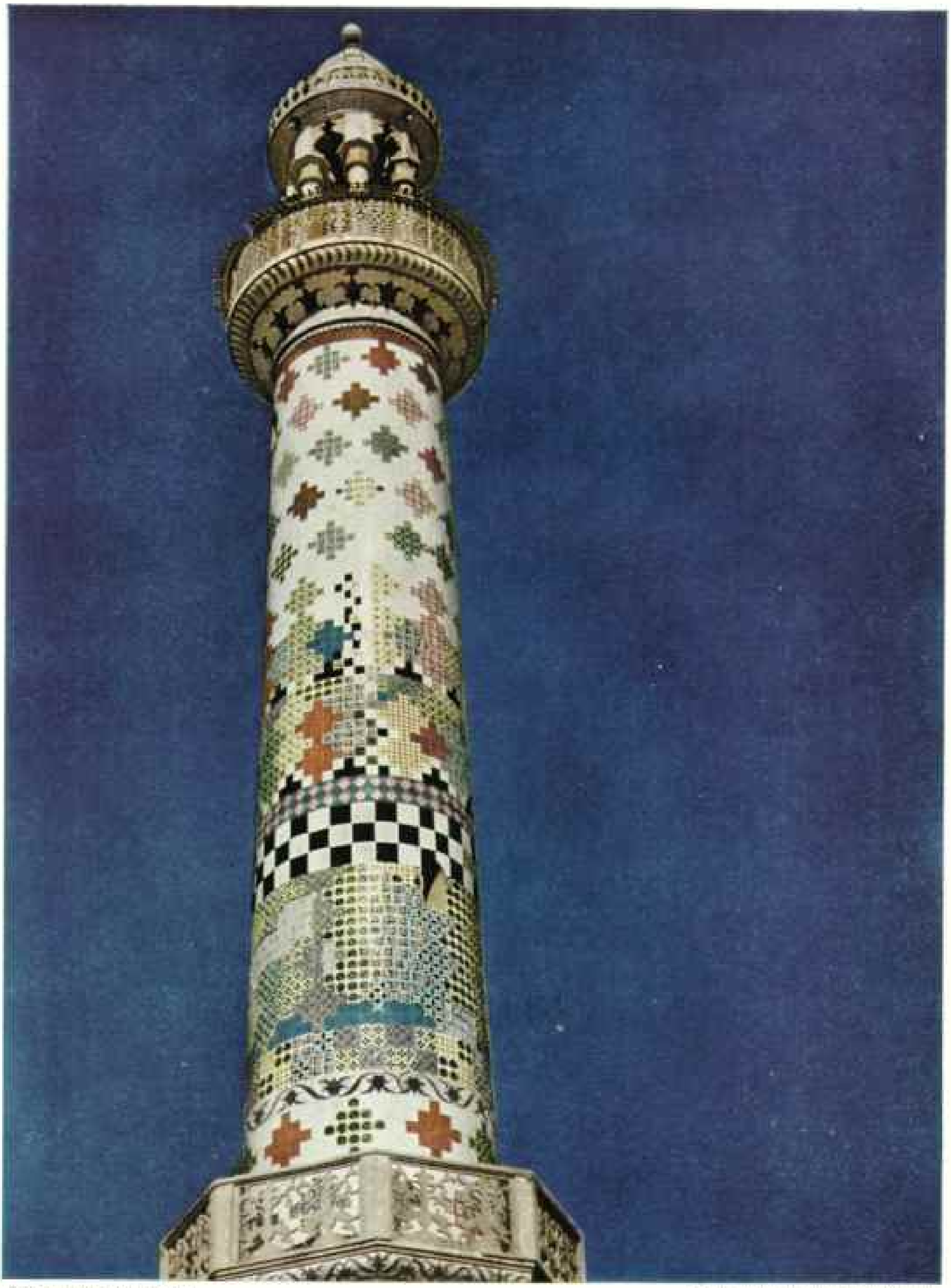
When an American Blonde Buys Slippers in Bahrein Bazaar, There's a Traffic Jam

GI's with much coveted PX privileges are good customers for local curios at Manama.

 Kodachromes by Maynard Owen Williams

Among Admiring Arabs, USO Girls Could Say, "We Came, We Were Seen, We Conquered!"

Their new-found friends coached them in Oriental bargaining. Singer Bonnie Holland's tousled head and Army slacks drew less attention than the Arab headdress of Judy Lane beside her.



 Kodachrome by Maynard Owen Williams

Tallest Skyscraper in Flat Manama Is This Crossword-puzzle Minaret

When British surveyors, their view obscured by palm fronds, made triangulations of low-lying Bahrein Island, they used old mosque towers, the ruined Portuguese Fort, and prehistoric grave mounds as observation posts. This unusual minaret was recently built.

solemn-faced Moslem merchants burst into smiles. Young boys formed a comet's tail of admirers. Khalifa beamed. Rashid bargained for rainbow-bright sandals and soft head shawls from Kashmir (Plate V).

"Fishing" for Pearls

Sporty game fish, such as barracudas, are plentiful around Bahrein, and I never ate better shrimps. But to hundreds of Bahreinis "fishing" is for pearls.* Not until I reached this famous pearl mart did I learn that in these shallow waters a pearl diver may sometimes gather oysters without getting his knees wet.

Pearl fishing is done when the water is warm, and the season had ended six months before my visit.

Had it not been for a shapely American toe dancer named Judy Lane, I might never have seen a quart of pearls, except when worn by maharajas in India (pages 198, 210).

Judy and I climbed a shaky stairway to where a wealthy pearl merchant poised lustrous pearls in his thin brown hand. Judy let a bright stream of glittering globules fall on the red display cloth while I took pictures.

Around the body of a parasitic worm or some other foreign irritant a pearl oyster slowly builds up a jewel which may be worth $40,000.

Sometimes, notably in Japan, men insert irritating particles into an oyster, hoping that it will produce a pearl. The product of this ingenuity is the culture pearl, so like the natural product that only experts can tell the difference.

Bahrein once sent out 20,000 pearl fishers in 1,000 boats. Naturally, it takes a dim view of pearl culture and forbids the importation of culture pearls.

Some Arab pearl divers, tired of enduring debt, penury, and exploitation in the vain hope of striking it rich, are drawing regular wages as oil workers, and fewer than 300 Bahrein pearl boats now sail the summer sea.

Bahrein is a low island. Its highest hill, Jabal ad Dukhkhan, the "Mountain of Smoke," is not as high as the Washington Monument. From a new minaret, its shiny cylinder patterned in tiles grouped like the spaces in a crossword puzzle (Plate VIII), I could see most of the island, with close-packed Manama directly below.

Here and there above the white buildings were tall towers through which the houses breathe in the humid summer heat (page 196).

When I saw Bahrein's whitewashed wind scoops I recalled Marco Polo's words about Hormuz: "In every house they are provided with ventilators, by means of which they introduce air to the different floors, and into every apartment, at pleasure."

After photographing these artificial lungs, shaped like squat steeples, I sought out another health benefit, the place of healing of Dr. Paul W. Harrison, who cures hernia by stitching a blowout patch inside the human groin.

The operation I watched was more modern—taking gasoline-burned tissue from an oil foreman's arm, while a black-haired, barefooted Arab attendant dripped chloroform on a gauze mask.

Dr. Harrison, one of Bahrein's 26 National Geographic Society members, has trained competent Arab assistants, and friends and relatives come in to nurse and feed the patients. Since Arabs leave their slippers outside, neither noise nor tracked-in dirt disturbs hospital routine. The homely companionship hastens healing, and a number of Bahreinis thus learn fundamentals of nursing and sanitation.

At Mrs. Harrison's tea table, around which the local gentry are familiar friends, I took a lesson in the transliteration of Arabic words.

One of her guests had come to meet me because the favorite books in his five-foot English shelf are bound NATIONAL GEOGRAPHICS. Of course I wanted to jot down his name.

"Write it the way it sounds," said Anna Monteith Harrison. So I wrote down "Ahmed Fakhroo" and the name of another tea guest, "Hussein Yatim."

American Products Preferred

Many a wholesaler might envy Mr. Yatim his exclusive agencies for Carrier ice plants and air conditioning, Philco Radio, Caterpillar Tractor, Chesterfields, and other American products.

"In modernizing their habits, the people of Bahrein have decided preferences for specific products," he said. "Many of these—refrigerators, for instance—are American, and we naturally hope that nothing will hamper trade."

Mr. Yatim visited the United States with a progressive Bahrein sheik who lives in a shady garden near the 16th-century Portuguese Fort. In mid-career, this generous patriarch divided his fortune among his sons.

One of them is Bahrein's chief of police. Despite the red-turbaned policemen who stood stiffly at attention, I felt quite at home in his white-towered headquarters. It wasn't so much that he and my family had friends

* See "Rise of the New Arab Nation," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, November, 1919.

Lindt Dunkar from Black Star

No Ducking This One! It's a Contract

On concluding a bargain, an Arab broker kisses the pearl fisher on the forehead to seal the bond. Meanwhile, patrons of the coffeehouse, which serves as pearl exchange, sip dark Mocha and discuss prices and the luster of the pearls.

in common at Beirut. That made for small talk. But what gave body to our fellowship was the fact that, in more than a literal sense, we both "spoke the same language."

At his seaside home, the modern-minded Sheik Khalifa bin Mohammed al Khalifa, who was educated at the American University of Beirut, does not accept the easy-going theory that grass, flowers, and vegetables will not grow in coral sand. In his swift launch he cruises over famous pearling grounds to a guano island, brings back fertilizer, and gets exercise by working in his garden.

Several times, as I strolled about, seeking palace reflections in the coral-lined tidal basins or watching happy youngsters play at whiptops, Sheik Khalifa stopped his jalopy and we had a talk as we rode toward my barrack quarters.

Both of us spoke "from the heart out" concerning how social service and profit sharing may be extended in Arab communities, or what constitutes a good Arabian stallion, or the comparative merits of American football and English soccer.

The "bin Mohammed" in Khalifa's name means "son of Mohammed." Accompanied by Khalifa's brother, I paid a call on their father, whose full title is His Highness Sheik Mohammed bin Issa al Khalifa (Mohammed, son of Jesus, of the Khalifa family).

We wandered through his orchard of delicious fruits, including huge specimens of citrus fruit such as I have never seen. Then, as we ate and drank together, this modern-minded sheik told me of his visit to America, which had been shortened by the outbreak of war. In our far country he experienced "the greatest event of his life," meeting the late President Roosevelt at Hyde Park.

Just as memorable, if less of an honor, was his encounter with a chair pusher at the New York World's Fair. This anonymous instructor in Yankee democracy gave Sheik Mohammed a lesson which he was proud to repeat. The spectacles which he had removed for his photograph were back on his nose. Behind them his eyes twinkled merrily.

"The young man was most helpful. I offered him a present. He refused the money but asked for my signature, not on a check but on his sun helmet. I shall never forget the sense of brotherhood that gave me."

Such is the stuff that a sheik's dreams are made on, out there on Bahrein Island, in the Persian Gulf!

A City That Refused to Die

By Harvey Klemmer

With Illustrations by Staff Photographer B. Anthony Stewart

CITIES, like nations, have stories to tell. Few cities can boast a more inspiring record than that of Britain's Plymouth.

The history of Plymouth goes back many centuries and it is filled with the bold deeds of valorous men.* Few deeds of the past can surpass the achievement of this community in staying alive—in refusing to die—during the war.

The German enemy decided to obliterate certain British cities. Plymouth was one of them. But Plymouth refused to be obliterated. The citizens rose up in their collective might. Notwithstanding some of the ghastliest punishment of the war, they did not fail or falter. They stood fast. They made of their city a citadel which the enemy, try as he might, was not able to destroy.

The story of Plymouth in World War II is not a pleasant one. Yet it is a story which should be told. It should be told because it shows what urban civilization will be up against if we fail to remove the menace of modern, scientific warfare from the affairs of men. It should be told also as an example of the courage and ingenuity with which common people are able to act in the face of danger, and of the sacrifices which they are willing to make in behalf of freedom.

Now It Can Be Told

Much of the Plymouth epic could not be told while the war was on. Victory in Europe canceled the necessity for security restrictions. This article—based on personal observation, conversations with many persons, and a sojourn in the ruins—is an attempt to tell the full story of the travail and the triumph of the "city that refused to die."

The story of Plymouth is of particular interest to Americans. No city in Britain, few cities anywhere, are more intimately concerned with our own development than this interesting old town.

Generations of Americans have landed at Plymouth or have sailed from there (p. 215).

As every American school child knows, the Pilgrims set sail from Plymouth. In the old harbor, on a quay known as the Barbican (Plate V), there is a stone bearing the simple inscription, "Mayflower, 1620."

It was fitting that the Rock upon which these Founding Fathers landed should have been named for the city which bade them godspeed.

A few miles northeast of Plymouth, at Princetown, is the Church of St. Michael, begun by French prisoners and completed by Americans taken prisoner in the War of 1812.

Two Americans, killed in the War of 1812, are buried in the churchyard of historic St. Andrew's in Plymouth. The Daughters of 1812 have restored a doorway leading to the churchyard from the Prysten (Priests) House. The door, known as the "Door of Unity," is the scene of an annual ceremony in which people from both countries join (Plate III and pages 214, 216, 234).

The *NC-4*, first airplane to span the Atlantic, landed in Plymouth Sound, after flying via Newfoundland, the Azores, and Portugal.

St. Andrew's was burned out in the early days of the blitz. An American sailor came to Plymouth and asked to see the ruins. He looked at the devastated shell a long time, then said slowly:

"I saw a movie of this back home. I decided to join the Navy and help punish the people who did it."

Then, more slowly still, "Here I am."

U. S. Troops Stationed There

American troops were stationed in and around Plymouth during most of the European war. We also maintained a sizable naval establishment there (page 212).

The war began early for the people of Plymouth.

Survivors of bombed and torpedoed ships started to arrive in the Sound soon after the outbreak of hostilities.

Thousands of Allied troops—tired, wounded, beaten—came into Plymouth at the time of the fall of France. These men, like the survivors of sunken vessels, were given the best that the people had to offer. This included not only food and drink and cigarettes; one group, sorely tried, was taken to a local club where members removed the men's boots and socks and washed their feet.

The first stick of bombs was dropped on Plymouth in June, 1940. There were intermittent raids through the rest of the year and into 1941.

The concentrated attack, which was to give Plymouth one of the hardest poundings of

* For an interesting contrast of life in this famous city just before the war, see, in the National Geographic Magazine for July, 1938, "Pilgrims Still Stop at Plymouth," by Maynard Owen Williams.

"Good-bye, Plymouth!" "Farewell, Yanks!" Sailors and Lord Mayor Say It with a Shake

Plymouth-based Americans cemented a friendship when they cleaned up debris after a raid. They were very popular with the girls, but much less so with the young men. One Yank has the Navy's amphibious patch on his sleeve. Lord Mayor H. G. Mason carries his seal of office from the chains. He went out of office on November 9, 1945. Mrs. Mason (left) wears the chains of the Lady Mayoress.

the war and subject her people to one of the most terrible ordeals ever endured by a civilian population, began on March 20, 1941—two hours after the King and Queen had left town following an inspection of Civil Defense services.

From then on, life in Plymouth took on the characteristics of a battlefield.

Sirens were going most of the time. The bombers came by night; and in the daytime, when the harassed city was catching its breath, reconnaissance planes would shoot across the Channel to gloat over the handiwork of the night before and to plot new terror for the night to come.

Nazi airmen seemed to press the attack on Plymouth with special venom. When they ran out of bombs, they threw from the planes whatever they could get their hands on—boxes, bottles, wrenches, pieces of pipe. They dropped spikes to puncture the tires of ambulances, fire trucks, and other defense vehicles. They filled the sky with flares which turned night into day and exposed the city's vitals to a relentless downpour of destruction.

The enemy played with the city like a cat with a mouse. Planes would cruise around for perhaps half an hour while the bombardiers got their bearings. Sometimes they would come so low that victims could hear the squeak of the bomb levers.

Destruction by Zones

The attackers destroyed by zones, taking up one night where they had left off the night before.

Three thousand bombs were dropped altogether. Most of them were of the instantaneous or short-delay type, but there was a generous sprinkling of delayed-action bombs. There were, in addition, many thousands of incendiaries.

The city meanwhile was subjected to other assaults. Mines were dropped in the river and in the Sound. Enemy pilots would also on occasion strafe the town.

Throughout the war, Plymouth faced the peril of invasion. She had to keep an eye not only on the sea but on the land as well. A glance at the map on page 215 will show that Plymouth is located on a tongue of land. It is only 35 miles across this tongue of land, and military authorities feared that the Germans might attempt an assault from the rear.

This fear was so real that the railway bridge over the Tamar, which connects Devon

Plymouth's Own Churchill, a Fishmonger, Is a Fighter Like His Famous Namesake

One 2 a. m. Randolph H. Churchill (left) lost his father in a German raid. At 9 a. m. he opened his shop as usual, saying that people must still eat. "We won't quit," he announced. "Never. Never!" For these words he is celebrated locally and his store is a shrine of sorts. His ancestors for 200 years were Plymouth fishermen (page 222).

with Cornwall, was decked over to permit the passage of tanks if the Germans should attempt to land in Bristol Channel.

In addition to those working on Plymouth, swarms of enemy aircraft passed over on their way to Liverpool and the towns of Wales. The latter planes went over innocently enough, but some of them developed an annoying habit of saving a bomb or two for use against Plymouth on the way back.

Plymouth was under fire, in one way or another, for a period of four years. The last raid took place shortly before D Day.

Allied victory came just in time. When our troops swept through France, they found in the Cherbourg area batteries of V-bomb launching platforms aimed in the direction of Plymouth. A few more months and Hitler would have been able to unleash a new kind of terror against the city which had thus far refused to crack.

It was entirely proper that the honor of capturing some of these platforms aimed at Plymouth should fall to American troops who had been billeted in Devon.

Casualties and damage in Plymouth were not large compared with those of London and other great cities. They were extremely heavy in relation to the size and population of Plymouth.

Fourteen hundred people gave their lives to keep this city on the map. Four thousand people gave blood and flesh.

Stories of Stark Tragedy

The stories you hear make your blood run cold. Listen to this:

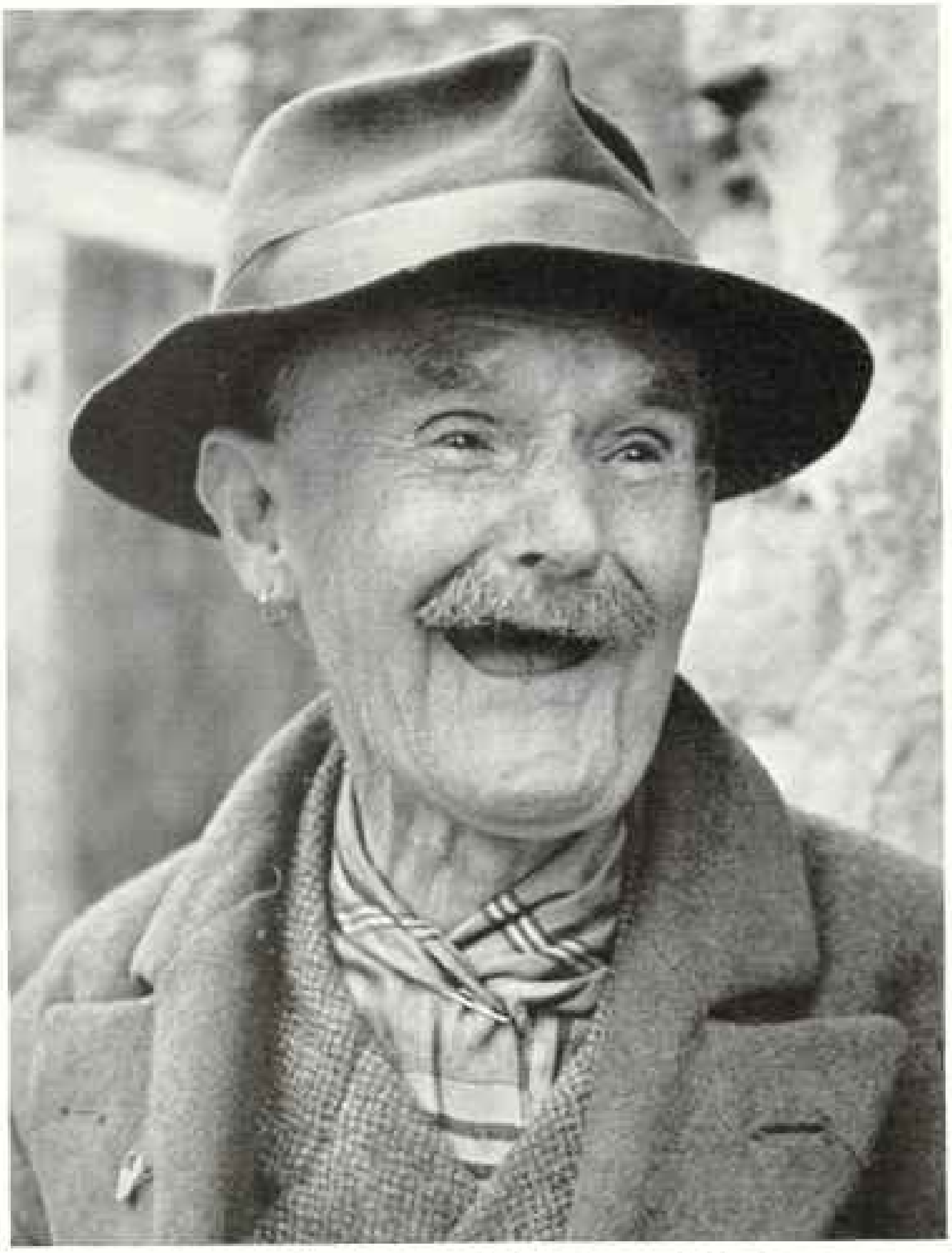
"A man came into the mortuary with a shopping bag. It contained the remains of his father."

And this: "Five men were trapped in the bank. We spent a week looking for them. We found the keys which had been in the teller's pockets."

And this: "A Naval Dockyard worker used to live here with his wife and five children. They were all killed except a daughter. She is in the hospital, paralyzed."

Fifty people are still unaccounted for in Plymouth.

A naval man came home on leave and found his wife and three children gone. To this day no trace of them—human or otherwise—has been found. Rescue workers combing debris in the area where their home had been were unable to salvage even a memento.



An Octogenarian Wears the Earrings of His Youth

Says Robert Dick, a retired hotel worker: "I always lived in the Barbican" (Plate V). In that old-time quayside men's earrings, heirlooms of sailing days, are a disappearing fashion (page 224). The photographer encountered Mr. Dick at Lady Astor's home, where she occasionally distributes tobacco among deserving townspeople.

A body found in the wreckage of a hotel, after a lapse of two years, was identified as a sailor long believed to be a deserter.

Survivors of Plymouth's ordeal can tell you stories by the hour about their narrow escapes. Practically everybody has had some contact with bombs, and their experiences—some gruesome, some pathetic, some amusing—will be recounted by generations of Plymothians yet unborn.

More than 4,500 houses were completely destroyed and an additional 2,000 were seriously damaged. Fifty thousand houses suffered minor damage. When this latter figure was given to me by a city official, I thought he had made a mistake and hastened to remind him that there were only 42,000 houses in Plymouth before the war.

"Everybody challenges us on that one," he replied. "The explanation is that many houses were damaged more than once."

Some people were in fact bombed out three times. Altogether, 30,000 people were deprived of shelter as a result of enemy action.

Property damage is estimated at $100,000,000—about a third of the city's rated value.

The center of Plymouth was almost completely destroyed. Every big store had gone. The main shopping streets were wiped out, the city center demolished, the post office removed. Some forty churches were put out of action, along with a hundred pubs and a good share of the city's schools, libraries, and theaters (Plates III and IV; pages 219, 235).

A Tour of the Past

Walking around Plymouth after V-E Day with a local resident was like making a tour of the past.

"That's where the draper used to be. That's where the ironmonger used to be. That's where the baker used to be." And so on. And so on.

The Bank of England, scorched but defiant, still stands. Derry's Clock—the hub of Plymouth, where boys meet girls and sailors get their bearings—rises from a wilderness of debris.

