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THE NATIONAL GEOGRAPHIC MAGAZINE

How We Fight with Photographs

BY F. BARROWS COLTON

HIDDEN in caves in the face of a steep cliff, a battery of German cannon was plastering American troops below with deadly fire. Our artillery could not find them, and our bombers could not reach them.

But our cameras rooted them out.

A group of daredevil photographic pilots flew fast fighter planes equipped with cameras right down past the face of the cliff. Literally "looking into the cannon's mouth," they snapped quick pictures of the German guns in the caves as they zoomed by.

Using the pictures as guides, our own artillery then was able to lob shells into the caves and destroy the German guns.

That's just one sample of how we're fighting with photographs. Cameras and film have become as essential in this war as guns and bullets, on some occasions more so.

Glass-eyed Mata Haris

From pictures taken from the air in enormous numbers, we learn far more about the enemy than from prisoners, spies, and all other sources. Cameras, called the "glass-eyed Mata Haris" of this war, make their namesake, the glamorous dancer-spy of World War I, look like a piker.

More than 85,000 aerial cameras are believed to be in use by American and British forces alone. Cameras enter every phase of war, from X-raying recruits' lungs to making identification badges for factory workers.

Without pictures taken from the air, our vast bombing operations against Germany would be less effective, our ground armies would be blind, our artillery fire inaccurate. Without maps made on the spot from aerial photographs, our campaigns in remote and little-known regions would be far more difficult.

To help train our troops, we use movie shorts with titles that range from "How to Get Killed in One Easy Lesson" to "Baking in the Field," and thereby cut 30 percent off training time. Thousands of airplanes are now in combat, instead of still back in the factory, because we learned to make accurate patterns by photography, saving weeks of work. Without X-ray pictures to detect broken bones and shell fragments embedded in the bodies of the wounded, our casualties would be far more serious.

In 1938 the German General Werner von Fritsch said: "The country with the best photographic reconnaissance will win the next war." He was right, but the *Allies* have it!

A friend of mine, an officer in the American Air Forces stationed in England, wrote me: "Between 80 and 90 percent of all our information about the enemy comes from aerial photographs. It's the greatest detective story of the war." General H. H. Arnold himself has said: "A camera mounted on a P-38 often has proved to be of more value than a P-38 with guns."

Photographs Paved Way for Invasion

Before the invasion of Normandy, 200 million photographic prints of the invasion coast are estimated to have been used in planning and reconnoitering.

On those aerial photographs we spotted enemy guns, fortifications, radio towers, rocket batteries, fuel tanks, supply depots, ammunition dumps, camps, barbed wire, and communications. From the photographs, too, we brought our invasion maps up to the minute, so that when our troops went ashore they would have the latest information (page 269).

All this saved countless lives.

Thanks to our photographs, we knew before

U. S. Navy, Official

Mount Fuji, Photographed through a Periscope, Proves a U. S. Submarine Came Close

The famous volcano, dormant since 1707, is about 60 miles southwest of Tokyo and 12,388 feet high. Marks on the picture are calibrations on the periscope eyepiece, used in sighting a ship to be torpedoed. Such pictures are made with an Eastman 35-mm. still camera, a type used by many amateurs and specially adapted for this purpose. Before the invasion of Africa, sections of its shoreline were photographed through submarine periscopes to aid in the choice of good landing places.

we landed the locations of roads, bridges, power plants, villages, railroad yards, and airfields; the widths and capacities of highways; what bridges were strong enough for tanks and heavy guns; the lengths and widths of airfield runways and the types of planes that could use them.

One direct benefit to geography from this war has been the enormous progress made in mapping remote and little-known regions of the earth. Some such areas are now more accurately mapped than parts of the United States itself. Most of this has been done from aerial photographs and is a direct result of the fact that we are fighting in places that have not been well explored.

Charts of the South Pacific, based on inaccurate surveys of the last century, are being corrected by the Navy through photography. Great areas in Africa, the Himalayas, Canada, and South America have been accurately mapped for the first time with photography by the Army Air Forces. The Air Forces have mapped with aerial photographs combined areas nearly twice the size of continental United States, in Alaska, Mexico, South America, Africa, Asia, and the Pacific. From all this will come even better NATIONAL GEOGRAPHIC maps after the war.*

Pictures Show Enemy Movements

Every day, weather permitting, we take pictures wherever we please over Germany, spotting movements of enemy railroad trains and truck fleets that may be rushing reinforcements or supplies to the front, checking on damage done by our bombers, counting the planes on German airfields.

With the aid of aerial photographs, an Army or Navy commander today has almost godlike powers. Through his pictures he can see, from his headquarters, a thousand miles behind the enemy's lines, pick out a target for his wrath, strike it with bombs like thunderbolts, or shower paratroops on it like a plague of locusts, and finally, with more photographs, literally look down from the sky upon the destruction he has wrought.

* See "Maps for Victory: National Geographic Society's Charts Used in War on Land, Sea, and in the Air," by Gilbert Grosvenor, NATIONAL GEOGRAPHIC MAGAZINE, May, 1942; and "The Making of Military Maps," by William H. Nicholas, June, 1943.

Staff Photographer Edwin L. Wisherd

Air Force Photographers Learned New Tricks in This Flying Laboratory

In the nose a photographer demonstrates how pictures are taken with a huge hand-held camera. "Shutter Bug" is a Flying Fortress specially equipped for experiments in aerial photography and has been flown thousands of miles over the United States and Alaska while her crew tried out photographic equipment.

With huge flashlight bombs of nearly a billion candlepower it is even possible to photograph enemy activities being carried on under cover of darkness. With such pictures we have occasionally spotted German troop movements and changes in enemy gun positions.

So expert are "photo interpreters," the Army and Navy officers who read aerial photographs, that they can measure on pictures the heights of buildings and depths of ditches, tell whether a railroad is standard or narrow gauge, and even identify types of airplanes which appear only a few hundredths of an inch long on the photographs. On pictures taken from several miles up they can distinguish between a cruiser and a battleship, a chemical works and a cement factory; they have even spotted new types of enemy aircraft in pictures before they were seen in action (page 267).

Sometimes luck plays a part. In Greenland the Army Air Forces were assigned to photograph all our radio stations from the air. When the pictures were developed, there were two stations too many! Without realizing it, they had photographed two German stations we hadn't known about, which were radioing weather information to Germany.

Another time, in the Pacific, one of our flyers photographed a small Jap-held island as routine. Examining the picture later, a photo interpreter found on it a camouflaged Jap ship tied up to shore. We went back and sank her.

Still another time, a disabled bomber landed in the sea and the crew swam ashore on a Jap island. With great presence of mind, a photographer in another bomber of the same formation photographed the terrain where the men landed. With the help of the picture, rescuers were able to find the spot later and save the flyers.

Most of Italy Photographed

Long before the invasion of Normandy, key points on the French and Belgian railroad systems were photographed and the most important were selected as bombing targets. After they were bombed, more photographs revealed the damage and indicated whether return visits by the bombers were necessary.

Low-level photographs of the Normandy beaches revealed the location of under-water obstacles placed by the Germans (page 269). After our troops established the beachhead, we used photographs to spot the movements of

U. S. Navy, Official

How We Get Information from Photographs Is Shown on This Shot of Wake Island

In upper right corner are Japanese barbed-wire entanglements, gun positions, and trenches. In center, shells from U. S. naval vessels offshore are bursting. Mottled area to their left is a coral reef. Below are craters showing direct hits on the airfield runway and bomb hits on revetments or embankments used to protect airplanes.

trains bringing up German reserves.

Prior to the invasion of Sicily, we had photographed all of it and most of the Italian mainland as well.

Before the Battle of Kula Gulf, in July, 1943, our Navy had no charts of the reef-pocked waters there. Photo planes flew out over the gulf one morning, made some 1,500 photographs of the shallow waters, and by nightfall delivered mosaic photo-charts to our ships. In shallow water it is possible to gauge depths approximately on photographs from the varying shades of color. In the ensuing battle no American ship ran aground.

"Watching from the sky" with photographs, Royal Air Force men have kept a constant check on movements of German warships, tankers, and merchantmen. A Royal Air Force photograph of the battleship *Bismarck*, showing she was about to get under way, was the first step in the chase that led to her doom.

Staff Photographer Edwin L. Wisherd

Few Secrets Can Escape This "All-seeing Eye"

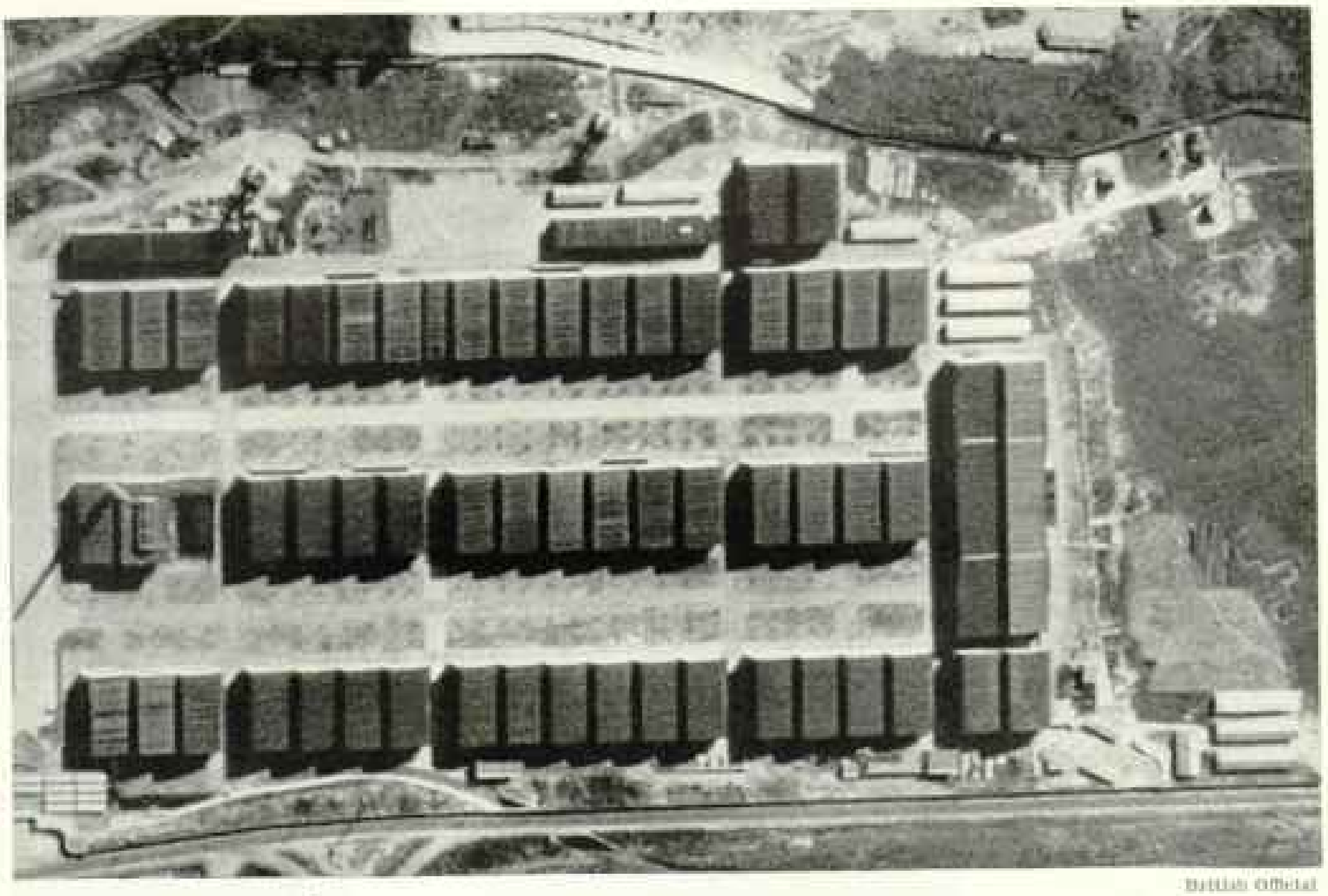
A WAC shows the difference in size between a huge aerial camera lens, developed for the Army Air Forces at Wright Field, Ohio, and the small lens of a standard 3¼ by 4¼ news camera. The big glass is designed for photographing from altitudes of 35,000 feet or more.

Because many warships look much alike from the air, some of our flyers have reported sinking Jap battleships when they actually hit cruisers, or cruisers when they hit destroyers. Photographs, taken during the attacks and studied later, reveal the real facts and protect us from errors.

How hazy your ideas of this war would be without movies shown weekly at your local theater, and without news photographs which are cabled from London to the United States in seven minutes. Sometimes you see pictures of battles in your newspaper the same day they take place. What a far cry from gallant Matthew Brady, following the Civil War armies with a clumsy darkroom on a horse-drawn wagon, coating emulsion on his plates on the battlefield, and making only a few pictures a day.

If you own a camera, you probably have had a hard time getting film. Almost all the film now is going to war. The Eastman Kodak Company alone has produced enough film for war purposes since Pearl Harbor to make a strip two and a quarter inches wide extending four times around the earth.

Thanks to America's love for snapshots and the movies, we were not "too little and too late" with photography when we went to war. The great market for film and paper, represented by our 18 million amateur photographers and Hollywood, had created an



British Official

"Before and After" Pictures Graphically Show Bomb Damage to Airplane Engine Plant

Here is the Gnome-Rhône factory at Limoges, France, prior to a raid by the Royal Air Force. From such photographs photo interpreters can determine vital parts of a factory, what it is making, and even its approximate output by watching traffic in and out. Smokestack's shadow helps reveal its height. This plant was taken over from the French by the Germans in 1943.

enormous photographic industry that swung at once into war production.

That film you can't buy is literally saving lives on the battle fronts. In one case, great fields of buried enemy land mines were detected on aerial photographs. To soldiers on the ground they were invisible, but even slight disturbances of the earth show up on pictures taken from the air under certain conditions. With aid of the photographs, our armies were able to by-pass the mines.

War Waited for Photographic Weather

Another time our commanders held up their advance for two days waiting for good photographic weather, then made pictures of all the enemy's lines. On the photographs we spotted German guns so accurately that our artillery knocked out every one of them, our infantry advanced with little opposition, and German prisoners thought we had a new secret weapon!

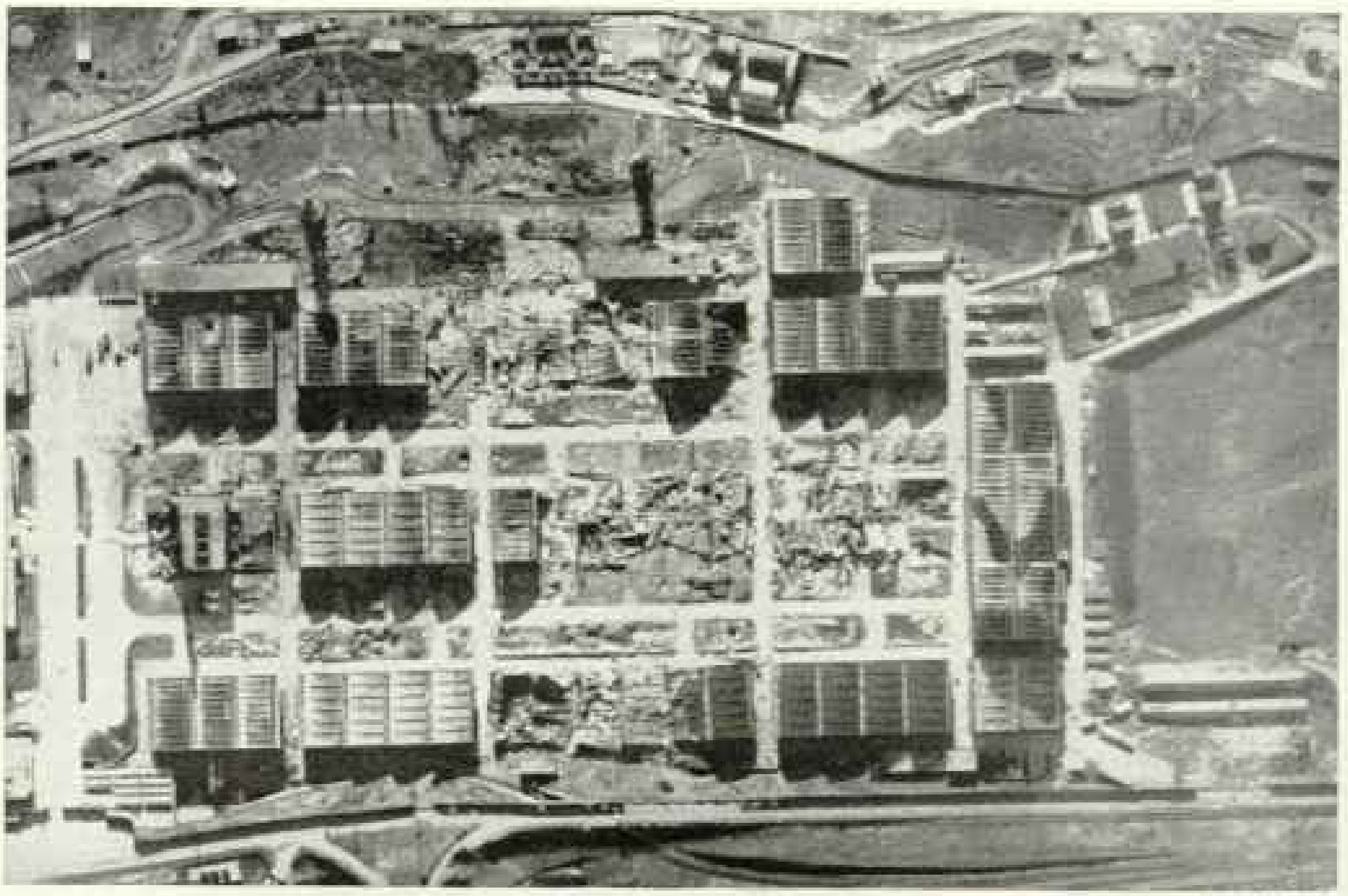
To help catch spies and saboteurs we use cameras hidden near their meeting places or even photograph their "casual" meetings on the street. Special film finds unseen fingerprints on surfaces dusted with fluorescent powder, unseen chemical erasures, or bloodstains on cloth when illuminated by ultraviolet or infrared light. People can be photographed even in total darkness with invisible infrared light.

Photographs of blood vessels in the eyes of pilots are taken by the Royal Canadian Air Force to detect early signs of deficiency of riboflavin (vitamin B_2) in their diet. If the vitamin lack progresses too far, pilots suffer from eyestrain, headaches, dizziness, and poor vision.

After Pearl Harbor our bombed warships were urgently in need of quick repairs. Blueprints for one destroyer alone cover a quarter of an acre. Shipping all the original bulky blueprints to Hawaii would have taken weeks; so, instead, the Navy photographed the blueprints on microfilm, the same as that used for V-mail, and flew the film to Hawaii. There the plans were enlarged to original size. Our ships were in service that much sooner.

British parish registers, stored in churches, containing the only records of early times, were photographed in case the originals should be destroyed in the blitz.

"Before and after" photographs of the re-



British Official

Comparing This Aerial with the Opposite Reveals Extent of Destruction by Bombs

British Lancasters attacked the plant on the night of February 8-9, 1944. Analysis of the photograph showed that 21 bays, or sections, are completely destroyed, three are severely damaged, and roofs are damaged on 17. By studying it in detail, officers can judge how much production is affected and how soon the factory can be repaired. Faint, irregular white lines at extreme right are shelter trenches for workers.

sults of plastic-surgery operations on soldiers disfigured by wounds are used to give new hope to other disfigured men.

When the Germans started dropping a new kind of small delayed-action bomb on England, designed to kill and wound civilians unawares, a one-reel movie describing it and showing how to deal with it was made and shown in every picture theater in Great Britain in just six days.

Geographic Photos Go to War

National Geographic staff photographers and contributors, taking pictures all over the world before the war, hardly thought that their photographs would have military value; yet such proved to be the case.

By official request the Army, Navy, and other agencies have been furnished nearly 30,000 pictures from the world-wide photographic files of your Geographic Magazine. Some of them date back to the early days of The Magazine, when it was pioneering in the extensive use of photographs as illustrations.

These pictures, together with many others supplied by travelers, tourists, and missionaries, have been used in briefing flyers on landmarks and bombing targets, showing invasion forces how shorelines look, identifying cities, railroad stations, and factories.

Pictures from your Geographic, too, are used by the Army Signal Corps and the Navy as reference material in accurately reproducing scenes for training films from the Arctic to the Tropics, and by the Air Forces to help identify objects in reconnaissance photographs.

In a closely guarded room in Washington our Army Air Forces have one of the world's largest collections of aerial photographs, including many selected from Geographic files. This vast file includes pictures of cities, airfields, docks, harbors, beaches, bridges, lakes, from all over the world, and is consulted before important military operations.

Aerial photographs were used for scouting in World War I, supplemented by airplane observers who relied on memory to report what they saw. Since then, the science of aerial photography has made tremendous strides.

Aerial scouts of this war are photographic pilots who fly so high they cannot be seen from the ground. They use powerful cameras that can "see" farther and better than

International News

Photographs Are Washed in a Jungle Stream When There's No Running Water Handy

While a watchful soldier with a Tommy gun covers them from the bank, two Army photo technicians rinse their prints in the only water available to them in the Solomons. In order not to delay vital photographs of enemy positions, Army and Navy cameramen often must work under such primitive conditions (page 266).

the human eye, and that never forget what they've seen. Photo pilots fly some of the fastest planes available, chiefly P-38 fighters or Spitfires that do more than 400 miles per hour.

True daredevils, they fly with their planes stripped of guns to decrease weight and give them greater speed to run from the enemy—they are the only pilots who are expected to run away. Their job is to fly in at top speed over the area they want to photograph, snap their pictures, and streak home before enemy fighters can catch them. The pictures they bring back are more important than any enemy planes they might shoot down if they did have guns.

Photo pilots flying six miles up, at a speed of 300 to 400 miles per hour, can shoot photographs so sharp that interpreters can count and identify individual cars in a freight train on them. With high-speed emulsion film, special lenses and filters that help penetrate haze, they can photograph objects on the ground that the human eye could not possibly see from such a height.

Infrared sensitive plates used in photographing the curvature of the earth from the world's record altitude of 72,395 feet (13.71 miles) on the National Geographic Society-U. S. Army Air Corps stratosphere flight of November 11, 1935, were a stage in the development of infrared film used in the war today to make high-altitude photographs.*

Pictures Back before Bombers

So fast are the photo-reconnaissance planes that in one case a pilot followed a bomber group to its target, photographed the results of the bombing, flew home, and had the pictures on the commanding officer's desk before the bombers returned.

Cameras are mounted in the plane's belly pointing straight down or at oblique angles. A robot device snaps a picture automatically as often as every three seconds, rolls up the film ready for the next picture, then snaps another. The pilot flips a switch on the dashboard to start or stop his cameras, and can change the shutter opening by remote control if the light becomes stronger or weaker while he is taking pictures. He can make 500 pictures on a single flight and photograph hundreds of square miles of enemy country in a few hours. In a single morning our photo planes once photographed an area half the size of the State of Vermont.

Photo pilots must constantly be on the lookout for hostile planes, for the enemy tries hard to keep them from getting home with their telltale pictures. One pilot, looking at his pictures after a mission, discovered he had photographed three Jap Zeros flying below. He hadn't noticed them, and, luckily, they hadn't noticed him!

To get close-ups of special targets or enemy installations, a photo pilot may take his life in his hands and fly down to only 300 feet above the ground to snap his pictures, trusting to luck and speed to keep from being shot down. They call this "dicing," perhaps because it's a gamble with death.

Occasionally a daring pilot makes a "continuous-strip" photograph of a slice of enemy territory, most frequently of a beach to determine underwater depths for landing operations. For this a special camera is used with a narrow open slit instead of a shutter. The film moves automatically across the slit, its speed adjusted to the speed at which the plane is flying. By this process, flying at low altitudes, it is possible to obtain a photograph which is one long continuous picture covering the entire length of the film roll. The pictures are clear enough to show the "A" sticker on an auto windshield (page 274).

Back at the base, aerial-reconnaissance films are rushed to the darkroom for quick development, for they may reveal information that calls for immediate action.

"In New Guinea," a sergeant told me, "headquarters used to call up the darkroom and ask the photo interpreters to count the Jap planes on freshly developed negatives of enemy fields, even before we made prints. Acting on that information, our bombers would go out right away to attack."

When word came that the French Fleet had been scuttled at Toulon, a U. S. photographic plane sped out at once from Algiers to "shoot" the scene. From the pictures, it was clear that the sunken French ships could not be used by the Germans; consequently, many ships of the British Mediterranean fleet were released immediately to fight in other theaters.

Bomber crews about to go out on missions are shown photographs of the target, and the bombardiers may take along copies to help them recognize it. Bomber crews take their own photographs, too, during and after bombings, partly to record the results, partly to prove they were over the target.

"On antisubmarine bomber patrol out of Greenland," a sergeant told me, "we photographed every sub we sank to help get credit for the 'kill.' Once, after a raid on Berlin, we had to bail out into the English Channel, but I took the camera with me when I jumped

* See "Man's Farthest Aloft," by Capt. Albert W. Stevens, National Geographic Magazine, January, 1936.

Staff Photographer Edwin L. Wisherd.

Movies Give the Illusion of Flying as a Fighter Pilot Practices Shooting

Sitting in a dummy plane, the student sees before him the sky and ground as if he were actually flying. Projected against this background is an enemy plane maneuvered by an instructor. The student works his controls to "pursue" it and keep it in his gun sights. When he moves the stick to "climb," he sees clouds and empty sky on the screen; if he "dives," he sees the earth; if he "banks," the horizon tilts. When he "fires" he even hears the rattle of machine guns.

and managed to keep it dry enough so we could still see the results on the film."

Before our forces landed on Guadalcanal, photo planes took pictures of the island. Prints were flown out and dropped on the decks of the transports so the Marines going ashore would have the latest information on positions of Jap guns, pillboxes, and ammunition dumps, the probable number of Jap defenders, and the best places to land.

Bury Film to Keep It Cool

Taking the pictures, however, is only half the story. They have to be developed and printed before they are of any use, and often this has to be done under extreme difficulties. Darkrooms have been set up in light-proofed tents, ruined buildings, and even in the privy of a French school. When no regular water is available, melted snow, sea water, or muddy swamp water may be used to mix chemicals. Once, when the water supply failed in a field darkroom in North Africa, prints were rushed by jeep to the near-by seashore and washed in the ocean.

When light is shut out from a darkroom, air is often shut off as well, and heat in tropical darkrooms may climb to 120 degrees F. or higher. In extreme heat, emulsion may melt and run off the film. One photo crew in the South Pacific had to mark their boxes of photo materials with crayon because giant cockroaches ate the glue off the labels. In another place the air was so humid that wet prints took three or four days to dry. In the North African desert, film had to be buried six feet deep in the sand to keep it cool. Tropical fungus grows on camera lenses and secretes an acid that actually etches the glass.

Shooting Pictures under Fire

"One thing you have to learn is not to be ashamed to be scared," a Signal Corps officer photographer just back from the South Pacific told me. "We always carried carbines or pistols, and I traveled in a jeep with a driver who carried a Tommy gun. He would cover me while I was taking pictures under fire, and that sure helped me keep my mind on my work!

"We made pictures of Jap pillboxes and entrenchments and circulated prints among

Staff Photographer Edwin L. Wisherd

He Shoots with Either Gun or Camera from the Waist of a Flying Fortress

Wearing an oxygen mask and heavy gloves, an Army Air Force photographer points his big aerial camera for a long-distance picture of enemy territory. Such a camera weighs 50 pounds or more and is difficult to lift in the rarefied air of high altitudes.

our units so they'd recognize them when they went into action. Photographs helped us in our operations in the jungle in a lot of ways. Photographers lead the same life as front-line troops and take equal risks. One cameraman went so far forward to get better pictures he was pinned down for hours in a foxhole by Jap machine-gun fire.

"Once, before we landed on a Pacific island, aerial-reconnaissance pictures showed there were heavy Jap fortifications on the shore at the point where we had planned to go in. We changed our plans and landed at another place. Those pictures prevented a disaster."

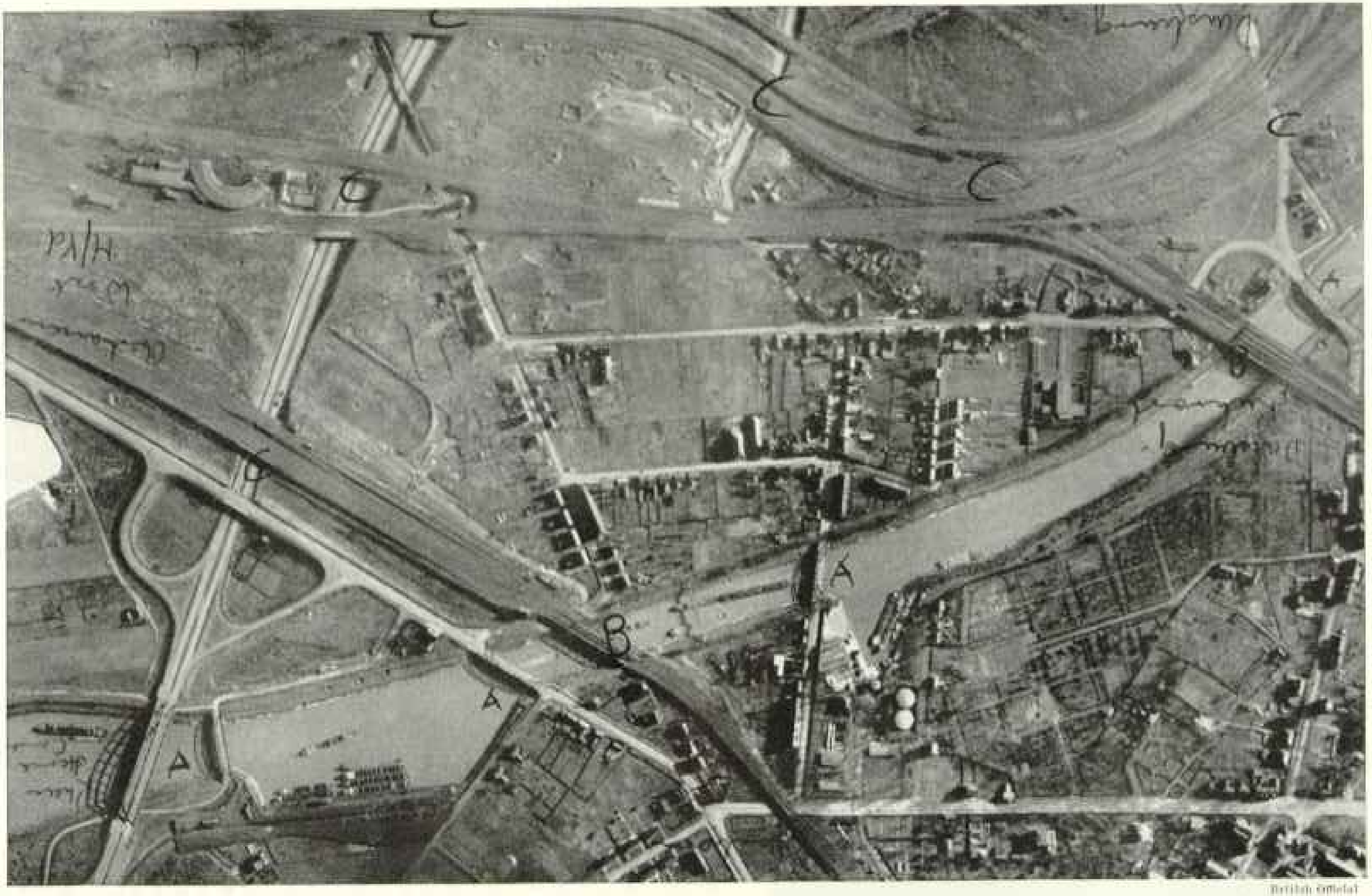
One day in Washington I heard that a friend of mine, a paleontologist of the Smithsonian Institution, had been commissioned a captain in the Air Forces. A paleontologist knows all about dinosaurs and other extinct creatures, and digs up their bones, but what use that knowledge might be to the Air Forces I couldn't imagine. Then one day he explained.

"I'm a photo interpreter," he said. "Almost all the photo interpreters are archeologists, paleontologists, geologists, civil engineers, architects, soil experts, and other people who are used to working with the earth and its lines, curves, and natural formations. That experience enables them to look at aerial photographs and pick out things that other people wouldn't see or recognize."

There are thousands of photo interpreters at work now with the U. S. and Allied Armies. Some of the best of the British are women.

An aerial photograph that looks flat and uninteresting to you or me is full of information for a photo interpreter. He knows, for example, that paved or dirt roads and smooth trails photograph in light tones, as does plowed land. They all reflect much light. Meadows and swamps appear dark. Forests and brushlands have a coarse texture and cast shadows with hard outlines. A track, trail, or road that seems to lead to nowhere probably indicates that there is a camouflaged gun position, ammunition dump, or command post where the track ends. Oil tanks with no tracks leading to them probably are dummies. Fake airfields can be spotted by the lack of activity around them.

Everything is suspect. As one officer explained: "You photograph an area one day and notice an empty field in it. Next day you photograph it again and there's a shadow in the field that wasn't there before. You



British Official

Shapes of Shadows Reveal the Types of Bridges in This German Transport Bottleneck Near Duisburg, on the Rhein-Herne Canal

Letters, marked on picture by photo interpreters, indicate different kinds of bridges. "A's" are shown by shadows to be the bowstring or arched type of suspension; "B's" are lattice girder; and "C's" plate girder. Heights of buildings, bridges, and trees can be estimated from their shadows.

British official

Photographing French Beaches Before the Invasion, a Plane Catches Germans Erecting Obstacles, Fleeing Possible Bullets

Workers putting up pilings and other landing craft obstructions are dispersing and falling flat on the wet sand in fear of machine-gunning by the plane. Thousands of such pictures of all the French coast were taken before the invasion, so that Allied troops would know the strength and types of German defenses (page 257).

Army Air Forces, official.

When War with Japan Drew Near, We Were Already Mapping Alaska from the Air

Army Air Forces took 35,000 aerial photographs for use in mapping 292,000 square miles, one of the biggest mapping operations in history. The map covers more territory than one of Germany and Hungary combined. Making such a map by ground-survey methods would take many years.

can't make out what's casting the shadow, perhaps, but you know something has been put there that ought to be investigated."

On pictures taken daily or oftener, photo interpreters can watch an enemy gun battery being camouflaged step by step, or an airfield being built under concealing trees. On photographs of bombed cities piles of rubble and wreckage show up white because the millions of tiny clean surfaces of newly broken stone and plaster reflect more light than the old, dull, weathered surfaces.

Color Film Spots Camouflage

Trenches in use by troops can be distinguished from old or abandoned ones because their outlines are sharper. Photo interpreters of one U. S. division landing in Sicily spotted 90 percent of the enemy's defensive works on pictures before the troops went ashore.

In the South Pacific, color film is used to detect camouflage. Natural green shows up as reddish brown, but green paint or other imitations of Nature's green appear in their true colors and "stick out like a sore thumb."

Such use of color photography bears out a prediction made by General H. H. Arnold in an article, "Aerial Color Photography Becomes a War Weapon," in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1940, when he wrote: "Old methods of camouflage, however, will soon be out-of-date. Like a magic eye, the natural-color camera penetrates the veil of camouflage. Natural color also gives a sense of depth, or a third dimension."

As early as 1930, with the encouragement of the U. S. Navy, Melville Bell Grosvenor of the GEOGRAPHIC staff made the first natural-color photographs from the air "because of their potential value in the study of camouflaged areas, ships, and gun emplacements." *

* See "Color Camera's First Aerial Success," by Melville Bell Grosvenor, NATIONAL GEOGRAPHIC MAGAZINE, September, 1930.

U. S. Navy, Official

Swooping Low, a Navy Bomber Photographed This Jap Cargo Ship, Then Bombed It

Many details of the vessel, which may be of vital interest to Navy Intelligence, are clearly shown. Pilots taking pictures from such a low level are dangerously exposed to antiaircraft fire, but the information obtained may be well worth the risk.

Camouflage is also detected by black and white film sensitive to infrared light. Chlorophyll, the green coloring matter in grass and foliage, reflects invisible infrared rays and shows up light in the picture, but areas camouflaged with fake leaves or grass don't reflect it and appear dark.

In the Owen Stanley Range of New Guinea, we used photographs to locate camouflaged Jap camps, supply dumps, and pack-mule corrals in the mountains. They then were bombed, and this helped our forces push the Japs back toward Salamaua.

Stereoscope Shows Three Dimensions

Most aerial photographs are taken in series so that the pictures overlap about 60 percent. The interpreter looks at them through a stereoscope, essentially the same as the old-fashioned parlor instrument with which our parents and grandparents admired views of Niagara Falls. When you look through a stereoscope at two aerial photographs of the same area taken from slightly different angles, you see only one picture, but that picture has height and depth. Buildings and trees jump up at you, ditches and ravines appear depressed; you see the whole scene as you would in Nature.

On such a picture many things stand out that are not noticeable on a flat photograph. The photo interpreter has an amazing device to measure the heights and depths he sees through the stereoscope. A tiny dot is projected onto the picture. Watching it through the stereoscope and turning a knob, he can make the dot appear to move vertically up and down. He manipulates the dot until it seems to rest on the sidewalk beside a building. Then by turning the knob he lifts the dot up to the roof level. From a gauge he then can calculate the height of the building. In the same way are measured depths of ravines, trenches, railroad cuts, or heights of viaducts, radio towers, and trees.

U. S. Navy, Official

Photographs of Enemy Territory Are Dropped by Parachute for Quicker Handling

Films of Jap positions at Munda taken by a Navy photographic plane are delivered to a base on Rendova Island in the Solomons, where they will be developed and printed for immediate study by Intelligence officers. Films can be developed in a few minutes, so that targets revealed may be attacked immediately (page 273).

Even without this measuring device, it's possible to establish the dimensions of buildings from their shadows if the time of day when the picture was made (to get the angle of the sun), the scale of the photograph, and the latitude and longitude of the place are noted.

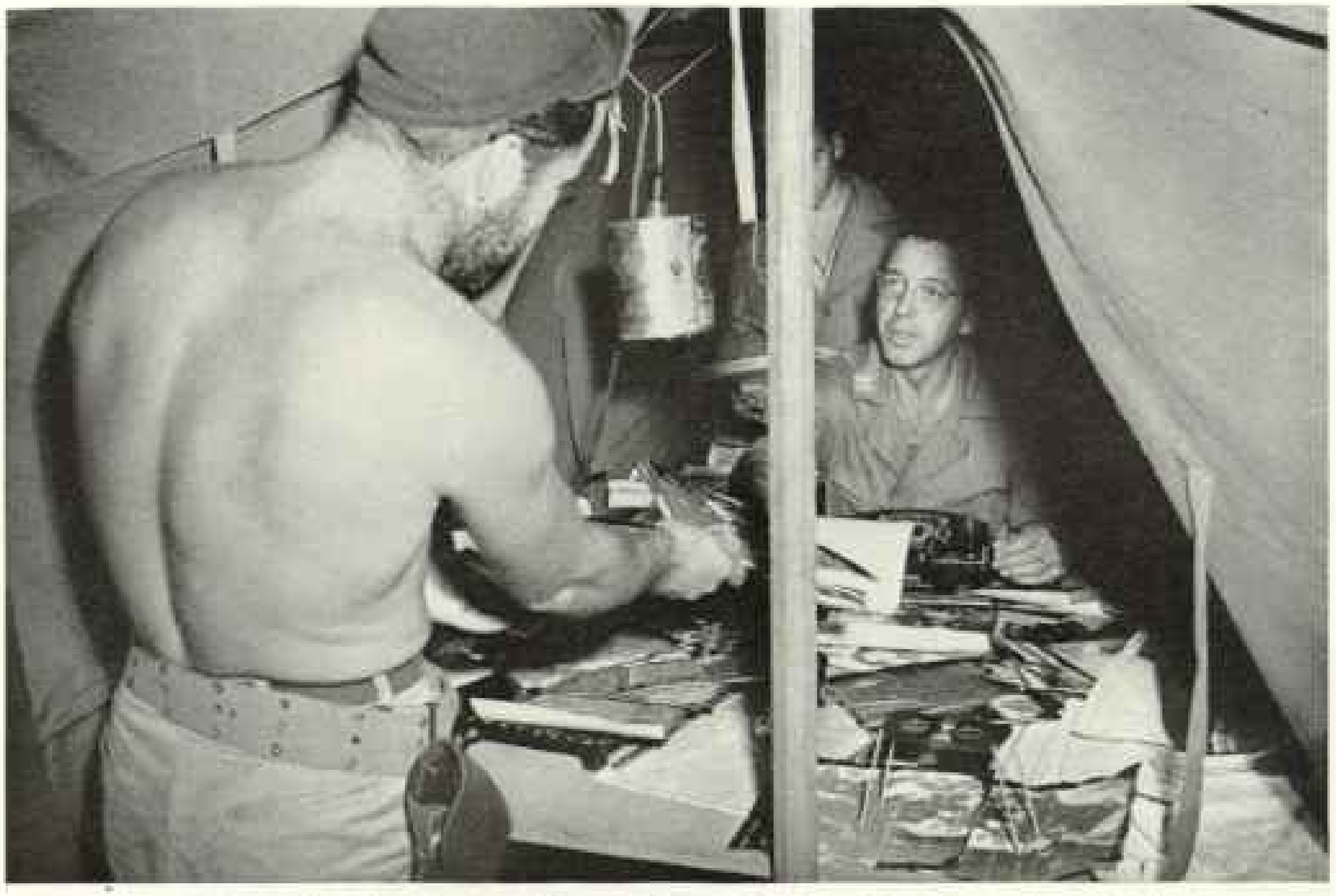
Most automobiles are about the same width; so, if an auto on a road in an aerial photograph is seen, it's easy, with a pair of dividers, to measure the width of the road. To figure the distance along a winding road or trail that shows on a picture, run a little measuring wheel over it. Magnifying glasses, of course, are constantly used.

Because cement, for example, is made in a certain way, cement factories everywhere in the world necessarily have pretty much the same layout. The same is true of chemical factories, gasworks, and many others. Some photo interpreters get so they can tell what a factory is making just by studying pictures showing its smoke, traffic, stock piles, and scrap heaps.

Mapping with Photographs

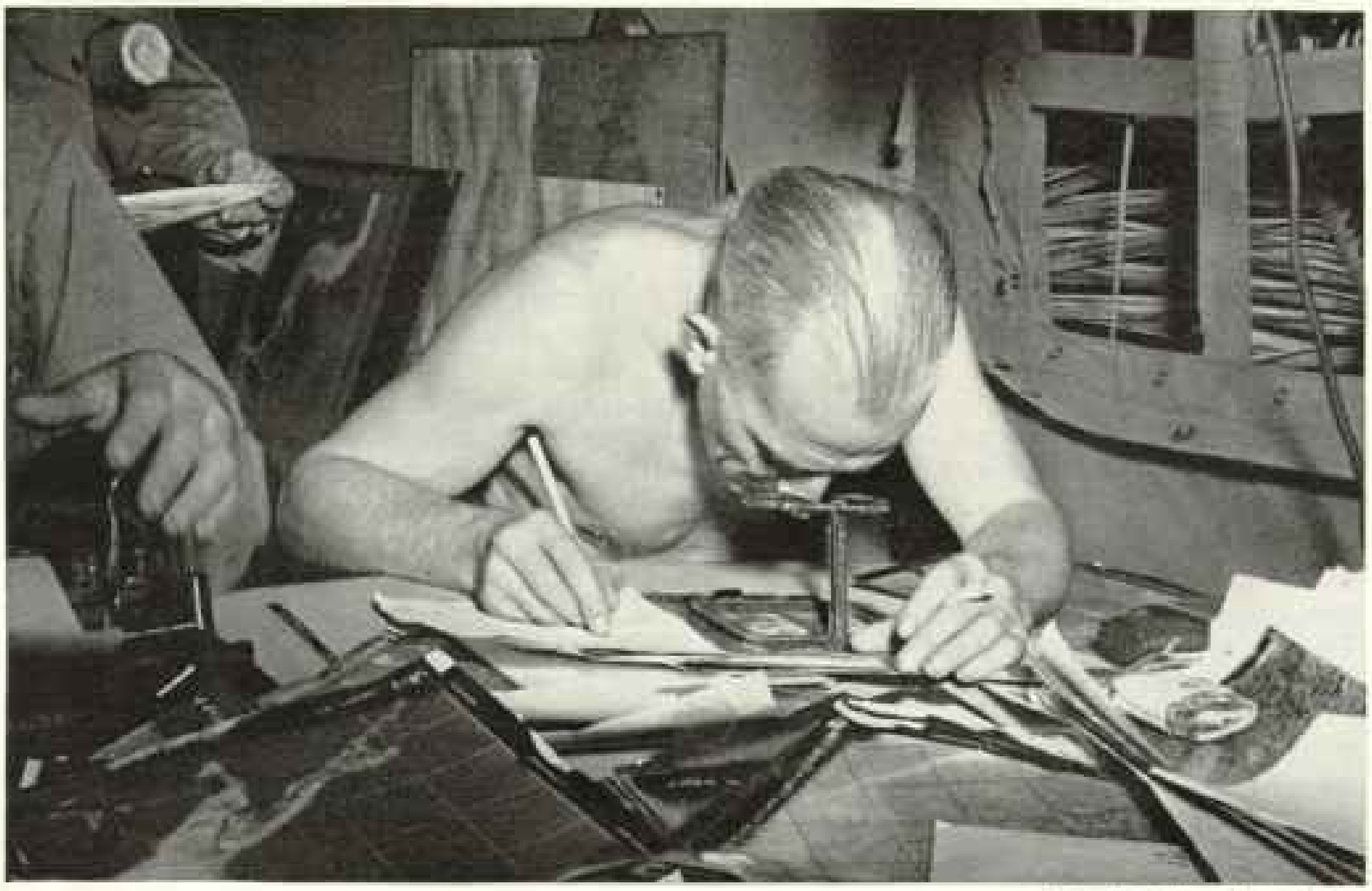
But sometimes funny mistakes are made. One day as a pilot came in for a landing he photographed a road near his own field to use up the few feet of unexposed film left in his camera. The photo interpreter examining the film thought he had photographed a hitherto-unknown enemy landing strip. They woke up the commanding officer to tell him before they realized the truth!

Mapping of the earth's surface, thanks



"Here Are the Latest Shots of That Jap Bomber Base, Captain."

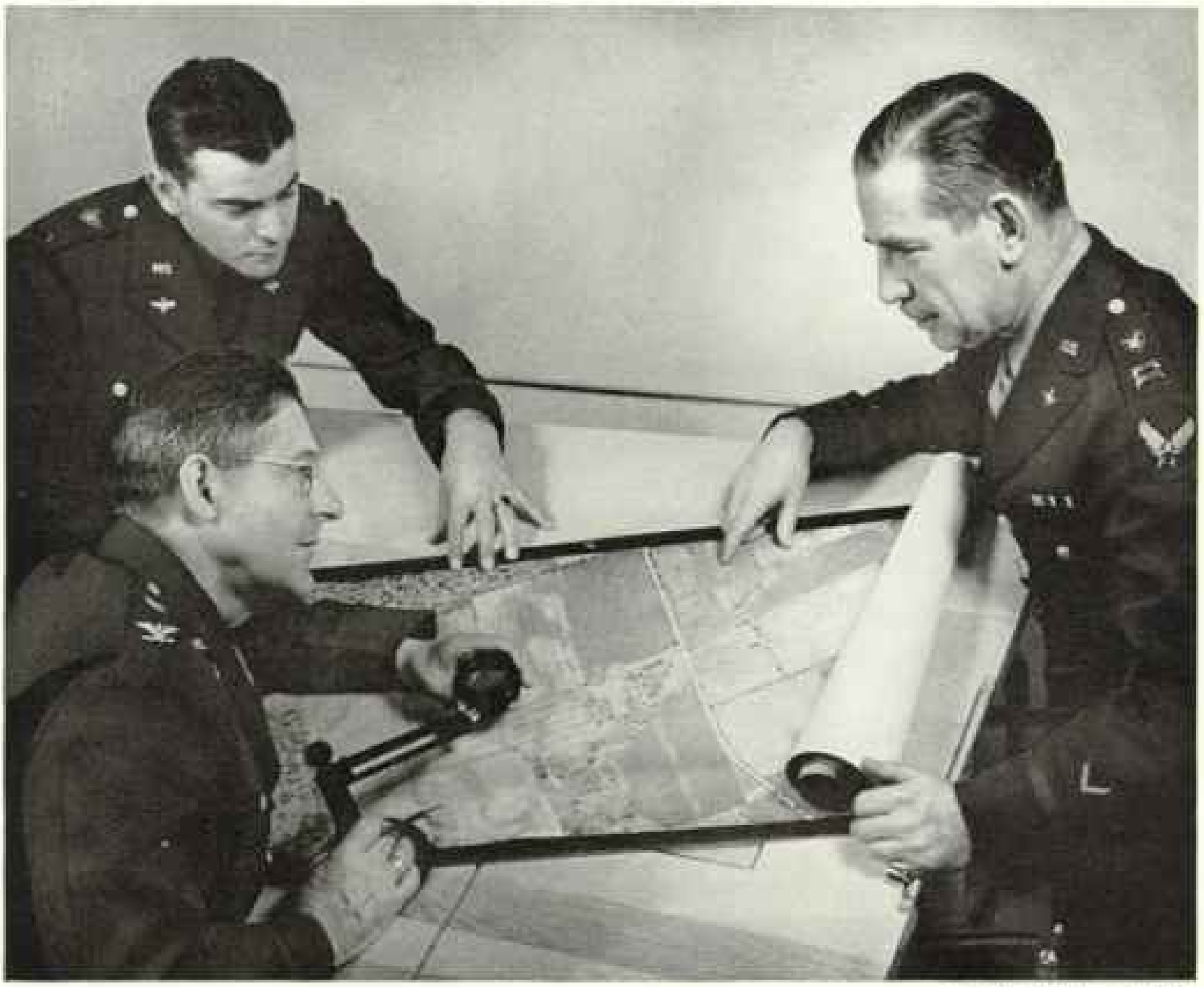
A messenger, armed with a pistol, hands a batch of freshly developed aerial photographs to the photo interpreter who will scrutinize them for Jap planes, guns, workshops, fuel tanks, ammunition dumps, etc.



U. S. Army Signal Corps, Official

With a Stereoscope He Finds Bombing Targets on Photographs of Munda Point

Here the photo-interpretation officer, stripped to the waist in the tropical heat, studies the aerial pictures of Japanese-held territory to locate targets. Viewed through the stereoscope, objects appear in three dimensions, with height and depth, making it easier to identify them (page 271).