Bombs are no respecters of history. In Plymouth many a priceless heritage was destroyed. St. Andrew's was reduced to a blackened quadrangle of walls with gaping holes where windows once were. The space within

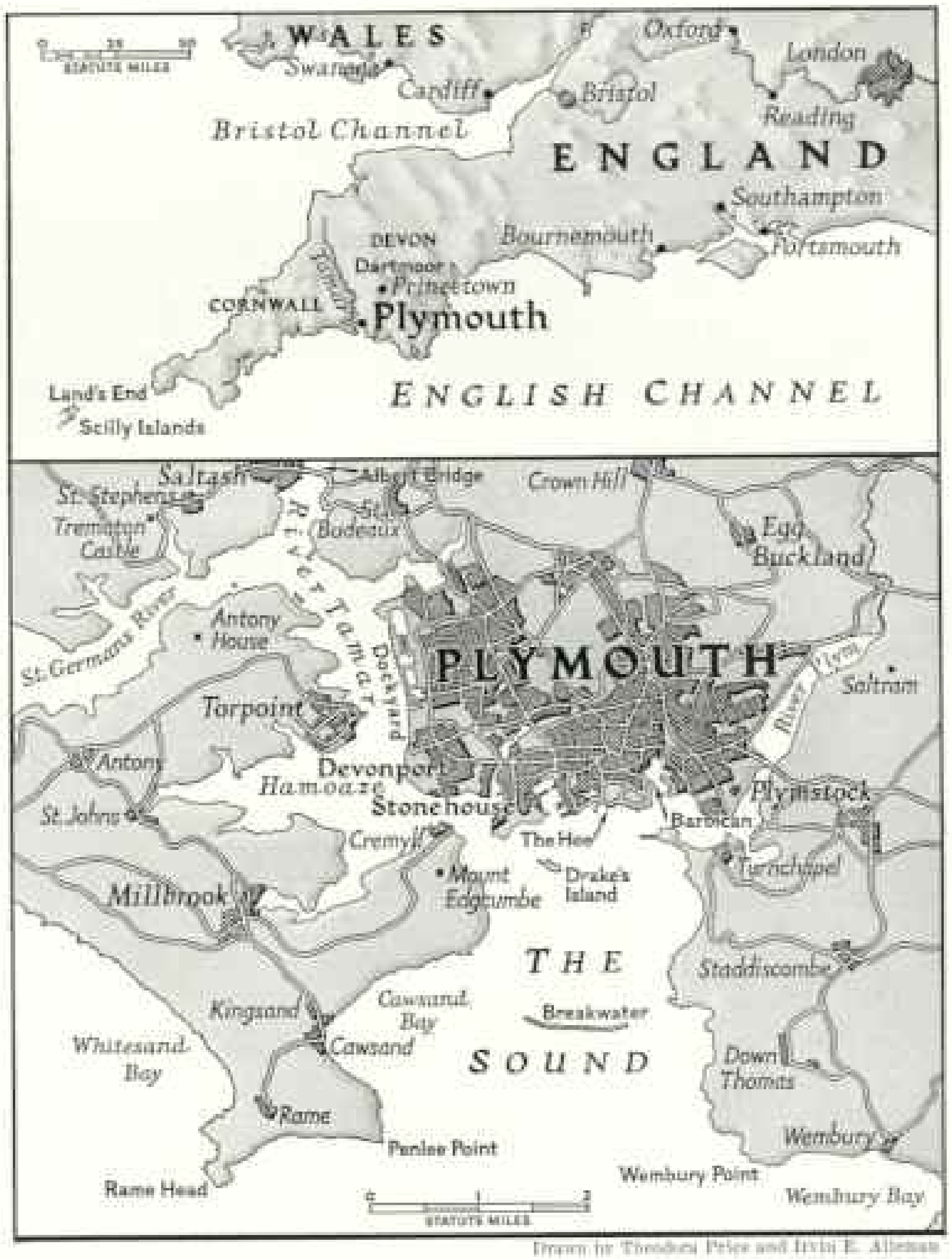
the walls has been planted to grass and flowers, and a small sign informs you that "This is none other than the house of God." It is very quiet and very impressive and very sad (Plate III and pages 211, 216).

Yogge's Tower, which stands at the west end of the church, fortunately has been spared, along with its famous bells.

The Guildhall is a total loss. The library has lost most of its books, but the museum and art gallery, which are also housed in the same building with it, are intact. The City Council, having nowhere else to go, now meets in the museum.

Mementos of Drake

Sir Francis Drake, whose name is synonymous with the history of Plymouth, suffered along with the rest (Plate I). A portion of Drake's leat (water trench)—dug in the 16th century to bring water into Plymouth—was laid bare by a type of war which Drake could not possibly have comprehended.



Drawn by Theodora Peke and Irvin E. Alleman

Plymouth, the Pilgrims' Port, Lives Around Its Fine Harbor

From the Barbican, the old city radiated. Three decades ago it absorbed Stonehouse and Devonport, so that today it stretches from the River Plym to the Tamar. Many citizens derive their income from the Naval Dockyard.

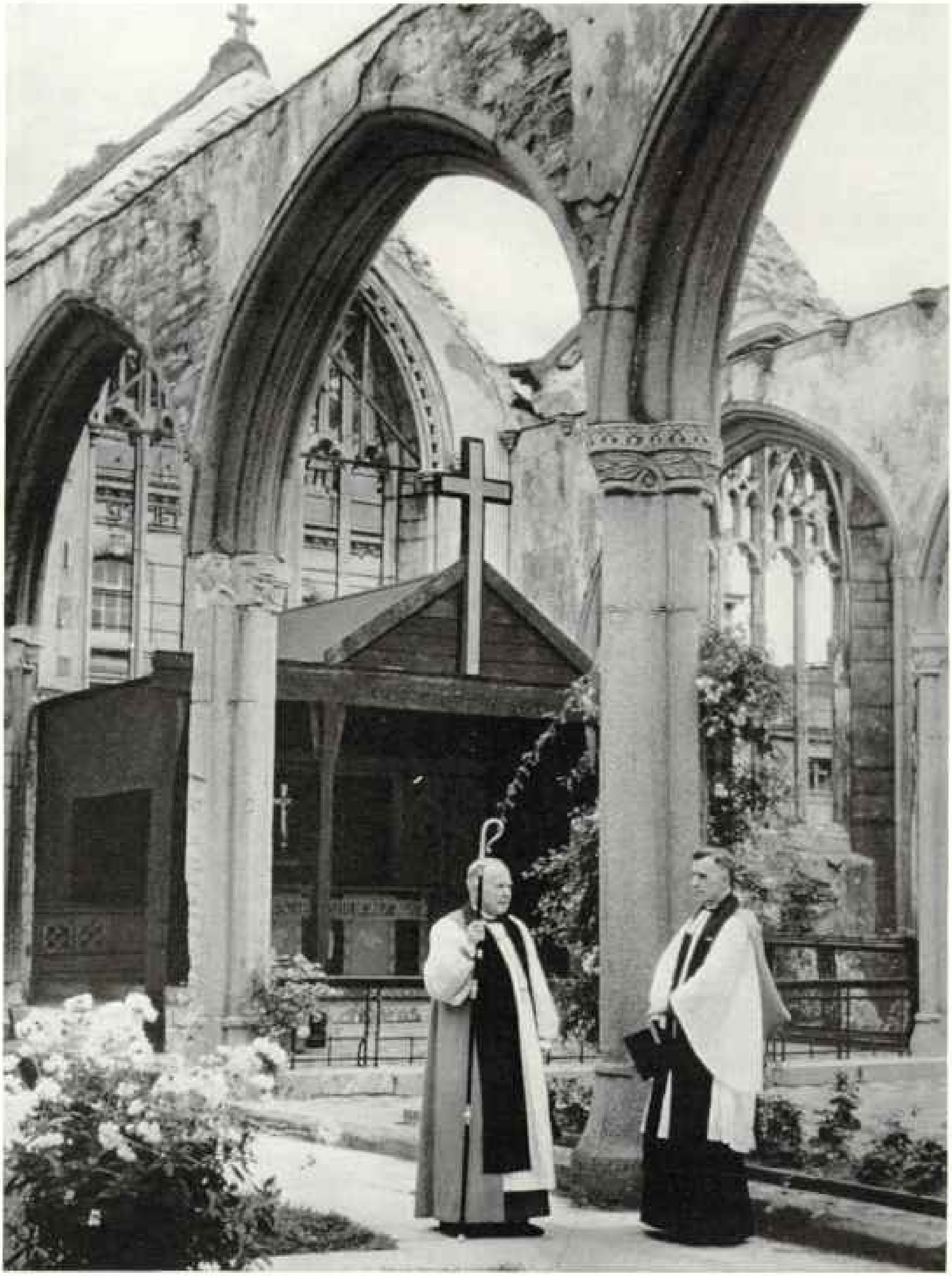
A stone figure of Drake which was dislodged from the Guildhall has been ignominiously consigned to a box. It was originally prepared for shipment to Chicago, but the people who wanted to display it apparently changed their minds. Anyone who would like to borrow a life-size statue of Sir Francis Drake can probably procure same by communicating with the Plymouth town clerk.

The Drake portrait which for many years graced the Guildhall was saved through the intervention of an American correspondent, the late Ben Robertson, Jr. Ben urged that the painting be taken to a place of safety. It was, and consequently was not destroyed when the building burned.

One of the most surprising things about bombing is the capriciousness of blast. Plymouth abounds with examples of this sort. People will tell you of mirrors that were found, undamaged, in the rubble of houses; of attic furnishings discovered in the basement; of metal objects twisted and torn alongside some delicate ornament without a scratch.

There were instances of people being stripped naked, and one man told me that he had seen coins which had been fused in the pocket of a victim.

The power of blast is not diminished by the fact that it is capricious. That part of Plymouth which was not destroyed in the blitz was pretty well blown about. A man came to Civil Defense headquarters one day to report that there was a strange lawnmower in



Fire-blackened, Roofless St. Andrew's Remains the Pride of Plymouth, the House of God

Amid grass and flowers the Bishop of Plymouth (left) confers with the Vicar of St. Andrew's. Each Sunday its congregation still gathers. A temporary shed bearing the cross shelters the original pulpit. This old church has been the goal of many American pilgrims. Several times rebuilt, it looks forward to a new restoration.

his house. He later found a stepladder in an upstairs room. No owners were ever found for either the lawnmower or the ladder.

Several cars were taken off the roofs of houses and in one instance a double-deck bus was deposited on top of a garage.

Such is the fruit of man's dominion over the forces of Nature.

People who had no reason for remaining were, as far as possible, induced to leave town. The population, which had been 220,800 before the war, dropped to 110,000. It was back to 140,000 when I left. Remaining evacuees will probably have to stay where they are for a while because of the lack of housing.

Fire a Major Menace

The principal menace was fire. Had it not been for the heroic efforts of fire fighters, the entire city could easily have been destroyed.

Firemen were handicapped by lack of water. Drake's leat (page 215) was reconditioned so that, if all else failed, water could be brought in from Dartmoor. Stonehouse Creek was dammed and 10,000,000 gallons of water impounded. This water was then carried to tanks erected all over town through mains laid on the pavement. I mentioned to a fire fighter that the water in Stonehouse Creek is salt.

"An unimportant detail," he said grimly. "All we asked was something that would go through a hose."

He went on to describe the frantic search for liquids when the water supply gave out. Once, in a burning store, firemen opened cans and used everything that would go through a stirrup pump. They got along fine until they came to the disinfectant department and failed to notice, in the smoke and confusion, that each can bore a sign, "Keep away from open flame."

The shortage of water was not confined to that required for fighting fires. Water for drinking, cooking, and bathing was also a problem. When the mains were destroyed, water was taken around in carts. A mobile bath unit—complete with boiler—was supplied by a soap manufacturer. It served nobly for three years and is now being used on the Continent.

Gas and electrical installations were hit repeatedly. The electricity was off only for a couple of days, but the city at one time was without gas for more than a month.

Transportation, as may be imagined, was kept going only with the greatest difficulty.

Delayed-action bombs were a special problem. A city official told me that he had himself seen two parties of men blown to pieces while working on DA's.

A time bomb fell near the Eye Infirmary. Sometime later a policeman came by to see how the bomb-disposal boys were making out. He found three youths lying on the ground. They were watching a fourth youth who was down in the crater with his arms around the bomb, *gently cuddling it out of its hole!* He looked for all the world, said the policeman, like some young father dealing with a reluctant baby.

Then there was the huge bomb—one of the largest dropped in Plymouth—which fell into the basement of a house. The occupants were away at the time. Repair squads inspected the place and found a hole down through the building as far as the ground floor, which was covered with debris. They repaired all the holes from the ground floor to the roof and went on their way.

A few days later the tenants returned and, on going to the basement, found a cigar-shaped tube seven or eight feet long sticking out of the floor.

Police wasted no time in clearing the district of its inhabitants. The bomb-disposal people came with a kind of large vacuum cleaner, sucked the explosive out of the big cigar, and all was well.

The repair of houses was a prodigious undertaking. As has been stated, there were more repair jobs than houses because some buildings were hit more than once.

Rest centers were set up in various parts of the city.

People opened their homes to one another. A billeting officer whom I tried to compliment didn't seem to think his job called for any particular notice.

"People under fire," he explained, "have an amazing capacity for being generous."

A Railway Tunnel Shelters Hundreds

The construction of shelters was handicapped by a lack of manpower and materials. An abandoned railway tunnel was converted into a shelter capable of accommodating 1,000 persons. It was half a mile long and was equipped with canteens, recreation rooms, and bunks.

Communal feeding was used on a large scale. People who had difficulty in leaving their homes were fed from mobile canteens. Army field kitchens were also brought in.

Hospitals were hit, patients and nurses killed. Commented a doctor ruefully:

"Of that which was needed most, we had least."

An asylum was hit, and the authorities had to evacuate a hundred inmates in the middle of the night. The inmates were taken to a

"But Where Is the Money Coming From?" A City Father Asks a Disturbing Question as the Council Discusses Plymouth's Rebuilding

Bombed out of office repeatedly, the Council members here meet in the city library. Behind the maces, which reflect the city's authority, the Lord Mayor (center; page 212) and his deputy (right) wear the robes and chains of office, and the town clerk is in a wig. Over their heads hang the arms of Plymouth. Its motto, "Jehovah's name is the strongest tower," was brought home to many during the blitz. Like Americans at a town meeting, Plymouth citizens (left) have the right to speak.

The London Times

A View from Guildhall Tower Shows the Ruins of George Street, the Shopping Center, after a Fire Raid

Flames, not blast, created most of the havoc. Plymothians say that most damage could have been prevented if fire fighters had understood from the beginning the necessity of manning rooftops. Thanks to its own fire force, the Odeon Theater (upper left) is scarcely touched. Only vacant lots remain here today.

Architects of Plymouth's Future Examine Their Model for the Proposed Civic Center

The opened book contains the Abercrombie-Watson Plan, named for J. Paton Watson (left) the city engineer, and Prof. Sir Patrick Abercrombie, Britain's noted city planner (right). They aim to break crowded Plymouth into smaller communities linked by wide green areas. Traffic congestion, shown by the map (center), will be eliminated. Prewar population density is illustrated by blocks (left); the highest represents 230 persons per acre (page 233).

school and then sent to the country. How did they react?

"They were remarkably calm. We had much less trouble than we anticipated."

Despite the destruction of sanitary facilities and the shortage of doctors and nurses, there were no epidemics of any consequence during the siege of Plymouth.

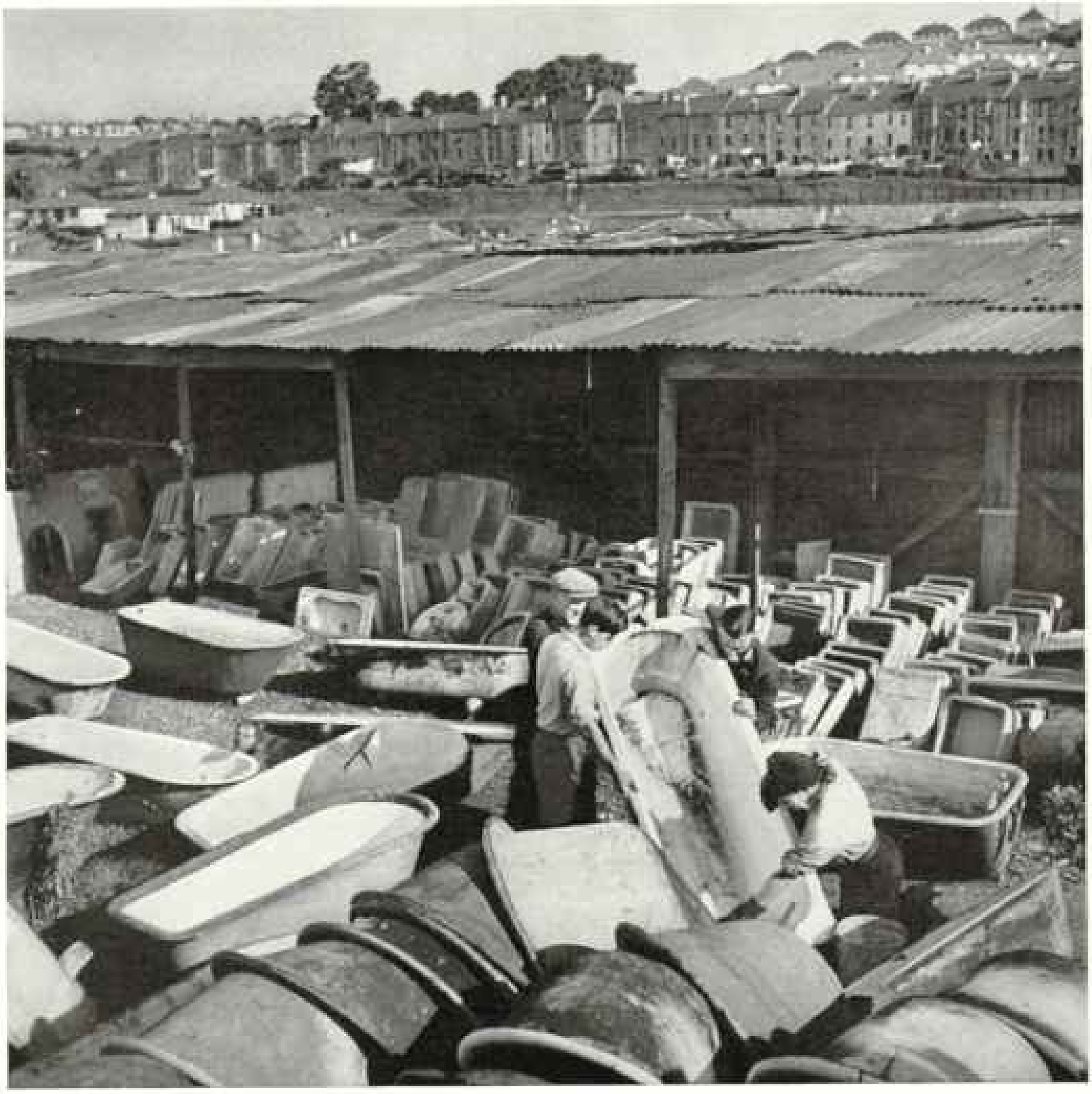
As has no doubt become obvious by now, the British genius for improvisation played a major role in the defense of Plymouth.

People didn't worry about whether or not they had training for a particular job; they did the job first and worried about qualifications afterward. The man who took charge of the mortuary had formerly handled community entertainment. Similar incongruities ran through the entire defense organization.

Buildings were employed for purposes bearing no relationship whatever to those for which they were intended.

The Corn Exchange was used for community feeding by day, as a dance hall in the evening. Dances were also held in schools and churches.

St. John's Church in Devonport was used—is still being used, for that matter—as a community center. The place where the altar



Blitz-proof Tubs, Saved by Thousands, Stand Ready to Pour the New Plymouth's Baths

The city collected 16,000 tons of iron. Melted type worth $14,000 was salvaged from a print shop. U. S. Army trucks helped move furniture of the homeless. This repair crew is bossed by a woman (right). Wall-fitting American tubs are little known (page 222).

was is now a stage. The pews have been removed to make room for dancing and boxing matches. The space under the gallery contains recreation rooms and a seamen's hostel.

Schools Had Many Uses

Schools have been used for many purposes—as rest centers, community centers, storehouses, offices.

The big stores, all of which were destroyed, are now spread throughout the residential areas of the city (Plate III and page 235).

When buildings were not available, the people carried on in the open.

The City Fathers were hard put to find quarters for themselves. When the Guildhall went, they met in the square to decide what to do. Since there was little likelihood that they could all get space in one building, they decided to separate.

It was "every man for himself." The medical officer found a house; the Lord Mayor (at that time Viscount Astor) and a number of other officials moved into the library.

The "Lord Mayor's Parlour" consisted of a small wooden table, a typewriter, some pins, and a little stationery which had to be carried about in an attaché case, as there were no drawers in the table. Money, which began to pour in from all parts of the British Isles and

from overseas, was kept in a child's toy box during the day; at night it was locked in the librarian's safe.

The town clerk established himself in the museum. His desk was on the lecture platform, from which vantage point he was able to superintend operations in the rest of the room. The principal difficulty with the arrangement was that the rest of the room was used as an information headquarters and was packed with people from morning till night. However, the clerk wasn't there very long. Within a fortnight he was bombed out of the museum and then he had to conduct his office from a building in the park.

The Lord Mayor eventually graduated from the library to a house on the sea front.

The ferocity of the German attack on the Plymouth area is indicated by the fact that three town halls were destroyed in a single night. I asked the town clerk if the records were lost.

"Yes," he said glumly, and then added without enthusiasm, "that is, everything was destroyed but the tax records."

The town clerk also served as Civil Defense controller. In addition to being bombed out twice as town clerk, he was bombed out twice as defense controller. Moreover, by a weird coincidence, he was bombed out of both jobs in one night.

Plenty of Scrap

There was one good thing about the attack on Plymouth: it gave the people an opportunity to collect plenty of scrap. Everything which could be extracted from the wreckage was salvaged and stored for future use.

Sixteen thousand tons of iron were recovered from ruined buildings. Hundreds of thousands of bricks were collected, along with vast quantities of lumber, pipe, sanitary fixtures, and the like (page 221). The accumulation of wood got so great that it became a fire hazard and several thousand tons had to be dumped into Stonehouse Creek.

Even the nails from blitzed buildings were saved.

Bells and images were rescued from blazing churches and put away. Plymouth also has on hand (thanks to the labors of her salvage corps) an enormous collection of doors, staircases, window frames, fireplaces, and other articles for use in her postwar building program (Plate IV).

Household effects were by far the largest item in the salvage program. Said Stanley Prince, who had charge of this phase of the battle:

"You think it's quite a job to move one houseful of furniture. How would you like to handle the effects of 12,000 homes?"

Prince wasn't joking. He and his men did just that. They stored the stuff wherever they could find room—in schools, churches, sheds, halls, warehouses. When they ran out of space in town, they went out on the moor and commandeered a clay-drying shed (page 236).

Furniture was also stored—is still being stored, no doubt—in brick kilns. At one time there was such a stream of stuff pouring out of the city that the authorities had to build a trestle over a highway used by American troops in order not to interfere with military traffic.

People's Morale "Incredible"

The morale of the people was incredible. When I mentioned this to Lady Astor, who went to the House of Commons from Plymouth as the first woman member of Parliament and who represented this district for a quarter of a century, her eyes quickly filled with tears.

"They were wonderful," she said. "You never saw such courage, such patience, such good humor, in the face of almost insurmountable difficulties."

At one time there were 300 bodies in the mortuary. Many of the dead could be identified only through clothing or other articles.

A soldier lost his wife and five children when 70 persons were killed in a shelter. He identified each one as best he could—a two-months-old baby by the dummy teat still in its mouth. When the bodies had all been identified, the soldier saluted and said:

"I suppose we shall have to bury them. Then I'll go and do my job."

Mass funerals were held, and the dead were placed in communal graves. A hundred persons were buried at one time. Pastors of all denominations took part in the services to make sure that each victim was represented by a clergyman of his own faith.

"We Won't Quit"

The people carried on. Churchill, the fishmonger, lost his father at 2 a. m. At 9 a. m. he opened his shop, ran up a flag, and assured his customers, "We won't quit. Never. Never!" (page 213).

Mrs. Rowland, another fish dealer, was blown into the back of her tiny shop on Treville Street. A few hours later she was dispensing cockles. When neighbors remonstrated with her, she replied testily, "They 'ave to be served, don't they?"

Mrs. Rowland is 75 years old. When I stopped to chat with her, her principal concern

A Radiant July Day Garnishes Cliffs and Beach with Sun Bathers

Gloomy weather sweeps the sands bare of humanity. As bathhouses are scarce, most visitors arrive in bathing suits. On the beach they relax in canvas chairs; within the arcades they sip tea. Standing on the Hoe, the Marine Biological Laboratory occupies the large building. Solid stone girds the Royal Citadel (right), a creation of Charles II. Though obsolete, this fortification stood guard over wartime Plymouth.

seemed to be the fact that she didn't have any windows in the shop.

"Just get me a bit o' glass," she importuned, "and I'll be all right."

Women of Plymouth stood shoulder to shoulder with their men throughout the onslaught.

Women served as fire watchers; they drove ambulances, did nursing, ran canteens, conducted rest centers; they worked on anti-gas measures; they fought fires. They also did heavy work, such as moving furniture from bombed-out houses. They even tore down damaged buildings and cleaned up the sites.

More than one Plymouth woman gave her life in line of duty.

Not all of Plymouth's raid experiences were sad. As may be expected, there were many amusing incidents.

In Devonport an old lady who had been pressing the city engineer for bricks to build an air-raid shelter was buried in the ruins of her home. She was dug out seven hours later, black but uncowed. Surveying the bricks piled in heaps about her, she gloated, "Well, that blankety-blank engineer won't be able to say there are no bricks for a shelter now!"

Another old lady, who had lost everything, refused to be downhearted. When friends tried to commiserate with her, she said:

"Yes, I've lost my house; my furniture is

gone; the only clothes I have are those I'm wearing. But I can do what no German dares do—I can say what I think."

An important factor in the preservation of morale was a special fund set up at the beginning of the war by the Lord Mayor for the benefit of service people and air-raid victims.

Dancing amid Danger

One of the most spectacular results of the fund's activities was open-air dancing on the Hoe, an imposing bluff which overlooks the harbor. Plymothians had danced on the Hoe during the Napoleonic Wars. The custom was revived during the grim days of the present war and did much to maintain the morale of the people (Plate II).

While the enemy boasted that Plymouth was through, as many as 6,000 people would gather on the Hoe to prove that music and laughter and rhythm are stronger than the threat of death.

Religious services were also held on the Hoe, while military bands played in the parks.

Plymouth's fight aroused the admiration of the world and assistance poured in from every side. Fire fighters rushed from other cities, strange policemen appeared in the streets, vans of food and clothing and medicine converged on the stricken city.

The siege of Plymouth has now faded into the merciful past. The enemy came less and less frequently and finally skulked off for good. Then, one day, a convoy of American trucks came in from the moor and headed for the water.

Ramps had been built in the Tamar and on Mount Edgcumbe. A vast armada of landing craft had been assembled. For months the boys had been running their boats up on these ramps and perfecting the art of getting out of them in a hurry. There had also been extensive tank maneuvers on the moor, while down the coast workmen had constructed a floating harbor about which there was much conjecture and no knowledge whatever.

The preliminaries were over; it was now time for the real thing.

Men and equipment poured in for days. People stood on the hills and watched the convoys coming over the moor. They knew that this was no practice. They knew it by the volume of equipment, by the set faces of the men, and by the fact that they were wearing Mae Wests. They knew it because the men had French money in their pockets.

The men went aboard their landing boats on Wednesday. Saturday night they sailed out of the Sound. A strange tenseness laid hold of the city, a tenseness made up at once of anticipation and dread, of exaltation and hope. Sunday morning ("Our hearts sank") the boats were back. But not for long. In a little while they left again and this time they did not return.

History seems to have conspired to produce in Devon a population and a tradition capable of withstanding the German assault.

Plymouth was once known as Sutton. That was back in Norman times when it was "a mene thing as an Inhabitation for Fischars."

The town sent its first representatives to Parliament in 1292. It was granted a charter by Henry VI and renamed Plymouth in 1439. The present city includes Devonport and Stonehouse, which were amalgamated with Plymouth in 1914.

The maritime influence is pronounced in Plymouth. You notice that your waiter is tattooed. Sailors with beards roll along the uneven streets and occasionally you bump into an old-timer with earrings (page 214).

Plymouth and Drake

What ships this Sound has seen! The fleet of the Black Prince. The vessels of Raleigh and Howard of Effingham. The *Mayflower*. Drake's *Golden Hind*. Cook's *Endeavour*. The *Bellerophon* with the captive Napoleon aboard. And finally, in the present war, the cruisers *Exeter* and *Ajax* returning in 1940 to a clamorous welcome following their victory over the *Admiral Graf Spee* in South American waters in December, 1939.

Plymouth's principal claim to fame, in a maritime way, stems from the exploits of British privateersmen. Portsmouth had its Nelson, but Plymouth had Frobisher and Hawkins—and Drake.

Every school child has heard the story of Drake and his famous game of bowls on the Hoe (Plate II); of how, when he was told that the Spanish Armada was approaching, he played on with the retort, "There's time to finish the game and beat the Spaniards, too"; of how he got his ships out of Plymouth Sound in the teeth of the wind to demonstrate that the Invincible Armada was invincible no more—that it, in fact, was no more.

There is an old legend that, when England needs him, Drake will come back. The poet Sir Henry Newbolt, describing the great sailor's end, put it thus:

> Take my drum to England, hang et by the shore,
> Strike et when your powder's runnin' low;
> If the Dons sight Devon, I'll quit the port o' Heaven,
> An' drum them up the Channel as we drummed them long ago.

Kodachrome by B. Anthony Stewart

Drake, Who Humbled the Spanish Armada, Survives the German Aerial Blitz

From Plymouth the Admiral turned back the Spanish invasion in 1588. During its recent travail his spirit upheld the city. This statue commemorates him, not as a fighter, but as a geographer and navigator, first to carry the English flag around the world. Tall white shaft, the Naval War Memorial, honors the dead of World War I.

Kodachrome by B. Anthony Stewart

For Centuries, Bowling on the Hoe Has Been a Symbol of Plymouth's Invincible Spirit

Drake, reputedly bowling here when the Armada hove in sight, insisted there was time to finish the game and beat the Spaniards, too. During the blitz some 6,000 Plymothians met occasionally on the Hoe to seek consolation in music and dancing. The Saxon word *hoe*, meaning "hill," survives only in English place names.

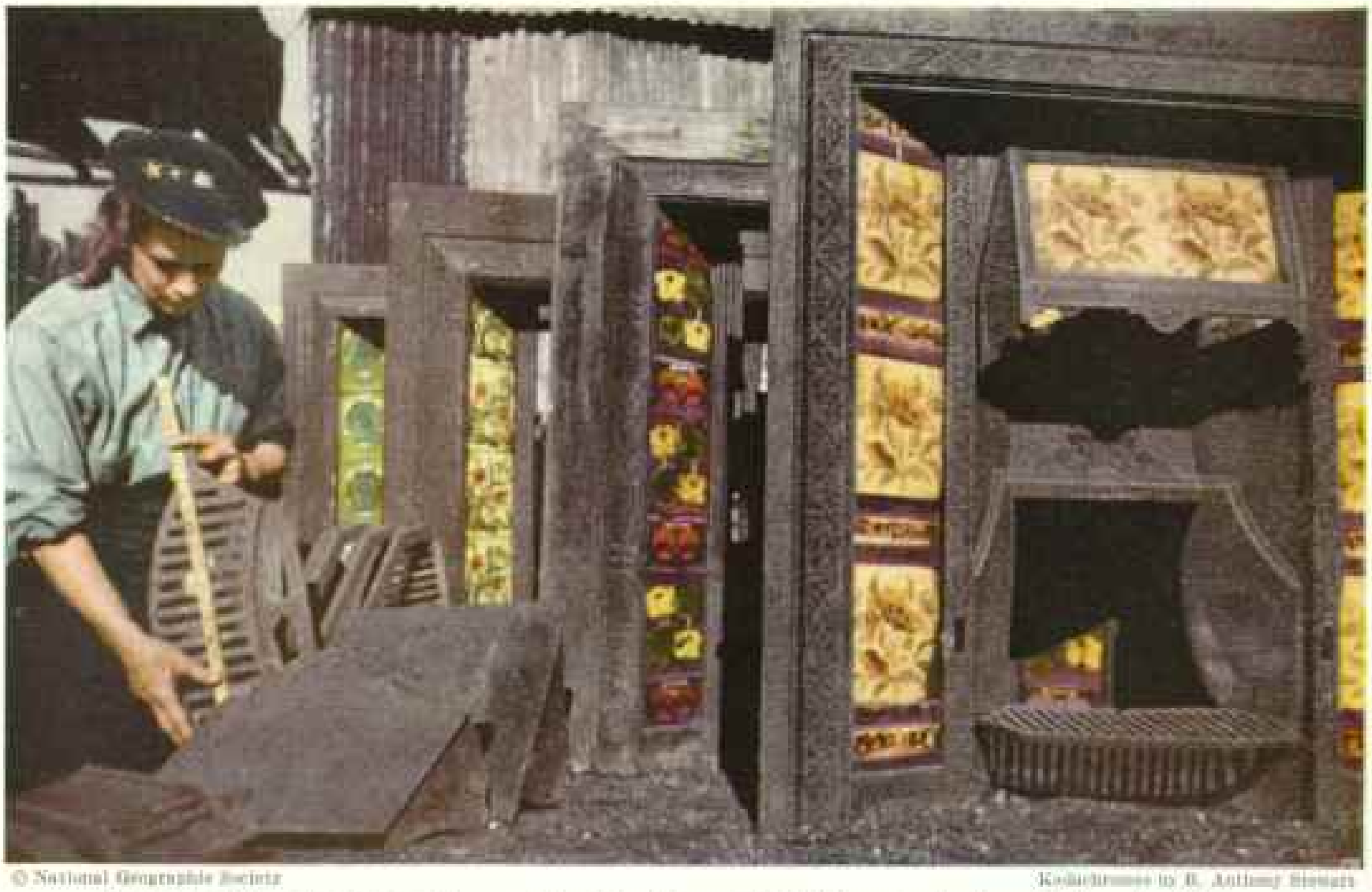
Rotogravure by R. Anthony Stewart

Fire-swept Downtown Plymouth Is a Hollow Shell. The Wonder Is That Any Part Remains

Though 15th-century St. Andrew's (left) is burned out and roofless, services are still held. Across the street, the razed area was occupied by Popham's, the city's big department store. Three thousand bombs caused $100,000,000 property damage and left 30,000 Plymouth citizens homeless.

Their Shops Destroyed, Plymouth Merchants Carry On under Sheds

Though every big store in the business center was bombed out, few gave up. Many did business in the open.



 Kodachrome by B. Anthony Stewart

Salvaged for the New Plymouth, Fireplaces Find Storage below Galvanized Iron

While fighting for their lives, civil defense workers saved thousands of tons of materials. Mantels, doors, pipes, tiles, bricks, and even nails were snatched from the ruins. This young woman measures stray grates to fit them into fireplaces.

 Kodachrome by B. Anthony Stewart

Their Years Are Few Compared with Those of the Barbican's Storied Walls

Plymouth spread from this section, which overlooks Sutton Pool, the old harbor. Once the Barbican's gabled houses were protected by a castle's barbican, or outer defense work. Here the *Mayflower* sailed in 1620 with the Pilgrims. Plymouth knew Drake's *Golden Hind* and Cook's *Endeavour*, too. Sir John Hawkins was a native.

Kodachrome by B. Anthony Stewart

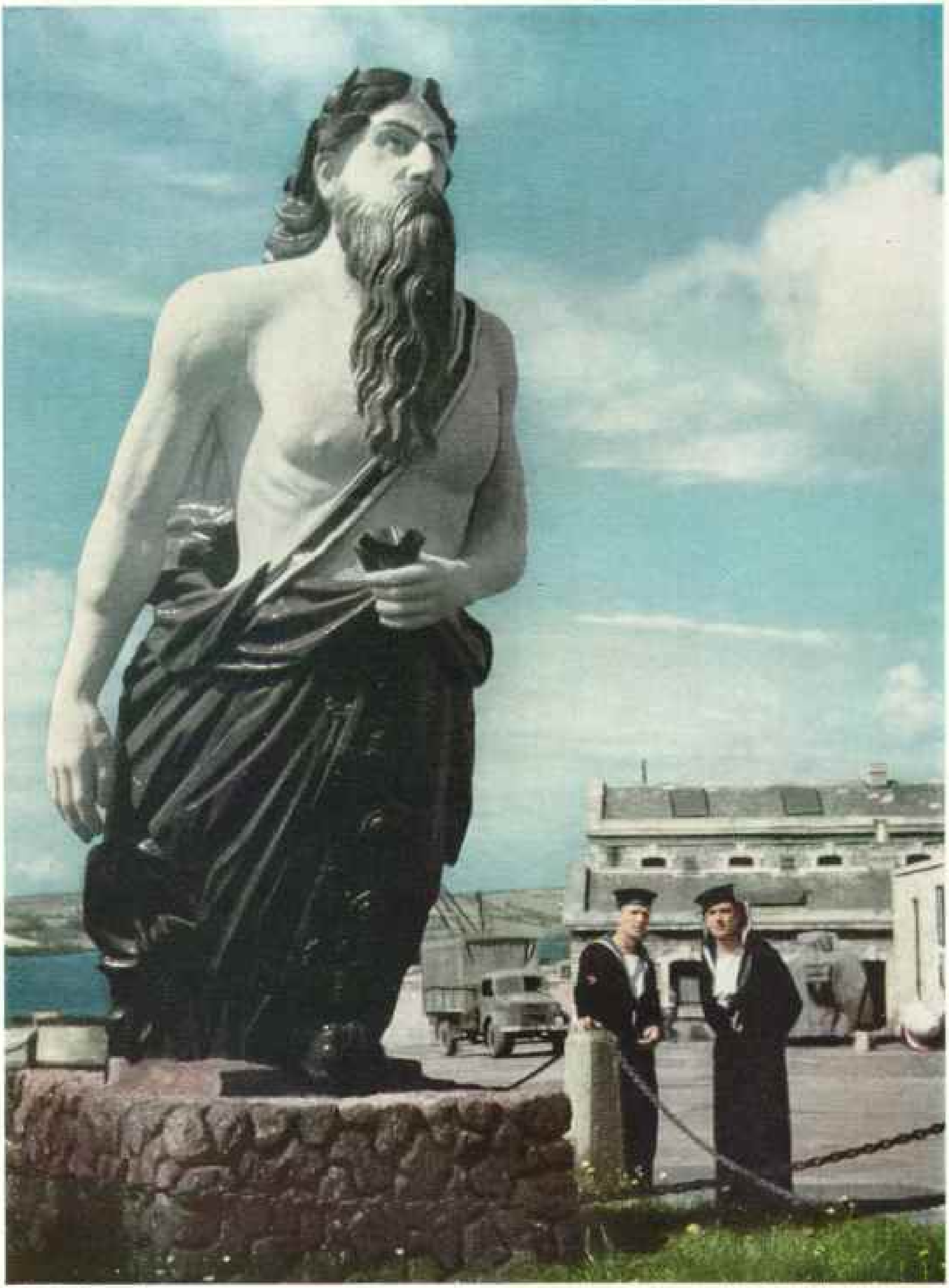
Where the Sea Is Fenced In with Concrete, Plymouth People Love to Bathe

Children enjoy the central fountain and sun bathers lie on the rocks. Standing on the Hoe, men of the Royal Navy look down on a carefree crowd. Even during the war this pool was used. At high tide ocean bathing is popular. Low tide exposes jagged rocks; then the pool is crowded.

Kodachrome by B. Anthony Stewart

Despite Blast and Fire, Plymouth Kept Right on Growing Flowers Throughout the War

Devon's mild, moist air produces blooms of singular brilliance. Devonshire violets are well known, and roses grow in profusion. This rose arbor, found in Westwell Street Park, makes a scented bower for pedestrians. There are many like it in and about Plymouth.



 Kodachrome by B. Anthony Stewart

From His Base in the Naval Dockyard, Tamar Rises Like Neptune from the Sea

Founded in 1691, the Royal Dockyard is Plymouth's principal industry. It contains a collection of brightly painted figureheads saved from old wooden ships. Some of these witnessed great battles of the past. This heroic figure derives its name from the river Tamar, which, flowing past Plymouth, separates Devon from Cornwall.

Drake didn't come back during this war's ordeal of Plymouth, but his spirit certainly did.

Plymouth is located in the southwest corner of Britain, at the point where the lush fields of Devon give way to the promontories of Cornwall. Only the narrow width of the River Tamar divides the two counties. Devonshire folk contend that Cornwall would fall off from the rest of Britain were it not for chains stretched across the river to keep the ferries on their course (map, page 215).

The city exists principally as a port of call for ocean liners and by virtue of the Naval Dockyard (Plate VIII).

There is a fishing industry and some manufacturing.

Plymouth has gained some distinction as a holiday and tourist center. Moreover, it serves as the shopping center for a wide area.

The climate is mild; however, there is plenty of rain and fog. People don't seem to mind either the rain or the fog. They will stand on the street and chat with water running down their necks, and you get accustomed, after a while, to seeing young women with dew in their hair and mist on their cheeks.

The coast is rocky and wind-swept. The country inland is one of the gentlest spots on earth, noted for its brilliant flowers, its green hills, and the softness of its foliage (Plate VII). Even Dartmoor, a much-maligned spot, has a certain gentle quality which belies the descriptions which you read in books and the impressions which you get from the movies. The fog comes over in sheets, to be sure, and the rain falls like a curtain; nevertheless, I spent Easter Sunday on Dartmoor and found it a far-from-forbidding place.

The Devon climate must be healthful; nowhere in the world will you see more old people. Everybody you meet seems to be 75 or so, and "youngsters" of 80 and even 90 are not uncommon.

Life Goes On

The people of Plymouth are a friendly lot. They are bluff and good-humored and, unlike some of their countrymen, do not hesitate to strike up a conversation with strangers.

Life in the once-beleaguered city today goes on more or less as usual. People still work, go to church, dance, ride, swim, play golf, send their children to school, attend the movies, and otherwise carry on the normal pursuits of humankind.

The city is of course beset by shortages, the most acute being the lack of houses. Consumer goods are desperately scarce.

The stores and the stalls which have been erected in the downtown area are crowded at all hours. There are queues everywhere.

Restaurants ask customers to vacate tables as rapidly as possible to make room for those who are waiting. Dart playing has had to be curtailed in one of the town's leading pubs for lack of elbow room.

Plans for the "New Plymouth"

The destruction of large sections of their city has given the people of Plymouth an opportunity for planning on a grand scale. J. Paton Watson, the city engineer and surveyor, and Prof. Sir Patrick Abercrombie, noted authority on city planning, have prepared a blueprint designed to make Plymouth one of the best laid out cities in Britain, if not in the world (page 220).

The Plan (it requires no further identification in Plymouth) goes far beyond the usual job of patching and renovation. Fate has given Plymouth an opportunity to create something positive, practical, and beautiful, and she is determined to take advantage of that opportunity.

"The new Plymouth," in the words of Lord Astor, "can be no 'half-and-half' affair. It must be rebuilt as a unity on land acquired by the public for this purpose. If a Greater Plymouth is to rise from the embers, its physical reconstruction must be unhampered and complete."

The undertaking, of course, is beset by many difficulties. The cost may well prove to be prohibitive, even though spread over many years and lightened by contributions from the National Government. The divergent interests of various groups, particularly shopkeepers, make agreement on specific details extremely difficult. Nevertheless, preliminary studies have been made and the City Council has moved to rebuild the city in a bold and comprehensive way (page 218).

The most spectacular feature of the plan is a new Civic Center. This is envisioned as a combined administrative-shopping-office-bank-amusement area, graced with modern buildings, suitably landscaped, and served by an adequate system of communications. It also includes a fine mall stretching from a combination railroad station and hotel to the Hoe.

A proposal as daring as this could hardly be made—and it certainly could not be carried out—in normal times. Conditions in Plymouth, however, are far from normal. Of the 150 acres involved in the proposed Civic Center, 100 acres have already been laid waste either by bombing or through neglect. This fortuitous juxtaposition of bombed areas and depressed areas has caused the Plymouth pro-

British Combine

In Plymouth Waters King George Welcomes President Truman Aboard the H.M.S. *Renown*

Our first American President since Woodrow Wilson to visit England, Mr. Truman paid a courtesy call on August 2, 1945, when he flew in from the Potsdam Conference. Afterwards His Majesty paid a visit to the President aboard the U. S. S. *Augusta* before she sailed for America.

posal to be called the "blitz and blight" plan.

Postwar housing is receiving a great deal of attention. Several thousand houses will have to be built merely to replace those destroyed during the war. In addition, it is estimated that half of the surviving houses will have to be replaced within the next quarter of a century. Even before the war, a survey revealed that 25 percent of the working-class families were living in overcrowded quarters.

Blending the Old with the New

The authorities are groping for a style of architecture that will blend with the Elizabethan, Medieval, and Renaissance buildings still standing. They have set themselves against "archeological faking"; nevertheless, they do stress the necessity for a harmonious blending of the old with the new.

Old Plymouth will be preserved as far as possible, as will those memorials which are worth saving. St. Andrew's Church (Plate III and page 216) will probably be restored. Charles Church, second oldest in the city, will be left as a "garden of memory," and an interdenominational memorial to the 40 churches that were destroyed will be erected near by.

City officials believe there is room for an entirely new type of house and they like to quote a passage from Shaw's "Man and Superman": "The house he lives in has not altered as much in a thousand centuries as the fashion of a lady's bonnet in a score of weeks."

The housing program is a long-term proposition. Immediate need for shelter will be partially met by temporary structures.

The planners believe that Plymouth should be decentralized. They visualize a series of communities, each surrounded by a belt of green land, in place of the congested central city. Population is estimated at about 180,000 in 1960, compared to 220,800 prewar.

It is hoped to strengthen existing industries and perhaps attract new ones. The authorities also believe that the city's position as a port can be strengthened, that it can win a place in the air-transport field, that visitors can be attracted in larger numbers, and that the fishing industry can be expanded.

The Plymouth Plan includes a radical revamping of the transportation system.

Where a Big Store Stood, a Billboard Directs Shoppers to Its Scattered Departments

Popham's did business in the heart of Plymouth (Plate III). Bombed out, its departments moved into 24 separate establishments. Within a month 14 of these were blitzed again. Each section of this board gives an address. The young woman indicates she's going to the hairdresser's. If her husband seeks a barber, he consults "men's hairdressing." A department store funeral is unusual even in England.

Fugitive from Women's Furnishings, a Dummy Models Furs Next to Vegetables

In a Clay-quarry Shed the Furniture of 800 Bombed-out Families Is Dusted Regularly

Plymouth moved the belongings of 12,000 families. Some owners were dead; others were in war-prisoner camps. The dollhouse belonged to a little girl who probably would have broken it by now save for the blitz. The figure "59" stands for the 59th raid; "7F" means the seventh family evacuated that day. The shed, hundreds of feet long, stands on the moor some ten miles northeast of Plymouth (page 222).

Decentralization, if achieved, will not be allowed to interfere with the agricultural hinterland; in fact, it is hoped that the outward trend can be controlled in a way that will utilize the least desirable land, from an agricultural standpoint, and spare that which is most suited for the growing of food.

The preservation of agricultural tracts will also provide the open spaces which are required as an antidote to the stress of city life.

The Naval Dockyard, the city's most important industry, will be given more room.

Recreational facilities have been planned.

John G. Winant, American Ambassador to the Court of St. James's, has congratulated the people of Plymouth on their vision.

"In the language of the *Mayflower* Compact," he said, "you have done what is 'most mete and convenient for the general good.'"

What Plymouth is able to do may well have a profound effect upon what happens to the others. This unconquerable community has embarked upon a bold experiment which will be followed with an interest hardly less keen than that which was bestowed upon her resistance to enemy bombs.

The people of Plymouth are conscious of the place which they have earned for themselves in history. They see writers, artists, and cameramen climbing over the rubble of their city to perpetuate for posterity the record of their historic siege.

Plymothians are determined, above all, to make their city a good place in which to live. Across the front of their Plan is emblazoned a Chinese proverb given to them by our own Admiral Harold R. Stark:

"If you are planning for one year, plant grain; if you are planning for ten years, plant trees; if you are planning for 100 years, plant men."

Plymouth is planning for 100 years.