U. S. Army Air Forces, Official

Officers Study One of the New Continuous-strip Photos, Made by Low-flying Planes

Col. George W. Goddard, pioneer in aerial photography in the U. S. Army Air Forces, is at lower left. Continuous-strip photographs are made with a camera which has a narrow open slit in place of a shutter. Film moves across this slit at a speed synchronized with the speed of the plane (page 265).

to aerial photography, has made more progress since the war began than in any similar period in the history of the world.

When the United States entered the war and the damaging attack on our fleet at Pearl Harbor left us vulnerable to possible invasion, it was realized that great areas of our coasts, including some densely populated regions where enemy landings might be made, were not adequately mapped for defense purposes. Thanks to aerial photography, we were able to make good maps of these regions quickly.

Making maps from aerial photographs is quicker, easier, and in many ways more accurate than by any other method. If you've ever flown in a plane, you know that the country below looks like a map. All that's necessary is to photograph it. The only drawback is that, on an aerial photograph, distances and shapes of objects are slightly distorted everywhere except in the center of the picture. Map makers, however, know how to correct for this distortion; so it is not a serious handicap.

On many battle fronts, where speed is essential and small distortions are not important, aerial photographs are used directly as maps. This is a wonderful short cut, for photographs of enemy-held territory can be made just before our infantry advances, showing the situation right up to the minute, and then thousands of prints can be distributed to every company or platoon or even to every tank and scout car.

A new set of such maps may be made and issued every day, or even oftener, to keep our troops up-to-date, for the situation behind the enemy lines is changing constantly, and a map made in the morning may be out of date by afternoon. Such maps are good for all operations except directing the fire of artillery, which requires maps free of distortions.

So rapid are our map-making methods now

AP from Press Association

German Prisoners Are Interviewed by a News Photographer on the Italian Front

William C. Allen of the Associated Press, holding camera, talks with captured troops after taking their pictures. Cloth keeps dirt out of the lens of his Speed Graphic, a camera universally used by news photographers. A smaller German Zeiss Ikon hangs around his neck. Several press war photographers have been captured, wounded, or decorated.

that aerial photographs of an area of 89,000 square miles in Africa, bigger than Utah or Minnesota, were made into a finished map in seven days after the photographs were flown to the United States. To make a map of so large an area by prewar ground-survey methods would have taken years.

Map Great Areas in a Few Hours

In making aerial maps of large areas, we use the "tri-metrogon camera," which really consists of three cameras, mounted in an airplane so that one points straight down and the other two point off obliquely at either side. Together, the three cameras photograph a strip of territory extending from horizon to horizon. The parts of the picture made by the oblique cameras have a different perspective, but this can be corrected when the pictures are made into maps.

With this method, a pilot can photo-map an area larger than the State of Rhode Island in three and a half hours of flying. He flies a straight course with his cameras set to snap automatically every so often, so that each set of pictures overlaps with the next. From 20,000 feet, in one shot he can photograph an area 30 by 9 miles. At the end of his course he turns and flies back again along a course paralleling and overlapping the first one, like the path you follow when you mow the lawn.

With such methods, great areas of the world are being mapped accurately for the first time, and existing maps are being corrected and brought up-to-date. Photographs of many Pacific islands have revealed that old charts, based on surveys made by whalers or early explorers, are inaccurate in some details. Islands are in wrong positions, drawn with wrong shapes: in some cases they are miles wider or narrower than old maps showed.

When the Army's Air Transport Command started to weave its far-flung network of air routes, the lack of proper maps of many parts of these routes at once became apparent.* So the Army Air Forces took over the job of photographing and mapping air routes all over the earth. Motion pictures of the terrain on many of these routes also are made, recording what the pilot sees below and ahead. Later these movies are shown to new pilots who are to be assigned to the same routes.

Our airplanes, guns, even our wound treatments are better because our scientists use high-speed movies that take from 1,000 to 10,000 individual pictures, or "frames," in one second. With them we can record things moving too fast for the unaided eye to see and can almost literally stretch out the passage of time and slow it down for easier study.

High-speed movies found the trouble in a machine gun caused by the firing pin lagging 1/2000 of a second. They can photograph objects traveling at twice the speed of sound. With such pictures scientists "stopped" the motion of helicopter rotor blades making 240 turns a minute and tracked down a troublesome vibration.

Four and a half million antiaircraft shells that had been rejected were salvaged when high-speed movies showed that they did not lose their nose-cap detonators in flight as inspectors had at first believed.

With automatic high-speed movie cameras mounted on the wings of planes, the Army has photographed the opening of parachutes and the jumping of parachute troops from planes. Shown later in slow motion, the pictures reveal why some parachutes are not opening right and what is the right and wrong way for a man to jump.

These movies and many other ways of using photography to help fight the war, some still highly secret, were developed at the Army Air Force laboratories at Wright Field, Ohio.

One old-time officer, contemptuous of the newfangled use of photography in war, snorted, "Nobody ever got killed by a camera!" But today's armies photograph each other so much that the saying goes, "Nobody gets killed now without having his picture taken."

"Gun Cameras" Record Air Battles

That's especially true in battles between fighter planes. Almost every fighter that goes into action carries a 16-mm. movie camera, the same type used for amateur movies. It is installed usually in the leading edge of one of the wings, along with the plane's machine guns, and hooked up electrically to the firing button on the pilot's control stick. When he gets an enemy in his sights and presses the button to fire his guns, the camera starts grinding, too. It records on movie film the results of the pilot's fire, shows whether he hit the enemy plane and whether he brought it down.

You've seen pictures taken by these "gun cameras" in the newsreels, showing enemy planes bursting into flame and wings breaking off. They show beyond question how many enemy planes a pilot shot down, how good his shooting was, or why he missed, whether he wasted much ammunition, and how skillful was his approach to the enemy. Gun-camera pictures are developed and shown to pilots as soon as possible while details of the dogfights are fresh in their minds.

Training Films Are Realistic

Gun cameras also are used in training pilots in accurate shooting. Pilots go up in planes equipped with cameras, but no guns, and engage in mock air battles with other planes, "firing" their cameras whenever they get another plane in their sights. When developed, the films show whether they would have hit the "enemy" if they had been shooting real bullets. Such training has improved the shooting of our aerial gunners 1,100 percent.

Movies are used to train soldiers and sailors in everything from how to salute to how to repair an Army truck or machine gun. Every man entering the Army sees five training films almost immediately, on the articles of war, military courtesy, personal and sex hygiene, and guarding military information. Hundreds of training films have been made, including such titles as "Kill or Be Killed," "Stop That Tank," "Know Your Enemy," "Swim and Live," "Blabbermouth," and "Map Reading." "Baptism of Fire" dramatizes a soldier's fear under fire and shows how to overcome it.

One training film on driving a tank was so clear that a soldier who saw it got into a tank afterward and drove away, though he never had seen the inside of a tank before. An engineer officer reported that a film on bridge building was shown to a group of recruits, none of whom ever had built a bridge. They went out afterward and built a bridge like the one in the film "as good as any I've ever seen."

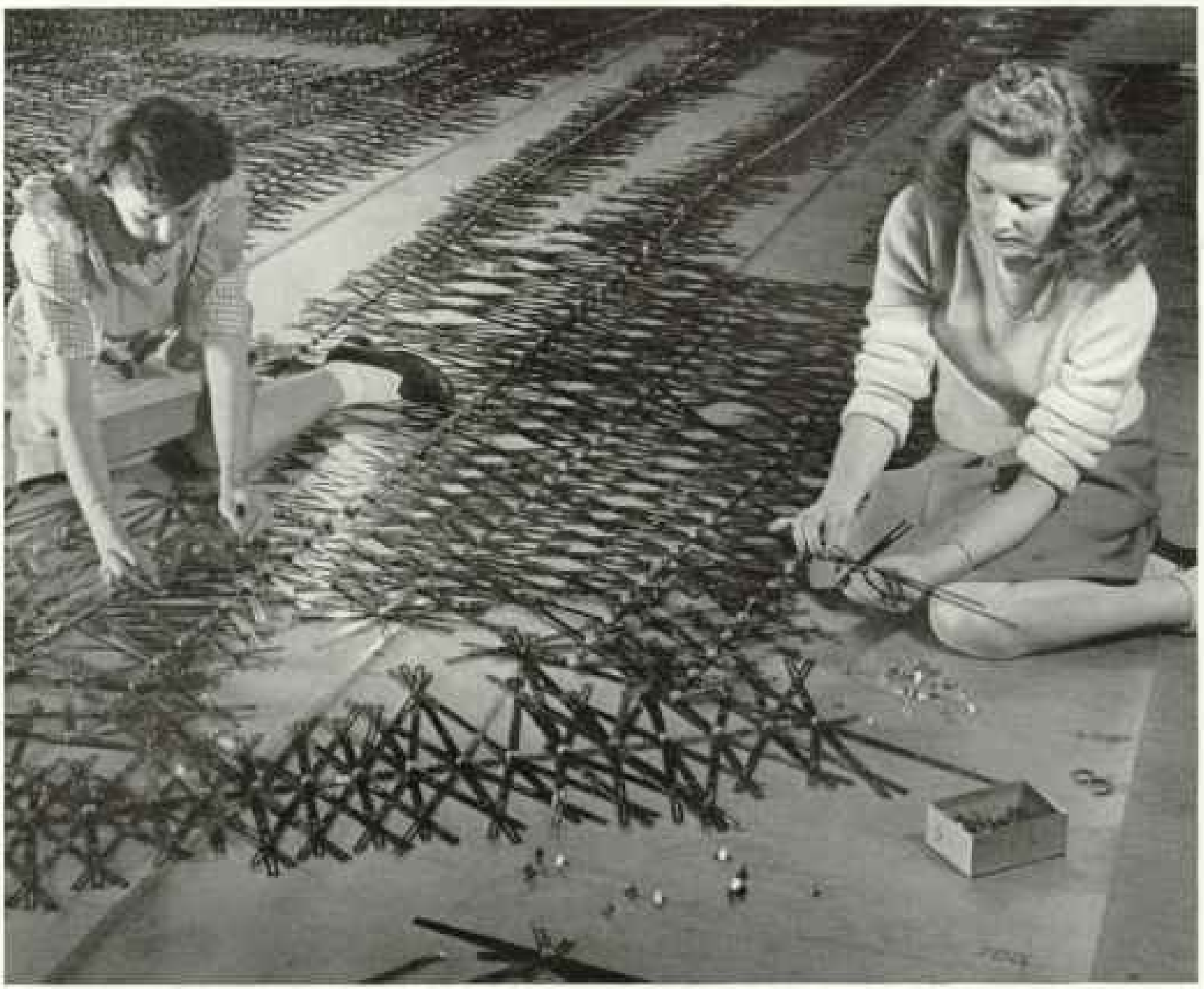
To give new hope to maimed and disabled men, a movie entitled "Meet McGonigle" was made by two veterans of World War I, one of whom had lost both arms, the other both

* See "American Wings Soar Around the World," by Donald H. Agnew and William A. Kinney, National Geographic Magazine, July, 1943.

Staff Photographer Willard R. Culver

Like Parts of a Jigsaw Puzzle, Photographs Are Fitted and Matched Together to Make an Aerial Mosaic Map

Workers of the Army Map Service are piecing together pictures taken at intervals by a plane flying over territory to be mapped. Each overlaps the next, so that features shown in adjoining photographs can be accurately matched. Then the complete mosaic is photographed on a single negative (page 275).



Staff Photographer Willard R. Culver

Key Points of a Map Are Transferred from Photographs to Paper by Metal Templates

The strips are adjusted so that slots in them correspond to key points on aerial photographs and are then locked in position. The templates next are laid on drawing paper, and the key points are marked on it as the first step in making the map.

legs. It shows them walking, brushing teeth, tying shoes and neckties, driving a car, eating, lighting cigarettes, and doing many other everyday tasks with artificial limbs.

In an old Paramount movie studio in New York City the U. S. Army Signal Corps has a "little Hollywood" where training films are made under the expert supervision of Hollywood directors, cameramen, and technicians, many of them now in uniform. They build sets there that duplicate New Guinea jungles, complete with plaster and burlap palm trees, dry-ice fog, rain from spray pipes overhead, and blood made of glycerin on "wounded" men. Arctic scenes use corn meal for snowstorms. The actors are ordinary soldiers, who can be made up to look even like Japs. A "Jap" on a training-film set was chewing gum. "Hey, Nip, cut that out!" somebody yelled. "They don't do that in Japan."

Here, too, in a Signal Corps school, movie and still photographers for the Army are trained by officers who formerly were hard-boiled New York newspaper cameramen.

"Can we teach combat photography?" said one captain. "Say, by the time you've covered fires, murders, gang wars, riots, shipwrecks, shot pictures from planes, blimps, and half-submerged submarines, as we have, you can take combat photography in your stride!"

Army Air Forces makes its own training films and its Training Aids Division has developed many devices that use still and motion pictures for instruction in gunnery (page 266), plane recognition and navigation.

Navy training films are made both ashore and afloat. Seagoing photographers are trained at the Naval Photo Science Laboratory near Washington, where photography also is helping win the war in secret ways.

One of the best films to come out of this war is entitled "A Welcome to Britain," made to be shown to American soldiers when they land in the British Isles. It shows our sol-

U. S. Navy Official

Aerial Photographs Are Processed by the Thousands in This Navy Field Laboratory

On the curving wall of the metal Quonset hut is a NATIONAL GEOGRAPHIC map of the Pacific Ocean, one of thousands which have been enlarged photographically by both Army and Navy for their own use. In this corridor prints are washed and dried preparatory to being fitted into aerial mosaics, or distributed individually to airplanes and surface ships.

diers, better than anyone could ever tell them, what life is like in Britain, how and why British customs differ from ours, what to do and not to do. In words that Americans can understand, it gives the best description of Britain's tea-drinking habit I've ever heard: "The British drink tea as we drink 'cokes' . . . It's the British 'pause that refreshes.'"

Pictures Help Train Surgeons

If you were a doctor from Boise, Idaho, or Boston, Massachusetts, you probably never saw a typhus rash, or an operation for a leg wound produced by stepping on a land mine, or a flyer's fingers "quick frozen" when he took off his gloves to fix a jammed machine gun in the substratosphere. But that's the sort of thing you'd have to treat if you became an Army or Navy doctor and went out on field service.*

So both Army and Navy now make photographs, often in color, of diseases and wounds that their medical officers will encounter in the various theaters of war, and use them for training.

X-ray pictures, taken with small portable machines, also are made almost in the front lines. Wounded men are X-rayed without being moved from their stretchers, and the pictures are available in a few minutes to show doctors the locations of shell fragments or how to set broken bones. Stereoscopic X-rays show the depth of a bullet or bomb splinter in a man's body.

Photographers in this war, both military and civilian, have run great risks and given their lives to get urgently needed pictures.

In North Africa an officer photographer charged a German pillbox with a grenade in

* See "Healing Arts in Global War," by Albert W. Atwood, NATIONAL GEOGRAPHIC MAGAZINE, November, 1943.

U. S. Navy, official

Jap Planes on a Field at Kavieng Are Clearly Shown in This Low-level View

Five aircraft are parked behind earth revetments to protect them from bomb blasts and splinters in case of attack. Other stalls are empty. At lower left a path leads to what is probably an ammunition dump with piles of bombs, or a fuel cache with gasoline drums. Such photographs, taken before a bombing raid, show the number of enemy planes on a field and where they are located, as well as antiaircraft gun positions.

one hand, a camera in the other. He threw his grenade, knocked out the pillbox, then photographed the result.

A sergeant photographer was badly wounded by shrapnel while running to hitch a ride on an American tank destroyer speeding into battle against German tanks. "I was only trying to get up closer where I could get better pictures," he told me!

"One day," he said, "I helped capture some German prisoners and happened to have a Rolleiflex hung around my neck. One of the Germans said sneeringly, 'Ach, so Sie müssen eine deutsche Kamera gebrauchen!' (Ach, so you have to use a German camera). I speak and understand German, so I came right back, 'Ja, und mit ihr werde ich die Eroberung von Berlin photographieren!' (Yes, and with it I'm going to photograph the capture of Berlin). That sort of stopped him!"

Once a Navy plane from an airplane carrier, with a pilot and photographer, escorted by fighters, flew over Rabaul harbor to make photographs of the Jap ships anchored there, preparatory to a raid by our bombers. A swarm of Zeros rose to attack. Bullets tore into the photographic plane, but the photographer continued calmly to shoot his pictures. When the plane landed back on the carrier's deck, the photographer was dead, the camera covered with his blood, but the badly needed pictures were intact. When the film was developed, the last picture on the roll showed a Jap Zero, coming in for the kill.

Rhodesia, Hobby and Hope of Cecil Rhodes

By W. Robert Moore

IN the Public Gardens at Capetown stands a statue of Cecil John Rhodes. His left arm is outstretched; his eyes are steadfastly fixed toward the horizon far to the north. "Your hinterland is there!" he exhorts (Plate I).

A few hundred yards away are the Assembly buildings where Rhodes, sitting in the Cape Parliament, had fervently pressed his ideas of northern expansion. He entered parliament at the age of 27, the year he got his degree from Oxford.

Five hundred-odd miles northward is Kimberley, famed for its "Big Hole" and its diamonds.* Here, when gems were first found, came Rhodes, a tall, tubercular youth of 18 years. He was no ordinary happy-go-lucky digger. The pockets of his rumpled, ill-fitting suit bulged with the classics!

Here, while he pumped water, sold ice cream, and dug diamonds, he spun grandiose imperial dreams. Between paragraphs of Aristotle, he pondered and planned a glorious path of empire.

Unlike some dreamers he also made money. In a few years he had founded a company that was to monopolize the entire South African diamond trade and had won a fortune which would further his vast colonial schemes.

As you travel still farther north now by express train, you pass through the empty desert of Bechuanaland, part of the path that Rhodes was instrumental in gaining.

More than 600 miles above Kimberley you come to Bulawayo. Here, too, is another statue of Rhodes. It also faces north—north toward Cairo, 3,500 miles away (page 286).

The Cape-to-Cairo Route

Cape to Cairo! An all-British route spanning the entire length of the huge African Continent—that and more was Rhodes's ambitious dream! †

The foundation of Rhodesia was to be a steppingstone in his project.

"My hobby," he once called it in a letter to a friend. Hobby indeed, this winning of trade and mining rights from fierce old black King Lobengula, pacifying natives, settling families, and juggling big business, while keeping his eye on more northerly expansion. Only Rhodes (shall we call him the Colossus?) would have called it that!

Let us look at this "hobby" fifty years after. Forty-two years have passed since Rhodes's body, hampered by a weakened heart, lost the race to his surging spirit and was buried in the lonely Matopo Hills, near Bulawayo. Only a scant score have elapsed since the land was finally annexed by Britain and the people acquired responsible colonial government.

Actually there are two Rhodesias.‡ The Northern colony, about a tenth larger than Texas, is nearly double the size of the Southern. Together, they approximate the area of the States lying south of Washington, D. C., and east of the Mississippi River.

But how different!

Over the broad Rhodesian spaces white people are scattered so thinly as to make our emptiest State, Nevada, look filled by comparison. There are only about 89,000 Europeans in Southern Rhodesia, and 15,000 in the big Northern colony. There are about 26 black natives to every white person. It is still a young pioneer land.

Small though the population is, today it is doing its bit. Many of Rhodesia's young men have donned wide-brimmed, beribboned campaign hats and British battle dress and gone north—north not only to Cairo, but to Somaliland, Ethiopia, Greece, Syria, and Libia. Now Rhodesians are fighting on all fronts.

At home the women are driving army trucks and carrying on other war work.

Planes Swarm over Airfields

Planes swarm the sunny Rhodesian skies above a dozen airfields scattered over the country. Here's a new use for the colony's wide-open spaces. The pilots? They're Yorkshire lads, men from London, burry-accented Scots, boys from the countinghouses in Liverpool, Anzacs from sheep and cattle stations in Australia and New Zealand. These extensive Rhodesian airfields are maintained by the Southern Rhodesian Government and operated by the RAF (Royal Air Force).

"I was in France and got out the last day from Dunkirk," said one. "Now I'm training to hit back."

"I was in London when they tried to burn it down; my wife and kiddy are still there."

* See, in the National Geographic Magazine, "Busy Corner—the Cape of Good Hope," August, 1942, and "Cities That Gold and Diamonds Built," December, 1942, both by W. Robert Moore; and "Under the South African Union," by Melville Chater, April, 1931.

† See "Cairo to Capetown, Overland," by Felix Shay, National Geographic Magazine, February, 1925.

‡ See "Rhodesia, the Pioneer Colony," by Melville Chater, National Geographic Magazine, June, 1935.

Dramatically a Sky View Reveals Rhodesia's Wonder, Victoria Falls—"Smoke That Thunders"

Sweeping past numerous islands, waters of the wide Zambezi River plunge 330 feet into this awesome gorge. From Devil's Cataract, left, to Eastern Cataract at right, the brink of Victoria Falls is 1,900 yards long. Near the center, partly covered by the mist of Main Fall, is tiny Livingstone Island, where the missionary-explorer first viewed the Falls on November 16, 1855. After dropping into the deep earth rent, the waters surge out through narrow Boiling Pot in the center and then flow humbly downstream in a sharp zigzag trench. The bridge over the gorge carries both railway and motor traffic into Northern Rhodesia (Plates II and III).

Spans of Donkeys Still Haul Wagons through Bulawayo's Streets

When the town was laid out in 1894, its streets were made wide enough to allow U-turns by such donkey or ox teams. Spick-and-span buildings line the wide thoroughfares of this commercial center, Southern Rhodesia's second largest city.

said another. "There's a spot of Berlin-burning to be done to pay Jerry back."

"Mine's advanced flying," said a young Australian. "I flew people out of Habbaniya to India when the Iraq show was on. Now I want to fly something hot!"

"Boy, does your voice sound good! Imagine me out here showing guys how to push crates around. I feel like I've landed in a hick town in the Middle West. But we've got plenty of room to fly without interference." He was a Canadian who had flown for several years with an airline in the United States.

You *are* reminded of Middle West towns as you look at Rhodesia's young settlements. Some of their foundings were just as informal. Black, hostile Matabeles and Mashonas, not Indians, had to be quelled.

Here's Bulawayo, for instance:

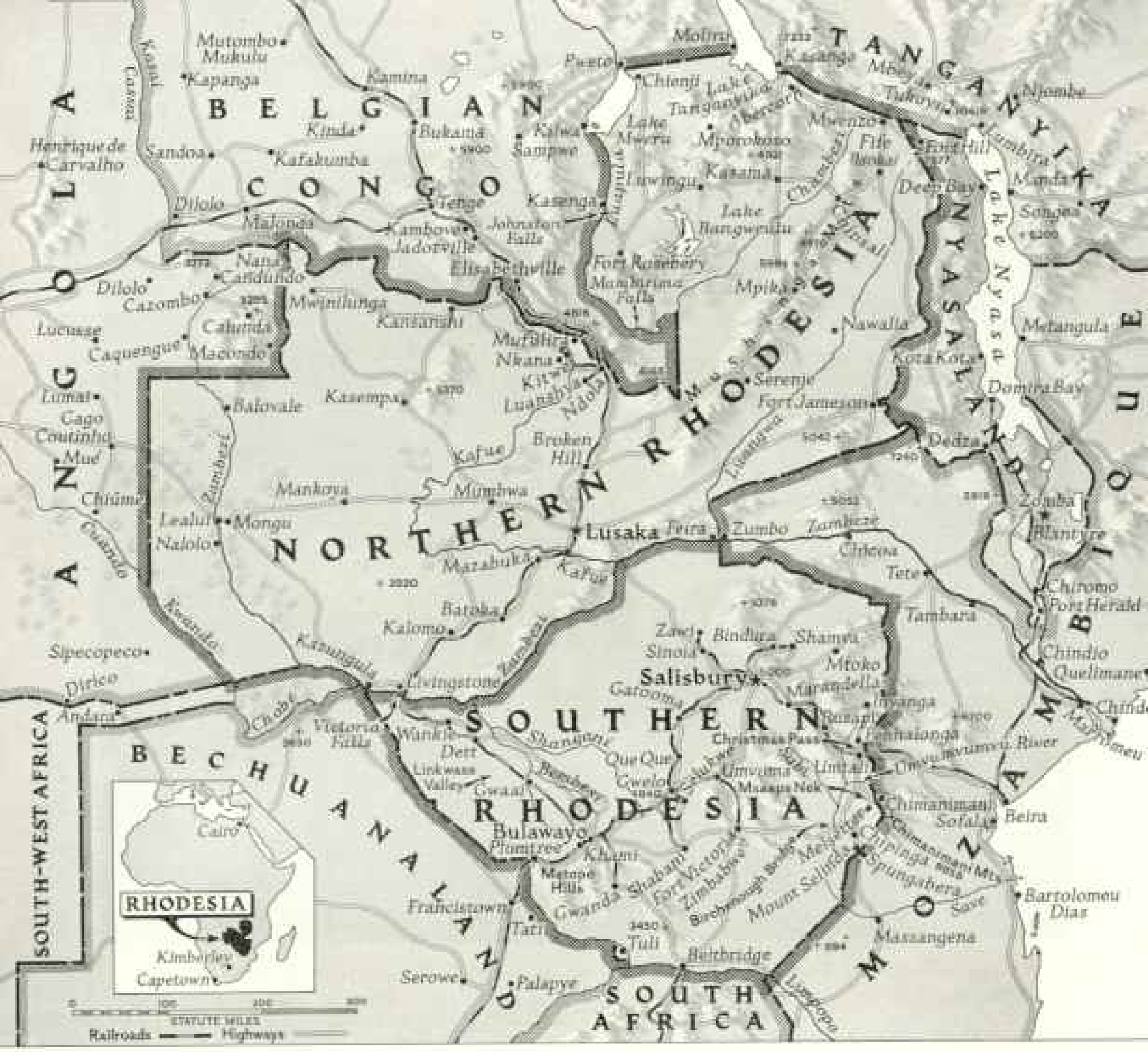
On June 1, 1894, its official opening took place. Lobengula's near-by kraal, called "The Place of the Killing," had previously been burned; his *impis* (armed forces) had been defeated in battles at the Shangani and Bembesi Rivers; peace of a fashion had been established.

Outside the unfinished Maxim Hotel, butcher, baker, miner, and homemaker gathered to hear Dr. Leander Starr Jameson, close friend of Rhodes, do the honors.

"It is my job, gentlemen," reportedly spoke Jameson, "to declare this town open. I don't think we want to talk about it. I make the declaration now. There is plenty of whisky and soda inside, so come in!"

In those days "Grand old Highland whisky" was advertised at 80 cents a bottle, but cauliflowers sold for $7.50 a head! A dozen eggs brought almost as much. In the market, too, potatoes were sold at nearly $100 a bag.

Next to Salisbury, the capital, Bulawayo today is the second largest town of Southern Rhodesia. More than 40,000 people, of whom some 17,000 are white, now live here. It is



the principal center of commerce for the colony and headquarters for the Rhodesia Railways, under whose control are 2,700 miles of line, connecting with the Union of South Africa, the Belgian Congo, and with the Mozambique port of Beira.

Buildings of two to four stories flank the uniformly plotted broad streets. Originally the avenues were designed wide enough to allow the turning of the long spans of oxen hauling huge wagons. Over rooftops many windmills whir in the breezes.

What with electric refrigerators, radios, movies, fine shops, several clubs and golf courses, and homes surrounded by bright gardens, Bulawayo has gone far since its first precarious days.

Jonathan Swift once gibed map makers with the verse:

> So geographers, in Afric maps,
> With savage pictures fill their gaps,
> And o'er unhabitable downs
> Place elephants for want of towns.

You think of those lines when you travel northwestward across the veld toward Victoria Falls. The elephants are here, roaming the bush! So, too, are lions, herds of wild buffaloes, big eland, wildebeests, giraffes, and many other animals. Towns are few (p. 287).

For fifty miles before reaching Dett, and much of the rest of the way to the coal-mining town of Wankie, the railway skirts the northern boundary of a huge wild game reserve, untamed save for a few paths.

Thread these trails and from the protection of your car watch a pride of lions at a kill, see herds of antelopes grazing, and come upon a herd of elephants or black buffaloes. You glimpse primitive Africa in the raw.

Within the hour after leaving this spectacular experience behind, you can drive your car right down into a coal mine at Wankie, the biggest coal seam in Rhodesia.*

* See "Coal: Prodigious Worker for Man," by Albert W. Atwood, NATIONAL GEOGRAPHIC MAGAZINE, May, 1944.

Staff Photographer W. Robert Moore

"Douse That Cigarette, Mister, and Take Care of Your Matches"

There are millions of trees ahead. Near Penhalonga operators of the Imbeza Forest Estate have planted well over 5,000 acres to eucalyptus, Carolina poplar, cypress, and pine. Some forests are now 17 years old and produce box wood and mine timbers (page 298).

A. G. & A. W. Steffens

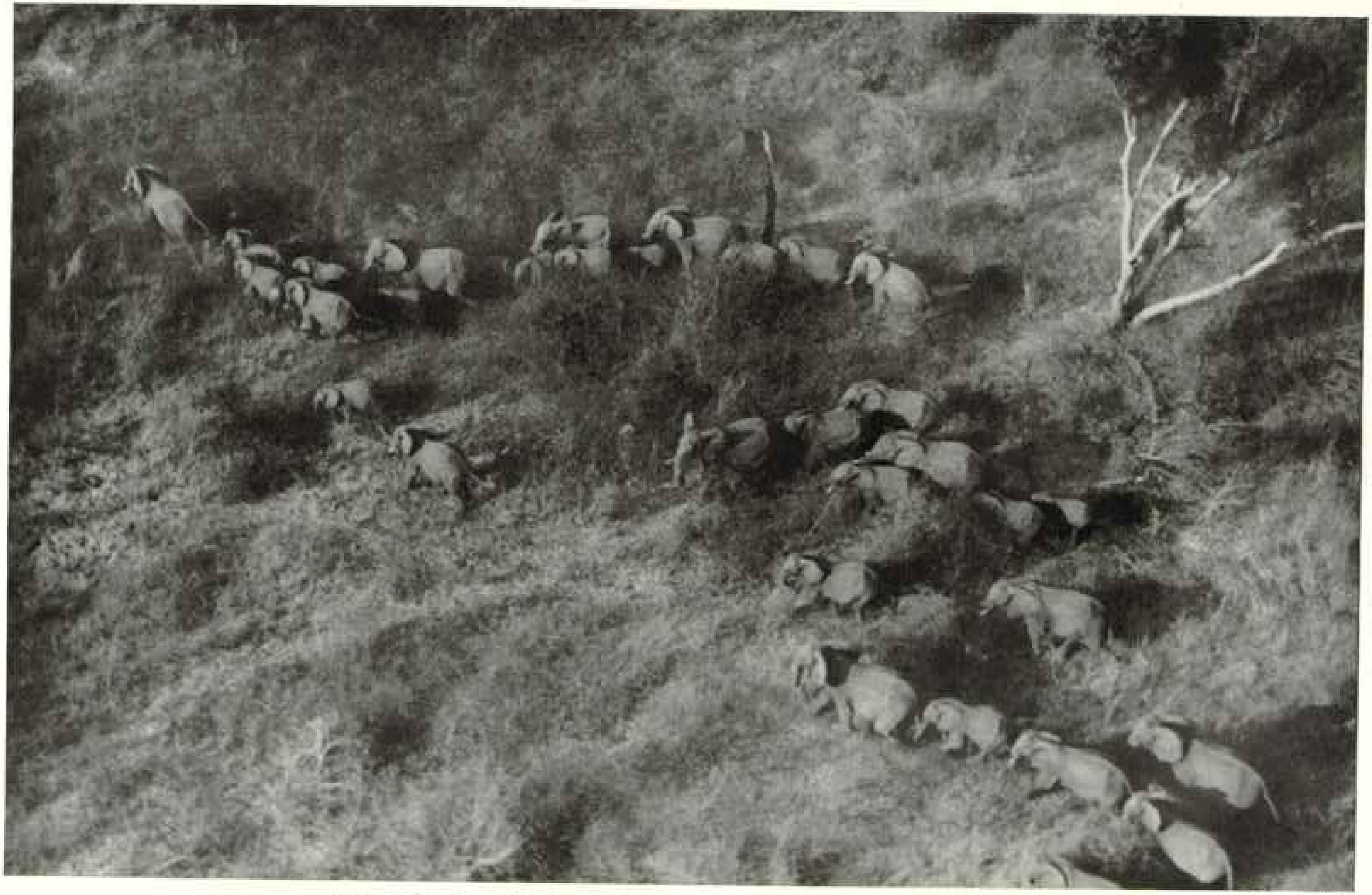
"Pardon Me if I Yawn!"

A lazy old hippopotamus "surfaces" in the Sabi River in Southern Rhodesia. During the heat of day these huge, piglike beasts spend much of their time under water, rising occasionally to breathe. At nighttime they shuffle to the banks to feed on grass.

Staff Photographer W. Robert Moore

To Those Who Fell in the 1896 Rebellion and to Rhodes, Bulawayo Has Raised Monuments on Main Street

Both Dutch and English names appear in the panels of this memorial to the quelling of the Matabele uprising in Rhodesia's early days of colonization. On a pedestal in the background stands a statue of Cecil Rhodes gazing north toward Cairo. The post office is at right (page 283).



With Wide Ears Flapping, Elephants Push through the Rhodesian Bush

The airman spotted them in the Linkwasa Valley about 120 miles northwest of Bulawayo. Six thousand square miles of wild bushland in this region have been set aside as a game reserve. Lions, buffaloes, eland, wildebeests, giraffes, and other animals roam the area (page 284).

If you are not jarred by this quick shift from lions gnawing bones to men gnawing at the jet walls of a six-billion-ton coal deposit, then hurry 60 miles to where thundering Zambezi plunges into its awesome abyss!

"Mosi-oa-Tunya" (The Smoke That Thunders) natives call Victoria Falls.*

When still several miles away we could hear its muffled roar, like the constant noonday traffic hum heard from a New York skyscraper. A line of white mist, like smoke billowing from a bush fire, hung above the green veld. Little wonder that superstitious natives believing in demons would not go near.

Despite all I had read about the Falls and the pictures I had seen, I still felt like a latter-day Livingstone creeping to the verge and peering down into the spuming rent for the first time (Plates II and III).

I felt the same awe and exultation as he must have had when, on November 16, 1855, he gazed at the two bright rainbows gleaming in the white cloud and saw the massive snow-white sheet of water leap clear of the rock, hurtle itself into the abyss, and shatter itself on the rocks at the bottom.

Livingstone saw this majestic scene from an island that seems stranded at the lip of the falls. He also planted a garden here which he thought might be a forerunner of other gardens if only the hippos would leave it alone. They didn't. There are still hippos about.

Victoria is so big that you cannot grasp its immensity. You have to walk well over a mile, plus a detour over the bridge spanning the gorge at its outflow, to go the length of the brink opposite the Falls. It is 1,900 yards long. Much of the time the main central falls are almost completely concealed in clouds of mist that rise from the gorge and perpetually spray the adjacent rain forest.

Water, Water—Yet Part of Rhodesia Is Thirsty

And the water flow? Enough dashes headlong into the chasm even at low water to provide every man, woman, and child—black and white—in Southern Rhodesia with more than four gallons every minute. In floodtime it is nearly 20 times that amount. The annual average is some *47 million* gallons a minute! Yet part of Rhodesia is often thirsty.

The yawning gorge into which the Zambezi plunges is more than 350 feet deep—more than twice as high as Niagara. Below the Falls the river flows humbly in a deep zigzag cleft in the basaltic rock.

With Mr. V. G. T. Miles, Curator at Victoria, I went several miles up the Zambezi above the Falls.

"You wouldn't think that this calm river commits suicide a mile from here, would you?" he said, as we looked at the placid water.

Mr. Miles had a task. He was oiling the river.

"Greasing it to make it slide over the Falls more easily?" I couldn't refrain from suggesting.

He laughed.

"Perhaps I should tell you what I once told a credulous woman tourist: 'The color of the oil film on the water helps brighten the rainbows, which at this season are rather weak!'"

Actually, he has done a remarkable job of oiling the moving water to lessen the malaria menace. The oil covers backwashes around banks and islands where mosquitoes might breed.

North of the Zambezi

Cross to the north side of the Zambezi and you enter Northern Rhodesia. The railway links both Rhodesias and then extends into the Belgian Congo.

The small town of Livingstone is only five miles above the Falls. Here are located the Zambezi Saw Mills, which turn out large quantities of finished woodwork, as well as railway sleepers and mining timbers. Rhodesian "teak" (*Baikiaea plurijuga*) is the most important hardwood timber tree. Like Indian teak, it is termite-resistant. It contains a high percentage of tannin, which is utilized in tanning leather for upholstering the furniture produced in the mills.

Mining! That is the magic word in this land. Broken Hill, 300 air miles north of Livingstone, lives, like its prototype in Australia,† for its mines of lead, zinc, and vanadium. Northward still are Ndola, Mufulira, Nkana, Kitwe, and a number of other strange place names—strange, that is, except to copper miners.

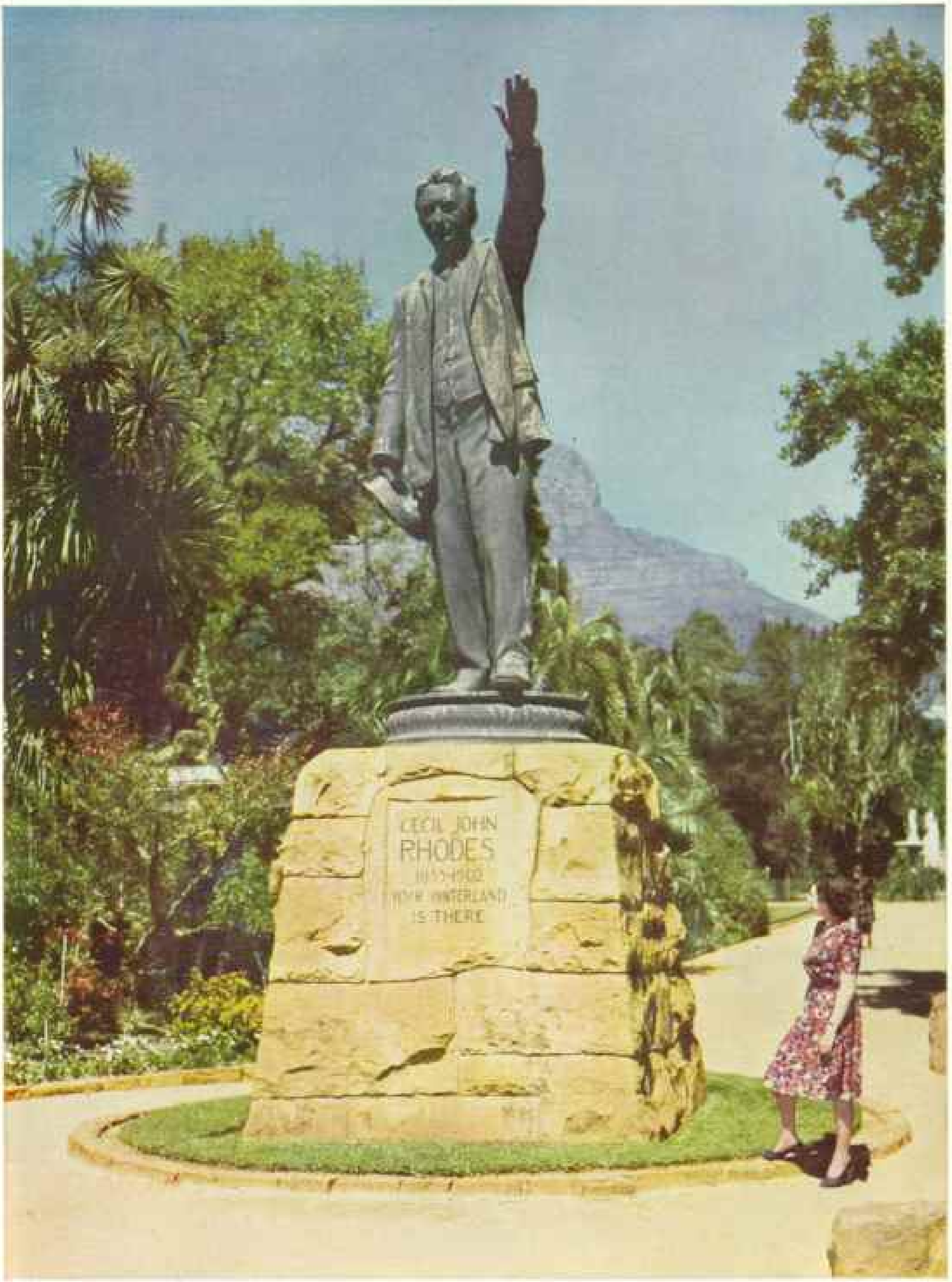
In this region, and stretching over into the Belgian Congo, lies a vast copper belt. It covers an area some 75 miles long and 20 miles across. Here are some of the biggest copper mines in the world.

Four big Rhodesian companies are developing the rich deposits. Even in peacetime the output of these mines is spectacular; now, with war on, production has been boosted.

Model towns that surround these big mines look almost as if someone had sat down with a mail-order catalogue and filled out a blank for hundreds of native huts and then ranged

* See "World's Great Waterfalls," by Theodore W. Noyes, National Geographic Magazine, July, 1936.

† See "Beyond Australia's Cities," by W. Robert Moore, National Geographic Magazine, December, 1936.



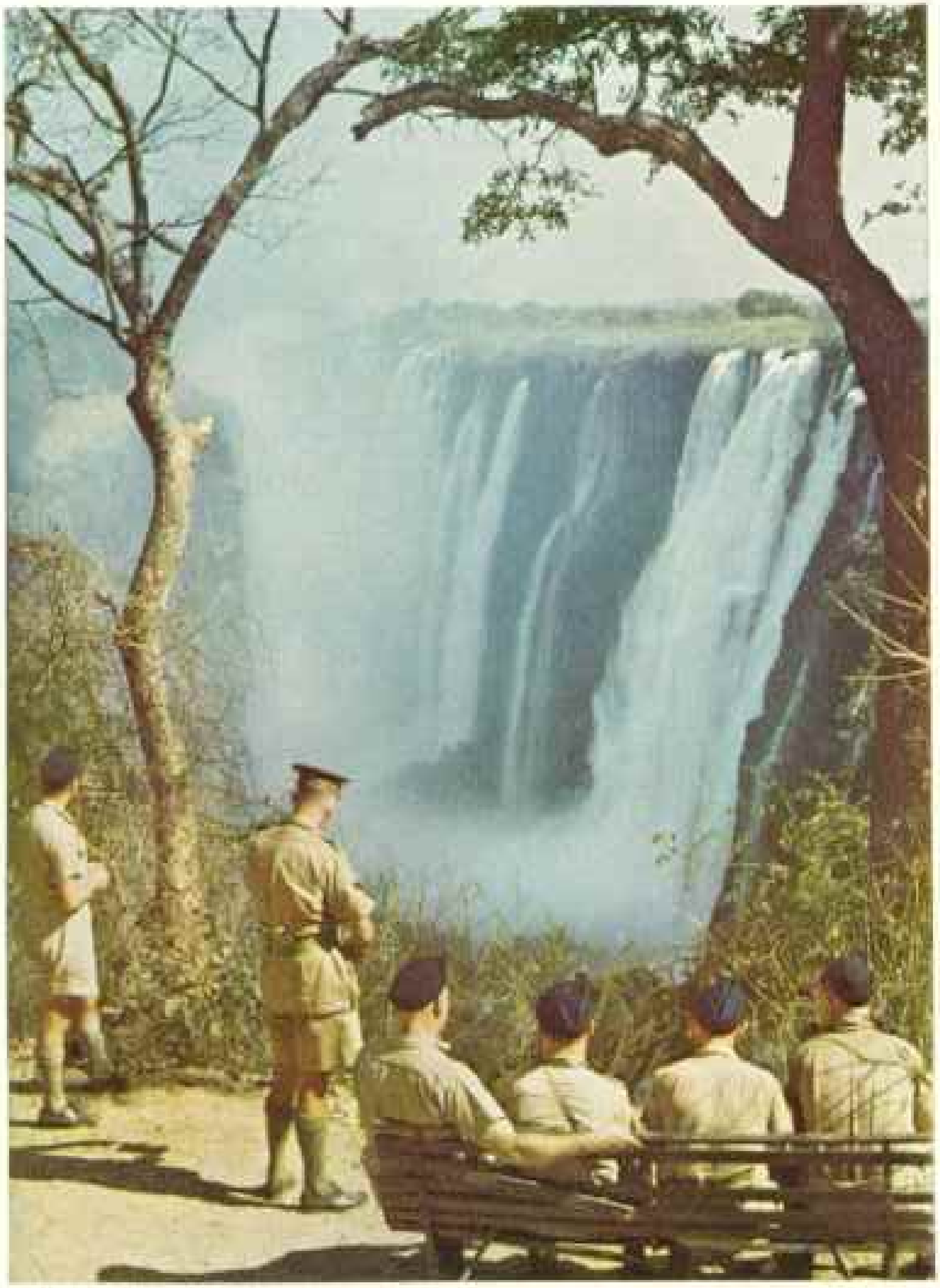
 Kodachrome by W. Robert Moore

At Capetown, Cecil John Rhodes Looks North toward the Land Which Bears His Name

In 1889 he organized the Pioneer Column of 200 European settlers to win a virgin territory for Britain before rival powers could stake claims. Not a man was lost trekking into the wilderness. But native revolt and animal pestilence scourged the Rhodes country before it was proclaimed Rhodesia in 1895.

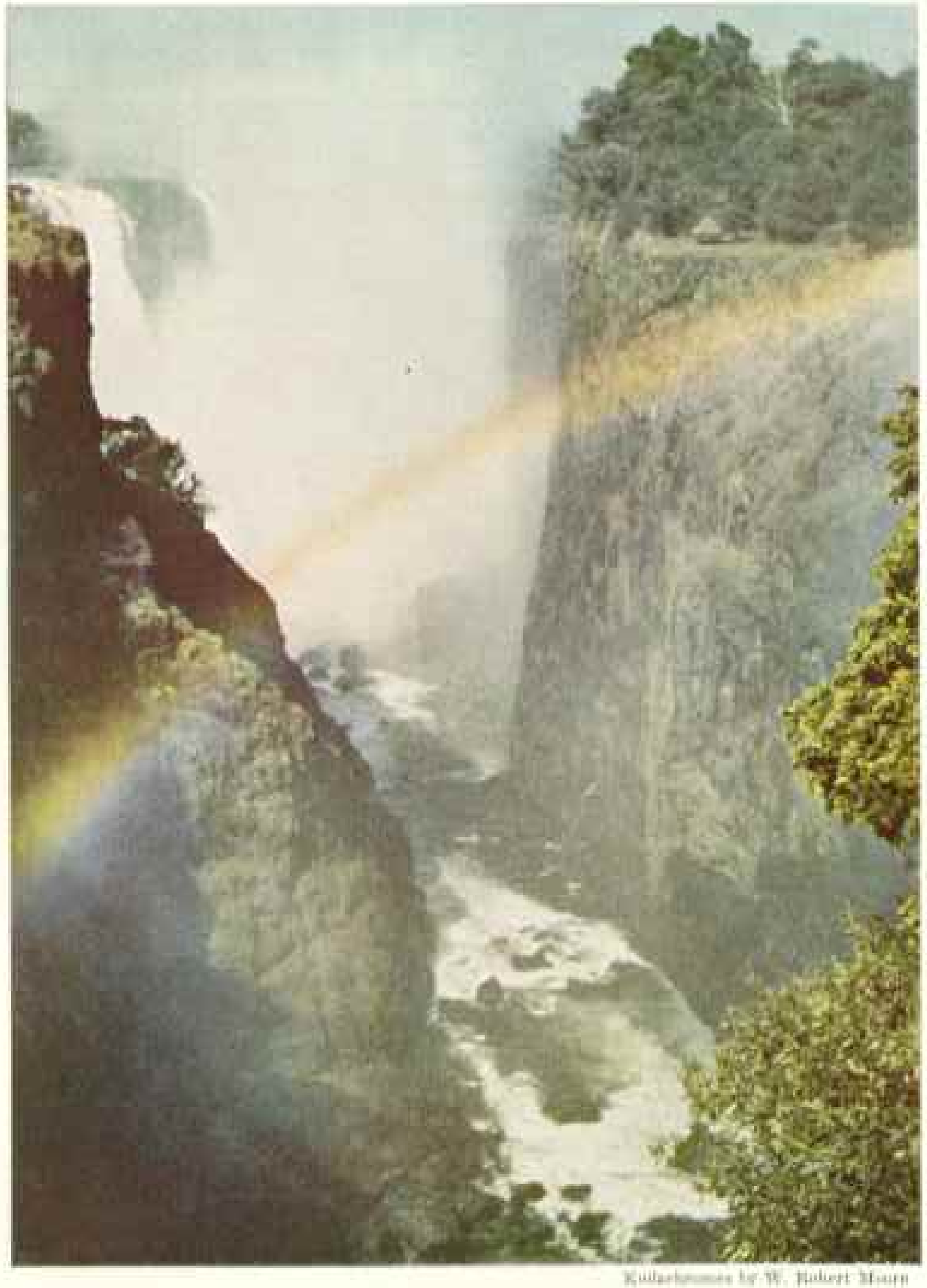
Kodachrome by W. Robert Moore

More than Twice Niagara's Height, Victoria Falls Hurls the Seething Zambezi 350 Feet into a Boiling Gorge



Awesome Eastern Cataract Enchants RAF Trainees

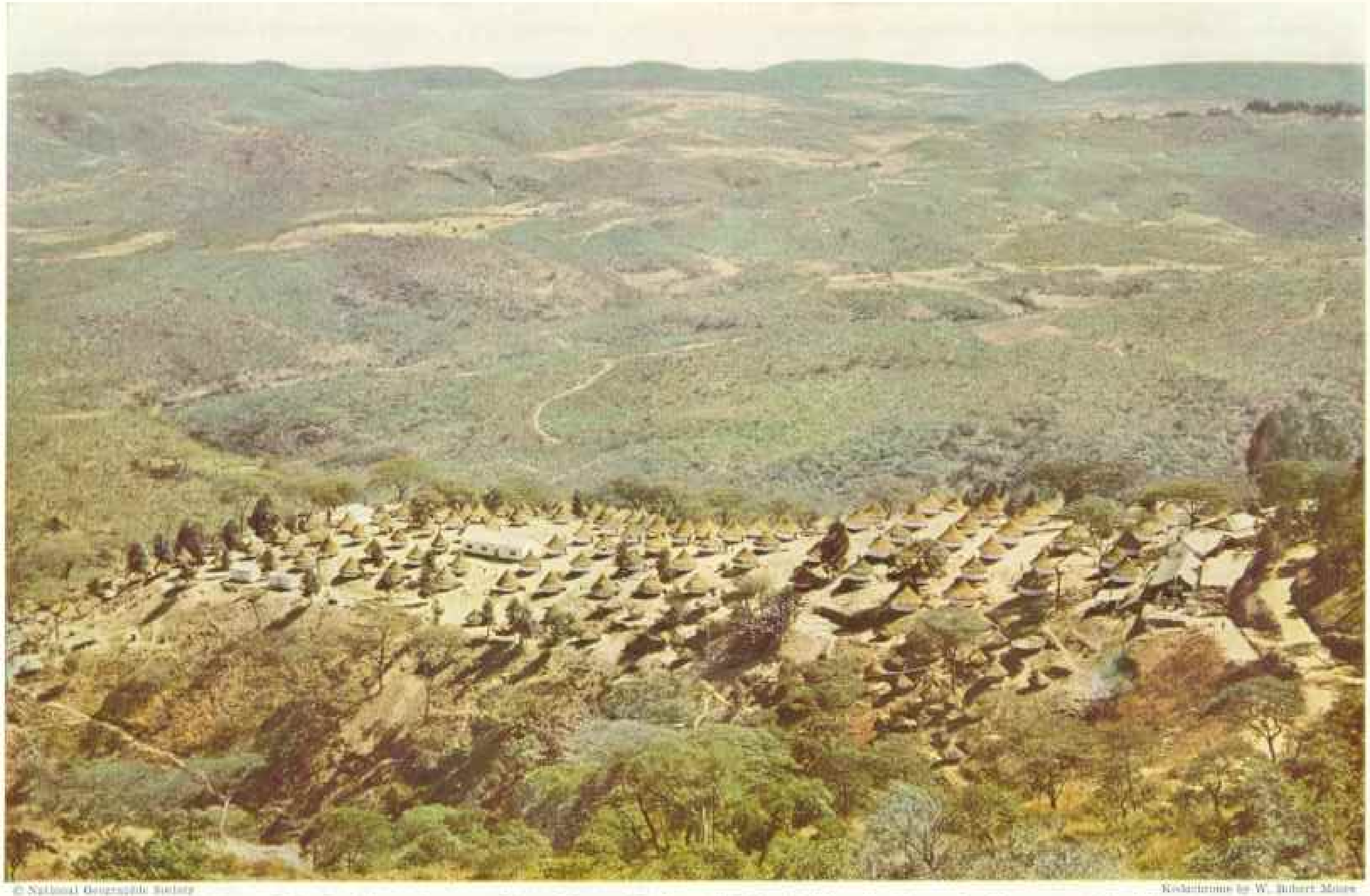
From an island, in 1855, Dr. David Livingstone first saw Victoria Falls.



Kodachromes by W. Robert Moore

Birthplace of Rainbows Is the "Smoke That Thunders"

In floodtime the pillar of mist may be seen for 70 miles.



Kodachrome by W. Robert Moore

Conical Huts, Like Beehives Row on Row, House Natives Mining Selukwe's Chromite, Essence of Stainless Steel

Chromium alloys, resisting oxygen, heat, and acid, glinted from peacetime automobiles, skyscrapers, and electric toasters. Now the metal toughens American armor plate and armor-piercing shells. Southern Rhodesia is one of the world's largest producers, and Selukwe is its richest deposit.

Reelectrotype by W. Robert Moore

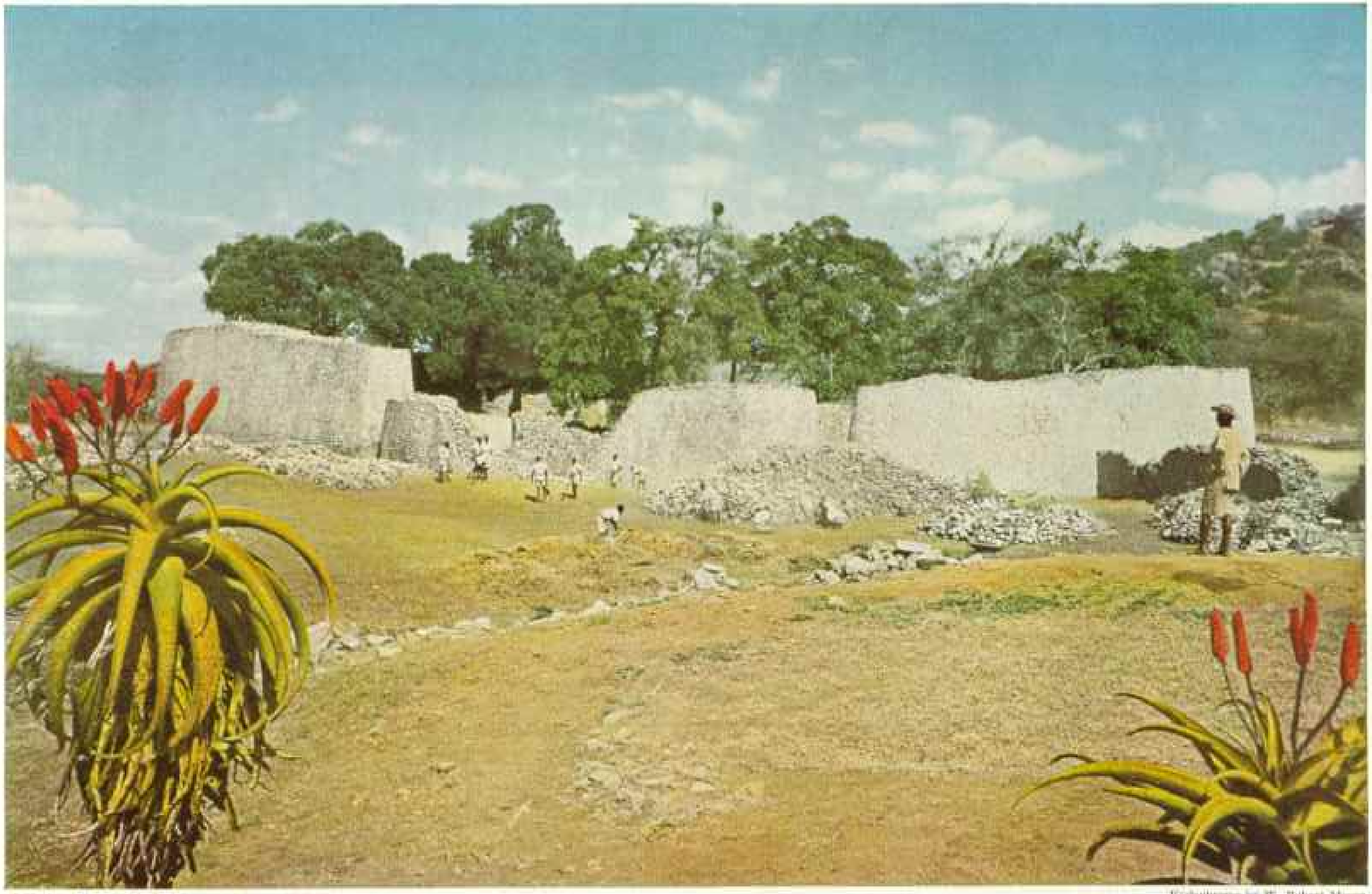
Slowly, Eight Yoke of Oxen Quit the Furrow and Plod across the Rich Red Soil They Have Plowed near Fort Victoria

Rhodesia's winter, June to August, is the dry, thirsty season. Pasturing outdoors all the year, cattle require no shed or silage. Native farm labor is cheap and skilled. Grandfathers of these "boys" owned herds before white colonists arrived in bullock wagons. As in Virginia, corn and tobacco are leading crops.

Kodachrome by W. Robert Moore

Waist-deep in Tea, Pickers Work Their Way Across This Leafy African Plantation

Tea, a Rhodesian infant industry, shows good promise. Twin estates of 500 acres produce 400,000 pounds a year, or 800 pounds to the acre. This yield compares favorably with that of Ceylon and India, from 500 to 1,000 pounds. At this estate in the Chipinga district, a small crop of coffee is grown, too.



Kodachrome by W. Robert Moore

Who Built Ruined Zimbabwe? What Became of Its Creators? Controversy Rages over the Riddle of the "Elliptical Temple"

Lost for centuries in the jungle, the roofless, mortarless oval was discovered in 1868 by an American hunter. "King Solomon's golden Ophir," romancers labeled it; Sir Rider Haggard wove his plots around this setting. "Typically Bantu," replied archeologists; "about 1,000 years old." Aloe plants in foreground.

No Reins Guide This Midget Team—a Native Leads the 12 Donkeys

Another walks with whip in hand. The third goes along just for the ride. When pestilence destroyed horses and oxen, Rhodes imported donkeys for colonists. Though serum checked disease, burros are still popular.

Kodachromes by W. Robert Moore

Fat, Squat Baobab, Its Trunk as Wide as the Car, Shades the Road in Sabi Valley

Rhodesia boasts of such trees 105 feet in circumference. Pulp from the gourdlike fruit is made into a refreshing acid beverage. Leaves are used medicinally. The bark may be spun into ropes and cloth.

them in neat rows upon delivery. Here, too, are movies, clubs, banks, trading stores, and other comforts in these remote regions.

Mining Champions, White Ants!

"Have you seen our biggest mining industry?" asked an engineer who had been showing me a fantastic array of mineral samples, which included titanium, beryllium, tungsten, vanadium, and pure native copper.

"Your biggest mining industry? Just what is bigger than your copper digging or the gold mining about Johannesburg?" I asked.

His eyes sparkled and he broke into a chuckle.

"That done by our white ants, or termites," he replied. "One day, after counting anthills over a large area and estimating their size, I calculated that they have easily piled up far more earth than is dumped in any mining enterprise."

You believe it when put thus. Anthills are everywhere. Some are so big that inexperienced mine hands train by tunneling into them!

Returning to Bulawayo and traveling on to Salisbury, I rode on the same train with Chief Justice Sir Alexander Fraser Russell. He was just returning to the capital after one of his Court "pilgrimages." The High Court holds sittings at several principal towns twice a year. While we sat over coffee in the dining car, he told tales of pioneer transportation.

The conversation drifted to donkeys that Rhodes had had imported when severe plagues swept off the young settlement's cattle and depleted its draft oxen (Plate VIII). Horses likewise suffered from disease. "Salted horses" —animals that supposedly had recovered from the disease—were sold at exorbitant prices in shady dealings.

Tenderfoot colonists, as usual, were nipped, though few were so naïve as one newcomer from England who was induced by a transport rider to buy two mules for breeding purposes!

Donkeys carried on, hauling coaches and wagons over the bumpy or mud-miring roads.

Then, with face in straightest judicial seriousness, Justice Russell told of one unparalleled pioneer ride. Some men had traveled long through the heat of the day and after nightfall decided that they needed a brief rest. So they outspanned their donkeys to let them feed.

It was still dark when they inspanned again and pressed on. They noticed that they were making unusually good time. When daylight broke they discovered the reason. Among the donkeys they had hitched a lion!

With or without "lions," the old coach trips were tediously slow and toilsome. Rivers, which in dry weather would only get a man dusty if he fell into them, during the rains often turned to torrents that kept people waiting for days at the crossings.

We rode from Bulawayo to Salisbury, just under 300 rail miles, in an overnight journey by comfortable sleeper.

"A Great Man, There!"

In the pleasant capital city of Southern Rhodesia, as I stood one morning near another statue of Rhodes, a white-haired man came up and spoke.

"A great man, there," he said, waving his hand toward the bronze figure. "I came out from England because of him—worked for him for several years. Too bad he can't see how Rhodesia has grown.

"Look at this place. Fine buildings, schools, hospitals, parks, and streets filled with motorcars now. In 1890 when the Pioneer Column came there was just empty veld."

Today Salisbury has 18,000 whites and perhaps nearly twice as many natives.

Over in front of Cecil Square near by stands a memorial flagstaff where the hardy occupation column planted its flag, fell out of rank, and became miners, farmers, and such. Thumb through old faded photographs made in that year of the shabby shanties built of mud, wattle, and thatch, and the contrast strikes deep.

It wasn't all clear sailing, just farming, gold digging, and building. Twice within six years after its founding the hostile Matabeles struck. Mashonas, too, rose in revolt. Everyone risked massacre.

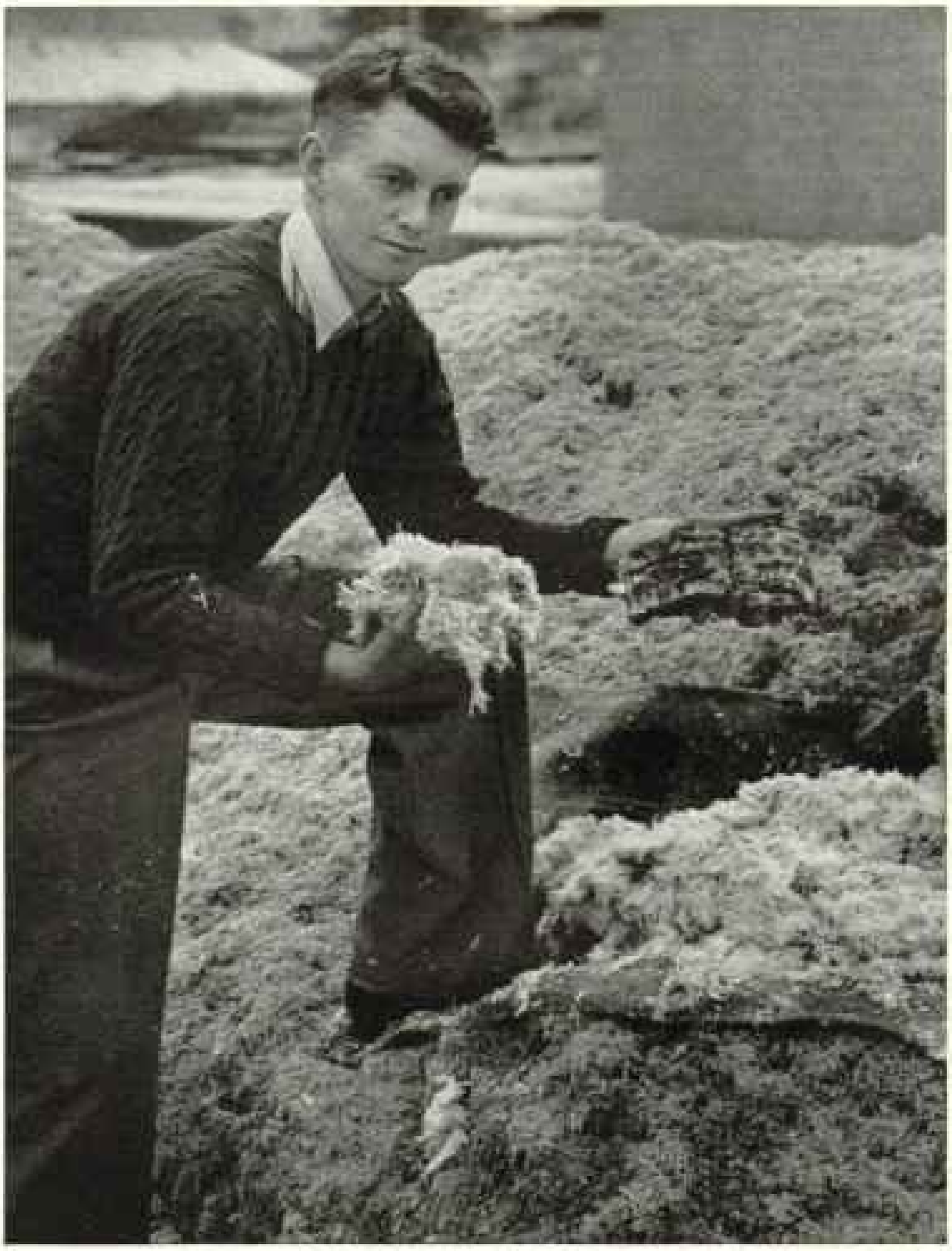
Salisbury now has swapped war chants for the equally unintelligible chant of the tobacco auctioneer.

"Sounds as if I might be in Virginia or the Carolinas," I commented as I visited one of the tobacco markets.

"That's not strange," laughed the manager. "We sell in the same way, except that our tobacco is sold in bales, rather than baskets. Our auctioneers are usually from the United States. A Scotsman is filling in now, but that's because our American auctioneer was on a ship torpedoed in the Atlantic. He got ashore safely, but on the wrong side for us."

Five hundred bales were sold in the hour. Annually, Salisbury auctions off nearly 35,000,000 pounds of Virginia leaf and from 750,000 to 1,000,000 pounds of Turkish tobacco.

"About 80 percent of our crop is grown by individual farmers," continued the manager. "There are few big companies. Our yield is less than yours—about 550 pounds to the acre



Staff Photographer W. Robert Moore

The "Makings" of Fireproof Pants, Pads, and Insulation

In his left hand the young miner holds a chunk of asbestos rock broken from the vein at Shabani. In his right hand, and by his foot, lies fully cleaned and washed white fiber. The pile in the background is cottony asbestos partially processed (page 305).

—but we have a research station working on improving yield, grade, and flavor."

In the Salisbury region, too, citrus fruits grow. Tens of thousands of trees stand row on row on irrigated land. Oranges and grapefruit come from California stock.

Mealies, or maize, however, are the Colony's staple crop, both for natives and for stock. Next to tobacco, it is also the largest agricultural export.

"Strip" Highways Require Straight Driving

From Salisbury I went by car to explore the mountainous eastern districts, and thence looped back to Fort Victoria, the Zimbabwe ruins (page 302), and the central mining districts.

When motoring you soon make acquaintance with Rhodesia's "strip" highways. Though some of the roads have full asphalt or gravel surfaces, miles of others possess only narrow ribbons of asphalt upon which you must keep your wheels to avoid deep dust or mud (page 304). Strip roads encourage straight driving!

We cruised over rolling uplands, past outcroppings of granite where fantastically eroded rocks perched precariously atop one another, and, after vaulting Christmas Pass, dropped down to the trim town of Umtali.

Eastern outpost of Rhodesia, Umtali looks as if builders and whitewashers had just finished its creation. Gay flamboyant trees spread banners of red blooms along its broad streets. Mountains pile the sky line all about and extend over into Mozambique (Portuguese East Africa), whose boundary is just beyond Umtali's doorstep. Beira, on the coast 160 miles away, is landlocked Rhodesia's chief port.

Northward lies the Penhalonga valley where I saw gold miners throwing up huge hills of tailings from underground burrowings. Over near-by rolling hills sprawl miles of forests of the Imbeza Forest Estate. Millions of trees—eucalyptus, cypress, pine, and Carolina poplar—have been planted.

With the manager I rode among the straight, orderly forests and fields of young saplings. At the mill we watched men cutting box wood and mine timbers.

"We're only 17 years old and are just now coming into production," he explained.

Another forest reserve, located on the high plateau bordering the Mozambique boundary, is controlled by the Government.

Wild Inyanga district flanks Penhalonga on the north. Forests, barren moors, deep gorges, waterfalls, and folded mountains are crowded into the area.

Traces of a Forgotten People

It wasn't always so empty. On some hillsides are large "pit circles" and tunnels faced with stone. Elsewhere whole slopes still show traces of elaborate irrigation ditches and labyrinths of stone walls. Apparently the district once was under cultivation and was thickly populated by some forgotten people.

Were they the ancestors of those who built Zimbabwe? Or was it their wealth that gave rise to the tales of fabulous treasure which, says legend, was King Solomon's golden land of Ophir? None can say for certain.

Archeologists have not yet solved the riddle any more than have miners discovered lodes which 16th-century Portuguese hunted.

Staff Photographer W. Robert Moore

"Here Lie the Remains of Cecil John Rhodes"

There is no date, for Rhodes felt he needed none! The tomb is atop a boulder-strewn, granite hill in the Matopos, some 20 miles from Bulawayo. Rhodes himself called it a "View of the World" (page 306).

Traveling south again to Melsetter, we crossed such quaintly named rivers as the Umvumvumvu by bridges built from the legacy of Alfred Beit, associate of Cecil Rhodes.

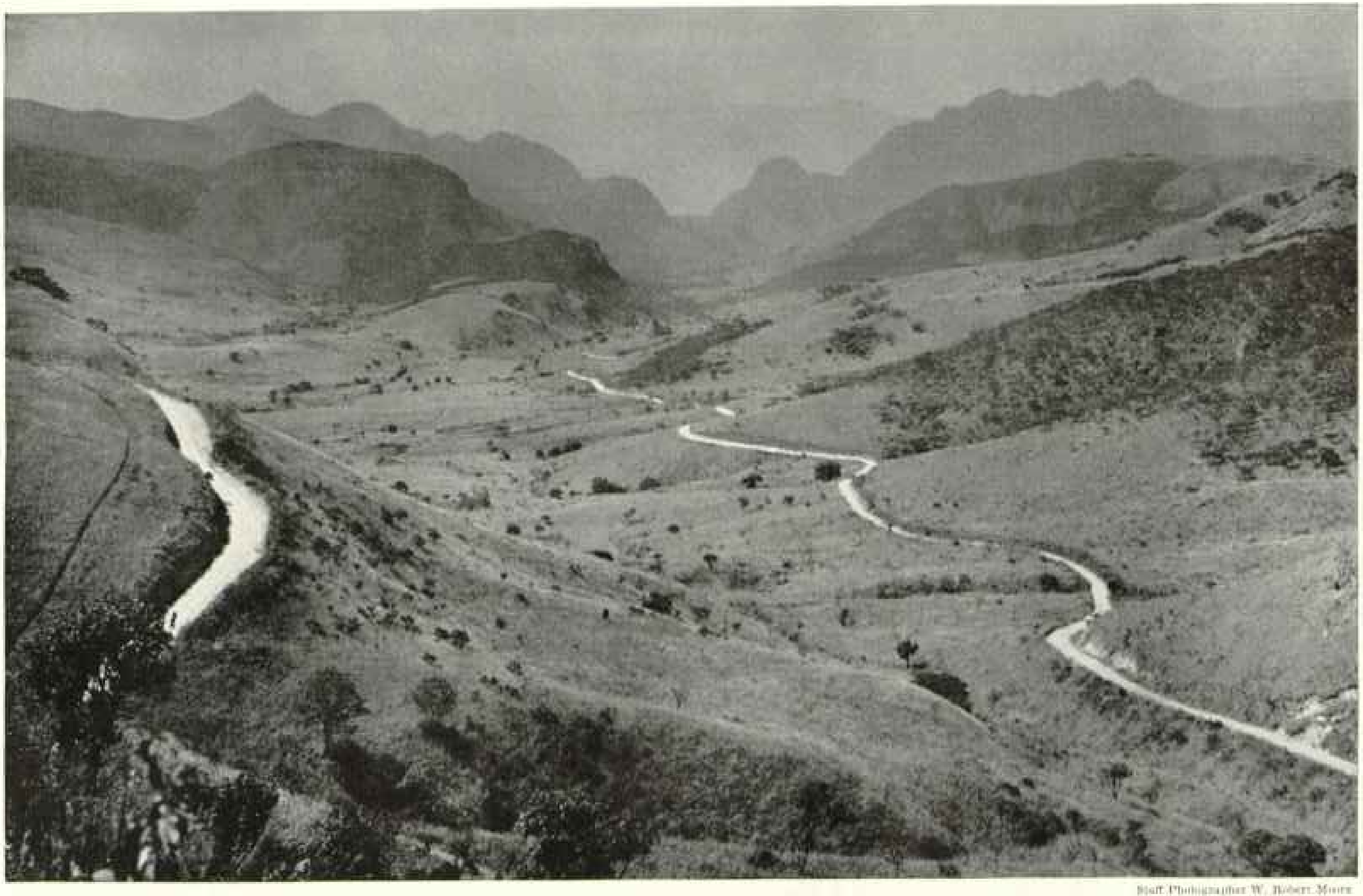
Then we climbed into the mountains. As we topped Msaaps Nek, nearly 7,000 feet above the sea, we gained a magnificent view of the towering crags of the Chimanimani Mountains, rearing beyond the border (page 300).

A few moments later we ran slap into a cloud of locusts. We had seen a peculiar black cloud over a hillside ahead, and then suddenly it dipped to earth.

Locusts hit the windshield like hail; our tires crunched and skidded; and through the air, awhir with the winged pests, we saw bushes and grass sagging under millions of brown bodies.

Fortunately we were through them before we had to begin opening farmland fence gates to get to Chipinga. Traffic is so infrequent in this farming and stock-raising area that fences cross the highway. In more populous districts iron grids substitute for gates.

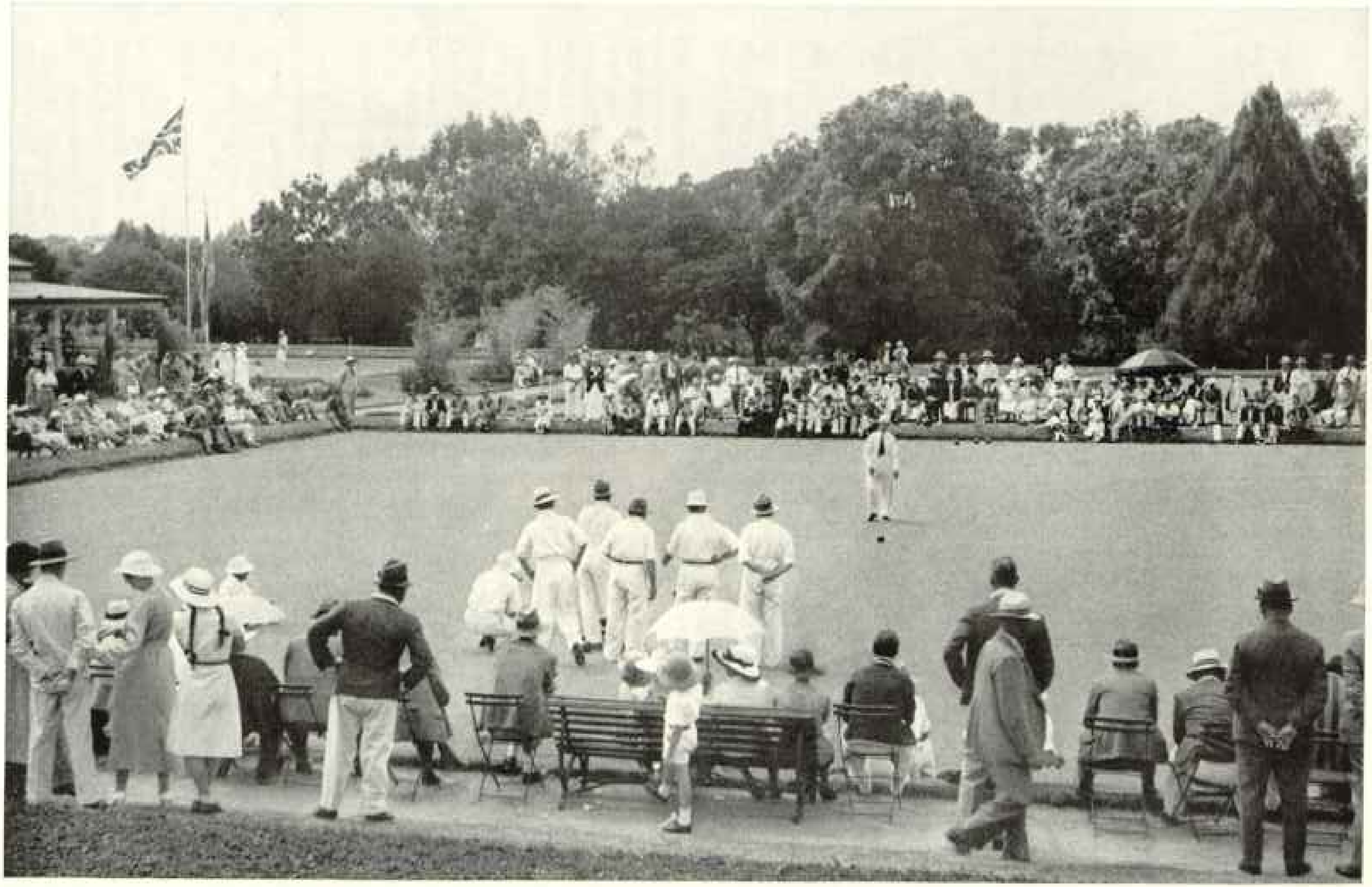
When we had opened our umpteenth gate and given ourselves up for lost in the cow pastures, an encouraging sign beside the dusty trail announced: "Cheer Up—5 Miles to Chipinga Hotel"!



Staff Photographer W. Robert Moore

Piled Against Rhodesia's Eastern Frontier Are the Lofty Chimanimani Mountains

This range of rocky crags, more than 8,000 feet high, lies just within the borders of Portuguese-owned Mozambique. This view is from the heights just beyond Msaapa Nek on the looping road down to Melsetter.



Wherever Englishmen May Go, They Take Along Their Games of Bowling on the Green and Cricket

Crowds gather in the Public Gardens at Salisbury, capital of Southern Rhodesia, to watch a bowling match. Since the Pioneer Column arrived here in September, 1890, and camped on barren veld, Salisbury has grown into a thriving city with a white population of more than 18,000.

A road continues southward to the top of Mount Selinda, where an American missionary group operates schools for both boys and girls.

In classrooms I watched girls weaving grass baskets, and in workshops boys were making furniture from timber cut on the mountaintop. In this forest, filled with tall bracken and choked with wild figs and giant lianas, is Rhodesia's biggest tree—a 2,000-year-old red mahogany monarch 216 feet high.

A Pioneer Threshing Machine

Out in the mission compound I saw an old Rhodesia "pioneer." It was an American threshing-machine engine that had been driven up from Beira under its own power in 1900! Drivers took six months to cut both path and fuel for it on the hazardous 160-mile trek.

Returning to Chipinga, we dropped down to the lowlands of the Sabi River. On the way we stopped at the Tanganda Tea Estate.

"I thought I was retiring when I came to Rhodesia from India," said one of the managers. "I've never worked harder in my life. We have 250 acres of tea here and an equal amount over by the Portuguese border. Our output is about 400,000 pounds a year. We also grow a small amount of coffee."

With tea drinking as universal as it is throughout southern Africa, tea growing is a profitable enterprise. By walking only a few yards I saw the complete process of picking, drying, and packing (Plate VI).

As we went on to join the main road at the Sabi, the verdure became more tropical. Feathery palms waved in the breeze. Here and there giant euphorbias lifted their spiny candelabra-shaped branches skyward. Leafless thick-bodied baobabs, or "cream of tartar" trees, looked like multiple-trunked elephants trained to sit up (Plate VIII).

On the limbs of many trees natives had placed beehives made of two-foot-long cylinders of bark to collect wild honey.

As we rounded one hillside curve we caught our first glimpse of Birchenough Bridge, arching high above the bush.

That night we slept at a roadside hotel near the bridge, where we digested with our food such facts as: "Span of Arch, 1,080 feet; Height from River Bed to Highest Point of Arch, 290 feet; and Painting Surface of Steel, 40,000 Square Yards." It is the world's third longest single-arch span. Like many other bridges in Rhodesia, Birchenough was built by the Beit Trustees (page 299).

One hundred miles and centuries of engineering achievement separate this majestic crescent of steel from the ruins of Zimbabwe, Rhodesia's prime mystery story.

The great Zimbabwe!

Back in 1868, an American hunter, Adam Renders, must have stopped and stared with pop-eyed amazement when he pushed through the bush and stumbled upon the ruins of massive walls and strange conical towers (Plate VII).

In any country such a find would have attracted attention; here it stood in a land where natives have built few impressive structures. An intriguing riddle, indeed! Who built Zimbabwe, and when?

Unlike the majestic temples and city of Angkor,* accidentally discovered by the French naturalist, Henri Mouhot, in Cambodia about the same time, these walls possessed no elaborately carved picture reliefs, no inscriptions, no associated history.

In short, there wasn't a single definite clue. Zimbabwe was probably derived from the Bantu words, *zimba*, "houses," and *mabgi*, "stones."

And that was that!

Archeologists could only measure its walls, sift dirt for artifacts, look at mysterious birds carved from soapstone, and then guess. Romancers linked the ruins with Egypt, India, Arabia, and with King Solomon's gold mines of Ophir.

Here was an elliptical enclosure some 800 feet in circumference. The walls were granite blocks, which rose from 22 to 36 feet high and were 12 to 15 feet thick at the base. Within were still other walls, ruined platforms, and a large conical stone tower. Three narrow gateways led into a labyrinth of passages, built perhaps for protection. A "temple," some call it, but they use quotation marks.

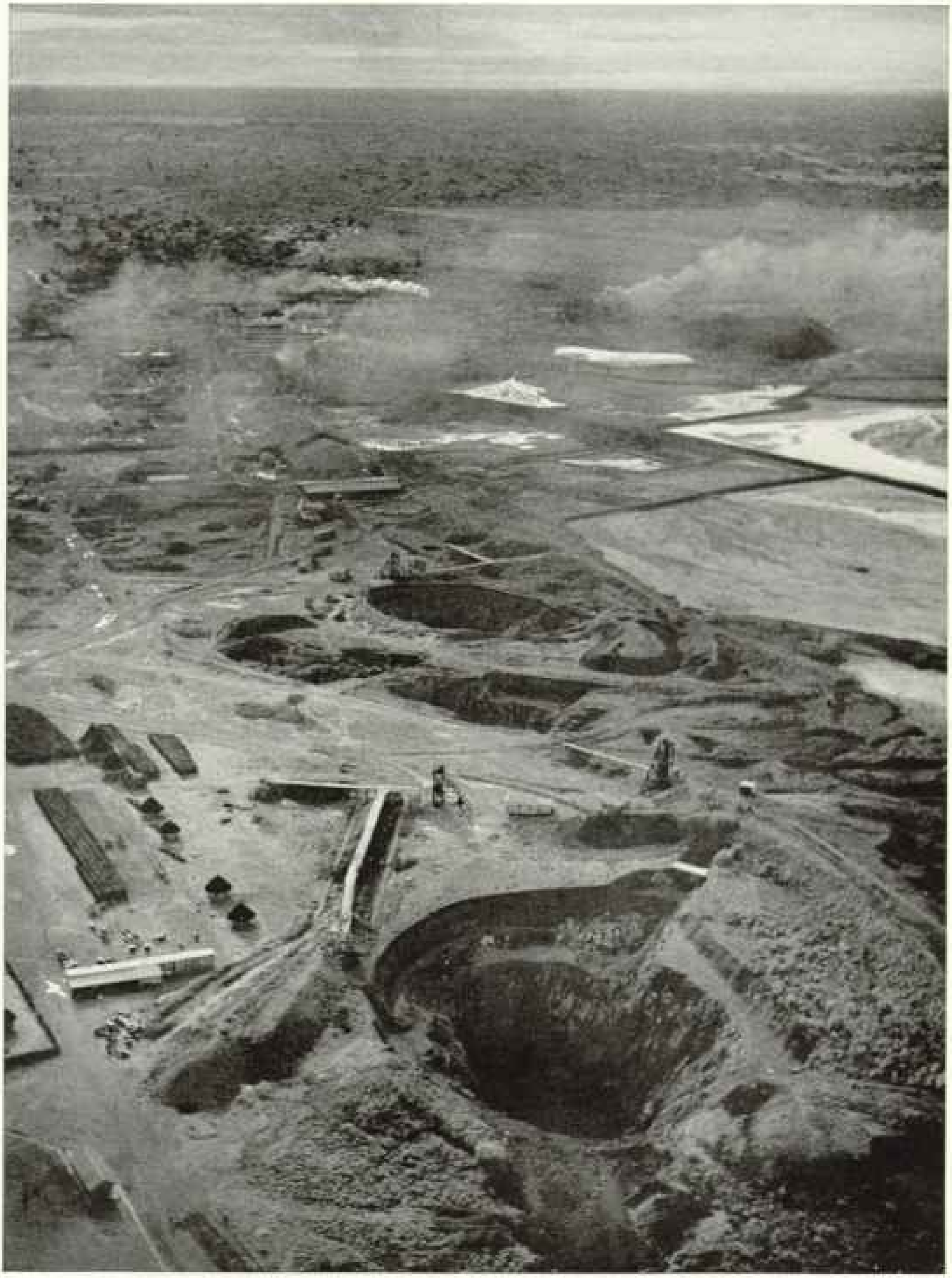
Near-by areas are strewn with vast heaps of rubble and remnants of granite-block walls. Across a valley dip rises a prominent kopje, or small hill. On this "acropolis" are other slab ramparts and more cones. Some walls have slots in them, like lookout apertures.

Zimbabwe once must have sheltered thousands of people. It is a place that lends itself to an embroidering by fantastic tales.

Later, while showing me some of the beads, bits of pottery, gold-covered wooden pots, and a gold-overlaid rhino, Mr. Neville Jones, Director of the National Museum at Bulawayo, summed up Zimbabwe by saying:

"Scientifically we can't possibly push the date of its building further back than A.D. 900. The elliptical enclosure seems to be a native Bantu pole kraal translated into stone. It

* See, in the National Geographic Magazine, "Four Faces of Siva," by Robert J. Casey, September, 1928.



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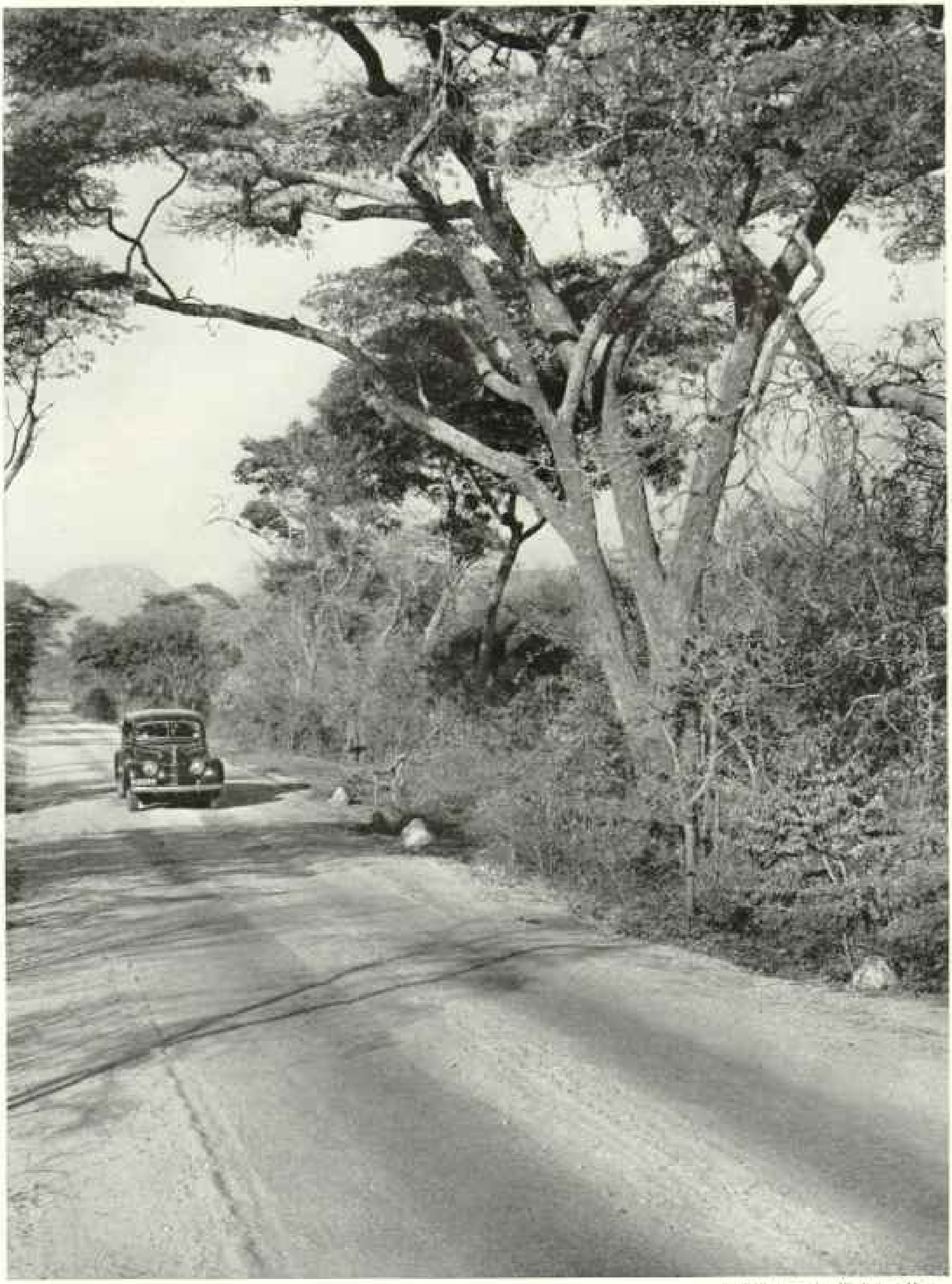
From the Air, Diggings at Broken Hill Look Like Giant Bomb Craters

Smoke in background comes not from bomb hits, but from refineries producing high-grade zinc and vanadium. Upper levels in the huge workings in Northern Rhodesia also contain lead. Chief product of this northern Colony is copper, extracted from an ore belt some 75 miles long and 20 miles wide along the Belgian Congo border.



Staff Photographer W. Robert Moore

"Strip" Roads Encourage Straight Driving in Rural Rhodesia

Such highways, surfaced by two narrow ribbons of asphalt, have been built where traffic is light. During the wet season meeting cars have difficulty passing, as mud is often deep along the sides. Here in the dry season reddish dust partially covers the strips.

may have had the benefit of foreign influence —perhaps of traders—in its building.

"The acropolis is the oldest part; the 'temple' never was finished. Bantu development was arrested at an early date. Today the people are making the same kind of spearheads they made a thousand years ago."

Only a few miles east is Rhodesia's huge new Umshandige Dam and irrigation project. Will archeologists, ages hence, "discover" its ruins and say: "Who built that? And why?"

The Country's Oldest Township

Fort Victoria, 15 miles north of Zimbabwe, is Rhodesia's oldest township. The Pioneer Column established a fort here before moving on to Salisbury. The old fort tower still stands, whitewashed and gleaming like the rest of the town.

The first newspaper to be published in the Colony appeared here at Fort Victoria on November 11, 1890. Appropriately, it was called the Nugget and bore a subhead "Root Hog, or Bust"! The "little rag," as the editor called it, was written by hand and was to confine itself to local tidbits and mining news.

Early emphasis here was the same as it had been for centuries—on gold!

Gold in this region was referred to in ancient works of Persians and Arabians. Sixteenth-century Portuguese faced malaria and massacre to find it.

On the acropolis at Zimbabwe and at the Khami ruins near Bulawayo, old crucibles in which natives melted the metal have been found. The country is pockmarked with holes where the natives have dug.

Early colonists hired natives to show them places where such digging had been done, hoping to hit bonanzas deeper down. In truth, most of the colony's gold mines have been found in this manner.

"I was an amateur gold miner myself a short time ago," said one RAF officer with whom I had struck up an acquaintance. "I got a hole and began working it on week ends and time off.

"Yes, we found gold. It wasn't a very rich vein, but we made money until a heavy rain flooded our diggings. I didn't have the time or money to pump it out. There's even an old gold hole over by one of our airports."

A Rich Asbestos Mine

Not all of the mines operate for gold. At Shabani, 55 miles southwest of Fort Victoria, is one of the world's richest asbestos mines.

A huge hole has been gouged into the earth in the exploitation of the asbestos-bearing seam. Numerous tunnels branch off from craterlike excavation into underground diggings.

Actually, asbestos is partially metamorphosed crystalline rock formed into masses of silky fibers.

Here at Shabani it appears in a number of thin greenish veins, one-eighth to four inches thick, throughout 100 feet of rock strata. When peeled up, the asbestos fibers become fluffy and white and look much as if cotton wool was oozing from the rock (page 298).

Workmen were busy breaking up the strata and transporting mine cars filled with the asbestos-bearing lumps to big crushing machines aboveground. The asbestos fibers are removed, washed, and cleaned, the last phases being accomplished by huge suction machines.

Asbestos deposits occur in many places in the world in varying forms. Shabani's fibers are flexible and for the most part are of spinning-length grade.

From these mines, which one is almost inclined to call "rock-cotton mills," I journeyed north to more of Rhodesia's mines. At Selukwe men have cut gaping rents in the red earth and are burrowing underground to extract quantities of chrome ore.

It seems a far cry from the mountainous heaps of dirty-looking ore that are brought to the surface here to gleaming steel produced in United States steel mills; yet that is its destination. Tons of the ore are dumped into the maws of America-bound steamers calling at Beira, the Colony's outlet to the sea lanes.

Journey to a "Lost World"

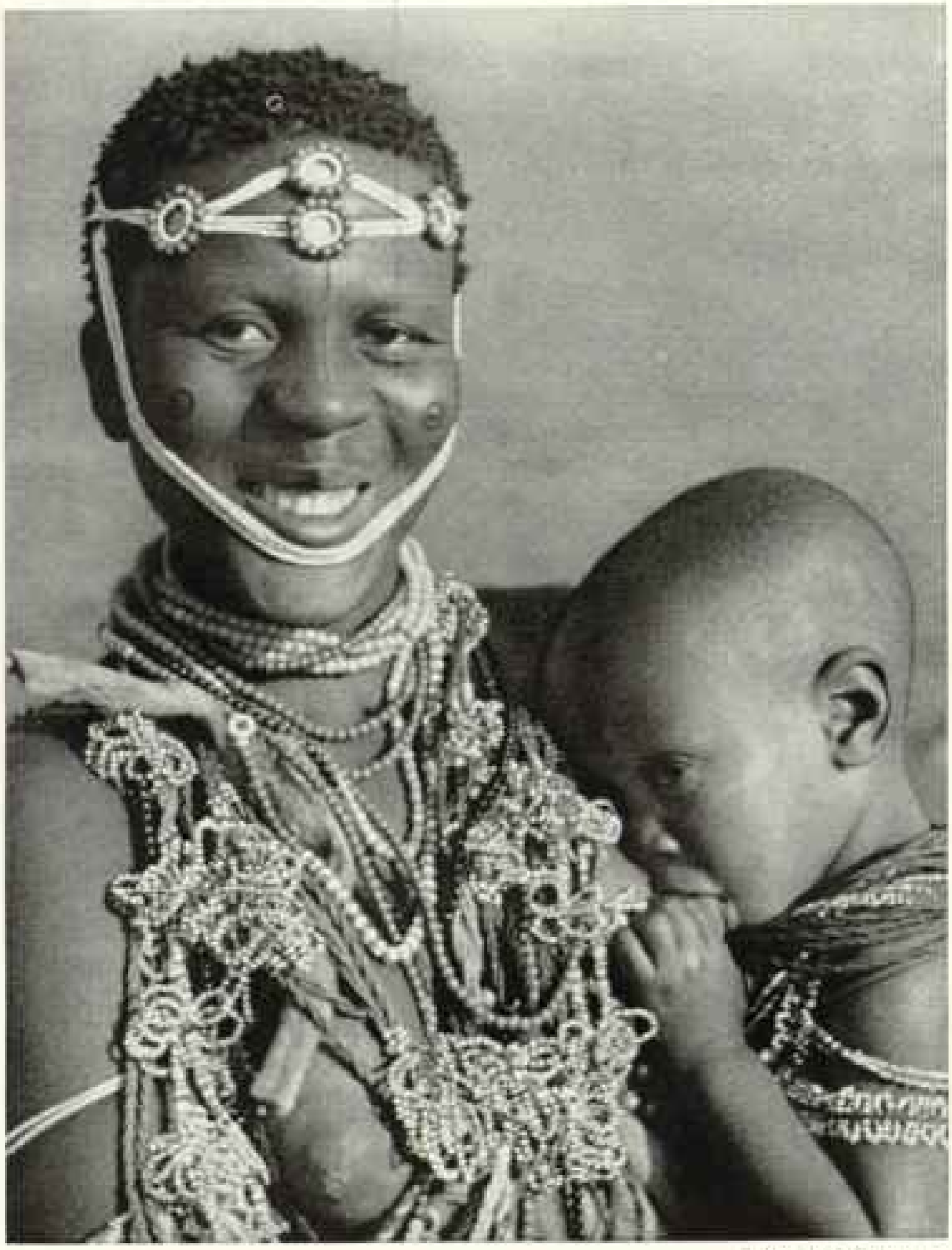
At Selukwe, too, Nature has demonstrated her idiosyncrasies by placing a workable gold seam just around a hill from one of the large chrome deposits!

Other gold mines dot the central Rhodesian districts. Small, trim trading towns, bright gardens of the colonists, and native compounds with row after row of rondavels (round huts) are set in miles of bush and open veld (Plate IV). In part, at least, Rhodes's hope for Rhodesia has been fulfilled.

Returning again to Buhawayo, I motored out to the Matopo Hills to see that bit of Rhodesia the empire builder chose for himself.

Some 20 miles from town and just beyond a farm owned by Rhodes begins this range of rough granite hills. It looks like a lost world.

Within this eerie stone heap and these narrow valleys primitive Bushmen once dwelled. Clambering over rocky slopes and through bushes, we found some of their caves where, in his leisure moments, a Bushman had turned artist and etched or painted pictures of animals and men on the granite walls.



© Elisabeth Armstrong

Beads Are the Main Costume for Mother and Babe

The woman also wears decorative scars on her face. Few natives in southern Africa are interested in foreign "fixings." Mashona and Matabele tribes ruled in Southern Rhodesia until the 1890's.

His "school" of art, if he had one, was realistic with regard to animals. Giraffes, rhinos, and antelopes are easily recognizable. Men, however, have slender matchstick figures, but they express unusual movement. Some have the grace of adagio dancers. This earliest cave-dwelling artist worked in yellow-ocher and claret-colored silhouettes. Later painters dabbled in polychrome.

Judging from the paintings, game was plentiful, but the Bushmen moved on. About 1,000 years ago the Bantus came and remained.

Here the savage Zulu refugee, Mosilikatze, father of Lobengula, founded the Matebele nation and established his original capital of Mhlahandlela. He is buried in one of the stone escarpments. In the Matopos, too, the colonists fought some of the fiercest battles in the Matabele war.

Among these rocks the late Lord Baden-Powell, who founded the Boy Scouts, first won his reputation as a scout. And here Rhodes, with three white companions, ventured unarmed to carry on a series of conferences with the rebellious natives in 1896 and established enduring peace.

This, in brief, is the history-filled spot that Rhodes chose for his own burial place.

Tomb Commands a "World's View"

Atop a domelike granite hill, whose crest is strewn with gigantic lichen-tinted boulders, Rhodes marked the site of his tomb (page 299). "View of the World," he called it. And once, it is said, he lay down full length there "to see how it felt."

On April 10, 1902, fifteen days after he had died at the Cape at the age of 49, the long funeral procession bearing his body toiled up through the lonely hills. The remains of his lifelong friend, "Dr. Jim," Sir Leander Starr Jameson; Sir Charles Patrick John Coghlan, first Prime Minister of Southern Rhodesia; and Maj. Allan Wilson, with his 33 gallant men who died at the Shangani River, have since been placed about the hill.

Rhodes's own grave is marked by a large bronze slab and bears the inscription he wished: "Here lie the remains of Cecil John Rhodes."

There is no date. Rhodes, dreamer in terms of continents and empires, felt that he needed none. To his memory he gave four thousand years!

Then look about you. Here's Rhodesia, his "hobby" and his hope!

Bare Feet and Burros of Haiti

By Oliver P. Newman

PIERRE BONHOMME strode steadily forward on a gravel path alongside a narrow, rocky road through the Haitian hills. A half-smile of pleasurable purpose illumined his black face.