Holland Rises from War and Water

By Thomas R. Henry

OF ALL the countries overrun by the Germans, none that I have seen has made swifter progress toward normal living than the picturesque little Kingdom of the Netherlands, even though it is still cut off from much of the rich colonial empire which contributed greatly to its prosperity (page 257).

As I traveled by Canadian Army jeeps over a considerable part of the Kingdom in 1945, I saw the Dutch everywhere hard at work in the restoration of their homeland.

This was my first visit to the land of tulip fields, cattle, canals, and windmills since the winter of 1939. Only a few months had passed since the capitulation of Germany, the withdrawal of the Wehrmacht, and the disappearance of the skull-and-crossboned terrorists of the SS.

The Netherlands had endured unspeakable tortures under German occupation. In five years nearly 200,000 Dutch citizens, including some 110,000 Jews, had fallen before German firing squads or perished in the cyanide "shower baths" of concentration camps because of suspected anti-Nazi activities or Jewish ancestry.

Close to a million had been taken from their homes for forced labor in Germany, Poland, and Russia.

I had met groups of hundreds of them on the roads of Germany in the previous months —vagabond men and women dragging behind them all their earthly possessions in hand wagons patriotically decked with Dutch flags. Now most of them, home again, had picked up the broken threads of their lives.

All the Netherlands' industry had been geared to the German war machine. Some of the richest land of the country had been flooded with salt sea water, and thus presumably rendered useless for agriculture for years to come (page 241).

Sturdy Dutch Fight Their Way Back

But already the sturdy Dutch were rising from the tragic effects of war and water, fighting their way slowly back with the same hard work and determination which in their earlier history won much of their land from the sea. It was difficult to realize that as recently as the previous spring these people had sunk to extremities of destitution and starvation.

The greatest suffering for the greatest number came during the last eight months of the war. Most of France and Belgium had been liberated. By November, Canadian, British, and American forces were established firmly in the southern provinces of the Netherlands.

As the Germans withdrew and concentrated in the Provinces of North and South Holland and Utrecht, that important part of the Netherlands became a fortress under siege (map, page 240).

Previously there had been constant passage of supplies across the German border, and the great Dutch cities had been able to draw on rich agricultural areas of their own country.

Aside from German tyranny and arrogance, life does not appear to have been too hard during most of the war. There was little real hunger; the minimum requirements for food and fuel were almost always available.

But during the last war months the highly concentrated commercial and industrial area of the country had been left to starve. At one time less than a pound of bread and two pounds of potatoes constituted the ration for a week in Amsterdam.

Some of the Starving Ate Tulip Bulbs

Women traded diamond rings for milk for their babies. Humans ate grass like cattle. Some of the hungry ones devoured non-poisonous species of tulip bulbs, though bulb eating did not become a widespread habit. People who ate them say they tasted like onions, but had a slightly sweet flavor. Tons of sugar beets were eaten, though nobody liked them.

Only in the last days of the war were the British and Americans able to relieve this starvation to some extent with food dropped from their planes, in accordance with an agreement between the Allies and the still-resisting Germans.

In the first autumn of peace, food was still scarce throughout the country and a strict ration system was enforced. But one found little evidence of a black market, and nobody was desperately hungry any longer (pages 238, 246, 247).

A holdover from the starvation days was the continued scarcity of tobacco, which resulted in a standard price of one guilder—approximately 40 cents at the United States Army exchange rate—for a single American or British cigarette. A pack of 20 could be sold easily for the equivalent of $8.

With imports cut off, the only wartime source of tobacco consisted of the few tobacco plants people were allowed to set out in their

Planet from Black Star

A Utrecht Shop Window, Empty Five Months, Feasts Starved Eyes on Canned Meat

The Allies assembled Europe's "largest grocery" for the starved Netherlands. With its liberation, they poured in a tide of meat, vegetables, flour, cheese, margarine, sugar, tea, and dried eggs. "It was a sight never to forget," said a Dutch woman. "White bread tasted like cake. I found myself crying like a child." This window shopper reflects the general emaciation.

gardens. The leaves were sent to a factory and returned to the grower as tobacco suitable for pipes or cigarettes.

Before the war the Netherlands was one of the world's great cigar-manufacturing centers. All along their route the American armies overran German storehouses packed to the roofs with Dutch cigars.

There still was a shortage of sheets and blankets. Hundreds of thousands of these were confiscated by the Germans in the last two years of the war. Clothing was shabby.

The most popular transportation in this flat country has been the bicycle. In 1939 there were nearly three and a half million registered bikes. Now there were fewer than a million. The others had been confiscated (page 252).

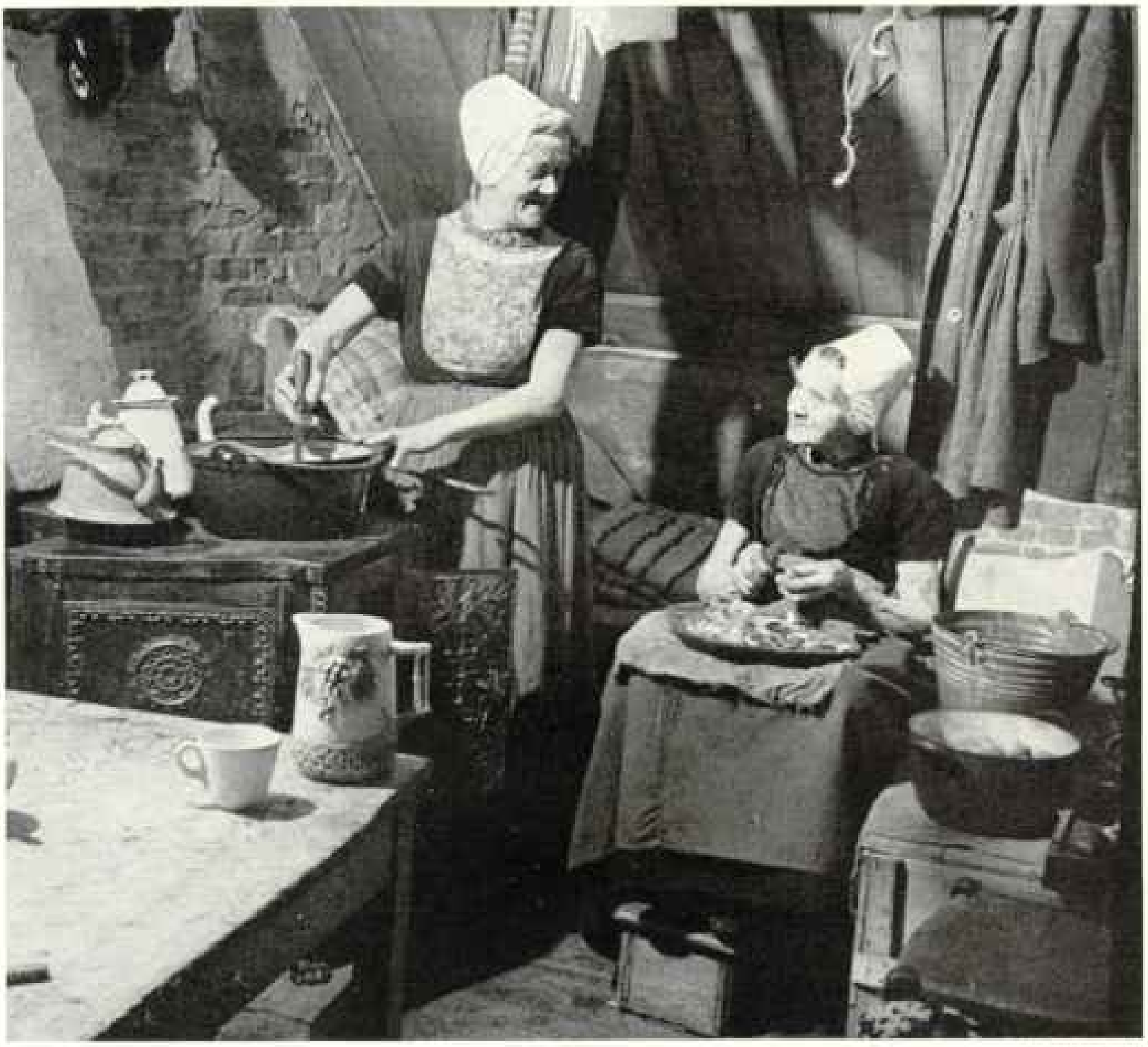
I heard no church bells. Nearly all had been taken by the invaders, who intended to use them for the metal. Some of the finest ones, however, have since been recovered.

Dogs were rare. Families had been forced to give up their pets to the German Army, some perhaps to be used as food in concentration camps.

This is a grim enough picture. Hanging alone, it would be extremely shocking. But it is less disheartening when considered as part of the great panorama of desolation which is postwar Europe.

Returning Exiles Feared the Worst

Dutch exiles, returning to their homeland after the victory, found a relatively intact country. In a few cases towns they had



British official

Refugee in an Attic, a Dutch Kitchen Sits Ten Feet above the North Sea Flood

Many Walcheren islanders, intensely conservative, refused to leave their homes (page 241). During low tide, some women worked in kitchens that were waist-deep at high tide. These housewives talk about little save the depth of the water. Spiral gold ornaments, handed down from generation to generation, decorate their bonnets at the temples.

known were rubble piles. Many familiar faces had vanished. But the changes were considerably fewer than they had feared during the heartbreaking years of exile when news from the Netherlands had been spasmodic, occasionally tinged with hysteria and subject to exaggeration and distortion.

This had been true especially with respect to damage from flooding. Reports reaching England had led to the fear that the returning Dutch would find great tracts of waste marshland where formerly had been fertile fields—salt marsh which would be essentially useless for agriculture for a quarter of a century.

Such destruction threatened to be one of the worst tragedies of the war. Bricks, money, and human energy could rebuild bomb-gutted towns in a few years. Restoration of land poisoned by sea water presented a much more difficult problem.

Approximately one-fourth of the Netherlands lies below sea level. Seen from the air, much of the land appears as a great sheet of delicate green lace with cities and villages like crocheted designs in a gossamer fabric of rivers, fields, and canals. The Meuse (Maas) and the Rhine with their branches and tributaries form a wide network.

The land has been reclaimed from these rivers and from the sea by intense labor over many generations. It is protected by elaborate systems of dikes and drainage canals, the latter serving also as waterways. Otherwise, much of the Kingdom would be marsh, practically worthless for agriculture and capable of sustaining only a small population.

Rhine Delta and the Netherlands Are One

Here Germany's "Father Rhine," losing its name, splits into several arms. Much of the Netherlands lies below sea level (shaded areas). Holland, the country's popular name, is its former political core. North and South Holland are but two of 11 provinces.

From the unique character of the Dutch landscape comes the equally unique national-defense system. The sea and the rivers can be allies in war as they can be relentless enemies in peace. The water can be mobilized against an invader by opening the dikes and flooding selected areas in the path of an advancing army.

Such tactics were completely successful during the Dutch war for independence against Spain, when troops of the Duke of Alva were besieging Leiden in 1574. The plight of the starving city was desperate.

The dikes holding back the North Sea were cut, and Leiden, though not on the sea, had the sea brought to it. At the last moment

a great storm came out of the west. It piled the waters over the land to such a depth that the "Sea Beggars," the freebooter navy of the Prince of Orange, were able to sail to the relief of the patriot defenders. It was one of the miracles of history.

The event became enshrined in Dutch legendry. Holland owed its salvation to its eternally loyal ally, the cold, storm-swept sea.

When the French invaded Holland just after the French Revolution, however, little effort was made to stem their advance by inundations. In the intense cold of that winter, rivers and low-lying lands became a sheet of ice over which the invading force could maneuver at will.

Thenceforth until 1940 the country had comparative peace. Modern engineering evolved. Dike and canal engineering became a highly specialized profession. It was naturally a specialty of the Netherlands, where it held a place of more vital significance than in any other part of the world.

As modern military science also developed, it was inevitable that Dutch military engineers should consider the dikes, with the possibility of flooding extensive areas, among their greatest assets. This was demanded by tradition, even if unsupported by science.

The only threatening power was Germany. In the path of the *Boche* the river dikes could be opened. This would flood a narrow strip of farmland with harmless fresh water. There would be no permanent damage. It might even increase fertility.

Accordingly, a water line which traversed the country from north to south, beginning at Muiden, on the Zuider Zee (IJssel Meer), and running just east of Utrecht and Gorinchem, on the south, was created against the Germans in 1940 in an effort to halt their progress against the great cities of western Holland.

Dutch plans for national defense called for holding this area to the last ditch. In fact, this "New Holland Water Line" was to be the last ditch, designed to seal off the area from the east with an expanse of water one to five miles wide extending essentially from the Zuider Zee to the Waal River region. The zone was provided with permanent defense positions in the form of casemates and massive earthworks.

Salt Water Damage Less than Reported

As matters turned out, the plan proved futile. The Netherlands General Staff had not foreseen the speed and fury of the German advance, which employed specially constructed boats and "vertical envelopment" by paratroops. The earthworks were obsolete. At the end of the five-day war the fate of the Fortress of Holland was sealed.

During March, 1944, the Netherlands Government in London received ominous reports that the Germans, fearing an Allied invasion along the coast of the Netherlands, were flooding large areas with sea water. This meant that the land, impregnated with salt, would be barren for years.

These reports were somewhat exaggerated. The end of the war found only two major areas actually under salt water. One was Walcheren Island, in the Schelde estuary, which contains the two large towns of Middelburg and Flushing (Vlissingen). Since its fortifications control the approach to Antwerp, this was a vital point in the German defense system.

In October, 1944, RAF flyers blew four huge breaches in the island's dikes, covering about 40,000 acres with 1,500,000,000 cubic feet of sea water. When I was there, it had been possible to repair only one of the gaps. Walcheren remained largely covered with water. Twice daily, tides poured over it at an estimated speed of ten miles an hour (pages 239, 242, 254).

Islanders Lived an Amphibious Life

Most of Middelburg and Flushing stood above the waves. So did half a dozen old villages which were built on higher ground. Nearly all transportation was by water, with one narrow roadway along the top of a dike between the two principal towns.

The flooded interior was a place of tragic beauty, with the endless lines of dead trees on both sides of the flooded roads giving the island a weird aspect of premature winter in late summer. Those inhabitants who remained gradually grew accustomed to an amphibious existence. The peasant women afforded a curious picture as they went about in boats, wearing their traditional costume with its huge, gold-ornamented lace bonnet.

Hundreds of houses were totally destroyed and several thousand were so badly damaged that it probably will be necessary to raze them.

At first it was assumed that the sea water would make Walcheren a desert for at least ten years. It was even proposed that the island be given back to the sea. Later developments, however, give grounds for a more optimistic outlook. As I write, repair of the dikes has been more rapid than was thought possible at first, when lack of materials and transport seemed insurmountable obstacles.*

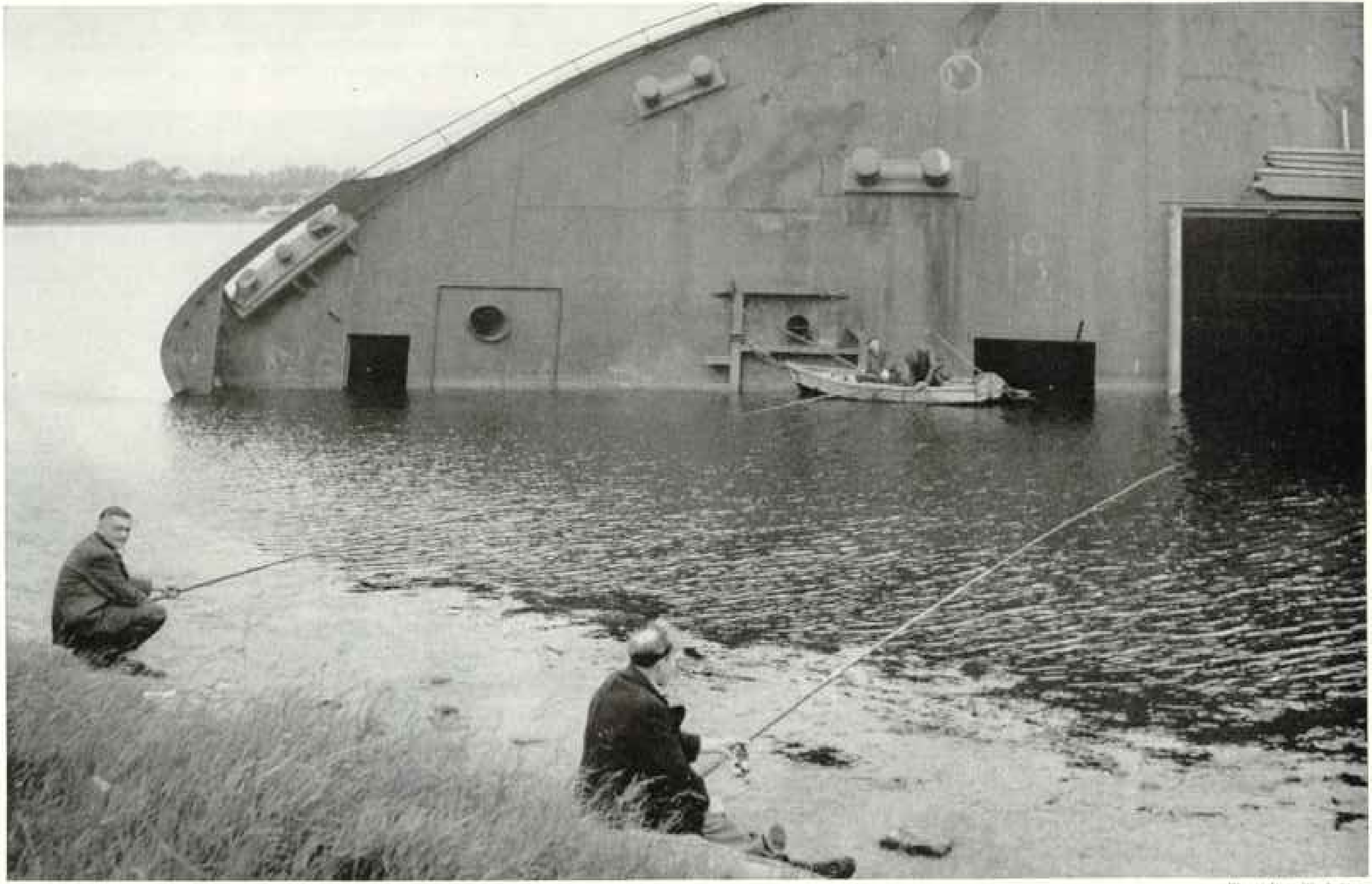
Agricultural scientists have now developed

* All breaches in the Walcheren dikes are now completely or partially closed.

British Information Services

A Willow Mattress, Couch for Stones and Sand, Mends a Walcheren Dike Breached by RAF Block Busters to Drown Nazi Guns

In October, 1944, this island paid a heavy price that Allied shipping might use the channel into Antwerp, Belgium (map, page 240). As the sea raced across farm lands, the British followed in assault boats. This winter the last of four breaks was being sealed. Here at Westkapelle high tide pours in from Holland's old enemy, the sea (left). British concrete caissons, similar to Normandy's artificial harbor works, are sunk in the breach. Left: A landing craft, LCM, beaches on the dike. Right: A Dutch windmill, with no grain to grind, stands idle.



Planet from Black Star

This Rusting Freighter, Hitching Post for a Fishing Boat, Was Scuttled to Block Allied Use of Amsterdam's Port

Germans paralyzed the city's diamond industry by confiscating stocks and deporting artisans. They stole all machinery in the Fokker aircraft plant. They sowed mines in the harbor; blew up cranes, warehouses, and pipelines; destroyed buoys and navigation lights. Last summer Liberty ships got through with foodstuffs.

British Official

Here, under Daylight Fire, American Paratroopers in Assault Boats Crossed the Waal River and Captured Nijmegen Bridge Intact

On September 20, 1944, the Stars and Stripes was raised over the far shore. Meanwhile, Britons stormed the bridge house (right), where the Nazis made a desperate stand. Though the enemy mined the span, Dutch patriots cut the wires and saved it. Then German swimmers in rubber suits vainly tried to dynamite it. Liberated, front-line Nijmegen endured German bombs and shells for 137 days. Arnhem, ten miles away, saw the battle that might have decided the war in 1944.

Planet from Black Star

Rotterdam Children, Freed from Fear, Outrace Their Smiling Elders Marching to Meet Food-bearing Canadians

In September, 1944, Germany imposed slow starvation in reprisal for a Netherlands railroad strike called to aid the Allies. To exist, some city people ate tulip bulbs. Much of Rotterdam is ruined. On this undamaged street, tricolor flags, hidden five years, suddenly appeared, but no dogs or cats. Automobiles likewise were missing.

Planet from Black Star

In Comes a Tank Barge with Free Allied Milk to Relieve Amsterdam's Famine

Last winter Amsterdam's milk was cornered by the black market, and 90 percent of the cream was skimmed off. The food ration fell to 317 calories. Even water was doled out. To conserve energy, many citizens lay abed 18 hours a day. Ignoring the Nazi curfew, they slipped out after dark and chopped firewood. Trees along this canal survive probably because they served as camouflage. By hiding in secret places, men pictured here escaped room-to-room searches for slave labor.

Planet from Black Star

No Longer Afraid of Warplanes, Hungry Hundreds Form a Living, Waving Target for the "Food Bombing" of Rotterdam

Secretly advised of the RAF's coming, Netherlanders did not race to shelters last April 29, when the German Army was still in control. Instead, they turned eager faces skyward; they flew white flags, sheets, and tablecloths from nearly every roof. When 250 bomb bays dropped food packages, carts, perambulators, and bicycles raced to delivery areas. Six days later, American Flying Fortresses brought more. This "manna from heaven" seemed more important than the Nazi surrender.

Wheeler from Black Star

Four Wrinkled Faces Beam at the Warm Reception in an Allied Refugee Camp

Such a Dutch woman, liberated and fed, wrote: "Today we got margarine, cheese, and one heavenly bar of chocolate. You cannot imagine the feast we had. To crown the event, we were given real tea. I cannot describe our enthusiasm for the Americans and British."

techniques which, they believe, will somewhat ameliorate the effect of the salt on the land. It will be at least a quarter of a century, however, before Walcheren will look again as it did before the bombing of the dikes. That much time will be required to restore the trees, which perished quickly when their roots were immersed in salt water.

The flooding of Walcheren was a grim necessity of war. It was part of the price the Netherlands paid for its liberation, and even the homeless people do not feel too bitter over the disaster.

Pointless Nazi Fury Flooded 50,000 Acres

Quite different, however, is the story of the other major area now flooded with sea water, the district of Wieringermeer Polder, north of Amsterdam, where early last spring the Germans blew a hole 400 yards wide in the dike which holds back the waters of the Zuider Zee. This district was one of Holland's latest acquisitions from the ocean. It was entirely reclaimed land.*

Approximately 50,000 acres were flooded. Most of the houses were ruined. Millions of bushels of potatoes and grain were lost, and the loss in agricultural implements alone is estimated at about $3,000,000. The act, as far as can be seen, served no military purpose and was intended as pure terrorism—an example of what might be done to other large areas.

The hole in the dike has been repaired, but the water will be pumped out slowly in hopes that it will carry with it most of the salt. The summer and autumn of 1945 were exceptionally wet. Every heavy rain dilutes the salt content of the water covering Wieringermeer Polder and enables it to absorb more of the salt deposited in the soil. Gypsum from Belgium is being used to neutralize the salt. Cultivation may be resumed this spring, but to raise a normal crop on this polder will require from two to six years, depending on the amount of rainfall and on the nature of the crop.

Southeast of Utrecht, around the old city of Tiel, is an area flooded early in the war, from which the water now has been cleared. It was covered with fresh water. The land was not injured. Unfortunately, however, this was the Netherlands' richest orchard country.

* See, in the National Geographic Magazine, "New Country Awaits Discovery," by J. C. M. Kruisinga, September, 1933.

Mile after mile was covered with cherry and pear trees. These orchards now appear to be dying. At least five years will be required before the trees can be restored.

Over this part of Holland the tide of war surged back and forth in the autumn of 1944, following the British airborne landing near Arnhem, and all the towns are badly damaged by shellfire. Many farmhouses were destroyed, and the families now are living in temporary structures sent from Sweden. One of the Netherlands' greatest benefactors since the end of the war, Sweden has furnished much of the present food supply.

Heavy destruction is evident through the entire Province of Gelderland, where bitter fighting occurred. The name most associated with this phase of the war is that of the old city of Arnhem, many of whose streets now are heaps of rubble. It was a town of fine residences, the homes of retired well-to-do families.