One arm swung freely at his side; the other balanced a long-handled hoe over his shoulder. His cotton-print shirt, fresh and clean two hours before, showed streaks of perspiration where it clung to his straight back.

One bare foot, with its tough, leathery sole, followed the other in rhythm as his long, steady steps carried him toward a rendezvous. It was not yet 7 A. M., but he had covered 14 miles since he left his valley home.

A high-crowned straw hat with a huge, flopping brim, plaited by his grandfather from native sisal in his front-yard shop, protected Pierre's head from the sun, whose burning rays, in an hour or two, would beat down upon him with merciless fury (Plate V).

Footprints of Centuries Smooth His Path

He seldom looked down. The roadside path was smooth from millions of bare Haitian feet and millions of burro hoofs, which had been treading it for more than two centuries.

Pierre was on his way to a *coumbite*, where a crop was to be planted. He had almost reached his destination, the farm of a cousin. Soon he would encounter others journeying afoot to the same spot.

Save for an occasional trip to the near-by village, Pierre, like all Haitian peasants, lives a restricted life. He never sees a newspaper. Except for one weekly in Creole, the few Haitian newspapers are printed in French. Pierre understands only Creole, until recently a spoken, not a written, language (page 328).

He never gets a letter. Neither he nor his friends and relatives have a radio. He cares little about what goes on in the world outside his own valley. Rumors come in occasionally by word of mouth.

Pierre has to sweat a living out of a stubborn soil, and a bare subsistence is all he can produce. His interest is in rain, storm, drought, flood, crops, harvesting, and marketing done by his mother in the nearest center. There she sells the corn, beans, pineapples, cotton, sisal, coffee, cocoa, tobacco, or bananas which the men of the family raise.

The coumbite is a social gathering, where all the problems and experiences of farm life are understood and gossiped about with enthusiasm. Its purpose is to help a friend plant or harvest a crop.

Pierre knows he will have to work hard for two or three days. He will receive no pay (not a *gourde*, equal to 20 cents in U. S. money; not even a centime, a hundredth part of a gourde), but he doesn't care.

Nothing but death or illness can keep a Haitian away from a coumbite once he has been notified of its date. A 15- or 20-mile walk to get there he takes in his stride. He has a lot of fun, and he knows he will be repaid in kind when it is his own time to plant or harvest.

Feasting and Dancing Are Coumbite Highlights

Of food and *clairin* (native rum) there will be an abundance. No matter how poor the farmer who holds the coumbite, he must provide refreshment in plenty. He pinches centimes with self-sacrificing denial throughout the year to provide highly seasoned stews of meat and vegetables and rum by the gallon. At night there are dancing and cockfighting, chief recreations of the Haitian of the hills.

The three million who inhabit the rural sections of Haiti live unobtrusively.

In habit and appearance, the prosperous are identical with the average man or woman. It is too risky otherwise. A jealous neighbor might inflict a pretentious man with ill luck brought by a *wanga*, and the victim may have to go to a voodoo, or *vodun*,* priest to buy protection in the form of an *arrêt*, a *garde*, or a *drogue*.

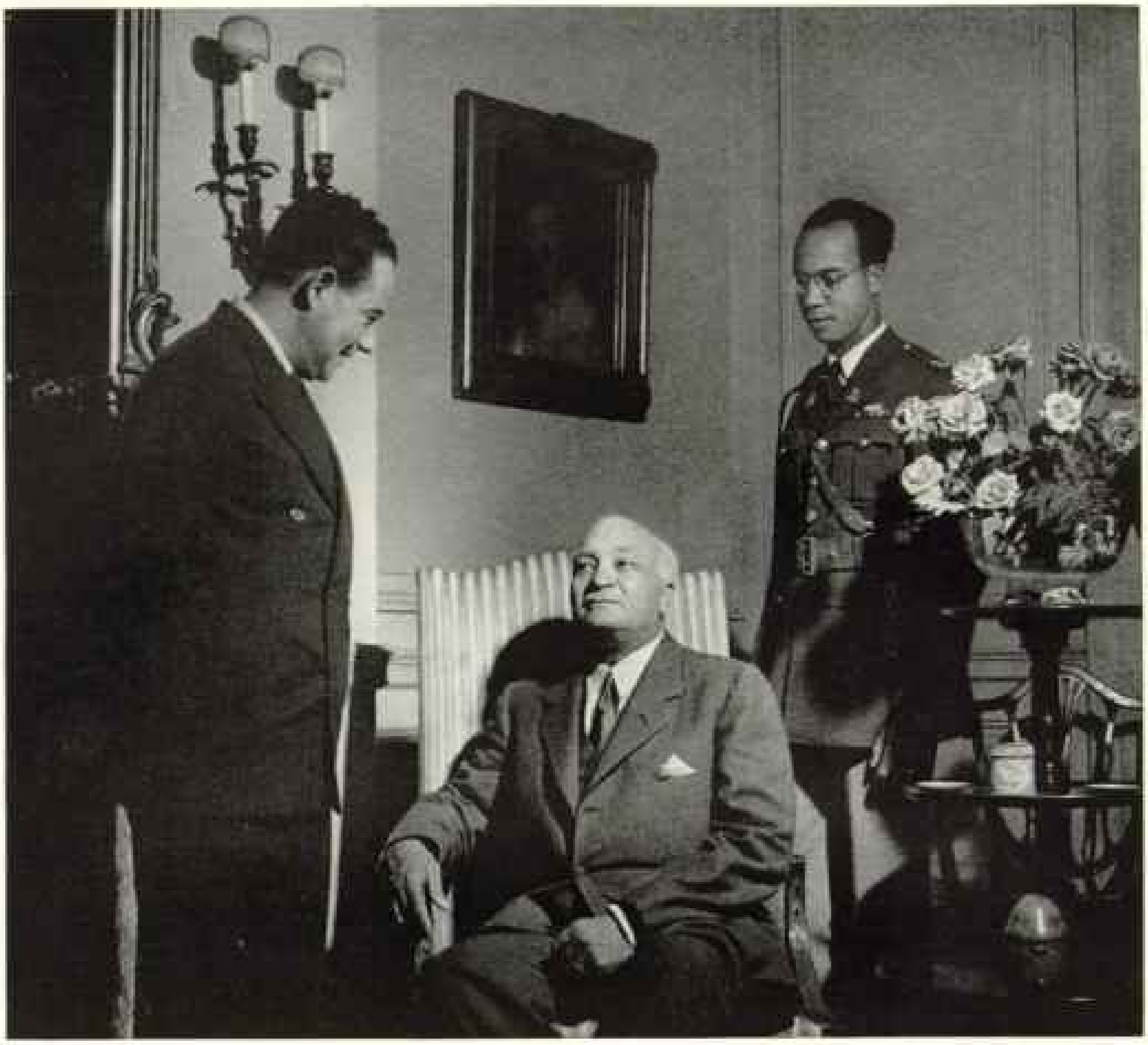
Perhaps the wanga of his enemy may be too strong to be overcome. Then evil may befall. His crops may fail, his wife become sick and die, his child be attacked by the evil eye, his house burn down, his work animals break their legs. It is better, he feels, to live simply.

The population figure of three million is a consensus of the best guessers of Haiti. An accurate census is impossible. When the census taker comes around, the Haitian people hide out in the hills.

A Government agent, they fear, brings trouble, never good. Therefore, when the Government undertakes even such an inoffensive thing as counting them, they disappear. Hidden valleys, nooks, and crannies in the mountains are so inaccessible that the Government never finds all of its citizens.

At the coumbite Pierre found an animated scene. Seventy-five or a hundred others had

* The word *vodun* is traced by some scholars to a Dahomey (West Africa) word for "god" or "spirit."



Staff Photographer B. Anthony Stewart

President of Haiti, Elie Lescot, Is Greeted by His Ambassador, André Liautaud, during Last Year's Conference with President Roosevelt

Behind President Lescot in this Blair House reception room in Washington, D. C., stands his son and aide-de-camp, Roger Lescot. During their October, 1943, visit they stayed in the Nation's official guest residence, one block from the White House.

trekked from 15 to 50 miles to help the host prepare his ground and plant his crop, for the farm was larger than the average.

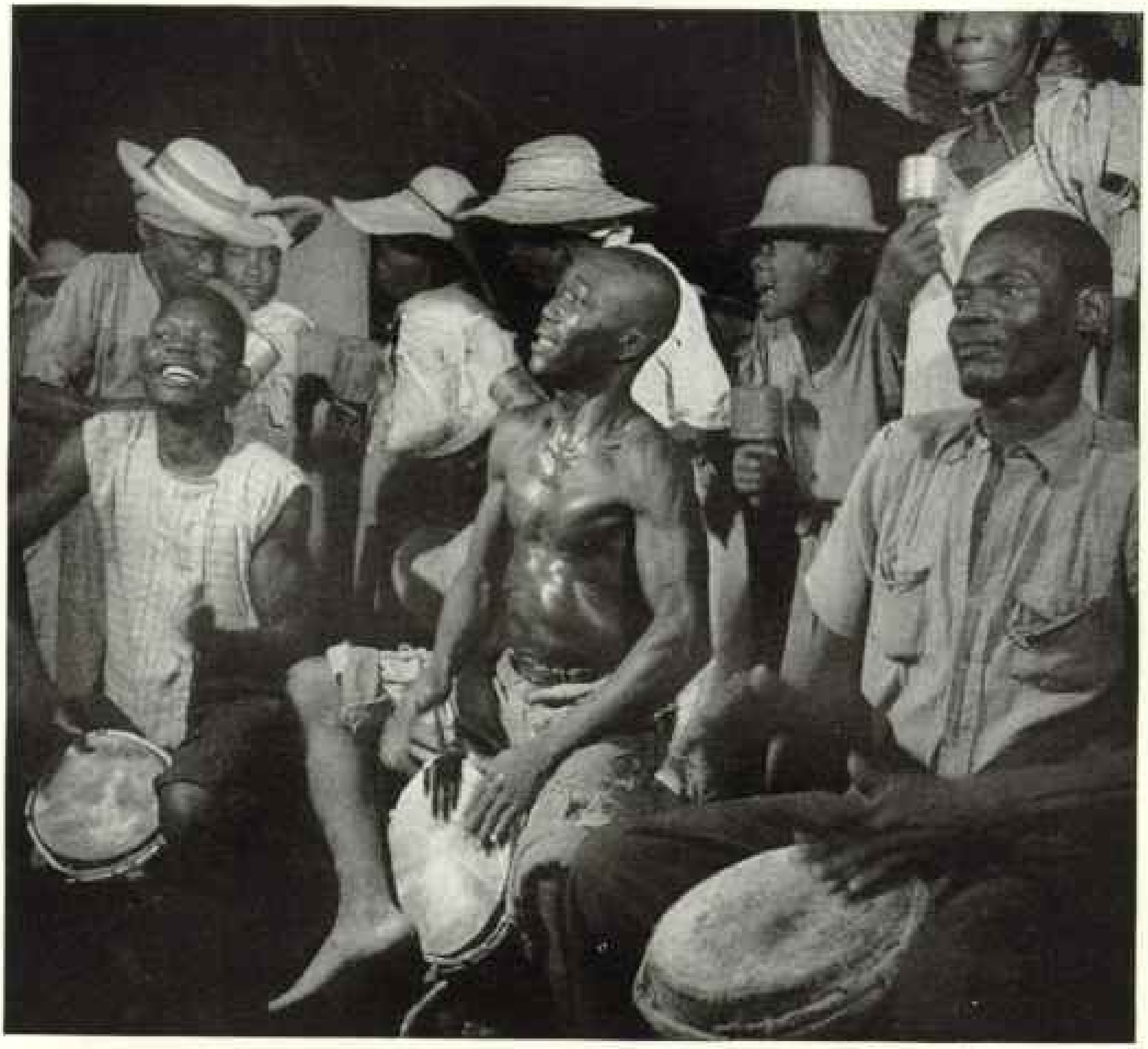
In a cleared space at one side of the farmer's shack were 15 or 20 women of the neighborhood, preparing the evening feast for the workmen. Pots and kettles were simmering on open fires. Gourds full of clairin were assembled under a tree. Laughter, song, and sprightly conversation rose from the lively spot.

The host formed the volunteers into teams of half a dozen, headed by one or two men famous for rapid, untiring labor. Pierre joined a team and in a few minutes the beating of a drum gave the signal to begin. The drummer took his place in front of the workers. With him was a singer, chanting in rhythm.

Singer and drummer moved down the field; the volunteer helpers took up the chant. Faster and faster grew the pace as the hoes rose and fell. In a remarkably short time a large field had been planted. Working by day, feasting at sundown, gossiping or dancing or watching cockfighting by night, the happy workers finished the coumbite in short order and returned home full of news for their families.

Population Density Exceeds India's

Between coumbites the farmer will work his fields himself, aided by his sons and daughters, his sons-in-law, and one or two hired hands if his holdings are large. The Haitian



Staff Photographer B. Anthony Stewart

In Tuxedos and Shoes They Would Pass for the Drum Section of a Harlem Jive Band

The women are accompanying the drummers with pebble-filled rattles to make the lively music of a *bamboche*, the Haitian version of "Hot Time in the Old Town Tonight." This is a social gathering, but at other times the Haitian night throbs with African rhythms as drums beat.

family is a close-knit clan and each clings to its little plot of ground.

Haiti contains only a little more than 10,000 square miles, about a third of the area of the island of Hispaniola (page 312). The Dominican Republic, its neighbor on the east, occupies the rest.*

Two-thirds of Haiti is mountainous. Except for three east-and-west stretches of plain —Plaine du Nord in the north, the Artibonite in the middle, and the Cul de Sac in the south —the Republic is made up of rugged mountain ranges (one peak of 8,790 feet) and sharp, steep valleys. Great areas are arid. Yet in these restricted sections 3,000,000 people have to dig a living out of the soil, often on hillsides so steep that both man and plant must struggle for a foothold.

Density of population adds to the problem—294 per square mile, denser than in either India or China. The biggest town, Port au Prince, has a population of 125,000. Eight others have from 8,000 to 20,000. All the rest of the 3,000,000 live in the country and till the soil.

Average cash income of the Haitian farmer is $75 a year.

When Pierre Bonhomme got home from the coumbite, his grandfather called a council of the elders on the important subject of the young man's marriage.

Among Haitian farmers, the eldest son eventually becomes head of the family. Knit

* See "The Land Columbus Loved," by Oliver P. Newman, NATIONAL GEOGRAPHIC MAGAZINE, February, 1944.

Staff Photographer B. Anthony Stewart

Toussaint, Liberator of Haiti, Keeps a Watchful Eye on the National Palace, Home of His Country's Presidents

On his palm-trunk pedestal, "The First of the Blacks" receives the palm of victory from a liberated slave. Toussaint L'Ouverture was a military genius, defeating in turn French, English, and Spanish armies. Unlike Christophe and Dessalines, he was humane, educated, and not self-seeking (page 325). Trying to win back France's rich colony, Napoleon had Toussaint captured by a trick and allowed him to die in a French dungeon.

Albert W. Harson

Port au Prince, Sun-soaked Carpet of White, Stretches from the Head of a Great Bay to the Foot of Haiti's Mountains

The Cathedral shimmers in the center of the city. At the extreme right stands the white-domed National Palace. The road up the mountain leads to Pétionville and Kenscoff, cool summer retreats. Near the water front (right) is the two-story Customhouse. The square (left) is the open market.

Haiti Reaches toward Cuba with Two Clawlike Peninsulas

This tiny Caribbean Republic, with its African culture, French-speaking people, and memories of empire, lies on the western end of Hispaniola Island. Windward Passage, between Haiti and Cuba, has been an important shipping lane almost as far back as Columbus' time. Buccaneers of the 17th century played hide and seek with Spanish galleons around their stronghold of Tortuga (Ile de la Tortue), north of Haiti. The natives of Gonâve, within the great bay, made a United States Marine sergeant their king.

together by the custom which gives each son a little piece of the farm when he marries, the clan's life is thereby perpetuated in the spot to which it is bound by the soil.

These little family clans are sprinkled among the arable Haitian valleys, each with a holding of a few acres. Since the apportionment of land among the people more than a century ago, large farms have been almost unknown.

Pierre had served a year's apprenticeship since his betrothal to a daughter of a neighboring farmer. The union had been approved by the girl's family as well as by his own.

A year before, Pierre's grandfather had given him a plot of ground. Pierre had planted and harvested his crop and his mother had sold it in the market.

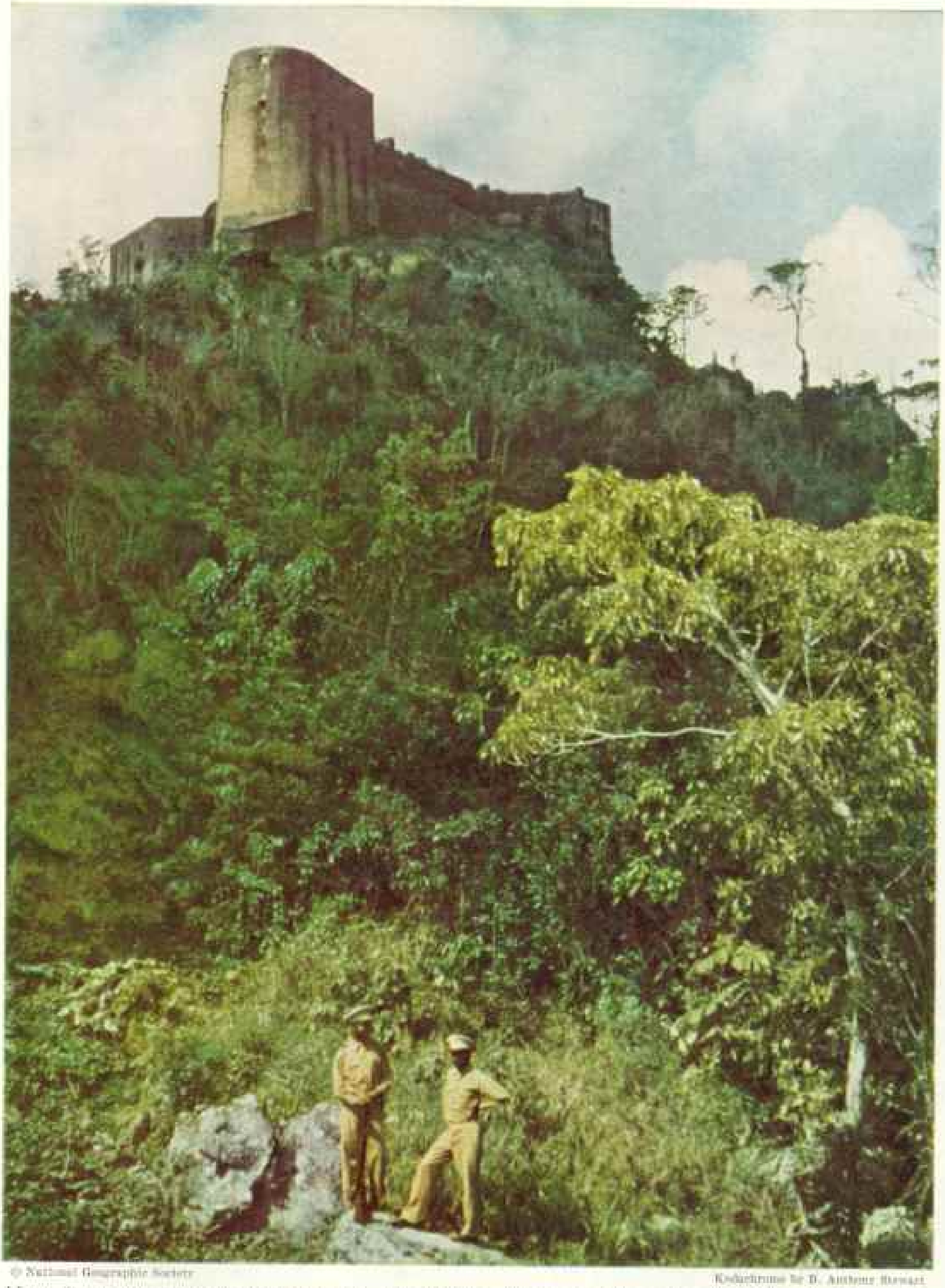
He had built his house, of one room, with walls of clay and grass, similar to the adobe walls of Mexico. It had a thatched roof and a bare dirt floor. Outside was a metal kettle for cooking. Inside were metal utensils for eating, a handmade bed, and handmade chairs. Thousands of Haitian farmers live in houses exactly like it.

Pierre's prospective bride was 16, tall and slender, straight as a reed. Her head and features, like Pierre's, had been carefully molded by mother and grandmother in early babyhood.

For more than a hundred years, heads and nostrils of many Haitian babies have been molded by pinching and compressing during the first month or two of their lives, as if by a sculptor. Visible results indicate that the women who have performed this duty have been artists.

The slaves brought to Haiti in the 18th century came from many different tribes in Africa, but a number were Peuhls (Fulani), from West Africa.* These were intelligent people of fine stature and regular features.

* See "Nigeria: From the Bight of Benin to Africa's Desert Sands," by Helen Trybulowski Gilles, National Geographic Magazine, May, 1944.



Kodachrome by B. Anthony Stewart

Here Rests the New World Pharaoh—His Mighty Monument Is a Wonder Like the Pyramids

Legend says thousands died building this mountaintop fortress for Henry Christophe, the slave boy who became King Henry I. Enthroned in 1811, he killed himself in 1820 when paralysis and revolution beset him. A few soldiers now guard the Citadel which he designed to garrison 10,000.

Kodachrome by B. Anthony Stewart

Market Day Is Holiday for Rural Haiti—Happy Farm Wives, Bartering Food and Gossip, Make Business a Pleasure

Near St. Marc they trade with one another in amounts rarely exceeding a few centimes. Working blue, salted with white, is the common costume. Sheds house perishables from sudden rains. Dog and goat are on the loose. Once unloaded, the horse will go to the donkeys' "parking lot."

As Evening's Shadows Lengthen, a Laughing, Singing Women's Army Marches Home with Market Baskets on Heads

Haiti's most characteristic spectacle is head-laden women treading its roads from dawn to night. Erect carriages are the reward of bearing burdens on the head. These women have sold their produce near St. Marc (Plate II).

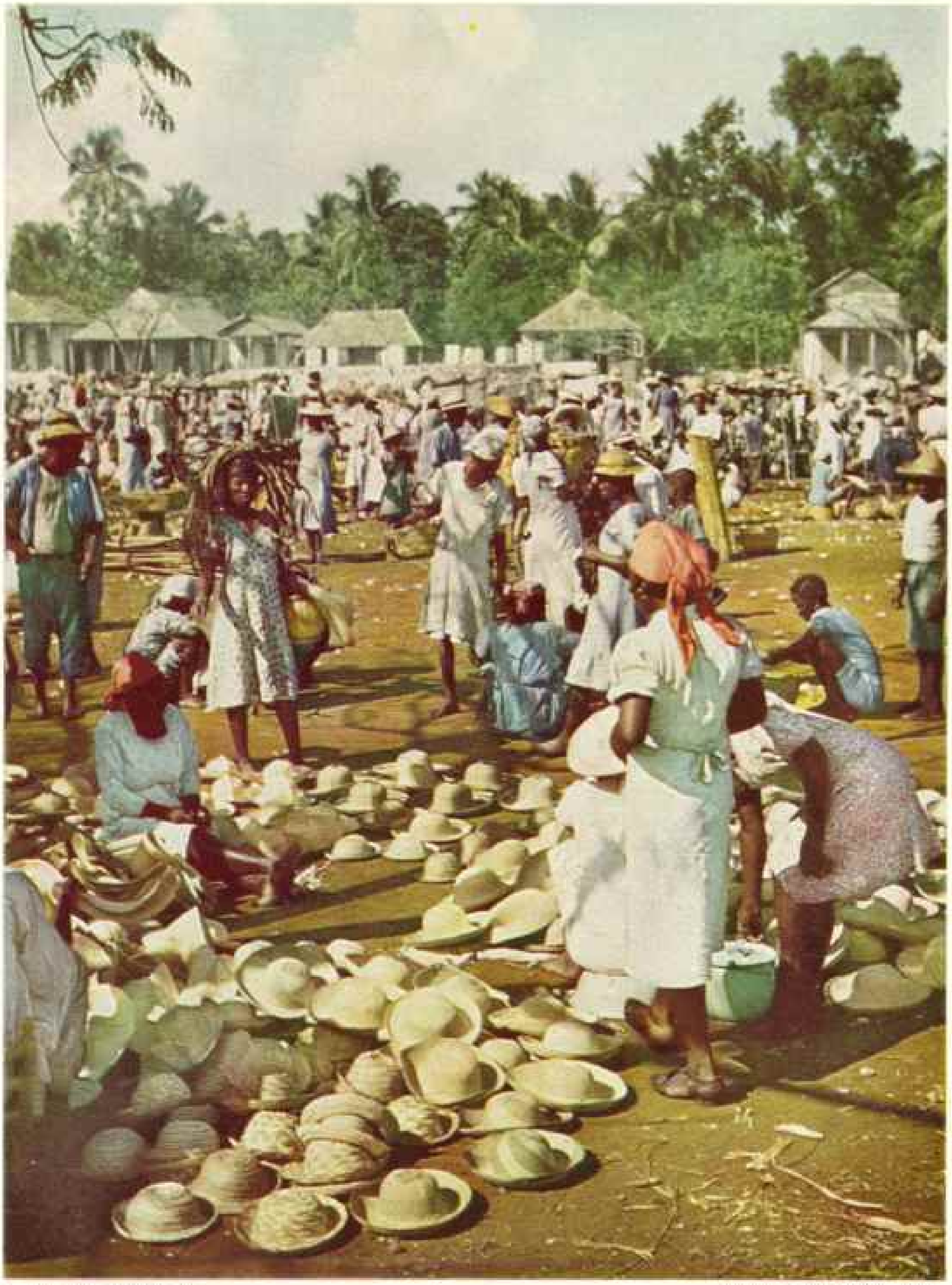
The Turban of Leaves Protects the Bananas, Not His Head, from Bruises

In banana parlance, he is a "bruiser." For a half-mile trip he earns one cent (U. S.). In addition to his 35-pound pay load, he carries personal possessions in a bag slung from the shoulder strap.

Kodachromes by B. Anthony Stewart

No Burglar Rat Can Crack This Open-air Corn Safe

From each ear a shuck has been pulled back and tied to a pole suspended from the rack. As sister watches, baby gets a standing-up shirt repair from mama's needle.



 Richardson for B. Anthony Stewart

A Thousand Bare Feet Have Tamped the Hat Counter in Grand Goâve Market Place

One woman here wears shoes, but, like her sisters, she has no worries about shortages in silk and rayon stockings. Jeannie with the light-brown coil of rope wears it, not as a hair ribbon, but as a sales offering. The straws are the wares of a family that wove them.

Kodachrome by B. Anthony Stewart

Rolling Across Blue Hills, the Rainy Season Bursts on Gros Morne—Impassable Roads Lie Ahead of the Stalled Bus

Hurrying home before the storm, a boy carries his mother's chair from the market across the street. Balconies of French colonial style teeter precariously on slender timbers. In the distance, a sign announces gasoline.

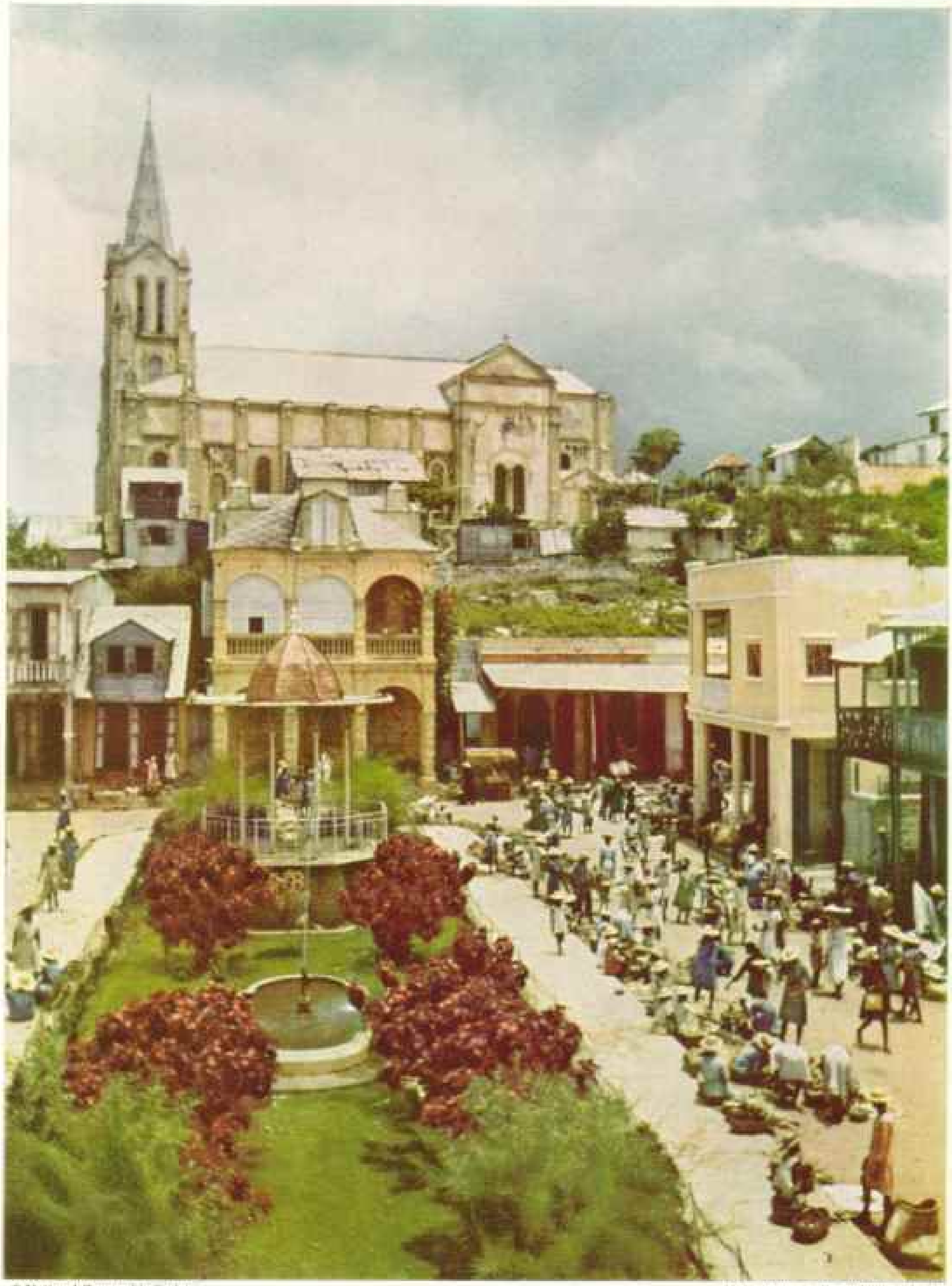
From Native Mahogany He Carves a Tiptop Curio Stand

With a pull on the bar, shelves spring out horizontally to receive bric-a-brac. Tourists are enthusiastic buyers of this valuable wood, sold here at low prices.

Kodachromes by B. Anthony Stewart

Attractive Hat and Purse Are of Sisal, the Binder Twine

Seashells are her necklace; the bouquet is hibiscus. Daughter of a Cap Haitien banker, she is a representative of Haiti's elite. She speaks French and English.



 Kodachrome by B. Anthony Stewart

Cathedral and Market Square Are Soul and Heart of Miragoâne

Seen from the town hall, balconied shops rim the Grande Place. Fountain and bandstand occupy the park. Rain is minutes away. This port is remarkable for having approach roads so steep and narrow that both inbound and outbound traffic are one-way.

Their physical characteristics have survived among Haitians of the present day.

Pierre carried upon his left cheek a deep scar, an inch long and half an inch wide, irregular in shape.

Outwitting the Werewolf

In the eyes of his bride the scar did not detract from Pierre's otherwise handsome face. She knew that, as a child, he had been of such pleasing appearance that his parents had intentionally marred his beauty by burning his cheek with the red-hot shell of a cashew nut. This kept him from tempting the voracious werewolf, which, every Haitian of the hills knows, lives on little children.

No one has ever seen a werewolf, there is no record of any child ever having been devoured by one, but the Haitian farmer firmly believes that there are such creatures. In the rural districts many adults have protective scars on their faces.

In the family council which arranged Pierre's marriage there was no suggestion that it be held in a church, although all the members of the family considered themselves good Catholics and attended Mass regularly every Sunday morning. They could not afford a church wedding.

The greatest obstacle was that at a church wedding one must wear shoes and dress accordingly. No member of Pierre's family had ever owned a pair of shoes.

Pierre and his bride would enter into a relationship known as *plaçage*, which, among their neighbors, is as definite and binding as a church ceremony. In the United States it would be known as a common-law marriage. Among Haitian farm folk there are probably 100 plaçage weddings, with elaborate vodun ritual, to one wedding in a church.

Pierre and his bride, whose name is probably Felice, enter upon a routine which will probably keep them in their own valley the rest of their lives.

Pierre will work his little farm six days every week. Not a stroke will he do on Sunday, except in extreme emergency, for Sunday is the day for rest and recreation.

Almost every Saturday night Pierre and Felice will dance to the vodun drums and conch shells. Some of the dances will be religious, with displays of emotional excitement, when their *loas* (gods) come down and "possess" them.

At daylight Sunday Pierre and Felice will march in solemn procession, together with their score or more friends of the dance, to the nearest Catholic church, where they will participate in an orthodox Mass.

Pierre and Felice do homage to their loas and worship the God of the Christians in the nearest Catholic church without the faintest feeling of inconsistency. They are the products of a blending in the human mind of two religions over a period of 250 years.

Felice's major duty is going to market. Every few days, when the bananas, beans, pineapples, coffee, or other products are being harvested, she fills a huge, shallow basket with all it will hold, places it atop her head, and begins her journey on foot.

The largest markets, where she can probably get the best prices, may be 15 to 20 miles away, but 20 miles on foot seems to a Haitian farm wife no more taxing than a quarter-mile stroll would to women in other lands.

Felice is tall and slender; her back and shoulders are flat and straight. She moves on bare feet with a long, steady, graceful stride.

Thousands of Felices may be seen all over Haiti, striding along the roadsides to market, bearing on their heads loads out of all proportion to their visible strength (Plate III).

Miles and miles of them, in straight, one-piece dresses of black, blue, or white cotton, move in a colorful stream along every main artery to every town, every day of the year except Sunday, come rain, come shine, for they are the garnerers of that small sum which is the Haitian's annual wage.

The expression on the face of the Haitian woman marching to market is a happy one. Frequently she sings as she swings along. The hours in the town square, where she sits on the ground beside her wares and bargains for the best prices, are filled with merriment.

Men Shun Market by Tradition

Why doesn't the man of the family ever go to market? Felice and Pierre do not know. However, there is a reason.

Among their ancestors in the tribes of Africa the women went to market, because, if men went, they were often kidnaped by chiefs of rival tribes, to be made into warriors or slaves. In the early days of the Haitian Republic, the men were in danger of being seized by a revolutionary leader and impressed into his army; so the women went to market because it was safer. Now it is merely custom.

Thrills and romance, exotic colors, majestic scenery, social and racial contradictions awaken the interest of the visitor in Haiti. As his ship or airplane glides toward Port au Prince he gets his first thrill. He comes from the direction of Cuba, over a long, broad bay, into the fork of two giant fingers studded with mountains and pointed at the western horizon.

At the bay's eastern terminus lies Port au

Staff Photographer B. Anthony Stewart

Rubber Plants Are "Milked" with a Knife in Haiti

The worker has roped together several small branch ends of the wistarialike *Cryptostegia* vine. He cuts them back a little farther every other day, allowing the wounds to bleed into the calabash. Cryptostegia, unrelated to the *Hevea* rubber tree, can be tapped within a year after transplanting from the nursery.

Prince, the capital, a shimmering white city with its feet in the water and, tossed up behind its back, tier upon tier of rugged, wooded mountains (page 311).

From Sea-level Heat to Mountain Coolness

Stepping from a plane or onto the dock from a ship, the visitor receives a startling blast of hot air in his face. Three miles away, up the steep hills, over narrow, twisting streets, in fashionable Pétionville, the temperature averages several degrees lower and a breeze blows day and night.

Twelve miles farther, almost straight up into the mountains, over tortuous roads, lies cool, swank Kenscoff, where the aristocratic Haitian and foreign-colony members have their summer homes at an altitude of over 4,500 feet and feast on strawberries, pears, and peaches.

About him the visitor hears from open shop fronts the soft, slow voices of venders. They try to interest him in lace and embroidery made by town women or girls in convents, sisal handbags and baskets in gay colors, straw hats, carved mahogany figures and trays, pottery, or straw mats in lively patterns.

Barefoot Negroes scurry about the city, performing tasks of menial labor. Suddenly a flash of chromium and shining blue whirls around a corner and the visitor sees an 8-cylinder limousine, with uniformed chauffeur, disappear in a crowd of scattering urchins. It bears a man with finely chiseled features, flashing eyes, and square shoulders, attired in the sheerest white drill money can buy. Obviously he is a man of wealth and distinction.

His complexion suggests that of a healthy man who has acquired a tan at Palm Beach. In that glimpse the visitor has seen one of the Haitian élite, two or three percent of the Haitian population.

His next surprise is a French omelette and a tossed salad such as only a French waiter can put together, followed by fish buried in a delicious cream sauce. After this come *poulet à la reine* and artichokes from the Kenscoff vegetable gardens.

The cuisine of hotels, clubs, and exclusive homes of Port au Prince is the French cuisine of the Paris cafés and provincial inns, brought two centuries ago to the Caribbean colony of Saint-Domingue, now Haiti, by the fabulous

French and Creole masters of a golden epoch.

In the homes of leading Haitian citizens of Port au Prince or of Cap Haïtien on the north coast, a guest encounters a friendly, cultured people who, if he speaks French, will captivate him by their charm, wit, and intelligence.

He may encounter a discussion as to whether Rousseau or Montesquieu had the wider influence on pre-revolutionary French thinking; or whether Socrates expressed his own philosophy or was merely a vehicle selected by Plato to publicize his ideas.

The élite Haitian has spent much time in Europe. Before the war he went to Paris for his education.

Haitians Remember the Marines

He knows the United States. For many years Port au Prince was a regular port of call for American cruise ships. He respects the United States and admires its achievements.

Staff Photographer B. Anthony Stewart

Christophe, Misguided Tyrant, Aped Napoleon Even in Dress

In the long years of fighting the French, Henry Christophe forgot the feel of slavery and ruled his "free" subjects with a hand of iron. This bust is at Petite Rivière de l'Artibonite, housed in a palace built by Dessalines.

The United States sent Marines into his country in 1915 to enforce the law and supervise finances. They stayed until 1934.*

Haiti had had a history of almost continual revolution. From 1843 to 1915, when the Marines landed, the country had had 23 presidents, many of whom died violent deaths or were deposed. Seven different men had been president during the four years preceding the Marine occupation.

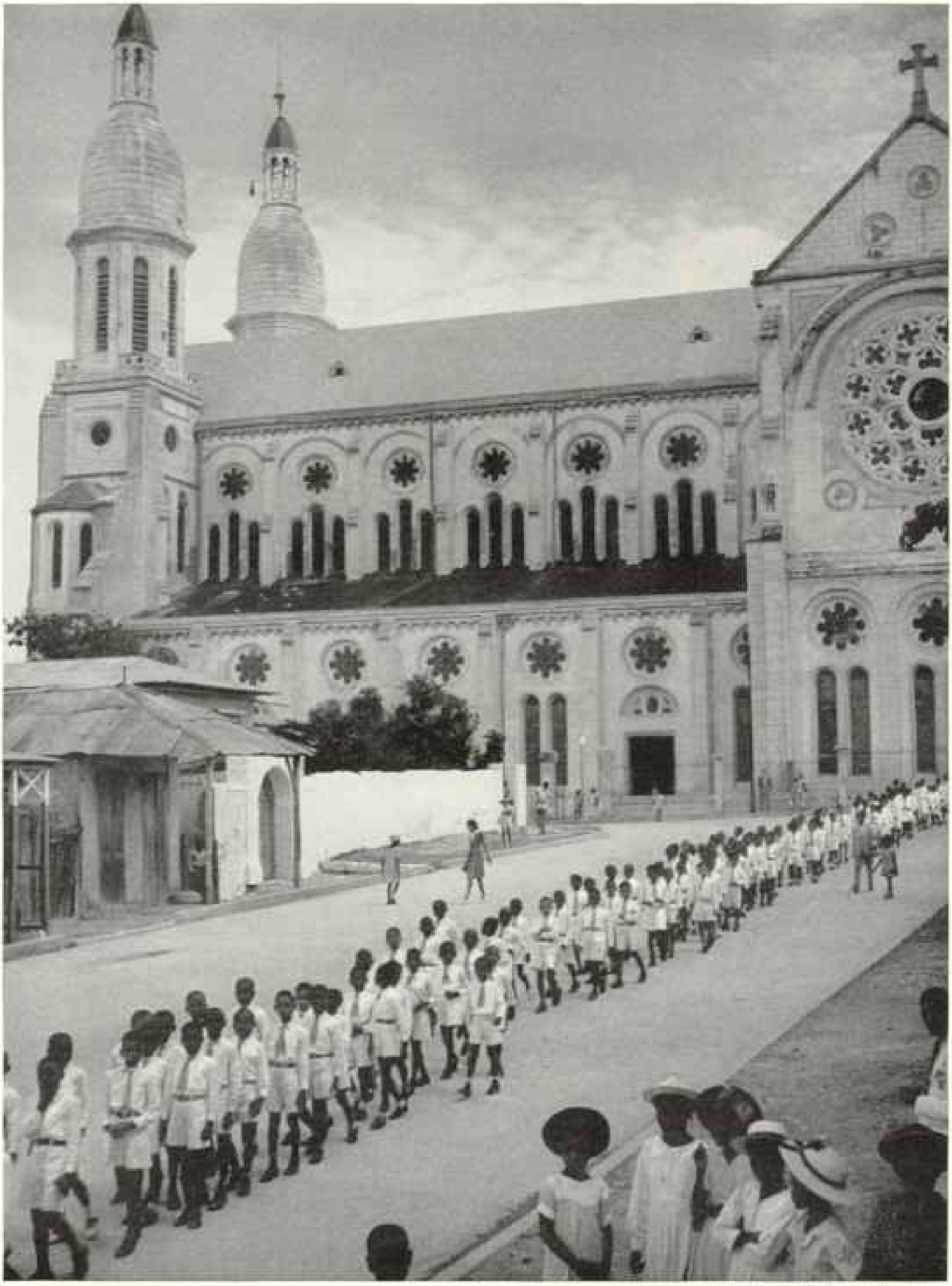
The U. S. Marines established peace and order; straightened out finances; built roads, bridges, water systems, and schools; and gave modern sewers and sanitation. But the occupation was resented and the capital has not wholly forgiven it.

As to the war, the élite Haitian is pro-American and pro-French. He longs for the day when France will be free and he can again enjoy the cultural pursuits of peacetime.

His position as a member of the élite puts him in a group that is almost a caste. In Haiti there is only one way to become a member of the élite—to be born into it.

Neither the élite Haitian nor his ancestors for a hundred years have ever done any work

* See "Haitian Vignettes," by Capt. John Houston Craige, National Geographic Magazine, October, 1934; "Haiti—A Degenerating Island," by Rear Adm. Colby M. Chester, U. S. N., March, 1908; "Haiti and Its Regeneration by the United States," December, 1920; "Haiti, the Home of Twin Republics," by Sir Harry Johnston, December, 1920.



Staff Photographer B. Anthony Stewart

Public School Boys in Sunday Best March from Port au Prince's New Cathedral

Like Britain's Westminster Abbey, this building is more than a church. The Republic's presidents are inaugurated here and it witnesses many public State and Church functions. Built by the Government in 1914, it is the city's most prominent structure. Roman Catholicism is Haiti's state religion.

Staff Photographer B. Anthony Stewart

Six Men Put Up a Haitian Home in Record Time

Similar to a barn-raising in rural United States is this Haitian application of the Golden Rule: Help me build my house and I'll help plant your sugar cane—no money exchanged (page 307). The workers are thatching the roof. Unwieldly bundles soon will be neat, tightly woven, waterproof mats.

with their hands. Many are descendants of French noblemen. When a young man of the élite has reached maturity, after broad schooling in Paris or in the hands of tutors, he usually becomes a lawyer, a doctor, or an officer of government.

Although the élite constitute only a fraction of the population of Haiti, they have had a major share in running it for more than a century.

First Native Leaders Were Slaves

Haiti's first great native leaders, Toussaint L'Ouverture, Dessalines, and Christophe, were ex-slaves. They were generals during the turbulent years after the bloody revolt of 1791, when half a million blacks wiped out their white owners or caused them to flee (p. 327).

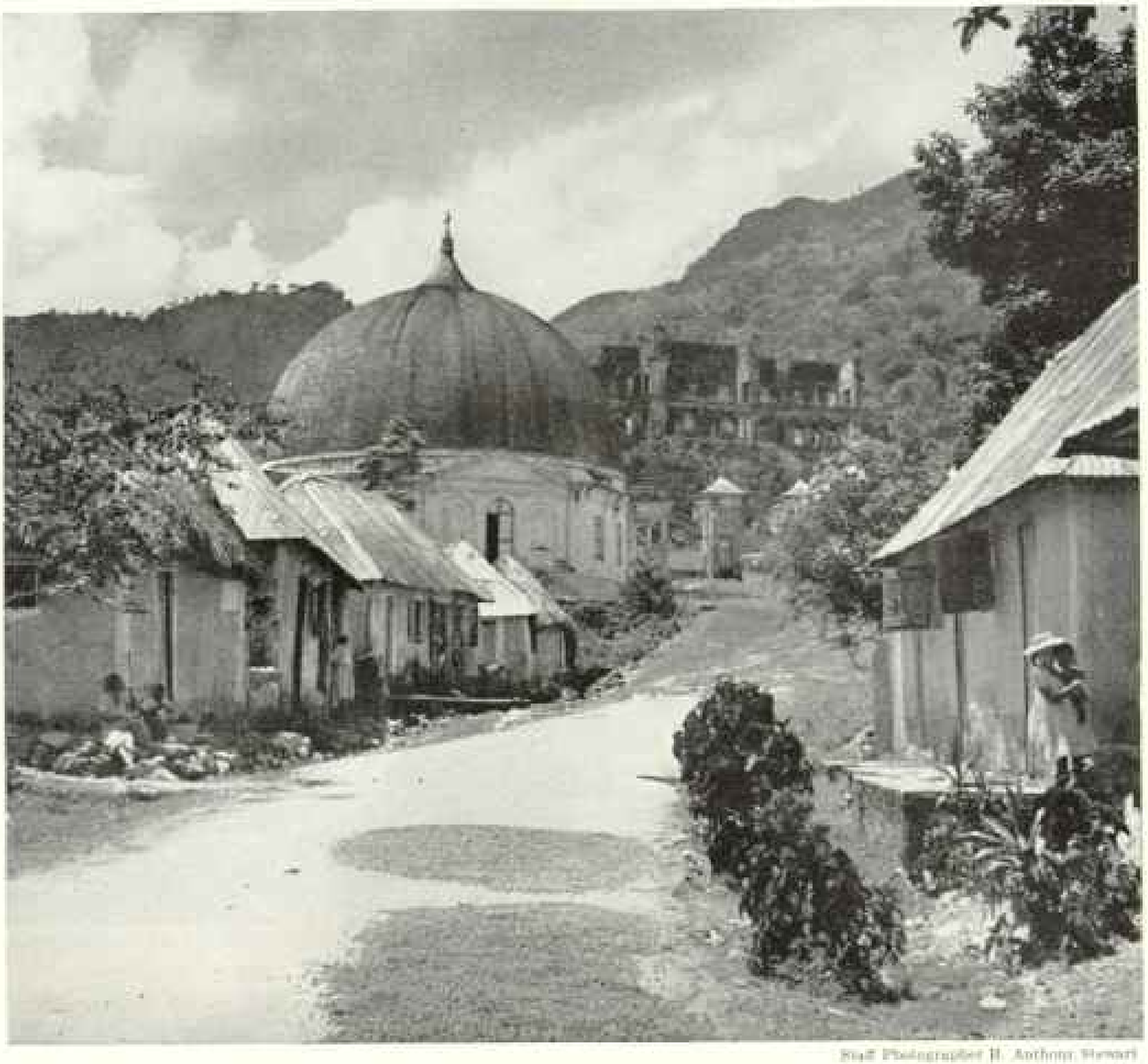
These were the French and Creole masters of the era of glory, wealth, and grandeur of the French colony of Saint-Domingue, which produced about a third of the sugar exported to Europe, kept 700 ships and 80,000 seamen busy carrying their products to the ends of the earth, and reaped the profits of a rich commerce.

Élite Take Over Government

When Henry Christophe, the last of the three rulers, died in 1820 by his own hand in his famous and beautiful villa of Sans Souci, at the foot of the mountain upon which he had erected his gigantic Citadel,* the élite took over the government and have held certain key positions in it ever since (pages 323, 326).

True, only 13 of Haiti's 31 heads of state have been from the élite. Some of the others were Negroes selected by the élite and controlled by them. Others were courageous and intelligent characters who won the presidency by revolution.

* See "Little-known Marvel of the Western Hemisphere: Christophe's Citadel," by G. H. Osterhout, Jr., National Geographic Magazine, December, 1920.



Staff Photographer B. Anthony Stewart

Grass Grows and Beans Dry in the Street of Milot Where Christophe's Royal Retinue Often Passed to Sans Souci

In the ruined palace at the end of street, King Christophe held court (page 325). From its terrace he reviewed his army. "Sans Souci" means "free from care," but it was here that Christophe killed himself. Two patches in foreground are cacao beans spread to dry. Peacetime travelers mounted burros at Milot for the trip to the near-by Citadel.

To manage and direct the various Government departments, it was necessary for somebody to know how to read and write French, the official language. Few Negroes could speak French, and they could not read or write their own Creole patois because for so long it was only a spoken language (page 328).

On the other hand, every member of the élite speaks and understands Creole, which he learned in childhood from his nurse. A Negro president has no alternative but to call on the élite for help.

Indians Destroy First Colony

Haitian origins were glamorous and tragic. Columbus discovered the island, on December 6, 1492, when he made a landing at what is now Môle St. Nicolas, on its northwest corner. On Christmas Day, 1492, the *Santa Maria* was wrecked on a reef near the present Cap Haïtien, on the north coast. There Columbus established the first European settlement in the Western Hemisphere.

He named the colony "La Navidad" and the island "La Isla Española," which geographers soon corrupted to "Hispaniola." La Navidad was soon destroyed by Indians, and the western end of the island lay practically uninhabited for 200 years.

In 1697 Spain ceded the western portion of the island to France, which named it the colony of Saint-Domingue. French pirates, free-

booters, and buccaneers, from their once-flourishing headquarters on Tortuga (Ile de la Tortue), a small island just off the north coast, swarmed onto the mainland and inaugurated the 100-year saga of Saint-Domingue.