The Center of Rotterdam a Weed Field

My own greatest shock came when I arrived in Rotterdam for the first time in six years. Fields of green weeds, intersected by footpaths, cover large sections of what once was the heart of this great city.

About six years ago Rotterdam was a rich and important commercial center. Through its stores and warehouses flowed the tea and spices of the Indies (page 257). A vast variety of goods moved out of Central Europe to world markets by way of the Meuse and the Rhine.

Counters of great department stores were piled high with products of Europe and Asia. Luxurious hotels and blocks of glass-walled apartment houses represented the most modern architectural designs. Such streets as the Coolsingel were jammed with traffic night and day.

For eight months after the beginning of the war, Rotterdam, with a population of some 600,000, was literally an island of light with its neon advertising signs flashing in the darkness of western Europe. Travelers from dim-lit France and Belgium felt that they were coming into a sane world again as trains neared the Dutch metropolis and they saw the city's luminescence reflected against the sky.

The story of the bombing of Rotterdam still is somewhat confused. It started at 1:30 p. m., May 14, 1940, three hours after surrender negotiations had begun. The Germans had threatened to destroy not only Rotterdam but also The Hague, Amsterdam, and Utrecht. In the case of Rotterdam, they went ahead with their plans anyway, without giving the inhabitants any warning.

Large bombers viciously attacked a section in the heart of the city. This was long before anyone had dreamed of the great "block buster" bombs which later contributed to the downfall of Germany. Much use was made of fire bombs, and these apparently caused the greater part of the damage by starting conflagrations against which the fire fighters were helpless.

Germany never offered any valid explanation for this act of wanton destruction. Apparently the outrage was pure terrorism. It was a significant factor in turning the sentiment of the rest of the civilized world definitely against the Axis powers.

Naturally, early reports were contradictory and somewhat exaggerated. Loss of life, for example, was estimated as high as 100,000. Actually, it now appears, about 10,000 were casualties. This is more in keeping with air-raid statistics elsewhere. Many of the victims were drowned when water from the canals flooded the shallow basements where they had sought shelter.

Nature Helps Rotterdam Hide Its Scars

Rotterdam today looks as many of the blasted cities of Central Europe—Cologne, Koblenz, Frankfurt, Hamburg, Berlin, Budapest—may look three or four years hence. With a little assistance from man, Nature hides quickly the scars of war.

The chief commercial thoroughfares exist no more, except in some cases as muddy footpaths across vacant city lots covered with green weeds and with occasional patches of blue or white wild flowers which have sprung up on the ruins.

Old residents of Rotterdam, back after five years of exile, can hardly find their way; they have difficulty locating the spots where once stood the apartment houses which were their homes or the office buildings where they worked.

In the central part of the city, in an area of 525 acres, the Nazis destroyed 25,000 dwellings, 500 restaurants, 4 hospitals, 21 churches, 69 schools, 1,200 factories, and more than 2,300 retail shops, banks, theaters, and other buildings, not counting harbor installations.

A stranger might well assume that the dreary stretches of vacant lots always had been there. It would be hard to convince him that in so recent a past the muddy, twisting footpaths through the weeds had been wide avenues lined with majestic buildings, or that one of the finest hotels in Europe once stood on a vacant lot where goats are browsing.

Planet from Black Star

Food Hunters, Liberated Far from Their Homes, Return from Country to City with Baby Buggies and Bicycle Trailers

Last winter thousands trekked out of foodless cities in three "hunger provinces." Those who survived wandered like gypsies, sleeping in haystacks and subsisting on handouts. Many who collected food lost it to Nazi confiscation at the end of 200-mile walks. Near Amersfoort, this British soldier inspects passes.

Rotterdam, lying practically at sea level, had few cellars; consequently there were no gaping cellar holes to be filled with rubble, as was the case in most other bombed cities.

The Dutch have a passion for neatness. Hardly had the fires been extinguished when citizens were busy knocking down tottering walls and putting the bricks and stones in neat piles, thus leaving the building sites vacant for the grass and weeds.

On these lots many temporary buildings have been erected to house essential stores and offices. These are neat one-story structures with show windows piled high with merchandise. The appearance of parts of central Rotterdam today is in some respects like that of the boom towns in our old West, except that everything is much neater than was reputed to be the case in such towns.

The area of destruction covers approximately one and a half square miles, but it is not continuous. Here and there are blocks which escaped without much injury. These are almost unchanged in appearance from prewar days.

Amid the emptiness stands the skeleton of the city's largest and most historic religious edifice, the Church of St. Lawrence, or Groote Kerk. The interior is completely burned out and all the windows are gone. It will be restored as part of the reconstruction plan.

Outside the devastated area in the center of the city there was little damage. Life goes on as usual in the outlying sections. The harbor area was bombed several times in 1943 by the RAF and AAF, but the damage was slight compared with the punishment administered to other German-held cities.

The Germans apparently attached little strategic value to Rotterdam and made small use of one of the finest harbors in Europe. Since the city was liberated by Canadian troops last May, most of the industries have resumed operations. The great need is housing, for very little building has taken place since the catastrophe.

V-2's Launched Near The Hague Peace Palace

The Hague—the beautiful old town which is the seat of the Netherlands Government—is the city of peace. There stands the Peace Palace, home of the Permanent Court of International Justice.

When I saw it, the picture was fantastic. Every window in this splendid building, erected through the generosity of the late Andrew Carnegie, was broken. In the wood immediately behind the Peace Palace there were large seared areas.

Of all places, the grounds of the Peace Palace were used by the Germans as V-2 launching sites. From here scores of these deadly projectiles were hurled against England. The wood offered fine concealment. The seared places in the foliage were caused by the flames which spurt from these monsters as they leave the ground. The Peace Palace windows were smashed by one which failed to get away and exploded in the air near its starting point.

Curiously, one of the first air-raid shelters dug in The Hague in the early autumn of 1939 was on the Peace Palace grounds, intended as a refuge for members of the staff.

The work of the Court of International Justice was suspended, only unfinished cases being concluded, and foreign judges and their staffs who had remained at their posts were evacuated. The justice representing the Netherlands on the tribunal remained in charge of the building. From the beginning it was respected by the Germans and there were no acts of vandalism here.

V-2's were launched from many places in The Hague and its suburbs. These, residents who watched the procedure told me, required no permanent launching sites. They were extremely mobile. Any patch of wood where the launching apparatus could be concealed was good enough. This apparatus could be shifted quickly from one site to another when there was reason to suppose a launching place had been detected by scouting British Spitfires.

From the city and its environs the Germans launched the V-1's (the "flying bomb") as well as V-2's (the huge stratosphere rocket). Often the launching mechanism miscarried, and the deadly missiles fell in The Hague.

The Peace City Made a War Trap

With the exception of Rotterdam, The Hague suffered most of all Dutch cities. Here in September, 1941, Hitler started to build his "Atlantic Wall" which would secure his vaunted "Fortress of Europe" against invasion from the west while the bulk of his forces were engaged in the projected Russian campaign. The Hague was planned as one of the anchors of this wall.

The first landmark to go was the celebrated seaside resort of Scheveningen, long famous for its colony of fisher folk whose women added atmosphere to the place by their old Dutch costumes. This beach was entirely cleared (page 253). Summer homes were demolished and pillboxes took their places.

Extending toward The Hague itself, an area one and a quarter miles deep, reaching back from the coast, was evacuated. About 8,000

Utrecht Goes Cycling on Metal Rims, Hard Rubber, and Pneumatic Tires

"Herds" of bikes were a familiar sight in the peacetime Netherlands. As tires wore out, garden hose, cord, and demountable wooden tires were substituted. On bumpy surfaces, bare rims made as much noise as wooden shoes. When food deliveries failed, the tricycle cart (right) became worth a small fortune.

houses were demolished in this operation. Later another deep strip was evacuated and the houses were destroyed.

The Atlantic Wall here was planned as a masterpiece of military engineering, affording unobstructed fields of fire in several directions. In addition, a tank trap, one-third of a mile wide and running straight across The Hague, was built. These measures required the demolition of several hundred more buildings, including churches, hospitals, schools, and private dwellings. Woods were cut down and lakes filled. Fortifications were extended both north and south of the town. At least 85,000 residents were evacuated from the city.

Most of the work was done with Dutch labor.

The Hague was the first objective of the German surprise invasion on May 10, 1940. Paratroopers, many of them allegedly wearing Dutch uniforms, seized the airports around the city and then surrounded the small palace of Queen Wilhelmina, the "House in the Wood." They were driven off by the palace guards.

The Queen immediately moved to her palace within the city, where a surprise attack was less likely and means of defense were better. German troops laid siege to this palace. Some members of the court were killed in its defense. Queen Wilhelmina's son-in-law, Prince Bernhard, was among the defenders firing on the attacking force from the palace roof.

Obviously, one of the major objectives of the Germans at this time was to get possession of the Queen, through whom they hoped to be able to rule with some show of legitimacy. The Hague was too dangerous a spot.

The Queen escaped with members of her staff to Hoek van Holland, the North Sea port which is the gate to Rotterdam. Then she was taken to England on a British destroyer, and the Netherlands Government in exile was established in London.

This, events were to prove, was a wise move. At first the German intent was to conciliate the Dutch. The excuse for invasion was that they had come to save the country from attack by Great Britain and France. They hoped the Dutch would accept this argument and cooperate in the war as a unit of the Reich, somewhat as did Austria.

A curious sidelight is that many of the paratroopers used in the original invasion were Austrians who knew every road and

Black Star

This Spike-studded Tank Trap Replaced the Netherlands' Most Fashionable Promenade

Germans selected Scheveningen, a seaside resort near The Hague, as a likely invasion beach. Ruthlessly they demolished thousands of homes to make way for concrete, barbed wire, dragon's teeth, mines, and guns. This "Atlantic Wall" served no purpose but to destroy Scheveningen and despoil its beach (page 251).

byway of the countryside. They were the same Austrian orphans who had been taken to the Netherlands after the last war, reared in Dutch families, and educated in Dutch schools. Now they came back as soldiers.

The situation was much the same as that which shocked the world in the German invasion of Norway.* But the fact probably is that these Austrian boys were not consciously betraying their benefactors. Most of them had a sincere affection for the Dutch and had been recruited for the invasion on the plea that they were to "liberate" the Netherlands.

Nazi Conciliation Attempts Failed

German efforts at conciliation were a failure from the start and soon were abandoned. At no time did any considerable element of the population sympathize with Germany, although fifth columnists were much in evidence at the start and undoubtedly did much to bring the campaign to a rapid conclusion.

The National Socialist Party in the Netherlands always was negligible in numbers. It was headed by a curious little man named Anton Mussert, who was married to his own aunt and whose shoes were built up so that he would have the appearance of normal stature on the platform. Hitler seems to have been genuinely fond of him and always came to his rescue when he was in trouble. This was not infrequently, for Mussert was perpetually at odds with the Nazi authorities in the Netherlands.

The Hague, like Rotterdam, has come rapidly out of its Gethsemane. The Queen is back in her town palace, which, with its scores of bicycles in stands before the door, strikes one as being a rather plebeian sort of residence for the ruler of one of the world's greatest empires.

Despite the German devastations, the returning Queen found most that was of historic interest in The Hague still intact.

The Hague, Seat of Government, Not Capital

In early records the city is first linked with Count William, who had a hunting lodge here and began to enlarge it into a palace in 1250. Around the palace sprang up a settlement which is the nucleus of the present city.

The Hague—correctly 's Gravenhage, meaning "the Count's Hedge"—is the royal

* See, in the National Geographic Magazine, "The White War in Norway," by Thomas R. Henry, November, 1945.

British Official

From Boat to Door, an Elderly Walcheren Woman Treads a Rickety Catwalk. Her Street Is a Canal, Her Front Yard the Sea

Twice a day tides swept her flooded island. At high water people paddled boats into halls and tied up at staircases. At shallow points, German mine fields endangered boatmen. Doctors canoed to deliver babies. Cows were tethered on platforms teetering above the flood. Salt spoiled wells and killed trees (page 241).

Planet from Black Star.

Amsterdam Children Beat a Happy "Thank You" on Allied Food Tins They Emptied

By tying gift cans together, Dutch youngsters fashioned rafts which they propelled with the round tops. These children display leather and wooden shoes and bare feet. "How we wept when we shook hands with the first American boys!" one Netherlander wrote. "Our young people have had no youth. They hide in cellars and woods."

Planet from Black Star

Sister Wears an Orange Sash; Brother Carries a Gas Mask

When Allied troops met them at Hummelo, the countryside was ablaze in honor of the Royal House of Orange. Men wore orange rosettes and women orange hats. Horses and locomotives sported orange plumes. Abandoned by a fleeing German, the gas-mask container was salvaged as a plaything. Other Dutch boys played soldier in oversize Nazi helmets.

residence and the seat of the Netherlands Government, but, contrary to what is often taught in American schools, it is not the capital of the country. Amsterdam, which has nothing to do with the Government, claims that honor.

This is due to a curious historical evolution. After the seven Netherlands provinces had begun their efforts to throw off the yoke of Spain in the second half of the 16th century, they remained, in theory, seven independent nations bound together by agreement in a loose federation.

The Prince of Orange was recognized as the commander of the combined armies and navies. His residence was at The Hague. There also was a representative body of the provinces, the States-General, which conducted foreign affairs. The States-General had held sessions in several towns, but finally settled on The Hague.

But at that time the Netherlands did not consider itself as constituting a federated nation. Rather, it was a mutual-aid society of free states. There were fierce jealousies among the seven provinces. Every precaution was taken to avoid any act which might indicate a superiority of one over the other, such as designating any one city as the capital. There could not be a capital of a nonexistent nation.

But Amsterdam was by far the most important Dutch city and one of the leading financial centers of the world. Its citizens were fully aware of the big town's importance and were quick to resent any act which appeared as a slight. Such an act would have been designation of The Hague as capital of the federation. But establishment of Amsterdam as the capital would have been even more undiplomatic, for the countryside, as everywhere, resented any pretensions of the rich, sophisticated city.

Louis Bonaparte Made Amsterdam Capital

This status continued until the conquest of the Netherlands by the French and the establishment of the Kingdom of Holland under Napoleon's brother Louis in 1806. He promptly fixed his capital at Amsterdam. This arrangement was continued when the French were forced to leave the country after the defeat of Napoleon in 1813 and the establishment of the Kingdom of the Netherlands under the House of Orange.

But the monarch continued to live at The Hague and, following its old practice, Parliament continued to meet there. Naturally, other government establishments found this the most convenient location.

The constitution adopted in 1814, however, stated: "The Sovereign Prince shall take the oath and the States-General shall be inaugurated in the town of Amsterdam, this being the Capital." The arrangement has continued ever since.

The big city is the capital in name only, but it is proud of the title and probably would resent any change. The royal family has a palace there. Inauguration ceremonies must take place there. Otherwise most government activities are carried on at The Hague, which remains the political center of the country. Amsterdam is content to be the commercial and financial center.

The Hague has had relatively little industrial development. The din of commerce, as in Washington, D. C., is absent. It is a city of wide, clean streets and stately homes—a city of quiet, dignity, and wealth. It is a favored spot for the retirement of Dutch colonial officials and traders and planters who have made fortunes in the Netherlands Indies.

Wealth Flowed Here from the Indies

Into the coffers of this little country and its canny citizens, before the war, poured the storied "wealth of the Indies," greatly increased in modern times by shrewd development of the archipelago's remarkable agricultural and mineral resources.

Rubber trees, brought to the Netherlands Indies from South America and planted with parade-ground precision in vast plantations on Sumatra, Java, and other islands, in normal years supplied 35 to 40 percent of all the rubber used on earth.*

From the rich soil and tropical climate of this huge natural greenhouse came extensive exports of sugar, tea, copra, and palm oil. The islands had a virtual world monopoly of cinchona bark, from which quinine is made, producing 90 percent of the world's export total. They also provided 85 percent of the earth's pepper, 75 percent of its kapok fiber for life preservers, mattresses, pillows, insulation and the like, 25 percent of its sisal and other agave fibers, plus quantities of coffee, tobacco, tapioca, chocolate, spices, and timber.

Wealth also flowed to the Netherlands from the oil wells of the Indies, with revenue from petroleum and its by-products ranking second to that from rubber. In tin production only Malaya surpassed the Netherlands Indies.†

For their size, the Indies have become perhaps the most profitable of all the world's colonial possessions. In the last prewar year, 1938, their export and import trade totaled half as much as that of India, which is twice as large and has six times as many inhabitants.

Labor is cheap in the islands, and a heavy excess of exports over imports is made possible by the luxuriance of the rice and other crops which supply the food needs of the people.

Although increasing amounts of foreign capital have been admitted, most of the return from investments in the Indies still flows, in normal times, to the motherland.‡

Four cities—Rotterdam, The Hague, Amsterdam, and Utrecht—contain the bulk of the wealth of the Netherlands. They are the key towns of the so-called Fortress of Holland, one of the greatest concentrations of population and wealth in the world.

Amsterdam and Utrecht, as cities, suffered relatively little, though the misery of their populations, especially in the last terrible winter of the war, is another story. Virtually no destruction is visible on the surface.

Amsterdam Suffered Little from Bombs

There were several air raids on Amsterdam, the chief objectives being the great Fokker aircraft plants in the northern section of the city and the important Schiphol airfield. Most of these attacks, however, were carried out in daylight by American medium bombers. Only the targets themselves and the areas immediately around them were damaged.

One section of Amsterdam, however, looks

* See "Our Most Versatile Vegetable Product (Rubber)," by J. R. Hildebrand, National Geographic Magazine, February, 1940.

† See "Tin, the Cinderella Metal," by Alicia O'Reardon Overbeck, National Geographic Magazine, November, 1940.

‡ For additional articles on the Netherlands Indies in the National Geographic Magazine, see: "Keeping House in Borneo," by Virginia Hamilton, September, 1945; "Java Assignment," by Dee Bredin, January, 1942; "Timor a Key to the Indies," by Stuart St. Clair, September, 1943; "Airplanes Come to the Isles of Spice," by Maynard Owen Williams, May, 1941; "Unknown New Guinea," by Richard Archbold, March, 1941; "New Guinea's Mountain and Swampland Dwellers," by Ray T. Elsmore, December, 1945; "Treasure Islands of Australasia," by Douglas L. Oliver, June, 1942; "Through Java in Pursuit of Color," by W. Robert Moore, September, 1929; "Among the Hill Tribes of Sumatra," by W. Robert Moore, February, 1930; "Around the World for Animals," by William M. and Lucile Q. Mann, June, 1938; "By Motor Through the East Coast and Batak Highlands of Sumatra," by Melvin A. Hall, January, 1929; "Bali and Points East," by Maynard Owen Williams, March, 1939; "Artist Adventures on the Island of Bali," by Franklin Price Knott, March, 1928; "Celebes: New Man's Land of the Indies," by Maynard Owen Williams, July, 1940; "Island of Nias at the Edge of the World," by Mabel Cook Cole, August, 1931.

Planet from Black Star

A Canadian "Southpaw" Signs His Autograph for Admirers at Deventer

Everywhere Netherlanders welcomed their liberators with joy. Some greeters turned out despite falling shells. Saying farewell during a rainstorm, citizens of one village marched beside Americans and held umbrellas over their heads. Canadians played a major role in the Netherlands campaign.

as if it had been bombed, although nothing ever was dropped there. This is the Jewish quarter. It was never a "ghetto," in the popular understanding of the word, until the coming of the Germans. Official race discrimination is unknown in the Netherlands. It was a section of considerable wealth and many fine homes where Jewish citizens tended to concentrate.

After the German occupation this section was turned into a genuine ghetto, and persons of Hebrew faith from all over the Netherlands were brought there. Later most of them were taken to labor and concentration camps in Germany.

Of 140,000 Dutch Jews at the beginning of the war, only about 25,000 now are known to be alive. Except for a few who may have escaped, the others presumably perished in such hellholes as Dachau and Buchenwald or were put to death in the mass execution centers near Kraków and at Lublin in Poland.

The removal of the Jews left the houses in the old quarter vacant. Last winter the people of Amsterdam were dying of cold and hunger. There was no fuel. Hundreds raided these vacant houses, tearing out all the woodwork for firewood. Robbed of the support of their massive timbers, many of the houses collapsed. There are streets of ruins. Bombers hardly could have done a more thorough job.

Gaiety Returns to Unscarred Utrecht

Scars of war are even harder to find in Utrecht. The Canadians, who completed the liberation of the country, reached the city in April, 1945, and made it their headquarters for a while. During the five-day war it was attacked repeatedly from the air, but, the devastation of Rotterdam notwithstanding, air bombardment at the time was in a decidedly amateurish state. The Luftwaffe was still far from the full development of its technique or the full realization of the destruction of which

British Official

Nuns and the Aged, Their Village under Nazi Fire, Await Allied Transportation

These people lived at Best, a village in the Nijmegen salient driven into German-occupied Netherlands in 1944. A short while ago they saw Germans fleeing in horse carts, fire trucks, and hearses. Now the badly beaten enemy was striking back and these bewildered folk feared their liberation might be brief.

the air arm was capable. The rubble it left behind in Utrecht long since has been cleared away.

The city, however, was a pivotal point of the "New Holland Water Line" (page 241) and was one of the first large cities to be occupied by the Germans after the capitulation on May 14, 1940. With the return of peace it became one of the gayest spots in Europe, with perfect harmony between the thousands of Canadian soldiers billeted there and the liberated citizens.

Dutch Universities Caused Nazis Trouble

Throughout the war much of the resistance movement centered about the country's universities, long noted throughout the world for their liberalism.

Perhaps the most famous of these is the University of Leiden, founded in 1575 by William the Silent. Popular tradition has it that, in gratitude for the city's gallant defense against the Spaniards, he offered the citizens their choice of a university or several years' freedom from taxes. It is the alma mater of Hugo Grotius, the father of international law, in the study and practice of which the Netherlands has been in the forefront ever since.

Leiden was always a thorn in the side of the German administrators. The faculty stubbornly refused to recognize the Germans' right to abolish constitutional law or to approve the application in the Netherlands of the Nürnberg laws directed against Jewish citizens. Many students and professors were arrested.

One of the most eminent, Dr. B. M. Telders, professor of international law, died of typhus while a prisoner at the notorious concentration camp of Belsen. Nearly all the students took part in the Underground movement.