Adventurous settlers, including some of the nobility, came from France. Slaves were imported by the shipload. Sugar, coffee, cotton, cocoa, indigo, and tobacco sprang from the fertile valleys.

By mid-century, no Indian prince, no raja of the East, knew greater luxury and extravagance than the estimated 36,000 white planters and 28,000 mulatto freedmen of Saint-Domingue. Slaves irrigated and drained thousands of acres and built palaces for them to live in.

For six months every year many of the planters went to Paris, with retinues of as many as forty or fifty slaves per family. They lived in luxury in the gay French capital, where their display of wealth startled even the luxury-loving court at Versailles.

A half-million slaves toiled for them at home under the lash of cruel overseers, who drove them until they dropped in their tracks.

Haiti's Bloody Slave Uprising

On August 19, 1791, Saint-Domingue was at the zenith of its prosperity, extravagance, wealth, romance, and glamour. The next day it was destroyed. The long-oppressed and tortured slaves revolted. Freed mulattoes were spared, but hundreds of white planters were slain, in most cases with unspeakable torture.

Staff Photographer B. Anthony Stewart

What His Head Carries Will Pay for His Foot's Cure

After selling his baskets, he will enter a hospital to have his foot treated, he told the photographer. Baskets are made at home, of native grasses. Such loads as this are common in Haiti, but usually women carry them. Average yearly earnings of the Haitian farmer are about $75 (page 309).

The thirteen years which followed saw intermittent fighting against French armed forces sent to quell the uprising. The ex-slaves prevailed and on January 1, 1804, the Republic was ordained by Jean-Jacques Dessalines, slave commander, who gave the new nation the old Indian name "Haiti" (high hills) and elected himself emperor for life. He was assassinated two years later.

Gone were the great plantations. Gone were the overseas commerce, the 700 ships, and the 80,000 seamen. From that bloody saturnalia of arson, mayhem, and murder, Haiti of today has risen. Since that fatal twentieth of August, 1791, no white man has ruled it.

State Lands Distributed

The 3,000,000 Pierres and Felices of Haiti today are beholden for ownership of their little farms primarily to Alexandre Pétion (for whom Pétionville near Port au Prince is named), the first élite president. While it was Pétion who instituted the parceling out of state lands, certain of his successors gave away or sold even smaller plots.

The slaves had toiled and suffered for others without compensation. The land should be theirs, a few acres to each, in order that each could be free to enjoy the fruits of his own labor and, incidentally, have plenty to eat. It sounded like Utopia. But over a period of 100 years it ruined Haitian economy.

Haiti's great prosperity in the 18th century came from the export sales of its agricultural products, which at present market values would probably exceed $50,000,000 a year. Under the new agricultural policy each family raised little more than what it needed for its own consumption. Exports, except coffee, died a sudden death.

In the days of prosperity the population consisted of half a million slaves, with 60,000 or 70,000 white French and freedmen. Today the slaves have become 3,000,000 farmers, and the country's exports are approximately $10,600,000.

That is why Pierre has to work so hard and Felice has to take those long walks to market. There are few large private land holdings; no mass production except of sisal, sugar cane, and bananas. The small farmers can produce only an infinitesimal surplus for export.

For twenty years the Haitian Government has been striving to find some solution to this dilemma. It now has the cooperation of the United States.

One form of American aid has been the "Shada," officially the Société Haitiano-Américaine de Développement Agricole, which began operating in August, 1941.

The corporation, financed by the Export-Import Bank, put about 70,000 acres of Haitian land into production of rubber, lumber, spices, and other economic plants, and promoted native handicraft industries. Since the outbreak of war, emphasis has been placed upon the production of rubber and of sisal (page 322).

Creole Now Written Language

Another venture which promises much for Pierre and Felice is educational and religious.

An English Methodist missionary, the Rev. H. Ormond McConnell, Dr. Frank C. Laubach, missionary-linguist, and a Catholic priest have produced a written phonetic Creole language and have opened schools for Haitian men and women of the hills.

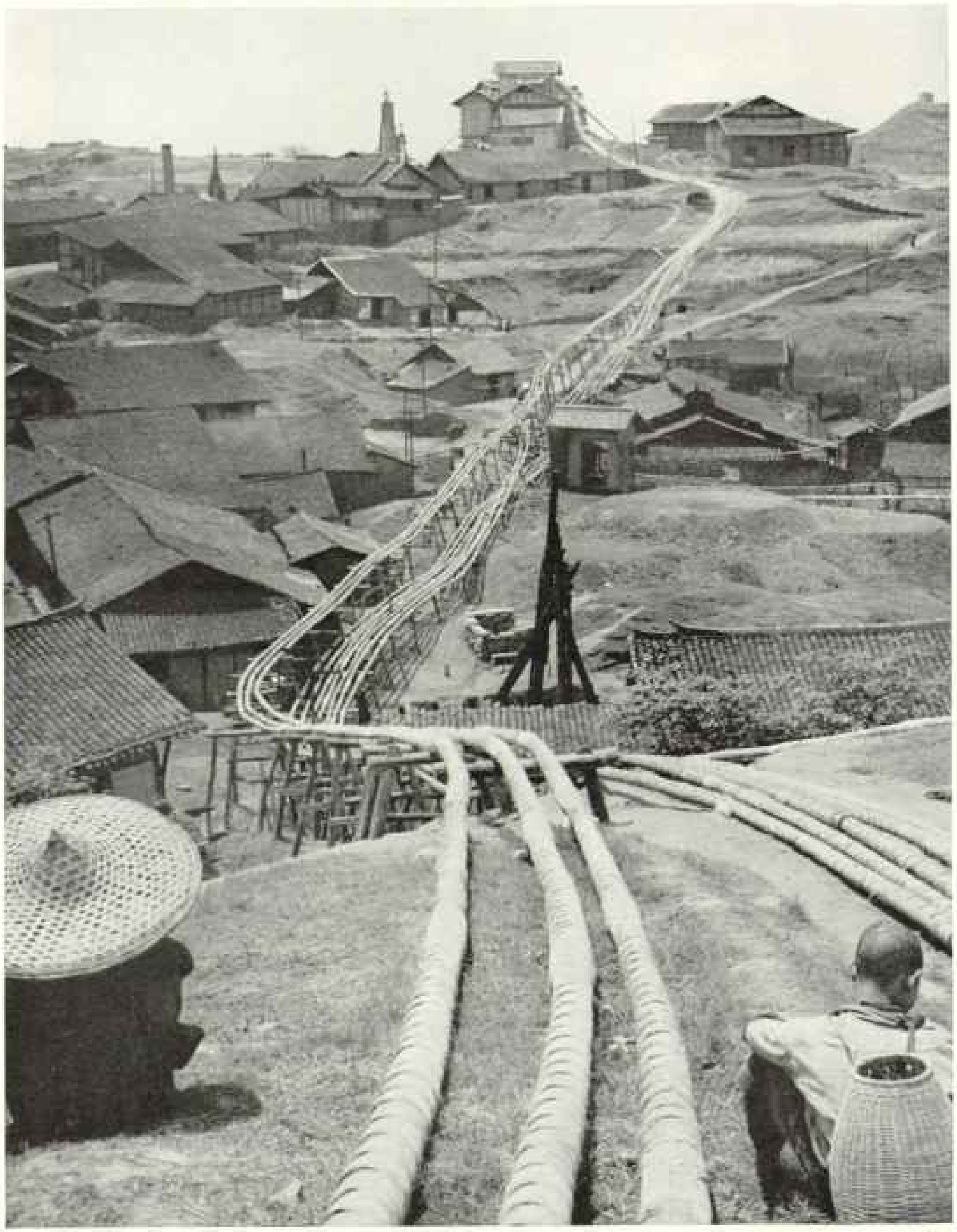
Texts evolved by the missionaries include verses from the Bible, short meditations, interesting stories, and news of Haitian and world events.

Each school has sessions five nights a week for eight weeks. At the end of that time the previously unschooled farm folk can read well and write stumblingly.

Farmers all over the country are clamoring for schools. At one village where Dr. Laubach arrived to establish a school, he found 2,000 people clustered in the streets waiting for him.

Young Catholic priests of the Oblate order from the Canadian-American border, who speak French and quickly learn the Creole patois, have come to Haiti to help the educational campaign.

The missionaries and the Catholic Church report that, with interest awakened in learning to read and write Creole, the peasants are giving up their ancient vodun faith.



Acme

A Centuries-old Engineering Marvel in Bamboo, Tzeliutsing Is Free China's Salt Capital

Literally, Tzeliutsing means "Self-flowing Well." Two thousand years of salt production, however, have dissipated any artesian effect. Drillers questing now for brine delve 5,000 feet and more. Tzeliutsing, 110 miles west of Chungking, produces almost half of Szechwan Province's 500,000 tons of salt a year. The city is essential to China's war economy, for Japan controls the sea salt. Here ten pipes, trestled across a valley, carry brine from a large well. A hoisting derrick pierces the roof of its shed (center). Clear air indicates that evaporating plants in this vicinity burn natural gas from one of the "fire wells" discovered by brine drillers.

Acme

Derricks Suggest Tzeliutsing Is an Oil Field, but Smokestacks Prove It's a Saltworks

Supported by a jungle of ropes, the 120-foot derricks hoist 80-foot-long brine buckets from the wells. Puffs of steam reveal the motive power—donkey engines. The haze is coal smoke (only a part of the evaporating plants burn natural gas). A reservoir (right) contains water for leaching subterranean rock salt.

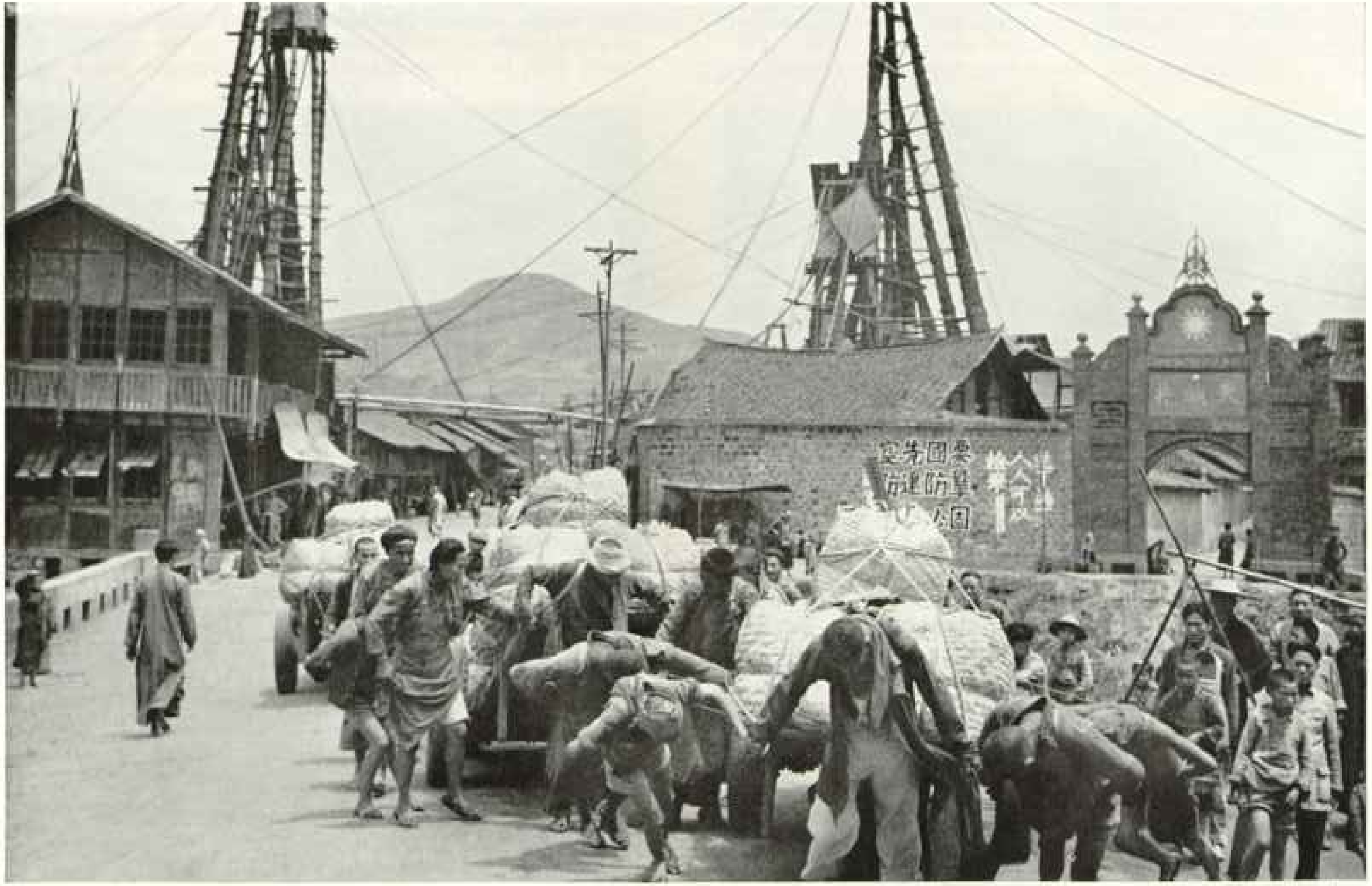
Into a Vat a Bailing Bucket Spews Brine Lifted 3,000 Feet

The bailer has just left the conical well mouth. Footpower drilled the well in three to 20 years. By jumping on and off a seesawlike "walking beam," men drove into the rock an iron bit hung from a bamboo rope.

Acme

Salt Stands Like Building Stones—Salt Paves the Warehouse Floor

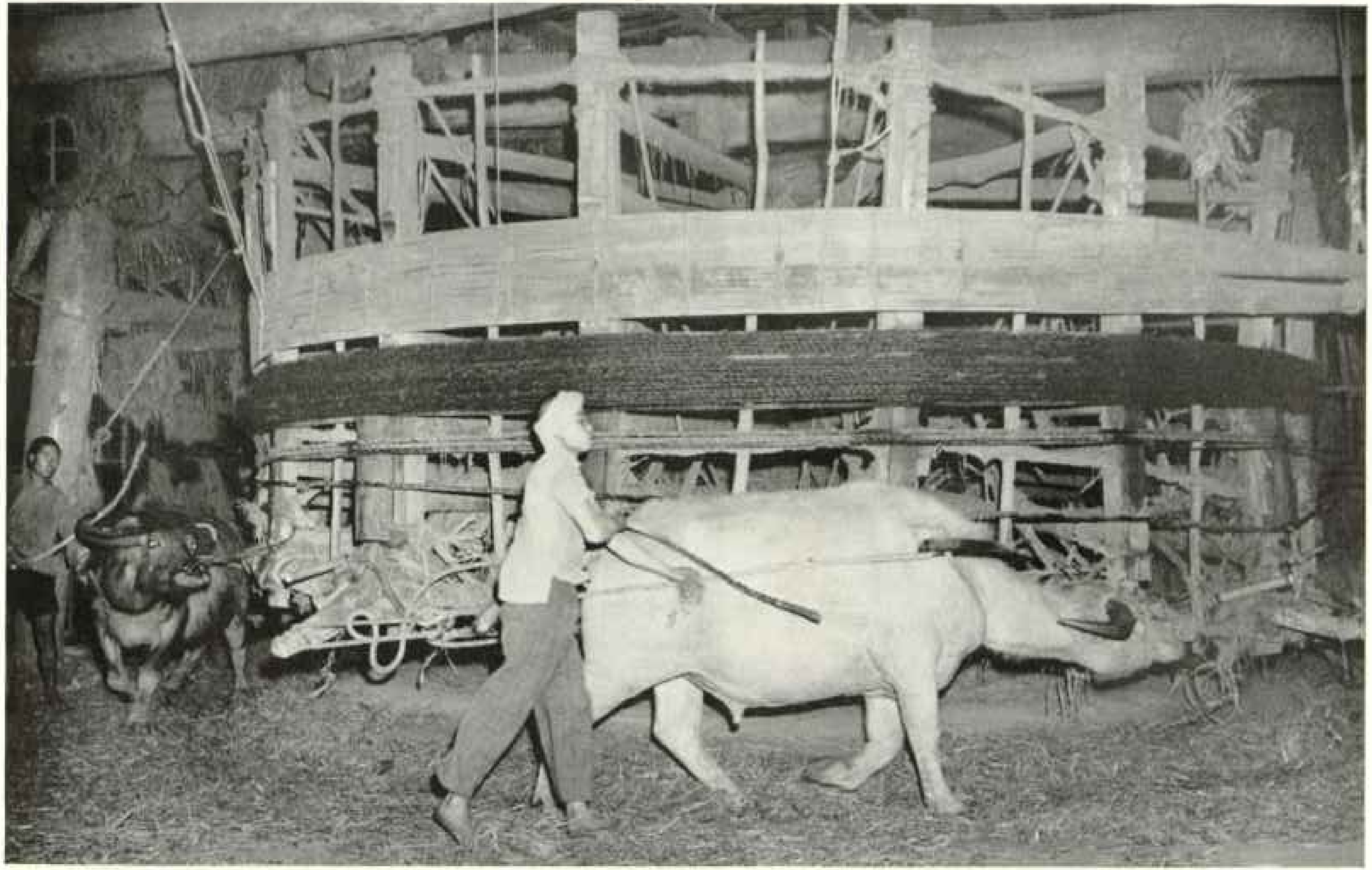
Salt is important to China's continued resistance. It savors the farmer's food, preserves his pork and vegetables. Lacking delivery, he would blame the Government monopoly. Discontent and riot follow a salt famine.



Arnold

Staggering Like Oxen and Yelling for Room, Men in Harness Drag Two-wheeled, Rubber-tired Salt Carts

Ofttimes troops of donkeys, horses, and water buffaloes add to the confusion. The men, bound for the water front, pass the Heaven Salt Well. It is identified by the sign below the Government's star. On the wall, a slogan exhorts the nation to foster air power. Derrick tanks hold brine for gravity flow.



Acme

Sped by Rope End, Water Buffaloes Turn the Creaking "Bull Wheel" and Lift a Ton of Brine from an Old-fashioned Well

Some 20 turns of rope around the windlass's 60-foot circumference show the bailer has risen 1,200 feet in the shaft. The broad bamboo band is a brake which, snubbed against the posts, moderates the bailer's drop back into the well. A relay of four animals, driven at top speed for 15 minutes, is the usual team. Trained for years to circle to the left, they balk at going to the right.

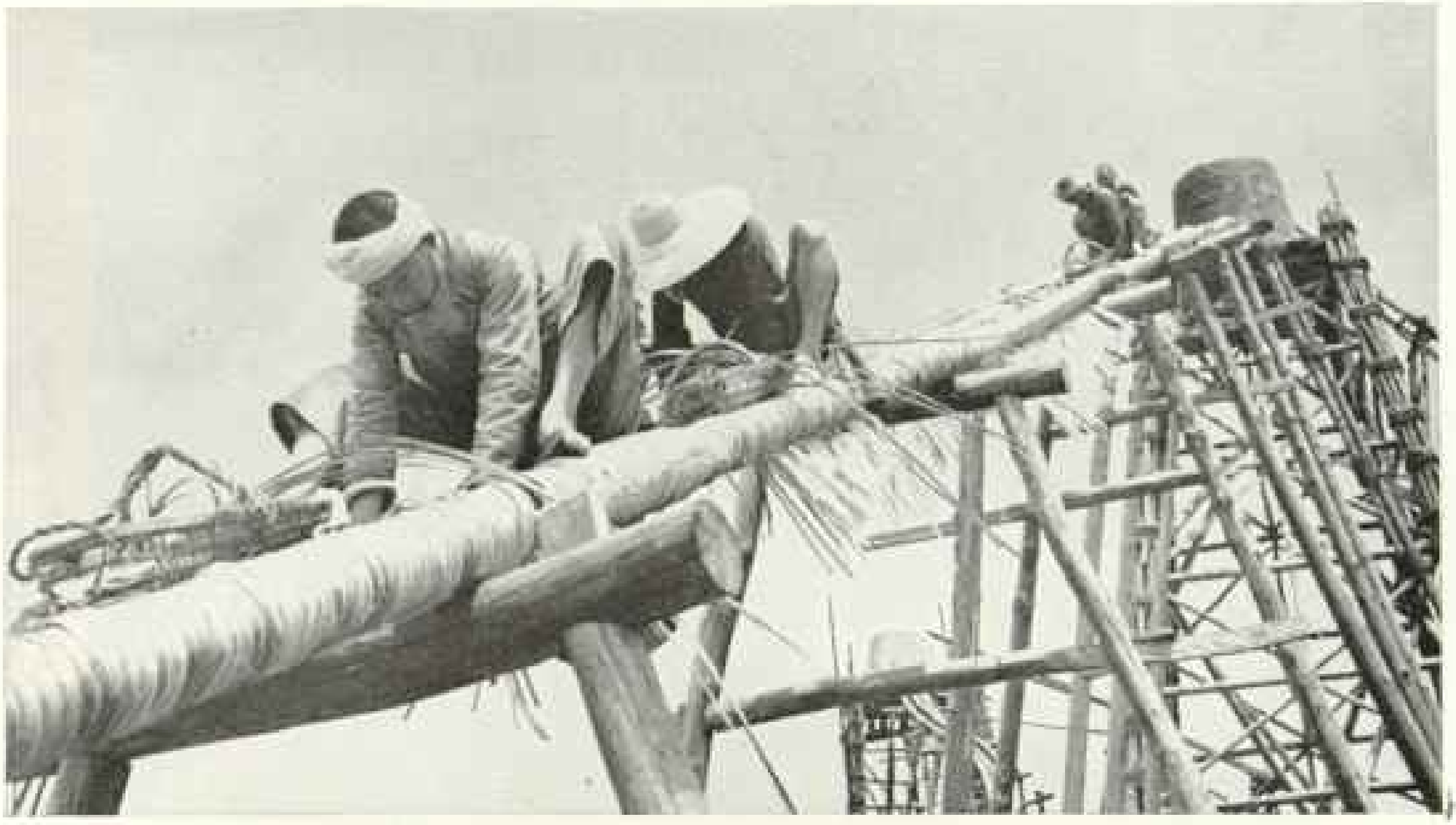
It Looks Like Winter's Snow, but Bare Feet and Chests Show It's Summer's Salt

Precipitated in evaporating pans (below), the salt has cooled. The average Chinese requires 8 to 10 pounds a year. The industry sustains almost a million in Szechwan. In Marco Polo's day, salt passed as money.

Acme

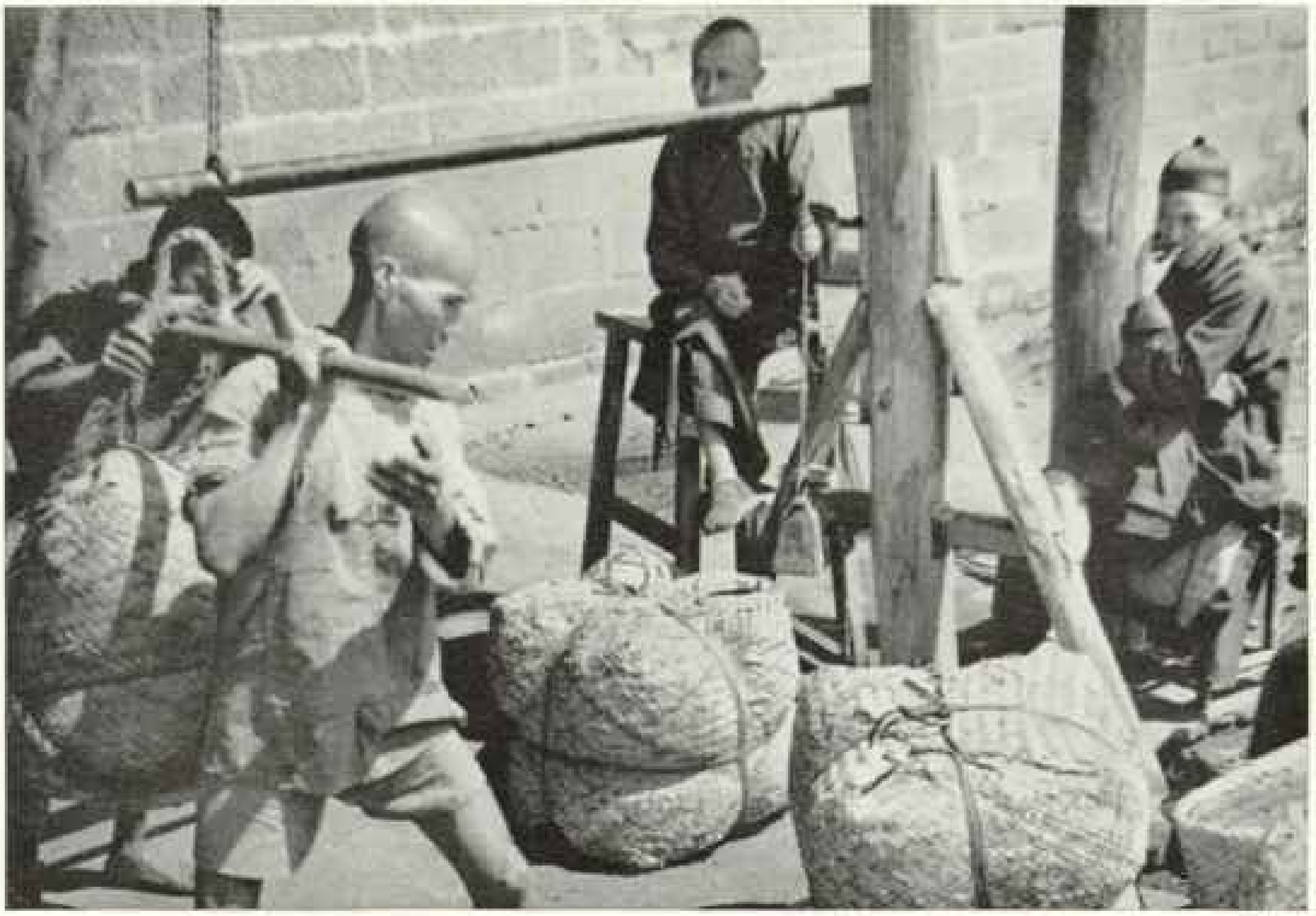
As Vapor Floats Off the Brine, a Long Pole Drags the Residue Out of the Boiling Pan

By night the fires under thousands of pans cast a glow across the city. A full day or more is required to boil off the liquids. A bean juice mixed with the brine collects impurities for skimming off.



To Prevent Cracking, Bamboo Pipes Are Wrapped with Flexible Bamboo

Tanks, filled by buffaloes or donkey engines, are elevated to assure flow by gravity. Spliced timbers support the towers. One bamboo pipe line at Tzeliutsing is five miles long. Turban and straw are local styles.



Acme

A Government Weigher (Hand on Cord), with a Buyer (Skullcap), Assesses the Salt

A rope, serving as fulcrum, supports the balance bar. A sliding weight on the long arm balances salt on the short end. For milleniums the salt monopoly has paid revenue to China. The tax secured foreign loans.

Acme

Yokes Bite Deeply into Shoulders Carrying Salt to a Shore Doubly Lined with Cargo Boats

From Tzeliutsing this river floats salt to the Yangtze. Of "crooked" design peculiar to the region, the sampans have ends twisted by the builders. Ofttimes sweeps are worked from the higher point. Treading catwalks beside the cabins, boatmen pole through shallows. Matting protects cargoes.

When GI Joes Took London

By Maj. Frederick Simpich, Jr., gsc, usa

D DAY was coming fast, but that didn't worry GI Joes. They still swarmed through London, sight-seeing by day, painting the town red at night—when they could get the "paint."

For months I shared wartime London's kaleidoscopic life. I saw how our men behaved, and how London reacted to them. Here are my notes, in present-tense, day-to-day narrative.

Despite blackout and congestion, the "baby blitz," and austerity meals, London stands as the best leave town of the war to date. GI Joe insists on that.

A 48-hour pass to the capital is, to GI's "somewhere in England," full compensation for weeks in a mist-bound Nissen hut. With the invasion under way, they will look back from battlefields on the Continent to Soho and the Marble Arch as the next best thing to a furlough home.

So great is the demand to visit London that complex Army regulations limiting the number of passes are required to ensure transients a place to sleep. Notwithstanding, eager soldiers, aided by soft-hearted commanders, contrive to cram the already overcrowded city.

Some nights as many as a thousand men, turned away from regular billets, sleep on cots laid by the American or British Red Cross in a bomb shelter reserved for the overflow.

British Hospitality, Unlimited

As another measure of the numbers of Americans who daily swarm London's honeycomb of narrow streets, consider that last year the Red Cross filled more than 75,000 invitations from Britishers who asked our boys to their homes. The many added thousands who broke bread over English tables without the knowledge of the Red Cross will never be known. But the Army's Special Services Division, which, with the Red Cross, is responsible for soldier morale, says invitations have doubled in the current year.

Better still as an indication of London's charms for the American GI is the door count at Rainbow Corner, center of the system of soldier clubs set up by the Red Cross throughout the city. Some 25,000 soldier visitors throng its lobbies every day.

To see this great old city as the GI sees it, start with Rainbow Corner. Here the Red Cross centralizes the activities of all enlisted men on pass in London.

Located just off Piccadilly Circus in the heart of the amusement district, Rainbow Corner is carefully designed for the American taste. Illustrating its appeal is its basement called "Dunker's Den," fitted out as a corner drugstore or Main Street "juke joint." Here gramophone records play the clock around, "Cokes" are served ice-cold for "thrippence," and hot doughnuts tumble from a battery of machines.

Adele Astaire, titled sister of the dancer, sits with other British volunteers behind a table in one corner of the Den, writing letters home for any boys who ask. Another beloved woman does nothing but sew on buttons. War heroines, indefatigable workers, put in eight hours daily in an atmosphere of frying grease and "Pistol Packin' Mama" as a gesture to our servicemen.

Upstairs in Rainbow Corner is a ballroom where volunteer hostesses dance nightly with the Yanks. Elsewhere a floor is devoted to hobbies. There is moist clay for those who wish to model, a piano for impromptu concerts, drawing material for talented fingers. From the drawings of the artful GI's who have sketched here the Red Cross has assembled exhibitions attracting large London crowds. Subjects shown reflect the infinite range of tastes in a citizen's army such as ours, running from scenes of crippled B-17's and antiflak-suited pilots to views of London pubs and landscapes back home.

Rainbow Corner devotes much space to a library of well-thumbed papers from the States, and in one room there is a gramophone restricted to classical music. Passing through one night, I was surprised to find every seat taken by moody music lovers and remarked to my Red Cross escort, "This seems as popular as the jive downstairs."

"Yes," she said, "but they never doze the night on the tables in here as they do by the juke box in the Den."

Rainbow Corner is more than a self-contained entertainment center. It is the American Express and Thomas Cook for our khaki-clad tourist crop of 1944. All soldiers visiting London go to its reception desk for billet assignments. Furnished a bed for the night, they are urged to deposit excess cash in safekeeping to avoid overspending.

At an adjoining desk English girls in the familiar gray of the American Red Cross play expert to the soldiers' "Information Please," on a round-the-clock basis. They never know

International News

In These Days of Mechanized Cavalry, Why Not a Mechanical Horse?

Anyway, Lochinvar himself never had a livelier gallop with a lady up. The girl is an English lass of the WAAFS; the boy, a Yank from Milwaukee, Wisconsin. The place is Hampstead Heath, London's Coney Island. The time? They don't care!

what is coming next. How to wire flowers to girls in the States is a frequent query, and many questions concern London and its sights. But one man is sure to want a date, and his successor may ask for a copy of Bartlett's *Familiar Quotations*.

Motherly Services at Rainbow Corner

There are other, motherly services, too, in Rainbow Corner. Special bunks are provided for those who have lost a bout with British beer and need sleep before going their way. A dispensary treats colds and headaches, and even flak-scarred flyers drop in to have wounds dressed while celebrating deserved leaves.

This is a fine job the Red Cross does. Don't forget the name, Rainbow Corner. The chances are your man over here will come home talking about it.

From its lobbies GI's fan out over the city to look and play. Long after the London transport system has shut down for the night, weary soldier celebrants congregate at its doors, confident they will be taken care of—and they are. Army trucks pull up from time to time in the blackout and distribute them to their billets throughout the West End.

Taxi tours of points of interest start from here. Scores of London's little hacks, tops thrown back to the chill London air, carry Americans on a routine swing from Buckingham Palace to St. Paul's Cathedral, past the Houses of Parliament and the Tower. Thus are crammed into brief hours sights known before only from the lifeless zinc plates of high-school history books.

The gasoline shortage has led the Red Cross to initiate a new kind of sight-seeing—it might be called a "walkie-talkie" tour. Soldiers in groups of 50 or more are regularly dispatched from Rainbow Corner with experienced guides to stroll about the city. Taking advantage of the wreaths of history which lie over London, a gifted guide can fill many

© Fox, British Combine

To Sailors Ashore Life Is Just One Gastronomic Adventure after Another

Having nibbled at strange foods in many a port, these men wind up before a pile of English cherries. In London on leave, they serve on United States ships attached to the British Home Fleet.

a dismal, gray-tinted square with talk of Saxon invasions and executions at the Tower, water carnivals on the Thames, and duels fought in Green Park.

Ask a guide what intrigues our men most and he'll reply that it is the changing of the guard at Buckingham Palace or standing before the terrace at near-by St. James's Palace where once a generation heralds proclaim, "The King is dead. Long live the King!"

Much that is historic in London has been removed as a result of the war. The Crown jewels are no longer in the Tower, the treasures of the National Gallery are buried in some hush-hush rural spot, but the city is generous with all that remains. Though the Tower is closed to the public, our soldiers may still be guided through. Special services are held for U. S. servicemen at Westminster Abbey on the unique American feast day, Thanksgiving, and everywhere that British uniforms pass free or at reduced rates Americans enjoy equal privileges.

All London is sensitive to the presence of the Americans, but no element more so than the entertainment world. The London stage, for example, now completing a most successful season, caters to the GI audience. American musicals which would not have been ventured by British producers in normal times are now staged as rapidly as rights become available, in the certainty that names like "Something for the Boys," familiar on Broadway, will draw khaki-clad American audiences looking for a taste of home.

Skits are introduced into most shows to play up the American "slant." Conversely, the presence of the Americans and their customs provide British comedians with an enduring subject for their humor. Many of their gibes concern our practice of monopolizing London's limited taxicabs during blackout hours.

One of the current musicals, largely devoted to a caricature of an American officer in London, draws its biggest laugh from a scene in which two Americans run across the darkened

British Combine

Crowds Mass in Trafalgar Square, Noted for Its Street Gatherings, as American Tanks Rumble Past

This parade was staged as part of an American Army "Salute the Soldier" ceremony. Though much of London has been wrecked by bombs, American prewar visitors will be happy to see this proof that many familiar signs and surroundings are still intact. At left men perch atop one of four huge Landseer lions which guard the lofty Nelson Monument.

British Combine

Lunch-hour Services in the Blitzed Church of St. Mary-le-Bow, Cheapside, London

Both Union Jack and Stars and Stripes drape the altar. American soldiers who happen to be Episcopalians feel at home as they join in the familiar ritual of the Church of England. Site of the oldest church in the City, Bow Church was rebuilt in 1670-80 by the famous architect, Sir Christopher Wren.

Acme

"Now, Here's a Baseball—and This Big Mitt's a Catcher's Glove"

So says Staff Sgt. T. McGoldrick of Savanna, Illinois, to her Royal Highness, the Duchess of Kent, who is plainly a bit puzzled by such terminology as "foul," "strike," "base hit," "home run," and "he fanned out." The Duchess was an interested spectator when American teams played an exhibition charity game. Besides turning some cricket fields into diamonds, Yanks play on scores of improvised sand lots.

stage, flick their flashlights on and off, and shout "Taxi!"

In its theaters as with its shrines, London has been generous to our servicemen. Daily thousands of free tickets are provided by London theaters for distribution among troops in the city. For a time the equitable distribution of these seats posed something of a problem for the United Nations. Remember, the Americans are not the only visiting force in the Kingdom. French, Poles, Czechs, Norwegians, and Belgians come here for entertainment as well. Now, through a small "League of Nations" representing all the Allied forces, free theater tickets and other such services are allocated on an agreed and harmonious basis.

On the "SPAM" Circuit

USO camp shows, often featuring big name stars, tour the "SPAM" circuit, as the American camps outside London are called, but seldom play the metropolis. Soldiers lucky enough to get to London find plenty of entertainment in the regular theaters. On occasion, however, a house is rented by Special Services. Then USO and soldier talent combines to produce a revue which follows the sure-fire formula for GI entertainment—plenty of music, plenty of dancing, and plenty of jokes on officers.

"Titling these shows is important," their producer told me. "They must have the GI slant. The one we've got running now is a natural. We call it 'Three Joes in a Jam.'

"Live talent," he said, "is the one thing the boys demand, but they can't get enough of movies either. Many soldiers come to town and take in a movie in the afternoon and then see a musical comedy at night."

The long queues before the box office at London cinemas support him. Programs run for months in the biggest London movie houses, with American soldiers composing a large part of the audience. Such stand-bys as "Gone with the Wind" still play "first run" in the theaters around Leicester Square, and more ordinary productions, such as "For Whom the Bell Tolls," show no signs of waning.

Recent movies are provided free to soldiers in a theater rented and operated by the Army's

Special Services. But the men still go to the expensive public movie houses and pay the staggering prices which prevail for films throughout the Empire. In any London cinema you will see the top price "Royal Circle" filled with American GI's at $2.20 a seat, even though the same film will be showing elsewhere to soldier audiences without charge.

"You can't explain it," one officer told me. "When we first opened our free theater, we had men turn away because it was free—afraid, I guess, we would force a training film on booby traps into the program."

London girls dance a great deal these dark nights, and Americans are usually their partners.

From the Dorchester House, smart park-side social center, to Covent Garden, celebrated dance hall, American uniforms predominate. But the pattern of London night life is somewhat different from that at home. There are no juke joints, no night clubs, no floor shows. With a few exceptions, closing hour is early by Broadway standards, 11 or 12 o'clock being customary.

Nearest approach the Americans have found to the din and congestion of their home-town night spots is the "bottle clubs"—reminiscent of prohibition days with their mumbo-jumbo of memberships and mysterious missions by runners after drink. These bottle clubs are now almost exclusively American.

At the elaborate all-night "jam" sessions of the Embassy and the Astor, "jitterbugging" is unrestrained and table talk is of Texas homes and big-league batting averages. Even the brocaded walls of the exclusive "400," last stand of London's cafe society, see khaki American uniforms jostling the dress blues of British Guardsmen on a Saturday night.

Press Association

***Yank*, Army's Own Newspaper, Is Favorite Reading of Millions**

Many of America's crack reporters, feature writers, comic-strip and other artists and photographers are now in uniform. The cream of this clever corps works for *Yank*, either on its staff or as contributors. They cover every big camp and every battle front. Future writers of World War II fiction will wade through files of *Yank* for plots, mood, and characters.

Eating Rationed; Prices Controlled

London restaurateurs will indorse the saying that a soldier is always ready to eat or sleep as if he didn't know when he would get another chance.

Our GI's and their officers are provided excellent messes by the Red Cross and the several officers' clubs, but the lure of world-famous names like Simpson's, which still undertakes to serve prime beef, draws them by scores to public eating places and the rigorous three-course meals of wartime.

British Combine

Hay-burning "Hippomobile" Hauls Sight-seers through Fleet Street

Nicknamed the "Washington Wagon," this vehicle belongs to an American Service Club in London. Here it halts before Ye Olde Cheshire Cheese, where long ago, according to tradition, Dr. Johnson and his famous biographer, Boswell, were familiar figures.

Resulting congestion has led many hotels to limit their dining rooms to house guests, and every popular restaurant requires advance booking of its tables. Despite the presence of inflationary factors, prices remain remarkably well controlled. With all the extras, the most fashionable meal will cost about two dollars —cheap enough to the well-paid American soldier on a two-day holiday after months of restrictions.

They find the food substantial but uninspiring. Nevertheless, even the company grouse who spurns a good Quartermaster meal in camp relishes hors d'œuvres concocted largely of carrots, smacks his lips over pigeon pie, potatoes, and more carrots, and mouths a doughy dessert with rhubarb filling when served him in a quaint pub in Shepherd Market.

Meals offered GI's and officers at the Red Cross clubs are generally superior to those available to the public. Green vegetables and salads are customary. Meat courses are substantial, while dubious fish and fowl, unrationed stand-bys of civilian eating places, are rarely on the menu.

Senior officers are privileged to use the Sassoon Mansion on Park Lane as a club serving meals as good as any customary in the States. As a measure befitting their rank, in this linen-shy country, generals are here provided napkins!

The great ballroom of the swank Grosvenor House is also an officers' mess. Fifty cents will buy canned corn, good meat, American coffee, and those childhood and soldier favorites, peanut and apple butter.

Capable of serving several thousand persons at each meal, this mess is a marvel of military efficiency and the largest cafeteria this writer has ever seen. Impressed by the assembly-line techniques applied to cooking and service, officers call it "Willow Run," in memory of the plane plant back home.

British Combine

"Keep It on Your Chin—Don't Let It Drip on Your Necktie!"

A Yank introduces a London boy to ice cream with chocolate sauce. Our airmen, with children of their own back in the States, played father to 100 British youngsters at an airfield Christmas party.

U. S. Army Signal Corps, Official

Even by Cable GI Joe Can "Say It with Flowers"

With the friendly help of the American Red Cross girl (Why didn't the cameraman get at least her profile?) two Yanks fill out a Mother's Day floral order.

Press Association

"Boy Meets Girl" Is the All-American Cure for Homesickness in London—These Red Cross Club Workers Are Fresh from the U. S. A.

Wearing their Palm Beach uniforms, the girls have just arrived at the Milestone Club, one of 398 Red Cross centers for Yanks in Britain. They will organize games, dances, tours, parties, and teas for British wives of Americans. College-trained recreation workers, they are chosen as much for charm as ability. Red Cross girls serve in Italy, Africa, Asia, and the South Seas. In Normandy clubmobile girls arrived on D Day plus 5.

U. S. Army Signal Corps, Official

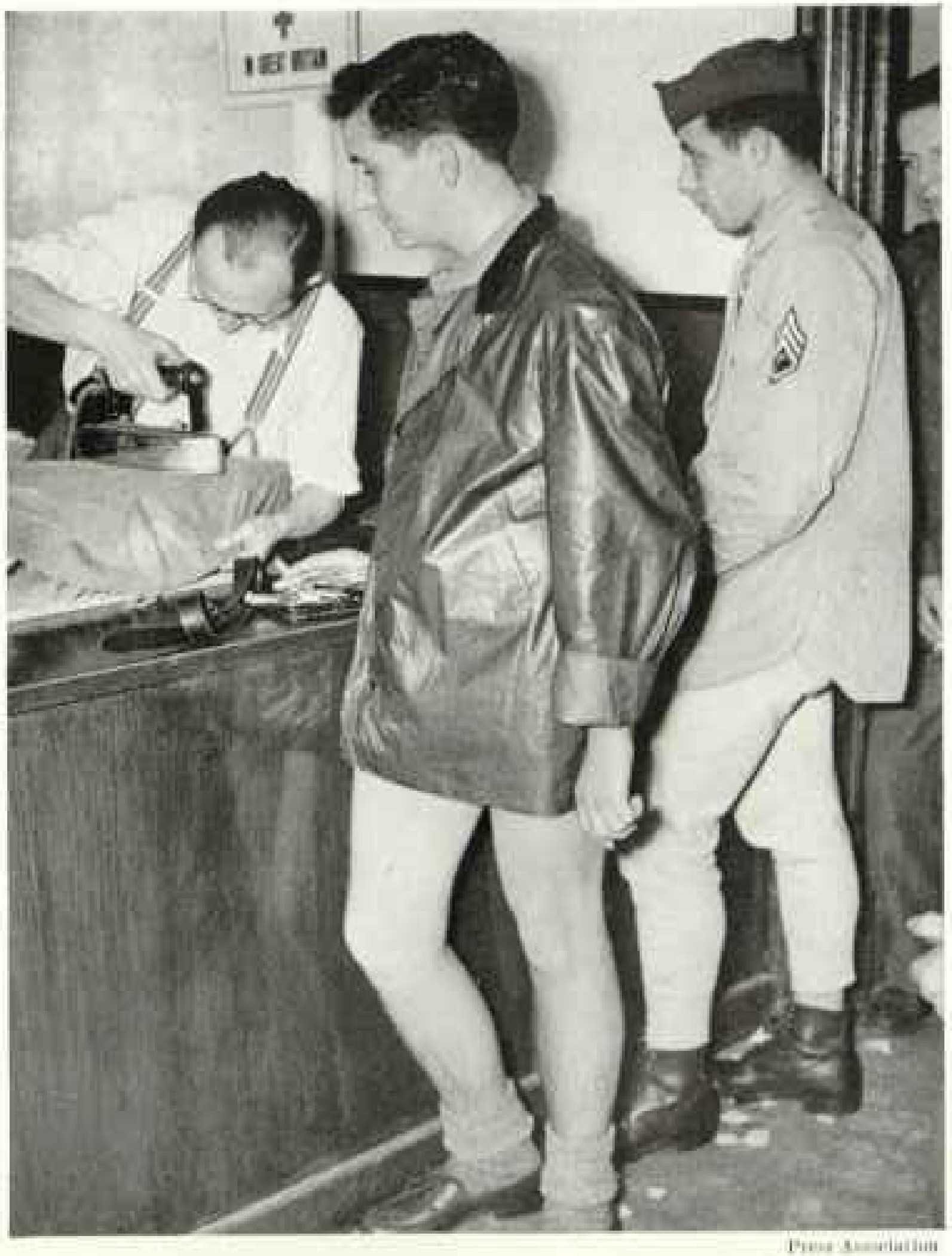
Admiral Stark, General MacArthur, and General Eisenhower—in Effigy—Greet Visitors to Madame Tussaud's Wax Museum

"They look real enough to salute," said Staff Sgt. Rolland Otterson, 19, tail gunner on a B-26, in London on a pass. Thanks to programs worked out by British and American entertainment organizations, including the English-Speaking Union, soldiers on 48-hour leave can have a good time for as little as a pound (about $4).

Press Association

"To Me They Look More Like Red Poker Chips"

"Yeah! London can roast beef and make swell Yorkshire pudding, but there's a trick in making hamburgers—you gotta learn it," say these Yanks, looking at a restaurant billboard. The "burgers" sell for sixpence, about 10 cents.



Press Association

You Might Stop All War by Taking Pants Off Soldiers

No man feels like fighting with his trousers off! These soldiers have handed their pants in at the Red Cross Washington Club in London, which presses them while the men wait.

British Combine

A Friendly Anglo-American Tug-o-War in London's Famous Old Vintners' Hall

For this party, 60 London school children invited their American soldier "uncles" to a Thanksgiving Day celebration, arranged by the Women's Voluntary Services. The soldiers brought boxes of Army candy. The big, handsome mustached man heading one team is General Archibald E. Nye, Vice-Chief of the Imperial General Staff.

Soldiers, Invited Out, Take Rations Along to Help Complete the Dinner

When a week end is offered a Joe through official channels, Army issues him tins of beef stew, generous portions of tea and sugar, and some margarine. With food so short, this plan saves Joe from eating his kindly hostess out of house and home.

Soho restaurants, Chinese, Greek, Italian, Spanish, and even those styled American, attract much soldier business. In this quarter, unlike much of the rest of London, the GI feels as if he were abroad. Here, too, disguised by unpronounceable foreign names, far more liberal portions are served, their ingredients known only to the chef. The best meal I have had in London came in a small, dirty Indian restaurant on Dean Street, Soho.

Restaurants for the "Blitzed-out"

American patronage is not confined to the celebrated and the exotic. GI's join in queues before the wartime "British Restaurants." This Government-operated chain, organized at the time of the blitz, serves substantial meals at giveaway prices. Therefore it has great appeal to incautious Americans who go broke in the city before their passes expire.

The great English tea custom also has its adherents within our ranks. Here is something like the pause for a "Coke" back home. And, despite limitations on flour and sugar, British pastry remains remarkably good. Drop into any London hotel at teatime and you'll find Americans meeting their girls for a sandwich, a cake, and a cup of tea. Elsewhere, in the teashops scattered over the city with the frequency of drugstores in New York, GI's munch away at scones and sugared buns.

Of all the British institutions the pub has been the quickest to catch our soldiers' fancy. Warm, mild beer, homely philosophy, and parlor games combine to create a familiar atmosphere. Stroll into the Fox and Hounds, the King's Arms, or the Admiral Keppel "during hours" and watch the American boys learn the wrist motion in throwing darts or apply United States techniques with a cue to the intricate "pub pool." They learn, too, that the apparently simple "shove ha'penny" takes more skill and patience than the most complex "pinball" game on Main Street (page 352).

British Combine

"Give That Boy Another Turkey Leg—and Some Mince Pie for These Girls"

Acting as waiters, GI Joes serve Thanksgiving dinner to some 200 London children. The little miss at the far end of the table is working hard on a candy cane. The courage and fortitude of London children, through all these dreadful months, is a splendid tribute to the never-say-die qualities of a heroic people.

American taste in beer, differing from that of the British, runs towards lager and light ales. Rarely is an American seen with bitter or the heavier British brews. But their taste for the beverage is substantiated by large increases in consumption figures for 1943 and 1944.

"Sand-lot" Baseball in Hyde Park

Soldier visitors to London have brought new games to the venerable city. Disregard stories about the British disdain of baseball. American soldier teams playing "sand-lot" ball in Hyde Park on a Sunday draw crowds tallied as high as 8,000 persons. Fascinated Londoners, unaccustomed to all aspects of the game, crowd the baselines and the batter with abandon. As a result, so many curious and unwary spectators have been "beaned" by fouls and wild pitches that police have undertaken special arrangements for their protection.

More formal ball games, played in stadiums before crowds of servicemen and civilians, attract several times the number drawn by the impromptu Hyde Park series. As many as 40,000 spectators, half British, half American, have filed into London stadiums to see football games between service teams, one of the best of which is Canadian (page 342).

This emphasis on sport in soldier entertainment attracts many GI's on leave as spectators or participants. Scores of men in town for a day or so forego the sights and fleshpots to phone Special Services officers to ask if there is a team they can play on, or a game they can watch.

Asked why he had not tried to teach the soldiers cricket and other English sports, an American athletic officer replied, "The boys won't turn out. They are interested, but shy. They don't like to try anything before strangers that they may not be able to do well.

"On the other hand," he said, "I think baseball is going to catch on over here. We have

International News

Bull's-eye for the Yankee Chief Pharmacist's Mate

To score at darts, you start with 301 and work downward. First team to reach zero wins. Dart-playing soldiers in Normandy used Hitler's picture as a target.

requests from schools to send out teams to play exhibition games. And there is never a day when some London kid doesn't phone or drop in and ask for some piece of equipment. I give them all the old gloves and bats and balls I have," he added. "Good for international relations."

This is only one example of good citizenship exercised by Americans in England. During this year's "little blitz" on London many Americans teamed up voluntarily with the city's fire fighters and rescue workers. Our soldiers present on the scene of a bombing apply disciplined manpower in extinguishing fires and removing debris.

Some Yanks, too, have been killed and wounded by the Nazi robot bombs, propelled across the Channel—a carrier of death and destruction unknown to Londoners before the invasion of Normandy.

Americans "Adopt" War Orphans

As another demonstration of gratitude for British kindness, American units throughout England have "adopted" war orphans. There are now some 500 children being fed, clothed, and educated as a consequence of this movement, which was initiated by the *Stars and Stripes*, the soldiers' newspaper.

It is remarkable, this warmth of feeling between the Americans and the British, living as they do crammed together on this already "tight little island." There are of course the usual jokes. You hear a variation of the old gag which has a London landlord refusing as tenants dogs, cats, or American officers.

We, on the other hand, are guilty of referring to our British brothers-in-arms as "redcoats," and GI's charge off any transaction with the English, from a girl's kiss to a lost musette bag, to "Lend-Lease." The British in turn speak of "Uncle Spam."

But beneath all this there is a growing friendship born of individual experience. Frequently hurried London business men have offered me their taxi out of respect for my American uniform. And our GI's smuggle their rationed cigarettes and candy bars from Army post exchanges to homes where they are entertained (page 350).

As always, the soldiers make friends with the children. You cannot walk down a London street when schools are out without being pestered by "small fry" demanding—it has become a password—"Hey, Yank! Give us some gum."

One harassed jeep driver has neatly lettered his vehicle, "No gum—chum!"

International News

Queen Elizabeth Flashes a Friendly Smile on Yankee Card Players

King George, with a good grip on his riding crop, seems ready to whack the sergeant should he make a foolish play. Here Their Majesties are visiting an American Red Cross club at Market Square, Northampton.

Best evidence that things go well between London hosts and American visitors is found in the report of one London paper that a third of the city's Easter weddings joined American soldiers and British girls.

Soldiers, like small boys and wire-haired terriers, are much given to aimless wandering —shiftless strolls through parks and side streets. So it is with our boys in London, who can be seen meandering about the ancient city as dim shapes in the heavy winter fog or as shuffling khaki figures in the late summer twilight.

At 7 o'clock one Sunday morning, when Hyde Park was as free of Londoners as is Times Square of New Yorkers at the same hour, I passed this historic crossroads. It teemed with Americans. Nowhere was a British uniform or civilian to be seen. Some of our early birds were in fact owls, late stragglers returning from evenings on the town, but the greater number were early risers, bound for the Zoo, Kew Gardens, or the paths that thread the banks of the Thames.*

The British affection for their river, the narrow, gentle Thames, has taken the American fancy. GI's lean from its score of bridges and think back on the centuries of history and drama which its banks have witnessed.

Benches spotted along the banks of the river to benefit London's picnickers and lovers now serve as a base for strolling GI's. From them they view the vivid life of the colorful river, the passing tugs mingling with craft sailed for pleasure. From them, too, they cast hopeful glances at passing British girls, call out phrases familiar on Michigan or Hollywood Boulevard, but new to English ears, such as, "Mamma! Buy me that!" or, "Come over and play in my yard!"

Sailors on Shore Leave

I have marveled at sailors, their flesh still spotted with flash burns from Pacific sea battles, who rush to rent horses and canter through Honolulu's Ala Moana, but find the spirit common to servicemen everywhere.

Up the Thames along the Teddington-Roehampton stretch you see small craft rowed or sailed by boys wearing the patch and wings of our Eighth and Ninth Air Forces, boys just

* For additional material about London in the NATIONAL GEOGRAPHIC MAGAZINE see: "Everyday Life in Wartime England," by Harvey Klemmer, April, 1941; "Along London's Coronation Route," by Maynard Owen Williams, May, 1937; "As London Toils and Spins," by Frederick Simpich, January, 1937; and "Some Forgotten Corners of London," by Harold Donaldson Eberlein, February, 1932.

returned from great air battles over Europe. On famed Rotten Row, bridle path of kings, our sailors, in from convoy duty, lope their rented horses the length of Hyde Park, cutting far from regal figures as their bell-bottomed trousers flap in the breeze.

With the "Colonel Blimps" and cockneys who share alike the privileges of Hyde Park, many Americans hire small green-painted chairs and loll away free afternoons in contemplation of birds, barrage balloons, scrambling children, and nursemaids. Others choose to doze on the grass or search the broad, flower-bordered lawns for flak metal and fuse-cap souvenirs from the last AA barrage.

Mild nights the blacked-out park is gay with the mingled accents of Devon and the Bronx, Ireland, and Alabama. One evening, with German raiders overhead, I watched a group of Americans attach themselves to a host of British girls in the uniform of one of the women's services who stood with their heads thrown back watching the show. The WAAFS were singing familiar old English songs in chorus even as the guns pounded, and as the men moved in they casually shifted to a popular American tune.

This gracious scene beneath the coned searchlights pictured the easy welcome given our GI's by all of London. It also recalled lines Ben Franklin wrote of this city that he loved in the course of a war we fought with the British against the French and Indians nearly two centuries ago. He said, "Of all the enviable things England has, I envy it most its people."

Off for the Invasion

Such *was* the picture, up to the eve of invasion of Normandy. Now London streets are not so crowded with boisterous bands of GI Joes, whistling for taxis, crowding the cafes and snack bars. You can really walk past Rainbow Corner now without getting knocked down and trampled by a crowd.

Besides the military exodus, tens of thousands of Londoners have gone to the country to escape the "doodlebug," as they call the buzzing robot bombs. Movie crowds have fallen off and many theaters have closed for lack of patronage. Now you can actually find a hotel room in London and don't have to wait for meals at eating places.

You can even work your way through Piccadilly Tube station, which before D Day was probably the world's most congested spot.

London's train service, too, is getting back to something near schedule. Now we can tell what was happening in those weeks before the invasion, when all British train schedules went completely haywire, and when not even a guess about arrivals and departures was chalked up on the boards. Troop trains by the hundreds, as well as long truck convoys, were moving soldiers, guns, and supplies to the Channel ports, and few coaches were left for civilian use.*

Wounded Return to London

Back to London now another human stream has begun to flow. It is a slow, careful stream. In it are some of the same Americans who left Piccadilly, the Strand, Hyde Park, and the Thames pleasure boats when "General Ike" made his last roundup. They are the wounded from Normandy. To them, with gentle care, Mother London opens her arms.

"Going home?" someone asked as I ended a visit to the Normandy beachhead.

"Yes," I replied, knowing he meant London—not America.

For this great city has become a common denominator for our GI's in Europe. Men from San Francisco or Boston, cramped in the same French foxhole, quickly find more mutual interests and common experiences in Piccadilly than in Golden Gate Bridge or Bunker Hill.

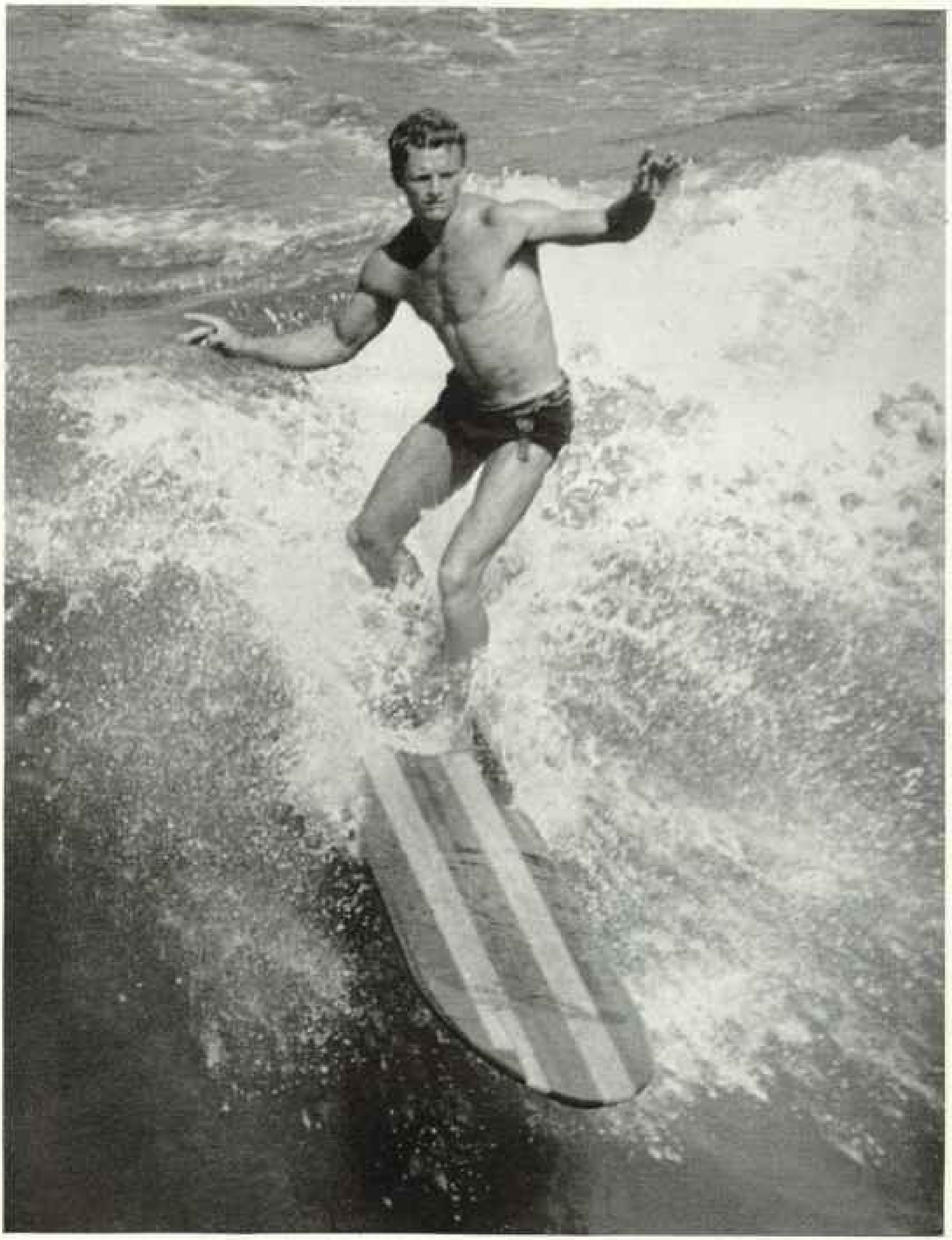
Boots bought from famous London makers protected many American feet as they splashed ashore on the Continent. Snapshots of London girls, carried in waterproof packets, inside helmets, went along as our men surged inland. Rare is the American in Normandy who does not have a folded program as a souvenir of a London theater or a charm made of silver threepenny bits as a memento of his stay in the United Kingdom.

Surprised U. S. Army postal officials find that one letter in eight, written from American beachheads in Normandy, goes to friends and sweethearts in England.

Thus far, no Yanks in Normandy go back to England except the wounded, or those on official business. But it is only a matter of time until furloughs "back to Blighty" will become, as they did in the last war, the next best thing to a visit to the States.†

* See in the National Geographic Magazine, "Dover, Front-line Town of Britain's Siege," by Harvey Klemmer, January, 1944; "Southampton—Gateway to London," by Stanley Toogood, January, 1940; "Pilgrims Still Stop at Plymouth," by Maynard Owen Williams, July, 1938; "Charm Spots Along England's Harassed Coast," August, 1940.

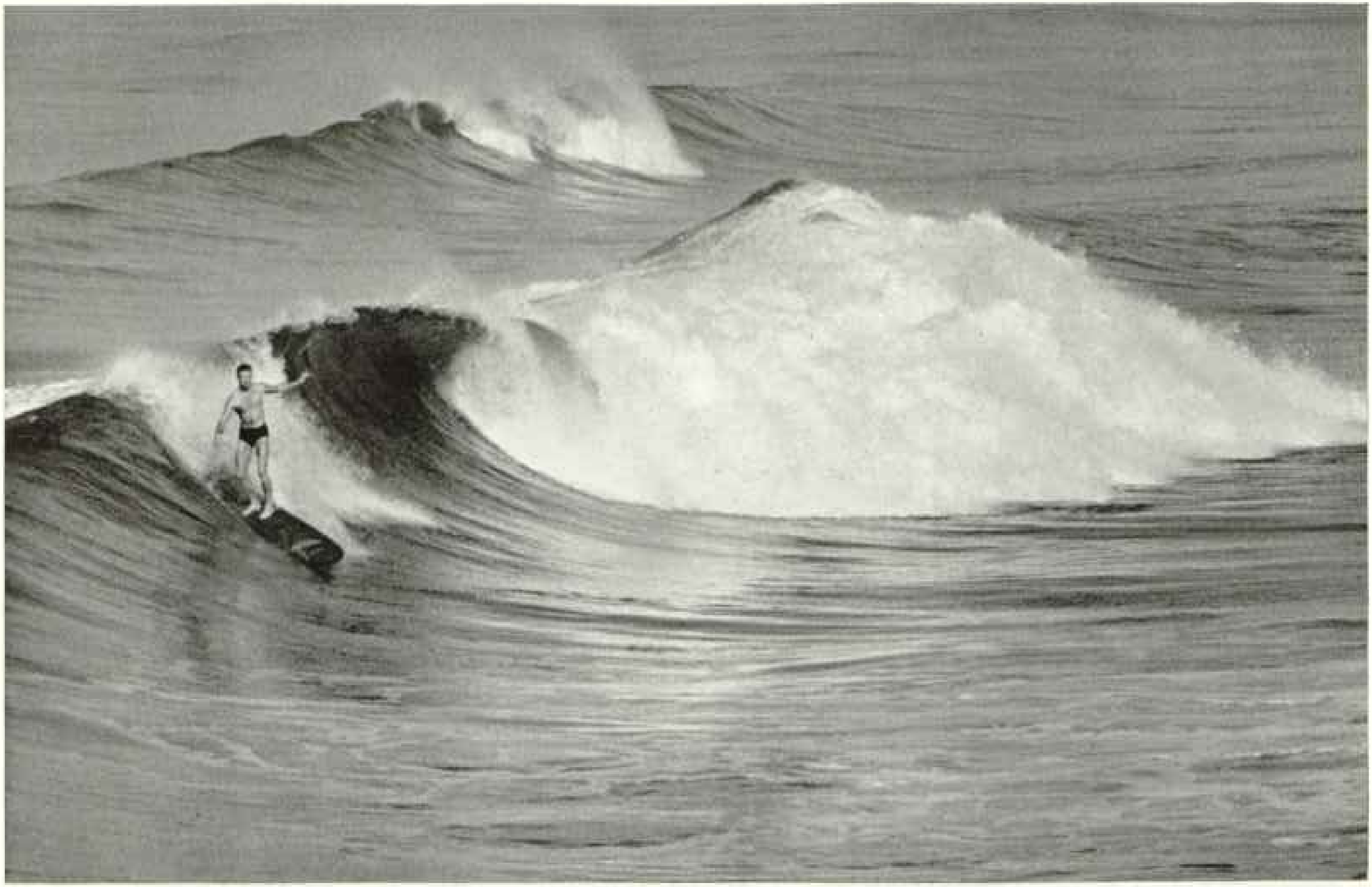
† For Normandy articles in The Geographic see "Coasts of Normandy and Brittany," August, 1943, and "Rehearsal at Dieppe," October, 1942, both by W. Robert Moore; "Normandy—Choice of the Vikings," by Helen Churchill Candee, May, 1936; and "Land of William the Conqueror," by Inez B. Ryan, January, 1932.



J. H. Bell

White Water Means Rough Going on Even a Small Wave

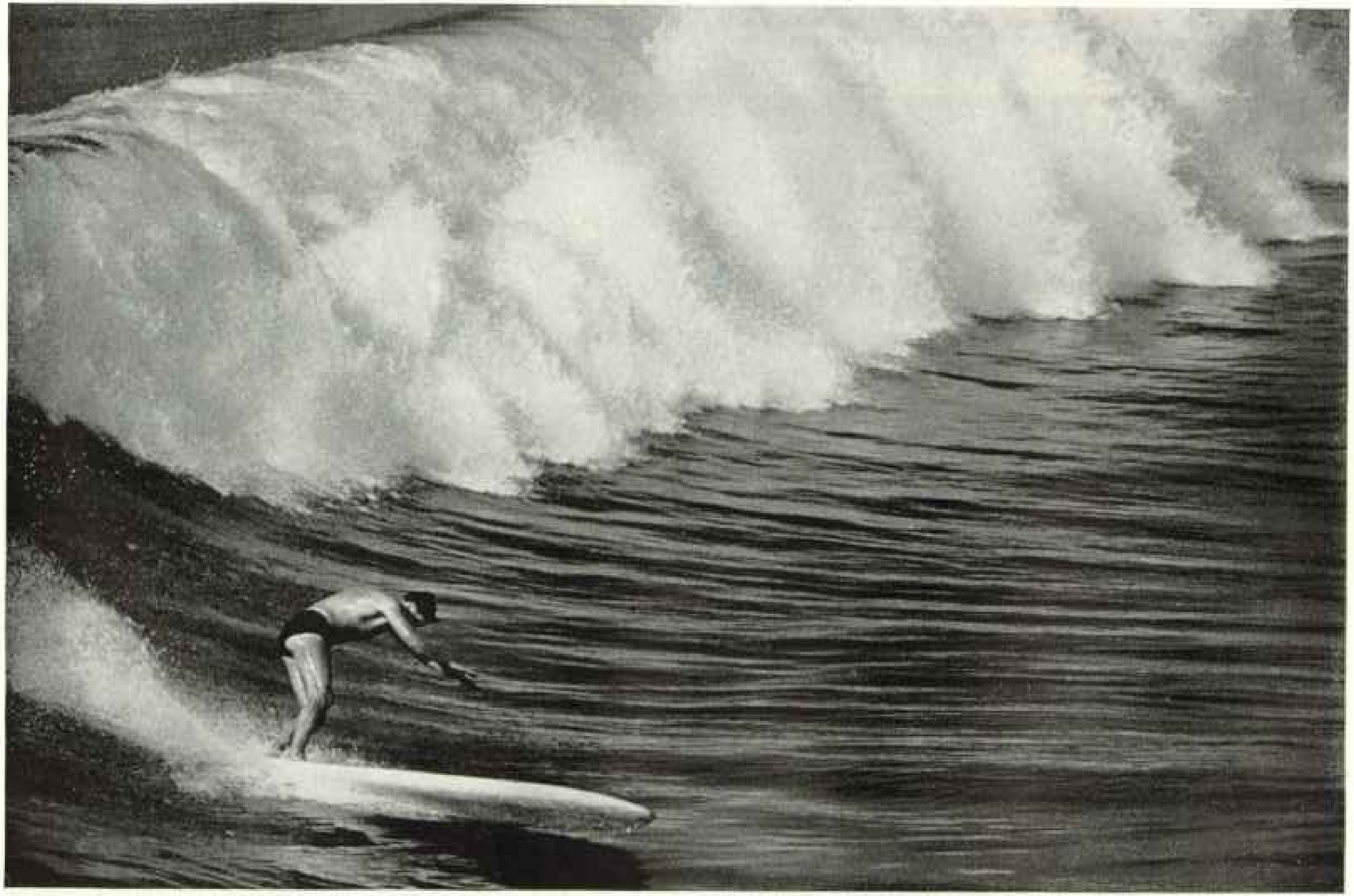
As the foam spreads this expert will need all his cunning to avoid a spill. Duke Kahanamoku, famous Hawaiian swimming champion, started the sport in Southern California years ago by taking the ride of his life on the booming winter surf with a board from his native land. Though California rollers do not travel so far as those at Waikiki, they move faster, rise higher, and are much steeper. Surfers now enjoy the pastime along 100 miles of coast from Malibu, Los Angeles suburb, to San Onofre, 50 miles above San Diego.



J. H. Ball

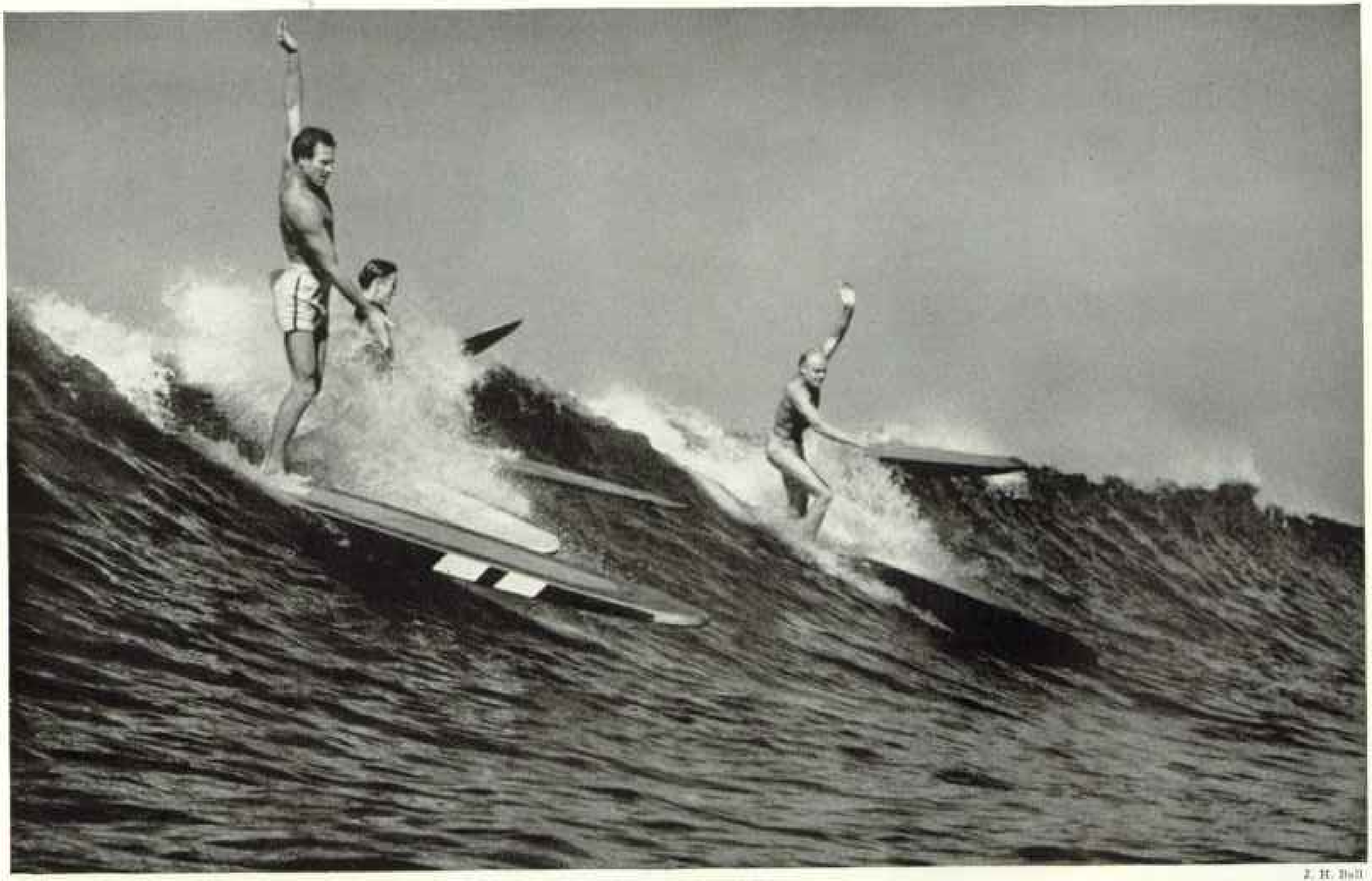
Right Turn Quick! The Big Wave Is Starting to Curl Over

Unless the rider can steer his board away in the nick of time, he will be caught in the tons of churning foam at his left. The maneuver is a tricky feat for an expert; beginners confine their practice to small rollers. Waves come in cycles, getting bigger and bigger and ending in a giant. Surfers wait for these "clean up" waves.



J. H. Ball

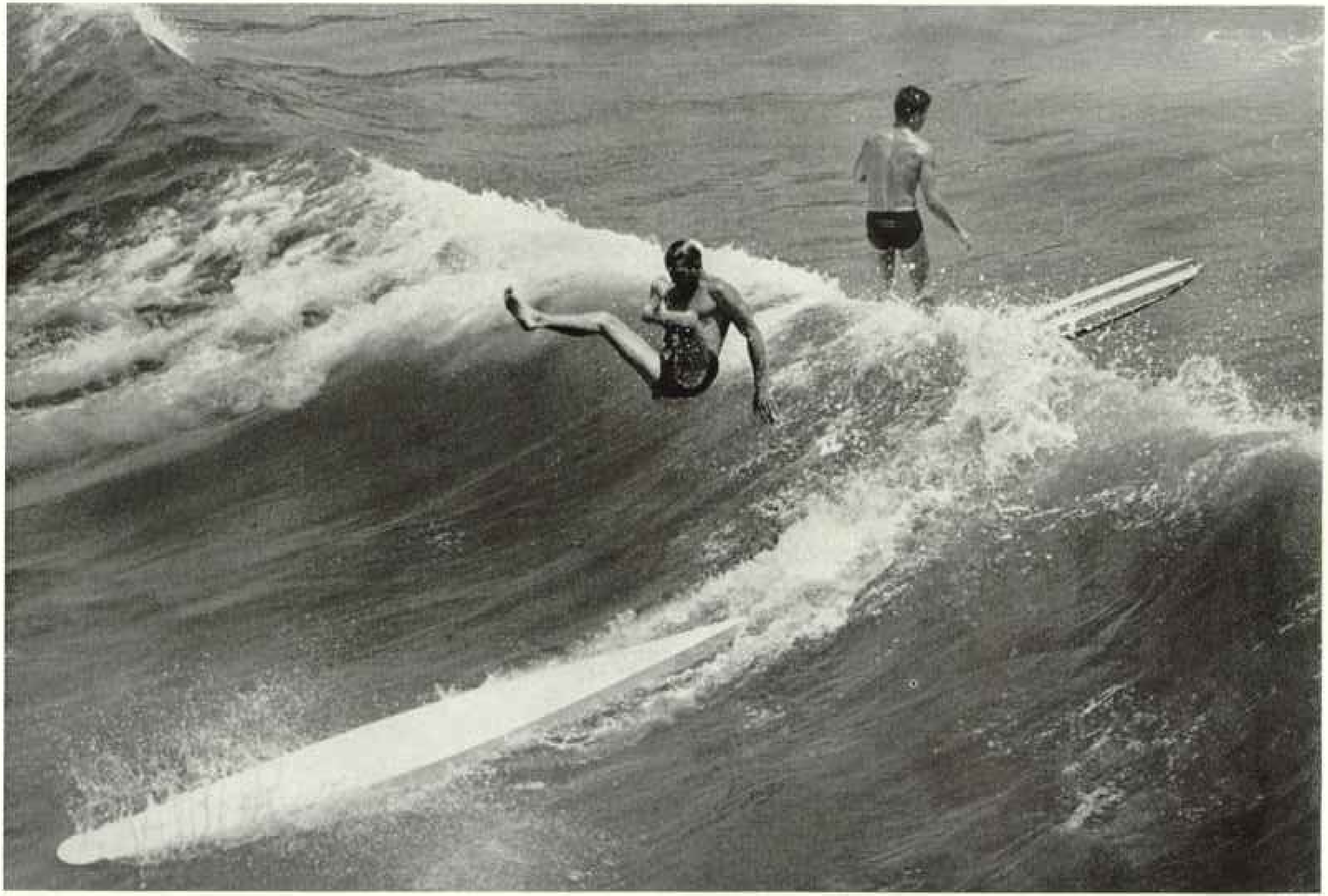
The Plunge Is Too Late! The Wave Will Crash on the Rider with a Roar That Can Be Heard a Mile Away
Caught by surprise, he has hurled his board forward to dive under; but he will get "the royal works" to the glee of the onlookers.



J. H. Ball

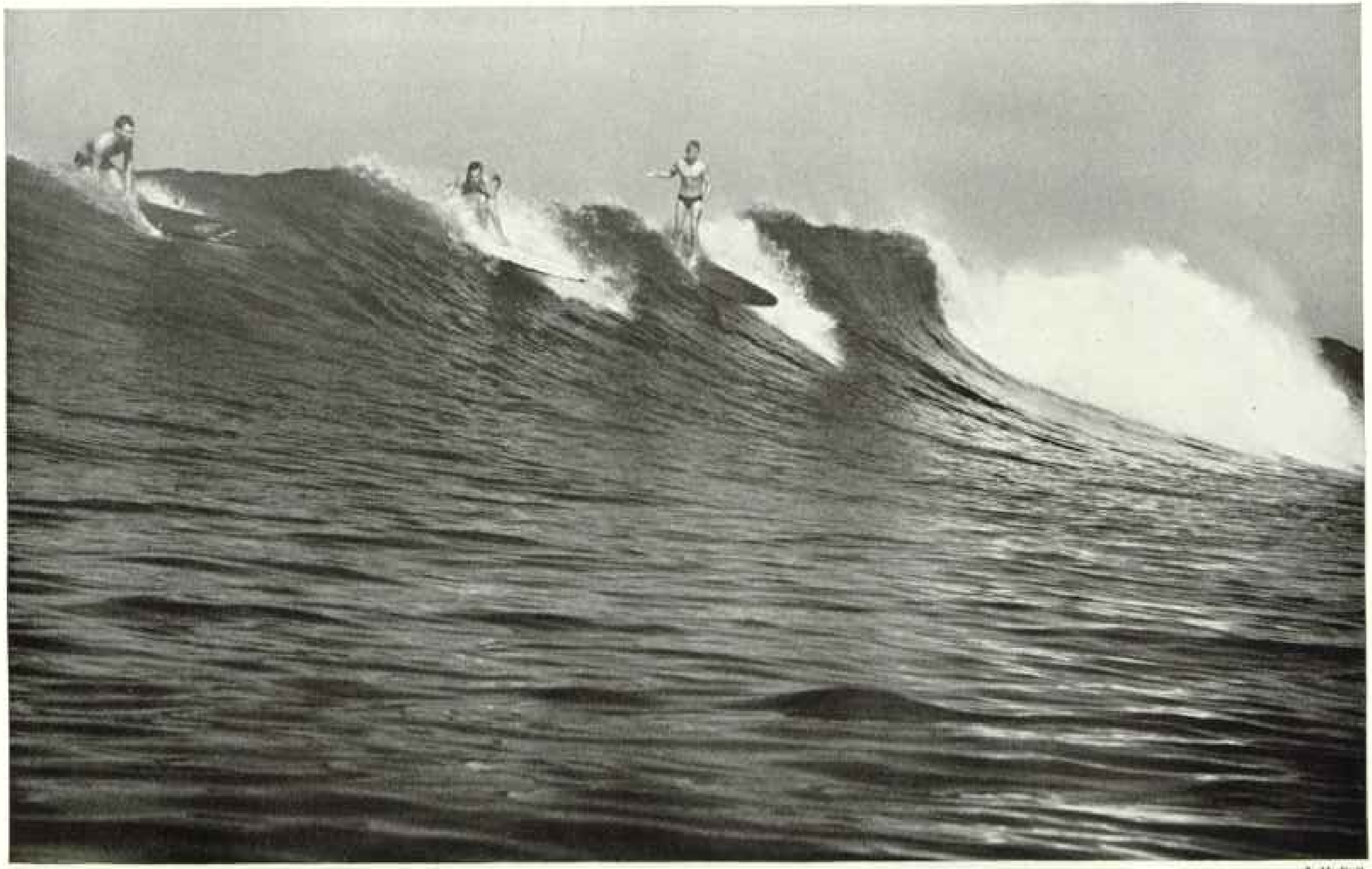
Catching a Big One That Will Build Up to a 15-footer Is a Real Thrill

Here, two riders are definitely "on," one may "catch" yet, and two others have missed. Dr. J. H. Ball took this "close-up" picture while balanced nonchalantly on a board carried by the same wave. For such snapshots he uses a camera in a waterproof case of his own devising. The surfers swam out, pushing their boards, to a rendezvous several hundred yards offshore. There they waited for the huge wave to come.



J. H. Hall

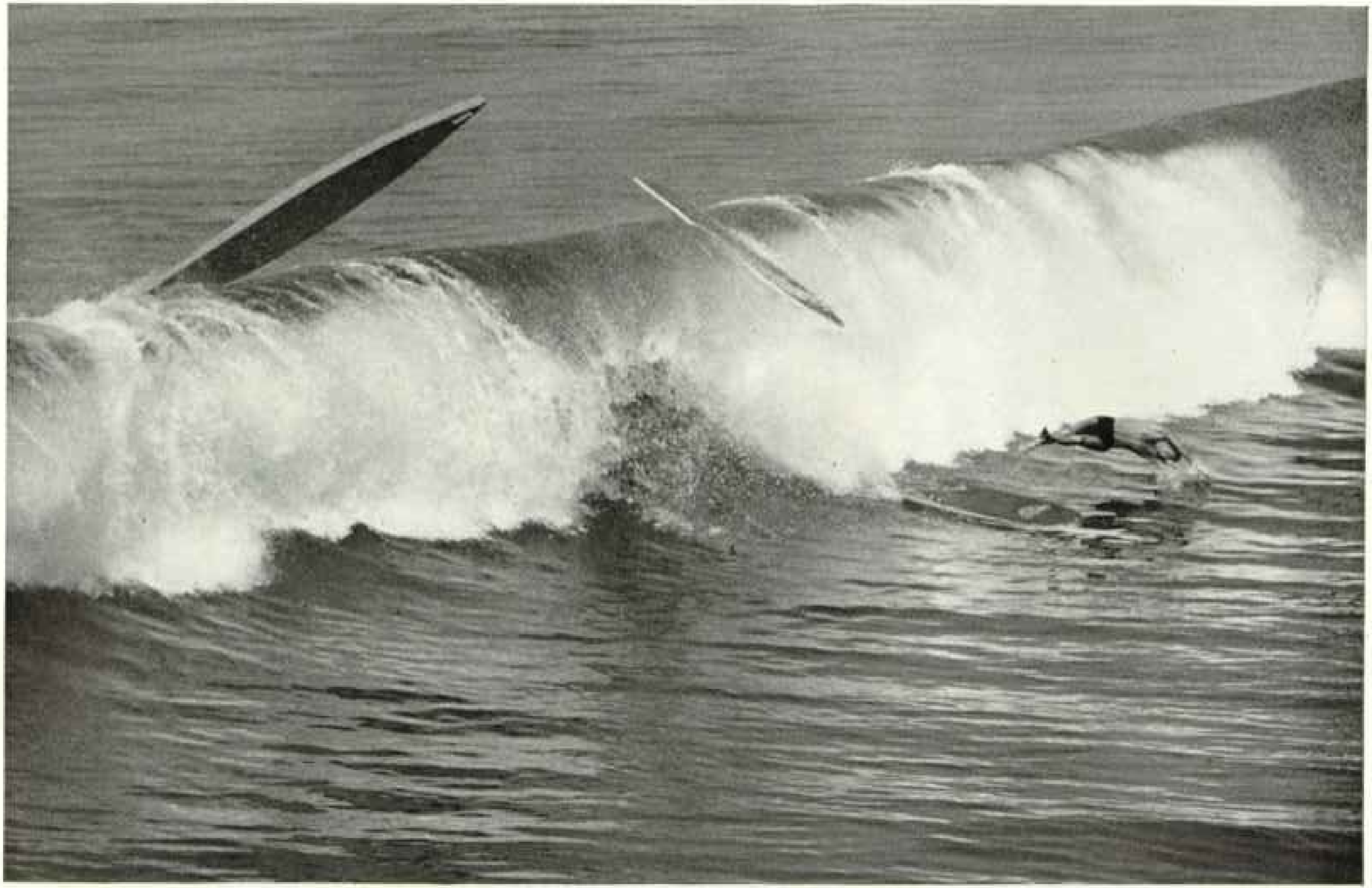
Up and Over! On the Way "Outside," Where Rollers Start, This Surfer Gets Past a Wave by Jumping Just As It Lifts Him



J. H. Bell

Three Men on a Big One Must Move Fast to Escape a Flank Attack from Their Left

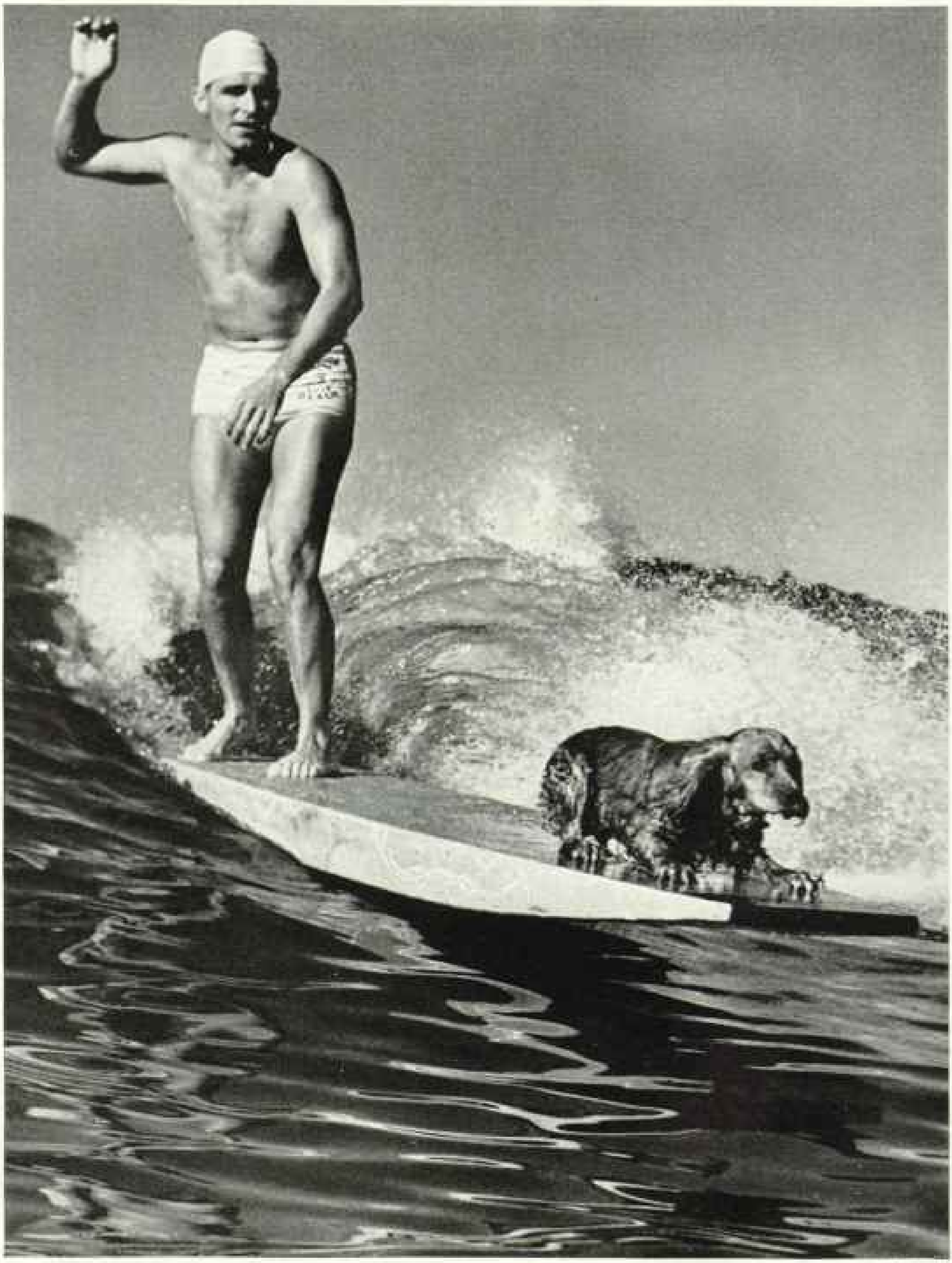
When a curl-over like this starts, it usually spreads all along the wave, making the ride difficult at best—often impossible. The surfers will stay on as long as they can; then try to dive under to escape a mauling in the white foam. Experts scorn rollers under 10 feet high. The technique is to catch the comber just as it goes humping past. The surfer who misses the crest kneels on the board and "scratches," or paddles madly, to get in position.



J. H. Ball

Seeking Safety, He Takes a Dive Under a 15-footer Curling Over

Despite his skill, however, the 50-pound runaway board bearing down on him gave him a bad leg gash. The picture taken by Dr. Ball on the same wave shows why surf riders follow a code of staying with their boards as long as possible.



J. H. Bull

Tom Blake Rides with His World-champion Dog Surfer, Rusty

Though the spaniel prefers to go out with his master, a famous rider, he is so fond of the sport that he will beg anyone launching a board to take him along. Surfers steer their boards by shifting the balance from side to side. Sometimes they "slide" down a wave, cut over, and skim at an angle to make the ride longer. (See "Waves and Thrills at Waikiki," by Thomas Edward Blake, NATIONAL GEOGRAPHIC MAGAZINE, May, 1935.)

Other Working Dogs and the Wild Species

By Stanley P. Young

Senior Biologist, Fish and Wildlife Service, United States Department of the Interior

With Illustrations from Paintings by Walter A. Weber

*This is the last of a series of seven articles descriptive of the world's principal breeds of dogs as recognized by the American Kennel Club. Illustrations for the series, reproduced from 120 original paintings by Edward Herbert Miner, 17 paintings by Walter A. Weber, and 16 natural color photographs by Staff Photographer Willard R. Culver, show 108 breeds in full color.**

A FUZZY little black-haired dog, evidently a soldier's pet lost in a great city, kept running after every serviceman he saw. For three days an elderly apartment-house doorman watched over him, catching him and holding him in his arms to comfort him after each disappointment.

"At my age the strain is beginning to tell," said the old man. "If this little guy weren't such a sad case, I'd have given up long ago."

There spoke the typical dog lover. Though less valuable economically than several other domesticated animals, the dog, whose ancient ancestor was a wolf, is in a class by itself as man's most intimate dumb companion.

The Wolf, Symbol of Superstitious Fear

Even the Wolf (Plate VII) plays a prominent role in the drama of civilization. From the werewolf of folklore and the "wicked wolf" of the fairy tale to the "big, bad wolf" of a Disney animated cartoon, it has been a fascinating symbol of superstitious fear and villainy.

Four United States sailors about to go overseas wrote recently to a western game and fish department, "Would it be possible for one of your members to send us four wolf teeth for good-luck pieces? We have great faith in wolves' teeth and believe they could bring us luck in ventures to come."

Our Army has a Timber Wolf Division (the 104th), with some of its top-notch men known as "Wolf Scouts" because they have shown in physical tests the wolf traits of courage, tenacity, and fighting ability.

Although the dog has been associated with man since the beginning of recorded history, it was not classified and described scientifically until 1758. The famed Swedish naturalist, Carl von Linné, 186 years ago, gave it the Latin name *Canis familiaris* (dog belonging to a household or family).

Despite later popularity of the dog, most Biblical references, with the exception of that concerning Lazarus, are contemptuous. Saint Paul said, "Beware of dogs." It may have been the bad reputation of the dog during Biblical times which gave rise to such expressions as "dog in the manger," "leads a dog's life," "gone to the dogs," "dog that bites the hand that feeds it," etc.

"Love Me, Love My Dog"

The great conciliator, Edmund Burke, said, "Dogs are indeed the most social, affectionate, and amiable animals of the whole brute creation; but love approaches much nearer to contempt than is commonly imagined; and accordingly, though we caress dogs, we borrow from them an appellation of the most despicable kind, when we employ terms of reproach; and this appellation is the common mark of the last vileness and contempt in every language."

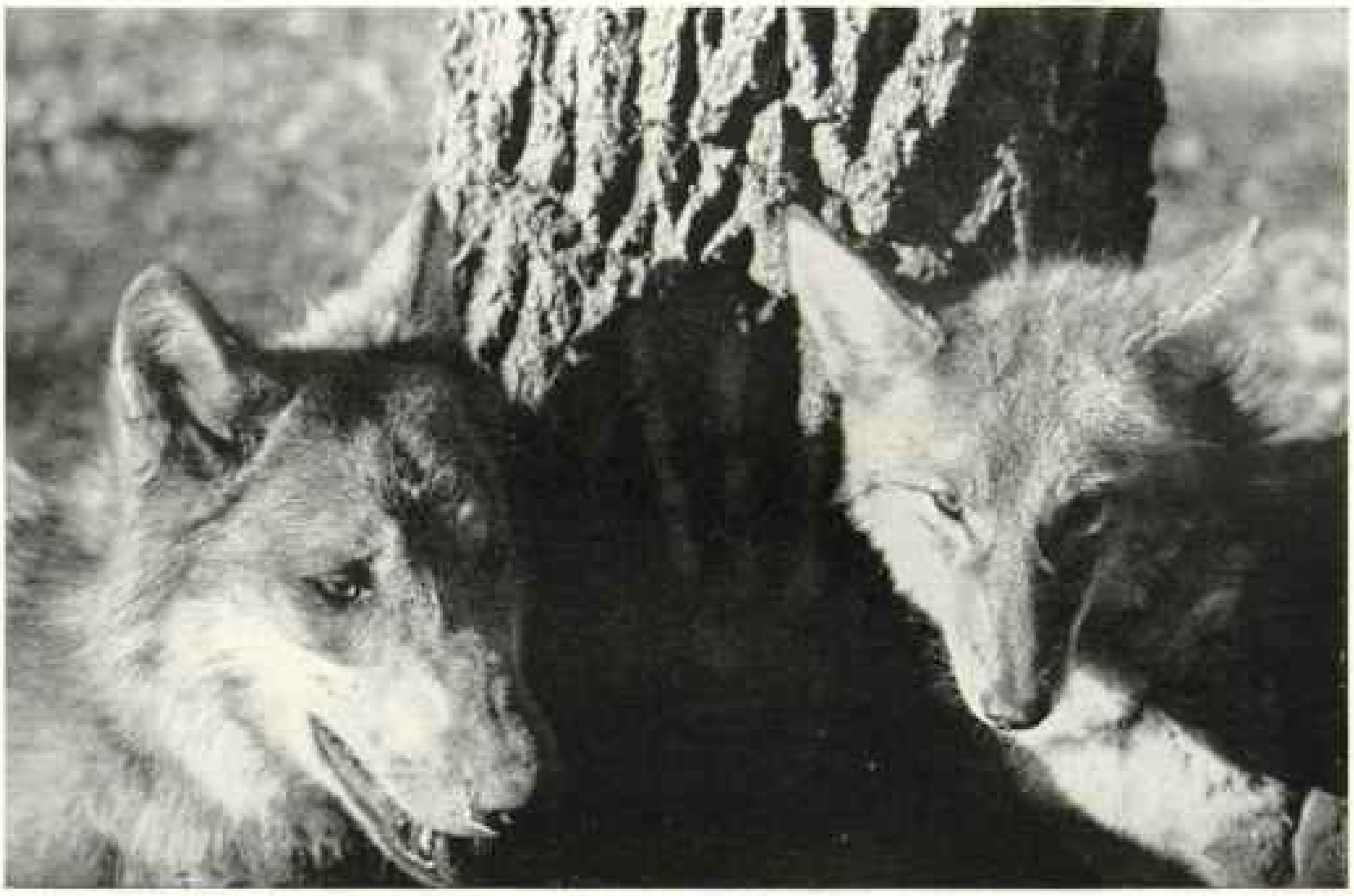
Though its closely related progenitor, the wolf, has been despised, persecuted, hunted, trapped, and poisoned through the ages, the dog nevertheless is held higher today in the affection of mankind than any other dumb creature. The dog enthusiast says, "Love me, love my dog." His visitor, however, may think, "How much more pleasant a call here would be if the dog could be put outside with all his ticks, mange, falling hair, and fleas!"

Household Pet Cousin to the Wolf

Zoologists generally agree that our household pet developed from the Eurasian wolf. The dog is classified as a carnivore, an animal feeding on flesh, and as such is in the same group with the wolves, coyotes, foxes, jackals, dingoes and other wild dogs of the world. Critical study of fossil remains indicates the existence some 40 million years ago of a small carnivore possessing a long, rather slender

* Previous articles in this series in the National Geographic Magazine are:

"Man's Oldest Ally, the Dog," February, 1936; "Field Dogs in Action," January, 1937; "Hark to the Hounds," October, 1937; "Working Dogs of the World," December, 1941; "Non-sporting Dogs," November, 1943; "Toy Dogs, Pets of Kings and Commoners," April, 1944, all by Freeman Lloyd.



E. W. Nelson

Natural Foes Forget Hatred in Captivity

Chained to a tree in a Government hunters' camp in New Mexico, a gray wolf (left) and a coyote suspend hostilities after a day or two of snarling. Characteristics of the two animals, both of the wolf family, are shown here in contrast. The wolf is doglike in appearance and mentality, with relatively short ears and heavy muzzle; the coyote is foxlike, with pointed ears, nose, eyes, and disposition.

body with short legs. It has been given the name of *Miacis*.

From this creature, fossil deposits show, evolved a type of carnivore that has been dubbed *Cynodictis*, the type from which the dog family is believed to have developed into its many offshoots. Though Cynodictis bore little resemblance to the dog as we know it today, it possessed many doglike characteristics in its development, retaining a long, weasel-like body but short in the reach of its legs.

Approximately 20 to 25 million more years are estimated to have elapsed in the geological timetable when two distinct doglike forms named *Temnocyon* and *Cynodesmus*, both derived from Cynodictis, made their appearance. Of the former, Temnocyon is believed to be the ancestor of the present-day wild hunting dogs of India and Africa. Cynodesmus became the ancestor of a large group of other dogs, the true wolves.

Many offshoots appeared and died off—a sort of survival of the fittest—always retaining in the bodily development, however, tendencies toward running and other activities which increased length of limb and made possible the chasing down of prey until, exhausted, it could be overtaken and killed.