Finally realizing the impossibility of bringing Leiden into line, the Nazis ordered the university closed on December 2, 1940. It

Planet from Black Star

While Their Dads Hunt Food at Sea, Small Fry Fish from a Pier in Spakenburg

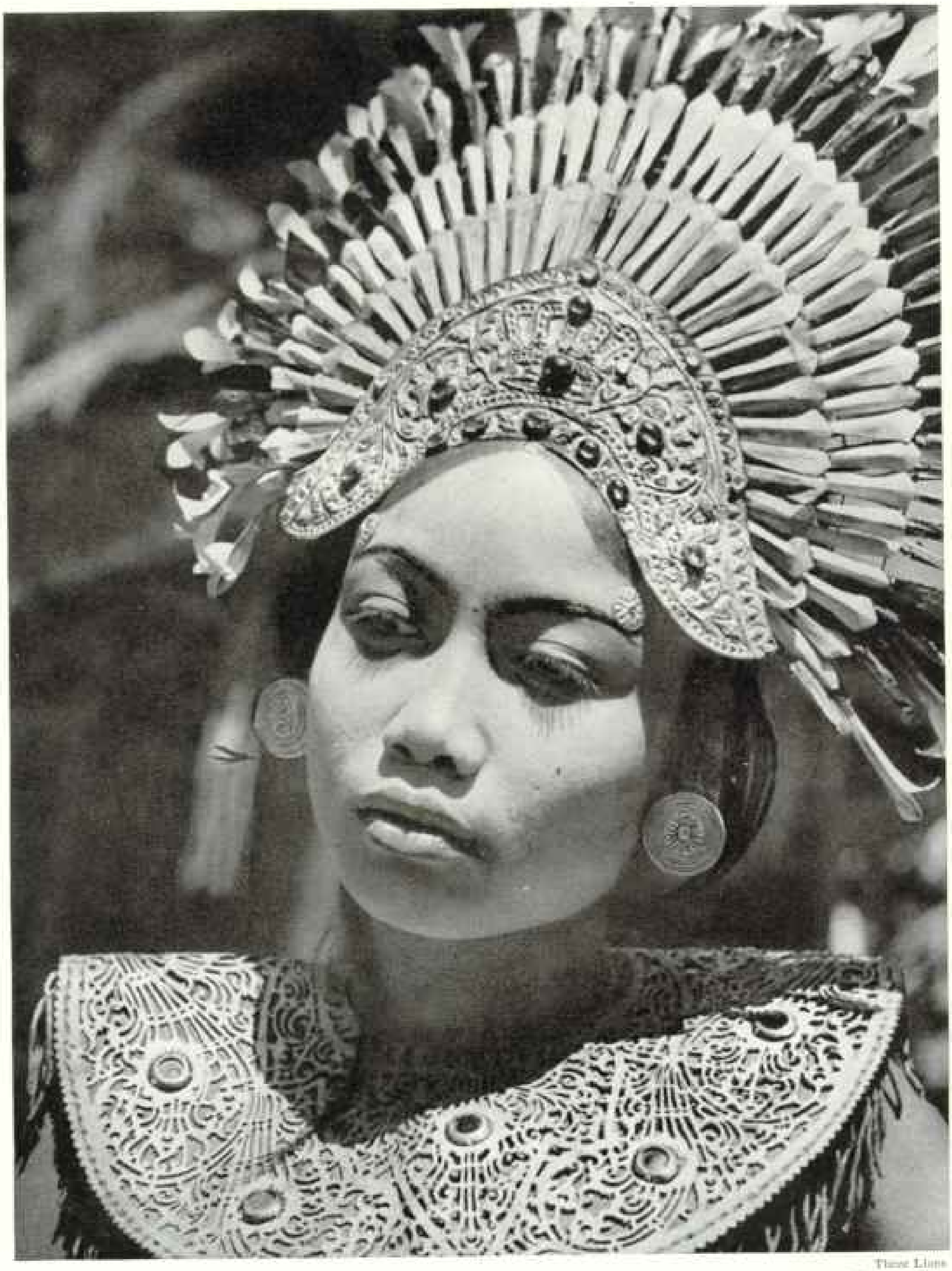
The Netherlands' once-abundant sea food became rare during the occupation. Commercial fishing, now under way again, has alleviated hunger for meat. Germans wastefully fished fresh waters with hand grenades. Floods smothered many fish in silt. Old Dutch costumes linger in Spakenburg, a small port on the Zuider Zee (IJssel Meer).

was reopened in May, 1941, and again closed in October of that year. It did not reopen again until July, 1945. Throughout the four years, however, classes were conducted in secret at the homes of professors and students, examinations were held regularly, and credits were accumulated toward degrees.

At the end of its five-year ordeal the Netherlands is facing the future with complete confidence. Damage to the cities and to the countryside was not so great as had been expected. The people are hard at work everywhere, and within a few months it will be difficult to find any scars of war on the somberly lovely Dutch landscape.*

* For additional articles on the Netherlands, see the Cumulative Index to the National Geographic Magazine, 1899-1945.

Notice of change of address of your National Geographic Magazine *should be received in the offices of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your April issue, The Society should be notified of your new address not later than March first. Be sure to include your new postal zone number.*



Three Lions

Paper-feather Headdress Crowns a Bali Temple Dancer; Her Collar Is Gilded Buffalo Hide

The Netherlands Indies stretch from Sumatra to mid-New Guinea—3,000 miles, a distance greater than the width of the United States. Because of the Netherlands' lack of troops and military resources, the British-American Combined Chiefs of Staff assigned to British forces the task of disarming the Japanese in Java and Sumatra and releasing Allied prisoners of war there.

Parasol Hats of Split Bamboo Protect Shoppers from Sun and Rain at Palembang, Sumatra

These women carry purchases in a square yard of cloth. The salesman's fez testifies that Mohammedanism is the Indies' prevailing religion. Palembang's American and Dutch oil refineries were seized by Japanese parachutists in 1942. Peace revealed them as wrecked by B-29's and British carrier planes.

On His Bicycle the Barber Carries Razors, Lotion, and Mirror

At Medan, Sumatra, he reads a Latinized Malay script as he waits for customers. Scarcely a human need in the Indies is neglected by the itinerant ironmongers, grocers, cobblers, and other peddlers.

Staff Photographer Maynard Owen Williams

A Motorized Variety of the Tricycle Rickshaw Pauses for Gasoline in Semarang, Java

Power is applied to the front wheel. The motor has no hood, but it could use a muffler; the noise would shame a motorcyclist. This model, used as bus or taxi, became popular in the Indies about 15 years ago.

© Screen Traveler, from Gendreau

Bataks, a Sumatran People, Construct Their Soaring Dwellings Entirely of Bamboo and Thatch

Handsome designs decorate the gables. Horned heads on ridgepoles indicate animals slaughtered at a housebuilding. Pigs roam among the supporting stilts. Bataks formerly lived in isolation and ate human flesh. Today civilization has infiltrated until—observe the mattresses on the veranda!

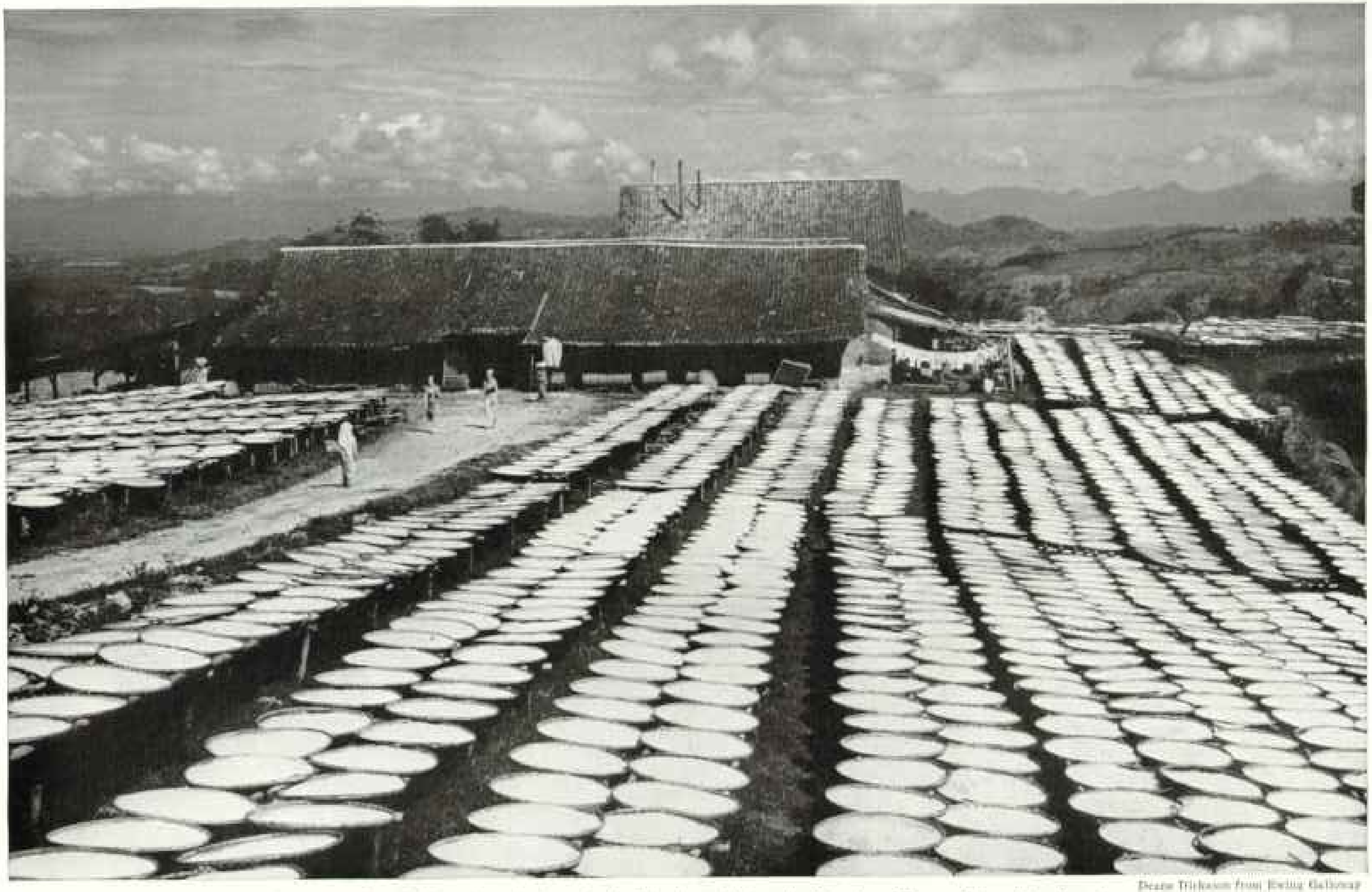
Batavia's Railroad Station and a Bank (lower right) Exemplify War's Rich Prizes in Java

Japan's collapse involved five peoples in a struggle over the Indies. Java's unrecognized "Indonesian Republic" represented native nationalists. Britain, as trustee for the Netherlands, resisted the rebels, and employed troops from India. Japanese, who surrendered weapons to the Indonesians, later fought them on Allied orders.

Staff Photographer Maynard Owen Williams

Canal, Washtub, and Bathtub! What a Servant of the People Is Batavia's Millstream!

Down a wide avenue flows the Molenvliet (millstream). Laughing laundresses dip their babies in its water. If one tires of her work, she drops into her soapsuds and paddles off to visit colleagues. Ofttimes her pounding board is a bamboo raft tied to shore. From walls to plumbing, bamboo is rural Java's building material.



Deane Dickason from Ewing Galloway

Cassava, Java's Bread and America's Tapioca, Dries in Bamboo Trays Near Bandoeng

The average Javanese farmer has a patch of large, starchy cassava plants. Bitter cassava root contains prussic acid. When it is baked into thin, round cakes, heat eliminates the poison. Sweet cassava is a harmless vegetable. Tapioca is made by hanging damp flour in bags, where it forms pudding's familiar "fish eyes."

Like a Giant's Staircase, Rice Terraces Climb a West Java Mountainside

Mud walls separate the fields. Irrigation ditches trickle beneath the railroad viaduct. A fourth of the country is under irrigation, without which Java would be just another jungle island. Native engineers have harnessed mountain streams and graded paddies for uncounted centuries.

Horace Bristol from Three Lions

As Midday Approaches, Fields Are Empty. The Farmers Rest in Their Hilltop Kampong

A dozen homes comprise the village. Coconut palms provide shade and food. Clumps of bamboo yield irrigation pipes. Cassava, which requires no irrigation, grows to the left of the settlement. Women do the rice planting lest the crop be unfruitful. Even Javanese Mohammedans honor Sri, the rice goddess.

Dean Dickson from Ewing Galloway

By Using Her Hot-wax Dipper Like a Pen, a Javanese Makes "Written" Batik

When she dips the fabric in dye, only the unwaxed design will be colored. Waxing and dyeing, she repeats the process as many times as she has colors. Her painstaking technique originated in the Indies.

Staff Photographer Maynard Owen Williams

His Hard, Lumpy Couch Is His Stock in Trade at Market in Pematangsiantar, Sumatra

Flesh of these ripe, husked coconuts is cooked into pudding, boiled into oil, or converted into "milk." The fiber makes rope and brushes; the shell, cups and firewood. Copra, the dried flesh, is an export.

Herron Traveler, from Gendreau

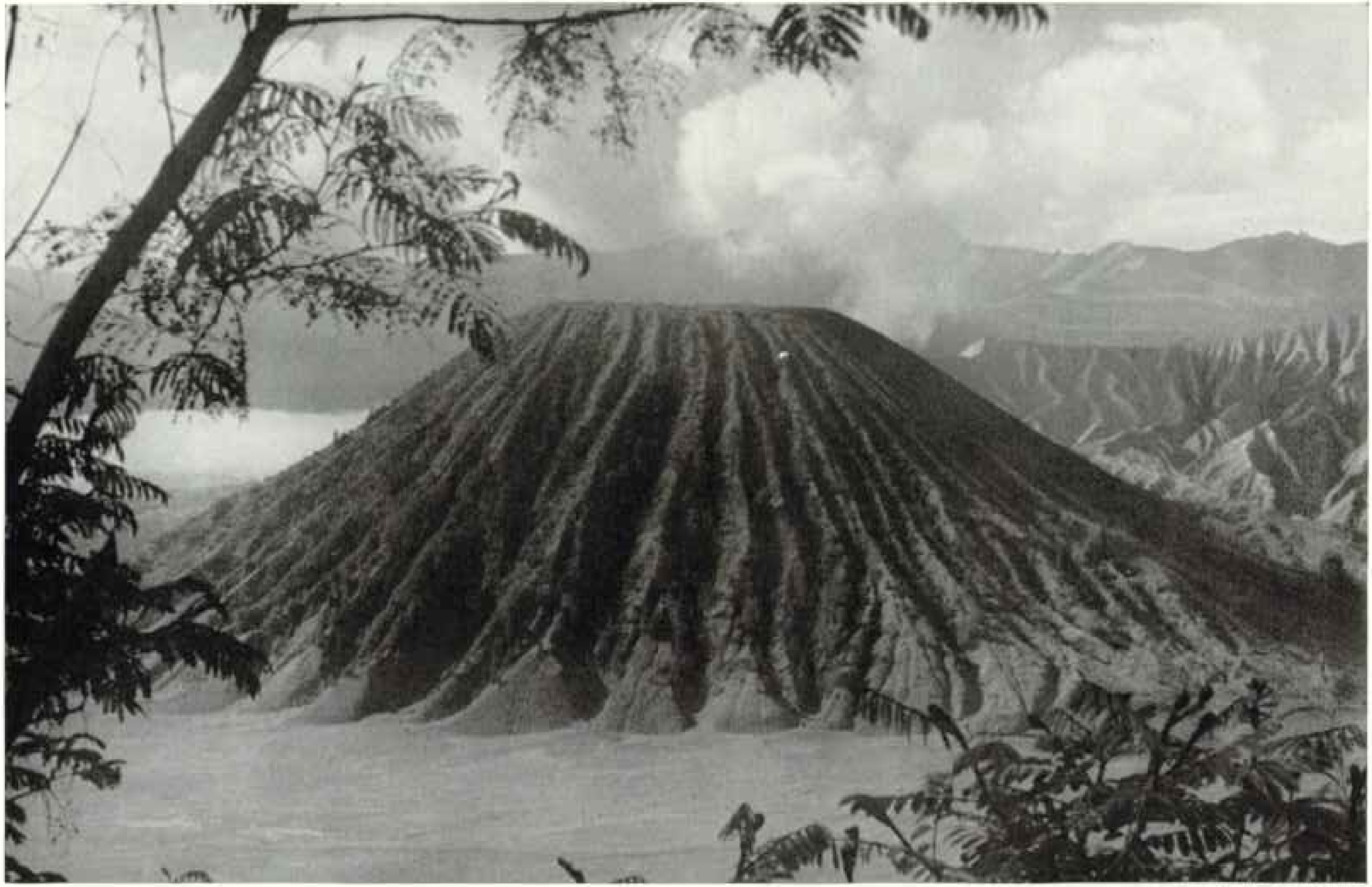
A Basket Peddler's Springy, Balancing Pole Makes Light of 60 Awkward Pounds

From door to door he walks in Bandoeng, a Java health resort. At one cent an item, his prewar price, he does not grow rich. Here are rice servers (top, left), a lidded dish holder (left), and catchalls.

Horace Bristol from Three Lions

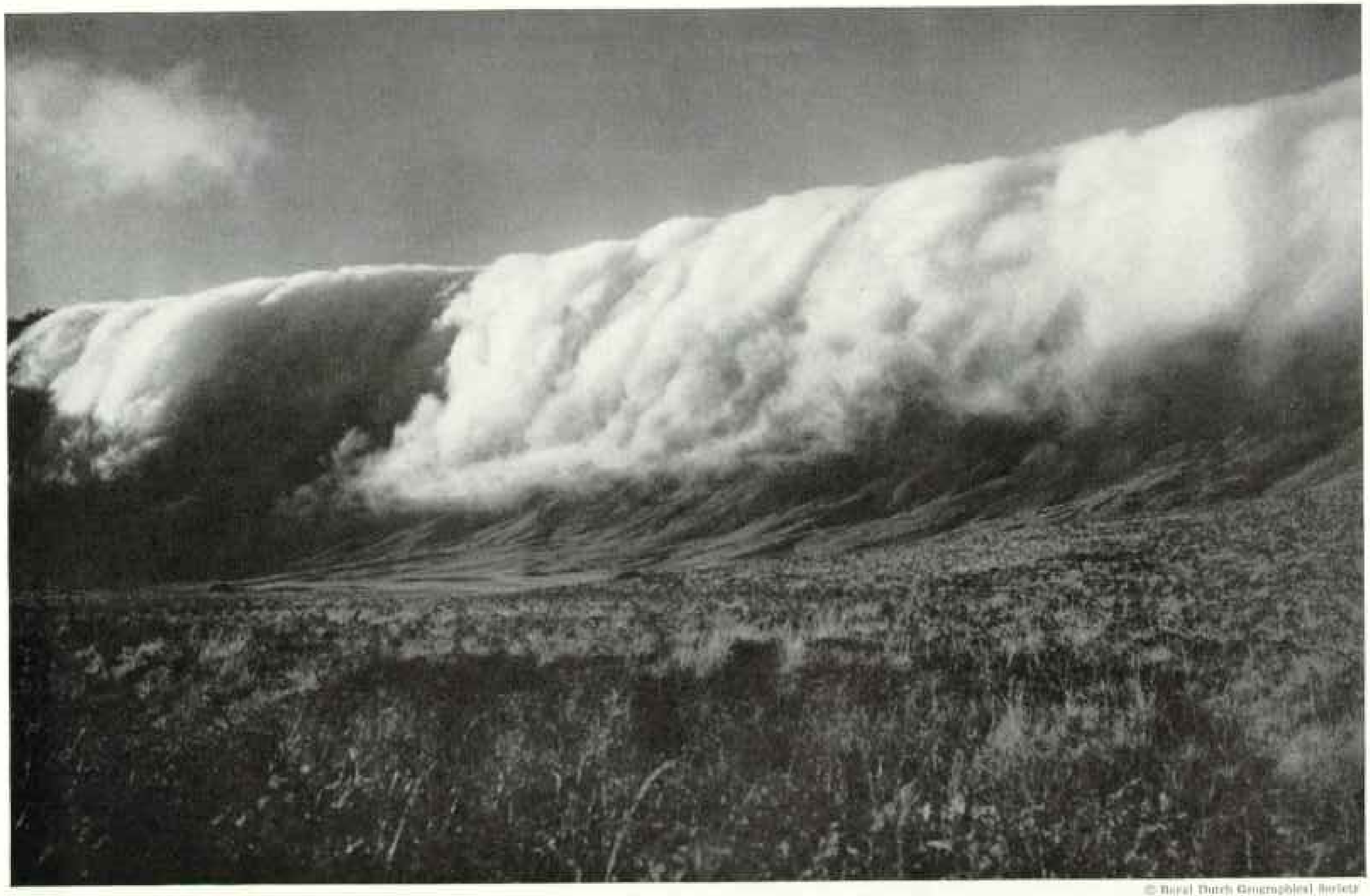
Only Allah Knows How the Javanese Herdboy Masters the Fierce Water Buffalo

At the unfamiliar scent of a white man, the animal is likely to charge. Though a white buffalo is rather rare, a clean one is quite uncommon. The buffalo so loves to wallow that its coat is usually caked with mud.



Java's Mount Batok, Its Symmetrical Cone Ribbed as by a Cupcake Mold, Stands in Sand Sea, a Desert of Volcanic Ash

Batok is dead. Steam and sulphur rise from Bromo, a crater here obscured by its taller neighbor. Both cones are enclosed within the walls of Mount Tengger, their parent volcano. Viewed from Tengger's wide rim, this wasteland seems as awesome as a pit on the moon. Natives once hurled human sacrifices into Bromo.



Like Water Hurtling over Niagara, a Cloud Cataract Flows Down into the Crater of Mount Tengger, Java

This fleecy cascade sinks on an atmospheric eddy set in motion by varying wind velocities above and below. It evaporates as it meets morning's heat rays rising from the warm, dry Sand Sea within the crater (opposite). Greater atmospheric compression at the lower level helps warm and dissipate the cloud droplets.

Straw Pagodas Rise as Javanese Colonists in Sumatra Stack Newly Harvested Rice

Overcrowded Java averages 817 inhabitants to the square mile; Sumatra, about an eighth as many. Here at a new Sumatran settlement the Netherlands Indies Government sought to relieve the pressure of Java's growing population. Celebes, another Netherlands Indies island, was the scene of a similar experiment.

Harare Bristol from Three Lions

To Make Quinine, a Javanese Strips Cinchona Bark

Java, once virtually the world's quinine monopolist, stands to lose a large part of its market. War revived the industry in South America, where it originated. Meanwhile chemists developed atabrine and a type of synthetic quinine.

Staff Photographer J. Baylor Roberts

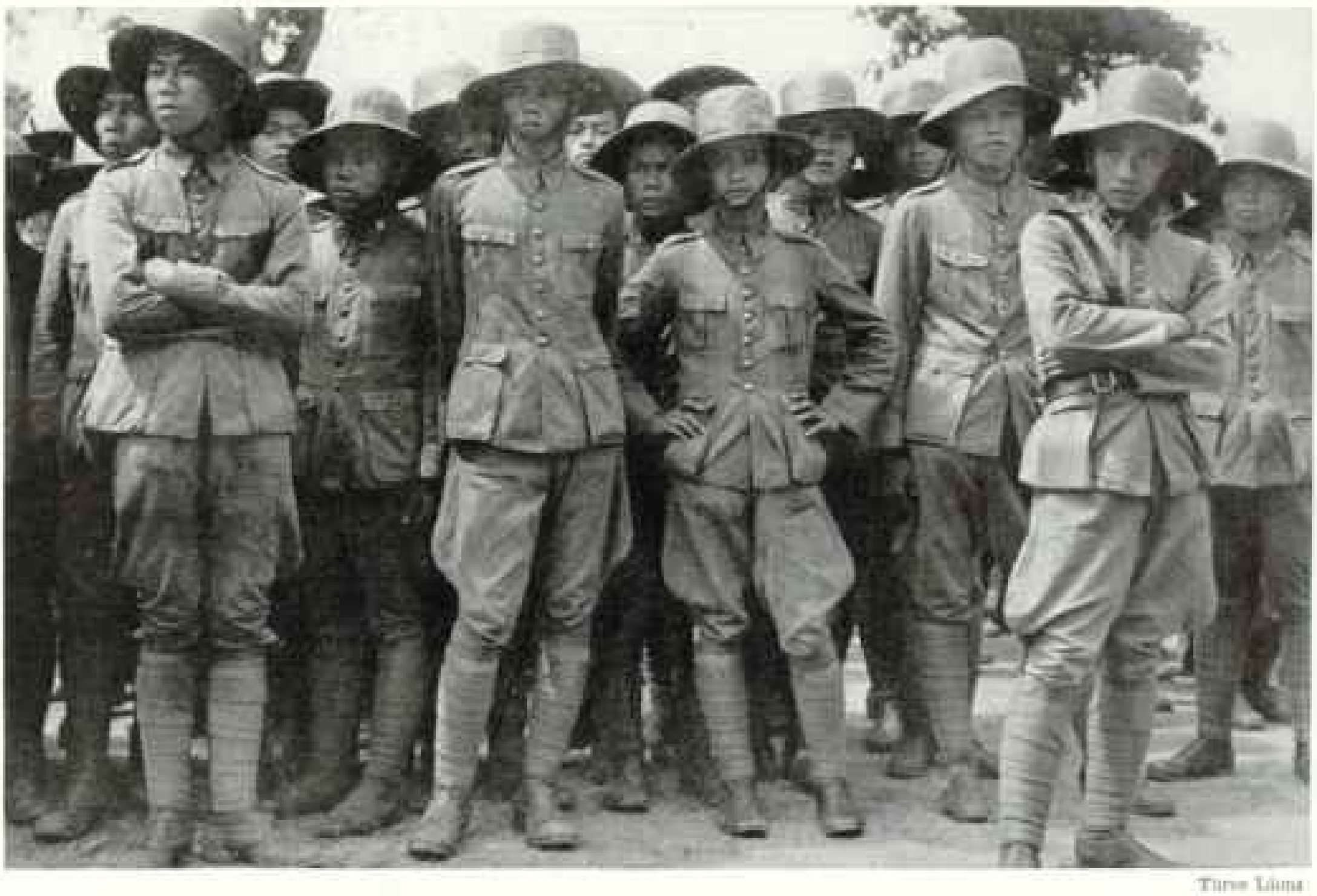
A Sumatran Clips Rubber Flaws Revealed by Illuminated Glass

Japanese in the Far East scattered half the native labor force and killed one of every 5½ trees, but left a stock pile of 250,000 tons of rubber. Estimated production in 1946 will be less than half that of 1941.