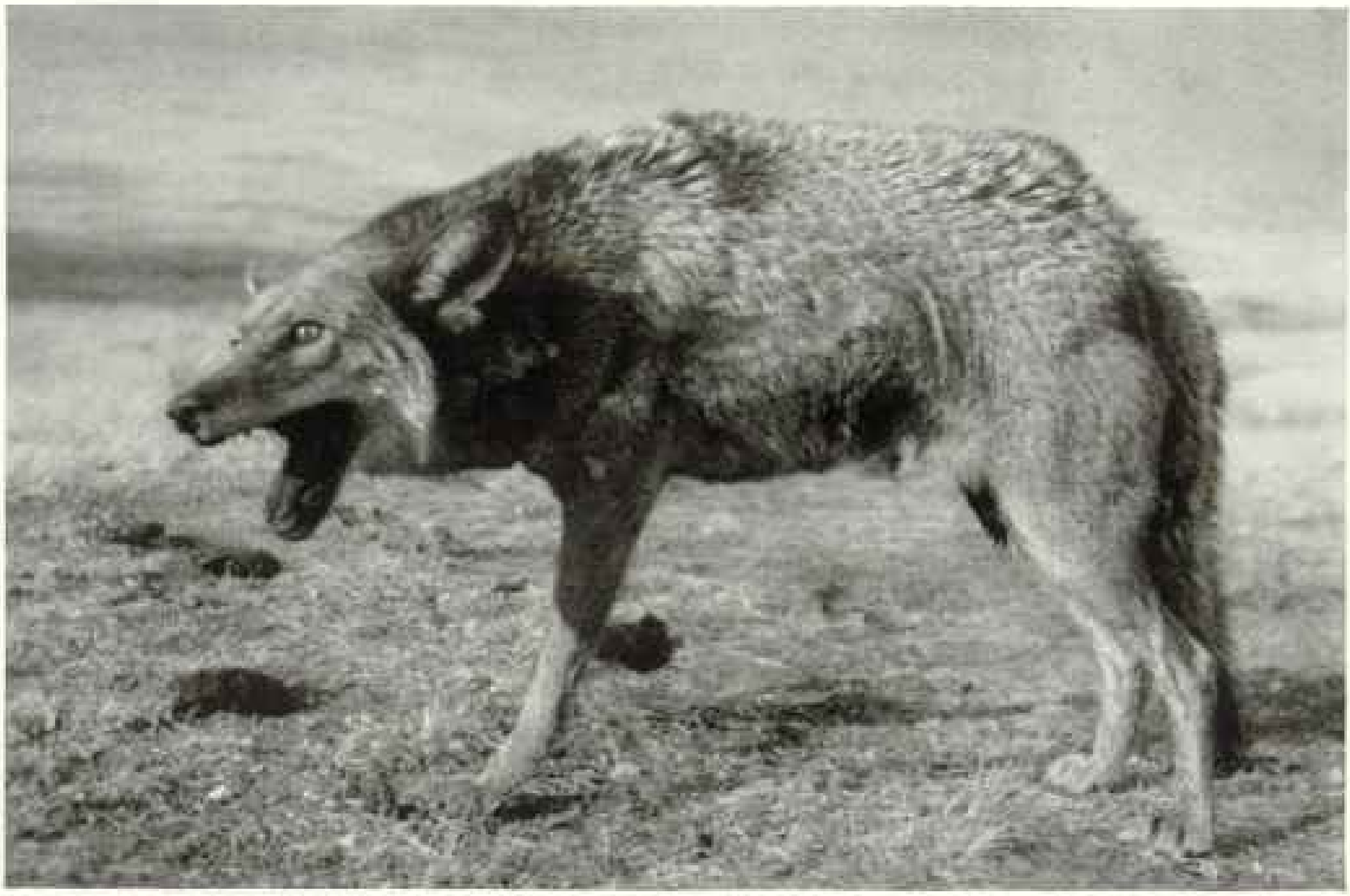
Offshoots in the evolution of the dog family show indications also that they may have been carrion feeders. Outstanding among these offshoots was the large, extinct dire wolf, skeletal remains of which have been removed from the deposits of the La Brea tar pits, at Los Angeles, California. Undoubtedly the carrion-feeding habits of these huge wolves led them to the oil pools to attack mired animals, only to become trapped themselves. Their bodies thus became embalmed in sticky oil deposits for present-century naturalists to dig out and study.

Though dogs and wolves sprang from a common ancestor, the former through the ages became tractable and domestic; the latter maintained their wildness and ferocity.

Prehistoric Man Tamed Dogs

What was the cause of the domestication of our dogs?

The real explanation may well be that primitive peoples everywhere make pets of animals and birds living about them. It was natural that wolf whelps should be among the familiar species, and they proved to be more adaptable than other animals and returned the affection.



R. W. Nelson

What Could Be More Truculent Than a Wolf at Bay?

It has such tremendous power in its jaws that no single dog of equal size is a match for it in a fair fight. Seldom does it slash into its prey or foe without removing some of the flesh. There are actual records of a single bite's dividing the spine of a calf and of one snap's severing a juniper limb two inches in diameter. Note the hair raised along the spine from neck to rump. This wolf was caught in a trap.

Daniel Defoe may have had in mind the proneness of primitive peoples to keep wild creatures about them when he wrote never-to-be-forgotten *Robinson Crusoe*. What a dull life Crusoe would have led without the animals he succeeded in capturing and taming for pets!

Shortly after the formation of the American Republic, European naturalists observed that our native Coyote (Plate VIII) was often tamed and kept by the Indians. In Montana many years later a male coyote mated with a female foxhound produced a litter of dogs approximately 40 pounds in weight with small, compact feet similar to the purebred coyote. Of this litter one beautiful tan-colored female became very friendly and would run and bark with trailing foxhounds.

Additional breeding of this half-bred coyote to a male purebred foxhound gave a litter of quarter-bred coyotes that had speed, together with plenty of grit when it came to killing an adversary. In every way they proved to be all-around good dogs.

Development of domesticity in a wild animal such as the wolf was noted by Coronado at the time of his visit to Indians on the plains of Kansas in 1541. This traveler noted great dogs which were used as beasts of burden and carried from 35 to 50 pounds weight when the Indians went on a hunt, or when they moved from place to place with their flocks and herds.

Study of skeletal remains found in Indian middens shows that the true dogs of American Indians apparently were of medium size. The conjecture is that these dogs accompanied prehistoric man, the first settlers in North America, known as the red Mongoloids, across the then-existing Bering Strait land bridge into Alaska.

This early settlement in North America by man with his true dogs soon brought the animals into contact not only with the wild wolves but also with coyotes then inhabiting North America. Considerable breeding with wolves must have taken place, so that by the time Coronado visited the Plains Indians, wolf-dog hybrids were much in evidence.

Plains Indians Domesticated the Wolf

Nearly three centuries elapsed following Coronado's comment, when early explorers of the Plains, such as H. M. Brackenridge and Alexander Henry, the younger, set down in their journals descriptions of this large Indian

Shooting Coyotes from the Air Makes Exciting and Hazardous Sport

Over flat, open country of the Dakotas, Idaho, and other western States and in Alaska, hedgehopping airplanes campaign against these elusive predators and their wolf relatives. The pilot swoops close while a marksman fires from the front of the ship. Broadside views are rare, because the coyote turns away.

Three Lions

A Man-made Hawk Will Carry Off Its Prey

No match in speed for the airplane, this coyote fell before a well-directed shot. The bounty pays only a small part of the expense of the hunt, but the saving of sheep, calves, and poultry makes up for the loss.

dog, Brackenridge calling it "nothing more than the domesticated wolf." They further record witnessing the actual breeding of these animals.

Near the middle of the 19th century, when John James Audubon, the naturalist, and Gen. John Charles Frémont made their exploratory trips to the Great Plains, the true Indian dog had become definitely crossed with the wolf. Hybrid wolves by the thousands lived in more or less harmony in many of the Indian villages of the Plains.

The crossbreeding was done to obtain a large hybrid dog for draft purposes in lieu of horses. The animals were used in moving an Indian village to a new site or in transporting travelers from one village to another far removed. The travois was the moving device hitched to these hybrid dogs. Alexander Henry, the elder, mentions that during the year 1776 more than 500 dogs were used in a pack train which moved a village of Assiniboins then located in southern Canada. Much later horses replaced the dogs.*

By the time Frémont and others saw them, the true Plains Indian dogs had all but lost their real identity, being more wolf than the original stock of the early invading Mongoloids. Early white explorers constantly refer to the savagery of these hybrids toward strangers, but their Indian masters no doubt held them in control.

Adolph Murie

How to Recognize Wolf Tracks

Wolf and large dog tracks are so similar that only with difficulty are most persons able to distinguish between them. Main differences are: The front-toe marks of the wolf are closer together than those of the dog, the toenails show more clearly when the prints are made in soft or dusty earth, and the track as a whole is more elongated. Here, right to left, are front-foot and hind-foot wolf prints.

Dogs and Wolves Rely on Scent

Long association with man has failed to obliterate in even the most refined breeds of dogs some characteristics which both they and their wolf relatives inherit from their common ancestry. When at play, dogs and wolves alike may hold their tails straight up. In fright both tuck their tails between their hind legs, and both wag their tails in expressing pleasure. Wolves and dogs differ, however, in the normal carriage of the tail. In the former it is held slightly below the level of the back. Like the dog, the wolf when angered curls its lips into a snarl. Wolves often show intelligence equal to or

* See "Indians of Our Western Plains," by Matthew W. Stirling, National Geographic Magazine, July, 1944.

exceeding that of dogs; and both wolves and dogs, even the most pampered, will eat carrion and garbage (page 383).

Another marked similarity between dogs and the wild wolves has to do with scent glands, urine, and the use of runways. The scent glands, generally bluish black in color, are located just above the vent at the sides near the base of the tail. They function by giving off a secretion when wolf meets wolf and dog meets dog. The tail is thrown straight up almost at right angles to the backbone and there held stiffly for a second or two while the creature's friend or foe sniffs. Scent glands are mainly of use to dogs and their wild brethren for sex identification.

The ability to detect scent, common to the domestic dog and to all of the wild-dog species, is probably keener in the latter because more frequently used by them. However, it is also pronounced in all domestic dogs.

While watching three battalions of prospective naval officers going through a marching inspection before their commander at Cornell University in May, 1943, I was strongly impressed with the mascot dogs' keen sense of smell under confused conditions. As each company marched into the drill hall, it was followed by a dog. By the time the battalions had reached their desired positions, the drill floor seemed to contain almost as many dogs as men.

When the three battalions came to parade rest, every dog trotted around seeking its own company. The search, save for the dogs' sniffing, was as orderly as if conducted by humans. As each dog located its company, it lay down and remained quiet until the three battalions were dismissed an hour later.

Wolves Like Dogs Have Scent Runways

It is in the use of runways that the wild species and dogs show the greatest similarity in habits, and therein scent plays the leading role. Every owner of a dog knows that when his pet is let out of confinement it invariably seeks a favorite route of travel, seldom deviating from it. Scent posts in profusion exist in every community—favorite hedges, rosebushes, dogwood trees, shrubs, or telephone poles. Thereon the dog leaves a telltale message for foe or friend. The habit is one every domestic breed of dog has carried down from its wild forebears.

With wolves similar runways and scent posts exist, but at greater distances than those maintained by dogs. A distance of more than 100 miles is known to have been covered by a family of wolves on a single runway. In one instance, a wolf runway in southern Arizona, approximately 70 miles in extent, was covered in its entirety with clocklike regularity every nine days.

The wolf runway, generally an irregular circle or ellipse in shape, is established in more or less open country. It consists of parts of trails used by range cattle, sheep, or wild game, or those in use as wood roads. It includes dry washes and dry canyons, particularly those with sandy bottoms. In width it may be but a few feet, as when a game trail is used, to more than a mile where the animals are hunting. The runway is a hunting route, its location depending on the available food supply.

Along these runways are to be found scent posts, such as bases of bunch grass, bushes, logs, or a weather-beaten carcass in an anthill, where wolves stop to urinate or defecate. These spots are recognized by toenail scratches similar to those the domestic dog makes after it has performed the function of nature along its runway. The habit of both wolves and domestic dogs of using scent posts and scratching near them is unquestionably the vestige of a remote ancestral habit of burying the urine or excreta.

Other habits and characteristics common to most of the domestic dogs and the wild species are the gorging of food, often to the point of stupefaction; keen sense of smell; alert hearing. Both dogs and wolves are subject to affliction by many parasites and to diseases of the same kinds; both have a gestation period of approximately 63 days, and in both hybridization takes place with fertile offspring. An instance is on record where the offspring of a cross between a female wolf and a collie dog maintained fertility through four generations.

Though the wild species of the dog family are at times very destructive to some of the economic pursuits of man, such as livestock raising, and obnoxious to the conservationist in the field of wildlife management, control of such depredations should not lead to the extirpation of the wild dogs, but should be on a scale that will afford these interesting creatures a perpetual place in the fauna of the world.

Dogs Sometimes Revert to the Wild

While huge sums of money have been expended over 2,000 years in payment of bounties on the wolf and other related wild species in order to curb depredations upon man's domestic livestock (page 383), the domestic dog, too, has come in for its share of control. Similar to his wild brethren, "man's best friend"

 Painting by Walter A. Weber

To the Swiss Alps 2,000 Years Ago Came the Bernese Mountain Dog with Invading Romans

Sires of this noble animal drew basket-laden wagons for the Bern weavers. The broad, white-blazed chest knows the harness no longer; today's Bernese is a house and show dog. When fanciers saved his kind from extinction half a century ago, only a few good examples remained.

Painting by Walter A. Weber

As White and Shaggy as His Charges, Komondor Is Not the Flock's Herder but Its Watchdog on an Estate in Hungary

Standing guard against raiders, this burly fellow leaves the roundup to smaller breeds. A thousand years ago the migrating Magyars acquired his ancestors on the steppes of Russia. In succeeding centuries breeders emphasized the strong bones and heavy coat. Komondor's armor against beasts of prey. Devoted to his master, he is a terror to prowlers.

Painting by Walter A. Weber

Claws in Wool, Puli Stops a Runaway by Leaping on Its Back and Hanging on Like a Broncobuster

His mount exhausted, this Hungarian shepherd will herd it back to the flock. At times he controls sheep by running over their backs. Courageous and intelligent, he makes a trustworthy pet for children. Pulis tested by the United States Department of Agriculture proved willing workers. One astounded its trainers by a climbing leap over a six-foot board fence overlaid with barbed wire.

Painting by Walter A. Weber

Rhodesian Ridgebacks, Named for the Cowlicks above Their Spines, Bay a Lion for the Hunter's Coup de Grace

Circling and feinting, these courageous 70-pounders harass but do not kill the King of Beasts. Ridgeback's extraordinary nose follows the faintest lion scent. Dorsal hair, escutcheon of the breed, grows from shoulder to tail in a direction opposite that of the rest of the coat. Ridgeback is a representative of *Canis familiaris*, which includes all domestic dogs, regardless of shape or size.

Painting by Walter A. Weber

African Hunting Dogs, Pied with Hyenalike Spots, Run Down Lesser Kudu, a 250-pound Antelope

Africa's wild *Lycaon pictus* is not a true dog, having slightly different teeth and four toes instead of five on his forefeet. Black snout and white brush mark every member of the tribe, but each has his own body pattern of white, black, and yellow. "Hoo! hoo! hoo!" is the terrifying hunting call. Though seldom attacked, man wages relentless war on this stock and game killer.

Painting by Walter A. Weber

Pursuing a Chital in Indian Jungle, Dholes Run in a Pack, a Hunting Cooperative Common to Most Canines

Doglike, the dhole growls, whimpers, fawns, follows a scent, and wags his tail in pleasure. A difference in tooth structure, however, puts him in the genus *Cuon*, apart from *Canis*, the true dog. Though they are related, their common ancestry is remote. Cuon is Kipling's "Red Dog," destructive terror of the jungle. With bewildering flank attacks, the pack annoys even the tiger.

Painting by Walter A. Weber

A Pair of American Wolves Rear Their Cubs in an Alaskan Cave

Gray mother will teach her young to avoid traps, poisons, and guns. Like their European brothers, they are members of *Canis lupus*. Black and gray are phases of the same wolf. Dog and wolf cross readily. Howl and bark distinguish them, but each can learn to imitate the other. Their tooth and bone structure are similar. Modern opinion is that they share a common ancestry.

Canis latrans (Barking Dog) Is the Western Coyote Serenading the Setting Sun

 Paintings by Walter A. Weber

Curbing His Own Appetite, Dingo Stands Guard as His Mate Feeds on Wallaby

Found only in Australia, *Canis dingo* arrived with the aborigines or via a land bridge.

sometimes becomes, as does a bad human, an outlaw of the worst kind.

Such was the case of a female wolf that enticed a graded collie dog from a cattle ranch in southern Colorado in the early 1920's. The dog reverted to the wild, abandoned its home, and bred with the wolf, which several months later was found with a litter of collie dog-wolf puppies. The dog was finally killed by a Government hunter.

After the death of the dog, the wolf returned with her puppies to the same ranch where her affections had been bestowed earlier and killed some young calves.

Later she was captured and killed, and all of her offspring were destroyed with the exception of one female. This animal was kept for several years and used in experimental breeding tests with an Airedale. It was powerfully built and shaggy, with a rough gray coat. The one puppy retained was of kindly disposition, but generally more suspicious of others than of the person constantly attending it.

After killing its first sheep, a dog has seldom been known to be broken of the habit. The killer dog will not only kill by himself, but will lead other dogs to help in the slaughter, often ranging far and wide.

A Canine Jekyll-Hyde

The mania that possesses some dogs for killing sheep came forcibly to my attention while I was camping on sheep ranges north of Roswell, New Mexico. The dog was "Shep," white-coated, gentle, friendly, and remarkably well trained. Under command he would turn a band of 2,000 sheep in the desired grazing direction, gently force a straggling lamb back into the main herd, or separate a small bunch from the band.

Shep had a malformation of the toes on his left front foot, the result of injury by a steel trap set for coyotes. In the healing process two of Shep's middle toes had atrophied and shortened so that his track in soft earth showed only the outermost toes on each side of his paw.

One morning in the middle of summer, 28 lambs and ewes were found dead in an arroyo about five miles from the headquarters ranch. Several other sheep were badly crippled. All of the killing and crippling had occurred under cover of darkness the previous night.

Telltale evidence of tracks present on the ground pointed to Shep's having been at the scene of the kill. No other tracks were discernible. The more closely the tracks were studied the more the finger of guilt pointed at Shep. Nevertheless, the owner could not bring himself to believe that Shep was a sheep-killing dog.

He determined to stand night watches in the immediate vicinity of his bedded flock until he should catch the real culprit red-handed. After five nights of constant vigil he was horrified to see Shep leading a pack of three neighboring ranch dogs in a wolflike attack on the outer flank of the sheepfold. Three sheep were instantly killed. Anger for the moment overcame his love and affection for old Shep. A rifle spoke, thus ending the life of a canine Dr. Jekyll and Mr. Hyde.

The strong affection between dog and man that has developed through the ages will probably be further cemented by the dogs' exploits in the present World War.* The part the dog has played with the armed forces in the frigid North, on the sea beaches of our long coastlines, or with our boys in the jungles of the South Pacific has not yet been revealed entirely. When the time comes for divulging war-dog stories from official sources, we may erect a statue in honor of *Canis familiaris* in the Capital of the United States similar to that in Rome which memorializes the wild female wolf which legend says suckled Romulus and Remus, founders of the Eternal City.

The dog will figure also in the lives of rehabilitated men. At the time of this writing, Congressional action has been taken and approved by the President, making available the services of Seeing Eye dogs to all returning blind soldiers.

BERNESE MOUNTAIN DOG

Canis familiaris

The euphonious title of this faithful dog (Plate I) is derived from the name of the capital of its native Switzerland. Near the close of the 19th century the Bernese Mountain Dog was on the way to extinction, but through the interest of breeders it has once again increased to goodly numbers throughout Switzerland. Some of the species were recently imported into the United States.

Like the dog of our early Plains Indians, the Bernese was at one time mainly a beast of burden. Instead of a travois, it drew a small cart or wagon containing laden baskets. At times it was called "the Bernese dairyman's dog," or sometimes *Dürrbachler*, from the Dürrbach district of Bern Canton.

Powerfully built, it reminds the layman somewhat of the Newfoundland or the St. Bernard dog. Some authorities believe it developed from the shepherd and herdsman's dogs.

The male Bernese stands between 23 and 27½

* See, in the National Geographic Magazine, "Your Dog Joins Up," by Frederick Simpich, January, 1943.

Sir Christopher H. Gibson

No Real Wolf Is the Strange Aguará-Guazú

Largest of the South American Canidae, this creature, sometimes called the red or maned wolf of Paraguay, inhabits that country and parts of Brazil and Argentina. Its prey consists of wild deer, pacas, agoutis, birds, reptiles, and some insects. Mainly nocturnal, it utters a cry sounding like its colloquial name "A-guará." The animal, bred to the domestic dog, has produced offspring excellent for trailing.

inches at the shoulder, has pendulous ears, and is usually tricolored, with long silky, wavy, black hair predominating over its main bodily proportions to the end of its white-tipped tail. It has a white breast, the white coloring extending to crown of head. There is a touch of red or yellowish red on the forehead close to each eye. Sometimes the red or yellowish-red shade replaces the black as the main body color. The feet usually are white. The female is slightly smaller than the male.

KOMONDOR

Canis familiaris

The association between dogs and sheep, in which the dog assumes the role of protector, appears to go back at least to the Bronze Age. Deposits occurring in Bavaria, northern Netherlands, Bohemia, Pomerania, and the oasis of Anau, near Ashkhabad, east of the Caspian Sea, have given up remains of both sheep and dogs that clearly indicate the close association.

Most authorities agree that the first task given the dog in assisting and working for the shepherd was that of a guardian against wild carnivorous animals such as wolves, or against thieving humans. Later, as need became evident, the dogs were taught to replace human drivers and herders at the sheepfolds. Utility evidently was the predominant domesticating factor in their case.

The Komondor, a Hungarian sheep dog (Plate II), appears to have retained as its most helpful duty to man and his flock that of protector. Since the ancestors of the Komondor are believed to have existed upon the wolf-infested areas of the Russian steppes, it was natural that they should be trained to protect sheep from the hereditary enemy.

One reason for breeding a sheep-protector dog that maintained such a permanent shaggy coat as that of the Komondor was that the heavy fur served as a shield against enemy fangs. A vicious bite from an antagonist caused a loss of hair more often than of flesh (page 379).

With an average height of two feet at the shoulder, an overall length of 3 feet 9 inches, and possessing a dense coating of cream-colored hair, this dog is one of the beauties of the canine family. It came into Hungary with the Magyars at the close of the ninth century.

PULI

Canis familiaris

The Puli, averaging between 25 and 30 pounds in weight and about 17 inches in height, is generally white, cream, gray, or black; gray and black appear to be the most uniform colors. In Hungary it excels as a sheep dog. It straddles the back of a

Magyar Film Iroda

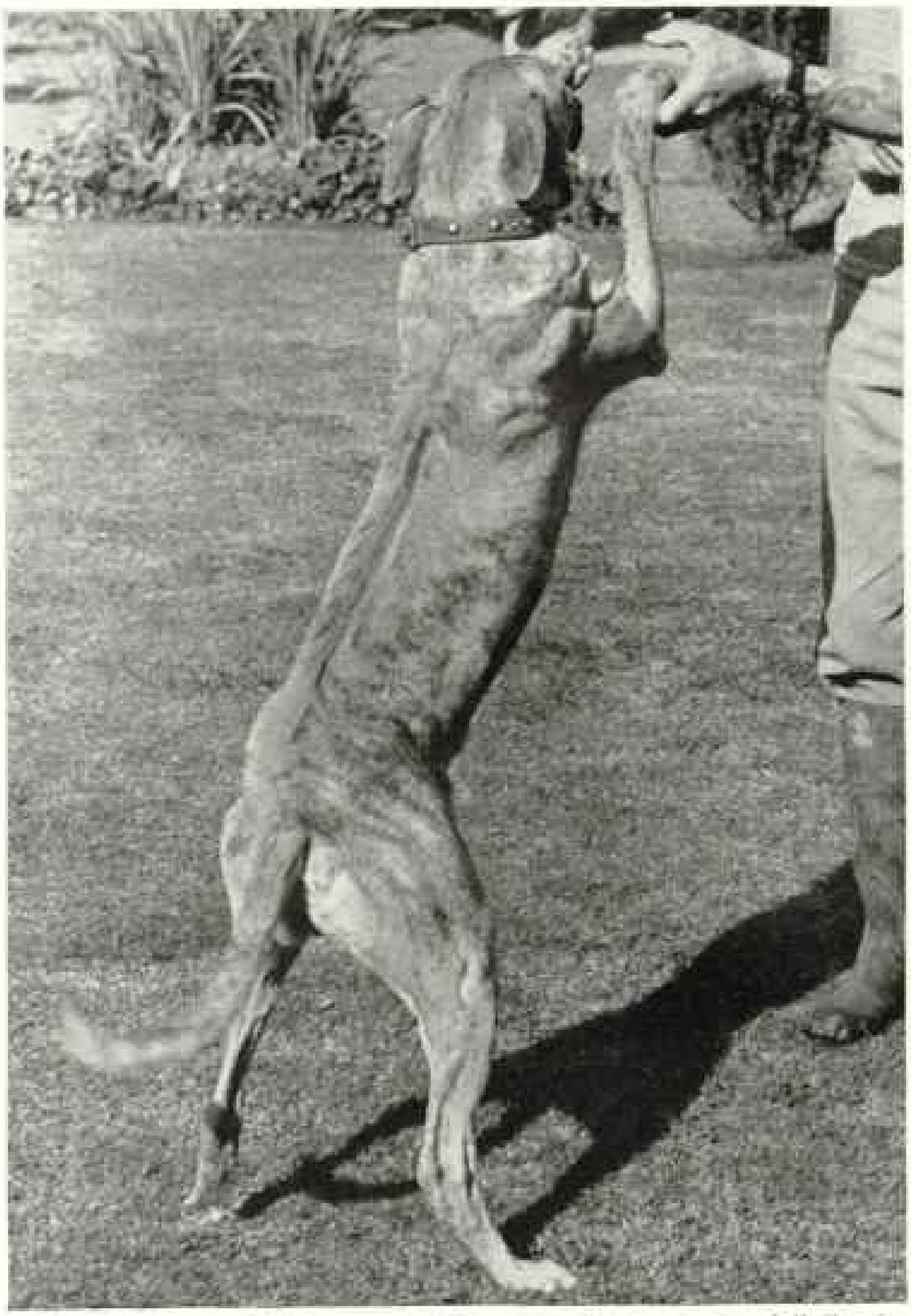
Wolves Attacking the Komondor Get Only a Mouthful of Hair

Brought into Hungary by Magyars from the steppes of Asia near the close of the 9th century, these handsome dogs became famous as protectors of sheep (Plate II and page 378). Their thick coats serve as baffling armor in combat with marauding animals.

Staff Photographer Richard H. Stewart

The Dhole Runs Like a Horse, Fights Like a Wolf

Dholes, forest dwellers, occurring throughout the Indian peninsula, are unique because of their wave-like canter when running prey (Plate VI). Though their gait departs from the usual foot placements of true wild dogs, their habits of attacking prey cooperatively and of disgorging food for their young are wolflike.



J. H. Champion

Wild Lions Fear the Rhodesian Ridgeback

Evolved in Africa through a series of crossings between native hunting dogs and the modern bloodhound, this courageous 70-pounder is used for baying the "king of beasts" (Plate IV). It is remarkable both for scent and eyesight. Standing about 26 inches at the shoulder, it is comparable in size to some of our western wolves. The "cowlick" making a ridge along the animal's backbone gives it its name.

straying sheep, sticks with the animal until it responds to herding, and returns it to the main flock (Plate III).

A few years ago the United States Department of Agriculture imported four Pulis to use in experimental breeding. It was hoped to ascertain differences in temperament, intelligence, aptitude, and suitability as herd dogs among different crosses with the Puli. Before these experiments were completed, however, war necessitated abandonment for the duration of this interesting bit of research.

In the breeding experiments that were conducted, the Puli had litters as large as ten; the smallest was four. The average appears to be six or seven.

Because of the need for good herding dogs in our range livestock business, it is hoped that the experimental breeding work with the Puli will be resumed after the war.

RHODESIAN RIDGEBACK

Canis familiaris

Erroneously referred to at times as the "lion dog" because of its ability to hold an African lion at bay until a hunter can approach and kill it, the Rhodesian Ridgeback has an ancestry buried in antiquity (Plate IV). Some authorities believe it to have been developed by a series of crossings between native hunting dogs and the modern bloodhound.

Ridgehound is another name sometimes applied to this dog because of a peculiar "lay" of the hair that grows along the animal's back from near the point between the shoulders to a point near the butt of the tail. The lay of this hair is opposite that in the rest of the coat.

Rhodesian Ridgeback's dense, sleek, glossy coat may be fawn or other main colors, the latter being interspaced with white. In height it approaches 26 inches and it will weigh up to 70 pounds. It is thus comparable in size to some of our western wolves. As in most other animals, the females are somewhat smaller than the males.

The Ridgeback possesses wolflike courage, stamina, endurance, and keenness of scent and eyesight. To a certain degree it exhibits also the wolf-dog's "one master" characteristic.

Though this beautiful and courageous dog has long existed in Southern Rhodesia, it was only two decades ago that attempts were made to standardize the breed. Considerable progress has

been made, and some specimens have been exported to England and Canada. Similar to the Kentucky foxhound, the Rhodesian Ridgeback works best in baying the quarry of its master when working in a company of from three to five.

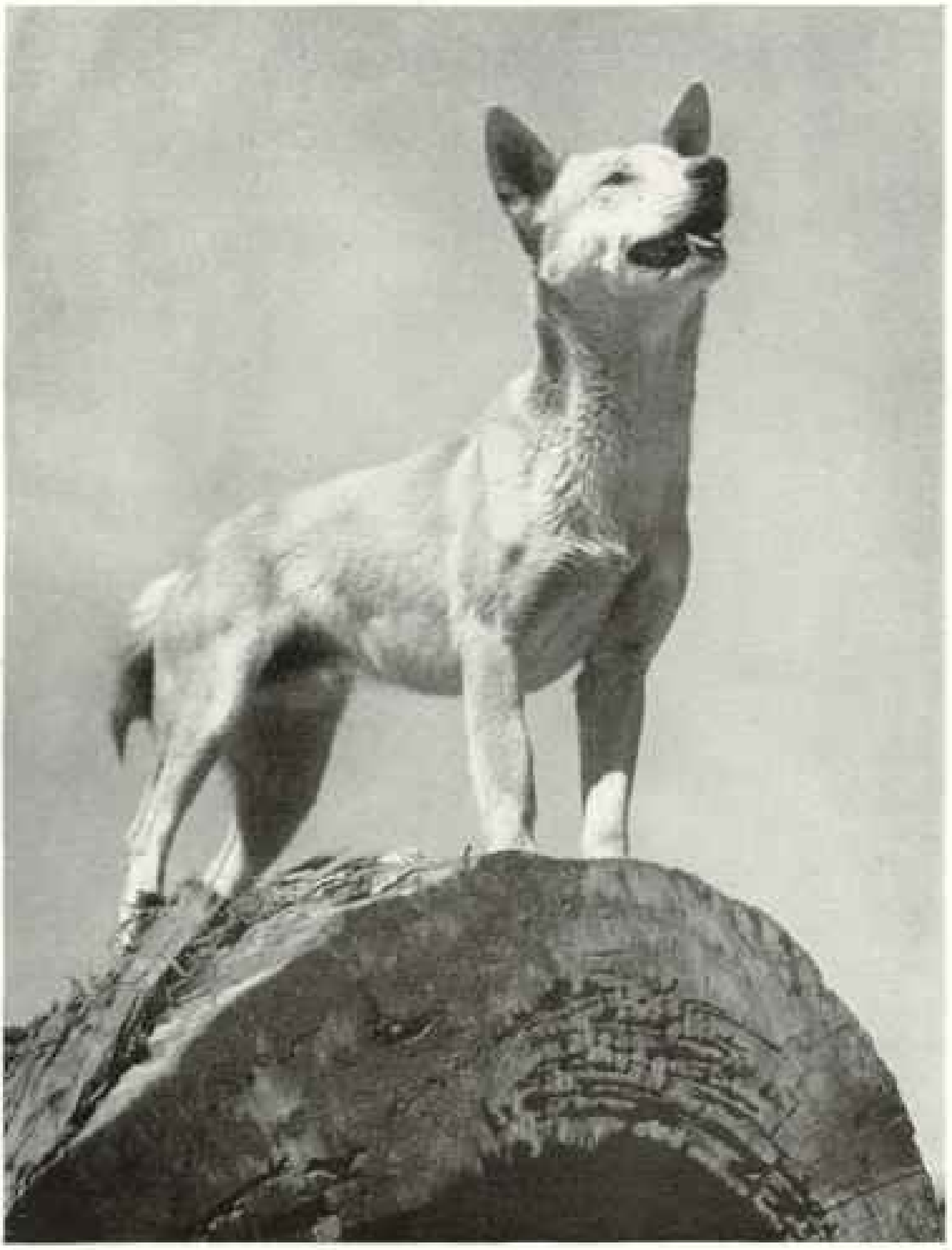
Although various breeds of hounds are used in the Americas for controlling the depredations of the puma, or mountain lion, I know of no use of the Ridgeback for this purpose. Its ability to bay the larger African lion could, I think, be turned to good use in puma hunting.

AFRICAN, OR CAPE, HUNTING DOG

Lycaon pictus

This animal is sometimes called "the hyena dog" because of its close resemblance to the hyena, for which it is often mistaken. The African Hunting Dog is not a true member of the dog group, though it possesses many doglike traits (Plate V).

In former times it occurred in large numbers in Africa from the Tropic of Capricorn north to the Sudan. It was listed by 1935 as part of the native fauna occurring in many African game reserves and national parks.



Australian N. T. A.

A Dingo Surveys His Hunting Ground

Though Australian wild dogs are creatures of the bush, some have been trained by tribesmen and cherished almost like children (Plate VIII). They make excellent hunting dogs. When captured, these animals have an opossumlike habit of playing dead (page 384).

About the size of a half-grown mastiff, it is rather rangy in its leg development and thus well equipped for speed in hunting forays. Its coloring is distinctive—light yellow-gray interspersed with black patches and patches of white mixed with black.

One of its outstanding physical characteristics is its light velvety ears. Of an irregular oval shape, they look not unlike bat ears. The ear in repose shows hardly a trace of a tip.

The dark muzzle is blunt, somewhat like that of the Boston terrier. The rather coarse-looking, yellowish tail ends in a brush of black hairs tipped with white, the latter predominating in underneath portions.

Dens for rearing the young are similar to those inhabited by the coyotes of the American Western Plains, being burrowed in the ground.

Though these hyenalike creatures are great hunters, they are not averse to eating carrion. Their hunting forays against prey such as the antelope are similar to those of the wolves and coyotes.

They hunt as a group, attacking in relays until the prey is exhausted, and then literally tear it to pieces from flank or rear. They can be extremely destructive to domestic stock.

A loud, short bark and a low, rapid monkeylike chattering like subsiding coyote yapping are their collective calls when a piece of carrion is located or prey has been overtaken.

The African Hunting Dog shows little fear of man when it encounters him in its native habitat. No success has been attained in domesticating it.

Stanley P. Young

Native American Is the Texas Red Wolf

One of three geographic races of a species known as *Canis niger*, it is found only in the United States. The red wolf formerly roamed the Mississippi Valley and east to Georgia and Florida. Its range is now reduced to south-central States. In its winter reddish coat it resembles the coyote, though it is generally larger.

DHOLE

Cuon alpinus dukhunensis

Because of its tooth structure, the Dhole, or Golden, Wild, or Jungle Dog (Plate VI and page 379), is put into a genus different from that of the wolves and other wild dogs. It is known as the wild dog of India, however, and is so dog-wolf-like in its habits as to be scarcely differentiated from the dog-wolf genus.

A forest or jungle dweller, it has an extensive range, being distributed throughout the Indian peninsula and along the Himalayas. Here its natural prey, such as the deer, wild pig, antelope, and occasionally domestic stock, forms its diet. It does its hunting during daylight.

The Dhole's overall length is approximately three and a half feet, of which the tail accounts for nearly a third. Its weight is about 40 pounds. It runs down its prey with the slashing attack of a wild dog, though its peculiar gait, somewhat similar to that of a galloping horse, is hardly doglike.

Like the large wolves, Dholes attack overtaken prey cooperatively. Eyewitnesses report that one will work on the rear of the victim while others worry it about the head, snapping at the nostrils, eyes, and lips. The rear killer lacerates the hind quarters and disembowels or hamstrings the prey so that it may literally be eaten alive.

This Indian wild dog is reported to be untamable. It has a small litter of young, generally four, which are born in winter. Somewhat like wolf whelps, they are at birth a sooty-brown color, which on maturity becomes reddish, with a tendency toward yellowish white on the flanks and under portions of the body.

Though not classified as a true dog, the Dhole feeds its young exactly as does the wolf, by disgorging food for them to eat near the den. This method of feeding is continued until the young become mature enough to aid in cooperative forays, running down their own prey.

Dholes are sometimes captured by crocodiles when a pack drives prey into crocodile-infested streams.

WOLF

Canis lupus

Wolves (Plate VII) form a compact circumpolar group, ranging across North America and Eurasia. In North America, where at one time 23 races of them lived, they ranged from Newfoundland, on the east, to Vancouver Island, British Columbia, to the west. Their northern range extended from the plateau of middle Mexico to the extreme polar regions, such as Cape Morris Jesup, approximately 440 miles from the North Pole.

Staff Photographer Edwin L. Wisherd

Instinct Prevails over Breeding

Although the owner of this pedigreed standard poodle feeds his pet only the choicest viands, the garbage pail is an irresistible lure to his canine appetite. Around the kitchen middens of prehistoric men, wolf whelps probably were domesticated. The whole dog family, from the lean, wild rover of forest and plain to the beribboned blue blood of milady's boudoir, will turn away from its usual fare to eat carrion or roll on it.

Wolves compose a conspicuous part of the native fauna in Mexico, Alaska, and northern Canada. In the United States they still occur in sparse numbers in the Cascade Range of Oregon, and in the Rocky Mountain States, with a much larger representation at times along the southern boundaries of Arizona, New Mexico, and Texas, where they cross the international border from Sonora, from Chihuahua, and occasionally from Coahuila.

Today Wolves have been extirpated from a large portion of their original range in Eurasia.

Throughout history this animal has been synonymous with waste and despoliation. Bounty acts for its extirpation have been in existence since the time of Solon, a span of more than 2,000 years. During that time millions of dollars have been spent in killing it.

In North America, only a decade after the landing at Plymouth Rock, the Pilgrim Fathers passed the first wolf bounty act. This was followed by similar action on the part of Virginia in 1632. Both these early colonial acts served as model laws for similar action on the part of the other eleven Colonies shortly after they received their respective colonial charters.

The wide range of the Wolf early brought it in contact with many peoples of the world, and the attempts to extirpate it were caused mainly by its severe depredations upon domestic stock and on wild game, such as deer.

Although Wolves as a group are recognized as among the most intelligent of the carnivores, the regularity of their habits, such as the use of established runways, has contributed greatly to their reductions in numbers (page 368). Knowledge of their traits has enabled man to destroy them by shooting, trapping, and poisoning.

Apparently they mate for life. Litters averaging seven whelps are born in dens in the early spring. Adults range in weight from 60 to 175 pounds. By field studies observers have learned that distinct variations in intelligence, disposition, timidity, boldness, viciousness, strength, and size appear in young Wolf whelps just as in litters of the domestic dog.

The Wolf never barks like a dog. Its call is a prolonged howl.

Though the animals are usually vicious, some Wolves can be domesticated. When one has been tamed, however, it generally becomes a one-man pet, evincing a savage and unapproachable attitude to any stranger who may attempt to caress it.

Hunted, trapped, and poisoned through the ages, always with a price on their heads, Wolves nevertheless form one of our most interesting groups of carnivores. Areas still remain in North America where they seldom come in conflict with any of man's economic pursuits. In such areas they should be permitted to remain unmolested as a part of the native fauna, for North America is their last stand.

COYOTE

Canis latrans

Truly "all-American," 18 geographic races of the Coyote (Plate VIII) have been described since 1823, when Thomas Say, American pioneer zoologist, first named the animal, calling it *Canis latrans* (barking dog).

A Chinese cook, Ty Sing, employed by the Death Valley Expedition under the leadership of the late Dr. C. Hart Merriam in the early nineties, persisted in using the scientific name, which he pronounced "Chinese lanterns." The name *coyote* comes to us from the Spaniards, a modification of the Aztec word *coyotl*.

Once heard making its calls late at night or near daybreak, our versatile wild dog of the western prairies, deserts, and mountains is never forgotten. A western man has aptly described the Coyote's cry as a "prolonged howl which the animal let out and then run after and bit into small pieces."

No other North American predator can compare with the Coyote in its ability to hold its own in the face of the many hazards with which it must contend.

More than 80 years ago men started against Coyotes and wolves a poisoning campaign which continued for a quarter of a century. The campaign was conducted over much of the animals' prairie range, from southern Saskatchewan to the Texas Panhandle.

In the so-called "tongue and tallow period" of the Plains buffalo, thousands of Coyotes were poisoned for their pelts around the strychnine-impregnated carcasses of buffaloes and antelopes. The professional wolf poisoner replaced to a large extent the beaver trapper, who, because of the diminution of fur bearers, turned to wolf and coyote poisoning for a livelihood.

Despite the destruction of thousands of Coyotes by poison, so many of the species survived this 25-year onslaught that by the close of the last century they were apparently as numerous as ever.

A litter of young Coyotes averages seven, with specific instances on record of individual litters as large as 15, 17, and 19. Such fecundity, coupled with uncanny cunning in direct conflict with man and amazing power to recuperate from severe physical injury, makes the species well-nigh ineradicable. It has remarkable ability to extend its range, to hold its own as to numbers, and to obtain a livelihood upon mountains, in valleys, or on deserts in spite of every hand being turned against it.

Unknown in Alaska prior to the gold rush of 1898, it now ranges, according to latest wild-animal estimate figures, to the number of 10,000 throughout the greater part of Alaska. The north-south range of the Coyote now extends from near Point Barrow, Alaska, to tropical Costa Rica—approximately 5,000 miles. Resourceful in obtaining food, the Coyote seldom goes hungry. It eats whatever it can find: carrion, insects, birds, domestic stock, rodents, reptiles, and at times full-grown deer and their young.

DINGO

Canis dingo

Occurring throughout Australia, but nowhere else in the world, the Dingo is a remarkable member of the dog family (Plate VIII). It is about the size of our western coyote, standing approximately 24 inches at the shoulder. Like most other wild dogs, it has a dark color phase, but usually shows a reddish cast produced by yellow guard hairs covering its gray underfur clear to its black muzzle. Its bushy tail commonly has a white patch on the tip.

The Dingo resembles our western coyote in fox-like traits and in this way departs somewhat from the characteristics prevailing in the other dogs and wolves. It often dens in hollow trees and produces from four to six young.

Like the large wolves, it sometimes maintains definite runways (page 368). A family stays together as a unit until members at maturity pair off for breeding. Mainly nocturnal in foraging for food, several Dingo families will band together like packs of wolves in short hunting forays which can be exceedingly destructive. These large groups, however, do not stay together permanently, the ordinary "pack" being only the single family composed of the adult male, adult female, and their one-, two-, or three-year offspring.

Some naturalists consider the Dingo a distinct species, indigenous only to Australia. Others believe it to be a dog which eventually reverted to the wild after being domesticated by prehistoric man.

Like most other wild canine species, the Dingo responds in some degree to domestication when taken and handled very young. It is credited with possessing keen scent, and instances have been reported of its use by Australian natives for game hunting.

A few years ago an Australian naturalist told me that Dingoes bred with domestic dogs have produced offspring which became valuable because of their ability to "heel" cattle while assisting herdsmen in driving.

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In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 400 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 15, 1939, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 291 B. C. (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.

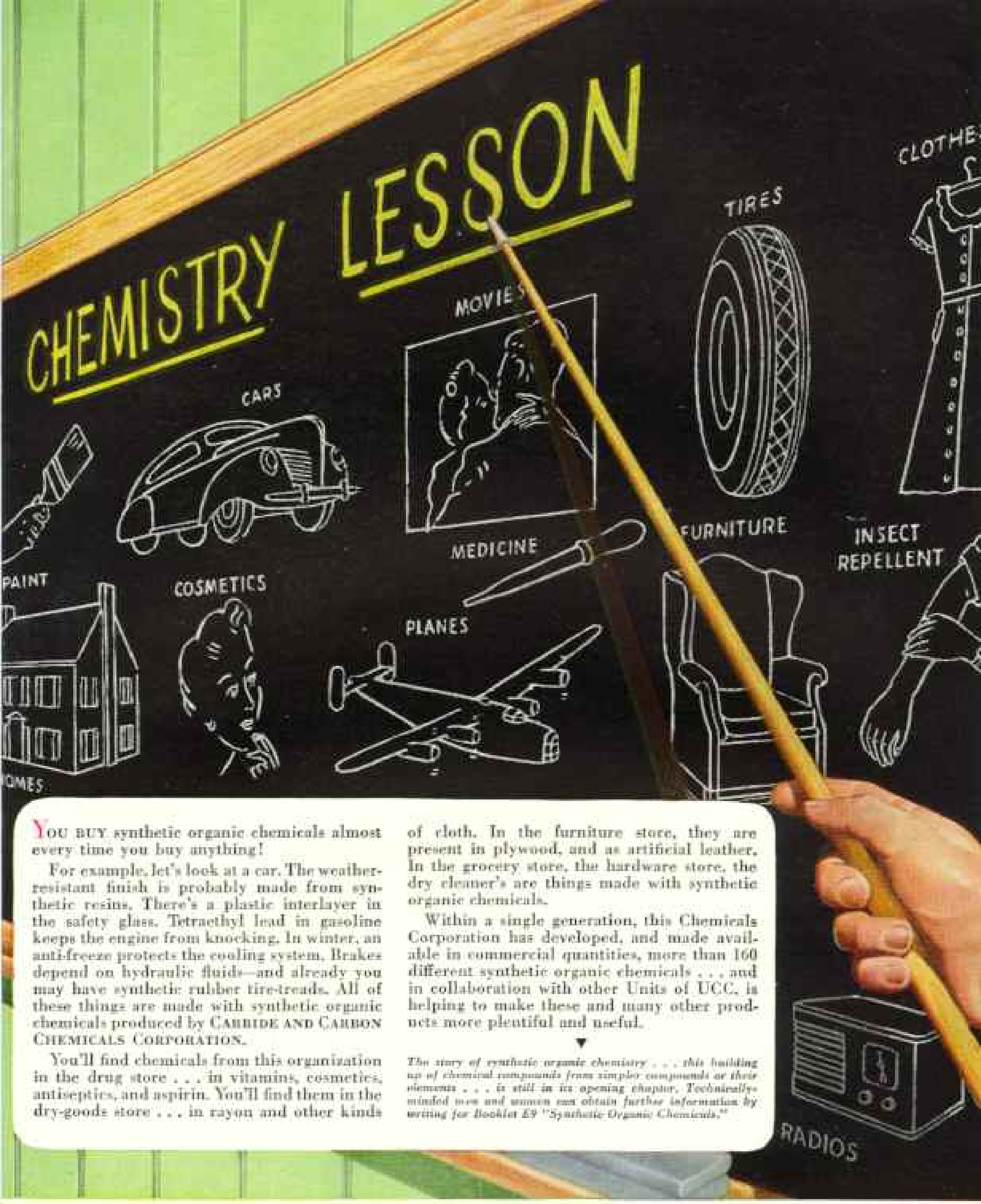
The National Geographic Society-U. S. Navy Expedition camped on desert Canton Island in mid-Pacific and successfully photographed and observed the solar eclipse of 1937. The Society has taken part in many projects to increase knowledge of the sun.

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.

Printed in U. S. A. Entered at the Post Office at Washington, D. C., as Second Class Mail Matter. Acceptance for mailing at special rate of postage provided for in Sec. 1103, Act of October 3, 1917, authorized July 1, 1918. Cover design and names registered in United States Patent Office. Manuf Registrada.



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For example, let's look at a car. The weather-resistant finish is probably made from synthetic resins. There's a plastic interlayer in the safety glass. Tetraethyl lead in gasoline keeps the engine from knocking. In winter, an anti-freeze protects the cooling system. Brakes depend on hydraulic fluids—and already you may have synthetic rubber tire-treads. All of these things are made with synthetic organic chemicals produced by CARBIDE AND CARBON CHEMICALS CORPORATION.

You'll find chemicals from this organization in the drug store . . . in vitamins, cosmetics, antiseptics, and aspirin. You'll find them in the dry-goods store . . . in rayon and other kinds of cloth. In the furniture store, they are present in plywood, and as artificial leather. In the grocery store, the hardware store, the dry cleaner's are things made with synthetic organic chemicals.

Within a single generation, this Chemicals Corporation has developed, and made available in commercial quantities, more than 160 different synthetic organic chemicals . . . and in collaboration with other Units of UCC, is helping to make these and many other products more plentiful and useful.

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Six *is* a magic age . . . for it's then that a new world begins slowly to unfold. Then the mystery of words and books and numbers starts again to reveal its endless magic . . . to another six-year-old.

His first day of school can happen only once . . . unless you capture it on *film* . . . with a Filmo Camera . . . *exactly* as it happened.

The accuracy and realism of the scenes you'll get with tomorrow's Bell & Howell Home Movie Cameras and Projectors will be little less than magic. For the principles of OPTI-ONICS*, perfected in our research on war devices, already point the way for truly significant refinements in postwar home movie equipment by Bell & Howell.

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The quick cartridge—for easy, automatic loading!

And we at Bell & Howell are planning now so you and your children may gain more enjoyment, more information from movies both at home and at school.

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The tread is General's Silent-Grip design . . . famous for long, even wear and quick, safe stops.

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The Tympanist tunes his instrument as subtly as a violinist . . . and with a Scott you hear the delicate shading of each pulsing drum!

E. H. SCOTT

If the drum means but a thud, a bump, a blunted sound to you now—wait until you hear fine music with a Scott. For even when the drums serve only to accent the rhythm or the mood, they have a distinctive voice, to be heard and enjoyed. And when they join in a clear shout of triumph, they will burst upon your ears with vibrant sonority, in a "living performance" on the Scott.

Indeed *each* instrument seems to be favored by a Scott. That is why so many artists check their own recordings with it. Fritz Reiner, conductor of the Pittsburgh Symphony, said that he could tell left from right in the orchestra when listening to record or radio with his Scott.

Because of its miraculous re-creation of sound, the Scott went off to war early. Scott engineers devised ways of eliminating tell-tale radiation, to make the Scott the first radio *safe* from enemy detection devices. Today it is bringing vital messages to our ships on all the oceans, and entertainment to lonely seamen whose only link with home is its welcome voice.

SCOTT
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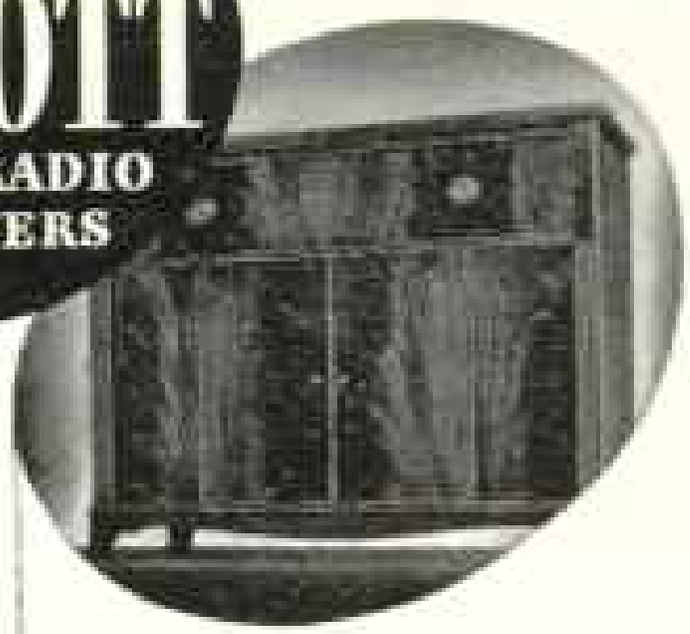

Meanwhile, you can hurry the happy day when a Scott will be built for *you* by buying bonds, bonds, and MORE BONDS.