Staff Photographer Maynard Owen Williams

Bikes and Billboard Reveal Two Javanese Delights, Cycling and "Opera"

Western plots adapted to the Malay tongue are popular opera fare. A distorted version of *Hamlet* is a favorite. Banquo's ghost brings down the house. This show, run by an Armenian, occupies a mat shed in Semarang.



Turner Linma

Before Japan Deposed Him, a Javanese Prince Maintained This Private Army

Two toy kingdoms, Soerakarta and Jogjakarta, surrounded their Dutch-advised sultans with courtiers, dancing girls, and all royal trappings. These troops guarded the petty chief of an enclave within Soerakarta.

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To carry out the purposes for which it was founded fifty-eight 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, 1930, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 B. C. (Spinden Correlation). It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society–U. S. Navy Expedition camped on desert Canton Island in mid-Pacific and successfully photographed and observed the solar eclipse of 1937. The Society has taken part in many projects to increase knowledge of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted $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.

The Christmas present that came on Valentine's Day!

"THE CARD SAYS, 'Merry Christmas—to my Valentine,'" Nan said. "Who ever heard of a Christmas present on St. Valentine's Day!"

"Probably one of your absent-minded relatives," I said casually.

"Listen," Nan said, reading on: "*This should have been your Christmas present, Nan, but it wasn't ready then. I'm sorry it's so late. Still—I think St. Valentine's is a swell day to give my best girl the present she's always wanted.*"

Nan eyed me suspiciously. Then, suddenly, her arms were around me and her hair was in my eyes. "Stop bawling and open the package," I said when I could untangle myself. "I'd like to see my wife in her brand-new Hamilton Watch!"

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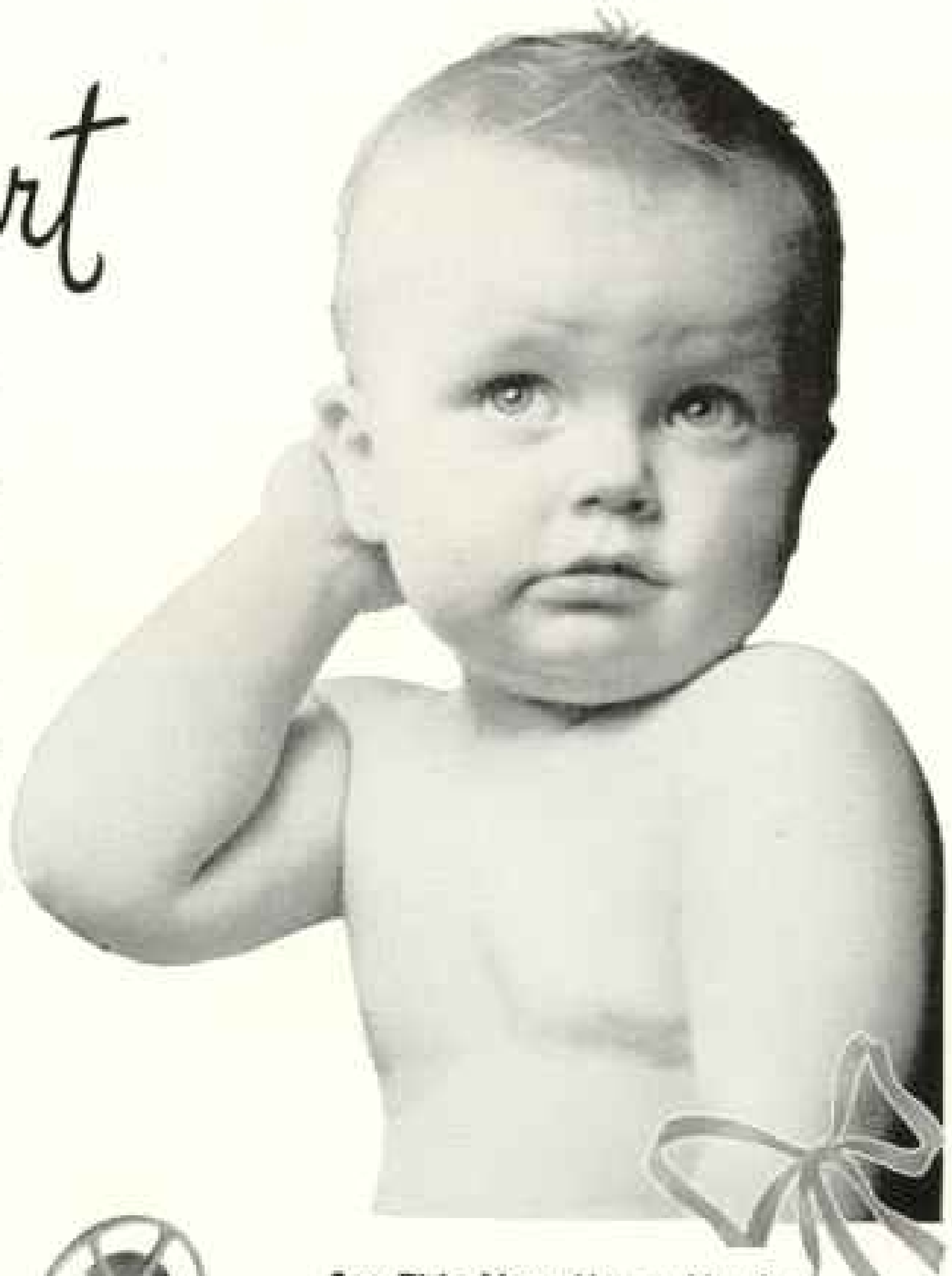

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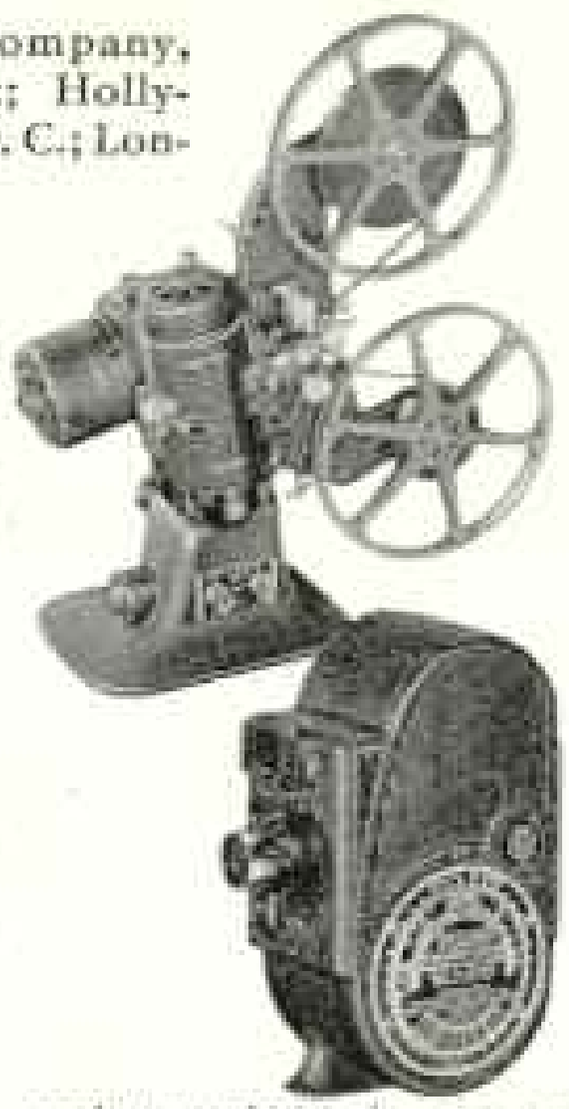

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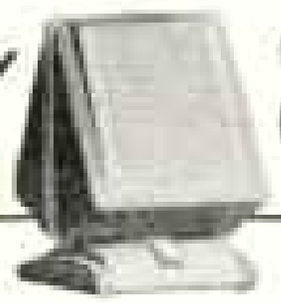
Control  *Center* FOR EXECUTIVE MANAGEMENT

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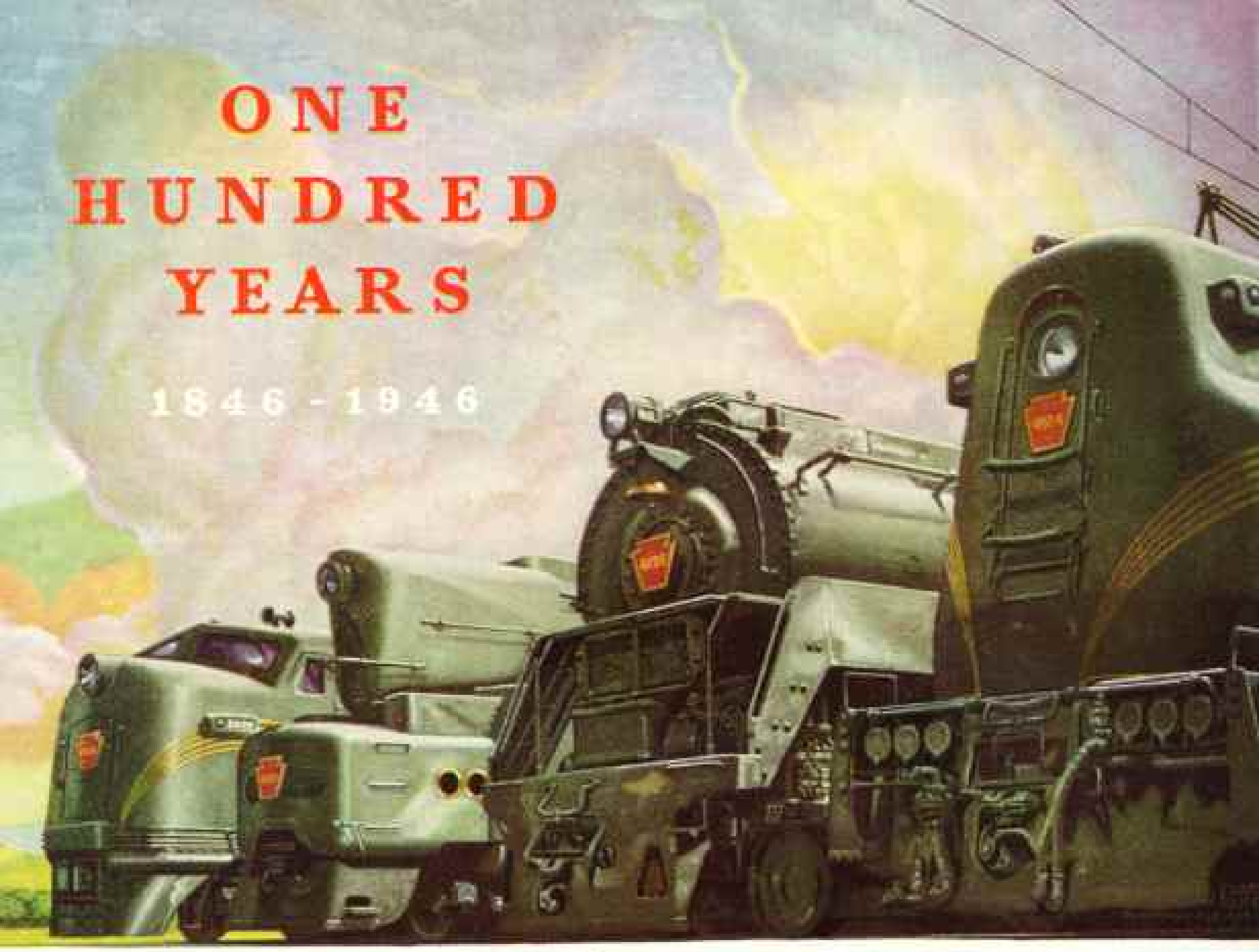
1846 - 1946



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A Pennsylvania Railroad locomotive of 1865

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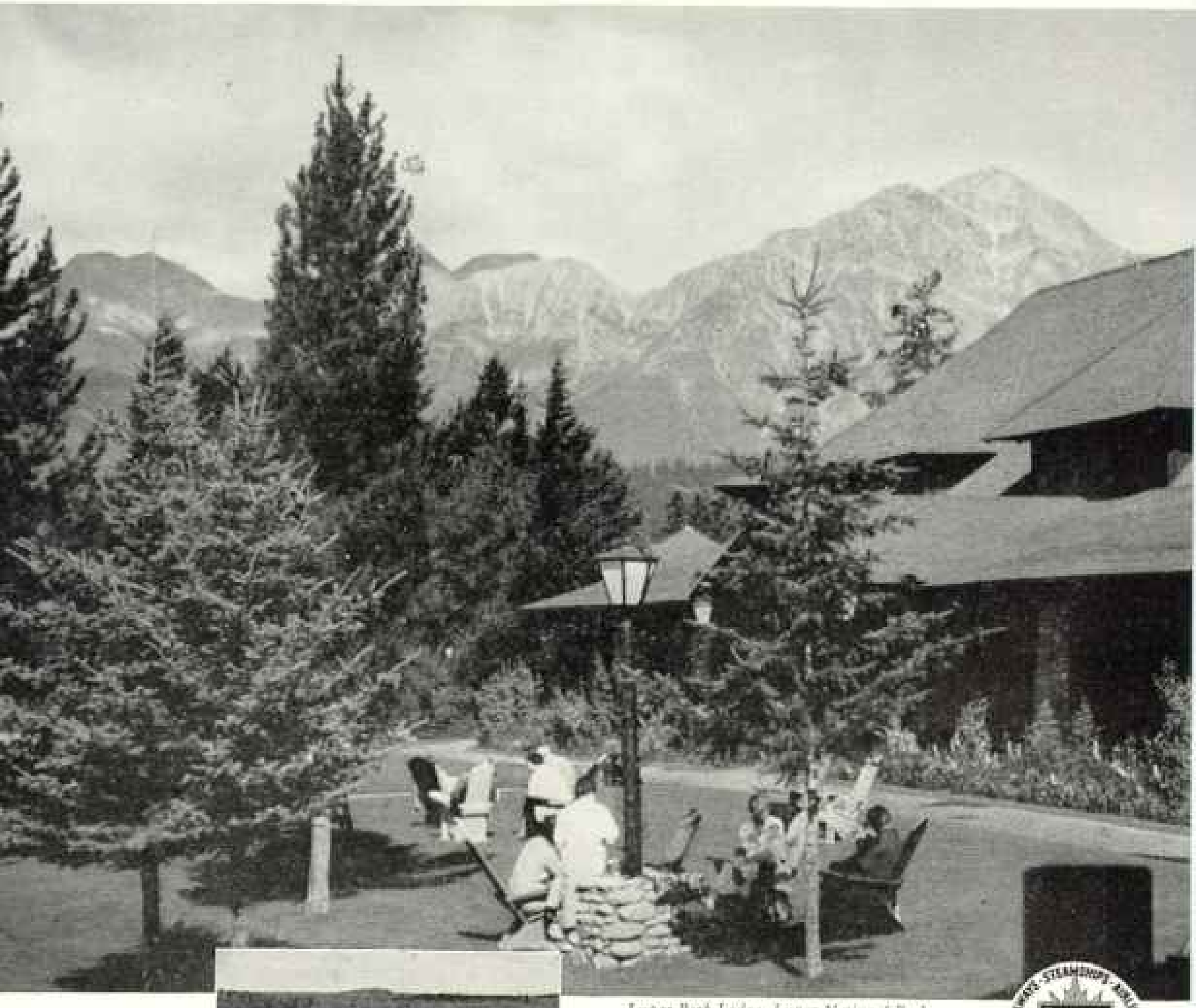

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—From reconstruction of a Coal Age scene in the Field Museum of Natural History, Chicago

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Get the whole picture with an argoflex®

Spoiled! A picture you've been waiting to take for a year. Spoiled because the center of interest was cut off.

Use the Argoflex method and you'll avoid this sort of disappointment. With Argoflex you can be sure you're not cutting off essential elements. You can be certain, too, of sharp focus, exactly where you want it. More than that, you see your picture at the precise instant of exposure. For better pictures, better use an Argoflex, *the twin-lens camera.*

Actual size view shown here

Synchronized matched lenses — one focuses the other "takes" the picture

®Reg. U. S. Pat. Off.

ARGOFLEX MEANS—

Better Composition because you see the picture before you take it. No cutting off, or leaving out part of the subject. The picture you see . . . is the picture you get.

Exact Focus: Turning one simple control until the image is sharp, *automatically gives the right focus.* Then snap the picture! No guess work — no fuzzy or blurred out-of-focus negatives.

Actual Size: The large view-finder shows the picture in *actual size* (2¼ x 2¼). The Argoflex is so free from complicated "gadgets", *you keep your mind on the picture.*

ARGUS INCORPORATED · **Ann Arbor, Mich.**

Fine Cameras and Precision Optical Instruments

GRACE LINE *Announces*

A New Fleet of

TWENTY "SANTA" SHIPS

For Express Passenger and Freight Service to the

CARIBBEAN and SOUTH AMERICA

Confident that a strong American Flag Merchant Marine is essential to our hard-won sea power and peacetime foreign trade, Grace Line has nearly completed a new, fast, more efficient fleet of 18 "Santa" ships (nine combination passenger and cargo liners and nine freight vessels) which, with the modernized SANTA ROSA and SANTA PAULA, will provide for an anticipated increase in trade.

The new passenger and cargo liners will be air-conditioned and will provide all outside rooms, each with private bath, and outdoor tiled swimming pools.

These twenty modern "Santas" will provide faster and more frequent service between Atlantic, Gulf and Pacific ports and Central and South America, as well as between New York, Venezuela, Netherlands West Indies and Colombia.

GRACE LINE

ROCKEFELLER CENTER or 10 HANOVER SQUARE, NEW YORK
PITTSBURGH, WASHINGTON, D. C., NEW ORLEANS, HOUSTON, CHICAGO,
DETROIT, SAN FRANCISCO, LOS ANGELES, PORTLAND, ORE., SEATTLE

Anybody else

want to bet against the Weather Man?

Teamed up with Western Union, the Weather Man hits the nail on the head better than 85% of the time.

"*Mad as a wet hen!*" . . . We all, at times, forget the weather forecast or don't believe it. But weather can be far more serious than an occasional wetting. - - - Remember the old fashioned blizzard—roads blocked, wires down, business at a standstill?

It's a different story today: via Western Union, forecast data flashed to Weather Bureaus every minute of the 24 hours. Miles . . . hours away, the infant blizzard is discovered. Experts map its growth and course, *give ample warning.*

Emergency crews rush to keep highways, tracks and wires open. By the time the storm strikes, perishables are under cover, food distribution is adjusted, merchants are advertising hand lotion and ski togs . . .

---

75 years ago, Western Union helped to establish the nation's Weather Bureau. Today, a vital part of the Bureau's data reaches forecasters via Western Union. *Automatic, instant* distribution of data to weather stations and airports totals about the same as 5 million telegrams every day. *Resulting forecasts score 85% to 90% accuracy.*

For nearly 100 years, Western Union has been pioneering in communications. As a second century of progress nears, Western Union developments in automatic telegraphy and electronics foreshadow a new era in the transmission of the written word. . . . The Western Union Telegraph Company, 60 Hudson Street, New York 13, N. Y.

WESTERN UNION

Catherine de Medici said "Mmmmm!"

Catherine, it seems, was not quite so heartless a hostess as she was cracked up to be. She *did* serve an occasional cup of nice, hot poison. But most of her dinner guests fared very well indeed, for she fed them heaping dishes of a new delicacy—ice cream!

As brides will, Catherine brought favorite family recipes from Florence to her husband's court. One of them was for ice cream. And the novelty-loving French, unused to such a rare delight, promptly lapped it up!

That was over four centuries ago. Yet ice cream remained a nobleman's luxury for many long years. Only in fairly modern times could its unique appeal be enjoyed by *everybody*—at *every-day* meals.

And it's only in modern times, too, that ice cream is recognized in its true light—not as a luxury, but as a valuable food. Like milk, butter and cheese, it furnishes both vitamins and calcium in generous amounts. Good reason why you find it so frequently starred by nutrition experts!

Today, again, you can satisfy war-suppressed appetites for all the ice cream you want, as often as you want it. We're glad to be able to restore it on your menus. And we'll continue to make ice cream of finest quality—striving always, through research, to offer you the greatest possible benefits from 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.

A Sensational New Way to Play Records

...ONLY ZENITH HAS THIS!

QUICK FACTS

THE COBRA:

★ Utterly new! No other tone arm rides so lightly (⅔ of an ounce) in the groove! Records last hundreds of plays longer.

★ No old-fashioned magnet or crystal. Reproduces tones on a Radionic Wave.

★ NO NEEDLES TO CHANGE! And new long-life "Floating Filament" retracts so you can *drop* the sturdy Cobra, even *scrape* it across records, nothing's harmed!

THE SILENT-SPEED RECORD CHANGER:

★ Smoothly, gently changes records in 3½ seconds.

★ Plays 10 and 12 in. records mixed, automatically!

YOU GET ALSO:

★ Famous Radiorgan with 64 tone combinations. New *genuine* two-band F-M radio. Gorgeous new flat-top cabinets. Record players that glide out for loading, glide back out of sight. And other brand new Zenith "Exclusives" galore!

NOW—FOR THE FIRST TIME—you can enjoy records *in your home* with the same quality, fidelity and clarity of tone demanded by broadcasting stations!

The Cobra tone arm so completely revolutionizes all former methods of record reproduction that broadcasting studios all over America are using it. It is not only a new tone arm, but employs an entirely new *principle* of musical reproduction. The Cobra reproduces tones on a *Radionic Wave*—there are no old-fashioned crystals or magnets . . . no needles to change!

You have a new thrill awaiting you when you play your own records with the Cobra tone arm. You'll hear golden tones and overtones which you never knew were in the records. The Cobra not only brings them out, but at the same time miraculously *erases* all annoying surface noise, rattle and hum!

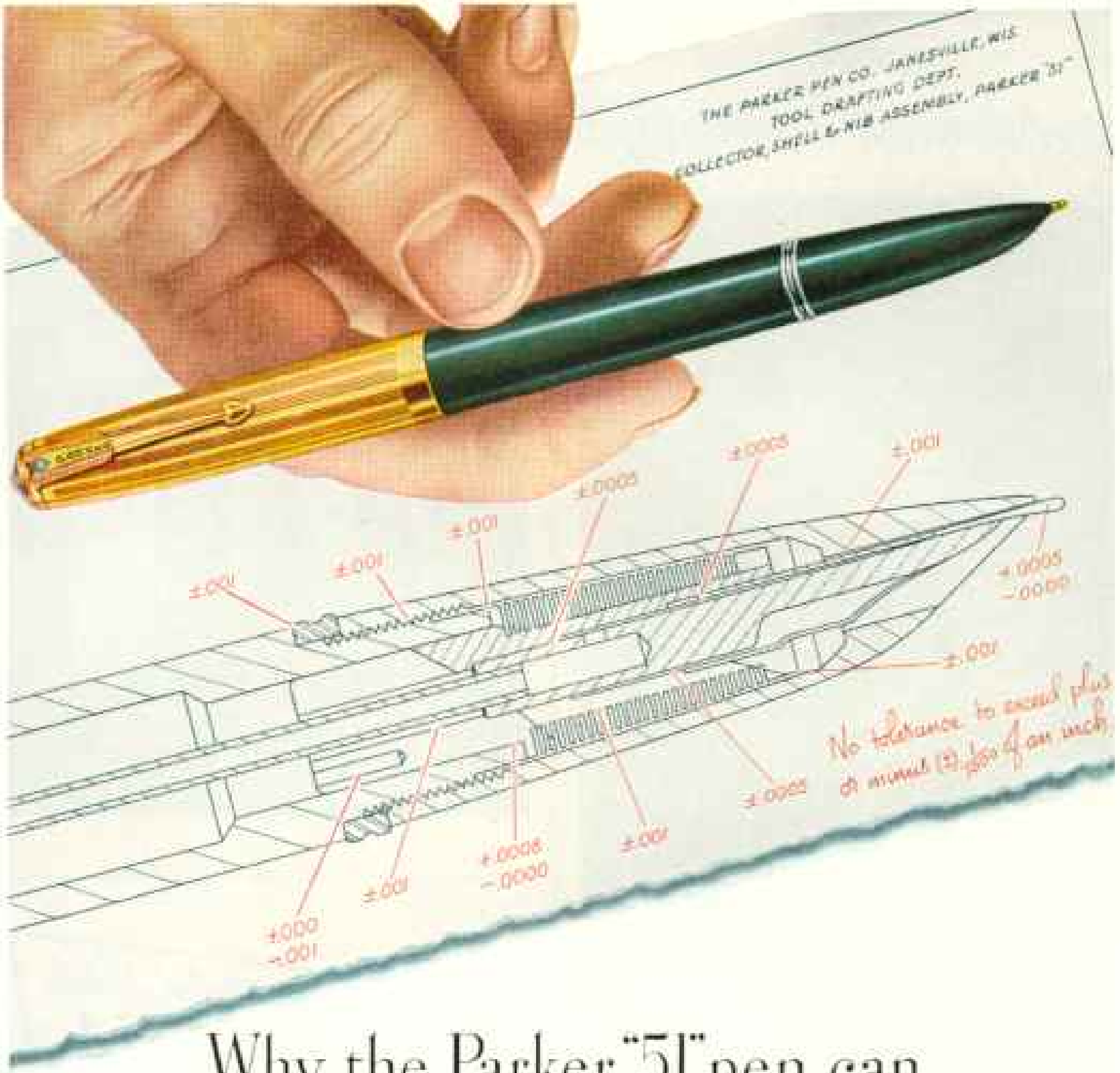
Another outstanding Zenith feature is the Silent-Speed Record Changer which changes records smoothly and quietly in 3½ seconds. There are no "gadgets" or complicated regulators to fuss with—and this changer plays 10 and 12-inch records intermixed, automatically!

See these revolutionary new Zenith features at your nearest radio dealer's today. Ask to hear a record played on any phonograph in the store—then listen to the difference when the same record is played on a new Zenith radio-phonograph with the Cobra tone arm.

You'll be amazed! Ask for a demonstration today.

ZENITH •LONG DISTANCE• RADIO

30 YEARS OF "KNOW-HOW" AND LEADERSHIP IN RADIONICS EXCLUSIVELY



Why the Parker "51" pen can never be "mass produced"

PRECISION CRAFTSMANSHIP, MEASURED IN THOUSANDTHS OF AN INCH, MAKES THIS THE WORLD'S "MOST WANTED" PEN.

Parker 51's are limited by their very precision. The craftsmen who make them work to standards of accuracy never before attained in fountain pens. Their pride in producing 51's equals the pride of those who own them.

One day you'll have your own "51". You'll discover its whisper-smooth writing. You'll find that only the "51" is designed for satisfactory use of Parker "51" Ink that dries as it writes. And you'll be glad you waited. More 51's *are* coming. Place a reservation order at your Parker dealer's now.

Colors: Black, Blue Cedar, Dove Gray, Cordovan Brown. $12.50; $15.00. Pencils, $5.00; $7.50. Sets, $17.50 to $80.00. Parker Vacumatic Pens, $8.75. Pencils, $4.00. The Parker Pen Company, Janesville, Wisconsin and Toronto, Canada.

"Writes dry with wet ink!"

PARKER "51"

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Shaving comfort from start to finish—Shaving Soap in sturdy mug, 1.00. Invigorating After-Shaving Lotion, 1.00† Soothing Talcum, .75† †*Plus Tax*

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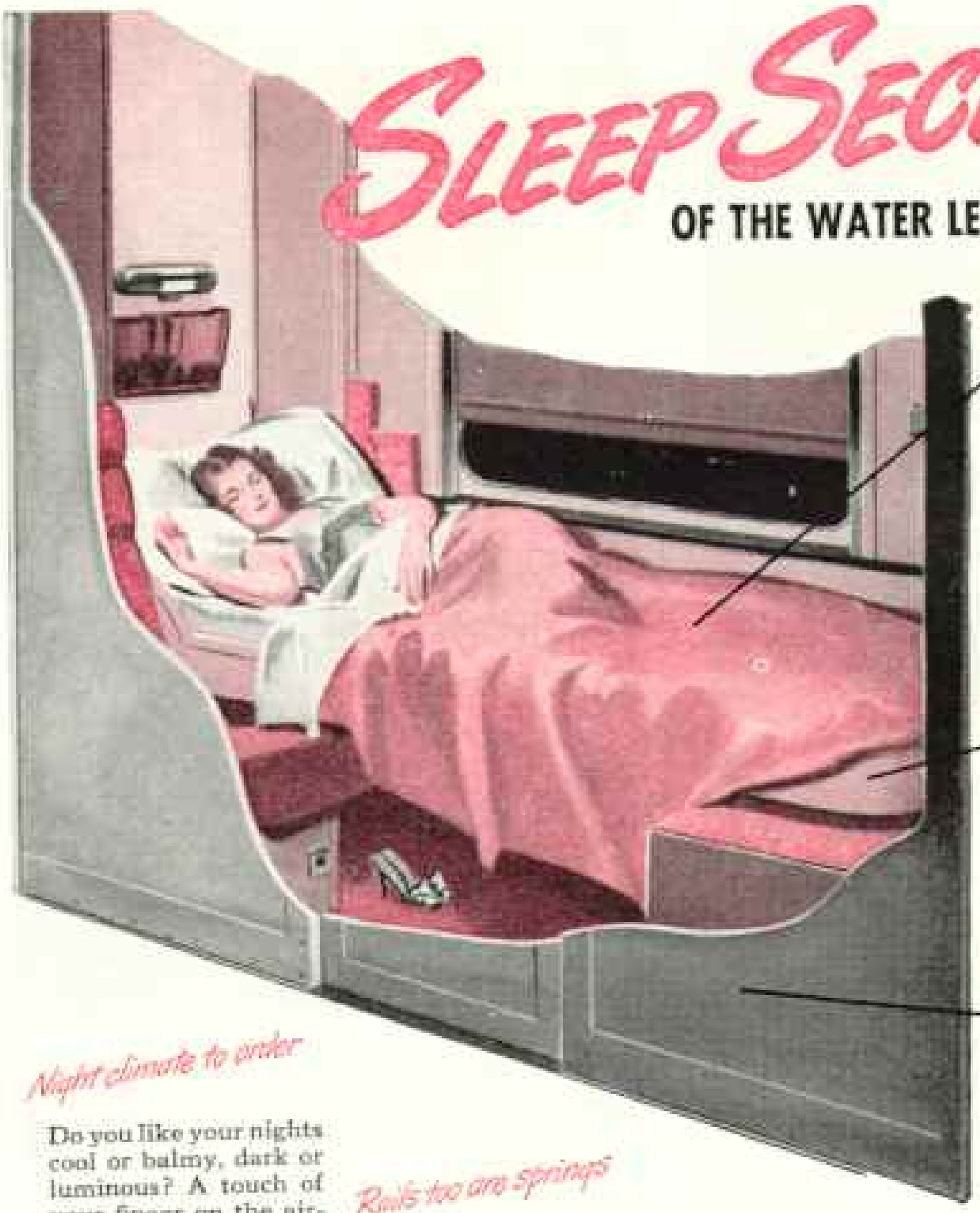
SLEEP SECRETS—

OF THE WATER LEVEL ROUTE



Night climate to order

Do you like your nights cool or balmy, dark or luminous? A touch of your finger on the air-conditioning control provides your favorite slumber climate. A flick of a switch gives you darkness, or a blue night light, soft as moonbeams.

Rails too are springs

Central's extra-heavy, tempered steel rails spell safe, easy riding. Laid on treated wooden ties, they allow for a scientifically planned cushioning action which adds to the comfort of your trip.

Teamed for your comfort

Your car rests on 24 springs, controlled by snubbers. Teamed with them are rubber cushioned couplers that tightly join your whole train into a unit to completely smooth your ride.

Let's begin with You!

Before retiring, you've had a delicious, leisurely meal in the dining car . . . enjoyed refreshments and a quiet game or chat in the club lounge . . . then read yourself to sleep by your handy bed light.

A bed to dream of (and on)

In this roomy, six-foot-plus bed, you float off to sleep on a deep rubber-foam mattress that puts Grandma's "feather puff" to shame!

Privacy and Peace of Mind

Nothing disturbs you in your fully equipped private room. Your mind's at rest, knowing the Porter will call you in the morning, and that meantime you're traveling in the safest place on earth.

On the level you can sleep!

Top "sleep secret" of all is Central's heavily-ballasted roadbed that follows gentle valleys between the East and the West. It's the big reason why travel-wise men and women say, *"I can get there in my sleep . . . on the Water Level Route!"*

NEW YORK CENTRAL

The Water Level Route—You Can Sleep

He wrestled the Wind
...and won!

A man of many talents, Robert Fulton promoted canals with his able pen . . . painted portraits, excelled at drawing . . . invented new dredging devices, perfected a torpedo for under water warfare, built "diving boats", and designed the Clermont . . . the steamboat which outmoded the wind, did much for the rising commerce of the rapidly expanding nation.

Fulton wrote with crude quill pens. Now men have far finer writing tools . . . the Inkograph, precision-made, fast-acting, easy-flowing, with a 14kt solid gold ball-like point that writes with the ease of a soft lead pencil . . . good for years of hard use . . . pleases the eye, fine in workmanship, looks expensive, but costs only $2.

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FEBRUARY 22

Two 18-hole golf courses, indoor swimming pool. Stables. Finest fishing. Beautifully redecorated rooms. Celebrated cuisine.

SIDNEY BANES, *President*

RCA's new television camera has a super-sensitive "eye" that sees even in the dimmest light—indoors or outdoors.

A television camera "with the eyes of a cat"

As a result of RCA research, television broadcasts will no longer be confined to brilliantly illuminated special studios.

For RCA Laboratories has perfected a new television camera tube, known as Image Orthicon. This tube can pick up scenes lit by candlelight, or by the light of a single match!

Operas, plays, ballets will be televised from their original performances in the darkened theater. Outdoor events will remain sharp and clear until the very end!

From such research come the latest advances in radio, television, recording. RCA Laboratories is your assurance that when you buy any RCA product you become the owner of one of the finest instruments of its kind that science has achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20. *Listen to The RCA Show, Sundays, 4:30 P.M., Eastern Time, over the NBC Network.*

RCA Victor television receivers with clear, bright screens will reproduce every detail picked up by the RCA television camera. Lots of treats are in store for you. Even today, hundreds of people around New York enjoy regular boxing bouts and other events over NBC's television station WNBT.

RADIO CORPORATION of AMERICA

ACTION
of the body muscles keeps the body fit the EXERCYCLE® way

SILENT — VIBRATIONLESS
DESIGNED FOR HOME USE

Many doctors have written to us that EXERCYCLE is far and away the healthiest, easiest method they've found to take off weight. No weakening diets, no dangerous drugs. This revolutionary exerciser is electrically operated. Just get on and RELAX. The motor does the work and you get the exercise. It's easy on the heart. Combines motions of horseback riding, bicycling, rowing, swimming. A few minutes a day is all you need. Send for interesting booklet, "Health in Action."

excellent for helping correct intestinal discomforts caused by sedentary work

* Reg. U. S. Pat. Off.

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G-1

GOOD NEWS! Hopes for a trouble-free screw-stem are realized at last by VanRoy Ajustomatic. This pipe cannot lock at an off angle. The patented stem is "float-mounted" so that it can be turned freely and repeatedly yet retain precision alignment. Get VanRoy Ajustomatic for enduring pipe contentment. VANROY CO., Inc., Empire State Bldg., N.Y. 1

SIGNET OF QUALITY IN PIPES

● A WIT-EEZ FAN installed in your car keeps windows and windshield clear of frost and fog. Adds to driving safety and comfort all year 'round.

Ask for WIT-EEZ . . . the fan with safe rubber blades, minimum battery drain, no radio interference . . . used in B29s, tanks. Leading dealers have WIT-EEZ or will get it for you.

WIT-EEZ DEFROSTING-VENTILATING **AUTO FAN**

WITTIE MFG. & SALES CO., CHICAGO 5, ILL.

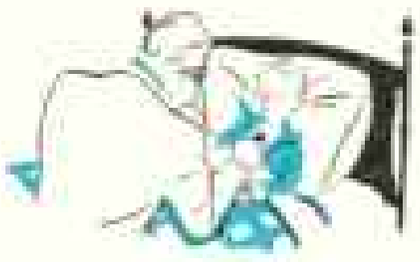
Rheumatic fever can be beaten!

Though it tries to harm the hearts of growing boys and

girls, serious damage may be avoided if the disease is recognized in time. Put your child to

bed if he has persistent low fever, pain in joints or muscles, or continued loss of weight

and appetite. Then have your physician examine him!



If the disease attacks your child . . .

. . . make sure the doctor's orders are followed. He should stay under a doctor's care until *all* signs—including laboratory tests—show that no vestige of the attack remains.

Unfortunately, rheumatic fever may *recur*. After convalescence, therefore, be specially careful to guard your child against wet feet and chills.

Try to avoid exposing him to people with "sore throats" and colds. For recurrence may be brought on by these and other mild illnesses, such as grippe and certain respiratory infections.

Sometimes rheumatic *heart disease* may be present although there has been no previous record of a rheumatic *fever* attack.

The only way to discover this condition—and to prevent serious heart damage—is by periodic physical examination.

Rheumatic fever, itself, causes more fatalities among school-age children than any other disease. The way to combat this tragic toll is to maintain youngsters in the best possible condition by proper diet, rest, healthy exercise, and *regular medical supervision.*

To learn more about combating the disease, send for Metropolitan's free booklet, 26-N, "Rheumatic Fever."

The shark that has no business being here

SHARKS are supposed to live in salt water.

But swimming around between two mountain ranges in Nicaragua is a shark that apparently never read the natural history books. For this shark makes its home in Lake Nicaragua, which is fresh water. It has no business being there.

But it is certainly there—because during the building of the Pan-American Highway, it was a menace to workmen who wanted to bathe in the lake, and, consequently, a problem for the contractor and insurance company responsible for the workmen's safety.

Man-eating sharks were only the beginning. The builders of this highway had to deal with jaguars, pumas, poisonous snakes, insects, dysentery, malaria, treacherous mountain roads, dynamite, landslides, floods, 120-degree temperatures, live volcanoes, and razor-edged machetes, among other perils.

And the Pan-American Highway—gigantic project that it was—was only a part of the biggest series of insurance risks ever tackled by an insurance company.

We took these risks at the request of the U.S. government early in the war. The United States was building bases and highways and airfields all over the world. These jobs were full of unknown hazards and claim problems. Yet the firms and men working on Army and Navy contracts *had* to have insurance protection.

The Travelers provided that protection and service and—through its Safety Engineers—helped keep the accident rate so low that *it has been possible to save the government, and that means the taxpayers, over 60% of their standard-premium costs on the risks we insured!*

Naturally, we're proud of this record. But the main reason we're telling you about it is this:

We'd like to help more contractors, manufacturers, and merchants stop accidents, save lives, and money. We can show how we handled tougher risks than peace times are likely to present to us and cut insurance costs in doing it. We have a service that's worth looking into, worth backing when installed in any plant.

MORAL: Insure in The Travelers. All forms of insurance and surety bonds. The Travelers Insurance Company, The Travelers Indemnity Company, The Travelers Fire Insurance Company, The Charter Oak Fire Insurance Company, Hartford, Connecticut.

Everybody's happy...Have a Coke

...the pause that refreshes brightens the trip

A familiar custom followed them when they went overseas... *the pause that refreshes* with ice-cold Coca-Cola. *Have a Coke* was a welcome greeting heard at one time or another behind nearly every fighting front. Now they are headed for home. Back to the folks, their friends, the old home town and the gang. Back to their American kind of life... with its happy ways and customs. In far away lands, ice-cold Coke brought them a touch of home, a glow of friendliness. It brought life, sparkle and comradeship to brighten many a drab moment... just as it goes on brightening happy moments at home.

Coke = Coca-Cola

"Coca-Cola" and its abbreviation "Coke" are the registered trade-marks which distinguish the product of The Coca-Cola Company.

Make up for lost time...and lost movies

start your NEW MOVIE RECORD now

IT'S TIME TO START—on those new home movies that are going to be the most interesting and exciting you've ever made.

There have been so many changes, since the last movies you took. So many changes in your own life—and in the family.

Don't lose any more picture opportunities—begin the new home movie record right away.

Ciné-Kodak Film is here again—any type you want, and, perhaps, *all* you want.

Free—a brand new home movie booklet. Ask your Ciné-Kodak dealer for a copy of "Time to Make Movies Again" . . . newest thing Kodak has published on home movie making. Or write for it to . . . Eastman Kodak Co., Rochester 4, N. Y.

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Romantic Old-World Flavor

with a Tang as fresh as Tomorrow!

Intriguing blend of choice glace fruits and nuts mellowed with rare brandies and wines —these are the precious ingredients superbly combined for year 'round enjoyment in each Hoenshel Brandied Fruit Cake.

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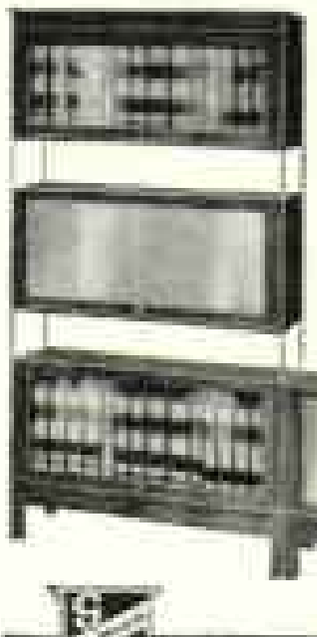

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.....*1946*

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Occupation.....
(This information is important for the records)

Address.....

.....*for membership in The Society.*

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Name and Address of Nominating Member

2-46

Starting next summer . . . the

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AND IT'S NOT FAR. It's amazing how much of Los Angeles County and all Southern California you can "do" on a two-week vacation. Now's the time to start planning your future trip. (Until conditions return to normal, it's essential to *secure accommodations* in advance.) So send for the FREE COLOR FOLDER, "What to Do and See in Southern California." Just mail the coupon below—today!

Bask on a broad beach, cooled by Pacific trade winds. Sail, surfboard, watch a regatta . . . skin-dive for lobsters . . . eat a shore dinner as the sun sinks into the sea.

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In this land of contrasts, see mile-high glacial lakes and volcanic hot springs . . . huge trees (largest and oldest living things) and miles of flower fields . . . prehistoric fossil pits in the midst of an ultra-modern shopping center.

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Please send me your free color folder: "WHAT TO DO AND SEE IN SOUTHERN CALIFORNIA."

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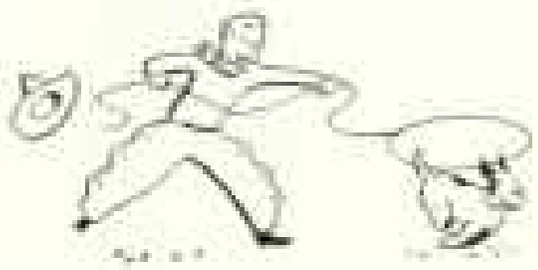

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ACCURATE, timely maps are essential to well-informed men and women, to students and teachers, and to all others who are eager to understand the geographic factors that influence day-to-day developments in our post-war world. Because the National Geographic Society's spelling is followed by major press associations, all place names in today's news are easily found on these legible, large-scale, *ten-color* charts. • Map Indexes, available for maps marked with an asterisk (*) in the order blank below, make easy the location of names on corresponding maps, and describe the areas covered. • In the ten pockets of the 7¾ x10⅝-inch Map File can be put 20 *folded paper* maps, or 10 *folded paper* maps with indexes.

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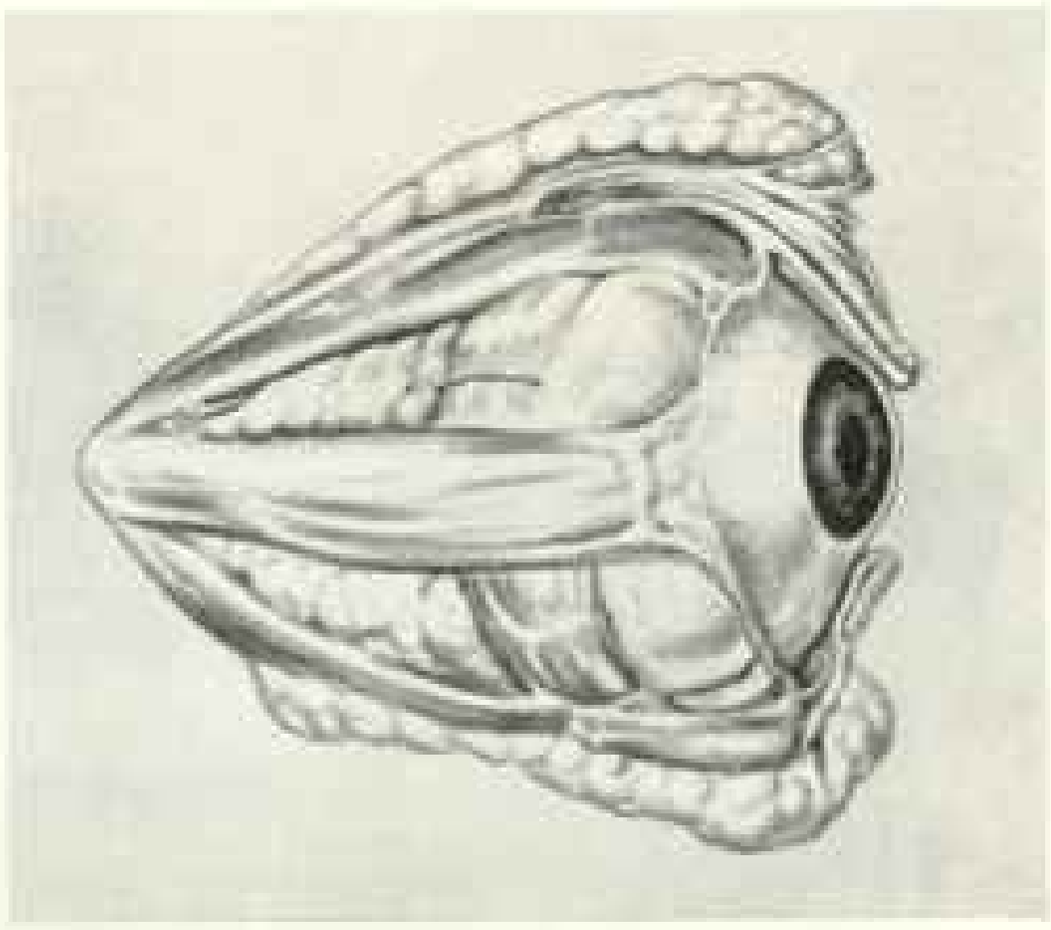
Name ____

Address ____



30,000 Americans spend their lives studying this picture!

NO ART TREASURE in the great galleries of the world is the subject of more intense and continued study than the picture you see here. No masterpiece requires so much study to be understood. Men spend their lives in probing its complexities.

Through long years of school and unceasingly in actual practice, America's 30,000 eye consultants have kept this and other views of the human eye ever in their minds. They know every detail of the entire visual anatomy . . . they can read the eye as clearly as the printed page. *No wonder you can have implicit faith in their recommendations!*

If an examination shows that you need bifocals, your eye consultant may prescribe Univis Bifocal Lenses. Out of our 20 years of experience in the development of the exclusive, almost invisible Univis *straight-top* reading segment we (together with thousands of eye consultants) are convinced that it gives a sharper image, a larger field of vision and greater comfort. But whatever lens your eye consultant prescribes, follow his advice. *He knows your eyes!*

There are 30,000 eye consultants in America. Choose one of them as the guardian of your vision. Let him examine your eyes at least once every two years.

Straight-Top Segment
UNIVIS

Life looks brighter through

Univis *Bifocals*

And Trifocals

UNIVIS

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THE news is a lot better for every one who's been waiting for a telephone.

We've put in more than 500,000 telephones in three months—and they're going in faster every day.

But there are places where we have complicated switchboards to install—even places where we must build new buildings for the new switchboards. In those places it will take more time.

We're working hard on that job and aiming to give everybody quicker and better service than ever before.

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There's Good Music on **The Telephone Hour** . . . every Monday evening over NBC

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