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Please send me a complimentary copy of your new booklet on radio, "Achievement Through The Years."

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Locomotive "No. 1," which puffed its way across the dales of mid-Wisconsin in 1851, was one of the trail blazers for the present magnificent transcontinental system of the Milwaukee Road.

Movement of vital war freight was speeded and tonnage increased when the Milwaukee Railroad installed General Motors Diesel Locomotives on the 223-mile mountain zone between Avery, Idaho, and Othello, Washington.

PATTERN FOR FINER TRANSPORTATION

WRITTEN into the grueling war job the railroads of America are doing, is the story of this mighty titan of the rails. This is the General Motors Diesel Locomotive. It is displaying the unusual stamina, speed and willingness to work ceaselessly which these urgent times demand. And with such tireless, low-cost, swift service these GM Diesel Locomotives are providing a pattern for finer transportation in the greater days to come.

KEEP AMERICA STRONG
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LOCOMOTIVES . . . . . *ELECTRO-MOTIVE DIVISION, La Grange, Ill.*

ENGINES . . . *150 to 2000 H.P. . . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, Ohio*

ENGINES . . . *15 to 250 H.P. . . . . DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.*

Home is the fortress of her future

There is no substitute for the warmth, security, and influence of the home in a child's life.

And in wartime, we in America are having this simple fact brought home to us with new force.

But the provision of adequate home life for children is not alone a wartime problem. Every father has this responsibility during his children's impressionable teen years, when proper environment is so vital.

Both in wartime and peacetime many families, every year, are left destitute upon the father's death. Without funds they cannot keep their homes—the center of a family's life, the fortress of a child's future. So life insurance, which provides such funds to protect your wife and children, is a fundamental security for the family at any time. It can assure them a living income, clothe them in your loving care far into the future—the unknown, unpredictable future.

Let the Prudential representative review your life insurance needs and help you toward the peace of mind which proper preparation for the future can bring. You will find him a friendly, experienced authority on how best to protect what is most dear to you.

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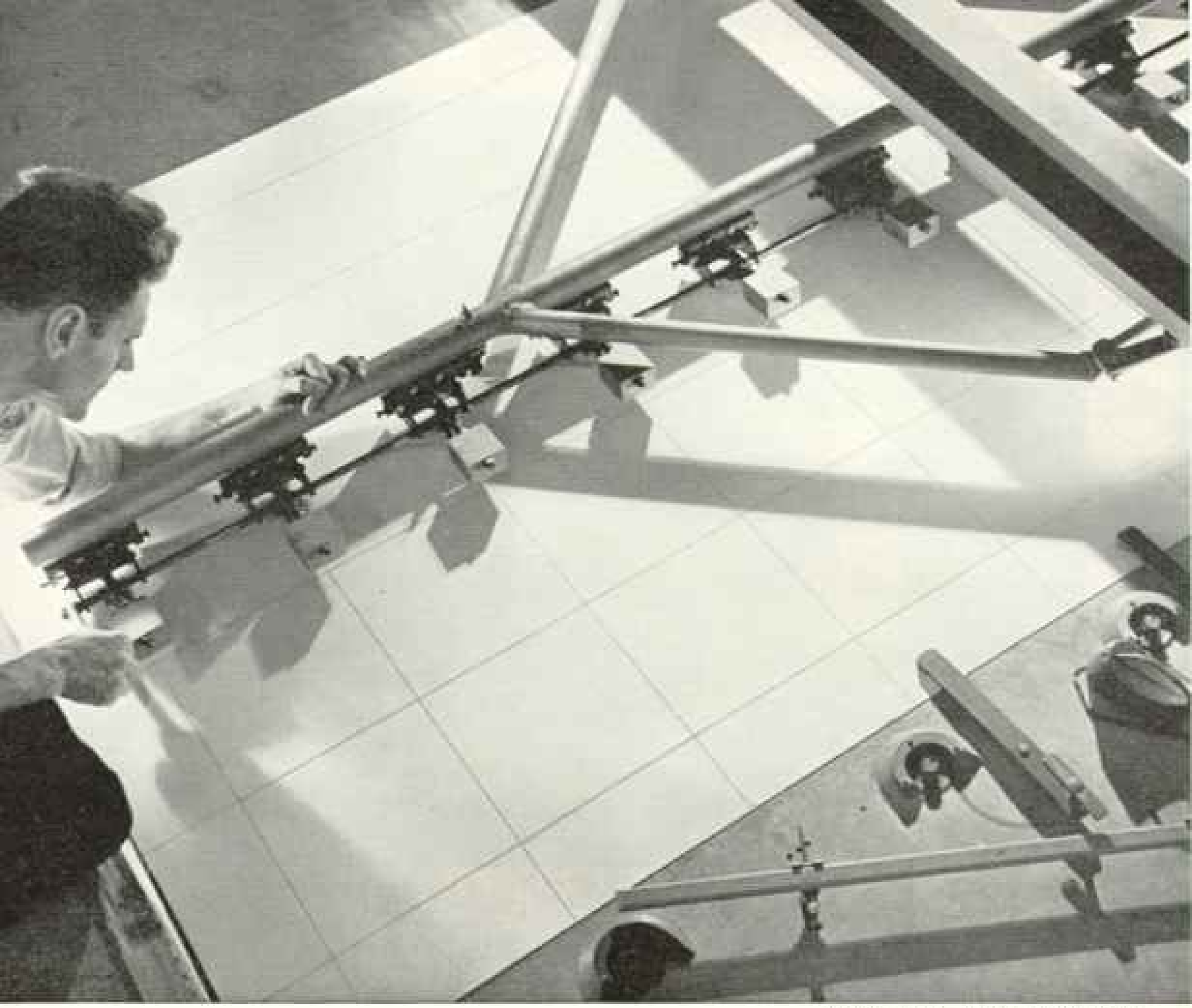


Buy War Bonds — to Have and to Hold

Bee-lines to Berlin

A straight line — *really straight* — is one of the hardest things in the world to draw. Yet thousands of mathematically straight lines are necessary to the building of a big airplane like the Boeing Flying Fortress.

The master layout drawings for every part of a bomber must be made on flat sheets of lacquered steel. To insure the accuracy of the finished drawing, the metal is first scribed with intersecting reference lines like those on a gigantic sheet of graph paper. And the lines must cross each other in perfect 10-inch squares, without deviating as much as 1/100th of an inch.

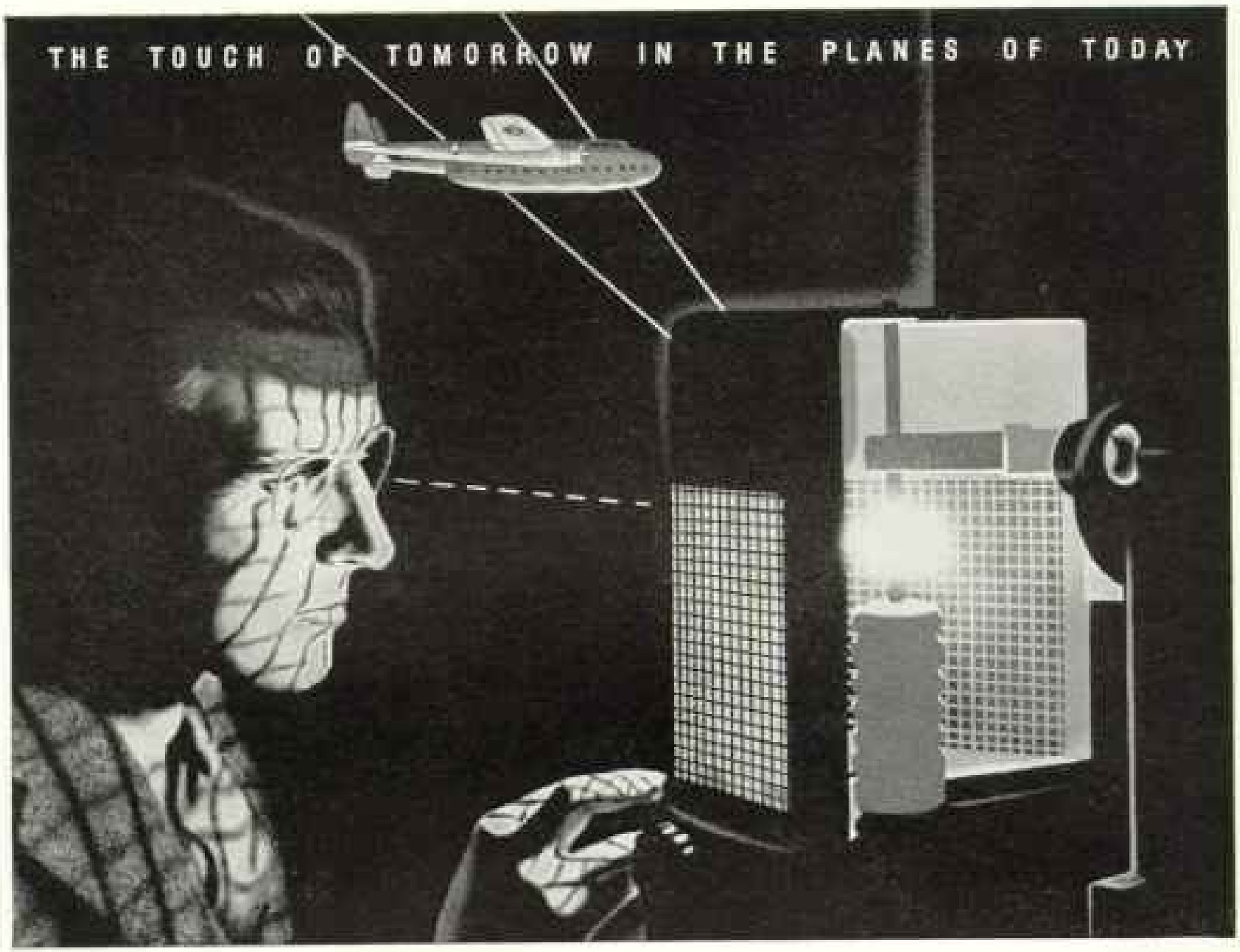
Until recently this was a slow and laborious job. Draftsmen sprawled across the big tables hour after hour, ruling in reference lines with straight-edges. But the slightest miscalculation — even the expansion of metal caused by the sun's heat — might ruin their efforts. Drawing the grid lines on master layouts for the frames and bulkheads of one model alone consumed 5600 hours.

Boeing engineers determined to change the method. They built the "Grid Machine" shown above — a simple, supremely accurate device that draws a dozen parallel straight lines while you watch. It never makes a mistake. And it has already saved thousands of priceless hours between blueprint and bombing mission. Today the work is done in *less than a tenth* of the former time.

All through the Boeing plants are similar examples of ingenuity and skill applied to the task of building *more* airplanes *faster* and *more economically* — speeding the production that shortens the distance to Victory.

When the war is won, Boeing's abilities in design, engineering and manufacturing will again be applied to peacetime products. You can be sure of any such product . . . if it's "Built by Boeing" it's bound to be good.

DESIGNERS OF THE FLYING FORTRESS • THE NEW B-29 SUPERFORTRESS • THE STRATOLINER • TRANSOCEAN CLIPPERS **BOEING**



Vigil in the Age of Flight

Scientists in aviation's research laboratories never take their eyes off the future.

In the arclight of the spectrograph the elementary composition of a substance is revealed and photographed on film . . . The X-ray diffraction camera takes pictures of chemical structures . . . Electric furnaces test steels in fire . . . And strange devices torture metals and woods to ascertain their strength.

Technicians at Fairchild use these and other tools constantly in their search for new applications, and in their control of quality. On their findings may depend an increase in power for Ranger aircraft engines—may depend the design for a new plane to be built for a *special* purpose with new materials.

Fairchild planes are renowned for their flying characteristics . . . their stability and ease of control. Inverted Ranger engines, inline, aircooled, are noted for their smooth, compact power. Both planes and engines earned their reputations because of a fundamental Fairchild philosophy—painstaking research and engineering excellence.

The scientists behind Fairchild doors marked "EXPERIMENTAL—Restricted Area" are, through continuing research, keeping "the touch of tomorrow in the planes of today."

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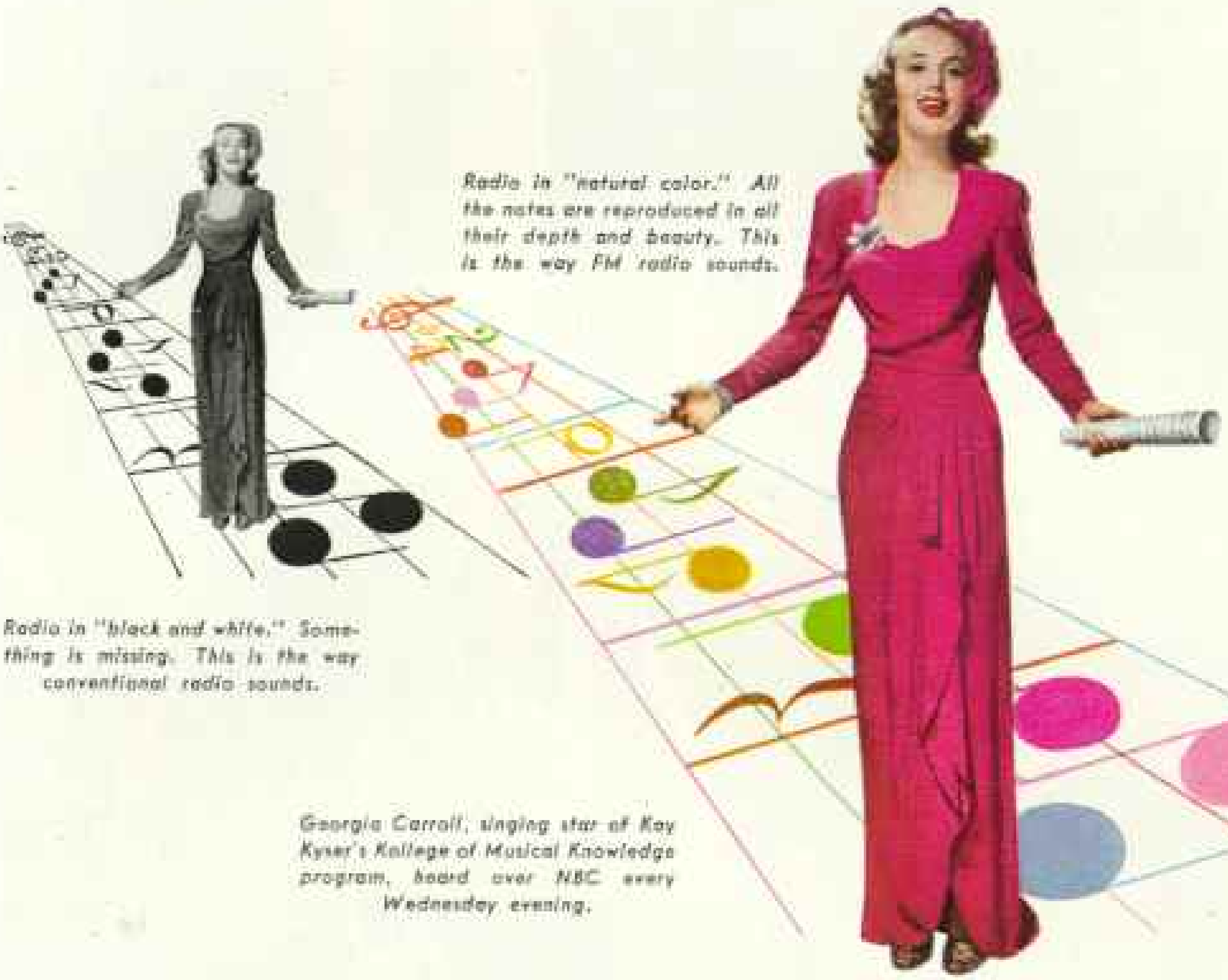

Radio in "natural color." All the notes are reproduced in all their depth and beauty. This is the way FM radio sounds.

Radio in "black and white." Something is missing. This is the way conventional radio sounds.

Georgia Carroll, singing star of Kay Kyser's Kollege of Musical Knowledge program, heard over NBC every Wednesday evening.

Your favorite programs sound even better on an FM "NATURAL COLOR" radio!

A new kind of radio is ready to open a whole new world of entertainment for you!

Conventional radio loses two-thirds of the tonal range as music travels from the station to your home. But General Electric FM (Frequency Modulation) radio receives the *overtones* that bring music to life—music in glorious "natural color."

When FM sets are available, you will hear special programs, planned for FM alone, that you can't get otherwise!

General Electric built the first FM radio receivers used by Major Edwin H. Armstrong, the inventor of broad-band FM, in perfecting this new kind of broadcasting. G-E has built more FM broadcasting equipment than any manufacturer.

No other manufacturer offers you so much FM experience.

FREE: "YOUR COMING RADIO—*as Forecast by General Electric*"—28 full-color pages of facts about the newest in radios; radio-phonographs, self-charging portable with its own rechargeable battery, and television! Section 3-D, *Electronics Dept., General Electric, Schenectady, New York.*

• Tune in General Electric's "The World Today" every evening except Sunday at 6:45 E.W.T. over CBS network. On Sunday evening listen to the G-E "All Girl Orchestra" at 10 E.W.T. over NBC. *Buy more War Bonds—and hold on to those you have.*

RADIO • TELEVISION • ELECTRONICS

GENERAL ELECTRIC

120-C8

Every General Electric radio is an electronic instrument

The heart of every General Electric radio is the electronic tube. This tube is similar to electronic tubes used in G-E television equipment, and in G-E electronic apparatus that speeds war output in thousands of industrial plants across the continent.

FM • RADIO

A product of G-E electronic research

Battle Song of the Liberators

OUT of the West they have come, an army of flying men in a vast armada of planes, bent on a mission of liberation.

Conquered peoples have heard the drone of their engines, and looked up in new hope.

Oppressors have felt the weight of raining bombs, and seen inevitable doom in the endless flow of American power and wrath.

It is a fitting thing that one of our mightiest weapons in this war armada is a bomber named the Liberator.

And it is a proud though sobering task to build the engines from which such planes get their power.

To date, more than 50,000 of these engines have come from Buick plants, enough to power 12,500 bombers, whose battle song of liberation is heard over every American battle front.

But we know, here at Buick, that our task is not to be measured in terms of numbers so much as by the way our work lives up to the expectations of American flyers.

So far, we are told, they have found that work good.

And good we intend to keep it till the battle song of the Liberators is heard in triumph around the world.

BUICK

POWERS THE LIBERATOR*

**BUICK DIVISION OF GENERAL MOTORS*

Every Sunday Afternoon — GENERAL MOTORS SYMPHONY OF THE AIR — NBC Network

**With Buick-built Pratt & Whitney air-cooled, valve-in-head aircraft engines*

The Army-Navy "E" proudly flies over all Buick plants.

558 Americans took vanilla!

They boarded a Swedish ship in a Portuguese port after being released from German internment camps. *And every one brought a long pent-up appetite for ice cream.*

"We must have eaten at least a quarter of a ton of it the first day out," one of the *Gripsholm* passengers reported.

That very human incident has been multiplied many times during this global war—wherever Americans are serving. Ice cream means birthday parties and strawberry socials and the corner drug store. Ice cream brings a brief taste of *home* to a bearded soldier or a tired nurse.

But ice cream is much more than a pleasant memory or a delicious dessert. Like the milk and cream from which it is made, *ice cream is a valuable food,* rich in vitamins and calcium.

That's why ice cream appears on Army and Navy menus as regularly as possible—and civilians cannot always get all they want. But if you'll be content with your fair share, and take part of your order in fresh fruit ices, you can continue to enjoy ice cream.

For our part, we'll make as much ice cream as we can—and keep it pure and good—and continue the intensive research that has developed so many nutritious products 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.

Report No. 6 on

HONESTY ENGINEERING

—a new idea in

Personnel Relations

THE words above are typical. Employers like Honesty Engineering because it helps reduce the personnel losses that hurt most—losses of trained and trusted employees who "didn't mean to steal" but did. Case studies show that this unique Personnel-Protection Plan, developed by the U. S. F. & G., has reduced substantially the number of men and women discharged for dishonesty.

The Personnel-Protection Plan not only insures you against financial loss through employee dishonesty but: (1) discloses undesirable personnel and prevents waste in training; (2) applies tested methods that keep good employees from going wrong; (3) helps employers eliminate leaks, pitfalls and careless acts that may lead to employee dishonesty.

Whether you employ 10 or 10,000 people, your U. S. F. & G. agent will be glad to show you how this plan helps you keep employees by keeping them honest. Consult him today.

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Consult your insurance agent or broker as you would your doctor or lawyer

One of a series of events in the lives of immortal composers, painted for the Magnavox collection by Walter Richards

When Gilbert and Sullivan attacked the "Pirates"

THE entire English-speaking world surrendered to *H.M.S. Pinafore.* In 1879 an American newspaper reported, "At present, there are forty-two companies playing *Pinafore* about the country. Companies formed after 6 P.M. yesterday are not included."

Yet from this unprecedented American success, not one penny of profit came to Gilbert and Sullivan. In the absence of an international copyright law, any unscrupulous producer could "pirate" the words and music.

To overcome this situation, the famous partners came to New York and staged an "Authorized Version." With Sir Arthur Sullivan conducting the orchestra, and William Gilbert, directing the performance, the official *Pinafore* received an ovation.

Although no more perfect artistic partnership has ever existed, no love was lost between its two members. Gilbert, a bluff typical Englishman with a sarcastic tongue and domineering personality, was a continual trial to the dark, Oriental-looking composer noted for his gentle charm and ingratiating manner.

Moreover, each considered himself capable of writing or composing works of far greater importance than light opera. Yet while their serious efforts have been largely forgotten, *Pinafore* and *The Mikado* will probably be played as long as the English language is spoken.

To enjoy the operas of Gilbert and Sullivan to the utmost, you should hear them played by a Magnavox. Of this instrument, it is sufficient to say that it is the radio-phonograph chosen by Kreisler, Ormandy, Beecham, Horowitz and Heifetz for their own homes.

Send for Reproductions of Art Subjects

• Reproductions of paintings from the Magnavox collection are available at nominal charge from the Magnavox Company, Dept. NGM, Fort Wayne 4, Ind.

The Watch that Aimed at the Stars

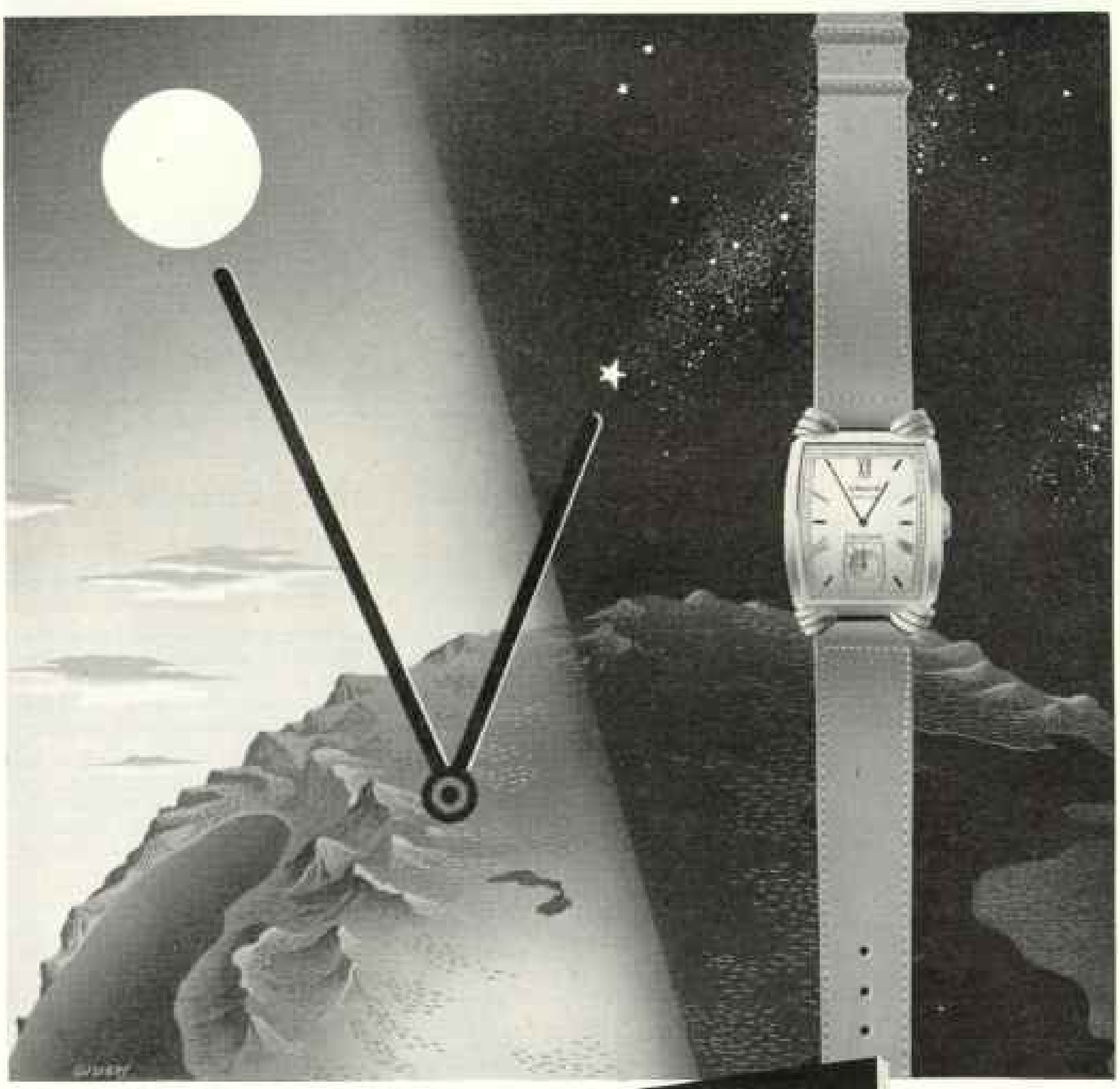
Strictly speaking, precision time is the time of the stars. No watch in the world can match their perfection.

Gruen has tried to come as close to it as is humanly possible. In fact, Gruen is the one watch permitted to carry the trademark "Precision." Behind this trademark lie 70 years of skill and craftsmanship . . .

Behind it are revolutionary new departures in design like the famous patented Gruen Curvex . . . a watch so daring, so different it is actually protected by a patent until 1959!

If you want a watch that gives you the utmost in precision, along with the very latest in style, be sure to see the new Gruen Watches. Ask your Gruen jeweler for the patented Gruen Curves or the equally famous patented Gruen Veri-Thin.

While we have been manufacturing large quantities of vital precision instruments for war, we also continue to produce fine Gruen Watches for civilian use . . . but of course the demand for these watches far exceeds production possibilities today.



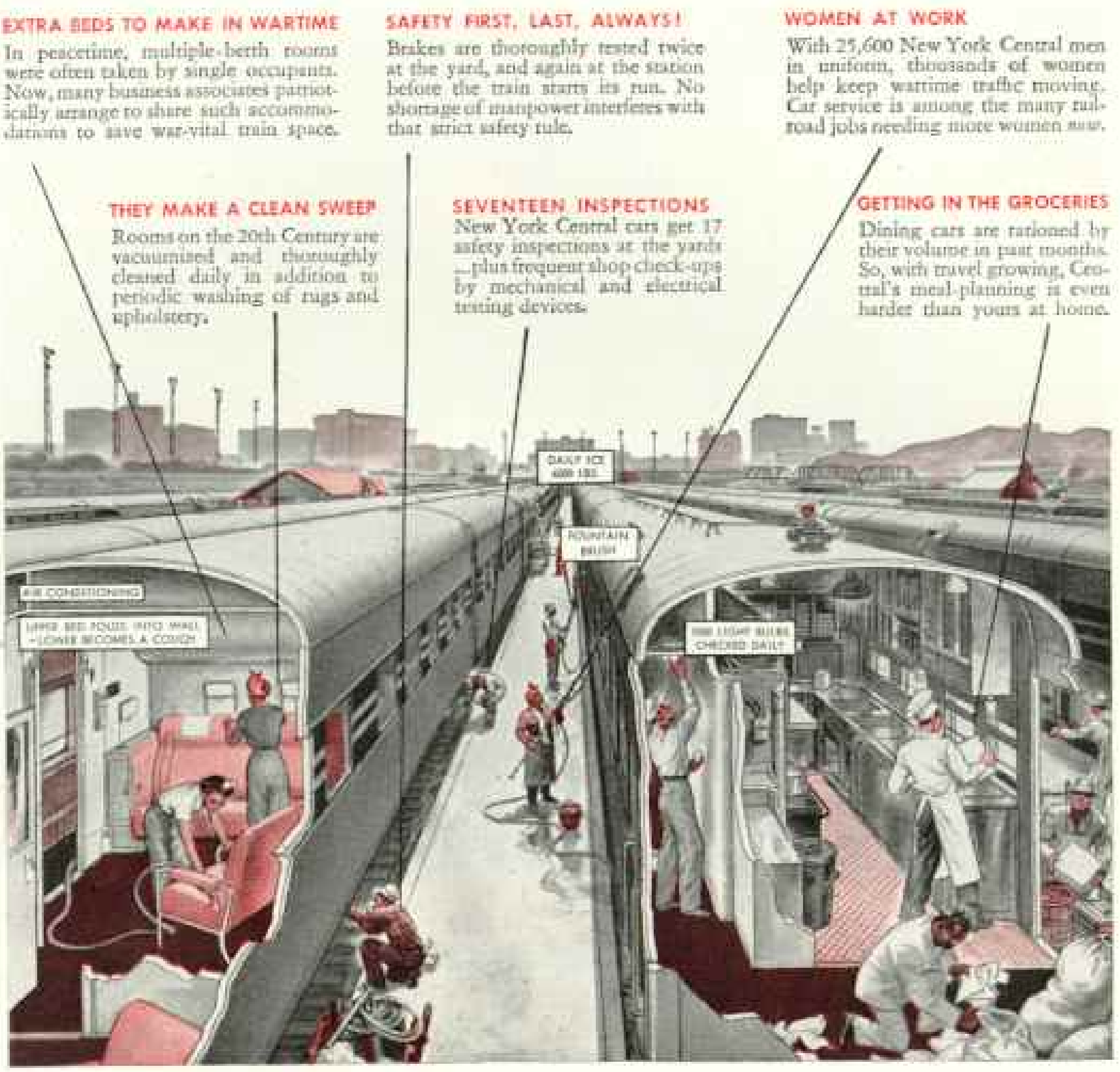
Illustrated above — CURVEX® COLLEGIAN, 17-jewel Precision movement, pink or yellow gold-filled case, $55.00 (Federal Tax included). Gruen Watches from $29.75 to $250; with precious stones to $4,000. Gruen Curvex models from $47.50 and up. Gruen Veri-Thin models from $29.75 and up. Prices include Federal Tax. The Gruen Watch Company, Time Hill, Cincinnati, Ohio, U. S. A. In Canada: Toronto, Ont.

GRUEN
THE PRECISION WATCH

BUY A GRUEN WATCH BUT
BUY A WAR BOND FIRST

GRUEN... MAKERS OF THE PRECISION WATCH... AND PRECISION INSTRUMENTS FOR WAR

America's Choice Since 1874



Housekeeping headaches of the "CENTURY"

Travel Volume up . . . Manpower down . . . and the 20th Century Limited plus 800 other New York Central trains to service every day!

HALF AN HOUR AGO, some 200 wartime passengers stepped off the 20th Century Limited. Already a switch engine has hustled the empty train out to the yards. And now New York Central service crews swarm over it.

Hammers clink against steel. Fountain brushes spurt against windows. Electric trucks hustle about with fresh ice and linen and groceries.

War adds both urgency and difficulty to the daily servicing of more than 800 New York Central trains. Travel has doubled. Supplies are scarce. And manpower is even scarcer.

But essentials still get 100% attention. And shorthandedness has even taught new short cuts, new methods that will mean greater efficiency when Victory frees America's railroads to bring you the finer travel of tomorrow.

***NEW FREE BOOKLET** with fascinating, cutaway pictures that take you into a locomotive cab, troop train, caboose, hospital car, Grand Central Terminal, and other places "BEHIND THE SCENES OF A RAILROAD AT WAR." Write to New York Central, Room 1221E, 466 Lexington Ave., New York 17, N.Y.*

BUY MORE WAR BONDS

NEW YORK CENTRAL SYSTEM

New York Central

ONE OF AMERICA'S RAILROADS—ALL UNITED FOR VICTORY

My pen stopped in mid-air . . .

How Andre Kostelanetz Responded to the Glory of the Meissner

Pen in hand as is his custom, Andre Kostelanetz sat waiting to hear one of his rehearsal recordings played for the first time on the Meissner radio-phonograph. Casually at first . . . then, *intently* . . . he watched as this new kind of automatic record-changer gently selected the record from the stack, silently placed it on the turn-table.

"Remarkable," he said, and was about to make note of it, when . . . Crescendo on crescendo, the tiny room had become a magnificent sounding board for the unseen orchestra.

"There were tones that were completely superb," reported Andre Kostelanetz. "My pen actually stopped in mid-air at the first note!"

Andre Kostelanetz, one of the world's great conductors, had just heard the only Meissner radio-phonograph in existence — the final laboratory model perfected just before war turned all of Meissner's skill and knowledge to the manufacture of electronic war equipment.

Many families are now looking forward to the day when luxurious postwar counterparts of the Meissner masterpiece will be obtainable for their own homes. Like you, they've been longing for some way to bring all the brilliant realism of the concert hall into the intimacy of the fireside circle . . . some way to recapture the "missing elements" for which present-day phonograph listeners so often wait in vain. And, like you, they'll welcome these and many other mighty Meissner advantages.

Needles and nails made his first watch tools . . .

THE March wind rattled the bedroom window. But the lantern on the floor gave a steady glow to warm the boy's feet.

Then his head bent more closely to the work. He nudged the balance wheel—and life came back into the timepiece.

Watch repairing was coming easier to young Henry Ford. He had started at 14 and the first watch (today in his collection at Dearborn) had been mended with a shingle nail, a corset stay, and knitting needles. Now, after school, he was neighborhood watch repairer.

Everyone was enthusiastic about his work, particularly because he didn't charge for it. But it wasn't money that Henry Ford was interested in. Here was an opportunity to *learn by doing!*

Years later, the watchmaker's precision learned by Henry Ford in those winter nights was to guide the building of 30 million cars and trucks. Moreover, it was Mr. Ford's knowledge of watchmaking that prompted inauguration of the assembly line. This in turn brought shorter working hours, increased wages, made life easier for millions, and is now speeding equipment to preserve our American way of living.

New cars belong to the future. But when tomorrow's Ford, Mercury and Lincoln cars arrive, they will reflect anew the watchmaker's skill, the workmanship and engineering resourcefulness that are typical of Ford Motor Company.

As in the past, they will be motorcars that are reliable and economical, smart and comfortable. And they will be priced within the means of the greatest number. For Mr. Ford has declared: "The profits we are most interested in are those the public gets from using the things that we produce. The only real profit is the public benefit."

FORD MOTOR COMPANY

Will Your Car Outlast the War?

As a special wartime service to owners of ALL MAKES of cars, General Motors offers a new edition of The Automobile User's Guide, containing 196 practical suggestions on such subjects as *how to get better gasoline economy, how to prolong tire life, how to keep your car in the best operating condition, how to preserve exterior finish, etc.*

You can get your FREE COPY from any General Motors dealer or by using the coupon below.

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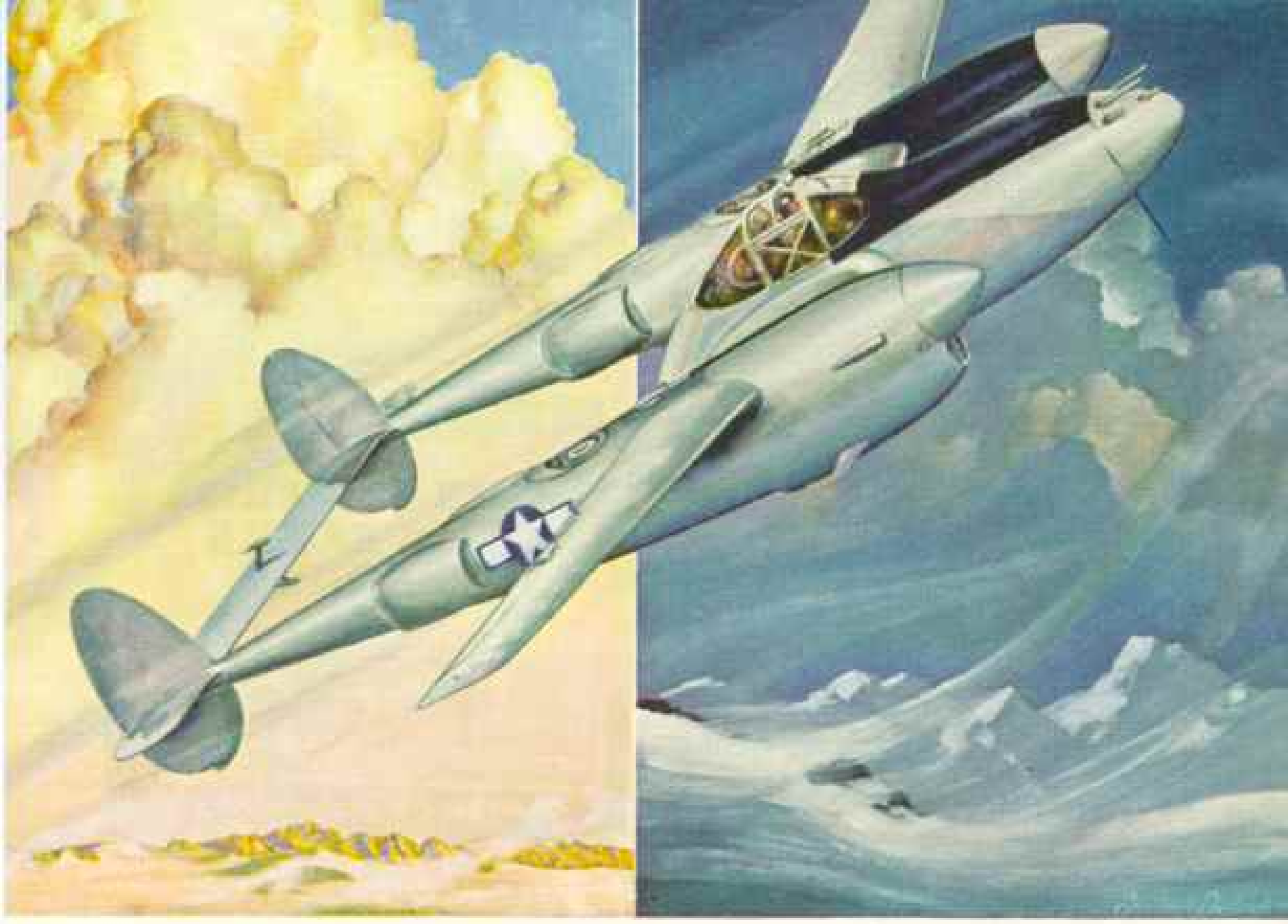

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So long as you *balance* your energy account every 24 hours, you feel well and work efficiently. But if, day after day, you spend more energy than you replace, fatigue *accumulates*. You get "that tired feeling."

This is nature's warning to do four things...

1. **See your doctor.** Chronic illnesses, such as tuberculosis or heart disease, can cause fatigue. So can poor eyesight or hearing, foot disorders, faulty posture, bad eating habits. Since bad teeth may be a cause—see your dentist, too.

2. **Accumulate more energy.** Eat adequate meals at *regular* intervals, including a good breakfast. Try to get to bed an hour earlier. Seek *extra* sunshine and fresh air.

3. **Withdraw less energy.** Try to change habits and living conditions which waste energy. Plan ahead—"What your head does, your feet won't have to." Worry, tension, fear, and anger squander energy—control your emotions!

4. **Practice relaxing** by deliberately letting stiff, tense muscles go limp, one by one. Use every odd moment to acquire this restful habit.

There's absorbing interest in your job if you look for it, and interest combats tension. After work take up a hobby—sports, music, Victory Gardening, reading, walking, just plain loafing—whatever revives you most quickly.

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HIGH UP on our western mountains lives a timid but resourceful little animal called the pika, or little chief hare (Ochotona princeps).

Though closely related to the rabbit, he is smaller and greyish in color. And, in some of his habits, he is very different.

The pika has many enemies. But the danger which threatens him most is hunger.

During the summer, he can find all he wants to eat on the grassy slopes near his home. But in winter, these slopes are covered by deep snows for many months. And, unlike many animals who live in severe climates, the pika does not hibernate. He needs food the year round.

If the pika were as careless and improvident about food as his cousin, the rabbit, he would go hungry, as the rabbit sometimes does. But, instead, he protects himself from want by planning for the future.

Toward the end of summer, the pikas become serious harvesters. All day they scamper back and forth from their rock-pile home to the weed patches and surrounding slopes, each returning with a bulky mouthful of grass.

This food is stored for the winter in little haystacks under the rocks. Thus when the snow comes, the pika need only slip through his protected rock galleries to dine.

Though it may never have occurred to you in just this way, man has a somewhat similar problem to that of the pika in obtaining food and shelter for his family and himself.

The pika's instinct warns him that, at a certain time of year, he will not be able to obtain food in his usual manner. But a man never knows when his ability to provide for his family and himself will be taken away. At any moment, his earning power may be temporarily or even permanently suspended because of injury following an accident.

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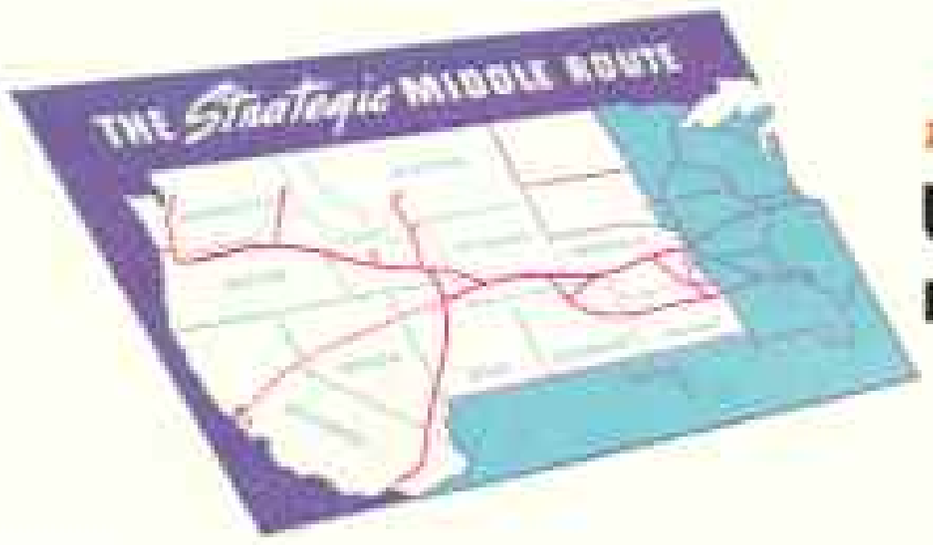

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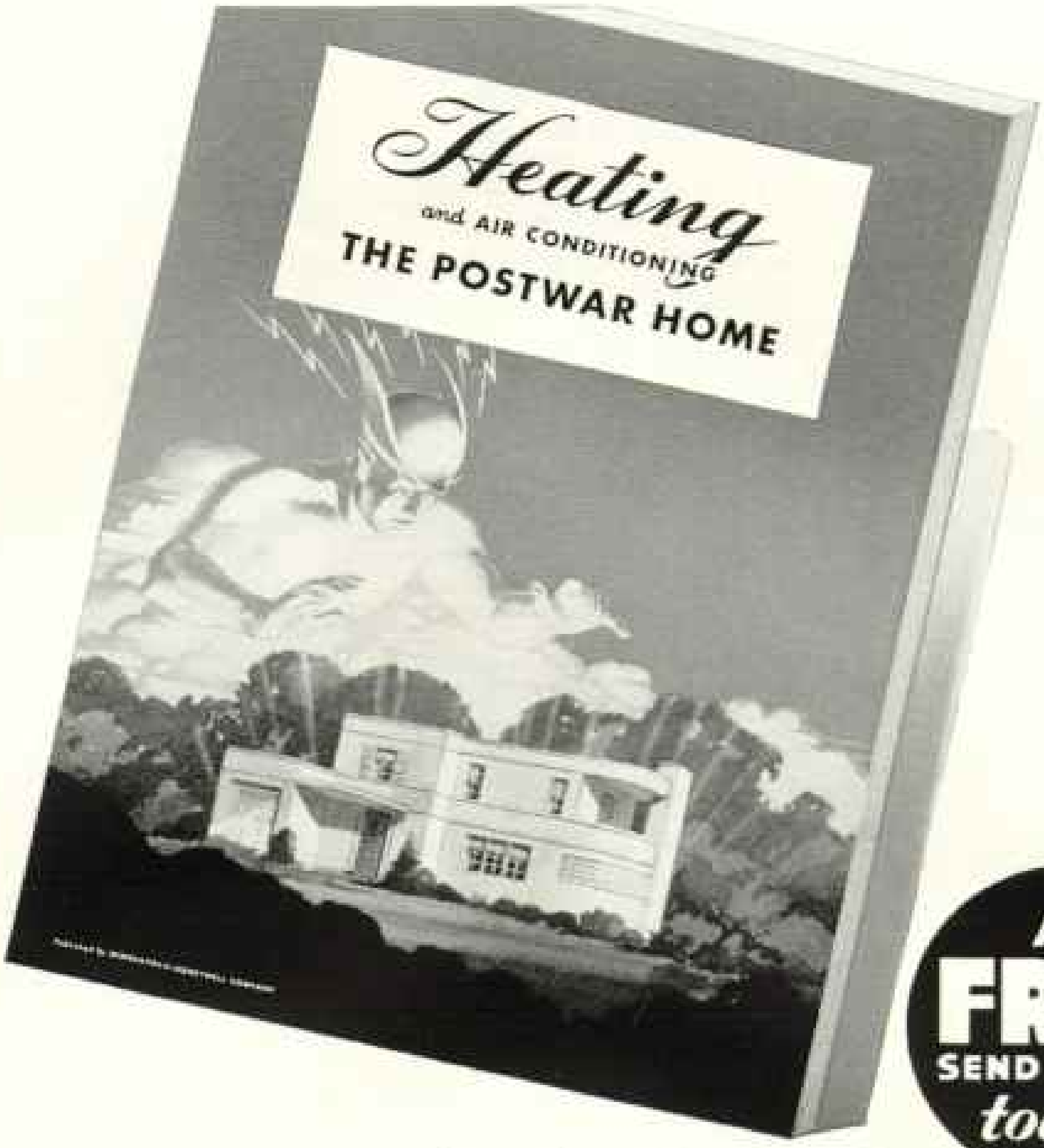

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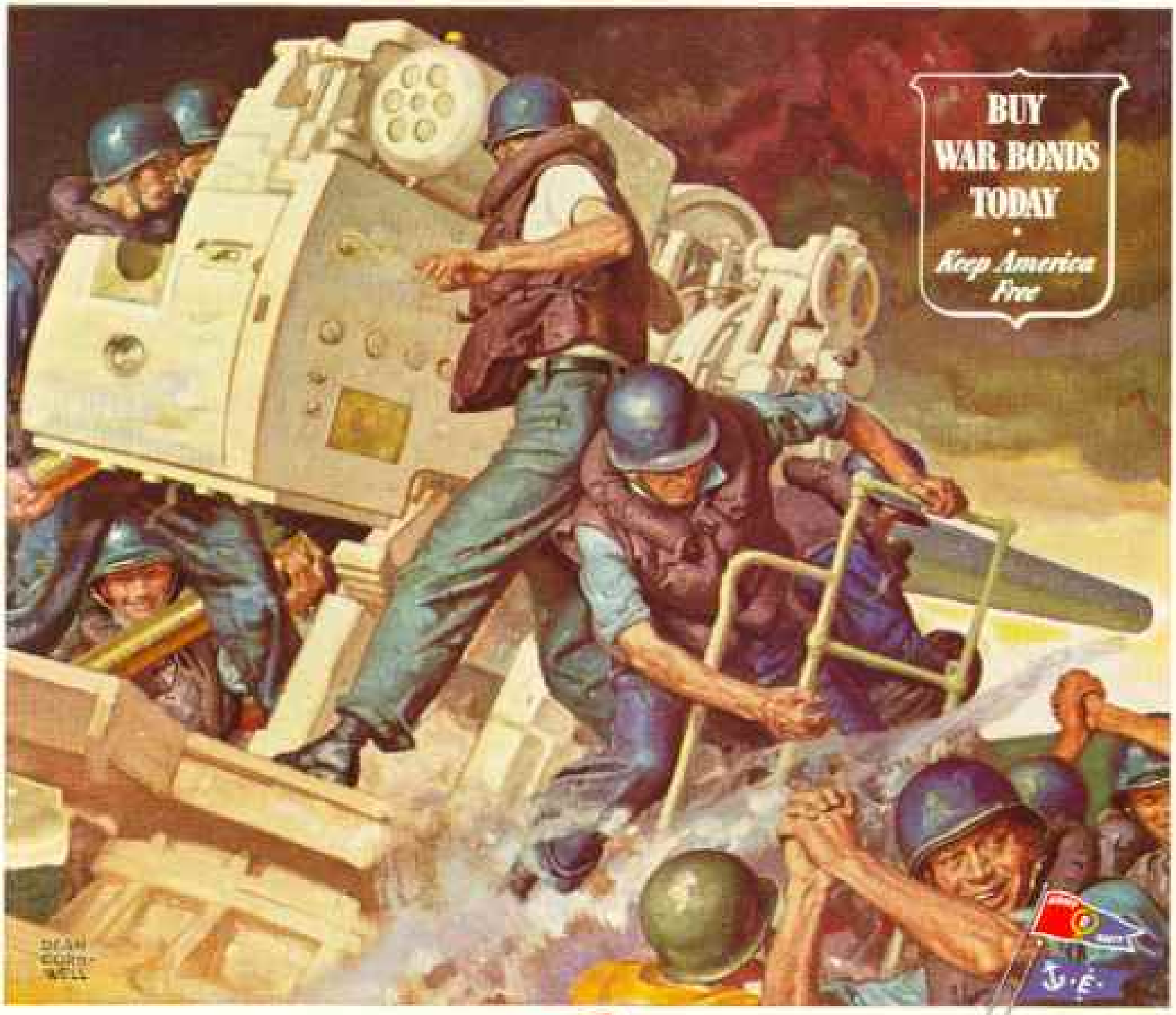

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